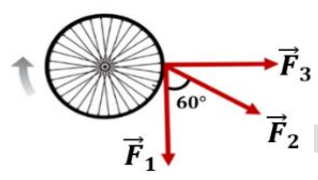
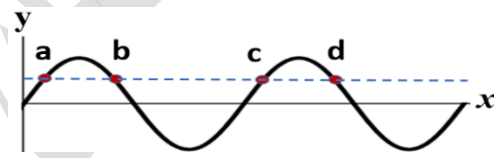
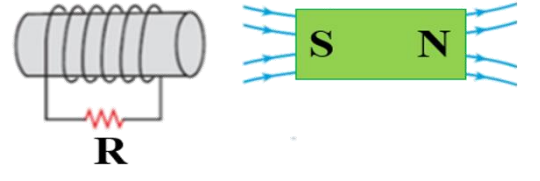
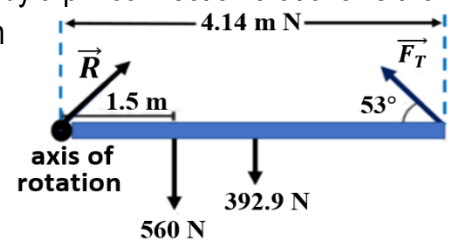
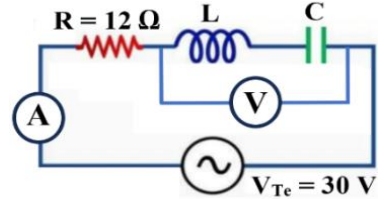
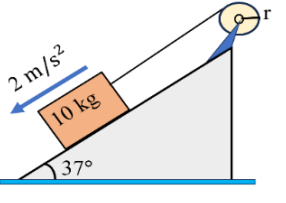


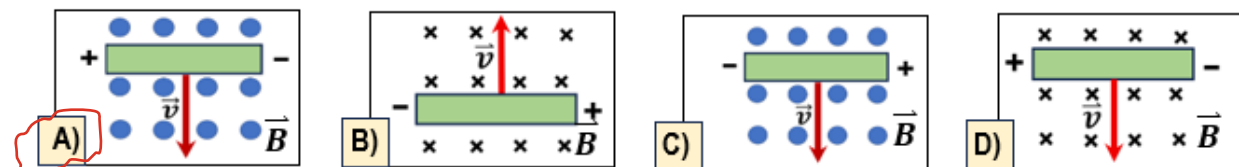
Choose the right answers for the following questions: (2 Marks each)

- Find the magnitude of ($\Delta\theta$) in the table? A) -180° B) -90°
C) -321° D) -360°

$\Delta\theta$	Δs	r
? deg	-4.2 m	0.75 m
- Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
A) 1.6×10^{-5} rad/s B) 1.06×10^{-7} rad/s C) 1.99×10^{-7} rad/s D) 2×10^{-4} rad/s
- A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s², how far does the coin roll before coming to rest?
A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m
- A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s², what is its tangential speed?
A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
- Earth ($m = 5.97 \times 10^{24}$ kg) orbits the sun ($M = 1.99 \times 10^{30}$ kg) at a mean distance of (1.5×10^{11} m) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11}$ N.m²/kg²)
A) 5.29×10^{32} N B) 3.52×10^{22} N C) 5.9×10^{-2} N D) 1.77×10^{-8} N
- (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
A) It has tangential acceleration but no centripetal acceleration.
B) It has centripetal acceleration but no tangential acceleration.
C) It has both centripetal acceleration and tangential acceleration.
D) It has neither tangential acceleration nor centripetal acceleration.
- In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?
A) -18 N.m B) 9 N.m
C) -9 N.m D) 18 N.m

- A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy
- Which of the following represents Newton's second law in rotational motion?
A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{a}$
- Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
A) 1.75 m B) 3.5 m C) 5 m D) 7 m
- The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
A) b,c B) a,b
C) c,d D) b,d

- Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
C) Doubling its length. D) doubling the number of its turns.
- A 256-turn coil with a cross-sectional area of 0.0025 m² is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced ($\mathcal{E}$) during this interval:
A) 0.21 V B) -0.21 V C) 3 V D) -3 V

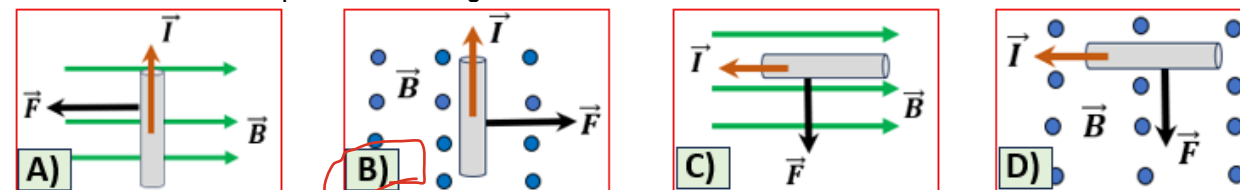
- A generator with a maximum output emf of 205 V is connected to 115 Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
- The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7}$ T.m/A]?
A) 5×10^{-4} T B) 5×10^{-3} T C) 5×10^{-2} T D) 5×10^{-1} T
- A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.

- What happens to a sound wave, when it travels from a cold room to a hot room?
A) speed of sound increases, frequency remains constant.
B) speed of sound decreases, frequency increases.
C) speed of sound decreases, frequency remains constant.
D) frequency decreases, speed of sound remains constant.
- A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
A) 500 N B) 400 N C) 560 N D) 630 N

- Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$
- The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel
- In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?
A) 10 V B) 18 V
C) 24 V D) 28 V

- A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°
- A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s². Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel? A) 0.195 kg.m² B) 0.915 kg.m²
C) 0.751 kg.m² D) 0.571 kg.m²

- A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s
- Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
A) Speed B) Frequency C) Wavelength D) All answers are correct

26. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?

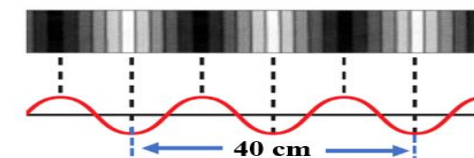


27. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: **A) high potential difference and low current.** B) low potential difference and high current. C) high potential difference and high current. D) low potential difference and low current.
28. An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?
A) $1.6 \times 10^{-16} \text{ N}$ B) $6.1 \times 10^{-16} \text{ N}$ C) $4 \times 10^{-9} \text{ N}$ D) zero
29.the difference in the distance traveled by two beams when they are scattered in the same direction from different points: **A) Order number** B) Path difference C) Resonance D) Diffraction
30. The time rate at which a body rotates about an axis:
A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) **C) Angular speed (ω)** D) Angular acceleration (α)
31. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
A) amplitude B) period C) frequency D) acceleration
32. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?
A) 0.1 m **B) 0.5 m** C) zero D) 50 m
33. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
A) 9 B) 3 C) $\frac{1}{3}$ **D) $\frac{1}{9}$**
34. Tesla (T) equal to: **A) $\frac{\text{N}}{\text{A} \cdot \text{m}}$** B) $\frac{\text{N}^2}{\text{A} \cdot \text{m}}$ C) $\frac{\text{N}}{\text{A} \cdot \text{m}^2}$ D) $\frac{\text{N}^2}{\text{A} \cdot \text{m}^2}$
35. What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?
A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ **D) $\lambda = 4L$**
36. Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? **A) drop them from the same height** B) roll them down an incline C) weigh them on a scale D) both (A and C) are correct
37. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
A) 48 turns, Step - up B) 8533 turns, Step - down **C) 48 turns, Step - down** D) 8533 turns, Step - up
38. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?
A) 2.758 s B) 3.258 s **C) 3.758 s** D) 1.746 s
39. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° **C) 30°** D) 53°
40. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?
A) ($B = \frac{\mu_0 N}{2r}$) B) ($B = \frac{\mu_0 N I}{2\pi}$) C) ($B = \frac{\mu_0 N^2 I}{2r}$) **D) ($B = \frac{\mu_0 N I}{2r}$)**
41. The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2

42. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string? **A) 44 m/s** B) 440 m/s C) 211 m/s D) 176 m/s
43. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
A) to the East **B) to the North** C) to the South D) to the Sky
44. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?

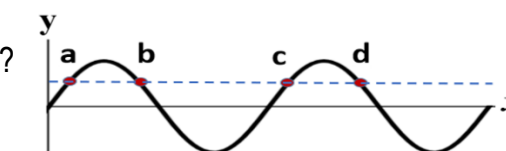
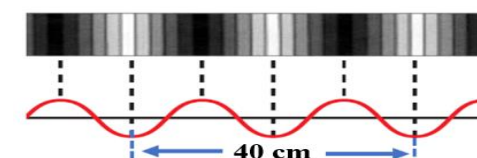
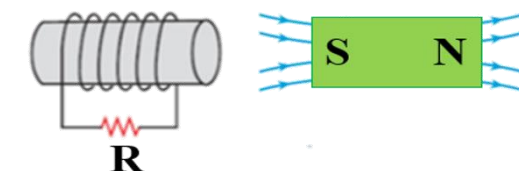
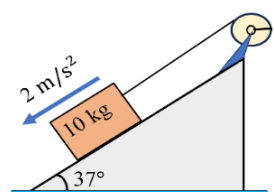
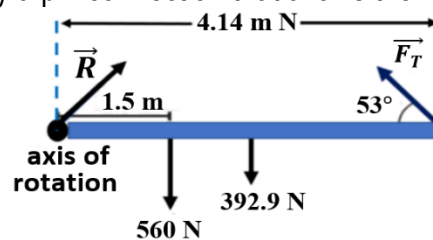


45. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
A) 44 μF B) 4.4 μF **C) 50 μF** D) 5.5 μF
46. Which of the following waves is used to measure distance between the Earth and the moon with precision?
A) infrasonic waves B) normal light **C) Laser beams** D) Audible waves
47. Diffraction is a property of : **A) Water waves** B) Sound waves C) Light waves **D) All waves**
48. Which rotational quantity is equivalent to force(F) in translational motion?
A) moment of inertia (I) B) angular momentum (L) **C) torque (τ)** D) mass (m)
49. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching **D) 30 m/s, moving away**
50. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?

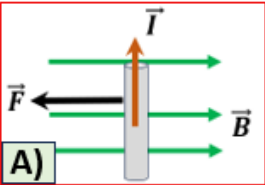
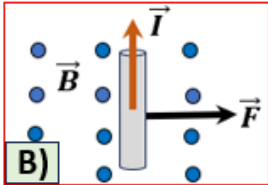
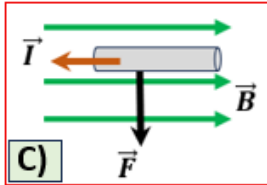
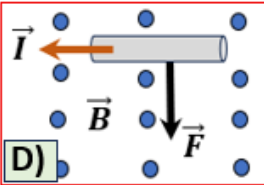
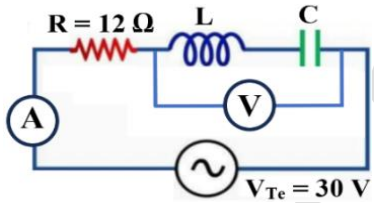


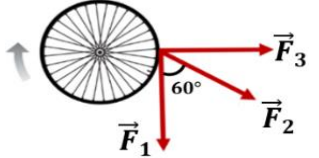
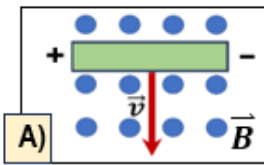
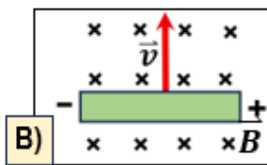
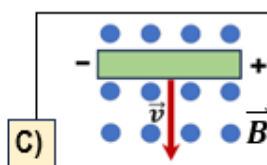
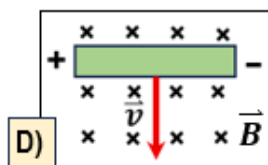
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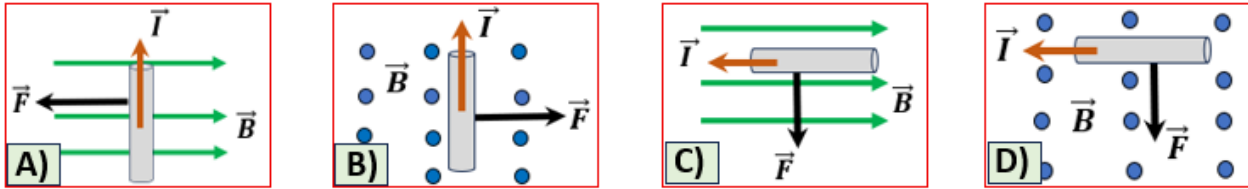


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A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$
- A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?
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31. Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
 A) 1.75 m B) 3.5 m C) 5 m D) 7 m
32. Which rotational quantity is equivalent to force (F) in translational motion?
 A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)
33. Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of ($1.5 \times 10^{11} \text{ m}$) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)
 A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$
34. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
 A) 45° B) 37° C) 30° D) 53°
35. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?
- 



36. In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?
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37. A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
38. The time rate at which a body rotates about an axis:
 A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)
39. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
 A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away
40. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
 A) amplitude B) period C) frequency D) acceleration
41. What happens to a sound wave, when it travels from a cold room to a hot room?
 A) speed of sound increases, frequency remains constant.
 B) speed of sound decreases, frequency increases.
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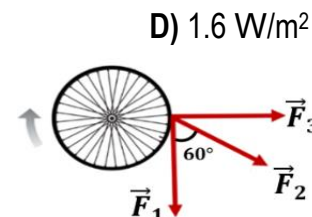
42. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
 A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$
43. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
 A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel
44. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?
 A) - 18 N.m B) 9 N.m
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45. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?
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46. A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°
47. An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?
 A) $1.6 \times 10^{-16} \text{ N}$ B) $6.1 \times 10^{-16} \text{ N}$ C) $4 \times 10^{-9} \text{ N}$ D) zero
48. (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
 A) It has tangential acceleration but no centripetal acceleration.
 B) It has centripetal acceleration but no tangential acceleration.
 C) It has both centripetal acceleration and tangential acceleration.
 D) It has neither tangential acceleration nor centripetal acceleration.
49. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
 A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$
50. Which of the following represents Newton's second law in rotational motion?
 A) $\sum \tau = I \alpha$ B) $\sum F = m a$ C) $\sum F = \frac{m}{a}$ D) $\sum \tau = \frac{I}{\alpha}$

Choose the right answers for the following questions: (2 Marks each)

- Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
 A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$
- A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s . Find the average induced (ε) during this interval:
 A) 0.21 V B) -0.21 V C) 3 V D) -3 V
- A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°
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- (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
 A) amplitude B) period C) frequency D) acceleration
- The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]?
 A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$
- A violin string that is 50 cm long has a fundamental frequency of 440 Hz . What is the speed of the waves on this string? A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s
- A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
 A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
- A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
 A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy

14. The power output of a certain loudspeaker is 250 W . If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
 A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2

15. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m , what is the resultant torque acting on the wheel?
 A) -18 N.m B) 9 N.m
 C) -9 N.m D) 18 N.m

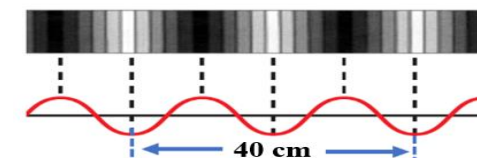


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 B) It has centripetal acceleration but no tangential acceleration.
 C) It has both centripetal acceleration and tangential acceleration.
 D) It has neither tangential acceleration nor centripetal acceleration.

17. Which of the following waves is used to measure distance between the Earth and the moon with precision?
 A) infrasonic waves B) normal light C) Laser beams D) Audible waves

18. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm . The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?
 A) 0.1 m B) 0.5 m C) zero D) 50 m

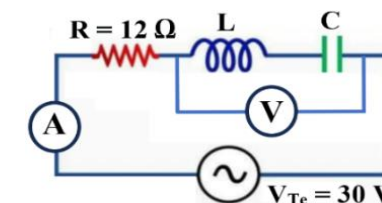
19. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s ?
 A) 7.5 m/s B) 3.75 m/s
 C) 6.25 m/s D) 5 m/s



20. Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
 A) Speed B) Frequency C) Wavelength D) All answers are correct
21. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
 A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
 C) Doubling its length. D) doubling the number of its turns.

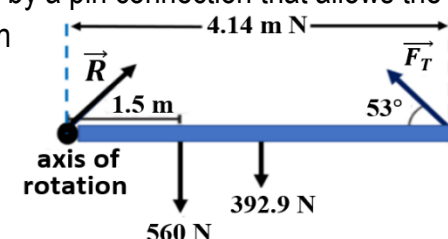
22. Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? A) drop them from the same height B) roll them down an incline
 C) weigh them on a scale D) both (A and C) are correct

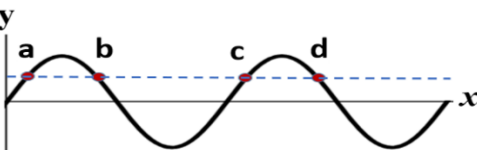
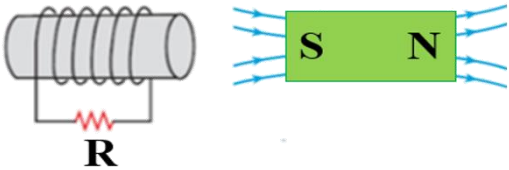
23. In the electrical circuit shown in the adjacent figure, if the ammeters reading is 2 A what is the voltmeters reading?
 A) 10 V B) 18 V
 C) 24 V D) 28 V

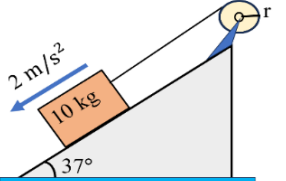
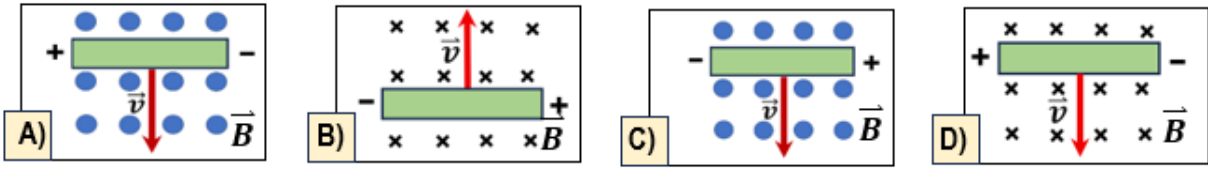


24. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?
 A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m

25. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500 \text{ N}$), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
 A) 500 N B) 400 N C) 560 N D) 630 N



26. The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
- A) b,c B) a,b
C) c,d D) b,d
- 
27. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
- A) to the East B) to the North C) to the South D) to the Sky
28.the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction
29. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
- A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.
- 
30. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
- A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s
31. What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?
- A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$
32. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: A) high potential difference and low current. B) low potential difference and high current.
C) high potential difference and high current. D) low potential difference and low current.
33. Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves
34. Which of the following represents Newton's second law in rotational motion?
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- A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away
36. Find the magnitude of ($\Delta\theta$) in the table?
- A) -180° B) - 90°
C) - 321° D) - 360°
- | $\Delta\theta$ | Δs | r |
|----------------|------------|--------|
| ? deg | - 4.2 m | 0.75 m |
37. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
- A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up
38. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?
- A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s
39. What happens to a sound wave, when it travels from a cold room to a hot room?
- A) speed of sound increases, frequency remains constant.
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41. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
- A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$
42. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?
- A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$
43. A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
- A) 0.195 kg.m² B) 0.915 kg.m²
C) 0.751 kg.m² D) 0.571 kg.m²
- 
44. Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
- A) 1.75 m B) 3.5 m C) 5 m D) 7 m
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46. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?
- 
47. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
- A) 44 μF B) 4.4 μF C) 50 μF D) 5.5 μF
48. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
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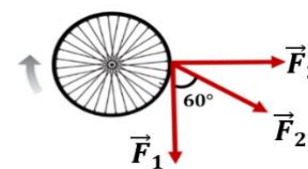
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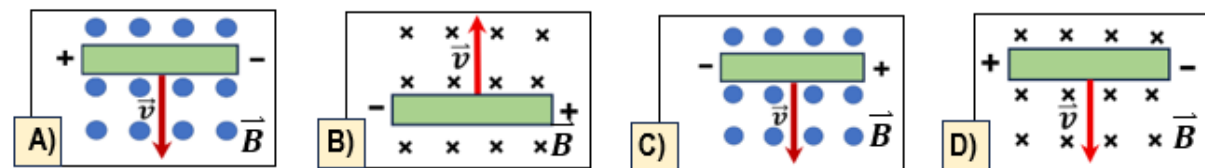
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$\Delta\theta$	Δs	r
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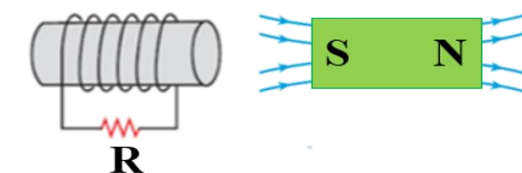
24. A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced (ε) during this interval:

- A) 0.21 V B) - 0.21 V C) 3 V D) - 3 V

25. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string? A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

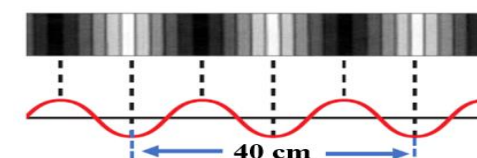
26. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?

- A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
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D) Both (A and C) are correct.



27. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?

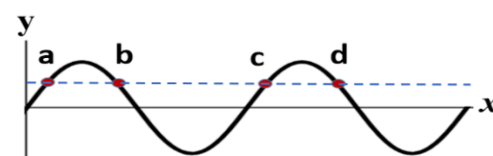
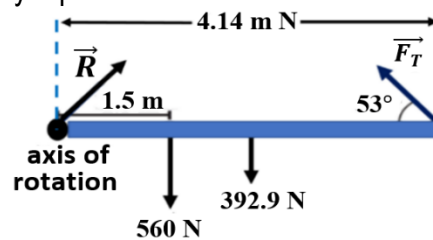
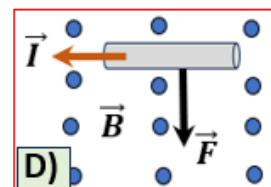
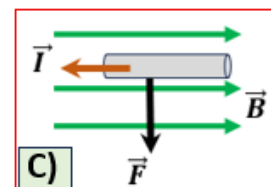
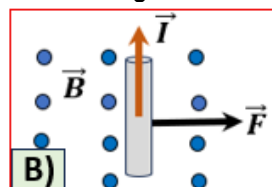
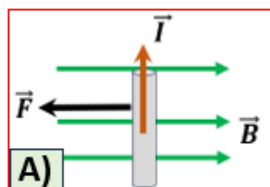
- A) 7.5 m/s B) 3.75 m/s
C) 6.25 m/s D) 5 m/s



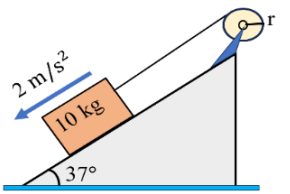
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- A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel

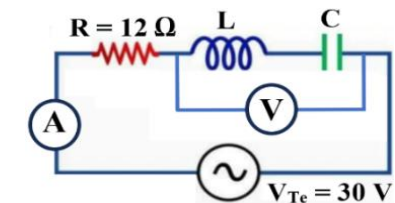
29. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere. What is the amplitude of the resultant wave if the interference is constructive?
 A) 0.1 m B) 0.5 m C) zero D) 50 m
30. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
 A) 500 N B) 400 N C) 560 N D) 630 N
31. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11}$ Hz. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
 A) 44 μ F B) 4.4 μ F C) 50 μ F D) 5.5 μ F
32. The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
 A) b,c B) a,b
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33. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by:
 A) high potential difference and low current. B) low potential difference and high current.
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34. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
 A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up
35. (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
 A) It has tangential acceleration but no centripetal acceleration.
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 C) It has both centripetal acceleration and tangential acceleration.
 D) It has neither tangential acceleration nor centripetal acceleration.
36. The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]?
 A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$
37. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
 A) to the East B) to the North C) to the South D) to the Sky
38. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
 A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
 C) Doubling its length. D) doubling the number of its turns.
39. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



40. What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?
 A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$
41. A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
 A) 0.195 kg.m^2 B) 0.915 kg.m^2
 C) 0.751 kg.m^2 D) 0.571 kg.m^2



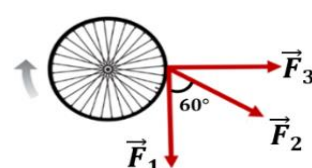
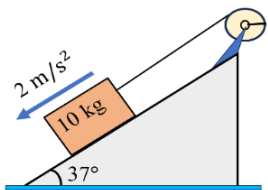
42. The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
 A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2
43. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
 A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$
44. Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
 A) Speed B) Frequency C) Wavelength D) All answers are correct
45. Tesla (T) equal to:
 A) $\frac{\text{N}}{\text{A} \cdot \text{m}}$ B) $\frac{\text{N}^2}{\text{A} \cdot \text{m}}$ C) $\frac{\text{N}}{\text{A} \cdot \text{m}^2}$ D) $\frac{\text{N}^2}{\text{A} \cdot \text{m}^2}$
46. Which of the following waves is used to measure distance between the Earth and the moon with precision?
 A) infrasonic waves B) normal light C) Laser beams D) Audible waves
47. Which rotational quantity is equivalent to force (F) in translational motion?
 A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)
48. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
 A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$
49. In the electrical circuit shown in the adjacent figure, if the ammeters reading is 2 A what is the voltmeters reading?
 A) 10 V B) 18 V
 C) 24 V D) 28 V



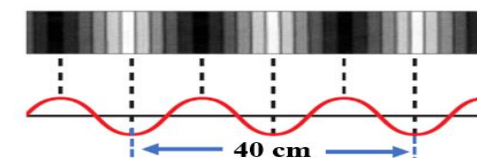
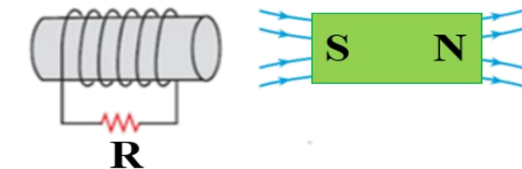
50. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
 A) amplitude B) period C) frequency D) acceleration

Choose the right answers for the following questions: (2 Marks each)

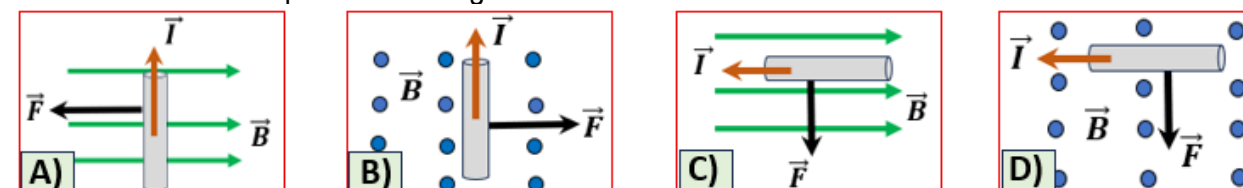
- A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
 A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s
- A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s². Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
 A) 0.195 kg.m² B) 0.915 kg.m² C) 0.751 kg.m² D) 0.571 kg.m²
- A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s², how far does the coin roll before coming to rest?
 A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m
- Two spheres look identical and have the same mass and same radii. One is hollow, and the other is solid. Which method would determine which is which?
 A) drop them from the same height B) roll them down an incline C) weigh them on a scale D) both (A and C) are correct
- An inductive coil of resistance R and inductive impedance 125 Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11}$ Hz. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
 A) 44 μF B) 4.4 μF C) 50 μF D) 5.5 μF
- Which rotational quantity is equivalent to force (F) in translational motion?
 A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)
- What happens to a sound wave, when it travels from a cold room to a hot room?
 A) speed of sound increases, frequency remains constant.
 B) speed of sound decreases, frequency increases.
 C) speed of sound decreases, frequency remains constant.
 D) frequency decreases, speed of sound remains constant.
- A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
 A) to the East B) to the North C) to the South D) to the Sky
- What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?
 A) λ = L B) λ = 2L C) λ = 3L D) λ = 4L
- A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
 A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away
- If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
 A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$
- In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?
 A) - 18 N.m B) 9 N.m C) - 9 N.m D) 18 N.m



- Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
 A) 1.75 m B) 3.5 m C) 5 m D) 7 m
- A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
 A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy
- (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
 A) amplitude B) period C) frequency D) acceleration
- A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
 A) From left to right, when the bar magnet is moved toward the coil.
 B) From left to right, when the bar magnet is moved away from the coil.
 C) From right to left, when the bar magnet is moved away from the coil.
 D) Both (A and C) are correct.
- The time rate at which a body rotates about an axis:
 A) Angular displacement (Δθ) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)
- Which of the following waves is used to measure distance between the Earth and the moon with precision?
 A) infrasonic waves B) normal light C) Laser beams D) Audible waves
- What is the wave speed of the wave shown in the figure. If the period of wave 0.04 s?
 A) 7.5 m/s B) 3.75 m/s C) 6.25 m/s D) 5 m/s
- Find the magnitude of (Δθ) in the table?
 A) -180° B) -90° C) -321° D) -360°
- (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
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 B) It has centripetal acceleration but no tangential acceleration.
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- The number of turns per unit length of the solenoid is 4000 $\frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [μ₀ = 4π × 10⁻⁷ T.m/A]?
 A) 5 × 10⁻⁴ T B) 5 × 10⁻³ T C) 5 × 10⁻² T D) 5 × 10⁻¹ T
- Calculate the period of a 3.5 m long pendulum, where (a_g = 9.782 m/s²)?
 A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s
- Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves
- The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
 A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel
- Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



Δθ	Δs	r
? deg	- 4.2 m	0.75 m



27. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?

- A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$

28. Tesla (T) equal to:

- A) $\frac{N}{A \cdot m}$ B) $\frac{N^2}{A \cdot m}$ C) $\frac{N}{A \cdot m^2}$ D) $\frac{N^2}{A \cdot m^2}$

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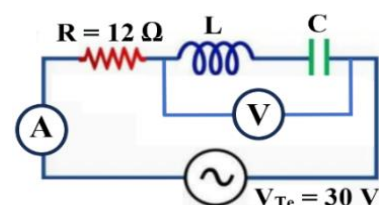
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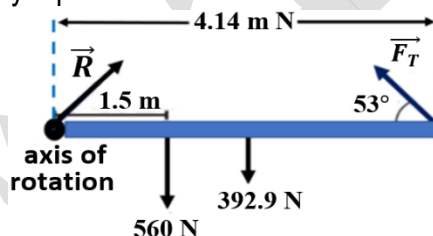


34. An alpha particle ($q = 3.2 \times 10^{-19}$ C) moves at a speed of 2.5×10^6 m/s perpendicular to a magnetic field of strength 2×10^{-4} T, what is the magnitude of the magnetic force on the particle?

- A) 1.6×10^{-16} N B) 6.1×10^{-16} N C) 4×10^{-9} N D) zero

35. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?

- A) 500 N B) 400 N C) 560 N D) 630 N



36. Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:

- A) Speed B) Frequency C) Wavelength D) All answers are correct

37. An AC source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:

- A) 45° B) 37° C) 30° D) 53°

38.the difference in the distance traveled by two beams when they are scattered in the same direction from different points: A) Order number B) Path difference C) Resonance D) Diffraction

39. Which of the following represents Newton's second law in rotational motion?

- A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{a}$

40. Earth ($m = 5.97 \times 10^{24}$ kg) orbits the sun ($M = 1.99 \times 10^{30}$ kg) at a mean distance of (1.5×10^{11} m) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11}$ N.m²/kg²)

- A) 5.29×10^{32} N B) 3.52×10^{22} N C) 5.9×10^{-2} N D) 1.77×10^{-8} N

41. A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s², what is its tangential speed?

- A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s

42. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string? A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

43. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere. What is the amplitude of the resultant wave if the interference is constructive?

- A) 0.1 m B) 0.5 m C) zero D) 50 m

44. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?

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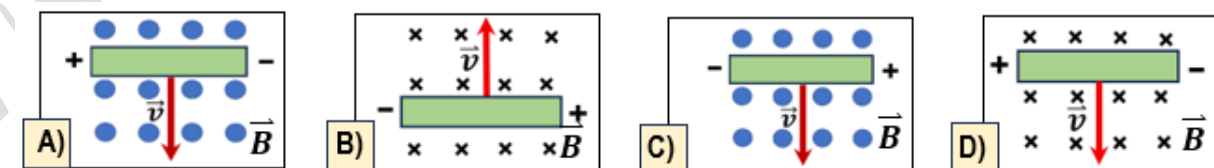
45. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?

- A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$

46. A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°

47. A generator with a maximum output emf of 205 V is connected to 115 Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A

48. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?

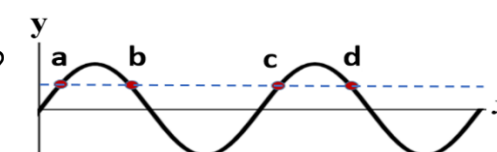


49. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)

- A) 1.6×10^{-5} rad/s B) 1.06×10^{-7} rad/s C) 1.99×10^{-7} rad/s D) 2×10^{-4} rad/s

50. The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?

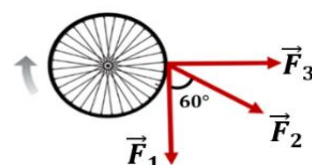
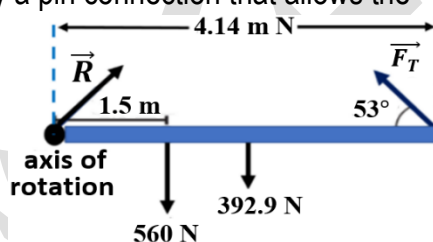
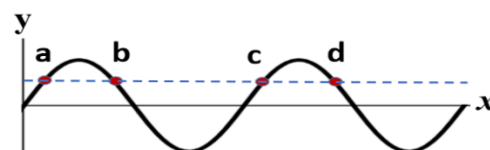
- A) b,c B) a,b
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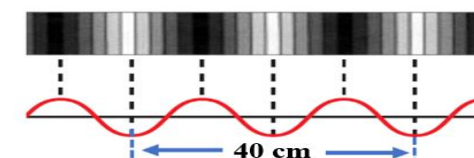
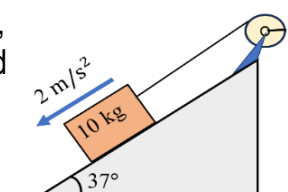
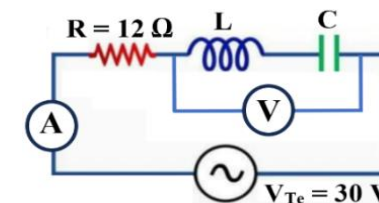


Choose the right answers for the following questions: (2 Marks each)

- The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel
- A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s . Find the average induced (ε) during this interval:
A) 0.21 V B) -0.21 V C) 3 V D) -3 V
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A) b,c B) a,b
C) c,d D) b,d
- Tesla (T) equal to:
A) $\frac{\text{N}}{\text{A} \cdot \text{m}}$ B) $\frac{\text{N}^2}{\text{A} \cdot \text{m}}$ C) $\frac{\text{N}}{\text{A} \cdot \text{m}^2}$ D) $\frac{\text{N}^2}{\text{A} \cdot \text{m}^2}$
- A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
- (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
A) It has tangential acceleration but no centripetal acceleration.
B) It has centripetal acceleration but no tangential acceleration.
C) It has both centripetal acceleration and tangential acceleration.
D) It has neither tangential acceleration nor centripetal acceleration.
- A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500 \text{ N}$), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
A) 500 N B) 400 N C) 560 N D) 630 N
- (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
A) amplitude B) period C) frequency D) acceleration
- What happens to a sound wave, when it travels from a cold room to a hot room?
A) speed of sound increases, frequency remains constant.
B) speed of sound decreases, frequency increases.
C) speed of sound decreases, frequency remains constant.
D) frequency decreases, speed of sound remains constant.
- In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m , what is the resultant torque acting on the wheel?
A) -18 N.m B) 9 N.m
C) -9 N.m D) 18 N.m
- Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of ($1.5 \times 10^{11} \text{ m}$) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)
A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$



- The power output of a certain loudspeaker is 250 W . If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2
 - A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy
 - Find the magnitude of ($\Delta\theta$) in the table?
A) -180° B) -90°
C) -321° D) -360°
- | $\Delta\theta$ | Δs | r |
|----------------|------------------|------------------|
| ? deg | -4.2 m | 0.75 m |
- Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
A) 1.75 m B) 3.5 m C) 5 m D) 7 m
 - What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L ?
A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$
 - A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m , what is the period of the oscillation?
A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s
 - An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° C) 30° D) 53°
 - In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?
A) 10 V B) 18 V
C) 24 V D) 28 V
-
- A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm , as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
A) 0.195 kg.m^2 B) 0.915 kg.m^2
C) 0.751 kg.m^2 D) 0.571 kg.m^2
 - Which of the following waves is used to measure distance between the Earth and the moon with precision?
A) infrasonic waves B) normal light C) Laser beams D) Audible waves
 - Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
C) Doubling its length. D) doubling the number of its turns.
 - A violin string that is 50 cm long has a fundamental frequency of 440 Hz . What is the speed of the waves on this string?
A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s
 - A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear?
A) 0.125° B) 8° C) 0.63° D) 11°
 - What is the wave speed of the wave shown in the figure If the period of wave 0.04 s ?
A) 7.5 m/s B) 3.75 m/s
C) 6.25 m/s D) 5 m/s
 - Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
A) Speed B) Frequency C) Wavelength D) All answers are correct



27. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?

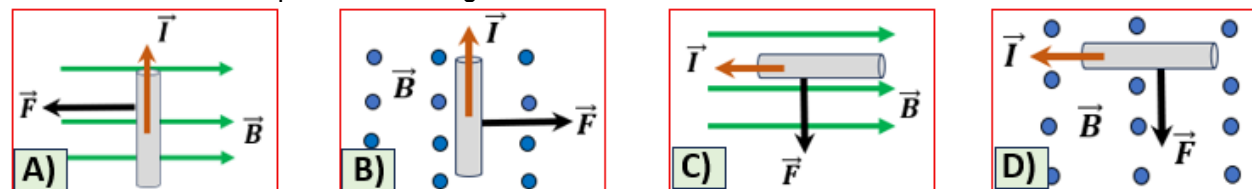
- A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$

28. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?

- A) to the East B) to the North C) to the South D) to the Sky

29.the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction

30. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



31. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?

- A) 0.1 m B) 0.5 m C) zero D) 50 m

32. Which of the following represents Newton's second law in rotational motion?

- A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{a}$

33. The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]?

- A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$

34. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?

- A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$

35. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?

- A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up

36. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: A) high potential difference and low current. B) low potential difference and high current. C) high potential difference and high current. D) low potential difference and low current.

37. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?

- A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s

38. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s², how far does the coin roll before coming to rest?

- A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m

39. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

- A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

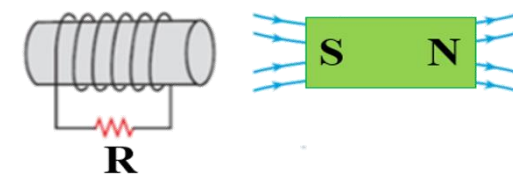
40. An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?

- A) $1.6 \times 10^{-16} \text{ N}$ B) $6.1 \times 10^{-16} \text{ N}$ C) $4 \times 10^{-9} \text{ N}$ D) zero

41. Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? A) drop them from the same height B) roll them down an incline C) weigh them on a scale D) both (A and C) are correct

42. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?

- A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



43. Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves

44. A generator with a maximum output emf of 205 V is connected to 115 Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A

45. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$

46. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)

- A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away

47. An inductive coil of resistance R and inductive impedance 125 Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?

- A) 44 μF B) 4.4 μF C) 50 μF D) 5.5 μF

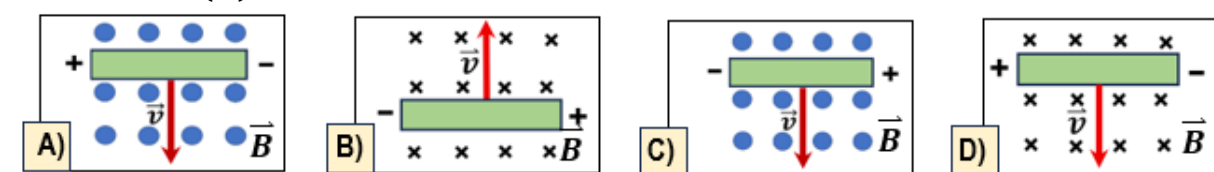
48. Which rotational quantity is equivalent to force(F) in translational motion?

- A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)

49. The time rate at which a body rotates about an axis:

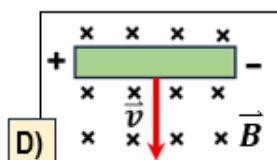
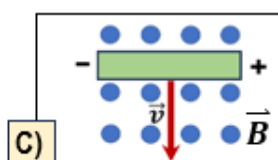
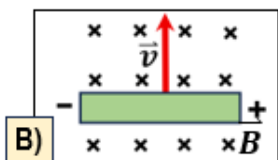
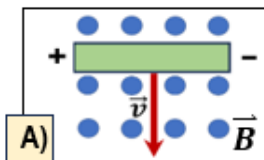
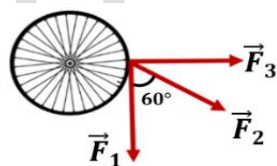
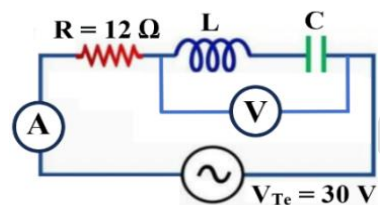
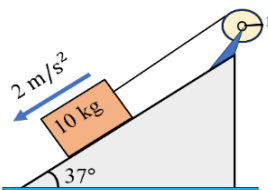
- A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration(α)

50. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?

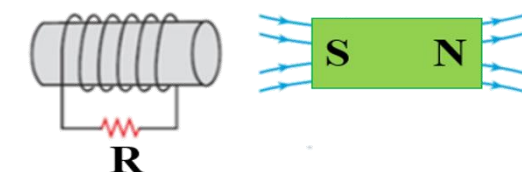
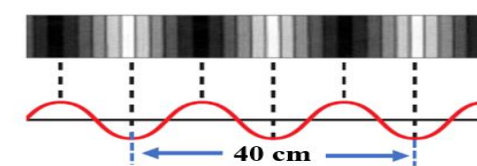
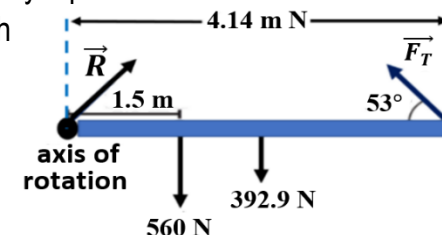
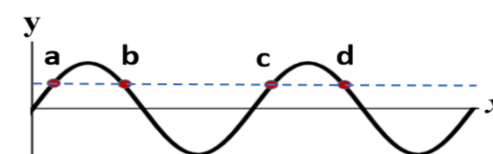


Choose the right answers for the following questions: (2 Marks each)

- The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]
A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$
- Which rotational quantity is equivalent to force(F) in translational motion?
A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)
- A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
A) 0.195 kg.m^2 B) 0.915 kg.m^2 C) 0.751 kg.m^2 D) 0.571 kg.m^2
- A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up
- Which of the following represents Newton's second law in rotational motion?
A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{\alpha}$
- Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
A) Speed B) Frequency C) Wavelength D) All answers are correct
- In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?
A) 10 V B) 18 V C) 24 V D) 28 V
- The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2
- (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
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- In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?
A) - 18 N.m B) 9 N.m C) - 9 N.m D) 18 N.m
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- A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere. What is the amplitude of the resultant wave if the interference is constructive?
A) 0.1 m B) 0.5 m C) zero D) 50 m
- Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?
A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$
- Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
A) 1.75 m B) 3.5 m C) 5 m D) 7 m
- What happens to a sound wave, when it travels from a cold room to a hot room?
A) speed of sound increases, frequency remains constant.
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- The time rate at which a body rotates about an axis:
A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)
- The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
A) b,c B) a,b C) c,d D) b,d
- A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500 \text{ N}$), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
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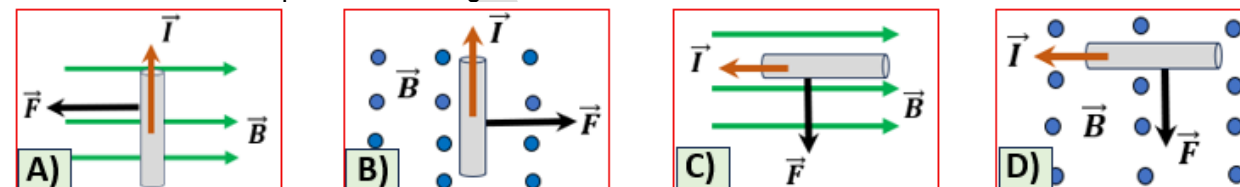
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C) weigh them on a scale **D) both (A and C) are correct**
29. Tesla (T) equal to: **A) $\frac{N}{A \cdot m}$** **B) $\frac{N^2}{A \cdot m}$** **C) $\frac{N}{A \cdot m^2}$** **D) $\frac{N^2}{A \cdot m^2}$**
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A) 44 μ F **B) 4.4 μ F** **C) 50 μ F** **D) 5.5 μ F**
31.the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: **A) Order number** **B) Path difference** **C) Resonance** **D) Diffraction**
32. A 256-turn coil with a cross-sectional area of 0.0025 m² is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced (ϵ) during this interval:
A) 0.21 V **B) - 0.21 V** **C) 3 V** **D) - 3 V**
33. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
A) 1.6×10^{-5} rad/s **B) 1.06×10^{-7} rad/s** **C) 1.99×10^{-7} rad/s** **D) 2×10^{-4} rad/s**
34. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
A) 9 **B) 3** **C) $\frac{1}{3}$** **D) $\frac{1}{9}$**
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40. An alpha particle ($q = 3.2 \times 10^{-19}$ C) moves at a speed of 2.5×10^6 m/s perpendicular to a magnetic field of strength 2×10^{-4} T, what is the magnitude of the magnetic force on the particle?
A) 1.6×10^{-16} N **B) 6.1×10^{-16} N** **C) 4×10^{-9} N** **D) zero**

41. Find the magnitude of ($\Delta\theta$) in the table? **A) -180°** **B) - 90°**
C) - 321° **D) - 360°**

$\Delta\theta$	Δs	r
? deg	- 4.2 m	0.75 m

42. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° **B) 37°** **C) 30°** **D) 53°**

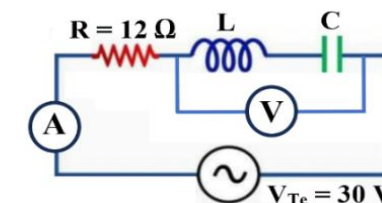
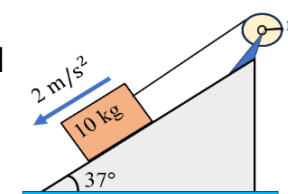
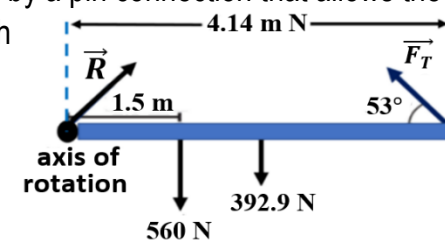
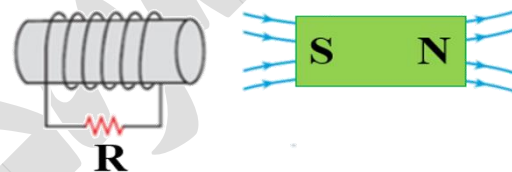
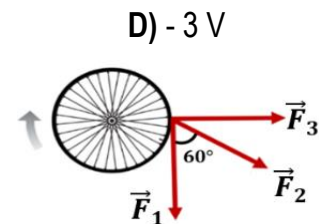
43. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



44. Which of the following waves is used to measure distance between the Earth and the moon with precision?
A) infrasonic waves **B) normal light** **C) Laser beams** **D) Audible waves**
45. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s², how far does the coin roll before coming to rest?
A) 2.3 m **B) 10.2 m** **C) 8.53 m** **D) 1.02 m**
46. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
A) 3.756 s **B) 2.6 s** **C) 0.14 s** **D) 1.7 s**
47. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782$ m/s²)?
A) 2.758 s **B) 3.258 s** **C) 3.758 s** **D) 1.746 s**
48. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
A) Doubling its cross-sectional area. **B) Reducing its cross-sectional area by half.**
C) Doubling its length. **D) doubling the number of its turns.**
49. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
A) 30 m/s, approaching **B) 20 m/s, moving away** **C) 20 m/s, approaching** **D) 30 m/s, moving away**
50. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
A) high resistance in series **B) high resistance in parallel** **C) low resistance in series** **D) low resistance in parallel**

Choose the right answers for the following questions: (2 Marks each)

- Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
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- An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?
A) $1.6 \times 10^{-16} \text{ N}$ B) $6.1 \times 10^{-16} \text{ N}$ C) $4 \times 10^{-9} \text{ N}$ D) zero
- A generator with a maximum output emf of 205 V is connected to 115 Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
- A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
- What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?
A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$
- A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced ($\mathcal{E}$) during this interval:
A) 0.21 V B) - 0.21 V C) 3 V D) - 3 V
- In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?
A) - 18 N.m B) 9 N.m
C) - 9 N.m D) 18 N.m
- An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° C) 30° D) 53°
- A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.
- Which of the following represents Newton's second law in rotational motion?
A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{a}$
- Which rotational quantity is equivalent to force(F) in translational motion?
A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)
- A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
A) to the East B) to the North C) to the South D) to the Sky
- The time rate at which a body rotates about an axis:
A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration(α)



- Tesla (T) equal to: A) $\frac{\text{N}}{\text{A} \cdot \text{m}}$ B) $\frac{\text{N}^2}{\text{A} \cdot \text{m}}$ C) $\frac{\text{N}}{\text{A} \cdot \text{m}^2}$ D) $\frac{\text{N}^2}{\text{A} \cdot \text{m}^2}$
- Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of ($1.5 \times 10^{11} \text{ m}$) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)
A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$
- (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
A) It has tangential acceleration but no centripetal acceleration.
B) It has centripetal acceleration but no tangential acceleration.
C) It has both centripetal acceleration and tangential acceleration.
D) It has neither tangential acceleration nor centripetal acceleration.
- A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°
- Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
A) 1.75 m B) 3.5 m C) 5 m D) 7 m
- Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves
- (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
A) amplitude B) period C) frequency D) acceleration
- A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500 \text{ N}$), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
A) 500 N B) 400 N C) 560 N D) 630 N
- Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
A) Speed B) Frequency C) Wavelength D) All answers are correct
- A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s
- A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel? A) 0.195 kg.m^2 B) 0.915 kg.m^2 C) 0.751 kg.m^2 D) 0.571 kg.m^2
- A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy
- Which of the following waves is used to measure distance between the Earth and the moon with precision?
A) infrasonic waves B) normal light C) Laser beams D) Audible waves
- In the electrical circuit shown in the adjacent figure, if the ammeters reading is 2 A what is the voltmeters reading?
A) 10 V B) 18 V
C) 24 V D) 28 V

28. Find the magnitude of $(\Delta\theta)$ in the table? A) -180° B) -90°
C) -321° D) -360°

$\Delta\theta$	Δs	r
? deg	-4.2 m	0.75 m

29. What happens to a sound wave, when it travels from a cold room to a hot room?

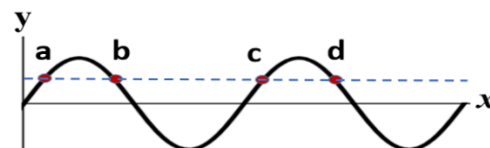
- A) speed of sound increases, frequency remains constant.
B) speed of sound decreases, frequency increases.
C) speed of sound decreases, frequency remains constant.
D) frequency decreases, speed of sound remains constant.

30. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?

- A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m

31. The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?

- A) b,c B) a,b
C) c,d D) b,d



32. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string? A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

33. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)

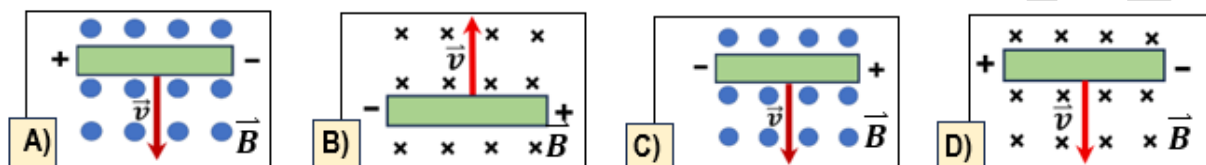
- A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away

34. Calculate the period of a 3.5 m long pendulum, where $(a_g = 9.782 \text{ m/s}^2)$?

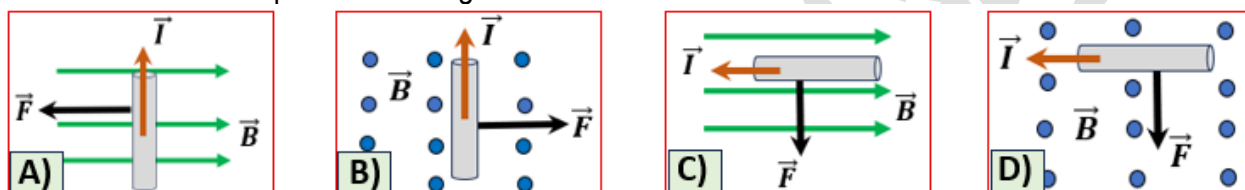
- A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s

35. Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? A) drop them from the same height B) roll them down an incline
C) weigh them on a scale D) both (A and C) are correct

36. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



37. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



38. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: A) high potential difference and low current. B) low potential difference and high current.
C) high potential difference and high current. D) low potential difference and low current.

39. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?

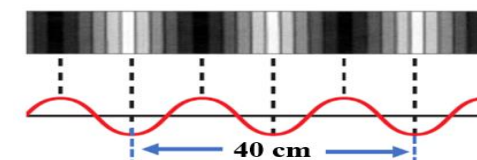
- A) 0.1 m B) 0.5 m C) zero D) 50 m

40. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?

- A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up

41. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?

- A) 7.5 m/s B) 3.75 m/s
C) 6.25 m/s D) 5 m/s



42. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?

- A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$

43. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)

- A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$

44. The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, $[\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}]$?

- A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$

45. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer

- A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel

46. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?

- A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$

47. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

- A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

48.the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction

49. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?

- A) $44 \mu\text{F}$ B) $4.4 \mu\text{F}$ C) $50 \mu\text{F}$ D) $5.5 \mu\text{F}$

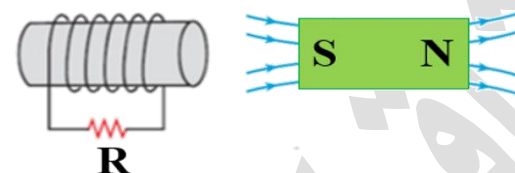
50. The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?

- A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2

Choose the right answers for the following questions: (2 Marks each)

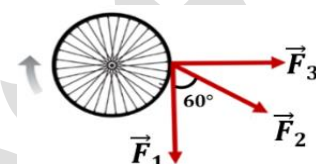
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- A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R ?
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 A) 1.75 m B) 3.5 m C) 5 m D) 7 m
- An alpha particle ($q = 3.2 \times 10^{-19}$ C) moves at a speed of 2.5×10^6 m/s perpendicular to a magnetic field of strength 2×10^{-4} T, what is the magnitude of the magnetic force on the particle?
 A) 1.6×10^{-16} N B) 6.1×10^{-16} N C) 4×10^{-9} N D) zero

- In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?
 A) - 18 N.m B) 9 N.m
 C) - 9 N.m D) 18 N.m



- An AC source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit is 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
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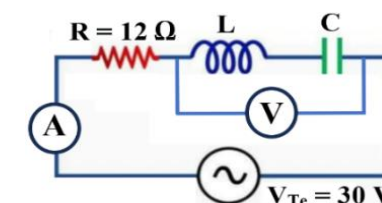
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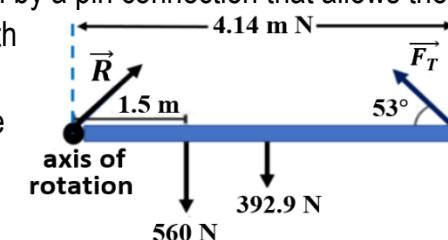
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- A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam is to be completely in equilibrium (as shown in the figure)?

A) 500 N B) 400 N C) 560 N D) 630 N

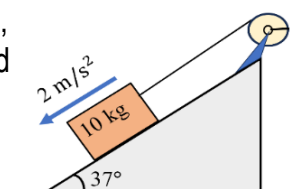


- A skater rotates on the ice, and the friction between the two skates and the ice is negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
 A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy

- (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represents:

A) amplitude B) period C) frequency D) acceleration

- A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s². Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
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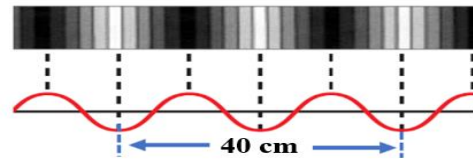
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 A) high potential difference and low current. B) low potential difference and high current.
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26. Which of the following waves is used to measure distance between the Earth and the moon with precision?
 A) infrasonic waves B) normal light C) Laser beams D) Audible waves

27. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?

- A) 7.5 m/s B) 3.75 m/s
 C) 6.25 m/s D) 5 m/s



28. What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?
 A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$

29. Find the magnitude of $(\Delta\theta)$ in the table? A) -180° B) -90°
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$\Delta\theta$	Δs	r
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31. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)

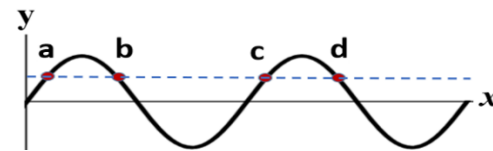
- A) 1.6×10^{-5} rad/s B) 1.06×10^{-7} rad/s C) 1.99×10^{-7} rad/s D) 2×10^{-4} rad/s

32. Which of the following represents Newton's second law in rotational motion?

- A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{a}$

33. The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?

- A) b,c B) a,b
 C) c,d D) b,d



34. A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced ($\mathcal{E}$) during this interval:

- A) 0.21 V B) -0.21 V C) 3 V D) -3 V

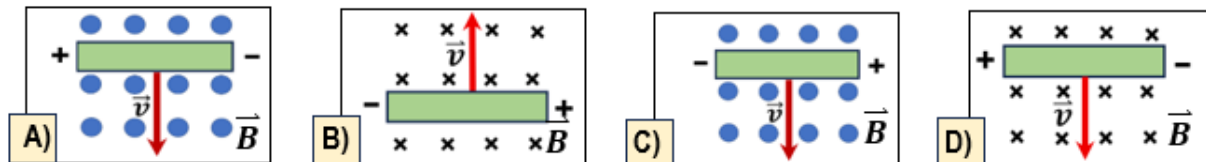
35. What happens to a sound wave, when it travels from a cold room to a hot room?

- A) speed of sound increases, frequency remains constant.
 B) speed of sound decreases, frequency increases.
 C) speed of sound decreases, frequency remains constant.
 D) frequency decreases, speed of sound remains constant.

36. A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?

- A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s

37. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



38. A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A

39. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer

- A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel

40. Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of $(1.5 \times 10^{11} \text{ m})$ What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)

- A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$

41. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?

- A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$

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 C) weigh them on a scale D) both (A and C) are correct

43. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?

- A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s

44. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?

- A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
 C) Doubling its length. D) doubling the number of its turns.

45. The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]?
 A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$

46. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?

- A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$

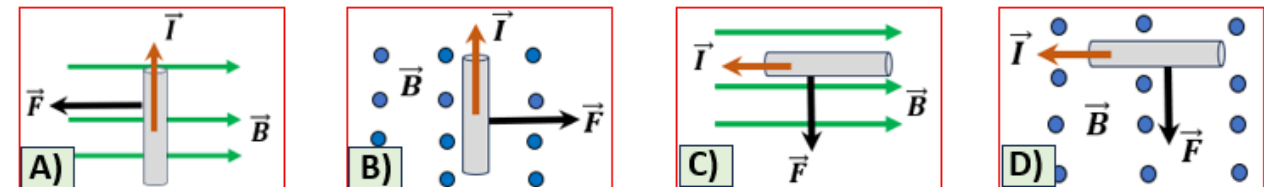
47.the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction

48. Tesla (T) equal to: A) $\frac{\text{N}}{\text{A} \cdot \text{m}}$ B) $\frac{\text{N}^2}{\text{A} \cdot \text{m}}$ C) $\frac{\text{N}}{\text{A} \cdot \text{m}^2}$ D) $\frac{\text{N}^2}{\text{A} \cdot \text{m}^2}$

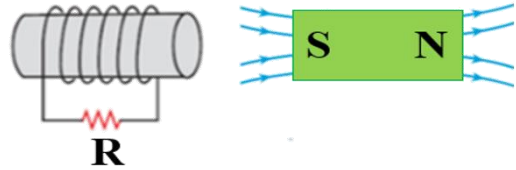
49. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

- A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

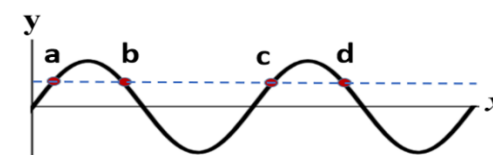
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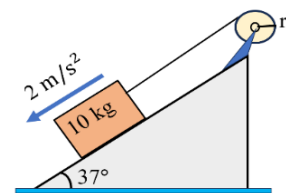
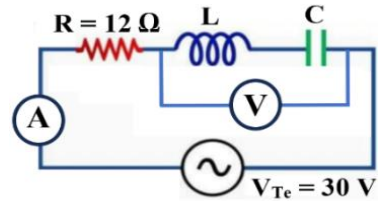


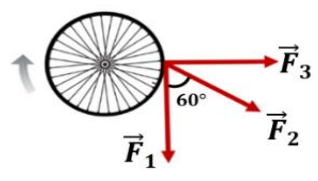
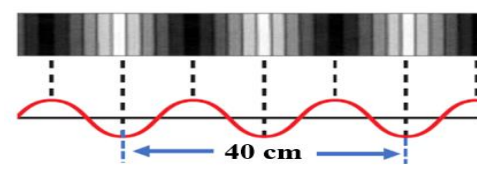
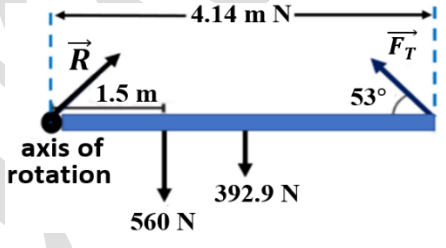
Choose the right answers for the following questions: (2 Marks each)

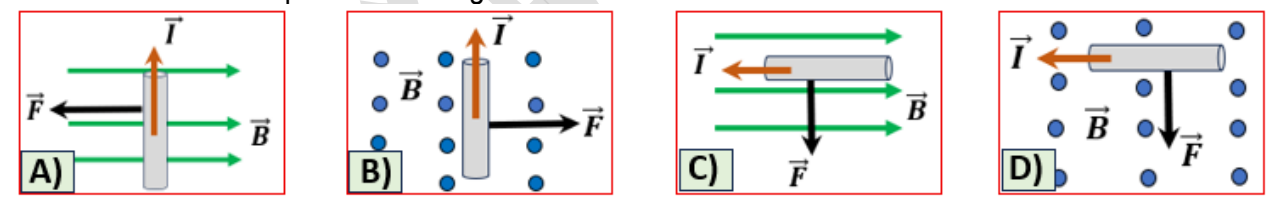
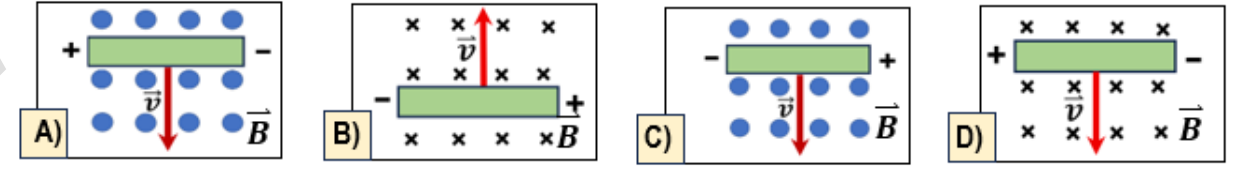
- What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L ?
 A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$
 - A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R ?
 A) From left to right, when the bar magnet is moved toward the coil.
 B) From left to right, when the bar magnet is moved away from the coil.
 C) From right to left, when the bar magnet is moved away from the coil.
 D) Both (A and C) are correct.
- 
- A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear?
 A) 0.125° B) 8° C) 0.63° D) 11°
 - A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
 A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
 - Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by:
 A) high potential difference and low current. B) low potential difference and high current.
 C) high potential difference and high current. D) low potential difference and low current.
 - A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
 A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away
 - What happens to a sound wave, when it travels from a cold room to a hot room?
 A) speed of sound increases, frequency remains constant.
 B) speed of sound decreases, frequency increases.
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 D) frequency decreases, speed of sound remains constant.
 - A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor:
 A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
 - Find the magnitude of $(\Delta\theta)$ in the table?
 A) -180° B) -90° C) -321° D) -360°
- | $\Delta\theta$ | Δs | r |
|----------------|------------|--------|
| ? deg | -4.2 m | 0.75 m |
- A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced (ε) during this interval:
 A) 0.21 V B) -0.21 V C) 3 V D) -3 V
 - An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?
 A) $1.6 \times 10^{-16} \text{ N}$ B) $6.1 \times 10^{-16} \text{ N}$ C) $4 \times 10^{-9} \text{ N}$ D) zero
 - (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
 A) amplitude B) period C) frequency D) acceleration

- The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
 A) b,c B) a,b
 C) c,d D) b,d



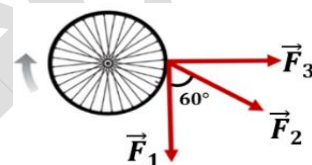
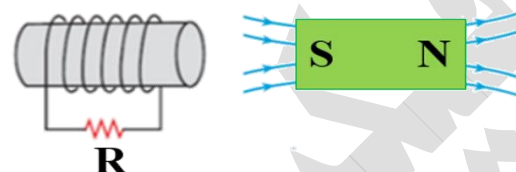
- The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]?
 A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$
 - A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
 A) 0.195 kg.m^2 B) 0.915 kg.m^2
 C) 0.751 kg.m^2 D) 0.571 kg.m^2
- 
- Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which?
 A) drop them from the same height B) roll them down an incline
 C) weigh them on a scale D) both (A and C) are correct
 - In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?
 A) 10 V B) 18 V
 C) 24 V D) 28 V
- 
- Diffraction is a property of :
 A) Water waves B) Sound waves C) Light waves D) All waves
 - Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
 A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$
 - Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
 A) 1.75 m B) 3.5 m C) 5 m D) 7 m
 - Which of the following waves is used to measure distance between the Earth and the moon with precision?
 A) infrasonic waves B) normal light C) Laser beams D) Audible waves
 - A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
 A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy
 - Which rotational quantity is equivalent to force (F) in translational motion?
 A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)
 - Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
 A) Speed B) Frequency C) Wavelength D) All answers are correct
 - A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?
 A) 0.1 m B) 0.5 m C) zero D) 50 m
 - A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
 A) to the East B) to the North C) to the South D) to the Sky
 - (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
 A) It has tangential acceleration but no centripetal acceleration.
 B) It has centripetal acceleration but no tangential acceleration.
 C) It has both centripetal acceleration and tangential acceleration.
 D) It has neither tangential acceleration nor centripetal acceleration.

28. An inductive coil of resistance R and inductive impedance $125\ \Omega$ is connected across an AC source of effective value 220 V and frequency $\frac{280}{11}\text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
 A) $44\ \mu\text{F}$ B) $4.4\ \mu\text{F}$ C) $50\ \mu\text{F}$ D) $5.5\ \mu\text{F}$
29. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
 A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel
30. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?
 A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$
31. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m , what is the resultant torque acting on the wheel?
 A) -18 N.m B) 9 N.m
 C) -9 N.m D) 18 N.m
- 
32. An AC source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600\ \Omega$ and a capacitor of impedance of $X_C = 200\ \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
 A) 45° B) 37° C) 30° D) 53°
33. Which of the following represents Newton's second law in rotational motion?
 A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{a}$
34. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s ?
 A) 7.5 m/s B) 3.75 m/s
 C) 6.25 m/s D) 5 m/s
- 
35. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?
 A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m
36. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500\text{ N}$), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
 A) 500 N B) 400 N C) 560 N D) 630 N
- 
37.the difference in the distance traveled by two beams when they are scattered in the same direction from different points: A) Order number B) Path difference C) Resonance D) Diffraction
38. A violin string that is 50 cm long has a fundamental frequency of 440 Hz . What is the speed of the waves on this string? A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s
39. Tesla (T) equal to: A) $\frac{\text{N}}{\text{A} \cdot \text{m}}$ B) $\frac{\text{N}^2}{\text{A} \cdot \text{m}}$ C) $\frac{\text{N}}{\text{A} \cdot \text{m}^2}$ D) $\frac{\text{N}^2}{\text{A} \cdot \text{m}^2}$
40. The power output of a certain loudspeaker is 250 W . If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
 A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2
41. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
 A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up

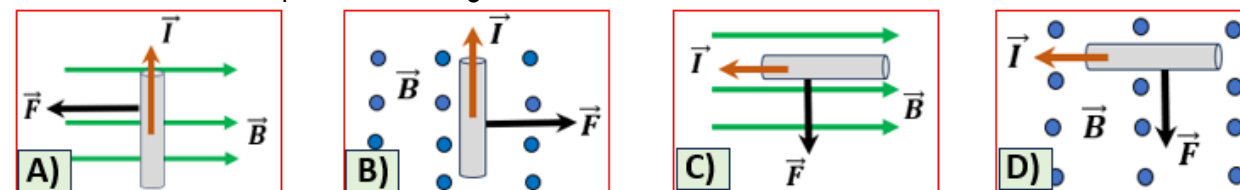
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46. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
 A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$
47. The time rate at which a body rotates about an axis:
 A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)
48. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?
- 
49. Find the average angular speed of Mars about the sun in rad/s . (Hint: Mars orbits the sun once every 687 days)
 A) $1.6 \times 10^{-5}\text{ rad/s}$ B) $1.06 \times 10^{-7}\text{ rad/s}$ C) $1.99 \times 10^{-7}\text{ rad/s}$ D) $2 \times 10^{-4}\text{ rad/s}$
50. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m , what is the period of the oscillation?
 A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s

Choose the right answers for the following questions: (2 Marks each)

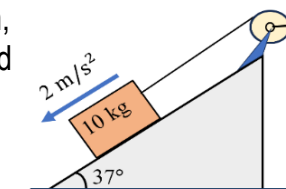
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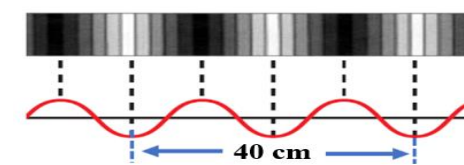
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 C) 0.751 kg.m^2 D) 0.571 kg.m^2
- Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?
 A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s
- The time rate at which a body rotates about an axis:
 A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)
- A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
 A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
- The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
 A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2



- Find the magnitude of ($\Delta\theta$) in the table?
 A) -180° B) - 90°
 C) - 321° D) - 360°

$\Delta\theta$	Δs	r
? deg	- 4.2 m	0.75 m

- What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?



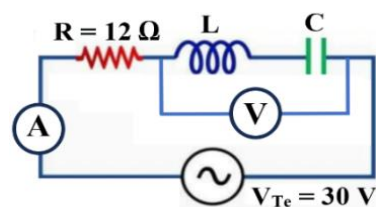
- An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?
 A) $1.6 \times 10^{-16} \text{ N}$ B) $6.1 \times 10^{-16} \text{ N}$ C) $4 \times 10^{-9} \text{ N}$ D) zero
- A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
 A) to the East B) to the North C) to the South D) to the Sky
- What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?
 A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$

26. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s², how far does the coin roll before coming to rest?

A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m

27. In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?

A) 10 V B) 18 V
C) 24 V D) 28 V



28. Which of the following waves is used to measure distance between the Earth and the moon with precision?

A) infrasonic waves B) normal light C) Laser beams D) Audible waves

29. A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear?

A) 0.125° B) 8° C) 0.63° D) 11°

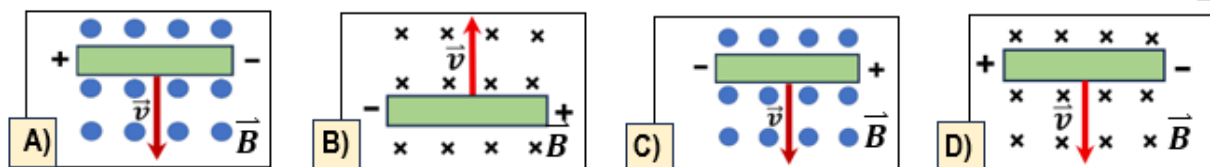
30. (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?

A) It has tangential acceleration but no centripetal acceleration.
B) It has centripetal acceleration but no tangential acceleration.
C) It has both centripetal acceleration and tangential acceleration.
D) It has neither tangential acceleration nor centripetal acceleration.

31. Earth ($m = 5.97 \times 10^{24}$ kg) orbits the sun ($M = 1.99 \times 10^{30}$ kg) at a mean distance of (1.5×10^{11} m) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11}$ N.m²/kg²)

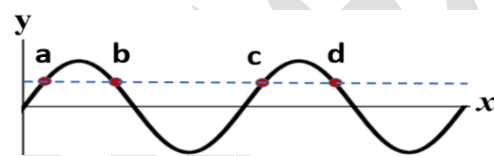
A) 5.29×10^{32} N B) 3.52×10^{22} N C) 5.9×10^{-2} N D) 1.77×10^{-8} N

32. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



33. The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?

A) b,c B) a,b
C) c,d D) b,d



34. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?

A) 0.1 m B) 0.5 m C) zero D) 50 m

35. The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7}$ T.m/A]?

A) 5×10^{-4} T B) 5×10^{-3} T C) 5×10^{-2} T D) 5×10^{-1} T

36. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

37.the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction

38. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11}$ Hz. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?

A) 44 μ F B) 4.4 μ F C) 50 μ F D) 5.5 μ F

39. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:

A) 45° B) 37° C) 30° D) 53°

40. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:

A) amplitude B) period C) frequency D) acceleration

41. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?

A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$

42. A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A

43. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: A) high potential difference and low current. B) low potential difference and high current. C) high potential difference and high current. D) low potential difference and low current.

44. Which rotational quantity is equivalent to force (F) in translational motion?

A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)

45. Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:

A) Speed B) Frequency C) Wavelength D) All answers are correct

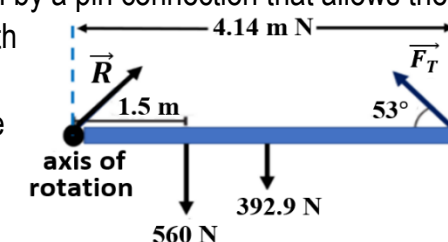
46. Tesla (T) equal to: A) $\frac{N}{A \cdot m}$ B) $\frac{N^2}{A \cdot m}$ C) $\frac{N}{A \cdot m^2}$ D) $\frac{N^2}{A \cdot m^2}$

47. Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? A) drop them from the same height B) roll them down an incline C) weigh them on a scale D) both (A and C) are correct

48. Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves

49. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?

A) 500 N B) 400 N C) 560 N D) 630 N



50. Which of the following represents Newton's second law in rotational motion?

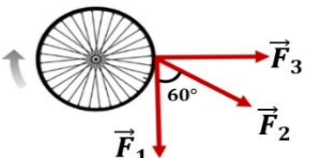
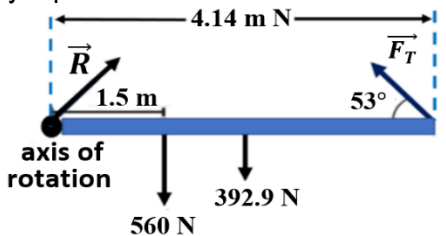
A) $\sum \tau = I \alpha$ B) $\sum F = m a$ C) $\sum F = \frac{m}{a}$ D) $\sum \tau = \frac{I}{\alpha}$

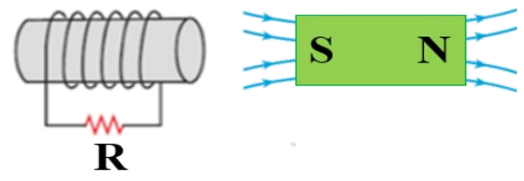
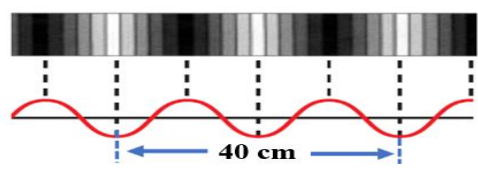


Choose the right answers for the following questions: (2 Marks each)

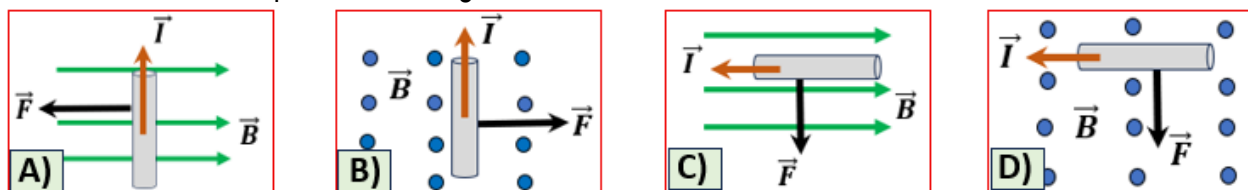
- A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
 A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
- The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]
 A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$
- What happens to a sound wave, when it travels from a cold room to a hot room?
 A) speed of sound increases, frequency remains constant.
 B) speed of sound decreases, frequency increases.
 C) speed of sound decreases, frequency remains constant.
 D) frequency decreases, speed of sound remains constant.
- Find the magnitude of $(\Delta\theta)$ in the table?

$\Delta\theta$	Δs	r
? deg	- 4.2 m	0.75 m

 A) -180° B) -90° C) -321° D) -360°
- Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
 A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$
- In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?

 A) - 18 N.m B) 9 N.m C) - 9 N.m D) 18 N.m
- Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of ($1.5 \times 10^{11} \text{ m}$) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)
 A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$
- A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
 A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away
- Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?
 A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$
- Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves
- A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
 A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy
- A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500 \text{ N}$), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?

 A) 500 N B) 400 N C) 560 N D) 630 N

- A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?
 A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m
- A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear?
 A) 0.125° B) 8° C) 0.63° D) 11°
-the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes:
 A) Order number B) Path difference C) Resonance D) Diffraction
- (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
 A) amplitude B) period C) frequency D) acceleration
- Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
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- An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?
 A) $1.6 \times 10^{-16} \text{ N}$ B) $6.1 \times 10^{-16} \text{ N}$ C) $4 \times 10^{-9} \text{ N}$ D) zero
- Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
 A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
 C) Doubling its length. D) doubling the number of its turns.
- A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string?
 A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s
- Tesla (T) equal to:
 A) $\frac{\text{N}}{\text{A} \cdot \text{m}}$ B) $\frac{\text{N}^2}{\text{A} \cdot \text{m}}$ C) $\frac{\text{N}}{\text{A} \cdot \text{m}^2}$ D) $\frac{\text{N}^2}{\text{A} \cdot \text{m}^2}$
- A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?
 A) 0.1 m B) 0.5 m C) zero D) 50 m
- A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?

 A) From left to right, when the bar magnet is moved toward the coil.
 B) From left to right, when the bar magnet is moved away from the coil.
 C) From right to left, when the bar magnet is moved away from the coil.
 D) Both (A and C) are correct.
- Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which?
 A) drop them from the same height B) roll them down an incline
 C) weigh them on a scale D) both (A and C) are correct
- A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
 A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up
- What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?

 A) 7.5 m/s B) 3.75 m/s C) 6.25 m/s D) 5 m/s
- A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor:
 A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A

28. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



29. The time rate at which a body rotates about an axis:

A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)

30. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?

A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s

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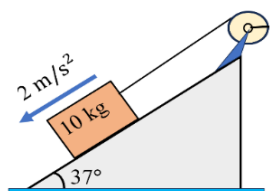
A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$

32. An AC source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:

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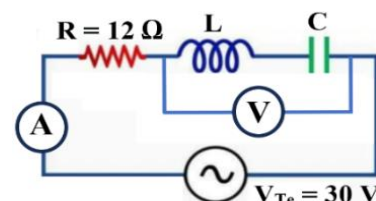
33. A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?

A) 0.195 kg.m^2 B) 0.915 kg.m^2
C) 0.751 kg.m^2 D) 0.571 kg.m^2



34. In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?

A) 10 V B) 18 V
C) 24 V D) 28 V

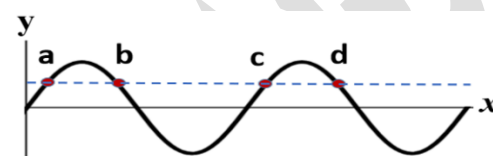


35. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?

A) to the East B) to the North C) to the South D) to the Sky

36. The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?

A) b, c B) a, b
C) c, d D) b, d



37. Which rotational quantity is equivalent to force (F) in translational motion?

A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)

38. The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?

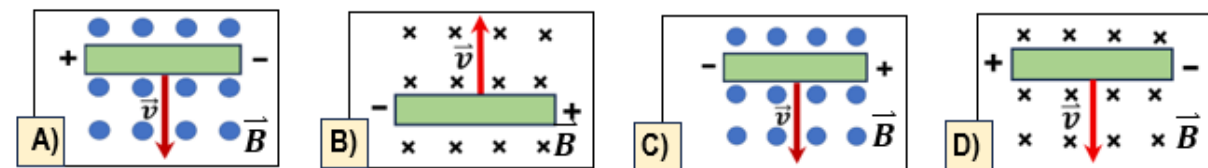
A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2

39. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: A) high potential difference and low current. B) low potential difference and high current. C) high potential difference and high current. D) low potential difference and low current.

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41. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



42. Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?

A) 1.75 m B) 3.5 m C) 5 m D) 7 m

43. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?

A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$

44. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer

A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel

45. Which of the following represents Newton's second law in rotational motion?

A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{\alpha}$

46. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?

A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s

47. Which of the following waves is used to measure distance between the Earth and the moon with precision?

A) infrasonic waves B) normal light C) Laser beams D) Audible waves

48. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11}$ Hz. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?

A) $44 \mu\text{F}$ B) $4.4 \mu\text{F}$ C) $50 \mu\text{F}$ D) $5.5 \mu\text{F}$

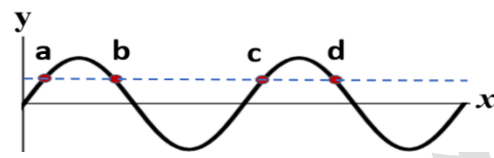
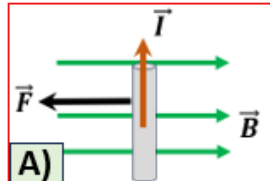
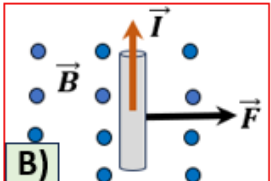
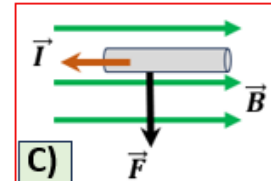
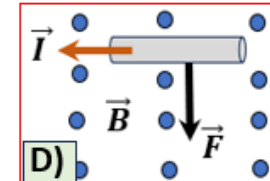
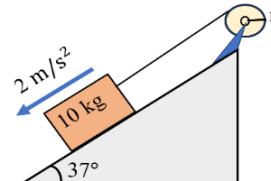
49. A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced ($\mathcal{E}$) during this interval:

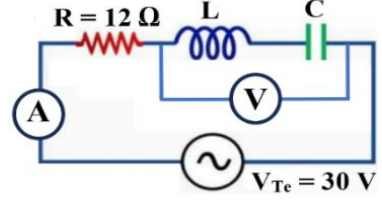
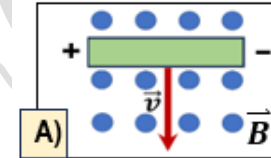
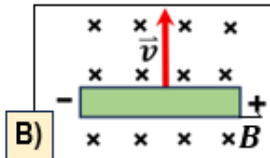
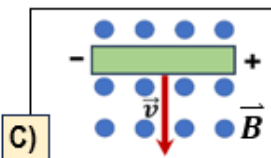
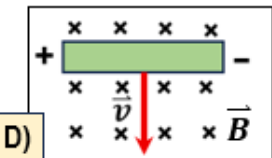
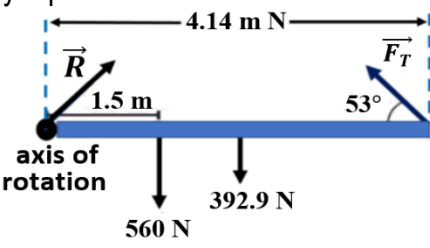
A) 0.21 V B) - 0.21 V C) 3 V D) - 3 V

50. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

Choose the right answers for the following questions: (2 Marks each)

- An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
A) $44 \mu\text{F}$ B) $4.4 \mu\text{F}$ C) $50 \mu\text{F}$ D) $5.5 \mu\text{F}$
 - A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
A) to the East B) to the North C) to the South D) to the Sky
 - A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?
A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m
 - The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$. Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, $[\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}]$?
A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$
 - The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
A) b,c B) a,b
C) c,d D) b,d
- 
- A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
 - Find the magnitude of $(\Delta\theta)$ in the table?
A) -180° B) -90°
C) -321° D) -360°
- | $\Delta\theta$ | Δs | r |
|----------------|------------------|------------------|
| ? deg | -4.2 m | 0.75 m |
- Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?
A) 
B) 
C) 
D) 
 - Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by:
A) high potential difference and low current. B) low potential difference and high current.
C) high potential difference and high current. D) low potential difference and low current.
 - An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?
A) $1.6 \times 10^{-16} \text{ N}$ B) $6.1 \times 10^{-16} \text{ N}$ C) $4 \times 10^{-9} \text{ N}$ D) zero
 - A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm , as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
A) 0.195 kg.m^2 B) 0.915 kg.m^2
C) 0.751 kg.m^2 D) 0.571 kg.m^2
- 

- Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
A) 1.75 m B) 3.5 m C) 5 m D) 7 m
 - What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L ?
A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$
 - Diffraction is a property of :
A) Water waves B) Sound waves C) Light waves D) All waves
 - Calculate the period of a 3.5 m long pendulum, where $(a_g = 9.782 \text{ m/s}^2)$?
A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s
 - The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel
 - The time rate at which a body rotates about an axis:
A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)
 - In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?
A) 10 V B) 18 V
C) 24 V D) 28 V
- 
- A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?
A) 
B) 
C) 
D) 
 - A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s . Find the average induced (ϵ) during this interval:
A) 0.21 V B) -0.21 V C) 3 V D) -3 V
 - A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500 \text{ N}$), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
A) 500 N B) 400 N C) 560 N D) 630 N
- 
- Find the average angular speed of Mars about the sun in rad/s . (Hint: Mars orbits the sun once every 687 days)
A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$
 - A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor:
A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
 - A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm . The two waves interfere. What is the amplitude of the resultant wave if the interference is constructive?
A) 0.1 m B) 0.5 m C) zero D) 50 m
 - A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear?
A) 0.125° B) 8° C) 0.63° D) 11°

26. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

- A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

27. Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:

- A) Speed B) Frequency C) Wavelength D) All answers are correct

28. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?

- A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
C) Doubling its length. D) doubling the number of its turns.

29. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?

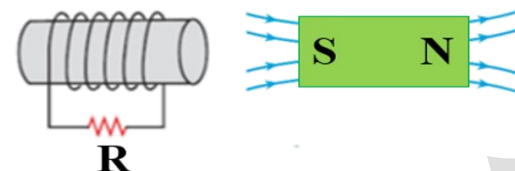
- A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up

30. What happens to a sound wave, when it travels from a cold room to a hot room?

- A) speed of sound increases, frequency remains constant.
B) speed of sound decreases, frequency increases.
C) speed of sound decreases, frequency remains constant.
D) frequency decreases, speed of sound remains constant.

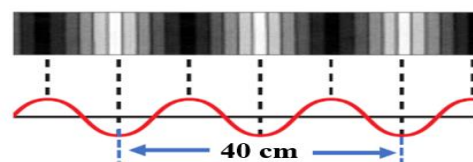
31. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?

- A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



32. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?

- A) 7.5 m/s B) 3.75 m/s
C) 6.25 m/s D) 5 m/s



33. The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?

- A) 0.47 W/m² B) 4.7 W/m² C) 0.16 W/m² D) 1.6 W/m²

34. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string? A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

35. (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?

- A) It has tangential acceleration but no centripetal acceleration.
B) It has centripetal acceleration but no tangential acceleration.
C) It has both centripetal acceleration and tangential acceleration.
D) It has neither tangential acceleration nor centripetal acceleration.

36. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)

- A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away

37. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:

- A) amplitude B) period C) frequency D) acceleration

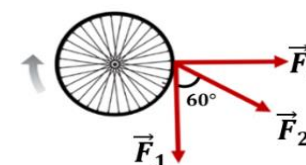
38. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:

- A) 45° B) 37° C) 30° D) 53°

39.the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction

40. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?

- A) - 18 N.m B) 9 N.m
C) - 9 N.m D) 18 N.m



41. Earth ($m = 5.97 \times 10^{24}$ kg) orbits the sun ($M = 1.99 \times 10^{30}$ kg) at a mean distance of (1.5×10^{11} m) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11}$ N.m²/kg²)

- A) 5.29×10^{32} N B) 3.52×10^{22} N C) 5.9×10^{-2} N D) 1.77×10^{-8} N

42. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?

- A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$

43. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?

- A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s

44. Which rotational quantity is equivalent to force(F) in translational motion?

- A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)

45. Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? A) drop them from the same height B) roll them down an incline
C) weigh them on a scale D) both (A and C) are correct

46. Tesla (T) equal to:

- A) $\frac{N}{A \cdot m}$ B) $\frac{N^2}{A \cdot m}$ C) $\frac{N}{A \cdot m^2}$ D) $\frac{N^2}{A \cdot m^2}$

47. A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?

- A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy

48. Which of the following waves is used to measure distance between the Earth and the moon with precision?

- A) infrasonic waves B) normal light C) Laser beams D) Audible waves

49. Which of the following represents Newton's second law in rotational motion?

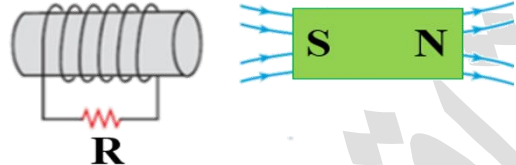
- A) $\sum \tau = I \alpha$ B) $\sum F = m a$ C) $\sum F = \frac{m}{a}$ D) $\sum \tau = \frac{I}{\alpha}$

50. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?

- A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$

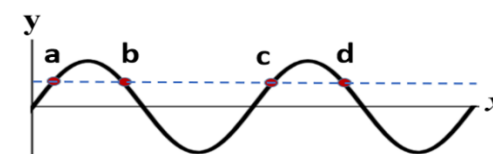


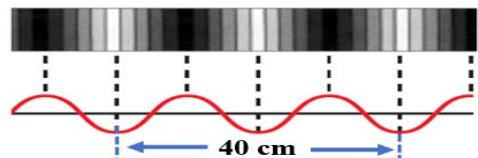
Choose the right answers for the following questions: (2 Marks each)

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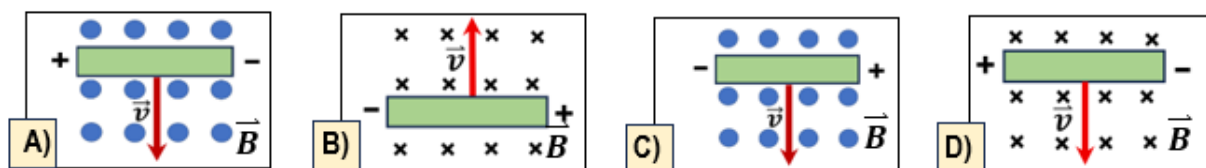
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$\Delta\theta$	Δs	r
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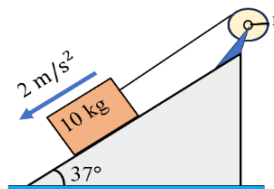
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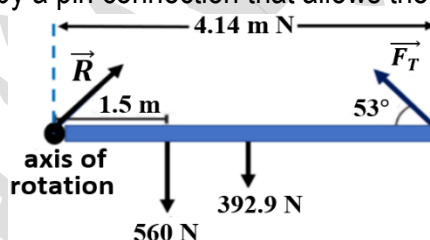
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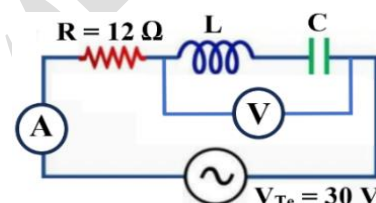


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41. The power output of a certain loudspeaker is 250 W . If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?

- A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2

42. Find the average angular speed of Mars about the sun in rad/s . (Hint: Mars orbits the sun once every 687 days)

- A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$

43. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

- A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

44. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?

- A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half. C) Doubling its length. D) doubling the number of its turns.

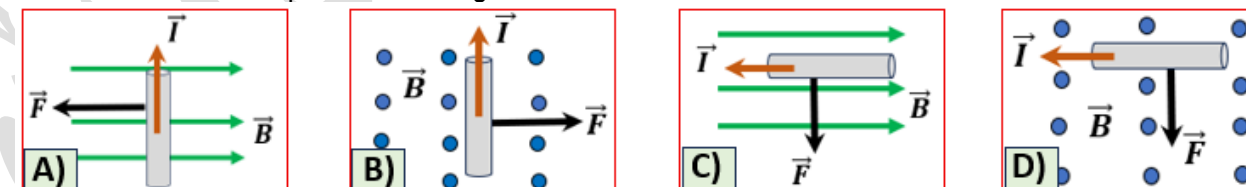
45. Which of the following represents Newton's second law in rotational motion?

- A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{\alpha}$

46. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?

- A) $44 \mu\text{F}$ B) $4.4 \mu\text{F}$ C) $50 \mu\text{F}$ D) $5.5 \mu\text{F}$

47. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?

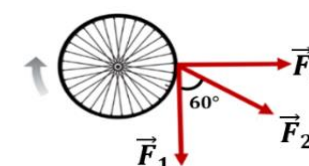


48. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz . An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz , what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)

- A) 30 m/s , approaching B) 20 m/s , moving away C) 20 m/s , approaching D) 30 m/s , moving away

49. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m , what is the resultant torque acting on the wheel?

- A) $-18 \text{ N} \cdot \text{m}$ B) $9 \text{ N} \cdot \text{m}$ C) $-9 \text{ N} \cdot \text{m}$ D) $18 \text{ N} \cdot \text{m}$



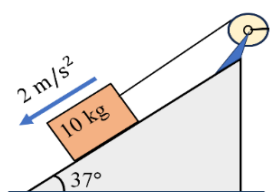
50. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m , what is the period of the oscillation?

- A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s

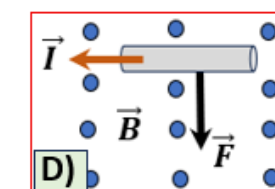
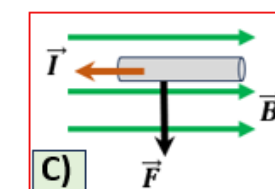
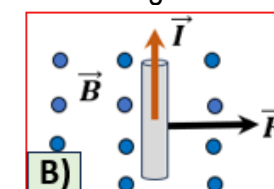
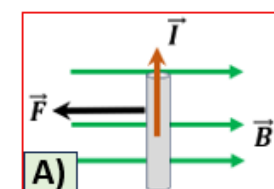
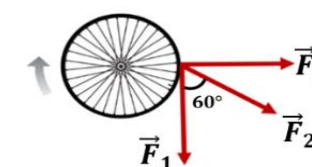
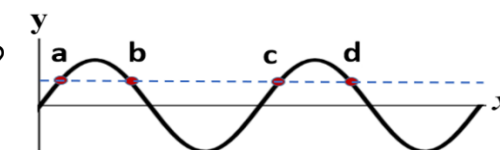


Choose the right answers for the following questions: (2 Marks each)

- (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
 A) It has tangential acceleration but no centripetal acceleration.
 B) It has centripetal acceleration but no tangential acceleration.
 C) It has both centripetal acceleration and tangential acceleration.
 D) It has neither tangential acceleration nor centripetal acceleration.
- A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
 A) 0.195 kg.m^2 B) 0.915 kg.m^2
 C) 0.751 kg.m^2 D) 0.571 kg.m^2
- A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
- Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?
 A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$
- The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
 A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2
- A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
 A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
- Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
 A) Speed B) Frequency C) Wavelength D) All answers are correct
- Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of ($1.5 \times 10^{11} \text{ m}$) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)
 A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$
- The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
 A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel
- (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
 A) amplitude B) period C) frequency D) acceleration
- Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves
- A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
 A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up
- The time rate at which a body rotates about an axis:
 A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)
- A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string? A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s



- A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
 A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s
- A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced (ϵ) during this interval:
 A) 0.21 V B) - 0.21 V C) 3 V D) - 3 V
- What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?
 A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$
- The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
 A) b,c B) a,b C) c,d D) b,d
- A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°
- In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?
 A) - 18 N.m B) 9 N.m C) - 9 N.m D) 18 N.m
- Which rotational quantity is equivalent to force (F) in translational motion?
 A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)
- The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]?
 A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$
- If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
 A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$
- Which of the following represents Newton's second law in rotational motion?
 A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{\alpha}$
- Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



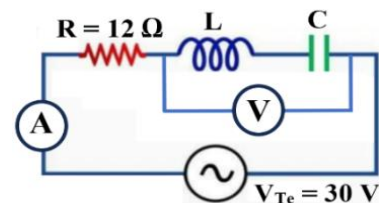
- An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit is 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
 A) 45° B) 37° C) 30° D) 53°
- A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?
 A) 0.1 m B) 0.5 m C) zero D) 50 m
- Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
 A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$

29. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
 A) 1.6×10^{-5} rad/s B) 1.06×10^{-7} rad/s C) 1.99×10^{-7} rad/s D) 2×10^{-4} rad/s

30. An alpha particle ($q = 3.2 \times 10^{-19}$ C) moves at a speed of 2.5×10^6 m/s perpendicular to a magnetic field of strength 2×10^{-4} T, what is the magnitude of the magnetic force on the particle?
 A) 1.6×10^{-16} N B) 6.1×10^{-16} N C) 4×10^{-9} N D) zero

31. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: A) high potential difference and low current. B) low potential difference and high current.
 C) high potential difference and high current. D) low potential difference and low current.

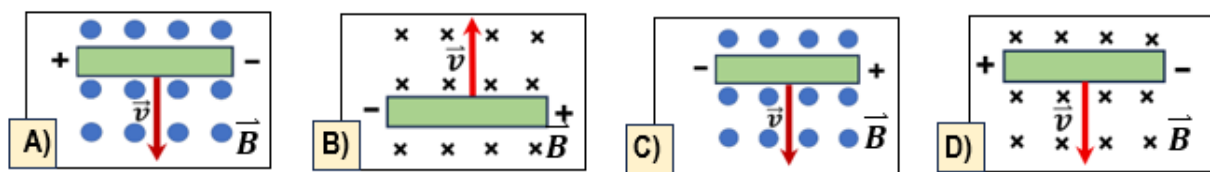
32. In the electrical circuit shown in the adjacent figure, if the ammeters reading is 2 A what is the voltmeters reading?
 A) 10 V B) 18 V
 C) 24 V D) 28 V



33. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?
 A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m

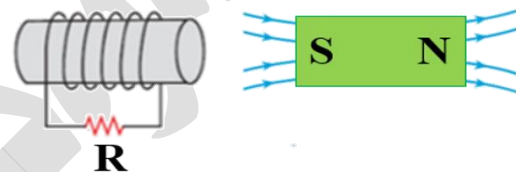
34. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
 A) to the East B) to the North C) to the South D) to the Sky

35. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



36. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11}$ Hz. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
 A) 44 μF B) 4.4 μF C) 50 μF D) 5.5 μF

37. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
 A) From left to right, when the bar magnet is moved toward the coil.
 B) From left to right, when the bar magnet is moved away from the coil.
 C) From right to left, when the bar magnet is moved away from the coil.
 D) Both (A and C) are correct.



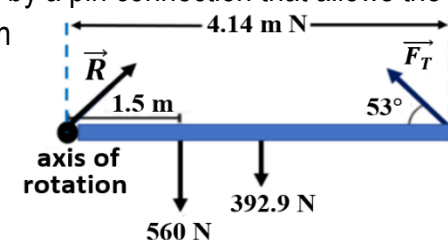
38. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
 A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
 C) Doubling its length. D) doubling the number of its turns.

39. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
 A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away

40. What happens to a sound wave, when it travels from a cold room to a hot room?
 A) speed of sound increases, frequency remains constant.

B) speed of sound decreases, frequency increases.
 C) speed of sound decreases, frequency remains constant.
 D) frequency decreases, speed of sound remains constant.

41. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
 A) 500 N B) 400 N C) 560 N D) 630 N



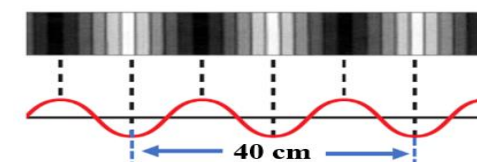
42. Which of the following waves is used to measure distance between the Earth and the moon with precision?
 A) infrasonic waves B) normal light C) Laser beams D) Audible waves

43. Find the magnitude of ($\Delta\theta$) in the table? A) -180° B) -90°
 C) -321° D) -360°

$\Delta\theta$	Δs	r
? deg	-4.2 m	0.75 m

44. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?
 A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s

45. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?
 A) 7.5 m/s B) 3.75 m/s
 C) 6.25 m/s D) 5 m/s



46. Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? A) drop them from the same height B) roll them down an incline
 C) weigh them on a scale D) both (A and C) are correct

47. Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
 A) 1.75 m B) 3.5 m C) 5 m D) 7 m

48. A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
 A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy

49. Tesla (T) equal to: A) $\frac{\text{N}}{\text{A} \cdot \text{m}}$ B) $\frac{\text{N}^2}{\text{A} \cdot \text{m}}$ C) $\frac{\text{N}}{\text{A} \cdot \text{m}^2}$ D) $\frac{\text{N}^2}{\text{A} \cdot \text{m}^2}$

50.the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction

Choose the right answers for the following questions: (2 Marks each)

- Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
 - Speed
 - Frequency
 - Wavelength
 - All answers are correct
- Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?
 - $(B = \frac{\mu_0 N}{2r})$
 - $(B = \frac{\mu_0 N I}{2\pi r})$
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 - $(B = \frac{\mu_0 N I}{2r})$
- Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
 - Doubling its cross-sectional area.
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 - $\frac{N}{A \cdot m}$
 - $\frac{N^2}{A \cdot m}$
 - $\frac{N}{A \cdot m^2}$
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 - 0.125°
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- An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?
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 - $6.1 \times 10^{-16} \text{ N}$
 - $4 \times 10^{-9} \text{ N}$
 - zero
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27. An AC source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit is 0.425 A calculate phase difference angle between the total current and the potential difference of the source:

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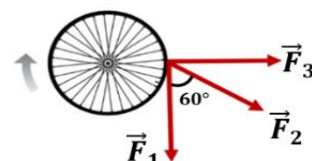
- A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

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- A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$

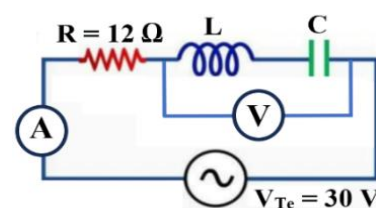
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- A) - 18 N.m B) 9 N.m
C) - 9 N.m D) 18 N.m



31. In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?

- A) 10 V B) 18 V
C) 24 V D) 28 V



32. Which of the following represents Newton's second law in rotational motion?

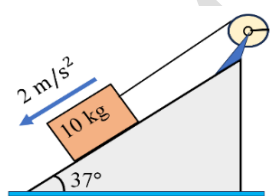
- A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{a}$

33. Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?

- A) 1.75 m B) 3.5 m C) 5 m D) 7 m

34. A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?

- A) 0.195 kg.m^2 B) 0.915 kg.m^2
C) 0.751 kg.m^2 D) 0.571 kg.m^2

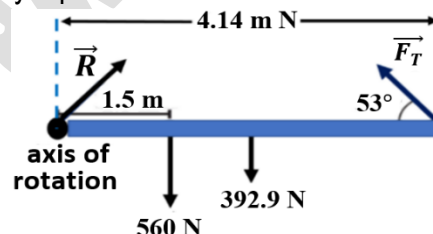


35. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?

- A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m

36. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500 \text{ N}$), find the force (R) exerted by the beam on the wall. If the beam is to be completely in equilibrium (as shown in the figure)?

- A) 500 N B) 400 N C) 560 N D) 630 N

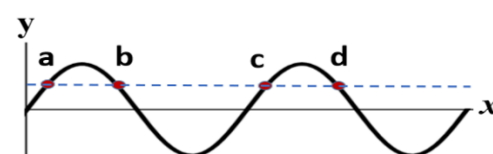


37. A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A

38.the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction

39. The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?

- A) b,c B) a,b
C) c,d D) b,d



40. A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced (ϵ) during this interval:

- A) 0.21 V B) - 0.21 V C) 3 V D) - 3 V

41. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)

- A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away

42. What happens to a sound wave, when it travels from a cold room to a hot room?

- A) speed of sound increases, frequency remains constant.
B) speed of sound decreases, frequency increases.
C) speed of sound decreases, frequency remains constant.
D) frequency decreases, speed of sound remains constant.

43. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)

- A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$

44. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?

- A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s

45. Find the magnitude of ($\Delta\theta$) in the table? A) -180° B) -90°
C) -321° D) -360°

$\Delta\theta$	Δs	r
? deg	- 4.2 m	0.75 m

46. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string? A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

47. A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?

- A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy

48. Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of ($1.5 \times 10^{11} \text{ m}$) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)

- A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$

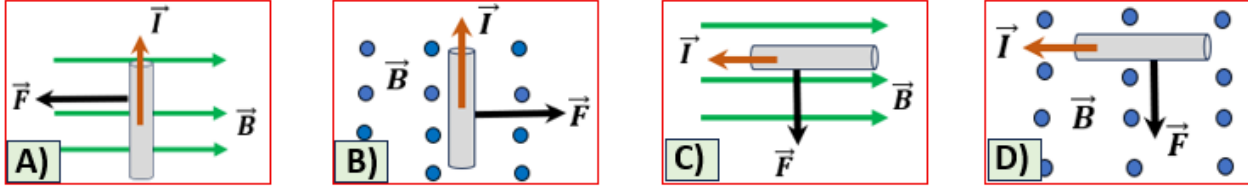
49. Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves

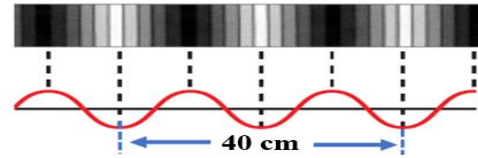
50. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?

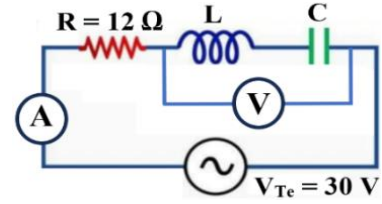
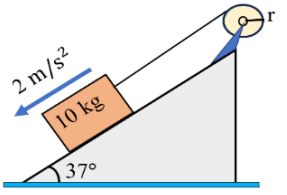
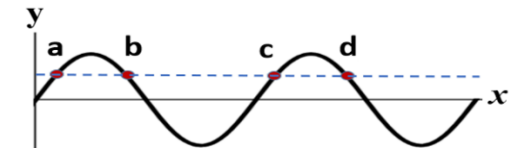
- A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up



Choose the right answers for the following questions: (2 Marks each)

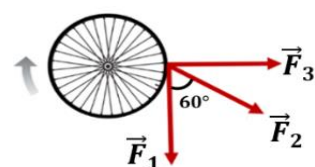
-the difference in the distance traveled by two beams when they are scattered in the same direction from different points: A) Order number B) Path difference C) Resonance D) Diffraction
- A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s . Find the average induced ($\mathcal{E}$) during this interval:
 A) 0.21 V B) -0.21 V C) 3 V D) -3 V
- Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?

- A police car moves at a constant speed and emits a siren of frequency of 1200 Hz . An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz , what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
 A) 30 m/s , approaching B) 20 m/s , moving away C) 20 m/s , approaching D) 30 m/s , moving away
- A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
 A) to the East B) to the North C) to the South D) to the Sky
- The power output of a certain loudspeaker is 250 W . If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
 A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2
- Find the average angular speed of Mars about the sun in rad/s . (Hint: Mars orbits the sun once every 687 days)
 A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$
- An AC source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
 A) 45° B) 37° C) 30° D) 53°
- A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
- A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
 A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up
- A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm . The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?
 A) 0.1 m B) 0.5 m C) zero D) 50 m
- Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
 A) 1.75 m B) 3.5 m C) 5 m D) 7 m

- A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°
- Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? A) drop them from the same height B) roll them down an incline C) weigh them on a scale D) both (A and C) are correct
- Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?
 A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s
- Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
 A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$
- (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
 A) It has tangential acceleration but no centripetal acceleration.
 B) It has centripetal acceleration but no tangential acceleration.
 C) It has both centripetal acceleration and tangential acceleration.
 D) It has neither tangential acceleration nor centripetal acceleration.
- What is the wave speed of the wave shown in the figure If the period of wave 0.04 s ?

 A) 7.5 m/s B) 3.75 m/s C) 6.25 m/s D) 5 m/s
- Find the magnitude of ($\Delta\theta$) in the table? A) -180° B) -90° C) -321° D) -360°

$\Delta\theta$	Δs	r
? deg	-4.2 m	0.75 m
- An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?
 A) $1.6 \times 10^{-16} \text{ N}$ B) $6.1 \times 10^{-16} \text{ N}$ C) $4 \times 10^{-9} \text{ N}$ D) zero
- In the electrical circuit shown in the adjacent figure, if the ammeter reading is 2 A what is the voltmeter reading?

 A) 10 V B) 18 V C) 24 V D) 28 V
- The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
 A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel
- A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm , as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel? A) 0.195 kg.m^2 B) 0.915 kg.m^2 C) 0.751 kg.m^2 D) 0.571 kg.m^2

- Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: A) high potential difference and low current. B) low potential difference and high current. C) high potential difference and high current. D) low potential difference and low current.
- The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?

 A) b,c B) a,b C) c,d D) b,d

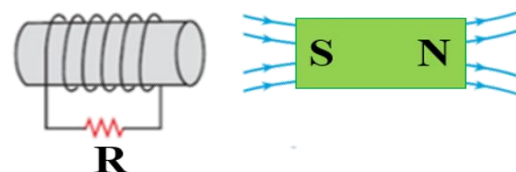
26. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?

A) - 18 N.m
B) 9 N.m
C) - 9 N.m
D) 18 N.m



27. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?

A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



28. Which rotational quantity is equivalent to force (F) in translational motion?

A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)

29. Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:

A) Speed B) Frequency C) Wavelength D) All answers are correct

30. Tesla (T) equal to:

A) $\frac{N}{A \cdot m}$ B) $\frac{N^2}{A \cdot m}$ C) $\frac{N}{A \cdot m^2}$ D) $\frac{N^2}{A \cdot m^2}$

31. The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{m}$. Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T} \cdot \text{m/A}$]?

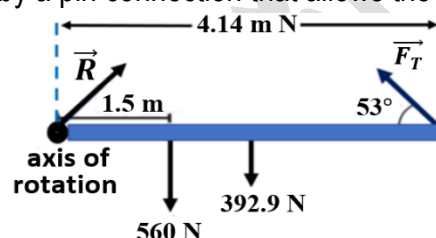
A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$

32. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?

A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
C) Doubling its length. D) doubling the number of its turns.

33. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500 \text{ N}$), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?

A) 500 N B) 400 N C) 560 N D) 630 N



34. What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?

A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$

35. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?

A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m

36. A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?

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37. Which of the following represents Newton's second law in rotational motion?

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A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$

39. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string?

A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

40. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

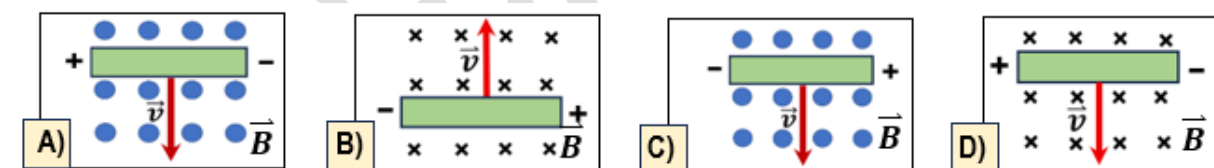
41. What happens to a sound wave, when it travels from a cold room to a hot room?

A) speed of sound increases, frequency remains constant.
B) speed of sound decreases, frequency increases.
C) speed of sound decreases, frequency remains constant.
D) frequency decreases, speed of sound remains constant.

42. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:

A) amplitude B) period C) frequency D) acceleration

43. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



44. A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?

A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s

45. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?

A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s

46. Which of the following waves is used to measure distance between the Earth and the moon with precision?

A) infrasonic waves B) normal light C) Laser beams D) Audible waves

47. Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves

48. The time rate at which a body rotates about an axis:

A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)

49. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?

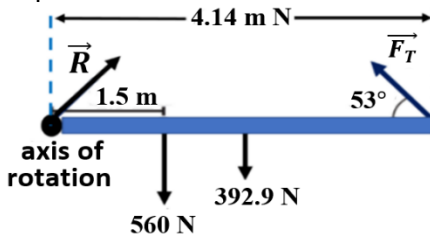
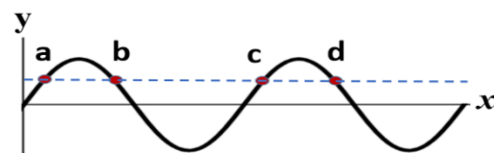
A) 44 μF B) 4.4 μF C) 50 μF D) 5.5 μF

50. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?

A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$



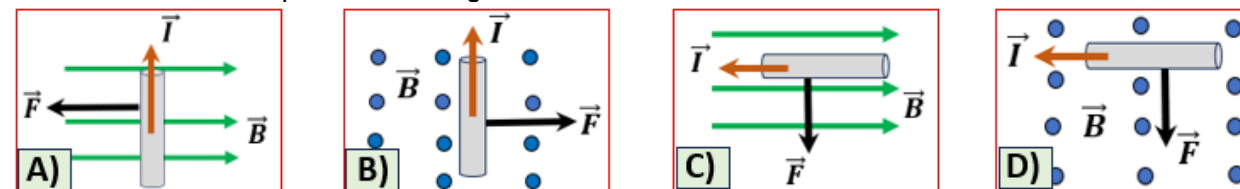
Choose the right answers for the following questions: (2 Marks each)

- A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?

 A) 500 N B) 400 N C) 560 N D) 630 N
- Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
 A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$
-the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction
- The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?

 A) b,c B) a,b C) c,d D) b,d
- The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]?
 A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$
- Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
 A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
 C) Doubling its length. D) doubling the number of its turns.
- Which of the following waves is used to measure distance between the Earth and the moon with precision?
 A) infrasonic waves B) normal light C) Laser beams D) Audible waves
- A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
 A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
- The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
 A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2
- A generator with a maximum output emf of 205 V is connected to 115 Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
- A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?
 A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m
- An inductive coil of resistance R and inductive impedance 125 Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
 A) 44 μF B) 4.4 μF C) 50 μF D) 5.5 μF

13. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?

A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s

14. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



15. What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?

A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$

16. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?

A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$

17. Which of the following represents Newton's second law in rotational motion?

A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{\alpha}$

18. The time rate at which a body rotates about an axis:

A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)

19. Which rotational quantity is equivalent to force (F) in translational motion?

A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)

20. A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°

21. Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:

A) Speed B) Frequency C) Wavelength D) All answers are correct

22. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer

A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel

23. A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?

A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy

24. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:

A) amplitude B) period C) frequency D) acceleration

25. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)

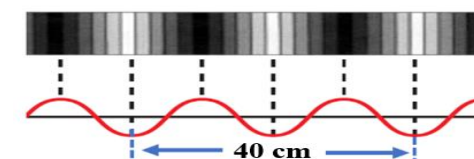
A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away

26. A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced (ϵ) during this interval:

A) 0.21 V B) - 0.21 V C) 3 V D) - 3 V

27. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?

A) 7.5 m/s B) 3.75 m/s
 C) 6.25 m/s D) 5 m/s



28. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?

- A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s

29. What happens to a sound wave, when it travels from a cold room to a hot room?

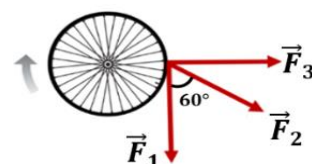
- A) speed of sound increases, frequency remains constant.
B) speed of sound decreases, frequency increases.
C) speed of sound decreases, frequency remains constant.
D) frequency decreases, speed of sound remains constant.

30. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

- A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

31. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?

- A) - 18 N.m B) 9 N.m
C) - 9 N.m D) 18 N.m



32. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?

- A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up

33. An alpha particle ($q = 3.2 \times 10^{-19}$ C) moves at a speed of 2.5×10^6 m/s perpendicular to a magnetic field of strength 2×10^{-4} T, what is the magnitude of the magnetic force on the particle?

- A) 1.6×10^{-16} N B) 6.1×10^{-16} N C) 4×10^{-9} N D) zero

34. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?

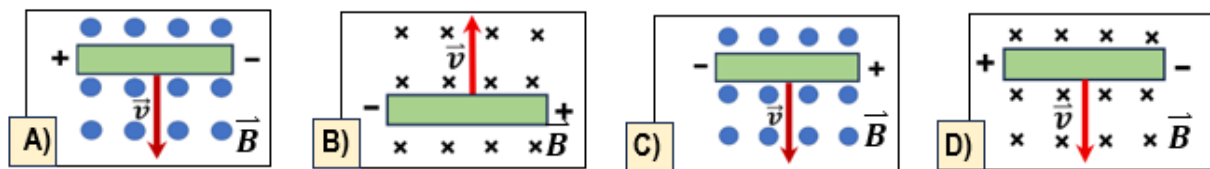
- A) to the East B) to the North C) to the South D) to the Sky

35. Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?

- A) 1.75 m B) 3.5 m C) 5 m D) 7 m

36. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: A) high potential difference and low current. B) low potential difference and high current. C) high potential difference and high current. D) low potential difference and low current.

37. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



38. Earth ($m = 5.97 \times 10^{24}$ kg) orbits the sun ($M = 1.99 \times 10^{30}$ kg) at a mean distance of (1.5×10^{11} m) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11}$ N.m²/kg²)

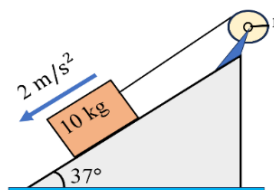
- A) 5.29×10^{32} N B) 3.52×10^{22} N C) 5.9×10^{-2} N D) 1.77×10^{-8} N

39. Tesla (T) equal to:

- A) $\frac{N}{A \cdot m}$ B) $\frac{N^2}{A \cdot m}$ C) $\frac{N}{A \cdot m^2}$ D) $\frac{N^2}{A \cdot m^2}$

40. A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?

- A) 0.195 kg.m^2 B) 0.915 kg.m^2
C) 0.751 kg.m^2 D) 0.571 kg.m^2



41. Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves

42. Find the magnitude of ($\Delta\theta$) in the table? A) -180° B) -90°
C) -321° D) -360°

$\Delta\theta$	Δs	r
? deg	- 4.2 m	0.75 m

43. Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? A) drop them from the same height B) roll them down an incline
C) weigh them on a scale D) both (A and C) are correct

44. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string? A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

45. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)

- A) 1.6×10^{-5} rad/s B) 1.06×10^{-7} rad/s C) 1.99×10^{-7} rad/s D) 2×10^{-4} rad/s

46. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit is 0.425 A calculate phase difference angle between the total current and the potential difference of the source:

- A) 45° B) 37° C) 30° D) 53°

47. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?

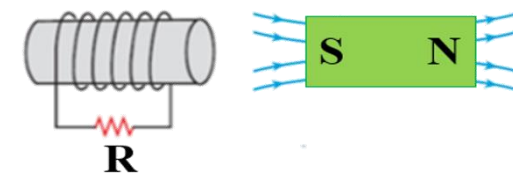
- A) 0.1 m B) 0.5 m C) zero D) 50 m

48. (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?

- A) It has tangential acceleration but no centripetal acceleration.
B) It has centripetal acceleration but no tangential acceleration.
C) It has both centripetal acceleration and tangential acceleration.
D) It has neither tangential acceleration nor centripetal acceleration.

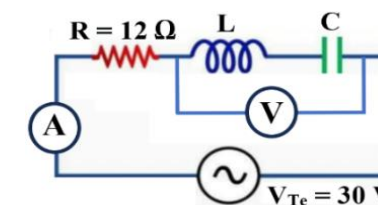
49. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?

- A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



50. In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?

- A) 10 V B) 18 V
C) 24 V D) 28 V



Choose the right answers for the following questions: (2 Marks each)

1. Earth ($m = 5.97 \times 10^{24}$ kg) orbits the sun ($M = 1.99 \times 10^{30}$ kg) at a mean distance of (1.5×10^{11} m) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11}$ N.m²/kg²)
A) 5.29×10^{32} N B) 3.52×10^{22} N C) 5.9×10^{-2} N D) 1.77×10^{-8} N

2. Find the magnitude of ($\Delta\theta$) in the table? A) -180° B) -90°
C) -321° D) -360°

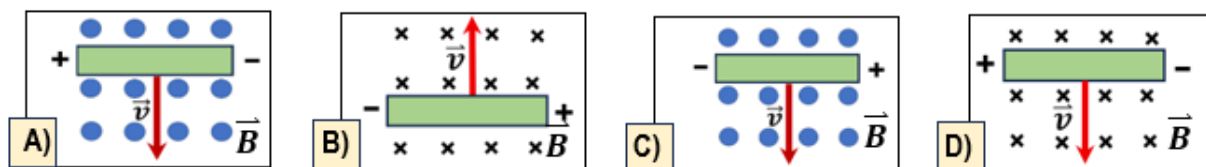
$\Delta\theta$	Δs	r
? deg	-4.2 m	0.75 m

3. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782$ m/s²)?
A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s

4. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string?
A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

5. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?
A) 0.1 m B) 0.5 m C) zero D) 50 m

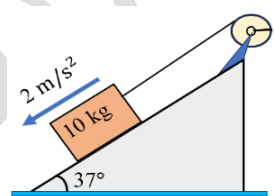
6. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



7. A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°

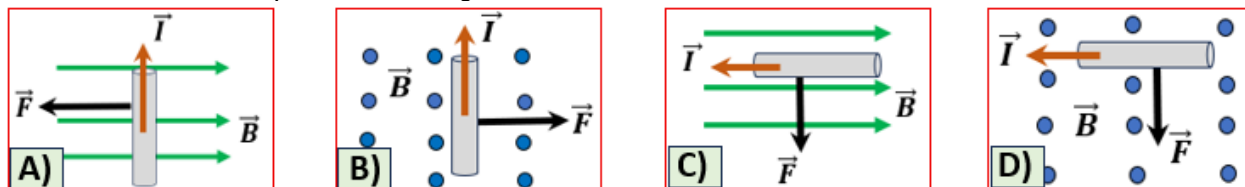
8. Which of the following waves is used to measure distance between the Earth and the moon with precision?
A) infrasonic waves B) normal light C) Laser beams D) Audible waves

9. A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s². Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
A) 0.195 kg.m² B) 0.915 kg.m²
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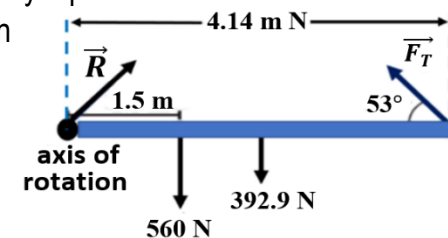


10. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
A) 45° B) 37° C) 30° D) 53°

11. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



12. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
A) 500 N B) 400 N C) 560 N D) 630 N

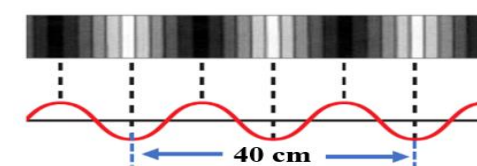


13. A 256-turn coil with a cross-sectional area of 0.0025 m² is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced (ϵ) during this interval:
A) 0.21 V B) -0.21 V C) 3 V D) -3 V

14.the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction

15. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$

16. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?



- A) 7.5 m/s B) 3.75 m/s
C) 6.25 m/s D) 5 m/s

17. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: A) high potential difference and low current. B) low potential difference and high current.
C) high potential difference and high current. D) low potential difference and low current.

18. The time rate at which a body rotates about an axis:

- A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration(α)

19. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

- A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

20. Tesla (T) equal to: A) $\frac{N}{A \cdot m}$ B) $\frac{N^2}{A \cdot m}$ C) $\frac{N}{A \cdot m^2}$ D) $\frac{N^2}{A \cdot m^2}$

21. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s

22. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?

- A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$

23. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
A) 1.6×10^{-5} rad/s B) 1.06×10^{-7} rad/s C) 1.99×10^{-7} rad/s D) 2×10^{-4} rad/s

24. Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? A) drop them from the same height B) roll them down an incline
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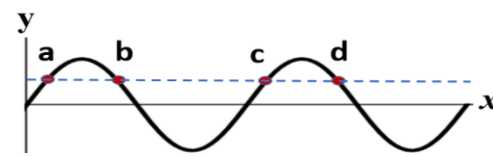
25. A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s², what is its tangential speed?
A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s

26. A generator with a maximum output emf of 205 V is connected to 115 Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A

27. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel

28. The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?

A) b,c
B) a,b
C) c,d
D) b,d



29. The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?

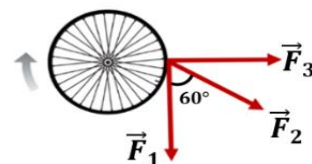
A) 0.47 W/m²
B) 4.7 W/m²
C) 0.16 W/m²
D) 1.6 W/m²

30. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s², how far does the coin roll before coming to rest?

A) 2.3 m
B) 10.2 m
C) 8.53 m
D) 1.02 m

31. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?

A) - 18 N.m
B) 9 N.m
C) - 9 N.m
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32. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?

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A) 1.75 m
B) 3.5 m
C) 5 m
D) 7 m

35. An alpha particle ($q = 3.2 \times 10^{-19}$ C) moves at a speed of 2.5×10^6 m/s perpendicular to a magnetic field of strength 2×10^{-4} T, what is the magnitude of the magnetic force on the particle?

A) 1.6×10^{-16} N
B) 6.1×10^{-16} N
C) 4×10^{-9} N
D) zero

36. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?

A) Doubling its cross-sectional area.
B) Reducing its cross-sectional area by half.
C) Doubling its length.
D) doubling the number of its turns.

37. What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?

A) $\lambda = L$
B) $\lambda = 2L$
C) $\lambda = 3L$
D) $\lambda = 4L$

38. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11}$ Hz. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?

A) 44 μ F
B) 4.4 μ F
C) 50 μ F
D) 5.5 μ F

39. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:

A) amplitude
B) period
C) frequency
D) acceleration

40. Which of the following represents Newton's second law in rotational motion?

A) $\Sigma \tau = I \alpha$
B) $\Sigma F = m a$
C) $\Sigma F = \frac{m}{a}$
D) $\Sigma \tau = \frac{I}{\alpha}$

41. A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?

A) angular momentum
B) angular speed
C) moment of inertia
D) rotational kinetic energy

42. The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7}$ T.m/A]?

A) 5×10^{-4} T
B) 5×10^{-3} T
C) 5×10^{-2} T
D) 5×10^{-1} T

43. Which rotational quantity is equivalent to force (F) in translational motion?

A) moment of inertia (I)
B) angular momentum (L)
C) torque (τ)
D) mass (m)

44. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?

A) 48 turns, Step - up
B) 8533 turns, Step - down
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45. Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:

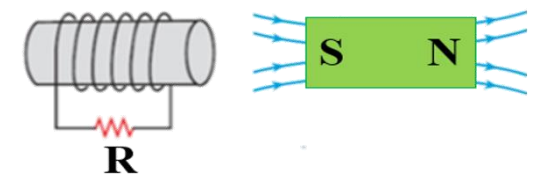
A) Speed
B) Frequency
C) Wavelength
D) All answers are correct

46. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)

A) 30 m/s, approaching
B) 20 m/s, moving away
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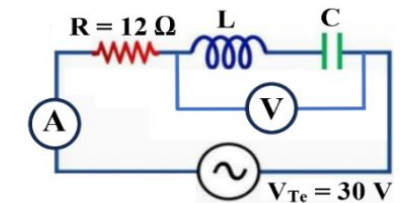
47. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?

A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
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48. In the electrical circuit shown in the adjacent figure, if the ammeters reading is 2 A what is the voltmeters reading?

A) 10 V
B) 18 V
C) 24 V
D) 28 V



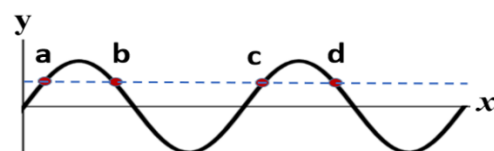
49. (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?

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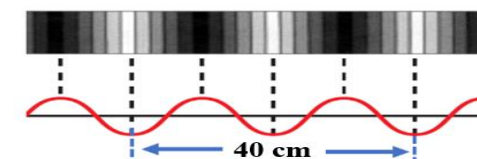
Choose the right answers for the following questions: (2 Marks each)

- A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s . Find the average induced (ε) during this interval:
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- A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m , what is the period of the oscillation?
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 C) high potential difference and high current. D) low potential difference and low current.
- Find the average angular speed of Mars about the sun in rad/s . (Hint: Mars orbits the sun once every 687 days)
 A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$
- Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which?
 A) drop them from the same height B) roll them down an incline
 C) weigh them on a scale D) both (A and C) are correct
- Which of the following represents Newton's second law in rotational motion?
 A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{a}$
- The power output of a certain loudspeaker is 250 W . If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
 A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2
- Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
 A) Speed B) Frequency C) Wavelength D) All answers are correct
- A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
 A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up
- The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
 A) b,c B) a,b
 C) c,d D) b,d

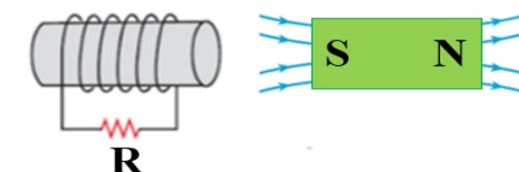


- Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
 A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$
- An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?
 A) $1.6 \times 10^{-16} \text{ N}$ B) $6.1 \times 10^{-16} \text{ N}$ C) $4 \times 10^{-9} \text{ N}$ D) zero

- What is the wave speed of the wave shown in the figure If the period of wave 0.04 s ?
 A) 7.5 m/s B) 3.75 m/s
 C) 6.25 m/s D) 5 m/s

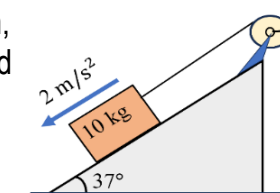


- A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
 A) From left to right, when the bar magnet is moved toward the coil.
 B) From left to right, when the bar magnet is moved away from the coil.
 C) From right to left, when the bar magnet is moved away from the coil.
 D) Both (A and C) are correct.



- What happens to a sound wave, when it travels from a cold room to a hot room?
 A) speed of sound increases, frequency remains constant.
 B) speed of sound decreases, frequency increases.
 C) speed of sound decreases, frequency remains constant.
 D) frequency decreases, speed of sound remains constant.

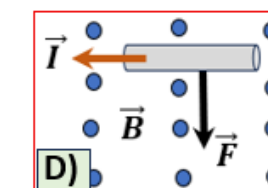
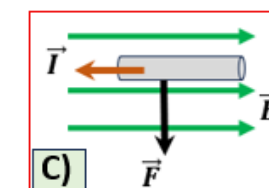
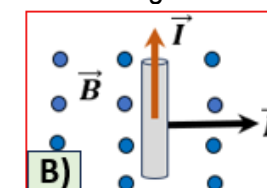
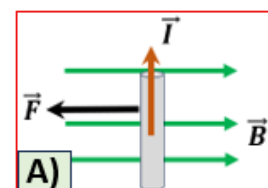
- A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm , as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
 A) 0.195 kg.m^2 B) 0.915 kg.m^2
 C) 0.751 kg.m^2 D) 0.571 kg.m^2



- Find the magnitude of ($\Delta \theta$) in the table?
 A) -180° B) -90°
 C) -321° D) -360°

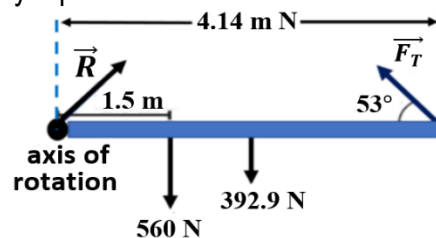
$\Delta \theta$	Δs	r
? deg	-4.2 m	0.75 m

- What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L ?
 A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$
- Diffraction is a property of :
 A) Water waves B) Sound waves C) Light waves D) All waves
- A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor:
 A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
- Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



- The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]?
 A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$

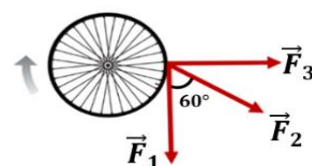
26. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
- A) 500 N B) 400 N C) 560 N D) 630 N



27. A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
- A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy

28. Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
- A) 1.75 m B) 3.5 m C) 5 m D) 7 m

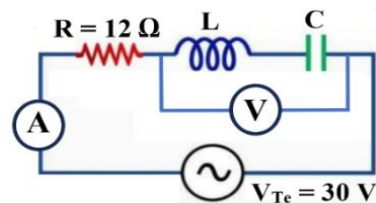
29. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?
- A) - 18 N.m B) 9 N.m
C) - 9 N.m D) 18 N.m



30. A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear?
- A) 0.125° B) 8° C) 0.63° D) 11°

31. Which of the following waves is used to measure distance between the Earth and the moon with precision?
- A) infrasonic waves B) normal light C) Laser beams D) Audible waves

32. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
- A) 45° B) 37° C) 30° D) 53°



33. In the electrical circuit shown in the adjacent figure, if the ammeters reading is 2 A what is the voltmeters reading?
- A) 10 V B) 18 V
C) 24 V D) 28 V

34. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
- A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
C) Doubling its length. D) doubling the number of its turns.

35. Which rotational quantity is equivalent to force (F) in translational motion?
- A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)

36. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?
- A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s

37. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?
- A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m

38.the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction

39. A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
- A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s

40. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?
- A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$

41. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
- A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

42. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
- A) to the East B) to the North C) to the South D) to the Sky

43. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
- A) amplitude B) period C) frequency D) acceleration

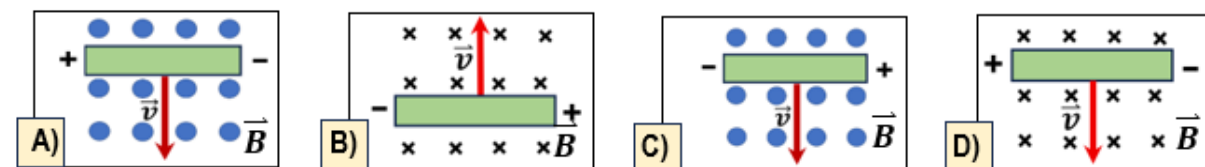
44. The time rate at which a body rotates about an axis:
- A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)

45. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?
- A) 0.1 m B) 0.5 m C) zero D) 50 m

46. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string?
- A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

47. Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of ($1.5 \times 10^{11} \text{ m}$) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)
- A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$

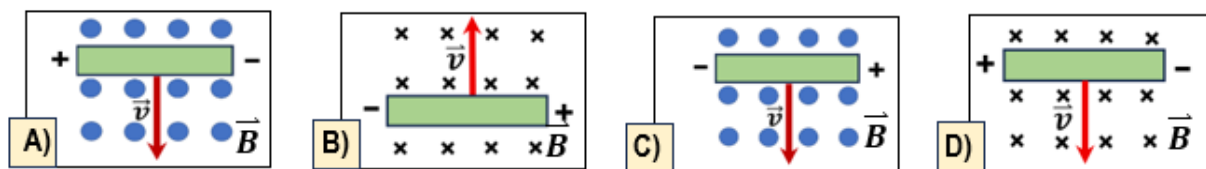
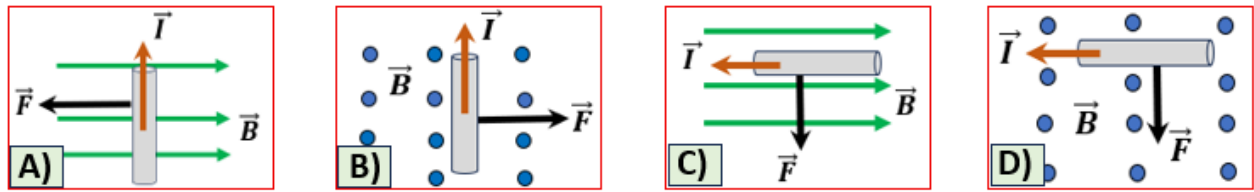
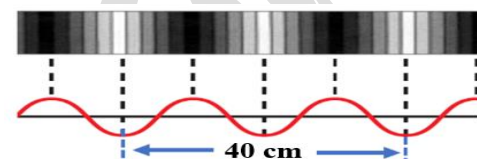
48. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



49. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
- A) $44 \mu\text{F}$ B) $4.4 \mu\text{F}$ C) $50 \mu\text{F}$ D) $5.5 \mu\text{F}$

50. Tesla (T) equal to:
- A) $\frac{\text{N}}{\text{A} \cdot \text{m}}$ B) $\frac{\text{N}^2}{\text{A} \cdot \text{m}}$ C) $\frac{\text{N}}{\text{A} \cdot \text{m}^2}$ D) $\frac{\text{N}^2}{\text{A} \cdot \text{m}^2}$

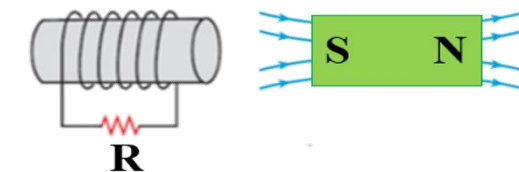
Choose the right answers for the following questions: (2 Marks each)

- An AC source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
 A) 45° B) 37° C) 30° D) 53°
- A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?

- Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?

- What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?
 A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$
- A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
 A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away
- A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
 A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy
- Tesla (T) equal to:
 A) $\frac{N}{A \cdot m}$ B) $\frac{N^2}{A \cdot m}$ C) $\frac{N}{A \cdot m^2}$ D) $\frac{N^2}{A \cdot m^2}$
- What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?

 A) 7.5 m/s B) 3.75 m/s
 C) 6.25 m/s D) 5 m/s
- Find the magnitude of ($\Delta\theta$) in the table?

$\Delta\theta$	Δs	r
? deg	- 4.2 m	0.75 m

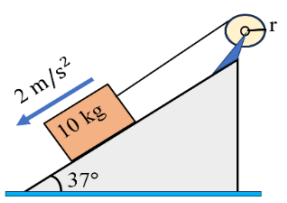
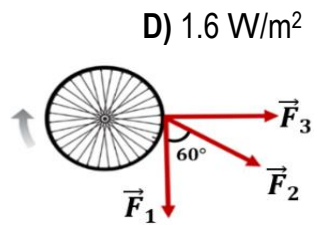
 A) -180° B) -90°
 C) -321° D) -360°
- A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
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- A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?
 A) From left to right, when the bar magnet is moved toward the coil.
 B) From left to right, when the bar magnet is moved away from the coil.
 C) From right to left, when the bar magnet is moved away from the coil.
 D) Both (A and C) are correct.

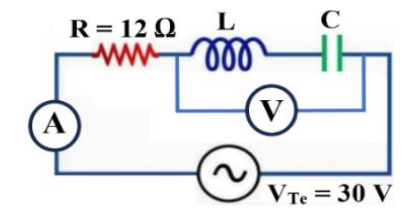
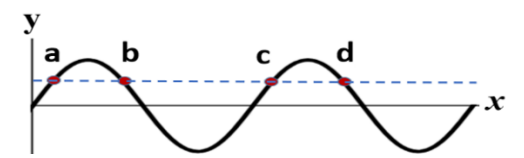
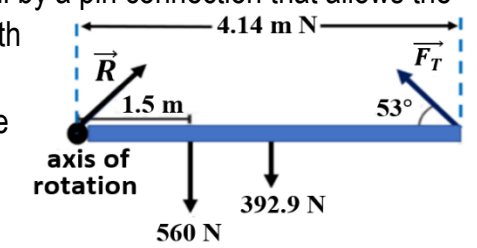


- The time rate at which a body rotates about an axis:
 A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)
- (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
 A) It has tangential acceleration but no centripetal acceleration.
 B) It has centripetal acceleration but no tangential acceleration.
 C) It has both centripetal acceleration and tangential acceleration.
 D) It has neither tangential acceleration nor centripetal acceleration.
- A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?
 A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m
- An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11}$ Hz. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
 A) $44 \mu\text{F}$ B) $4.4 \mu\text{F}$ C) $50 \mu\text{F}$ D) $5.5 \mu\text{F}$
- (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
 A) amplitude B) period C) frequency D) acceleration
- A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced (ε) during this interval:
 A) 0.21 V B) - 0.21 V C) 3 V D) - 3 V
- Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
 A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$
- Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?
 A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$
- What happens to a sound wave, when it travels from a cold room to a hot room?
 A) speed of sound increases, frequency remains constant.
 B) speed of sound decreases, frequency increases.
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- Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
 A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$
- Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?
 A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s
- Which of the following represents Newton's second law in rotational motion?
 A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{\alpha}$

24. A transformer is used to convert 120 V to 9 V for use in a portable CD player. If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
 A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up
25. The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
 A) 0.47 W/m² B) 4.7 W/m² C) 0.16 W/m² D) 1.6 W/m²
26. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?
 A) - 18 N.m B) 9 N.m
 C) - 9 N.m D) 18 N.m
27. Which rotational quantity is equivalent to force(F) in translational motion?
 A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)
28. Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves
29. A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s². Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
 A) 0.195 kg.m² B) 0.915 kg.m²
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30. Two spheres look identical and have the same mass and same radii. One is hollow, and the other is solid. Which method would determine which is which?
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 A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
 C) Doubling its length. D) doubling the number of its turns.
32. An alpha particle ($q = 3.2 \times 10^{-19}$ C) moves at a speed of 2.5×10^6 m/s perpendicular to a magnetic field of strength 2×10^{-4} T, what is the magnitude of the magnetic force on the particle?
 A) 1.6×10^{-16} N B) 6.1×10^{-16} N C) 4×10^{-9} N D) zero
33. Earth ($m = 5.97 \times 10^{24}$ kg) orbits the sun ($M = 1.99 \times 10^{30}$ kg) at a mean distance of (1.5×10^{11} m). What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11}$ N.m²/kg²)
 A) 5.29×10^{32} N B) 3.52×10^{22} N C) 5.9×10^{-2} N D) 1.77×10^{-8} N
34. Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
 A) 1.75 m B) 3.5 m C) 5 m D) 7 m
35. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by:
 A) high potential difference and low current. B) low potential difference and high current.
 C) high potential difference and high current. D) low potential difference and low current.
36. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
 A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$
37. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
 A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel
38. A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s², what is its tangential speed?
 A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
39. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere. What is the amplitude of the resultant wave if the interference is constructive?
 A) 0.1 m B) 0.5 m C) zero D) 50 m

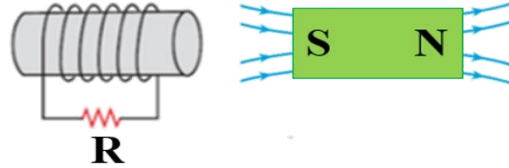
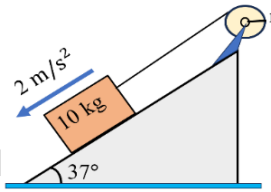


40. A generator with a maximum output emf of 205 V is connected to 115 Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
41. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
 A) 500 N B) 400 N C) 560 N D) 630 N
42. The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
 A) b,c B) a,b
 C) c,d D) b,d
43. Which of the following waves is used to measure distance between the Earth and the moon with precision?
 A) infrasonic waves B) normal light C) Laser beams D) Audible waves
44. In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A, what is the voltmeter's reading?
 A) 10 V B) 18 V
 C) 24 V D) 28 V
45. A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wavelength of 422 nm appear?
 A) 0.125° B) 8° C) 0.63° D) 11°
46. Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
 A) Speed B) Frequency C) Wavelength D) All answers are correct
47. The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$. Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7}$ T.m/A]?
 A) 5×10^{-4} T B) 5×10^{-3} T C) 5×10^{-2} T D) 5×10^{-1} T
48. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string?
 A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s
49.the difference in the distance traveled by two beams when they are scattered in the same direction from different points:
 A) Order number B) Path difference C) Resonance D) Diffraction
50. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
 A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s



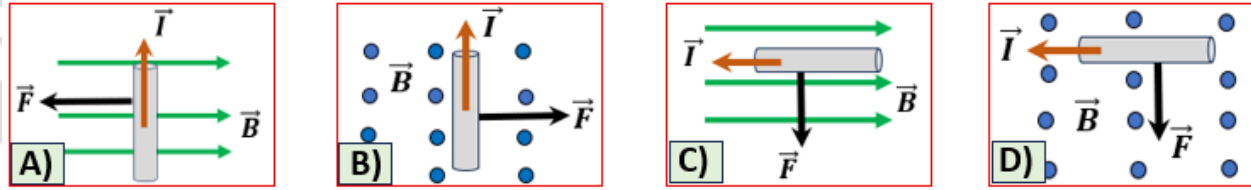
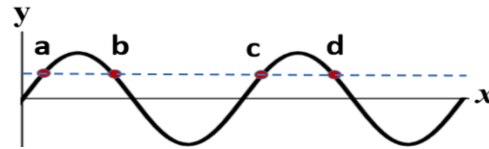


Choose the right answers for the following questions: (2 Marks each)

- The time rate at which a body rotates about an axis:
 A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)
- A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?

 A) From left to right, when the bar magnet is moved toward the coil.
 B) From left to right, when the bar magnet is moved away from the coil.
 C) From right to left, when the bar magnet is moved away from the coil.
 D) Both (A and C) are correct.
- Which of the following waves is used to measure distance between the Earth and the moon with precision?
 A) infrasonic waves B) normal light C) Laser beams D) Audible waves
- Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by:
 A) high potential difference and low current. B) low potential difference and high current.
 C) high potential difference and high current. D) low potential difference and low current.
- What happens to a sound wave, when it travels from a cold room to a hot room?
 A) speed of sound increases, frequency remains constant.
 B) speed of sound decreases, frequency increases.
 C) speed of sound decreases, frequency remains constant.
 D) frequency decreases, speed of sound remains constant.
- Tesla (T) equal to:
 A) $\frac{N}{A \cdot m}$ B) $\frac{N^2}{A \cdot m}$ C) $\frac{N}{A \cdot m^2}$ D) $\frac{N^2}{A \cdot m^2}$
- A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?

 A) 0.195 kg.m^2 B) 0.915 kg.m^2
 C) 0.751 kg.m^2 D) 0.571 kg.m^2
- (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
 A) It has tangential acceleration but no centripetal acceleration.
 B) It has centripetal acceleration but no tangential acceleration.
 C) It has both centripetal acceleration and tangential acceleration.
 D) It has neither tangential acceleration nor centripetal acceleration.
- A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor:
 A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
- Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
 A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$
- Find the magnitude of ($\Delta\theta$) in the table?

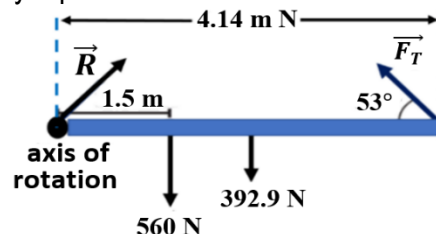
$\Delta\theta$	Δs	r
? deg	-4.2 m	0.75 m

 A) -180° B) -90°
 C) -321° D) -360°
- A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere. What is the amplitude of the resultant wave if the interference is constructive?
 A) 0.1 m B) 0.5 m C) zero D) 50 m
-the difference in the distance traveled by two beams when they are scattered in the same direction from different points:
 A) Order number B) Path difference C) Resonance D) Diffraction

- A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
 A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up
- Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?
 A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$
- A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced ($\mathcal{E}$) during this interval:
 A) 0.21 V B) - 0.21 V C) 3 V D) - 3 V
- A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
 A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy
- Which of the following represents Newton's second law in rotational motion?
 A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{\alpha}$
- Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?

- Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of ($1.5 \times 10^{11} \text{ m}$) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)
 A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$
- Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
 A) 1.75 m B) 3.5 m C) 5 m D) 7 m
- Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?
 A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s
- A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
 A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s
- An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle?
 A) $1.6 \times 10^{-16} \text{ N}$ B) $6.1 \times 10^{-16} \text{ N}$ C) $4 \times 10^{-9} \text{ N}$ D) zero
- A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?
 A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m
- The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?

 A) b,c B) a,b
 C) c,d D) b,d
- Which rotational quantity is equivalent to force (F) in translational motion?
 A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)

28. Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
- A) Speed B) Frequency C) Wavelength D) All answers are correct

29. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?
- A) 500 N B) 400 N C) 560 N D) 630 N



30. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
- A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel

31. An AC source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
- A) 45° B) 37° C) 30° D) 53°

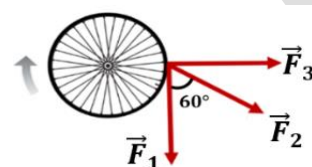
32. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
- A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
C) Doubling its length. D) doubling the number of its turns.

33. The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
- A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2

34. A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°

35. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string? A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

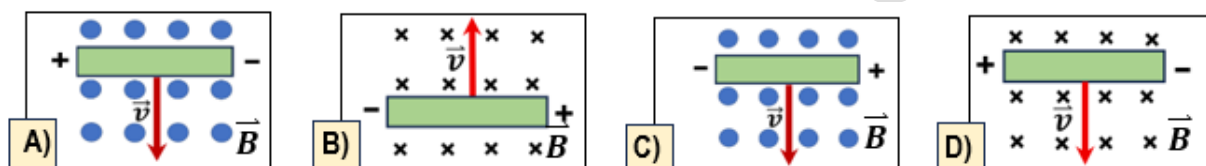
36. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?
- A) - 18 N.m B) 9 N.m
C) - 9 N.m D) 18 N.m



37. The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]?
- A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$

38. A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
- A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s

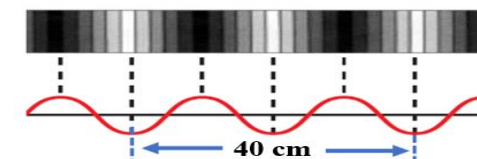
39. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



40. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
- A) $44 \mu\text{F}$ B) $4.4 \mu\text{F}$ C) $50 \mu\text{F}$ D) $5.5 \mu\text{F}$

41. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
- A) to the East B) to the North C) to the South D) to the Sky

42. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?
- A) 7.5 m/s B) 3.75 m/s
C) 6.25 m/s D) 5 m/s



43. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
- A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away

44. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:
- A) amplitude B) period C) frequency D) acceleration

45. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
- A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

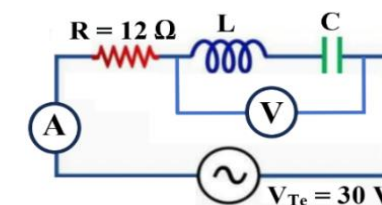
46. Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? A) drop them from the same height B) roll them down an incline
C) weigh them on a scale D) both (A and C) are correct

47. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
- A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$

48. What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?
- A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$

49. Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves

50. In the electrical circuit shown in the adjacent figure, if the ammeters reading is 2 A what is the voltmeters reading?
- A) 10 V B) 18 V
C) 24 V D) 28 V





Choose the right answers for the following questions: (2 Marks each)

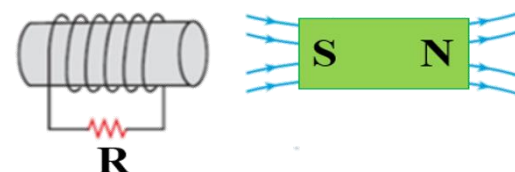
1. (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
 A) It has tangential acceleration but no centripetal acceleration.
 B) It has centripetal acceleration but no tangential acceleration.
 C) It has both centripetal acceleration and tangential acceleration.
 D) It has neither tangential acceleration nor centripetal acceleration.

2. A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)

A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away

3. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?

A) From left to right, when the bar magnet is moved toward the coil.
 B) From left to right, when the bar magnet is moved away from the coil.
 C) From right to left, when the bar magnet is moved away from the coil.
 D) Both (A and C) are correct.



4. Earth ($m = 5.97 \times 10^{24}$ kg) orbits the sun ($M = 1.99 \times 10^{30}$ kg) at a mean distance of (1.5×10^{11} m) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11}$ N.m²/kg²)

A) 5.29×10^{32} N B) 3.52×10^{22} N C) 5.9×10^{-2} N D) 1.77×10^{-8} N

5. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?

A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$

6. The time rate at which a body rotates about an axis:

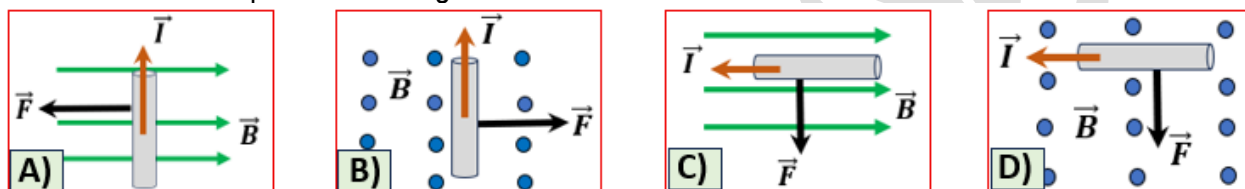
A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)

7. Which of the following represents Newton's second law in rotational motion?

A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{\alpha}$

8. A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°

9. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



10. Which rotational quantity is equivalent to force (F) in translational motion?

A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)

11. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?

A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$

12. What happens to a sound wave, when it travels from a cold room to a hot room?

A) speed of sound increases, frequency remains constant.

B) speed of sound decreases, frequency increases.

C) speed of sound decreases, frequency remains constant.

D) frequency decreases, speed of sound remains constant.

13. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string? A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

14. What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?

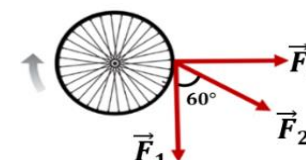
A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$

15. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782$ m/s²)?

A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s

16. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?

A) - 18 N.m B) 9 N.m
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17. Tesla (T) equal to:

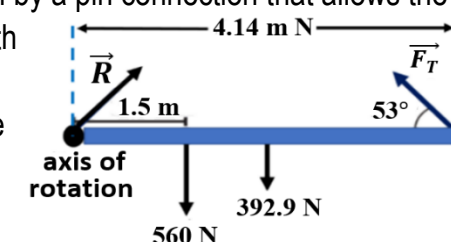
A) $\frac{N}{A \cdot m}$ B) $\frac{N^2}{A \cdot m}$ C) $\frac{N}{A \cdot m^2}$ D) $\frac{N^2}{A \cdot m^2}$

18. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?

A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up

19. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?

A) 500 N B) 400 N C) 560 N D) 630 N



20. An inductive coil of resistance R and inductive impedance 125 Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11}$ Hz. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?

A) 44 μ F B) 4.4 μ F C) 50 μ F D) 5.5 μ F

21. A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s², what is its tangential speed?

A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s

22. A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?

A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s

23. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?

A) 0.1 m B) 0.5 m C) zero D) 50 m

24. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?

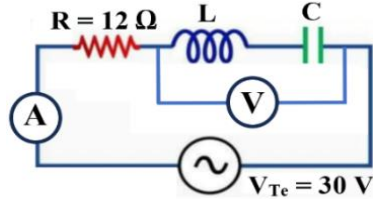
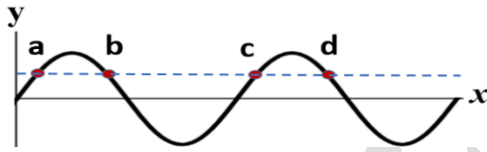
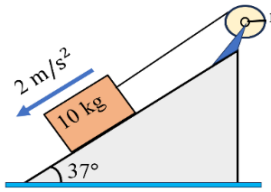
A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
 C) Doubling its length. D) doubling the number of its turns.

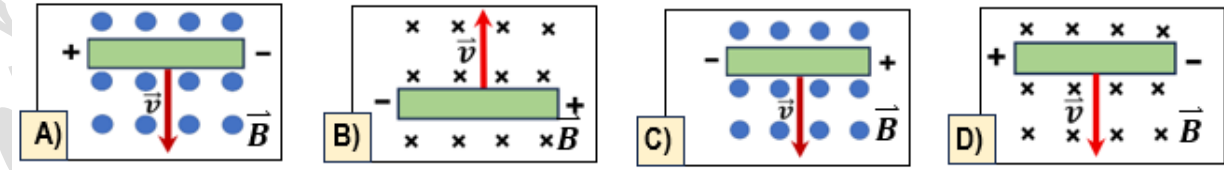
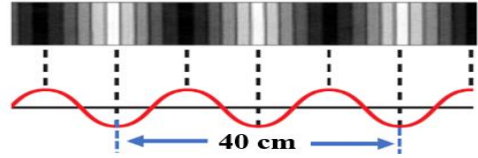
25. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:

A) amplitude B) period C) frequency D) acceleration

26. Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?

A) 1.75 m B) 3.5 m C) 5 m D) 7 m

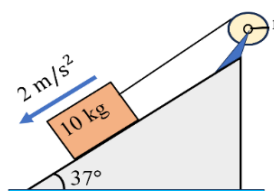
27. Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
 A) 1.6×10^{-5} rad/s B) 1.06×10^{-7} rad/s C) 1.99×10^{-7} rad/s D) 2×10^{-4} rad/s
28. An alpha particle ($q = 3.2 \times 10^{-19}$ C) moves at a speed of 2.5×10^6 m/s perpendicular to a magnetic field of strength 2×10^{-4} T, what is the magnitude of the magnetic force on the particle?
 A) 1.6×10^{-16} N B) 6.1×10^{-16} N C) 4×10^{-9} N D) zero
29. The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7}$ T.m/A]?
 A) 5×10^{-4} T B) 5×10^{-3} T C) 5×10^{-2} T D) 5×10^{-1} T
30. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
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31. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer
 A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel
32. In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?
 A) 10 V B) 18 V
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33. A skater rotates on the ice, and the friction between the two skates and the ice is negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
 A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy
34. The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
 A) b, c B) a, b
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35.the difference in the distance traveled by two beams when they are scattered in the same direction from different points: A) Order number B) Path difference C) Resonance D) Diffraction
36. Find the magnitude of ($\Delta\theta$) in the table?
 A) -180° B) -90°
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| ? deg | - 4.2 m | 0.75 m |
37. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
 A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$
38. A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
 A) 0.195 kg.m^2 B) 0.915 kg.m^2
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42. The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
 A) 0.47 W/m^2 B) 4.7 W/m^2 C) 0.16 W/m^2 D) 1.6 W/m^2
43. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?
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 A) 0.21 V B) - 0.21 V C) 3 V D) - 3 V
46. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?
- 
47. What is the wave speed of the wave shown in the figure? If the period of wave 0.04 s?
 A) 7.5 m/s B) 3.75 m/s
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48. Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves
49. A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor: A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A
50. An AC source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit is 0.425 A calculate phase difference angle between the total current and the potential difference of the source:
 A) 45° B) 37° C) 30° D) 53°

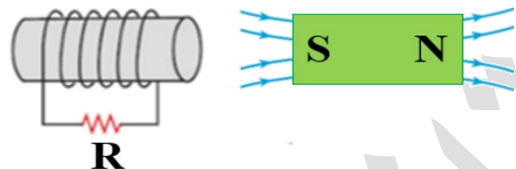


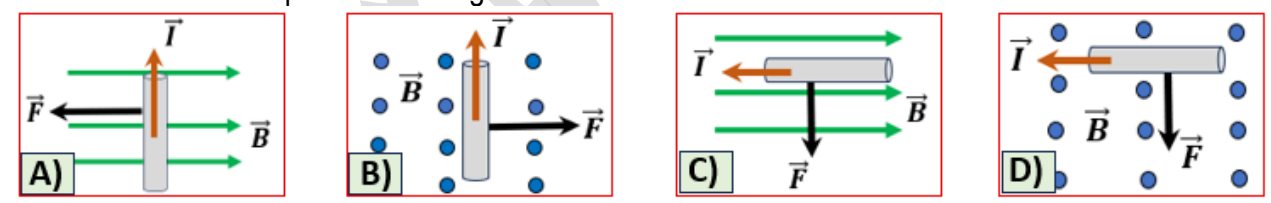
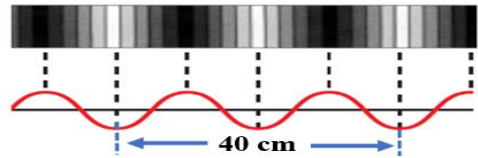
Choose the right answers for the following questions: (2 Marks each)

- A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s^2 . Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?
 A) 0.195 kg.m^2 B) 0.915 kg.m^2 C) 0.751 kg.m^2 D) 0.571 kg.m^2
- The time rate at which a body rotates about an axis:
 A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration (α)
- Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
 A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
 C) Doubling its length. D) doubling the number of its turns.
- A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?
- The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?
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- Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
 A) 1.75 m B) 3.5 m C) 5 m D) 7 m
- The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$] ?
 A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$
- The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
 A) b,c B) a,b C) c,d D) b,d
- Which rotational quantity is equivalent to force (F) in translational motion?
 A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)
- In the electrical circuit shown in the adjacent figure, if the ammeter's reading is 2 A what is the voltmeter's reading?
 A) 10 V B) 18 V C) 24 V D) 28 V



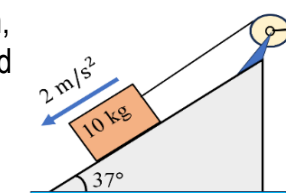
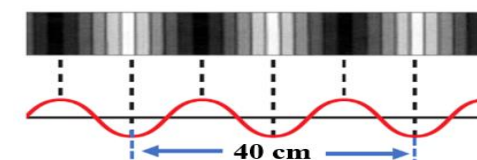
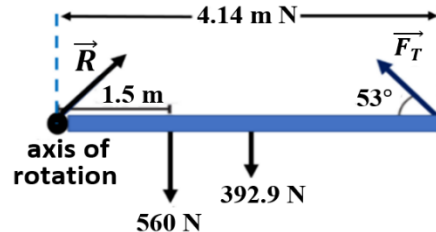
- A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500 \text{ N}$), find the force (R) exerted by the beam on the wall. If the beam is to be completely in equilibrium (as shown in the figure)?
 A) 500 N B) 400 N C) 560 N D) 630 N
- Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of ($1.5 \times 10^{11} \text{ m}$) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)
 A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$
- (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
 A) It has tangential acceleration but no centripetal acceleration.
 B) It has centripetal acceleration but no tangential acceleration.
 C) It has both centripetal acceleration and tangential acceleration.
 D) It has neither tangential acceleration nor centripetal acceleration.
- A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
 A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s
- A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
 A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away
- A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string?
 A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s
- A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
 A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
- Which of the following waves is used to measure distance between the Earth and the moon with precision?
 A) infrasonic waves B) normal light C) Laser beams D) Audible waves
- In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?
 A) - 18 N.m B) 9 N.m C) - 9 N.m D) 18 N.m
- A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?
 A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up
-the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes:
 A) Order number B) Path difference C) Resonance D) Diffraction
- A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear?
 A) 0.125° B) 8° C) 0.63° D) 11°
- If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?
 A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$
- Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
 A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$

25. Two spheres look identical and have the same mass and same radii. One is hollow, and the other is solid. Which method would determine which is which? **A)** drop them from the same height **B)** roll them down an incline **C)** weigh them on a scale **D)** both (A and C) are correct
26. A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected? **A)** to the East **B)** to the North **C)** to the South **D)** to the Sky
27. Which of the following represents Newton's second law in rotational motion? **A)** $\Sigma \tau = I \alpha$ **B)** $\Sigma F = m a$ **C)** $\Sigma F = \frac{m}{a}$ **D)** $\Sigma \tau = \frac{I}{a}$
28. What happens to a sound wave, when it travels from a cold room to a hot room? **A)** speed of sound increases, frequency remains constant. **B)** speed of sound decreases, frequency increases. **C)** speed of sound decreases, frequency remains constant. **D)** frequency decreases, speed of sound remains constant.
29. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent: **A)** amplitude **B)** period **C)** frequency **D)** acceleration
30. Tesla (T) equal to: **A)** $\frac{N}{A \cdot m}$ **B)** $\frac{N^2}{A \cdot m}$ **C)** $\frac{N}{A \cdot m^2}$ **D)** $\frac{N^2}{A \cdot m^2}$
31. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R? **A)** From left to right, when the bar magnet is moved toward the coil. **B)** From left to right, when the bar magnet is moved away from the coil. **C)** From right to left, when the bar magnet is moved away from the coil. **D)** Both (A and C) are correct.
- 
32. Find the magnitude of $(\Delta\theta)$ in the table? **A)** -180° **B)** -90° **C)** -321° **D)** -360°
- | $\Delta\theta$ | Δs | r |
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34. Diffraction is a property of: **A)** Water waves **B)** Sound waves **C)** Light waves **D)** All waves
35. Calculate the period of a 3.5 m long pendulum, where $(a_g = 9.782 \text{ m/s}^2)$? **A)** 2.758 s **B)** 3.258 s **C)** 3.758 s **D)** 1.746 s
36. An alpha particle ($q = 3.2 \times 10^{-19} \text{ C}$) moves at a speed of $2.5 \times 10^6 \text{ m/s}$ perpendicular to a magnetic field of strength $2 \times 10^{-4} \text{ T}$, what is the magnitude of the magnetic force on the particle? **A)** $1.6 \times 10^{-16} \text{ N}$ **B)** $6.1 \times 10^{-16} \text{ N}$ **C)** $4 \times 10^{-9} \text{ N}$ **D)** zero
37. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer **A)** high resistance in series **B)** high resistance in parallel **C)** low resistance in series **D)** low resistance in parallel
38. What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L? **A)** $\lambda = L$ **B)** $\lambda = 2L$ **C)** $\lambda = 3L$ **D)** $\lambda = 4L$
39. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil? **A)** $(B = \frac{\mu_0 N}{2r})$ **B)** $(B = \frac{\mu_0 N I}{2\pi})$ **C)** $(B = \frac{\mu_0 N^2 I}{2r})$ **D)** $(B = \frac{\mu_0 N I}{2r})$
40. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere. What is the amplitude of the resultant wave if the interference is constructive? **A)** 0.1 m **B)** 0.5 m **C)** zero **D)** 50 m

41. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance? **A)** $44 \mu\text{F}$ **B)** $4.4 \mu\text{F}$ **C)** $50 \mu\text{F}$ **D)** $5.5 \mu\text{F}$
42. An AC source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source: **A)** 45° **B)** 37° **C)** 30° **D)** 53°
43. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?
- 
44. A 256-turn coil with a cross-sectional area of 0.0025 m^2 is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced (ϵ) during this interval: **A)** 0.21 V **B)** - 0.21 V **C)** 3 V **D)** - 3 V
45. Which equation correctly describes the condition for observing the third dark fringe in an interference pattern? **A)** $d \sin \theta = \lambda/2$ **B)** $d \sin \theta = 3\lambda/2$ **C)** $d \sin \theta = 3\lambda$ **D)** $d \sin \theta = 5\lambda/2$
46. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest? **A)** 2.3 m **B)** 10.2 m **C)** 8.53 m **D)** 1.02 m
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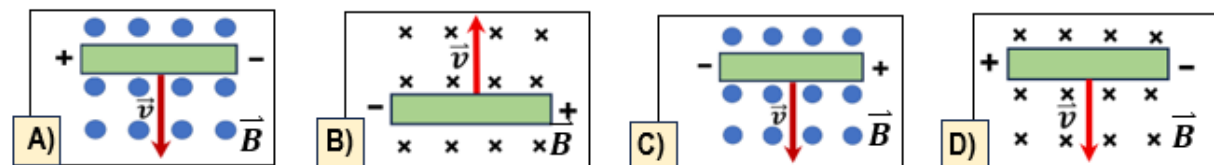
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- Which rotational quantity is equivalent to force (F) in translational motion?
A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)
- Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of ($1.5 \times 10^{11} \text{ m}$) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)
A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$
-the difference in the distance traveled by two beams when they are scattered in the same direction from different points: A) Order number B) Path difference C) Resonance D) Diffraction
- The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
A) b,c B) a,b
C) c,d D) b,d
- A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?
A) 0.1 m B) 0.5 m C) zero D) 50 m
- A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s
- Which of the following represents Newton's second law in rotational motion?
A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{\alpha}$

29. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



30. Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: **A)** high potential difference and low current. **B)** low potential difference and high current. **C)** high potential difference and high current. **D)** low potential difference and low current.

31. What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L ?

A) $\lambda = L$ **B)** $\lambda = 2L$ **C)** $\lambda = 3L$ **D)** $\lambda = 4L$

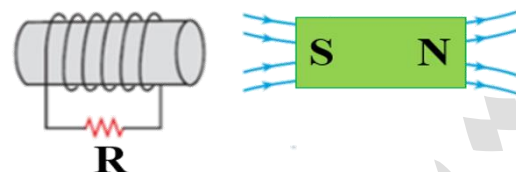
32. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

A) 9 **B)** 3 **C)** $\frac{1}{3}$ **D)** $\frac{1}{9}$

33. A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? **A)** 0.125° **B)** 8° **C)** 0.63° **D)** 11°

34. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R ?

A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.

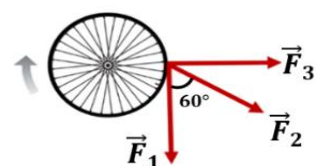


35. An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11}$ Hz. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?

A) $44 \mu F$ **B)** $4.4 \mu F$ **C)** $50 \mu F$ **D)** $5.5 \mu F$

36. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?

A) - 18 N.m **B)** 9 N.m
C) - 9 N.m **D)** 18 N.m



37. Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?

A) Doubling its cross-sectional area. **B)** Reducing its cross-sectional area by half.
C) Doubling its length. **D)** doubling the number of its turns.

38. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?

A) 48 turns, Step - up **B)** 8533 turns, Step - down **C)** 48 turns, Step - down **D)** 8533 turns, Step - up

39. A generator with a maximum output emf of 205 V is connected to 115Ω resistor. Find the rms current through the resistor: **A)** 1.78 A **B)** 1.26 A **C)** 0.707 A **D)** 145 A

40. What happens to a sound wave, when it travels from a cold room to a hot room?

A) speed of sound increases, frequency remains constant.
B) speed of sound decreases, frequency increases.
C) speed of sound decreases, frequency remains constant.
D) frequency decreases, speed of sound remains constant.

41. Find the magnitude of ($\Delta\theta$) in the table? **A)** -180° **B)** -90°
C) -321° **D)** -360°

$\Delta\theta$	Δs	r
? deg	- 4.2 m	0.75 m

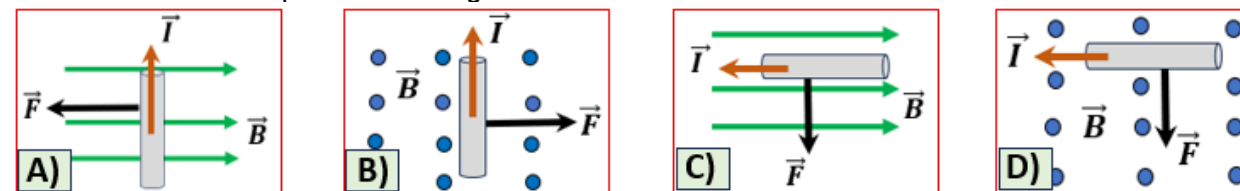
42. Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?

A) 1.75 m **B)** 3.5 m **C)** 5 m **D)** 7 m

43. The time rate at which a body rotates about an axis:

A) Angular displacement ($\Delta\theta$) **B)** Tangential acceleration (a_t) **C)** Angular speed (ω) **D)** Angular acceleration (α)

44. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



45. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?

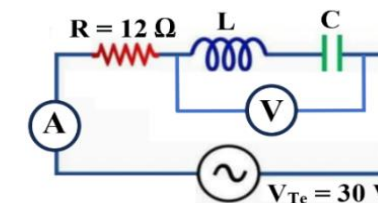
A) $(B = \frac{\mu_0 N}{2r})$ **B)** $(B = \frac{\mu_0 N I}{2\pi})$ **C)** $(B = \frac{\mu_0 N^2 I}{2r})$ **D)** $(B = \frac{\mu_0 N I}{2r})$

46. Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?

A) 2.758 s **B)** 3.258 s **C)** 3.758 s **D)** 1.746 s

47. In the electrical circuit shown in the adjacent figure, if the ammeters reading is 2 A what is the voltmeters reading?

A) 10 V **B)** 18 V
C) 24 V **D)** 28 V



48. A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?

A) angular momentum **B)** angular speed **C)** moment of inertia **D)** rotational kinetic energy

49. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:

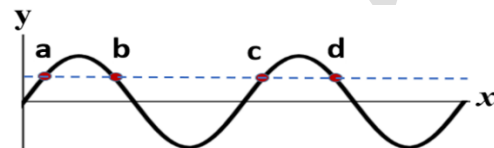
A) amplitude **B)** period **C)** frequency **D)** acceleration

50. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s^2 , how far does the coin roll before coming to rest?

A) 2.3 m **B)** 10.2 m **C)** 8.53 m **D)** 1.02 m

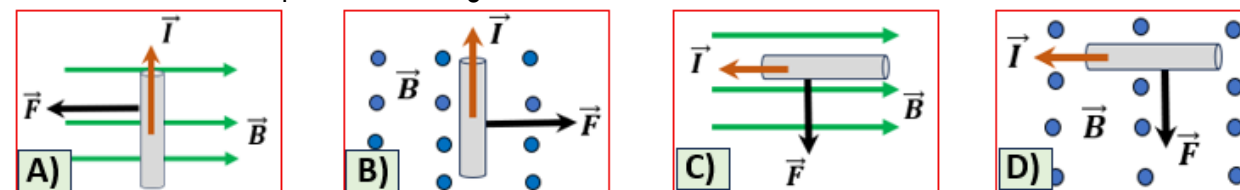
Choose the right answers for the following questions: (2 Marks each)

- A test car moves at a constant speed around a circular track. If the car is 48.2 m from the track's center and has a centripetal acceleration of 8.05 m/s^2 , what is its tangential speed?
 A) 0.364 m/s B) 19.7 m/s C) 1.33 m/s D) 31.63 m/s
- The number of turns per unit length of the solenoid is $4000 \frac{\text{turns}}{\text{m}}$, Calculate the magnitude of the magnetic field in the middle of the solenoid when a current of 10 A passes through its turns, [$\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$]?
 A) $5 \times 10^{-4} \text{ T}$ B) $5 \times 10^{-3} \text{ T}$ C) $5 \times 10^{-2} \text{ T}$ D) $5 \times 10^{-1} \text{ T}$
- A wire carrying a current is arranged so that electrons flow in one segment from west to east. If a compass is held over this segment of the wire, in what direction is the needle deflected?
 A) to the East B) to the North C) to the South D) to the Sky
- What happens to a sound wave, when it travels from a cold room to a hot room?
 A) speed of sound increases, frequency remains constant.
 B) speed of sound decreases, frequency increases.
 C) speed of sound decreases, frequency remains constant.
 D) frequency decreases, speed of sound remains constant.
- Find the average angular speed of Mars about the sun in rad/s. (Hint: Mars orbits the sun once every 687 days)
 A) $1.6 \times 10^{-5} \text{ rad/s}$ B) $1.06 \times 10^{-7} \text{ rad/s}$ C) $1.99 \times 10^{-7} \text{ rad/s}$ D) $2 \times 10^{-4} \text{ rad/s}$
- Which equation correctly describes the condition for observing the third dark fringe in an interference pattern?
 A) $d \sin \theta = \lambda/2$ B) $d \sin \theta = 3\lambda/2$ C) $d \sin \theta = 3\lambda$ D) $d \sin \theta = 5\lambda/2$
- Two laser rays, one of red light and the other of green light, propagate in vacuum. The two lights have the same:
 A) Speed B) Frequency C) Wavelength D) All answers are correct
- The opposite figure represents a transverse wave. Which two points are moving with the same speed and the same direction?
 A) b,c B) a,b
 C) c,d D) b,d

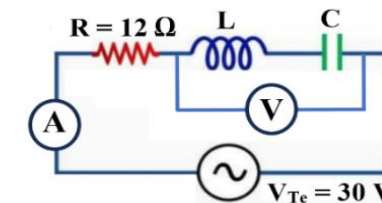


- A mass is attached to a spring and moves with simple harmonic motion on a frictionless horizontal surface. If the mass is 15 g and the spring constant is 30 N/m, what is the period of the oscillation?
 A) 3.756 s B) 2.6 s C) 0.14 s D) 1.7 s
- Which of the following leads to a higher increase in the coefficient of self-induction of a solenoid?
 A) Doubling its cross-sectional area. B) Reducing its cross-sectional area by half.
 C) Doubling its length. D) doubling the number of its turns.
- Diffraction is a property of : A) Water waves B) Sound waves C) Light waves D) All waves
- A skater rotates on the ice, and the friction between the two skates and the ice negligible, when he brings his hands and feet closer to his body. Which of the following remains constant?
 A) angular momentum B) angular speed C) moment of inertia D) rotational kinetic energy
- Calculate the period of a 3.5 m long pendulum, where ($a_g = 9.782 \text{ m/s}^2$)?
 A) 2.758 s B) 3.258 s C) 3.758 s D) 1.746 s

14. Which of the following figures correctly represents the direction of the magnetic force acting on a conductor carrying a direct current when placed in a magnetic field?



- A police car moves at a constant speed and emits a siren of frequency of 1200 Hz. An observer is standing on the sidewalk hears the siren at a frequency of 1102 Hz, what is the speed of the police car, and is the police car approaching or moving away from the observer? (Use the speed of sound in air as 340 m/s)
 A) 30 m/s, approaching B) 20 m/s, moving away C) 20 m/s, approaching D) 30 m/s, moving away
- Which of the following wavelengths will not produce standing wave on a string that is 3.5 m long?
 A) 1.75 m B) 3.5 m C) 5 m D) 7 m
- An inductive coil of resistance R and inductive impedance 125Ω is connected across an AC source of effective value 220 V and frequency $\frac{280}{11} \text{ Hz}$. Find the capacitance of the capacitor that should be connected in series in order to obtain resonance?
 A) $44 \mu\text{F}$ B) $4.4 \mu\text{F}$ C) $50 \mu\text{F}$ D) $5.5 \mu\text{F}$
- Earth ($m = 5.97 \times 10^{24} \text{ kg}$) orbits the sun ($M = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of ($1.5 \times 10^{11} \text{ m}$) What is the gravitational force of the sun on Earth? ($G = 6.673 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$)
 A) $5.29 \times 10^{32} \text{ N}$ B) $3.52 \times 10^{22} \text{ N}$ C) $5.9 \times 10^{-2} \text{ N}$ D) $1.77 \times 10^{-8} \text{ N}$
- (A car moves in a circular path at a constant speed) Which of the following statements is true of the motion of the car?
 A) It has tangential acceleration but no centripetal acceleration.
 B) It has centripetal acceleration but no tangential acceleration.
 C) It has both centripetal acceleration and tangential acceleration.
 D) It has neither tangential acceleration nor centripetal acceleration.
- In the electrical circuit shown in the adjacent figure, if the ammeters reading is 2 A what is the voltmeters reading?
 A) 10 V B) 18 V
 C) 24 V D) 28 V



- A diffraction grating with 4525 lines/cm is illuminated by direct sunlight. The first-order solar spectrum is spread out on a white screen hanging on a wall opposite the grating. At what angle does the first-order maximum for blue light with a wave length of 422 nm appear? A) 0.125° B) 8° C) 0.63° D) 11°
-the difference in the distance traveled by two beams when they are scattered in the same direction from different pointes: A) Order number B) Path difference C) Resonance D) Diffraction
- Two spheres look identical and have the same mass and same radii One is hollow, and the other is solid. Which method would determine which is which? A) drop them from the same height B) roll them down an incline
 C) weigh them on a scale D) both (A and C) are correct
- Which rotational quantity is equivalent to force(F) in translational motion?
 A) moment of inertia (I) B) angular momentum (L) C) torque (τ) D) mass (m)
- What is the longest wave length of a standing wave in pipe closed at one end, If the length of the pipe is L?
 A) $\lambda = L$ B) $\lambda = 2L$ C) $\lambda = 3L$ D) $\lambda = 4L$
- Electrical energy is transmitted from generation stations to houses and factories by means of a network of cables and transformers, by: A) high potential difference and low current. B) low potential difference and high current.
 C) high potential difference and high current. D) low potential difference and low current.

27. Which of the following represents Newton's second law in rotational motion?

- A) $\Sigma \tau = I \alpha$ B) $\Sigma F = m a$ C) $\Sigma F = \frac{m}{a}$ D) $\Sigma \tau = \frac{I}{a}$

28. Which of the following equations used to calculate the magnitude of the magnetic field at the center of a circular coil?

- A) $(B = \frac{\mu_0 N}{2r})$ B) $(B = \frac{\mu_0 N I}{2\pi})$ C) $(B = \frac{\mu_0 N^2 I}{2r})$ D) $(B = \frac{\mu_0 N I}{2r})$

29. The galvanometer can be converted into an Ammeter by connecting very..... to the galvanometer

- A) high resistance in series B) high resistance in parallel C) low resistance in series D) low resistance in parallel

30. A coin with a diameter of 2.4 cm is dropped onto a horizontal surface. The coin starts out with an initial angular speed of 18 rad/s and rolls in a straight line without slipping. If the rotation slows with an angular acceleration of magnitude 1.9 rad/s², how far does the coin roll before coming to rest?

- A) 2.3 m B) 10.2 m C) 8.53 m D) 1.02 m

31. A transformer is used to convert 120 V to 9 V for use in a portable CD player, If the primary, which is connected to the outlet, has 640 turns, how many turns does the secondary have and what type of transformer is it?

- A) 48 turns, Step - up B) 8533 turns, Step - down C) 48 turns, Step - down D) 8533 turns, Step - up

32. A wave with an amplitude of 30 cm has the same wave length as a second wave with an amplitude of 20 cm. The two waves interfere What is the amplitude of the resultant wave if the interference is constructive?

- A) 0.1 m B) 0.5 m C) zero D) 50 m

33. The power output of a certain loudspeaker is 250 W. If a person listening to the sound produced by the loudspeaker is sitting 6.5 m away, what is the intensity of the sound?

- A) 0.47 W/m² B) 4.7 W/m² C) 0.16 W/m² D) 1.6 W/m²

34. An alpha particle ($q = 3.2 \times 10^{-19}$ C) moves at a speed of 2.5×10^6 m/s perpendicular to a magnetic field of strength 2×10^{-4} T, what is the magnitude of the magnetic force on the particle?

- A) 1.6×10^{-16} N B) 6.1×10^{-16} N C) 4×10^{-9} N D) zero

35. (The pendulum bob hangs from a string and moves with simple harmonic motion) the maximum displacement of the pendulum bob from the equilibrium position represent:

- A) amplitude B) period C) frequency D) acceleration

36. Find the magnitude of ($\Delta\theta$) in the table?

- A) -180° B) - 90°
C) - 321° D) - 360°

$\Delta\theta$	Δs	r
? deg	- 4.2 m	0.75 m

37. A violin string that is 50 cm long has a fundamental frequency of 440 Hz. What is the speed of the waves on this string?

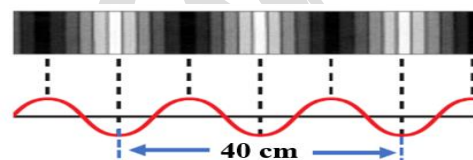
- A) 44 m/s B) 440 m/s C) 211 m/s D) 176 m/s

38. The time rate at which a body rotates about an axis:

- A) Angular displacement ($\Delta\theta$) B) Tangential acceleration (a_t) C) Angular speed (ω) D) Angular acceleration(α)

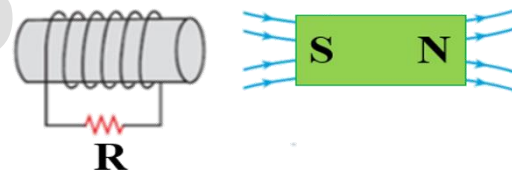
39. What is the wave speed of the wave shown in the figure If the period of wave 0.04 s?

- A) 7.5 m/s B) 3.75 m/s
C) 6.25 m/s D) 5 m/s

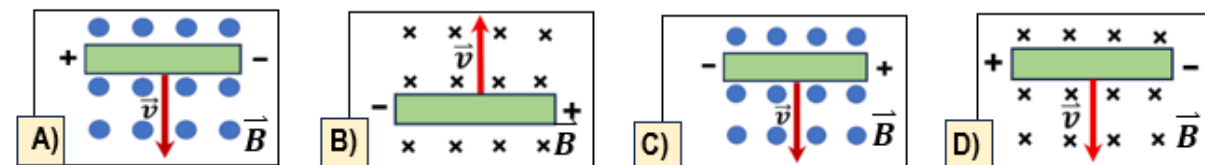


40. A bar magnet is positioned near a coil of wire, as shown in the figure. According to Lenz's law, what will be the direction of the induced current in the resistor R?

- A) From left to right, when the bar magnet is moved toward the coil.
B) From left to right, when the bar magnet is moved away from the coil.
C) From right to left, when the bar magnet is moved away from the coil.
D) Both (A and C) are correct.



41. A straight wire moves with a constant velocity ($\vec{v}$) in the plane of the paper, If the wire is perpendicular to the magnetic field ($\vec{B}$). Which of the following figures shows the correct polarity of the two ends of the wire?



42. A 256-turn coil with a cross-sectional area of 0.0025 m² is placed in a uniform external magnetic field of strength 0.25 T so that the plane of the coil is perpendicular to the field. The coil is pulled steadily out of the field in 0.75 s. Find the average induced (ϵ) during this interval:

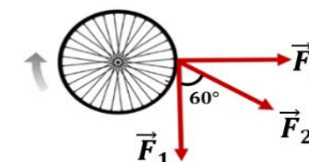
- A) 0.21 V B) - 0.21 V C) 3 V D) - 3 V

43. A generator with a maximum output emf of 205 V is connected to 115 Ω resistor. Find the rms current through the resistor:

- A) 1.78 A B) 1.26 A C) 0.707 A D) 145 A

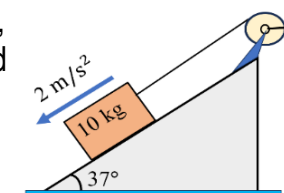
44. In the figure, if the magnitude of each force is 12 N and the diameter of the wheel is 1 m, what is the resultant torque acting on the wheel?

- A) - 18 N.m B) 9 N.m
C) - 9 N.m D) 18 N.m



45. A 10 kg mass is attached to a cord that is wrapped around a wheel with a radius of 10 cm, as shown in Figure. The acceleration of the mass down the frictionless incline is measured to be 2 m/s². Assuming the axle of the wheel to be frictionless, determine the moment of inertia of the wheel?

- A) 0.195 kg.m² B) 0.915 kg.m²
C) 0.751 kg.m² D) 0.571 kg.m²

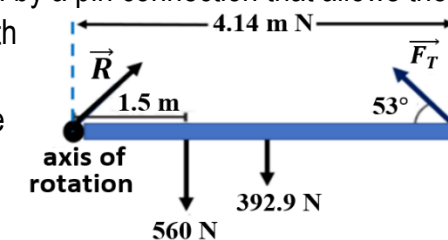


46. Which of the following waves is used to measure distance between the Earth and the moon with precision?

- A) infrasonic waves B) normal light C) Laser beams D) Audible waves

47. A uniform 4.14 m long horizontal beam that weighs 392.9 N is attached to a wall by a pin connection that allows the beam to rotate. Its far end is supported by a cable that makes an angle of 53° with the horizontal, and a 560 N person is standing 1.5 m from the pin. If the tension force in the cable ($F_T = 500$ N), find the force (R) exerted by the beam on the wall. If the beam to be completely in equilibrium (as shown in the figure)?

- A) 500 N B) 400 N C) 560 N D) 630 N



48. Tesla (T) equal to:

- A) $\frac{N}{A \cdot m}$ B) $\frac{N^2}{A \cdot m}$ C) $\frac{N}{A \cdot m^2}$ D) $\frac{N^2}{A \cdot m^2}$

49. If the distance from a point source of sound is tripled, by what factor is the sound intensity changed?

- A) 9 B) 3 C) $\frac{1}{3}$ D) $\frac{1}{9}$

50. An Ac source of effective value of 63.75 V is connected across a parallel combination of resistance (R), an inductor of impedance of $X_L = 600 \Omega$ and a capacitor of impedance of $X_C = 200 \Omega$. If the value of the effective current of the circuit 0.425 A calculate phase difference angle between the total current and the potential difference of the source:

- A) 45° B) 37° C) 30° D) 53°