2017 Grade 12 Physics Online model exam

Question 1

Not yet answered

Flag question

A 10 cm long candle is placed vertically 20 cm from concave mirror of focal length 15 cm . What is the nature and position of the image formed?

- a. Real, inverted, diminished and 30 cm from the mirror.
- b. Virtual, upright, magnified and 60 cm from the mirror.
- c. Virtual, upright, magnified and 30 cm from the mirror.
- d. Real, inverted, magnified and 60 cm from the mirror.

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A 100 m long metal wire with cross-sectional area of $1 \times 10^{-6}\ m^2$ has a resistivity of $1.8 \times 10^{-8} \Omega.m.m$. What is the resistance of the wire?

- a. 18Ω
- b. 0.18Ω
- c. 1.8Ω
- d. 180Ω

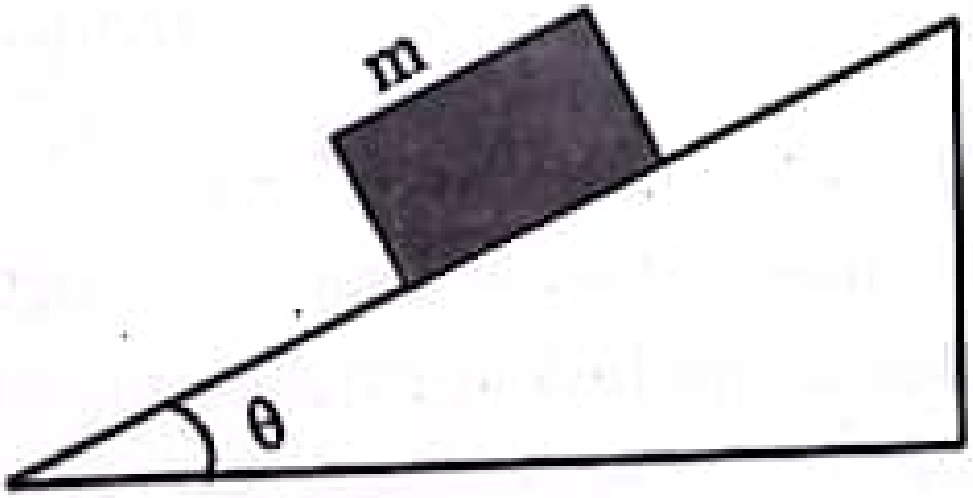
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A 1600 kg weighing car started moving from rest at a constant acceleration on a smooth horizontal road. How much work is done on the car to reach a speed of 20 $\mathrm{m/s}$?

- a. 4.0×10^4 J
- b. 1.6×10^4 J
- c. 7.2×10^4 J
- d. 3.2×10^5 J

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A block of mass m is sliding down an inclined plane that makes an angle θ above the horizontal as shown in figure bellow. The coefficient of kinetic friction between the block and the inclined plane is μ.



The net force on the block down the incline is

- a. $mg(\sin\theta + \mu\cos\theta)$
- b. $mg(\sin\theta - \mu\cos\theta)$
- c. $mg(\mu\sin\theta + \cos\theta)$
- d. $mg(\mu\sin\theta - \cos\theta)$.

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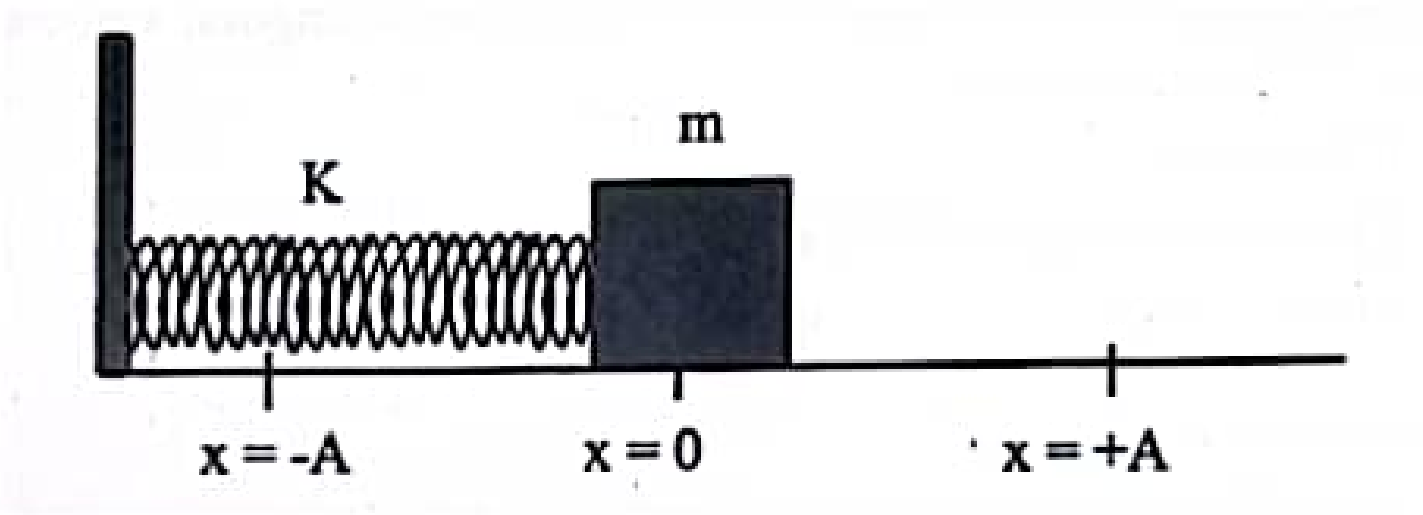
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Question 5

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A block of mass m is attached to a spring of spring constant K on a horizontal frictionless surface. The other end of the spring is attached to a fixed support. The block is displaced to the right, stretching the spring by a distance A , and is released. The block then oscillates back and forth between x= -A and x= +A about the equilibrium position, x= 0.



Which one of the following statements correctly explains the exchange between elastic potential energy of the spring and kinetic energy of the block?

a. Kinetic energy of the block is completely converted to elastic potential energy of the spring as the block moves from x = +A to x = 0 .

b. While the block is moving to the left from x = 0 to x = -A, kinetic energy of the block increases and elastic potential energy of the spring decreases by equal amount.

c. While the block is moving to the left from x = +A to x = 0, kinetic energy of the block decreases and elastic potential energy of the spring increases by an equal amount.

d. Elastic potential energy of the spring is completely converted to kinetic energy of the block as the block moves from x = +A to x = 0.

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A box of mass 50 kg is lifted to a height of 6 m by sliding it up the surface of an inclined plane of length 10 m . If the coefficient of kinetic friction between the box and the inclined plane is μ, the actual mechanical advantage of the inclined plane is

- a. $\frac{5}{4-3\mu}$.
- b. $\frac{5}{3+4\mu}$
- c. $\frac{5}{3-4\mu}$
- d. $\frac{5}{4+3\mu}$

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A capacitor is connected in parallel to a load in a full-wave bridge rectifier circuit. The purpose of the capacitor in the circuit is

- a. to convert the alternating current to a direct current.
- b. to increase the fluctuations of both the input and output voltages.
- c. to smooth out the fluctuations of the input voltage.
- d. to smooth out the fluctuations of the output voltage.

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A charged particle of mass, m, and charge, q, traveling at speed of, v, enters a region of uniform magnetic field, B , and follows a circular path of radius, r. The radius of the path followed by the charged particle is given by

- a. $r = \frac{qv}{mB}$.
- b. $r = \frac{mv}{qB}$
- c. $r = \frac{qB}{mv}$
- d. $r = \frac{vB}{qm}$

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A disk of radius 0.5 m rotates uniformly about an axis that passes perpendicular to its plane through the center. If the disk makes 10 revolutions within 2 seconds, what is the speed of a point at the rim of the disk?

- a. 5 m/s
- b. 31.4 m/s
- c. 7.9 m/s
- d. 15.7 m/s

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A disk rotating about an axis passing through its center and perpendicular to its plane has a moment of inertia, I , an angular velocity, ω, and an angular acceleration, α . The torque τ on the disk is given by

- a. $\tau = I\alpha$.
- b. $\tau = \omega\alpha$
- c. $\tau = I\omega$.
- d. $\tau = \frac{I\omega}{\alpha}$.

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A heat energy of 4200 J is absorbed by a metal block of mass 500 g as its temperature changes from $10^{\circ}\mathrm{C}$ to $80^{\circ}\mathrm{C}$, what is the heat capacity of the metal block?

- a. $60\ \mathrm{J/K}$
- b. $2300\ \mathrm{m/s}$
- c. $120\ \mathrm{J/K}$
- d. $420\ \mathrm{J/K}$

CamScanner

A length of a brass wire is 2 m at a temperature of $0^{\circ}\mathrm{C}$. What is the length of the brass wire at a temperature of $100^{\circ}\mathrm{C}$? (The coefficient of linear expansion of brass is $\alpha = 1.9 \times 10^{-5}\ \mathrm{K}^{-1}$)

- a. 3.8 mm
- b. 2003.8 mm
- c. 2000.38 mm
- d. 1996.2 mm

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A mean distance of a hypothetical planet from the sun is four times of that of the Earth's average distance from the sun. What is the orbital period of this planet in Earth's day?

- a. 1460 days
- b. 516 days
- c. 2920 days
- d. 330 days

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A rectangular box made of aluminum metal (density, $\rho = 2700\ \mathrm{kg/m^3}$) has dimensions 0.5 m, 1.0 m, and 1.5 m . The box is placed on a horizontal surface so that it exerts a maximum pressure. What pressure does the box exert on the ground?

- a. 13,500 Pa
- b. 27,000 Pa
- c. 202,500 Pa
- d. 40,500 Pa

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A rigid object lying in xy plane rotates about the fixed **z - axis** with angular velocity, ω and angular acceleration α . If a point on the object at a distance **r** from axis of rotation sweeps an arc length **s** while rotating through an angle θ. If the point has tangential velocity, v_t, tangential acceleration, a_t and radial acceleration, a_r at some instant, which of the following is correct relation between the angular quantities of the object and the linear quantities of the point on the object?

- a. $v_t = \frac{\omega}{r}$
- b. $a_r = \omega^2 r$
- c. $s = \frac{r}{\theta}$
- d. $a_t = \frac{\alpha}{r}$

CamScanner

A scientist has a plan to launch a satellite from the surface of the Moon. The mass of the Moon is about 7.2×10^{22} kg and its mean radius is about 1.8 x 10^{6} m. What is the escape speed of the satellite from the moon's surface?

- a. 1.72 m/s
- b. 2300 m/s
- c. 1220 m/s
- d. 1630 m/s

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A spring with spring constant of $300.0 \frac{N}{m}$ is stretched 40.0 cm in 4.0 s . What is the power applied to stretch the spring?

- a. 15 W
- b. 3.0 W
- c. 12 W
- d. 6.0 W

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A transistor operating on a common-emitter configuration has a base current of $I_B = 15.0\mu\ A$ and a collector current of $I_C = 3.0\ mA$. . The current gain of the transistor is

- a. 0.005.
- b. 20.0.
- c. 45.0.
- d. 200.0.

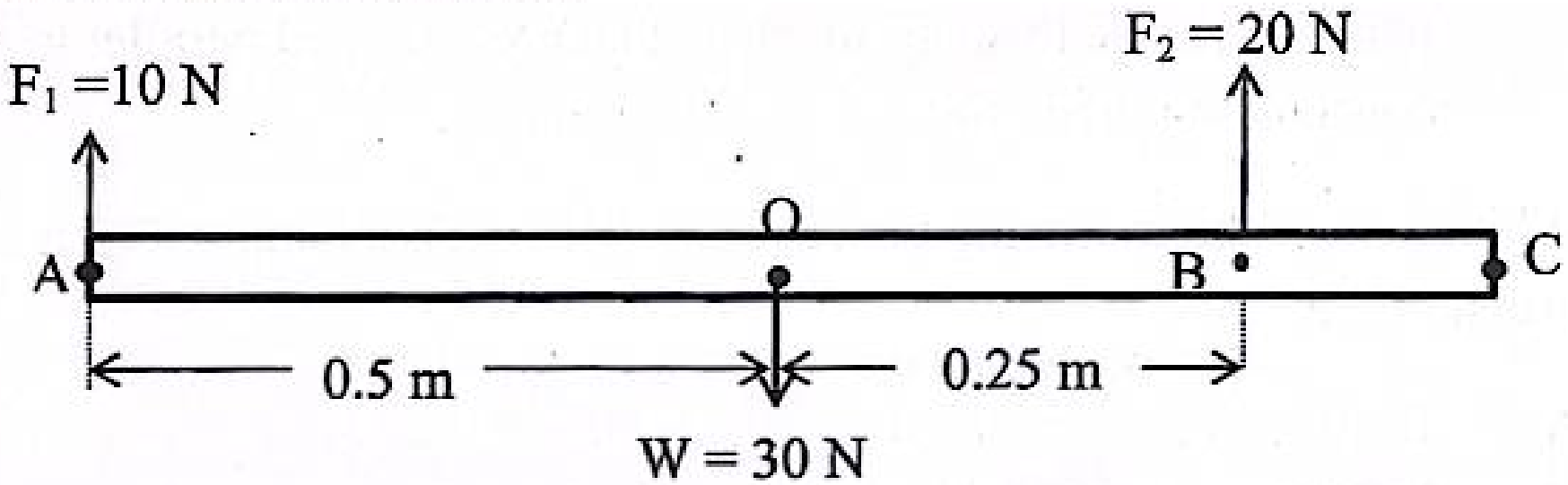
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Question 19

Not yet answered

Flag question

A uniform bar of 30 N weight and 1 m in length has a force of F_1 = 10N at its left end and F_2 = 20N at 0.25 m from its center as shown in the figure below.



Which of the following statements is correct about the net torque on the bar about an axis perpendicular to the length of the bar? The net torque about

a. points A, O, B and C is zero.

b. point O is greater than that about point C

c. point A is clockwise, whereas the net torque about B is anticlockwise

d. point O is less than that of about point B

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A uniform solid disk of mass **m** and radius **r** rotates about an axis passing through its center perpendicular to the plane with an angular speed, ω. If the tangential speed of points on the rim of the disk is **v**, which of the following equation for angular momentum of the disk is correct?

- a. $L = \frac{1}{2}mrv$
- b. $L = 2mr^2\omega v$
- c. $L = \frac{1}{2}mr\omega$
- d. $L = \frac{1}{2}mr^2\omega^2$

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Question 21

Not yet answered

Flag question

Ampere's law states that the magnetic field created by a long straight current-carrying conductor is

- a. directly proportional to the current.
- b. inversely proportional the square of the current.
- c. directly proportional to the square of the current.
- d. inversely proportional to the current.

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An air plane flying horizontally drops a food package from a height, **h**, above the ground. The package is observed to strike the ground at a horizontal distance **x** from the point of release. If the acceleration due to gravity is **g** and air resistance is neglected, what is the magnitude of initial velocity of the package with respect to an observer standing on the ground?

- a. $\sqrt{2gx}$
- b. $\sqrt{2gh}$
- c. $h\sqrt{\frac{g}{2x}}$
- d. $x\sqrt{\frac{g}{2h}}$

CamScanner

An alternating current source supplies 200 V to the primary coil of a transformer, which has 300 turns. If the secondary coil of the transformer has 3,000 turns, what is the voltage in the secondary coil?

- a. 2,000 V
- b. 200 V
- c. 20 V
- d. 20,000 V

CamScanner

Consider two satellites of different masses rotating around the earth along their circular orbit. Which of the following is correct about their motion?

- a. For the same orbit, the heavier satellite has smaller period than the lighter one.
- b. For the same orbit, both satellites have equal angular velocity.
- c. The satellite moving along longer orbit has greater angular velocity than the one moving along shorter orbit.
- d. For the same orbit, the heavier satellite has greater angular velocity than the lighter one.

CamScanner

In an experiment to charge an electroscope by induction a student is provided with a positively charged rod and a neutral electroscope. Which of the following observations is correct about the charging process?

- a. When the positively charged rod is brought near the head of the electroscope, positive charges are accumulated on its head while electrons are accumulated on its leafs.
- b. When the positively charged rod is brought near to the head of the electroscope, electrons are accumulated on its head and on its leafs.
- c. If student momentarily touches the head of the electroscope while the rod is held near its head, the leafs collapse and the electroscope is negatively charged.
- d. With the rod held near the head of the electroscope, the student momentarily touches the head and then removes the rod, the leafs of the electroscope diverges and it is positively charged.

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Question 26

Not yet answered

Flag question

Newton's law of universal gravitation states that the gravitational force between two masses is directly proportional to

- a. the sum of the two masses and inversely proportional to the square of distance between them.
- b. the sum of the two masses and inversely proportional to distance between them.
- c. the product of the two masses and inversely proportional to the square of the distance between them.
- d. the product of the two masses and inversely proportional to distance between them.

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Question 27

Not yet answered

Flag question

Rectilinear motion of light is

- a. the splitting of light into different colors.
- b. the propagation of light in a straight line.
- c. the bending of light after passing through a lens.
- d. the bouncing of light from a boundary between two different mediums.

CamScanner

Starting from rest, a car accelerates uniformly and covers 200 m in10 s . What is the acceleration of the car?

- a. $2\ m/s^2$
- b. $20\ m/s^2$
- c. $40\ m/s^2$
- d. $4\ m/s^2$

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Question 29

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Suppose that you are swimming in a pool of V-shaped with a maximum depth of 3.0 m . the pressure that you feel due to the water

- a. decreases as you move up from the bottom towards the surface.
- b. increases if you move horizontally at half depth of the pool from the wall towards the center.
- c. increases as you move up from the bottom towards the surface.
- d. decreases if you move horizontally at the surface of the pool from the wall towards the center.

CamScanner

Suppose water flows in a pipe of cross-sectional area of 5000.0 cm^2 at a speed 8.0 m/s . Near the outlet, the pipe has a constriction of cross-sectional area 500.0 cm^2. What is the speed of the water in the constricted part of the pipe?

- a. 80.0 m/s
- b. 0.8 m/s
- c. 40.0 m/s
- d. 640.0 m/s

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The adiabatic index of air and the ratio of molar gas constant to molar mass of air are 1.4 and $286\ \mathrm{m^2/s^2k}$, respectively. What is the speed of sound in air at a temperature of $27^\circ\mathrm{C}$?

- a. $200\sqrt{3}\ \mathrm{m/s}$
- b. $331\ \mathrm{m/s}$
- c. $2\sqrt{81}\ \mathrm{m/s}$
- d. $481\ \mathrm{m/s}$

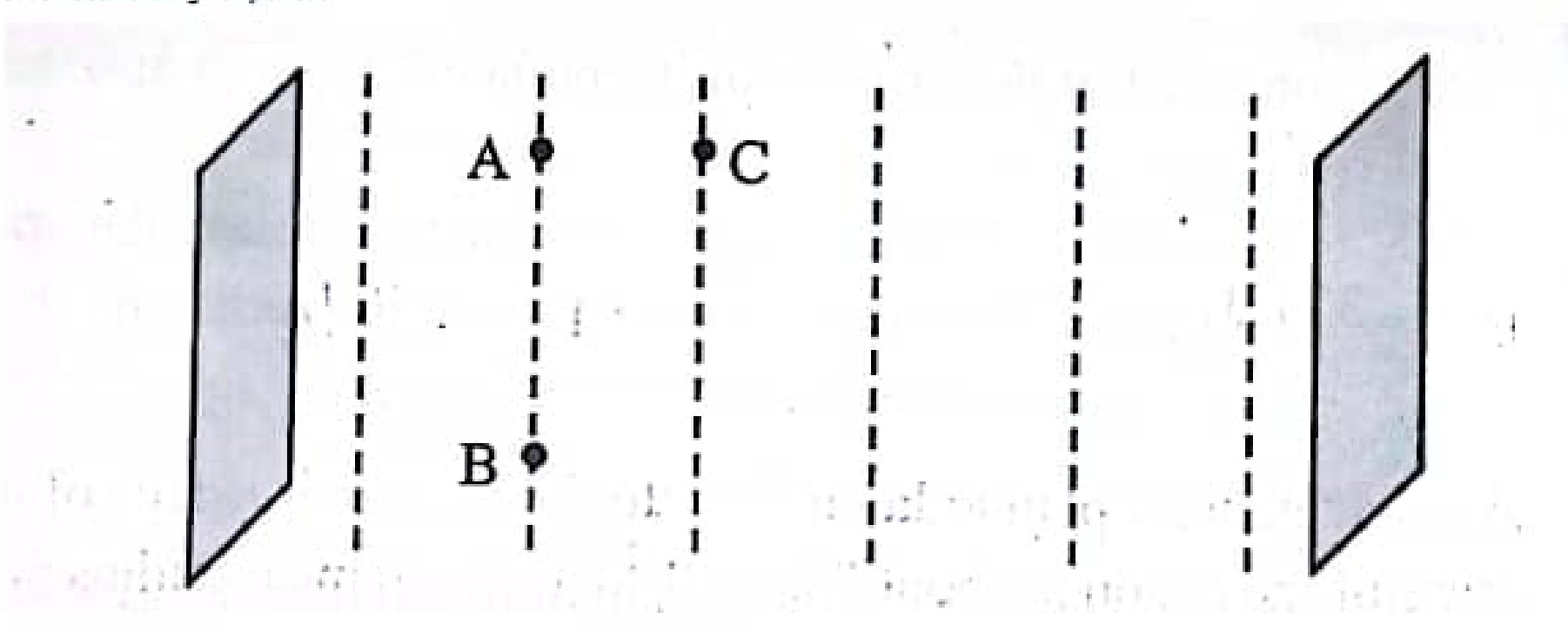
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Question 32

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The equipotential lines between two oppositely charged plates and points A, B, and C on the lines are shown in the figure below. Which one of the following statements is correct about the lines and the given points?



a. The electric field at point C is parallel to the line.

b. There is no potential difference between points A and B.

c. Considerable work is required to move a charge from point A to point B.

d. The potential difference between points A and C is zero.

CamScanner

Question 33

Not yet answered

Flag question

The linear momentum of a system is conserved, provided that

a. the system is moving with a non-zero constant acceleration.

b. a non-zero constant force is acting on the system.

c. the momentum of the system changes at a constant rate.

d. the net force on the system is zero.

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The magnetic flux through a coil was $0.56\mathrm{Tm}^2$ at time $t = 0$ s. It then decreased to $0.30\mathrm{Tm}^2$ after 2.0 s . What is the magnitude of the induced electromotive force in the coil?

- a. 0.43 V
- b. 43.00 V
- c. 1.30
- d. 0.13 V

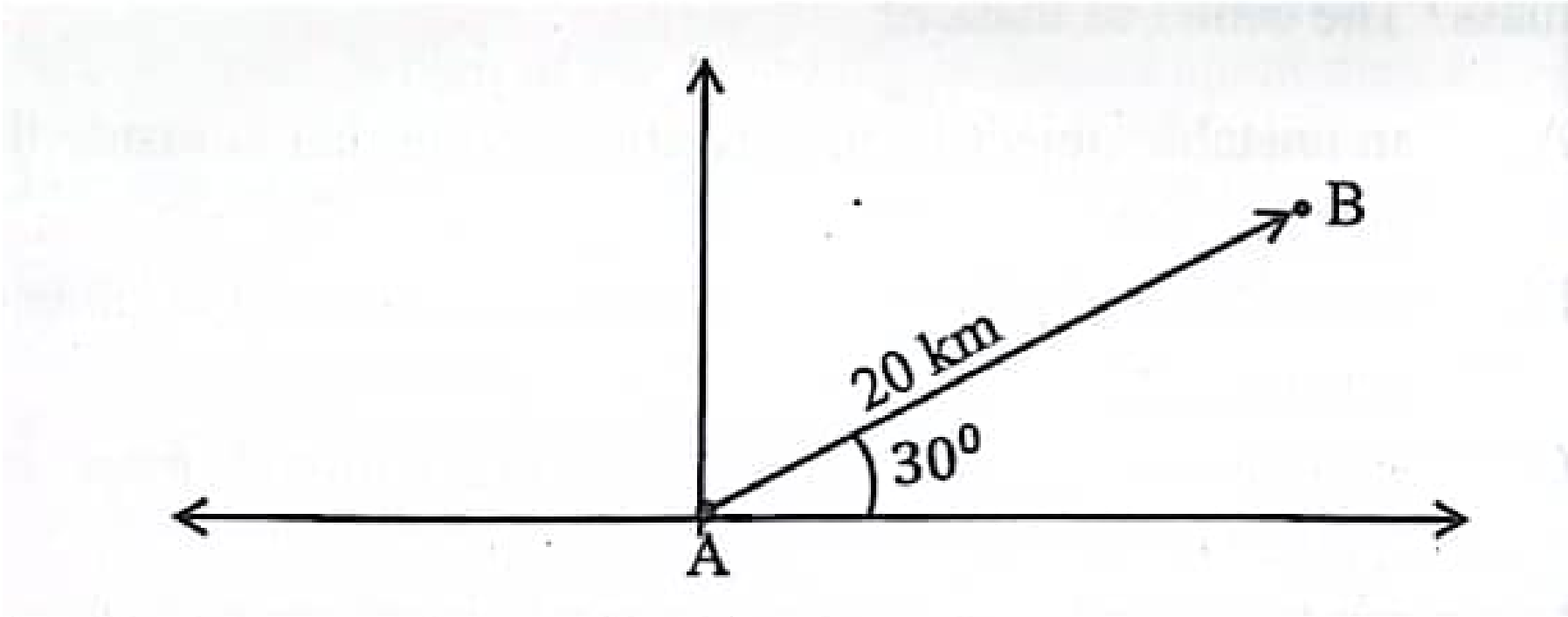
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Question 35

Not yet answered

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The position of point B with respect to point A is shown in figure bellow.



Which of the following statements is the correct way of describing the position vector of point B With respect to point A ?

a. B is North East of A.

b. B is 20 km from A on a bearing of 30°.

c. B is 20 km from A on a bearing of 60°.

d. B is 20 km from A.

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Question 36

Not yet answered

Flag question

The rotational kinetic energy of a flywheel rotating about a fixed axis is equal to

a. the product of its moment of inertia and the angular speed.

b. one-half of the product of its moment of inertia and the square of the angular speed.

c. the product of its moment of inertia and the square of the angular speed.

d. one-half of the product of its moment of inertia and the angular speed.

CamScanner

The SI unit of Ampere is defined as the amount of current flowing through

- a. a long straight wire in a perpendicular magnetic field of 1 T when the wire experiences a force per unit length of 2×10^{-7} N/m.
- b. two parallel long straight wires that are separated by 1 m in vacuum when a force per unit length of N/m exerts on each wire.
- c. a long straight wire in a perpendicular magnetic field of 1 T when the wire experiences a force per unit length of 1 N/m. .
- d. two parallel long straight wires that are separated by 1 m in vacuum when a force per unit length of 2×10^{-7} N/m exerts on each wire.

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Question 38

Not yet answered

Flag question

The sum of two or more vector physical quantities is a

- a. resultant vector.
- b. parallel vector.
- c. unit vector.
- d. opposite vector.

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The weight of a block, suspended by a string attached to a scale, is measured to be 12.0 N in air and 10.2 N when it is immersed completely in a fluid of density $900\ \mathrm{kg/m^3}$. What is the volume of the block?

- a. $1.8 \times 10^{-4}\ \mathrm{m^3}$
- b. $1.3 \times 10^{-4}\ \mathrm{m^3}$
- c. $2.5 \times 10^{-4}\ \mathrm{m^3}$
- d. $2.0 \times 10^{-4}\ \mathrm{m^3}$

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Three resistors with value of $\mathbf{R_1 = R_2 = R}$ and $\mathbf{R_3 = 3R}$ are connected in parallel. Which one of the following expression gives the effective resistance (R_{eff}) of the combination?

- a. $R_{eff} = \frac{5R}{6}$
- b. $R_{eff} = \frac{3R}{7}$
- c. $R_{eff} = 5R$
- d. $R_{eff} = \frac{7}{3R}$

CamScanner

Two identical marble balls, A and B, moving along the x-axis in opposite direction with velocities of 4 m/s and 5 m/s, respectively, make head on collision and move together after impact. What is the common velocity of the balls after collision?

- a. 0.5 m/s in the same direction to A
- b. 4.5 m/s in the same direction to A
- c. 4.5 m/s in the same direction to B
- d. 0.5 m/s in the same direction to B

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Two students walk between two points A and B. The first student follows a straight path between the points and the second student follows a path that is not straight. If both students cover their journey in equal time interval, which of the following statements is correct about their motion?

- a. The displacement of the first student is greater than that of the second.
- b. The distance covered by the first student is equal to that of the second.
- c. Both the students have equal average speed.
- d. Both students have equal average velocity.

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Two vectors: $\vec{A} = 4\hat{i} + 3\hat{j}$ and $\vec{B} = \hat{i} + 7\hat{j}$ makes an angle $\theta = 45^\circ$ to each other.

What is the scalar projection of $\vec{B}$ onto $\vec{A}$?

- a. 3.5
- b. $5\sqrt{2}$
- c. 5
- d. $25\sqrt{2}$

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Vector $\vec{A}$ has a magnitude of 50 units along 37° North of East and vector $\vec{B}$ has a magnitude of 20 units along 53° South of East. The components of their resultant vectors are,

- a. 14 units West, 52 units South.
- b. 52 units West, 14 units South.
- c. 52 units East, 14 units North.
- d. 14 units East, 52 units North.

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What is the drag force exerted on a sphere of radius 4 cm falling through a fluid of viscosity 0.8 Ns/m^2 with a velocity of 0.75 m/s ?

- a. 4.52 N
- b. 0.075 N
- c. 0.452 N
- d. 0.144 N

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What is the magnitude of velocity of a 2 kg ball released from a height of 20 m when it strikes the ground?

- a. 20 m/s
- b. $10\sqrt{2}$ m/s
- c. 10 m/s
- d. 400 m/s

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Question 47

Not yet answered

Flag question

What is the type of error in measurement readings that can be minimized by taking repeated measurements?

- a. Random error
- b. Systematic error
- c. Zero error
- d. Parallax error

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When the space between the plates of parallel plate capacitor is air, it has capacitance C_0, charge Q_0 , potential difference V_0 and stores electrical energy U_0 . After the space is completely filled with a dielectric material of permittivity ε , the capacitance is C , the charge is Q , The potential difference is V_0 and the energy stored is U . Which of the following is true about the effect of inserting the dielectric material between the plates of the capacitor?

- a. $U = U_0$
- b. $C = \frac{\varepsilon}{\varepsilon_0} C_0$
- c. $Q = \frac{\varepsilon_0}{\varepsilon} Q_0$
- d. $Q = Q_0$

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Question 49

Not yet answered

Flag question

Which of the following statement is a correct definition of surface tension? Surface tension is

a. a force of interaction between the molecules of a liquid within the bulk of the liquid.

b. a cohesive effect at the surface of a liquid due to the forces between the molecules of the liquid.

c. a force that sprays small drops of liquid into gas molecules.

d. an adhesive effect between molecules of a liquid that clump them together.

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Which of the following statements correctly illustrates the relation of physics with other sciences?

- a. In astronomy, electron microscopes are used to study how far object in the universe are from the earth.
- b. In chemistry, telescopes are used to detect parts of the electromagnetic radiation in the universe.
- c. In geology, spectroscopy is used to study the interaction of matter with electromagnetic radiation.
- d. In biology, the optical part of the electromagnetic spectrum is used to convert carbon dioxide and water into organic materials.

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Which of the following statements is correct about how the property of water is utilized in Magnetic Resonance Imaging (MRI) diagnosis?

- a. The hydrogen atoms in the water inside our body are sources of protons which give rise to small magnets that are arranged perpendicular to a constant magnetic field of an MRI scanner.
- b. The oxygen atoms in the water inside our body are sources of protons which give rise to small magnets that are arranged perpendicular to a constant magnetic field of an MRI scanner.
- c. The hydrogen atoms in the water inside our body are sources of protons which give rise to small magnets that are arranged parallel to a constant magnetic field of an MRI scanner.
- d. The oxygen atoms in the water inside our body are sources of protons which give rise to small magnets that are arranged parallel to a constant magnetic field of an MRI scanner.

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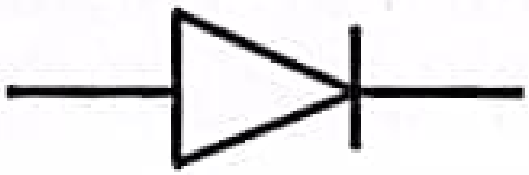
Which of the following statements is correct about intrinsic and extrinsic semiconductors?
Intrinsic semiconductors are

- a. electrically neutral whereas extrinsic semiconductors are charged.
- b. pure semiconductors whereas extrinsic semiconductors are doped by impurities.
- c. p-type semiconductors whereas extrinsic semiconductors are n-type.
- d. n-type semiconductors whereas extrinsic semiconductors are p-type.

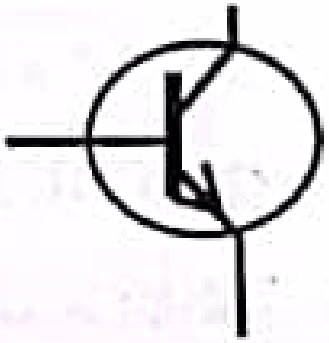
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Which one of the following circuit symbols represents a diode?

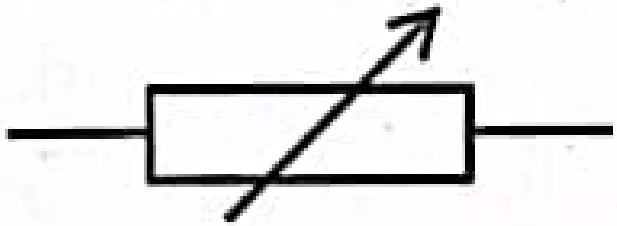
○ a.



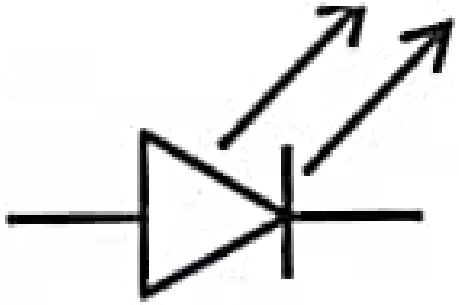
○ b.



○ c.



○ d.



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Question 54

Not yet answered

Flag question

Which one of the following processes is NOT an application of high pressure systems?

a. Boiling potato in an open pot

b. Cooking food with a gas cylinder containing liquid petroleum

c. Sealing gases in a cylinder for medical use

d. Inflating car tires with air

CamScanner

Question 55

Not yet answered

Flag question

Which one of the following statements correctly describe the center of mass? The center of mass of

a. an object is a point where all the particles of the object are actually concentrated.

b. an unstable object is directly above point that is inside the base of the object.

c. stable object is above a point that is outside the base of the object.

d. an object is a point where the gravitational force on the object appears to be acting.

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Which one of the following statements describes correctly the factors that affect the streamlining of cars, planes, and boats?

- a. The larger the viscosity of the fluid through which objects move, the faster is the motion of the object.
- b. Streamlined objects can easily overcome air resistance than those with flat surface at their faces.
- c. The more compressible the fluid through which an object moves, the slower is the object's motion.
- d. Increasing air resistance and surface area, increases the velocity of streaming objects.

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Question 57

Not yet answered

Flag question

Which one of the following statements is correct about measuring pressure in different systems?

a. The pressure of a point at certain depth below a lake is conveniently measured using a barometer.

b. The pressure of a gas that is trapped in a container is conveniently measured using a barometer.

c. The atmospheric pressure at a given location is measured conveniently using an open-end manometer.

d. The pressure of a gas contained in a gas cylinder is conveniently measured using a closed-end manometer.

CamScanner

Which one of the following statements is correct about the motion of an object moving in the direction of positive x-axis with an acceleration of -4 m/s^2 ? The velocity of the object

- a. increases by 4 m/s in each second.
- b. is 4 m/s at each second.
- c. decreases by 4 m/s in each second.
- d. is -4 m/s at each second.

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Question 59

Not yet answered

Flag question

Which one of the following statements is correct about the resultant and equilibrant forces acting on an object?

- a. They are in the same direction but different in magnitude.
- b. Their sum is twice the magnitude of either of them.
- c. They are opposite in direction and equal in magnitude.
- d. They are perpendicular to each other and equal magnitude.

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Which one of the following terms is used to express a region of high pressure in which particles are pushed together during wave propagation?

- a. Compression
- b. Trough
- c. Crest
- d. Rarefaction

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