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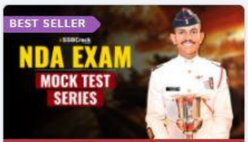

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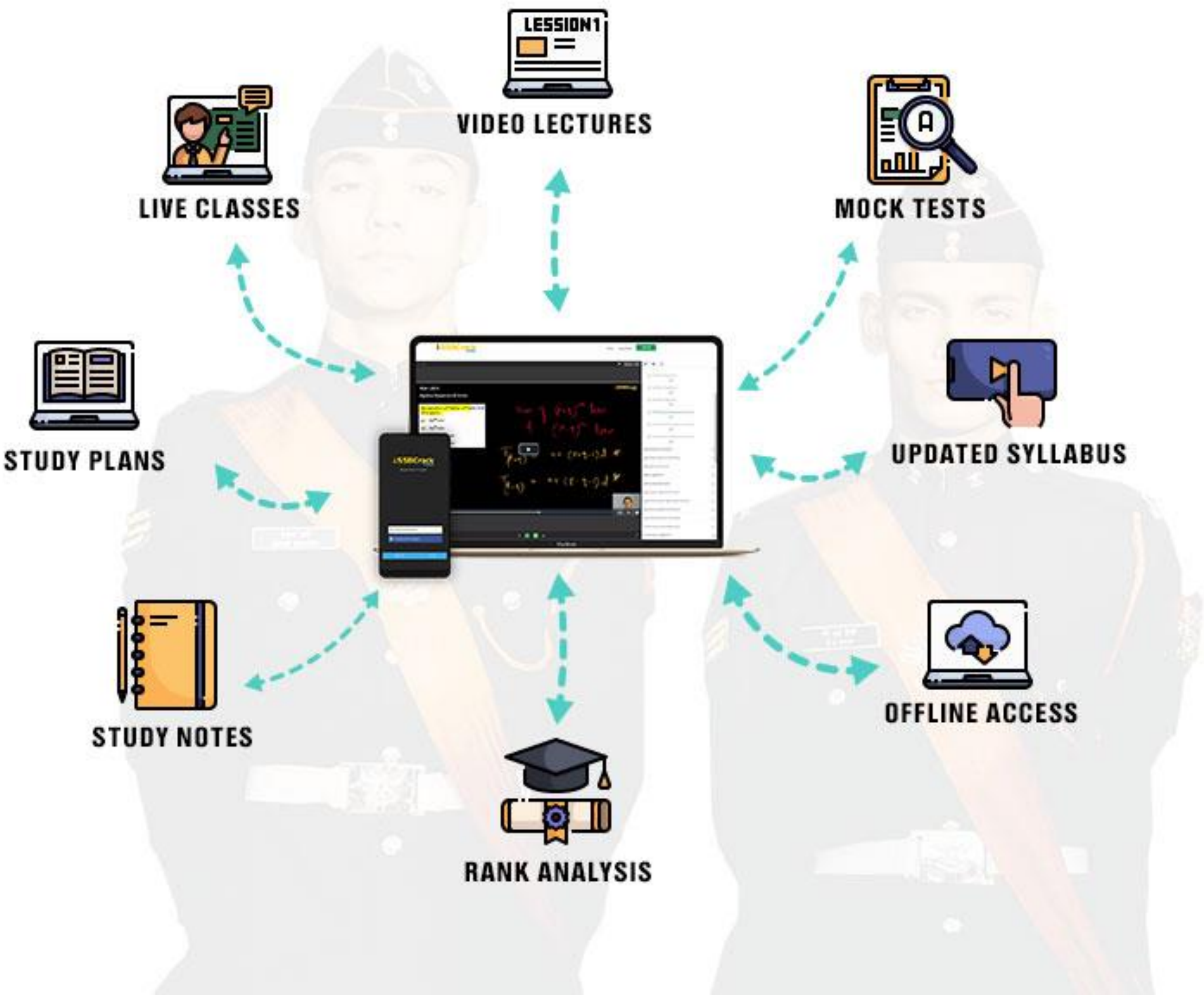

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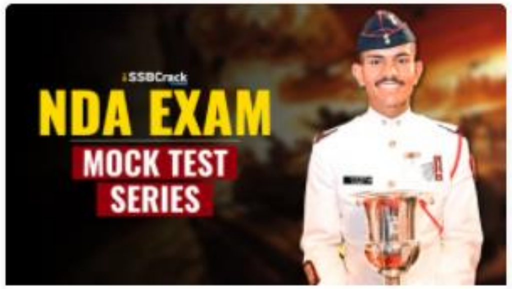

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Q) We are given three copper wires of different lengths and different areas of cross-section. Which one of the following would have highest resistivity?

(a) Copper wire of 50 cm length and 1 mm diameter

(b) Copper wire of 25 cm length and 0.5 mm diameter

(c) Copper wire of 10 cm length and 2.0 mm diameter

(d) All the wires would have same resistivity

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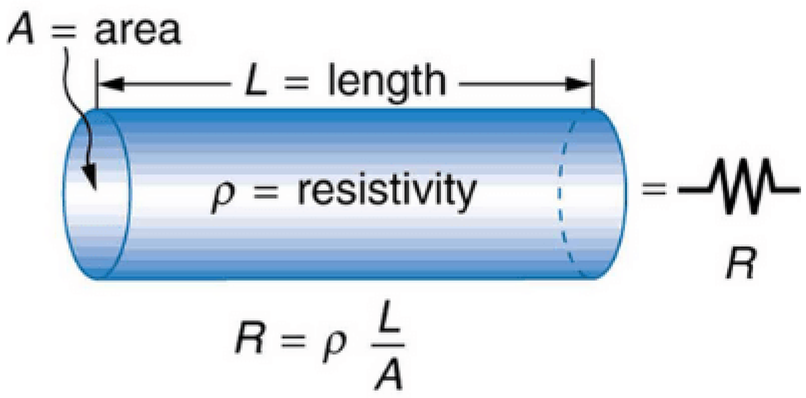

The resistivity is a property of a material, defined as the resistance between two opposite faces of a cube of a material of unit volume that is wire resistivity is only the unique property of a material and it does not depend upon the dimension of any piece of material. The same can be explained as $\rho = \frac{m}{ne^2\tau}$

where ρ is the resistivity

m and e is the mass and charge of an electron

τ is the relaxation time

Q) Which of the following statements about ‘fission’ is correct?

1. It is related with the creation of new individuals by means of cell division in unicellular organism.
2. It is related with the transformation of heavier nuclei into smaller nuclei.
3. It is related with the creation of a heavier nuclei by means of combining two higher nuclei.

Select the correct answer using the code given below:

(*a*) 1 only (*b*) 2 only

(*c*) 1 and 2 only (*d*) 1 and 3 only

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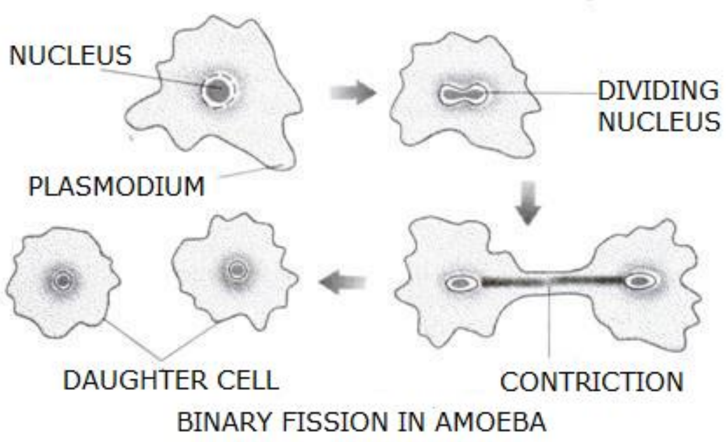

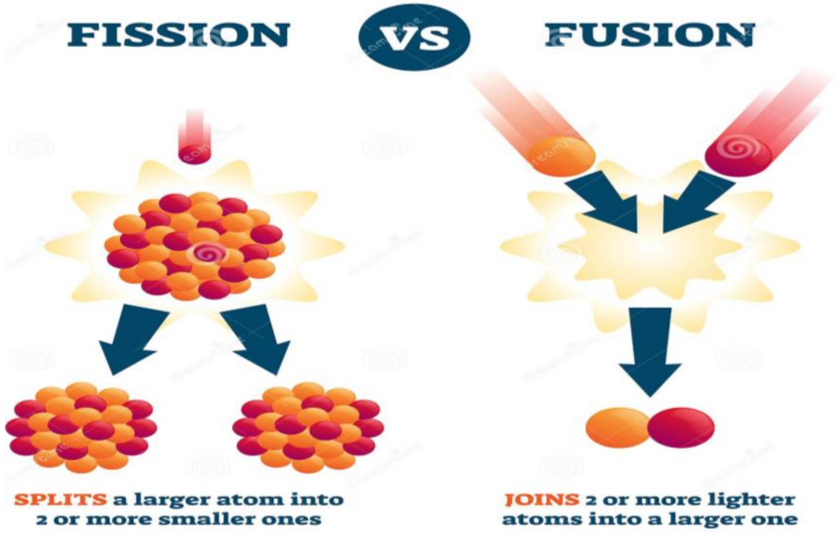

Q) Which one of the following is an electric conductor?

(a) A plastic sheet

(*b*) Distilled water

(*c*) Human body

(*d*) A wooden thin sheet

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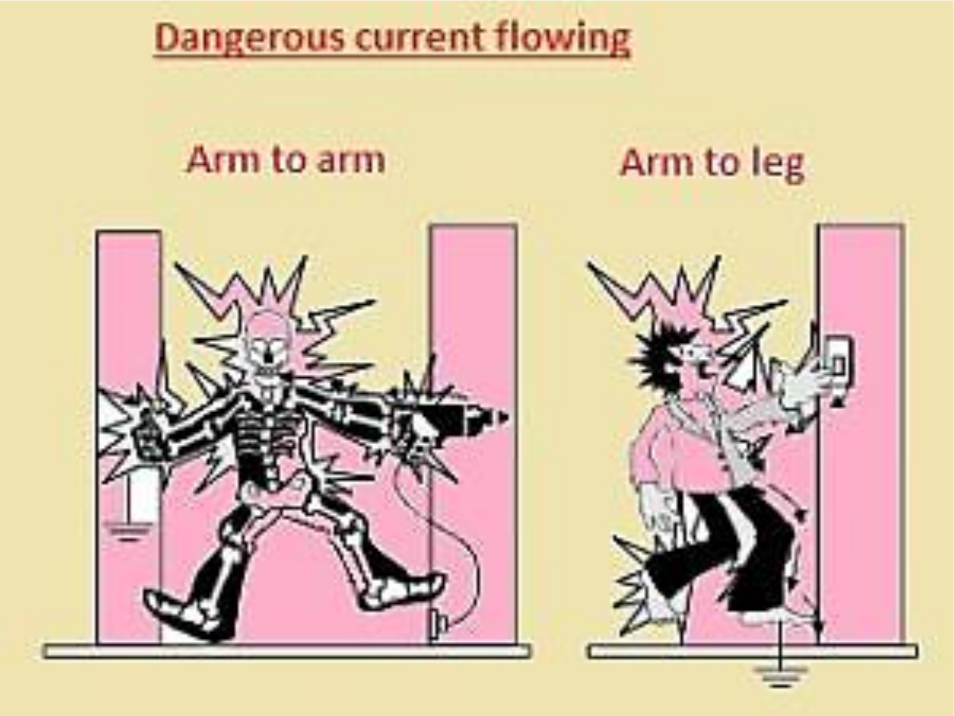

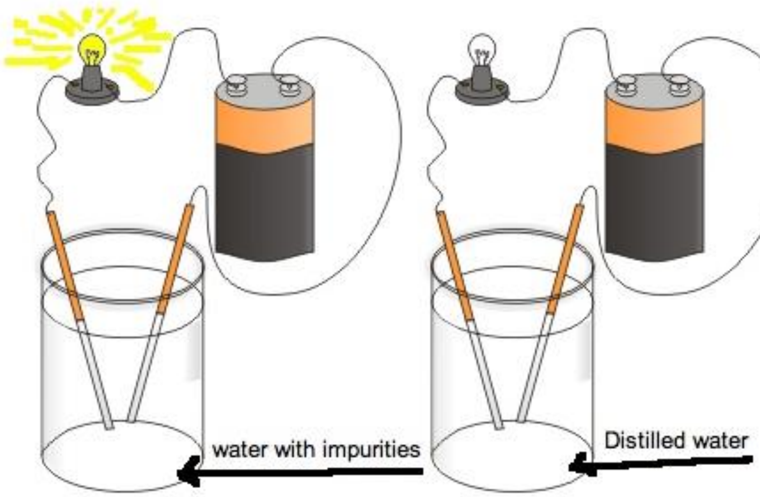

Q) A non-spherical shining spoon can generally be considered as a

(a) Spherical mirror

(*b*) Parabolic mirror

(*c*) Plane mirror

(*d*) Lens

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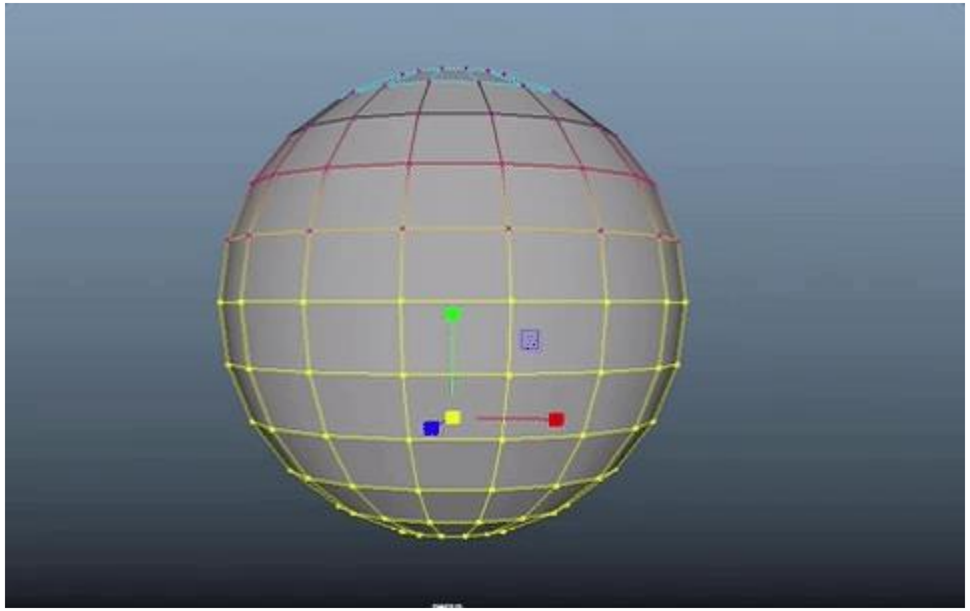

Q) Who amongst the following is a pioneer in discovering the heating effect of electric current?

(a) Isaac Newton

(*b*) Galileo Galilei

(*c*) James P. Joule

(*d*) J.J. Thomson

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THERMAL EFFECT OF CURRENT

Joule's Law:

When an electric current is passed through a conducting wire, the electrical energy is converted into heat energy. This effect is called 'heating effect of electric current'.

It is also called 'Joule Heating'.

Joule's Law gives $\boxed{Q = I^2 R t}$ **Q is in Joule, I in Amp, R in ohm and t in sec.**

$$\boxed{Q = \frac{I^2 R t}{J}}$$

Q is in Calorie, I in Amp, R in ohm and t in sec.

Q) Which one of the following laws of electromagnetism does ***not*** give the direction of magnetic field?

(*a*) Right-hand thumb rule

(*b*) Fleming's left-hand rule

(*c*) Fleming's right-hand rule

(*d*) Faraday's law of electromagnetic induction

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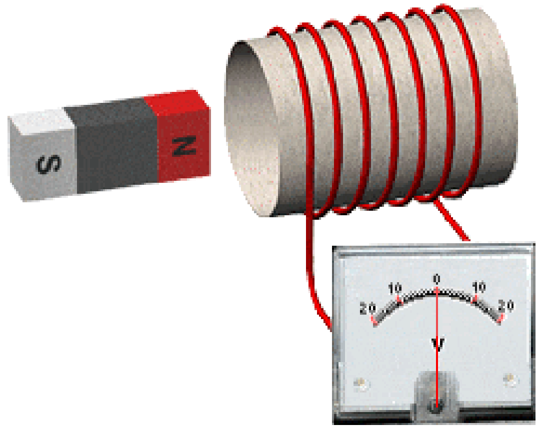
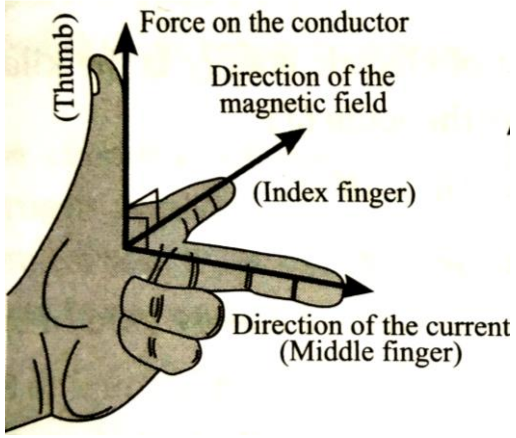
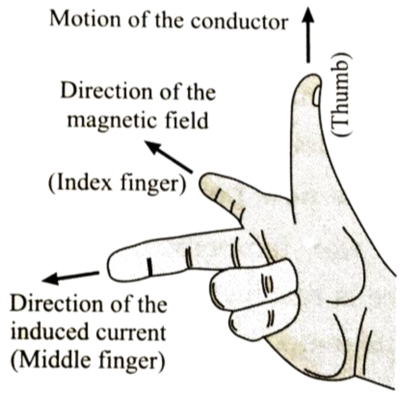
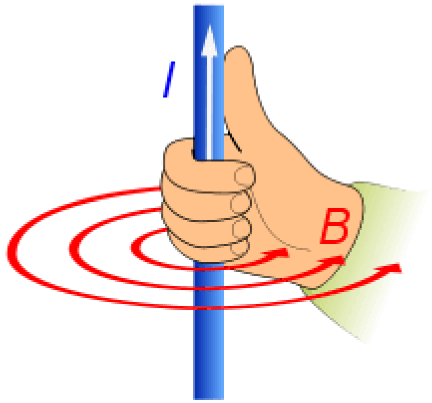
Faradays Law of Induction









Q) How many internal reflections of light take place in the formation of primary rainbow?

(a) 0

(*b*) 1

(*c*) 2

(*d*) More than 2

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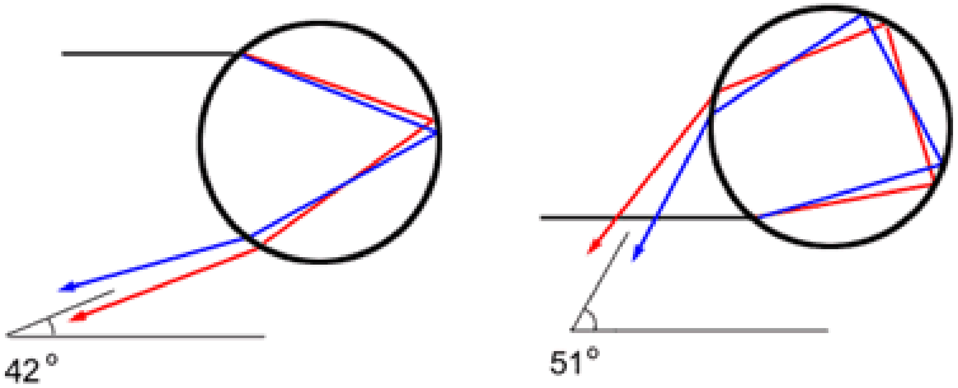

Primary Rainbow

Secondary Rainbow

Q) The direction of acceleration in uniform circular motion is along the

(*a*) direction of motion.

(*b*) tangent to the circle at the point of observation.

(*c*) direction of velocity.

(*d*) direction perpendicular to velocity

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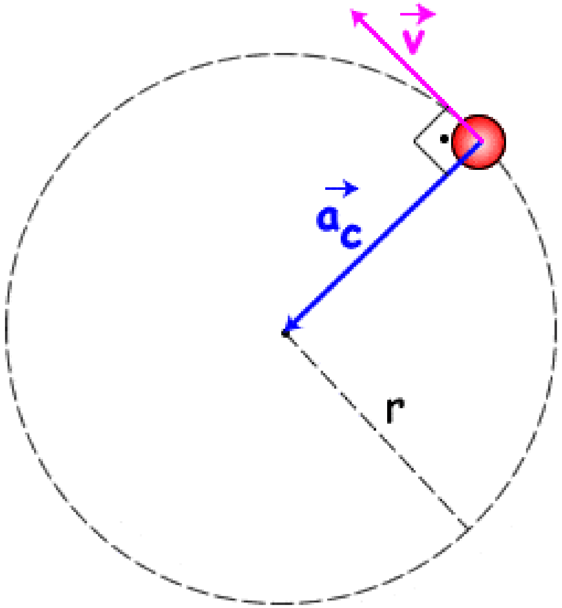

Q) The weight of an object is due to

(*a*) the net force acting on it.

(*b*) the total of all forces acting on it irrespective of their directions.

(*c*) the force that it exerts on the ground.

(*d*) its inert property.

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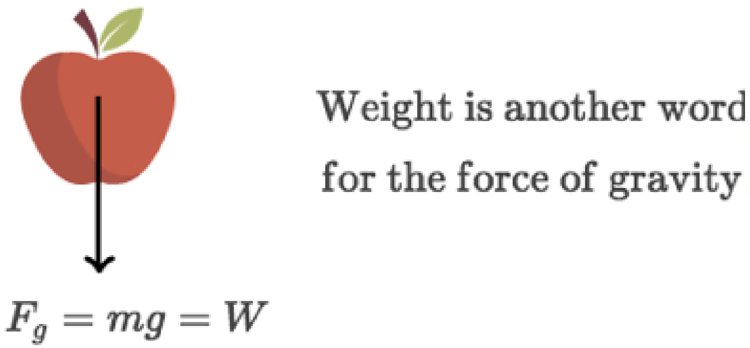

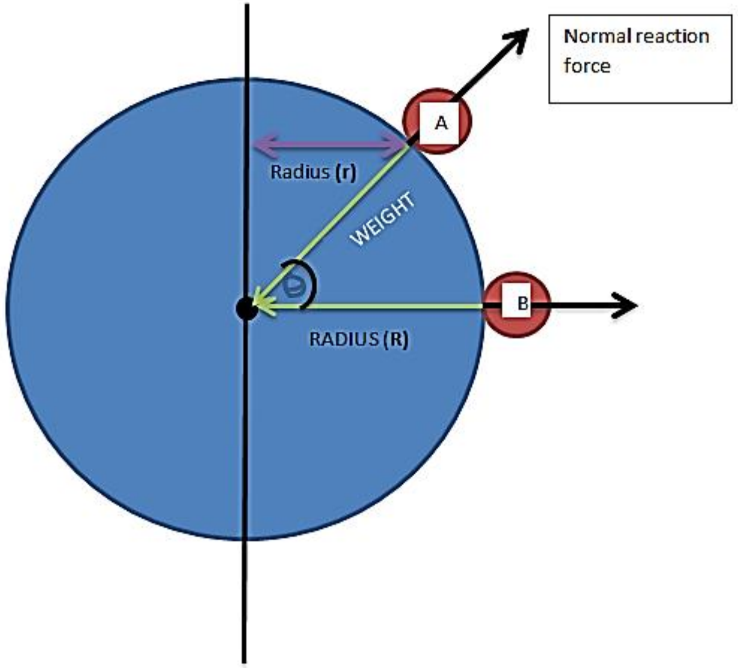

Q) The size of particles being studied in ‘nano-technology’ is about

(a) 1Å–10 nm

(*b*) 1–100 nm

(*c*) 1–50 μ

(*d*) 1 mm–10 mm

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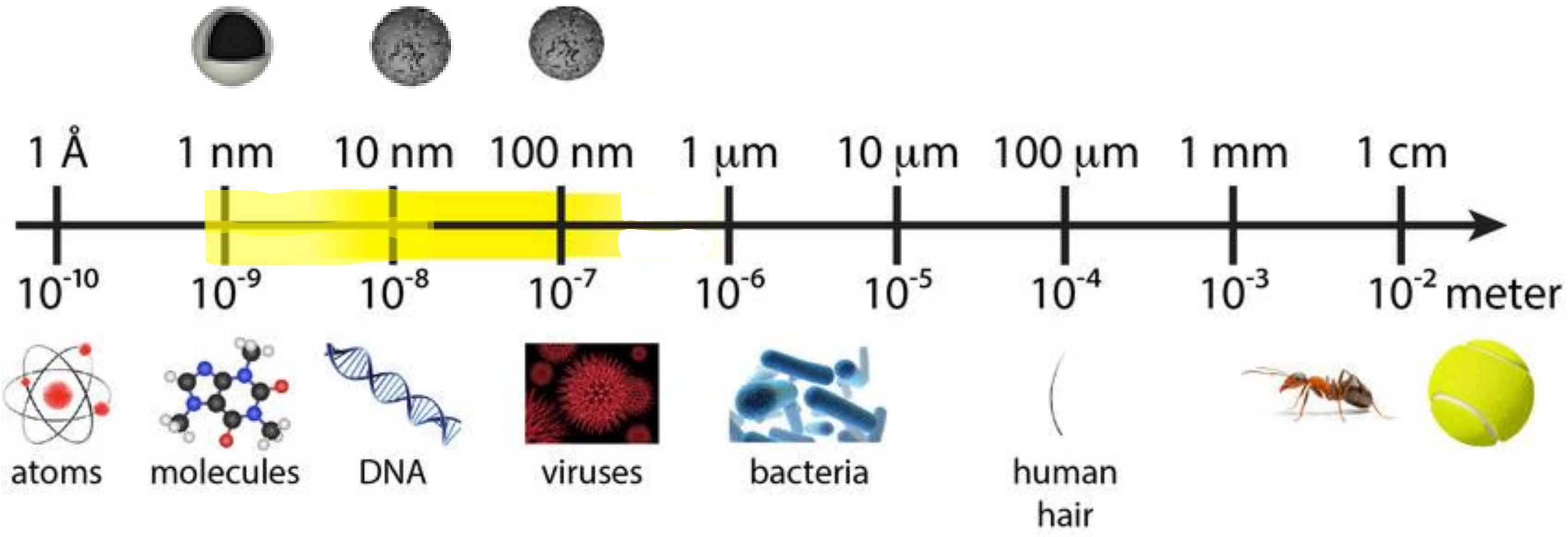

Q) An object weighs 9N on the surface of the Earth. What would be its weight, when measured on the surface of a planet where the acceleration due to gravity is 9 times that on the surface of the Earth?

(a) The weight would remain the same

(b) the weight would be equal to 1N

(c) the weight would become 9 times

(d) the weight will be reduced to $\frac{1}{9}N$

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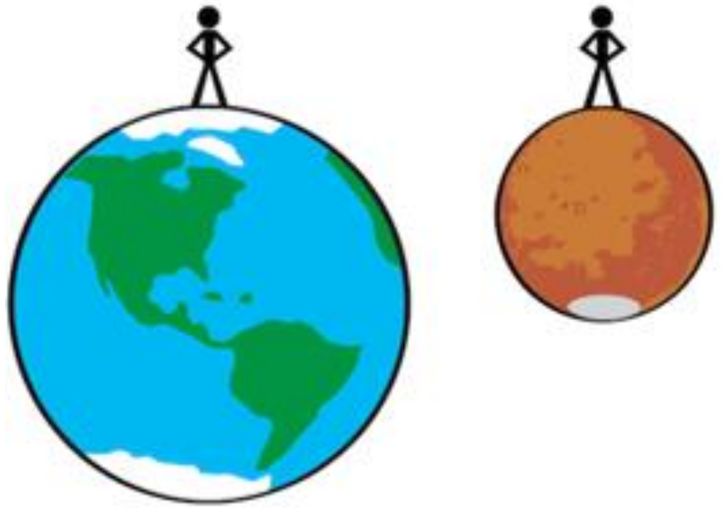

Q) The twinkling of a star is due to:

(a) atmospheric reflection of Starlight

(b) atmospheric refraction of Starlight

(c) continuous change in the position of the star

(d) oscillation of Starlight

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Q) A convex lens has a focal length of 15 cm. At what distance should an object be placed in front of the lens to get a real image of the same size of the object?

(a) 15 cm

(b) 10 cm

(c) 30 cm

(d) 40 cm

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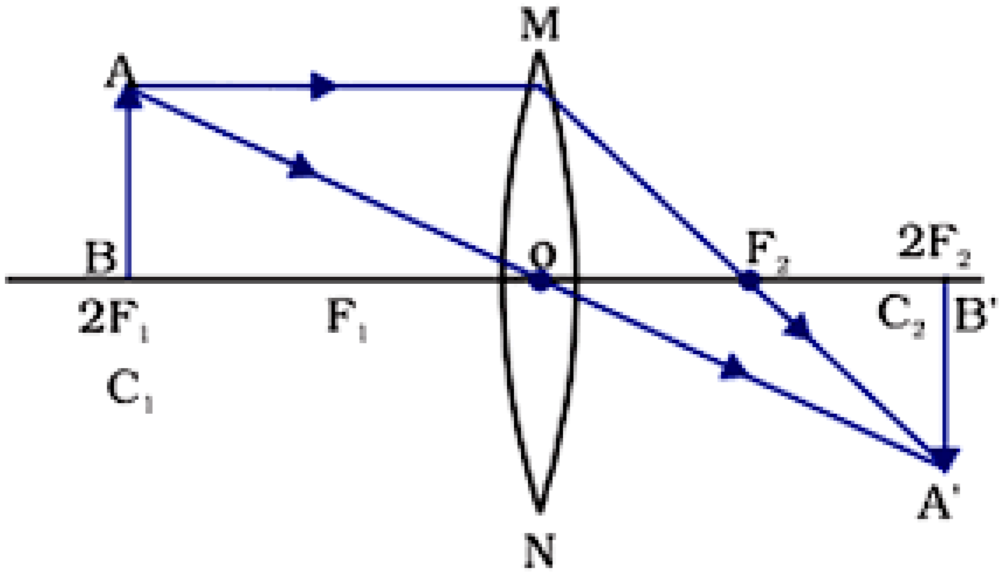

Q) Which one of the following statements about biogas is ***not*** correct ?

(a) it is mainly composed of methane gas

(b) it is a non renewable source of energy

(c) it is formed by the decomposition of cow dung in the absence of oxygen

(d) it burns without smoke and leaves no residue

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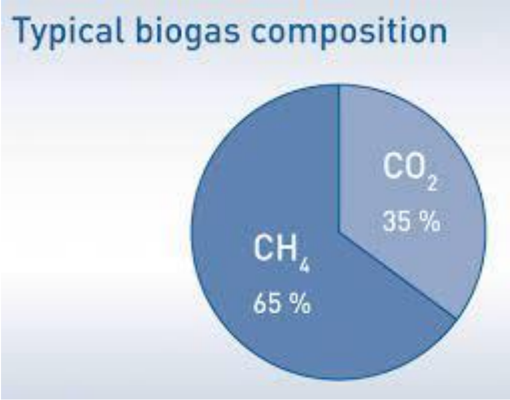

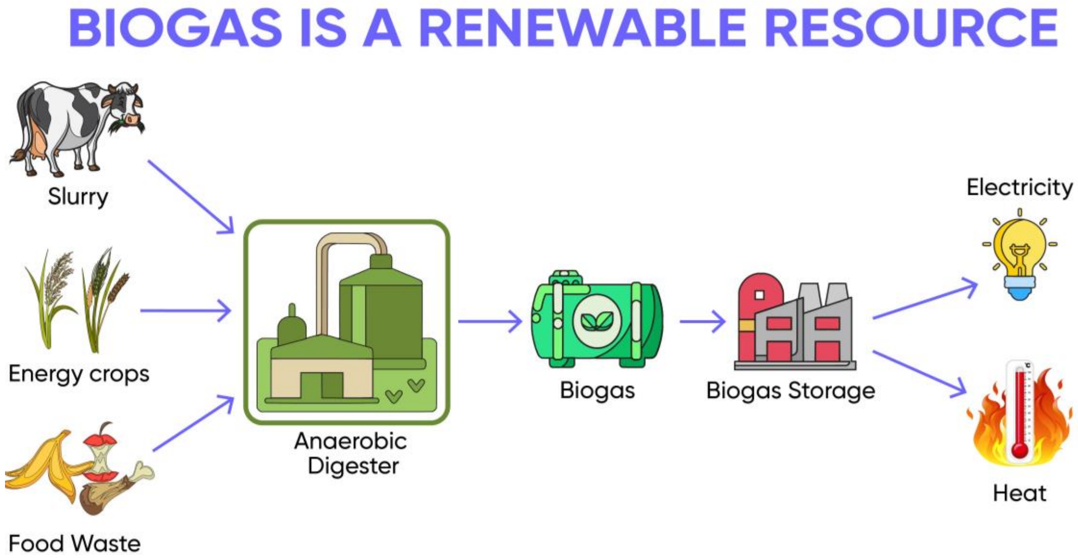

Q) If the magnification produced by a lens is +2 then the image is:

(a) erect, virtual and smaller than the object

(b) inverted, real and smaller than the object

(c) erect, virtual end larger than the object

(d) inverted, real and larger than the object

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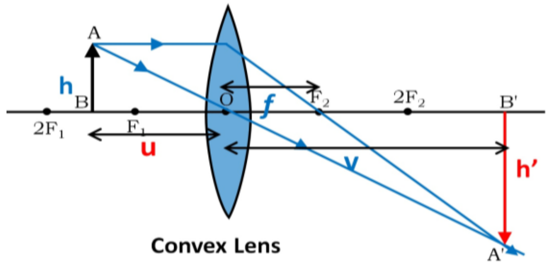
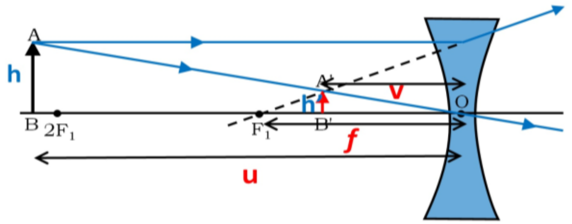
Lens Formula and Magnification



Convex Lens



Concave Lens

Lens Formula: $$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

Magnification $$m = \frac{Height\ of\ image}{Height\ of\ Object}$$

$$m = \frac{v}{u}$$

Q) What is the correct sequence of resistivity of silver, nichrome and glass at room temperature?

(a) Silver < Nichrome < Glass

(b) Glass < Nichrome < Silver

(c) Silver < Glass < Nichrome

(d) Nichrome < Silver < Glass

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	Material	Resistivity (Ω m)
Conductors	Silver	1.60×10^{-8}
	Copper	1.62×10^{-8}
	Aluminium	2.63×10^{-8}
	Tungsten	5.20×10^{-8}
	Nickel	6.84×10^{-8}
	Iron	10.0×10^{-8}
	Chromium	12.9×10^{-8}
	Mercury	94.0×10^{-8}
	Manganese	1.84×10^{-6}
Alloys	Constantan (alloy of Cu and Ni)	49×10^{-6}
	Manganin (alloy of Cu, Mn and Ni)	44×10^{-6}
	Nichrome (alloy of Ni, Cr, Mn and Fe)	100×10^{-6}
Insulators	Glass	$10^{10} - 10^{14}$
	Hard rubber	$10^{13} - 10^{16}$
	Ebonite	$10^{15} - 10^{17}$
	Diamond	$10^{12} - 10^{13}$
	Paper (dry)	10^{12}

Q) At the time of short-circuit, the current in the circuit :

(a) reduces substantially

(b) does not change

(c) increases heavily

(d) keeps on fluctuating

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Concept of Short Circuit

" Short circuit is an abnormal connection between two nodes of an electrical circuit that allows a current to travel along an unintended path with no or very low resistance. "

Q) Which one of the following statements is ***not*** correct ?

(a) an electric motor converts electrical energy into mechanical energy

(b) an electric generator works on the principle of electromagnetic induction

(c) the magnetic field at the centre of a long circular coil carrying current will be parallel straight lines

(d) a wire with a green insulation is usually the live wire of an electric supply

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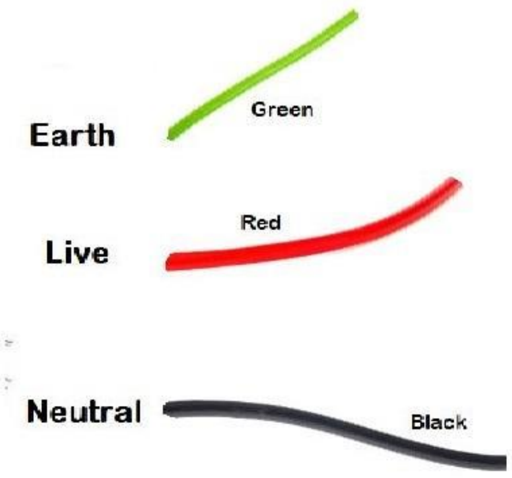

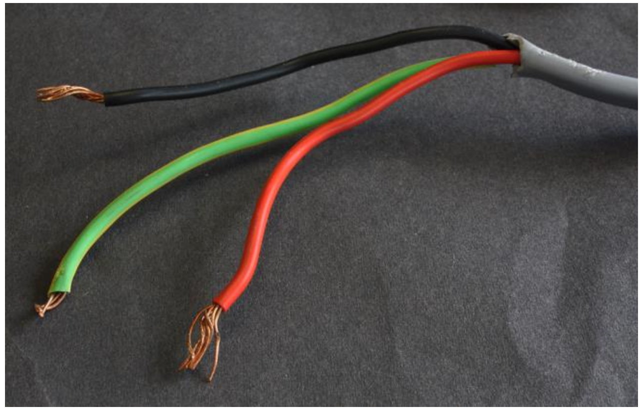

Q) A boy completes one round of a circular track of diameter 200 m in 30 s . What will be the displacement at the end of 3 minutes and 45 seconds ?

(a) 50 m

(b) 100 m

(c) 200 m

(d) 236 m

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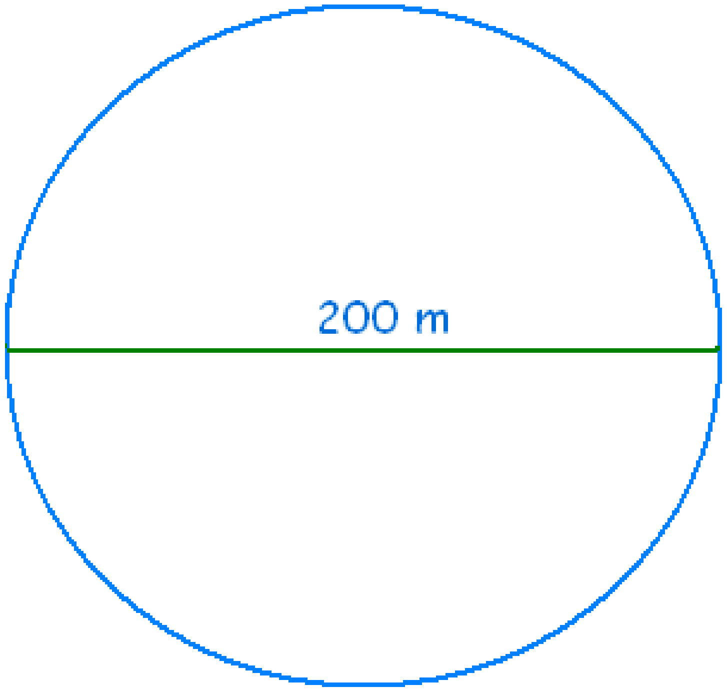

Circular track with diameter of 200 m

Q) What happens to the gravitational force between two objects if the mass of one object is doubled and the distance between them is also doubled ?

(a) The force would remain the same

(b) The force would be doubled

(c) The force would be halved

(d) The force would increase by a factor of 4

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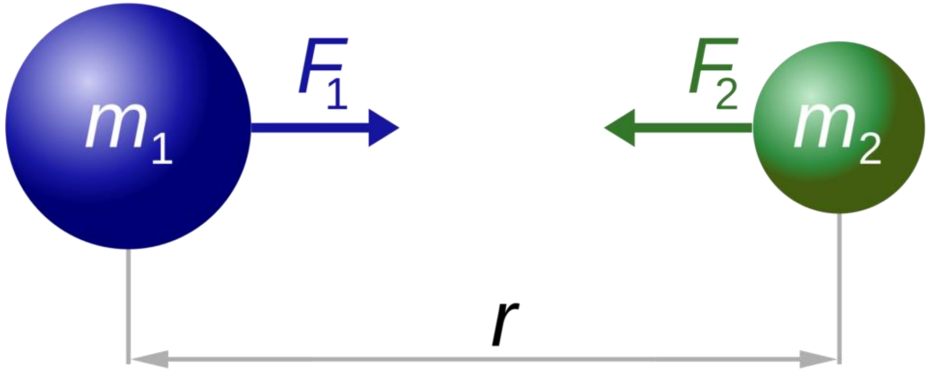

$$F_1 = F_2 = G\frac{m_1 \times m_2}{r^2}$$

Q) A glass prism splits white light into different colours. This phenomenon is called dispersion of light by prism. Which one of the following statements is correct?

(a) Red light will deviate the most and it is because of the reflection of light

(b) Violet light will deviate the most and it is because of the refraction of light

(c) Red light will deviate the most and it is because of the refraction of light

(d) Violet light will deviate the most and it is because of the reflection of light

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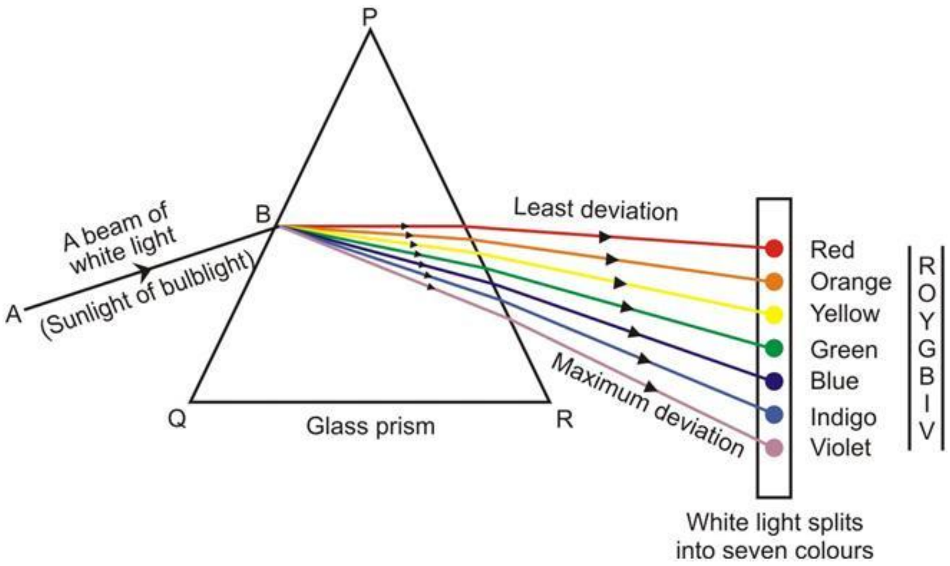

Q) Where should an object be placed in front of a convex lens to get a real and enlarged image of the object ?

(a)At twice the focal length

(b)at Infinity

(c)between the principal focus and twice the focal length

(d)beyond twice the focal length

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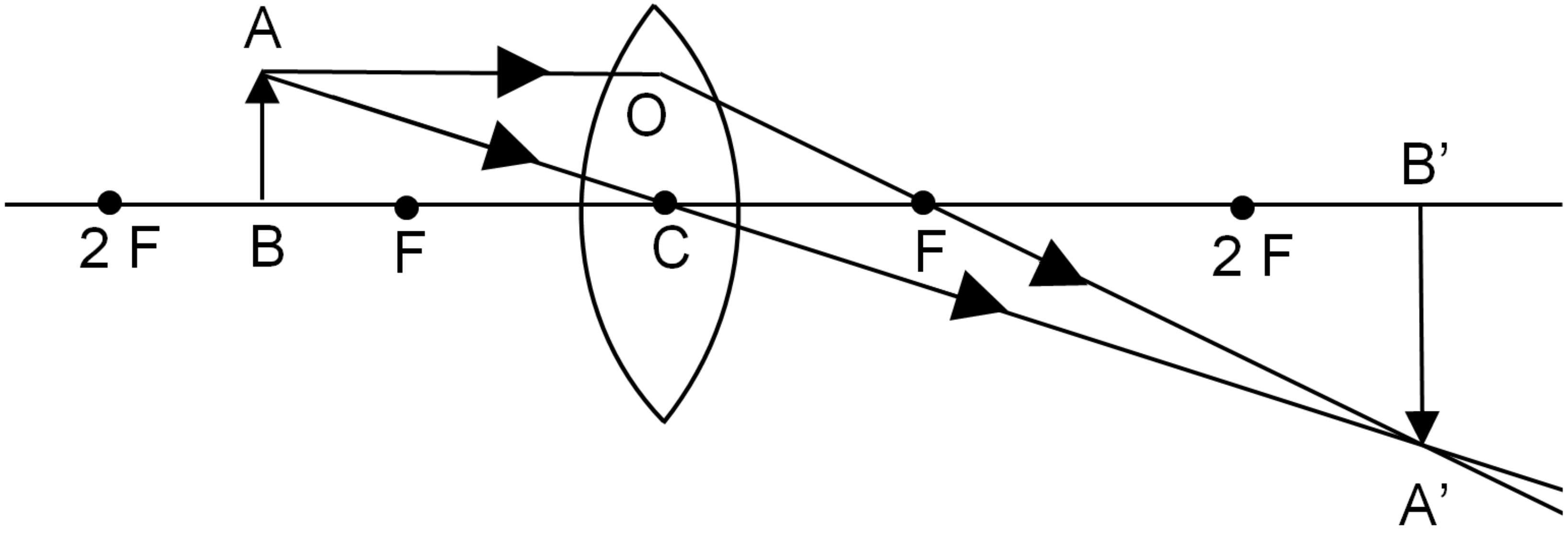


Q) Refraction of light, as it enters from one transparent medium to another, is due to

(a) change in temperature of the media

(b) change in the amplitude of light

(c) change in speed of light

(d) internal property of light

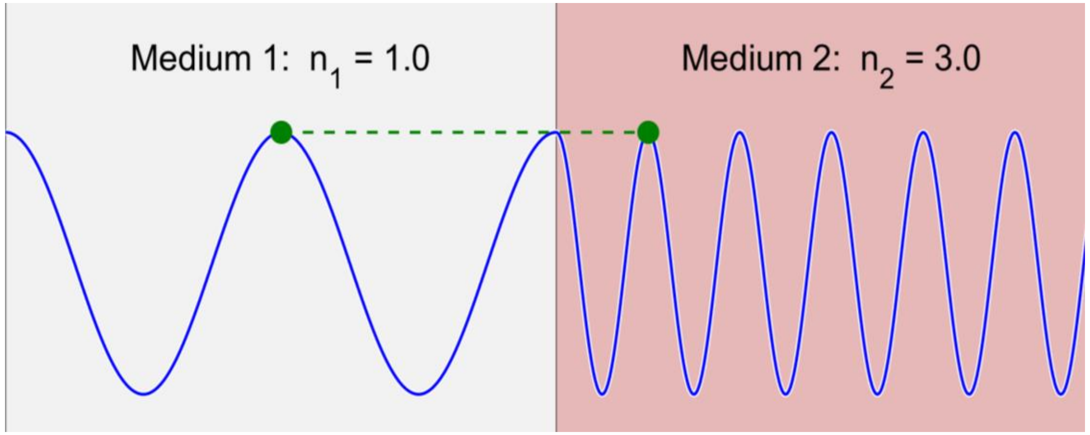
Q) Refraction of light, as it enters from one transparent medium to another, is due to

(a) change in temperature of the media

(b) change in the amplitude of light

(c) change in speed of light

(d) internal property of light



Light refracts whenever it travels at an angle into a substance with a different refractive index (optical density). This change of direction is caused by a change in speed. When light travels from air into water, it slows down, causing it to change direction slightly. This change of direction is called refraction.

Q) A bus starting from a bus-stand and moving with uniform acceleration attains a speed of 20 km/h in 10 minutes. What is its acceleration ?

(a) 200 km/h^2

(b) 120 km/h^2

(c) 100 km/h^2

(d) 240 km/h^2

Q) A bus starting from a bus-stand and moving with uniform acceleration attains a speed of 20 km/h in 10 minutes. What is its acceleration ?

(a) 200 km/h^2

(b) 120 km/h^2

(c) 100 km/h^2

(d) 240 km/h^2

Change in velocity = (final velocity, v -initial velocity, u)

=20-0=20km/hr

Time (t)= 10min = 10/60 h

Now, Acceleration= Change in velocity/time

$$=\frac{20}{\frac{10}{60}}$$

=120 km/h^2

Q) The magnetic field lines inside a current carrying long solenoid are in the form of

(a) Ellipse

(b) Parabola

(c) Hyperbola

(d) parallel straight lines

Q) The magnetic field lines inside a current carrying long solenoid are in the form of

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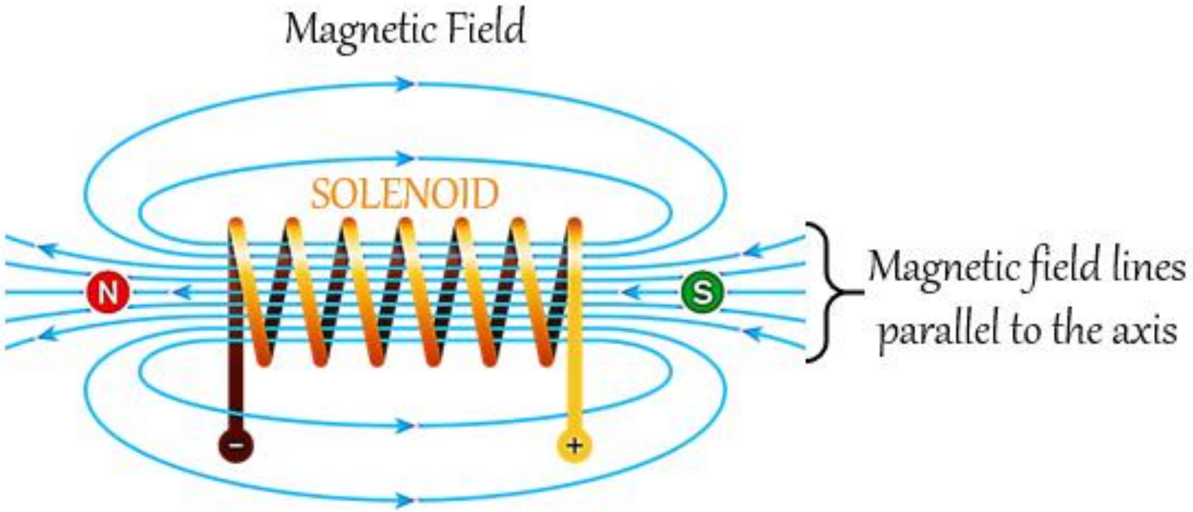

One end of the solenoid behaves as a magnetic North pole, while the other behaves as the South pole. The field lines inside the solenoid are in the form of parallel straight lines.

Q) A ray of light travelling from a rarer medium to a denser medium

(a) slows down and bends away from, the normal.

(b) slows down and bends towards the normal.

(c) speeds up and bends away from the normal.

(d) speeds up and bends towards the normal.

Q) A ray of light travelling from a rarer medium to a denser medium

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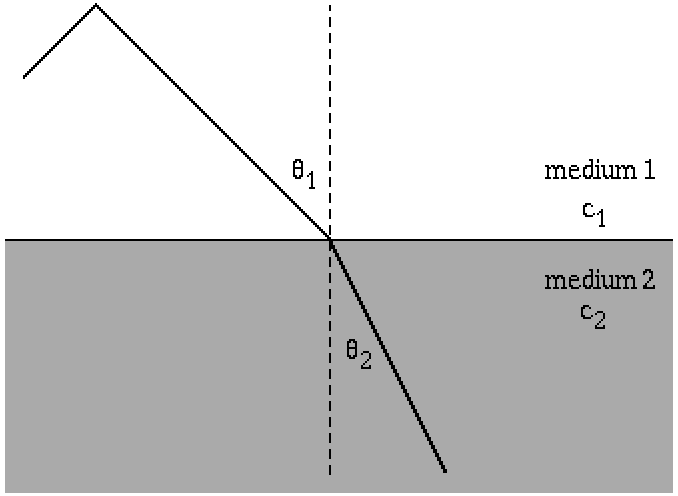

When a ray of light enters from a rarer to denser medium, light bends towards the normal and slows down. Since the speed of light changes as it enters from a rarer to denser medium the frequency of light does not change but its wavelength changes.

Q) An electric circuit is consisting of a cell, an ammeter and a nichrome wire of length l. If the length of the wire is reduced to half (l/2), then the ammeter reading

(a) decreases to one half

(b) gets doubled

(c) decreases to one-third

(d) remains unchanged

Q) An electric circuit is consisting of a cell, an ammeter and a nichrome wire of length l. If the length of the wire is reduced to half (l/2), then the ammeter reading

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(c) decreases to one-third

(d) remains unchanged

$$R = \frac{\rho L}{A}$$

ρ = resistivity
L = length
A = cross sectional area

I= V/R (current)

V= IR (voltage)

R= V/I (resistance)

If the length of the wire is halved, then the resistance of the wire will decrease to half. Hence, the Current will increase to double.
So, **the ammeter reading gets doubled**.

Q) What is the effect of pressure of a human body on sand?

(a) Larger while standing than while lying.

(b) Smaller while standing than while lying.

(c) Same while standing or lying.

(d) Larger while standing during the daytime and smaller during the night time while lying.

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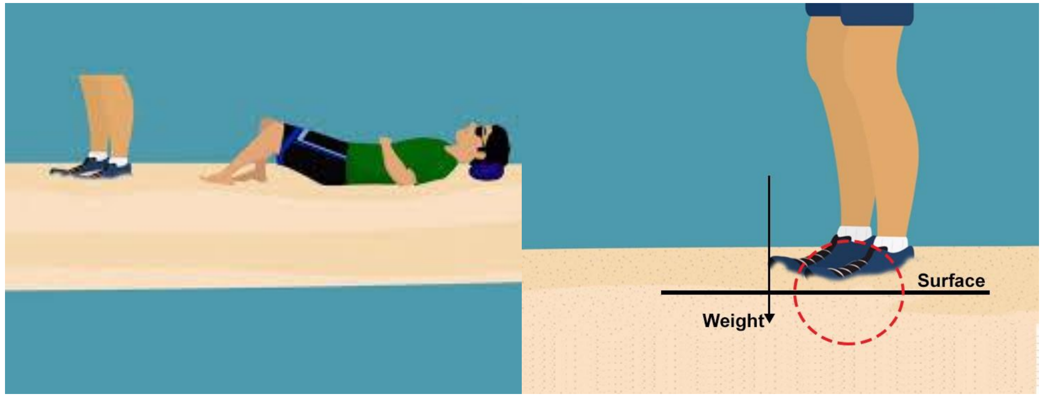

(b) Smaller while standing than while lying.

(c) Same while standing or lying.

(d) Larger while standing during the daytime and smaller during the night time while lying.

The effect of pressure of a human body on sand is larger while standing than while lying because the pressure exerted on a surface by an object increases as the weight of the object increases or the surface area of contact decreases.

Q) An athlete completes one round of a circular track of diameter 100 m in 20 s. What will be the displacements after 1 minute and 10 s, respectively?

(a) 0 m, 50 m

(b) 300 m, 100 m

(c) 300 m , 50 m

(d) 0 m, 100 m

Q) An athlete completes one round of a circular track of diameter 100 m in 20 s. What will be the displacements after 1 minute and 10 s, respectively?

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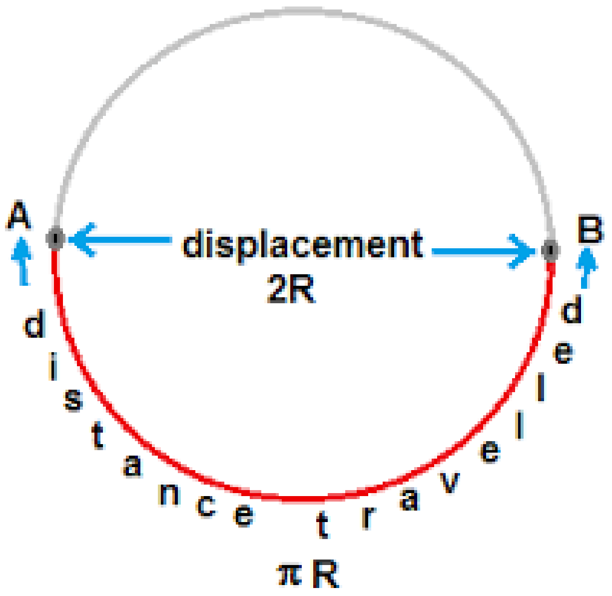

Displacement = Final position –initial position = change in position.
After 1 minutes i.e., 60 sec, Displacement will be 0 m as change in position will be 0 m because athlete will be at the initial position.
After 10 s, displacement will be 100 m is the change on position of the athlete

Q) A sound wave has a frequency of 4 kHz and wavelength 30 cm. How long will it take to travel 2.4 km?

(a) 2.0 s

(b) 0.6 s

(c) 1.0 s

(d) 8.0 s

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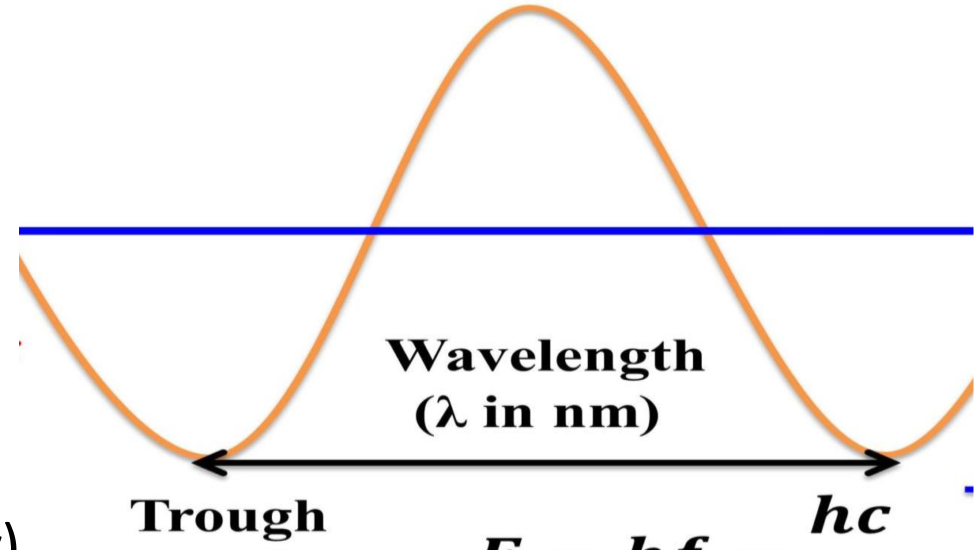
$$c = f\lambda$$



$$E = hf = \frac{hc}{\lambda}$$

Velocity (v) = frequency (v) ×wavelength (w)
= 4000 × 0.3 m
= 1200 m/s
Distance given = 2400 m
Time (t) = Distance (d)/Speed (v)
= 2400 / 1200 = 2.0 seconds.

Q) An electric bulb is connected to a 110 V generator. The current is 0.2 A. What is the power of the bulb?

(a) 0.22 W

(b) 2.2 W

(c) 22 W

(d) 220 W

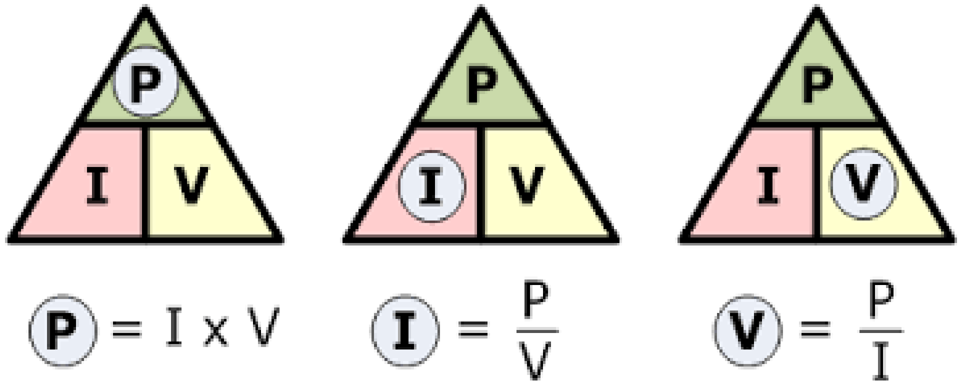
Q) An electric bulb is connected to a 110 V generator. The current is 0.2 A. What is the power of the bulb?

(a) 0.22 W

(b) 2.2 W

(c) 22 W

(d) 220 W



Power = Voltage × Current
Voltage = 110 V
Current = 0.2 A
Thus, power = 110 × 0.2
= 22 watt

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Q) The numerical ratio of displacement to distance for a moving object is

(a) always less than 1

(b) always equal to 1

(c) always more than 1

(d) equal or less than 1

Q) The numerical ratio of displacement to distance for a moving object is

(a) always less than 1

(b) always equal to 1

(c) always more than 1

(d) equal or less than 1

Displacement is the shortest length between the starting and the end pointing of a journey, whereas the distance is the actual length of the path travelled.
Hence, the distance will always be equal to or greater than the displacement. So, the ratio of displacement to distance will be always less than or equal to 1, since denominator(distance) is either greater than or equal to the numerator (displacement).

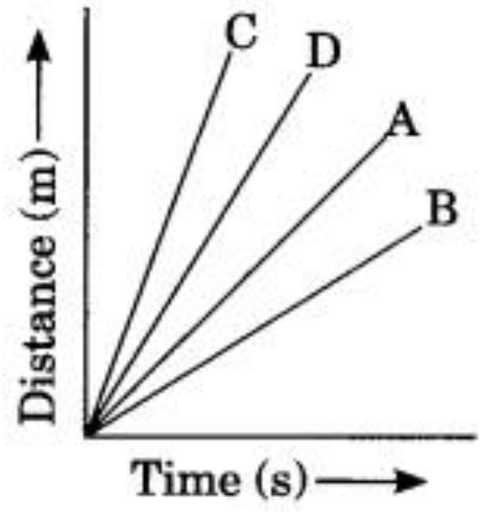
Q) Four cars A, B, C and D are moving on a levelled road. Their distance versus time graphs are shown in the adjacent figure. Choose the correct statement.

(a) Car A is faster than car D.

(b) Car B is the slowest.

(c) Car D is faster than car C.

(d) Car C is the slowest.



Q) Four cars A, B, C and D are moving on a levelled road. Their distance versus time graphs are shown in the adjacent figure. Choose the correct statement.

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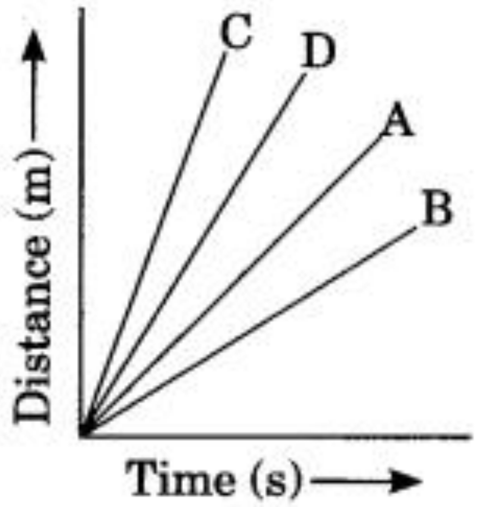


Speed is represented by the slope of distance versus time graphs. B has the smallest slope, and thus the lowest speed.

Q) The ratio of speed to the magnitude of velocity when the body is moving in one direction is

(a) Less than one

(b) Greater than one

(c) Equal to one

(d) Greater than or equal to one

Q) The ratio of speed to the magnitude of velocity when the body is moving in one direction is

(a) Less than one

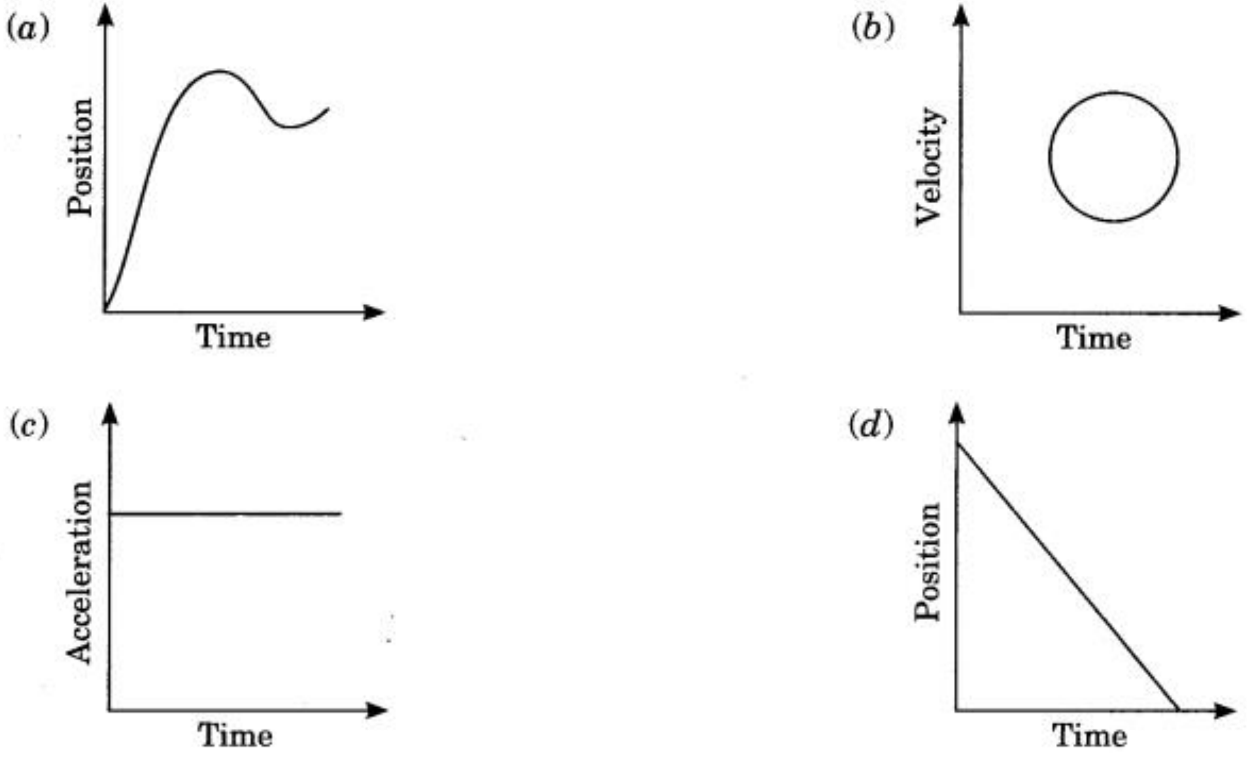
(b) Greater than one

(c) Equal to one

(d) Greater than or equal to one

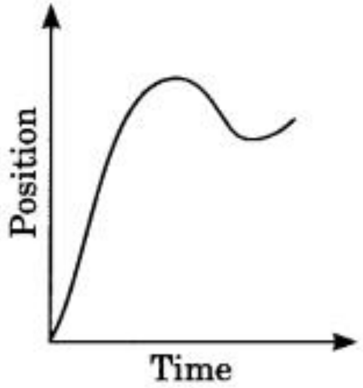
When body is moving in one direction then displacement and distance are equal in the same time interval. So, the ratio of speed and velocity is equal to one

Q) Which of the following graphs is not possible?

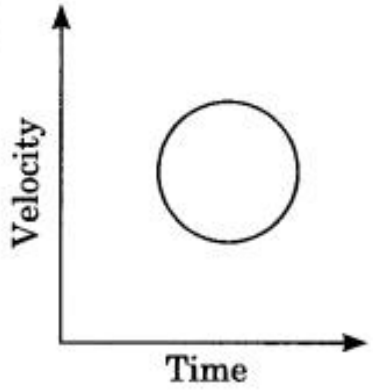


Q) Which of the following graphs is not possible?

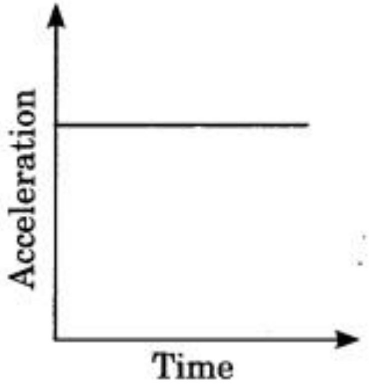
(a)



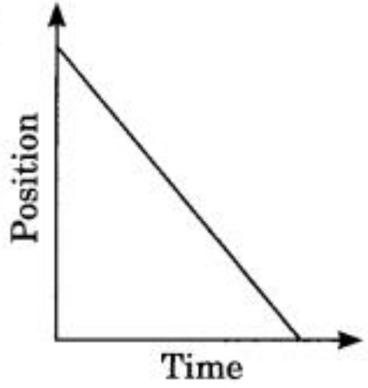
(b)



(c)



(d)



Ans: (b)

We know that it is not possible for a single object to have two values of velocity at the same time.

Q) An object travels 20m in 5 sec and then another 40m in 5 sec. What is the average speed of the object?

(a) 6 m/s

(b) 2 m/s

(c) 12 m/s

(d) 0 m/s

Q) An object travels 20m in 5 sec and then another 40m in 5 sec. What is the average speed of the object?

(a) 6 m/s

(b) 2 m/s

(c) 12 m/s

(d) 0 m/s

Average speed= (Total Distance)/(Total time)

= (20 m + 40 m)/(5 sec + 5 sec)

=60 m/10 sec

=6m/s

The average speed of the object is 6m/s.

Q) A wave completes 24 cycles in 0.8 s. The frequency of the wave is

(a) 30 Hz

(b) 24 Hz

(c) 36 Hz

(d) 8 Hz

Q) A wave completes 24 cycles in 0.8 s. The frequency of the wave is

(a) 30 Hz

(b) 24 Hz

(c) 36 Hz

(d) 8 Hz

Frequency is the number of vibrations or waves in a second,
So, the frequency is 24/0.8 = 30 Hz

Q) The frequency of sound waves can be expressed in

(a) Second

(b) Cycle

(c) Metre per second

(d) Cycle per second

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(a) Second

(b) Cycle

(c) Metre per second

(d) Cycle per second

The SI unit of frequency is Hz. One hertz means that an event repeat once per second. Another unit of frequency is Cycles per second.
We have the relation,
Time period = 1/frequency
As the unit of time period is second, the unit of frequency can be expressed as s^{-1}

Q) A boat is set into vertical Vibration by waves of speed 5 ms^{-1} whose crests are 5m apart. The Time period of vertical vibration of the boat is

(a) 4 s

(b) 2 s

(c) 1 s

(d) 0.5 s

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(a) 4 s

(b) 2 s

(c) 1 s

(d) 0.5 s

We know speed = distance/time
And time = distance/speed
= 5/5
= 1second
Here time is the time period of the wave.

Q) When the vibrating object moves backwards, it creates a region of low pressure called

(a) Refraction

(b) Reflection

(c) Rarefaction

(d) Retardation

Q) When the vibrating object moves backwards, it creates a region of low pressure called

(a) Refraction

(b) Reflection

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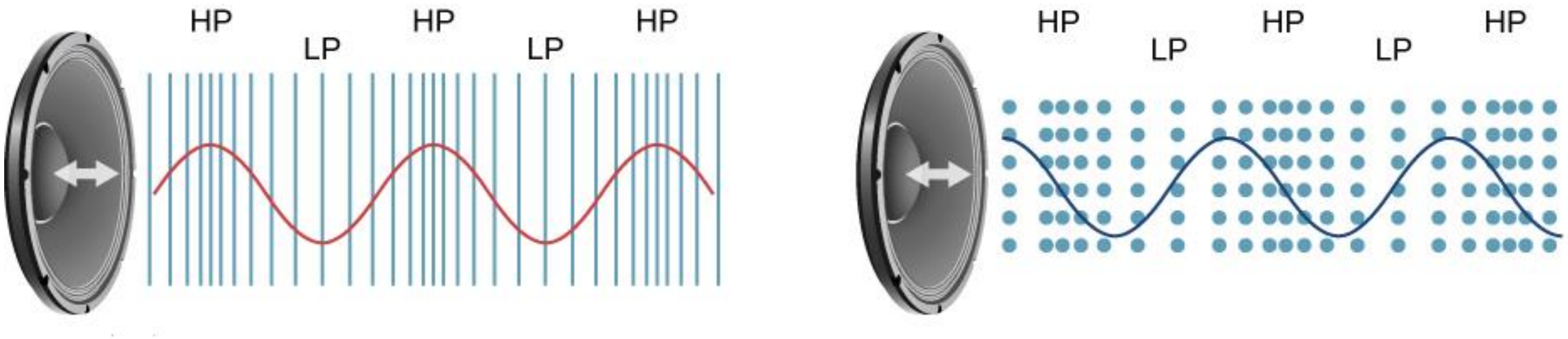
The compressions are regions of high pressure while the rarefactions are regions of low pressure.

HP = Compression LP = Rarefaction



Q) The phenomenon where a sound produced is heard again due to reflection is called

(a) Sound bounce

(b) Mirage

(c) An echo

(d) Interference

Q) The phenomenon where a sound produced is heard again due to reflection is called

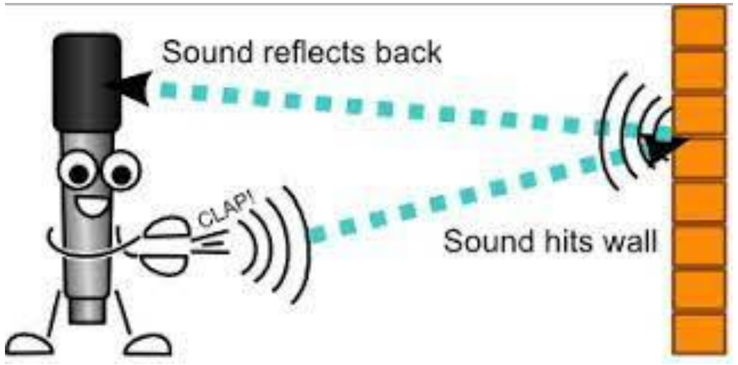
(a) Sound bounce

(b) Mirage

(c) An echo

(d) Interference

If we shout or clap near a suitable reflecting object such as a tall building or a mountain, we will hear the same sound again a little later. This sound which we hear is called an echo. Echoes are heard due to the phenomenon of Reflection of sound waves.



Q) The gravitational force causes

(a) Tides

(b) Motion of moon

(c) None of them

(d) Both (a) and (b)

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(a) Tides

(b) Motion of moon

(c) None of them

(d) Both (a) and (b)

IMPORTANCE OF UNIVERAL LAW OF GRAVITATION :-

1) Force binds us to the earth
2) The motion of moon around the earth
3) The motion of planets around the sun
4) Tides due to the moon and the sun

Q) The ball is thrown up, the value of ‘g’ will be

(a) Zero

(b) positive

(c) negative

(d) negligible

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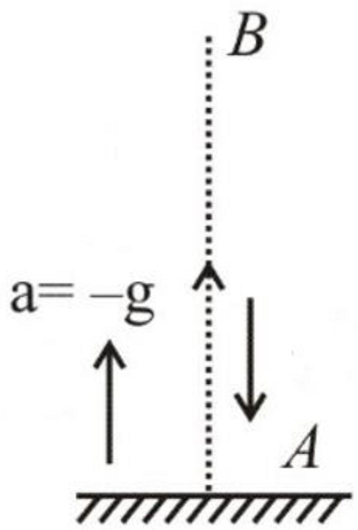

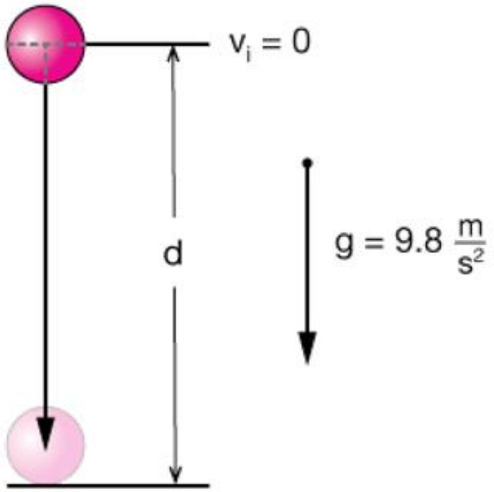

When a ball is thrown up, the direction of g which is downwards is opposite to the motion of ball which is upwards. Hence, g is negative.

Q) The mass of the body on moon is 40kg, what is the weight of the body on the earth.

(a) 240kg

(b) 392N

(c) 240N

(d) 400kg

Q) The mass of the body on moon is 40kg, what is the weight of the body on the earth.

(a) 240kg

(b) 392N

(c) 240N

(d) 400kg

We have mass of body on moon m = 40 kg.
We know that weight on earth is given by mass x gravitational force

So, W = m x g

$W = 40 \times 9.8\ m/s^2$

W = 392 N

So, weight on the earth is 392 N

Q) The distance between two bodies becomes 6 times more than the usual distance. Then the F becomes

(a) 36 times

(b) 6 times

(c) 12 times

(d) 1/36 times

Q) The distance between two bodies becomes 6 times more than the usual distance. Then the F becomes

(a) 36 times

(b) 6 times

(c) 12 times

(d) 1/36 times

New force will be reciprocal of square of given new distance. In the above question the distance becomes 6 times therefore, taking square of 6 and reciprocal it which is 1/36. Hence the new force will become 1/36 times the previous force.

Q) The Earth's atmosphere is held by the

(a) Wind

(b) Clouds

(c) Earth's magnetic field

(d) Gravity

Q) The Earth's atmosphere is held by the

(a) Wind

(b) Clouds

(c) Earth's magnetic field

(d) Gravity

The various atom of gases present in the earth atmosphere has masses and a gravitational force acts between theses atoms and earth.

Q) In a rocket, a large volume of gases produced by the combustion of fuel is allowed to escape through its tail nozzle in the downward direction with tremendous speed and makes the rocket move upward.
Which principle is followed in this take-off of the rocket?

(a) Moment of inertia

(b) Conservation of momentum

(c) Newton’s first law of motion

(d) Newton’s law of gravitation

Q) In a rocket, a large volume of gases produced by the combustion of fuel is allowed to escape through its tail nozzle in the downward direction with tremendous speed and makes the rocket move upward.

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Q) Quantitative expression of force is given by:

(a) Newton’s second law of motion.

(b) Newton’s third law of motion.

(c) Newton’s first law of motion.

(d) Newton’s law of gravitation.

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(a) Newton’s second law of motion.

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(c) Newton’s first law of motion.

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Newton's second law of motion.

Force can be calculated from Newton's second law of motion which gives that force is the product of mass and acceleration.

Q) Find the time taken by a body of mass 16 kg to come to rest from a uniform velocity of magnitude 10 m/s, when a force of 4N is applied continuously

(a) 20 s

(b) 30 s

(c) 40 s

(d) 50 s

Q) Find the time taken by a body of mass 16 kg to come to rest from a uniform velocity of magnitude 10 m/s, when a force of 4N is applied continuously

(a) 20 s

(b) 30 s

(c) 40 s

(d) 50 s

Here $u = 10\ m/s$, $v = 0\ m/s$

We know, $a = \frac{F}{m} = \frac{4}{16} = \frac{1}{4} ms^{-2}$

(since the body comes to rest acceleration will be negative)

Now, $v = u + at$

or, $0 = 10 + \left(-\frac{1}{4}\right)t$

or, $t = 40\ s$

Q) A batsman hits a cricket ball which then rolls on the ground. After covering a short distance, the ball comes to rest. The ball slows to a stop because:

(a) the batsman did not hit the ball hard enough.

(b) velocity is proportional to the force exerted on the ball.

(c) there is a force on the ball opposing the motion.

(d) there is no unbalanced force on the ball so the ball would want to come to rest

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(c) there is a force on the ball opposing the motion.

(d) there is no unbalanced force on the ball so the ball would want to come to rest

The ball slows down and comes to rest due to opposing forces of air resistance and frictional force on the ball opposing its motion.

Q) If the force acting on the body is zero. Its momentum is:

(a) Zero

(b) Constant

(c) Infinite

(d) None of the above

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(a) Zero

(b) Constant

(c) Infinite

(d) None of the above

p=mv
If F=0
So, ma=0
Since mass cannot be zero
So a=0
And a=(v-u)/t
0=(v-u)/t
v=u
Which means velocity is constant
Hence, momentum is constant

Q) The gravitational potential energy of an object is due to

(a) its mass

(b) its acceleration due to gravity

(c) its height above the earth’s surface

(d) All of the above.

Q) The gravitational potential energy of an object is due to

(a) its mass

(b) its acceleration due to gravity

(c) its height above the earth’s surface

(d) All of the above.

The gravitational potential energy of an object is given by: mgh (where m is the mass of an object , g is its acceleration due to gravity and h is its height above the earth surface).

Q) The energy possessed by an oscillating pendulum of a clock is

(a) kinetic energy

(b) potential energy

(c) nuclear energy

(d) mechanical energy

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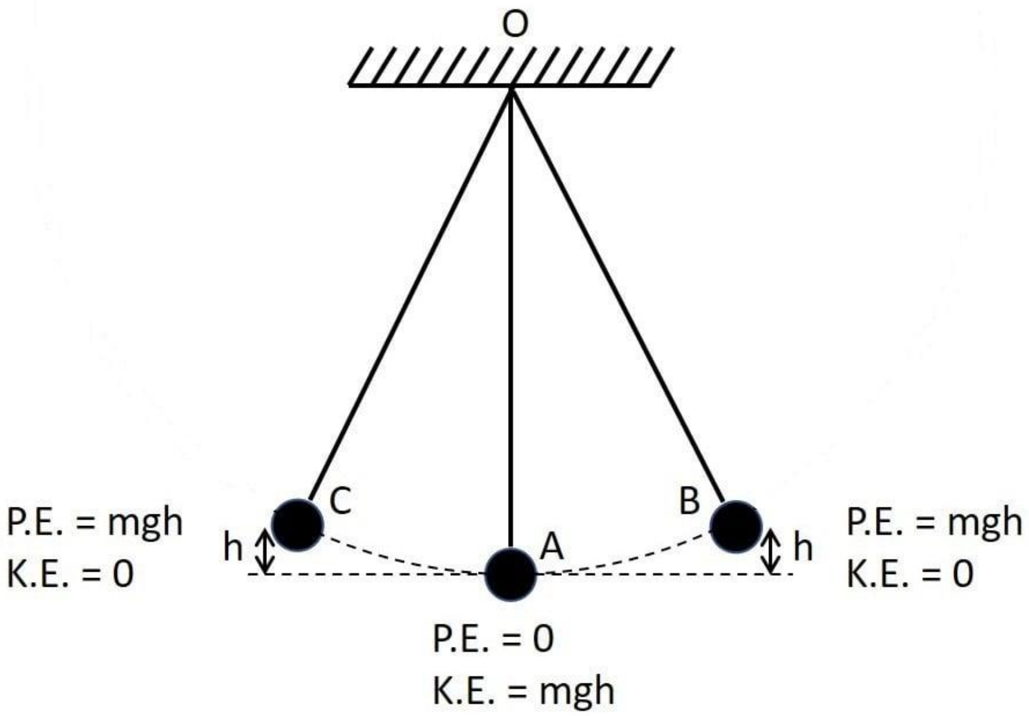

Q) A child on a skateboard is moving at a speed of 2m/s. After a force acts on the child, her speed is 3m/s. What can you say about the work done by the external force on the child?

(a) positive work was done

(b) negative work was done

(c) zero work was done

(d) infinite work was done

Q) A child on a skateboard is moving at a speed of 2m/s. After a force acts on the child, her speed is 3m/s. What can you say about the work done by the external force on the child?

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(c) zero work was done

(d) infinite work was done

Given, v_1=2 m/s, v_2=3 m/s
Since the child is in motion, he will have a kinetic energy of $(mv^2)/2$, which will be increased after an application of force by an external agent on him.
Now, Applying work energy theorem ,
Work done by the external force on the child = $\frac{1}{2}mv_2^2 - \frac{1}{2}mv_1^2$
Which will be positive.

Q) Mike applied 10N of force over 3m in 10seconds. Joe Applied the same force over the same distance in one minute. Who did more work?

(a) both did the same work

(b) both did zero work

(c) Mike

(d) Joe

Q) Mike applied 10N of force over 3m in 10seconds. Joe Applied the same force over the same distance in one minute. Who did more work?

(a) both did the same work

(b) both did zero work

(c) Mike

(d) Jose

For Mike:

Applied force $F = 10\ N$

Displacement $d = 3\ m$

Therefore, work done by Mike $W_{Mike} = Fd = 10\ N \times 3\ m$

$= 30\ J$

For Joe:

Force $F = 10\ N$

Displacement $d = 3\ m$

Therefore, work done by Joe $W_{Joe} = 10\ N \times 3\ m = 30\ J$

Therefore, the work done is the same.

Q) Work done by tension in the string when a ball tied to a string is being whirled around in a circle is

(a) tension does no work at all

(b) tension does negative work

(c) tension does positive work

(d) tension does infinite work

Q) Work done by tension in the string when a ball tied to a string is being whirled around in a circle is

(a) tension does no work at all

(b) tension does negative work

(c) tension does positive work

(d) tension does infinite work

The string and tangent of the circle will be perpendicular. Hence, work done is zero

Q) In a house 5 bulbs of 25 W are used for 6 hours a day. Then the expenditure for one month with the rate of ₹ 1.5 per unit is

(a) ₹ 22.5

(b) ₹ 33.75

(c) ₹ 37.25

(d) ₹ 43.25

Q) In a house 5 bulbs of 25 W are used for 6 hours a day. Then the expenditure for one month with the rate of ₹ 1.5 per unit is

(a) ₹ 22.5

(b) ₹ 33.75

(c) ₹ 37.25

(d) ₹ 43.25

Given,

- Number of bulbs, N= 5
- Power, P= 25 W
  - Total power, P= 5*25= 125 W
- It is given in the that, the bulbs are used for 6 hours for 30 days.
  - Therefore, **T = 30 * 6**
  - **= 180 hours**
- The total electrical energy consumption for the month is as follows:
  - Total Consumption, **E = P *T**
  - **= 125 * 180**
  - **= 22500 Wh**
- Which is equal to **E = 22.5 kWh** (dividing by 1000 to convert W to kW)
- The cost of energy per unit is given as Rs 1.5 per unit.
- Therefore, total cost of electricity will be **22.5 * 1.5 = Rs 33.75**

Q) When a 2A current flows in 3 ohm resistance for 10 seconds then the electrical energy spent is given by

(a) 120 J

(b) 60 J

(c) 600 J

(d) 180 J

Q) When a 2A current flows in 3 ohm resistance for 10 seconds then the electrical energy spent is given by

(a) 120 J

(b) 60 J

(c) 600 J

(d) 180 J

Current, I=2A
Resistance, R= 3ohm
Time, t=10sec
Electrical Energy, E = Pt

$=I^2Rt$

$=2^2 3 \times 10$

$=120$ J

Q) A wire of length l having resistivity ρ cut into half of its length, then the resistivity of the wire is

(a) ρ/2

(b) ρ

(c) 2 ρ

(d) 4 ρ

Q) A wire of length l having resistivity ρ cut into half of its length, then the resistivity of the wire is

(a) ρ/2

(b) ρ

(c) 2 ρ

(d) 4 ρ

Basis for comparison	Resistivity
Definition	it is defined as the resistance of material having specific dimensions
Formula	ρ= RA/L
SI unit	ohmmeter
Symbol	ρ
Dependence	Temperature

Q) Let an electric current of 1.5 A flow through an incandescent lamp in a circuit. What is the amount of charge that flows through it in 10 ms?

(a) 0.015 C

(b) 0.15 C

(c) 1.5 C

(d) 15 C

Q) Let an electric current of 1.5 A flow through an incandescent lamp in a circuit. What is the amount of charge that flows through it in 10 ms?

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(b) 0.15 C

(c) 1.5 C

(d) 15 C

I= 1.5 A
T=10ms=10x10^{-3} s
I = Q/T
Q=IT
Q=1.5x10x10^{-3}
Q=0.015 Coulomb

Q) One horsepower is equal to

(a) 736 watts

(b) 746 watts

(c) 748 watts

(d) 756 watts

Q) One horsepower is equal to

(a) 736 watts

(b) 746 watts

(c) 748 watts

(d) 756 watts

Power

The horsepower, hp, is another unit of power that is sometimes used.

$$1 \text{ hp} = 746 \text{ watts}$$

Q) The defect of vision in which the person is able to see distant object distinctly but cannot see nearby objects clearly is called

(a) short-sightedness

(b) Myopia

(c) Hypermetropia

(d) All above

Q) The defect of vision in which the person is able to see distant object distinctly but cannot see nearby objects clearly is called

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Hypermetropia
Farsightedness, also known as hyperopia, is a condition of the eye in which light is focused behind, instead of on, the retina. The person affected by hypermetropia cannot see nearby objects distinctly but can see distant objects clearly.

Q) The ability of eye lens to adjust its focal length to form a sharp image of the object at varying distances on the retina is called

(a) Power of observation of the eye

(b) Power of adjustment of the eye

(c) Power of accommodation of the eye

(d) Power of enabling of the eye

Q) The ability of eye lens to adjust its focal length to form a sharp image of the object at varying distances on the retina is called

(a) Power of observation of the eye

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(c) Power of accommodation of the eye

(d) Power of enabling of the eye

The ability of the eye lens to adjust its focal length is called power of accommodation. This is done by the ciliary muscles by changing the focal length of eye lens.

Q) Myopia and hypermetropia can be corrected by

(a) Concave and plano-convex lens

(b) Concave and convex lens

(c) Convex and concave lens

(d) Plano-concave lens for both defects.

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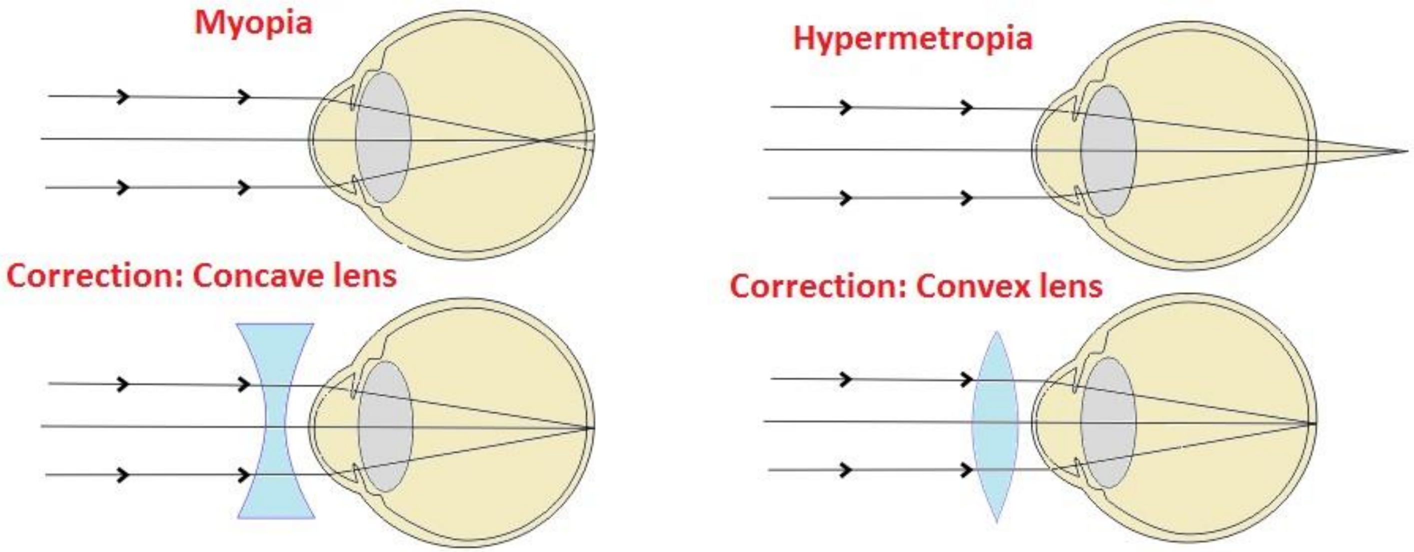

Q) The defective eye of a person has near point 0.5 m and far point 3 m. The power for corrective lens required for

(i) reading purpose and

(ii) seeing distant objects, respectively are:

(a) 0.5 D and +3D

(b) +2D and –1/3D

(c) – 2D and +1/3D

(d) 0.5 D and-3.0D

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For reading purpose

$u = -25$ cm, $v = 0.5$ m $= -50$ cm, $f = ?$ P = ?

Using, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{-50} - \frac{1}{-25} = \frac{1}{50}$

$\therefore P = \frac{100}{f(\text{cm})} = 100 \times \frac{1}{50} = +2\text{ D}$

For distant objects

$u = \infty$, $v = -3$ m, $f = ?$ P = ?

$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{-3} - \frac{1}{\infty} = -\frac{1}{3}$

$\therefore P = \frac{1}{f(\text{m})} = -\frac{1}{3}\text{D}$

Q) The image formed on the retina of the human eye is

(a) virtual and inverted

(b) real and inverted

(c) real and erect

(d) virtual and erect

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(a) virtual and inverted

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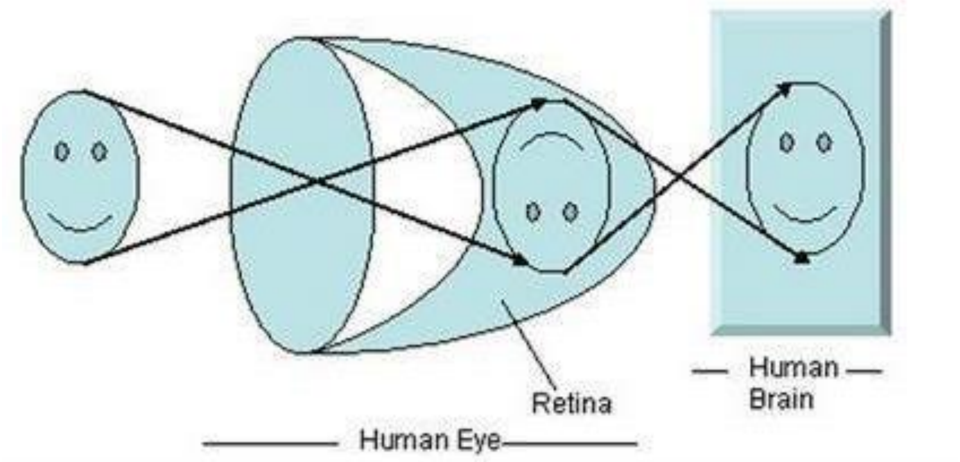
The image formed on the retina of the human eye is real and inverted.



Q) An object is placed 10 cm in front of a lens. The image formed is real, inverted and of same size as the object. What is the focal length in nature of the lens?

(a) 5 cm, converging

(b) 10 cm, diverging

(c) 20 cm, converging

(d) 20 cm, diverging

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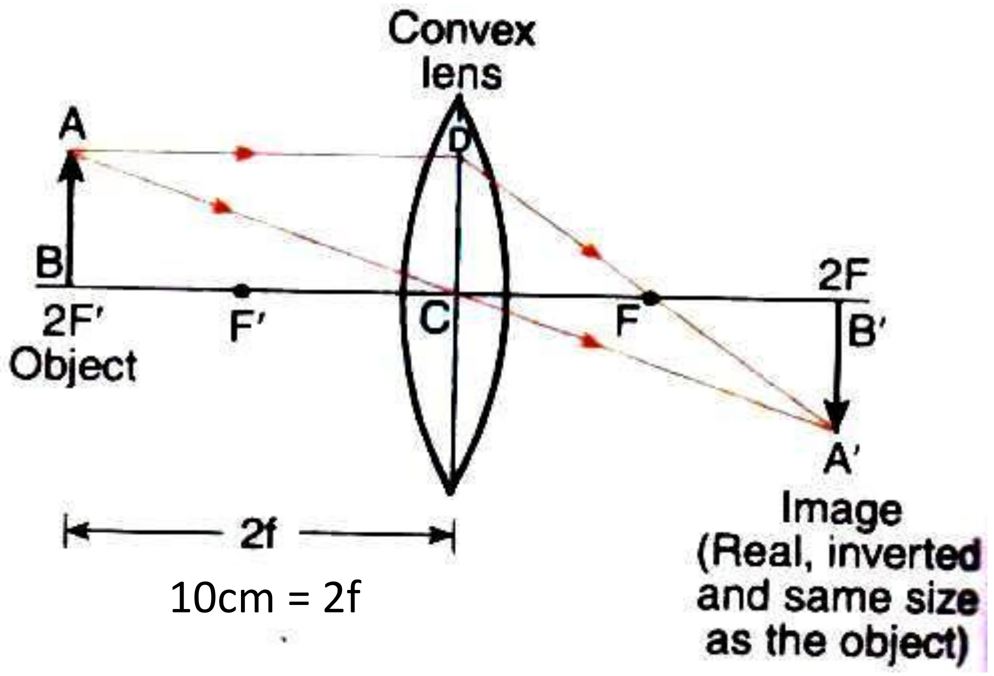

10cm = 2f

Q) Focal length of a concave mirror is 6 cm. If the object is at distance 4cm from the focus, then the position of the image w.r.t. the focus is

(a) 9 cm

(b) 4 cm

(c) 8 cm

(d) 6 cm

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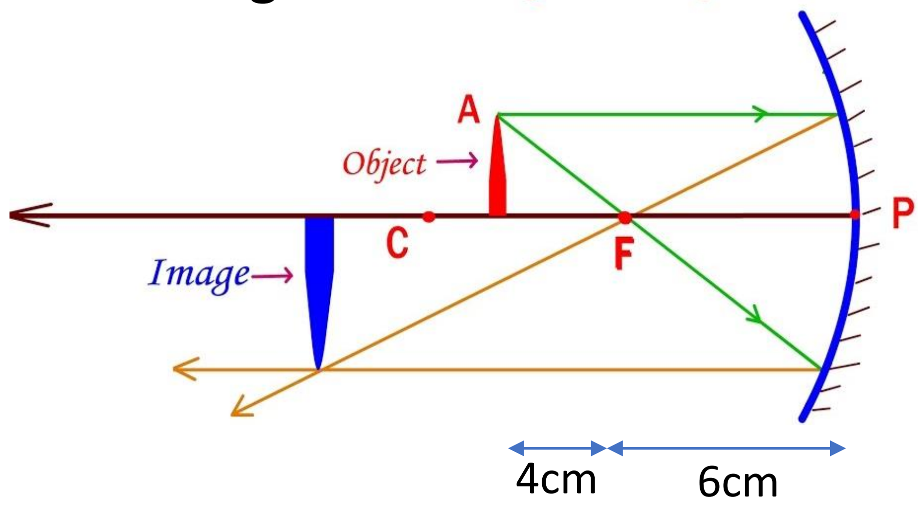

If x_1 and x_2 are distances of the object and image from focus then focal length,

$$f = \sqrt{x_1 x_2} \Rightarrow x_2 = \frac{f^2}{x_1} = \frac{36}{4} = 9 \text{ cm.}$$

Q) A 10 mm long awl pin is placed vertically in front of a concave mirror. A 5 mm long image of the awl pin is formed at 30 cm in front of the mirror. The focal length of this mirror is

(a) -30 cm

(b) -20 cm

(c) -40cm

(d) -60 cm

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(b) -20 cm

(c) -40cm

(d) -60 cm

∴ v = -30cm

Magnifying factor (m) = m/u = -y/x

- y = Image height
- x = Object's height

m = -5/10

Since m = v/u

-5/10 = v/u

-5/10 = (-30)/u

∴ u = 60cm

Since object distance is always negative, so u = -60cm

Apply mirror formula as

(1/ v) + (1/u) = 1/f

1 /(- 60) + 1/(- 30) = 1/f

-1/60 − 1/30 = 1/f

-90/1800 = 1/f

1 /(- 20) = 1/f or

Q) Under which of the following conditions a concave mirror can form an image larger than the actual object?

(a) When the object is kept at a distance equal to its radius of curvature

(b) When object is kept at a distance less than its focal length

(c) When object is placed between the focus and centre of curvature

(d) When object is kept at a distance greater than its radius of curvature

Q) Under which of the following conditions a concave mirror can form an image larger than the actual object?

(a) When the object is kept at a distance equal to its radius of curvature

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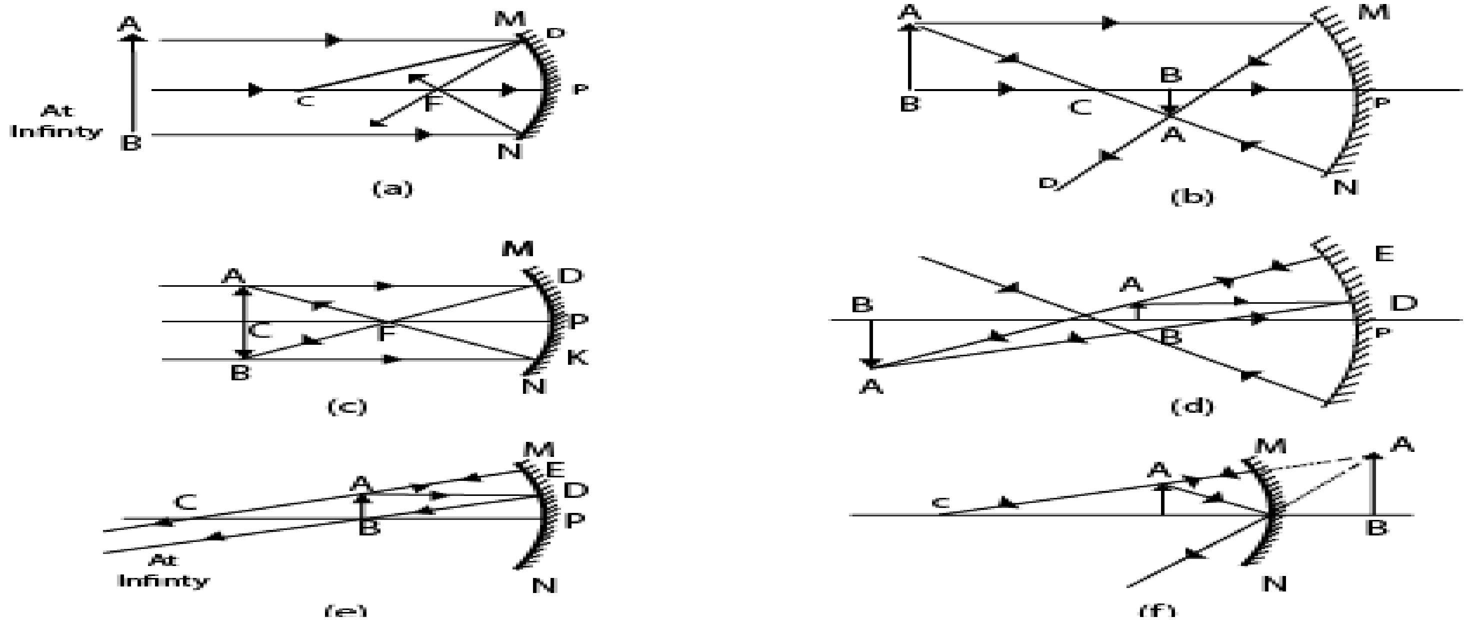

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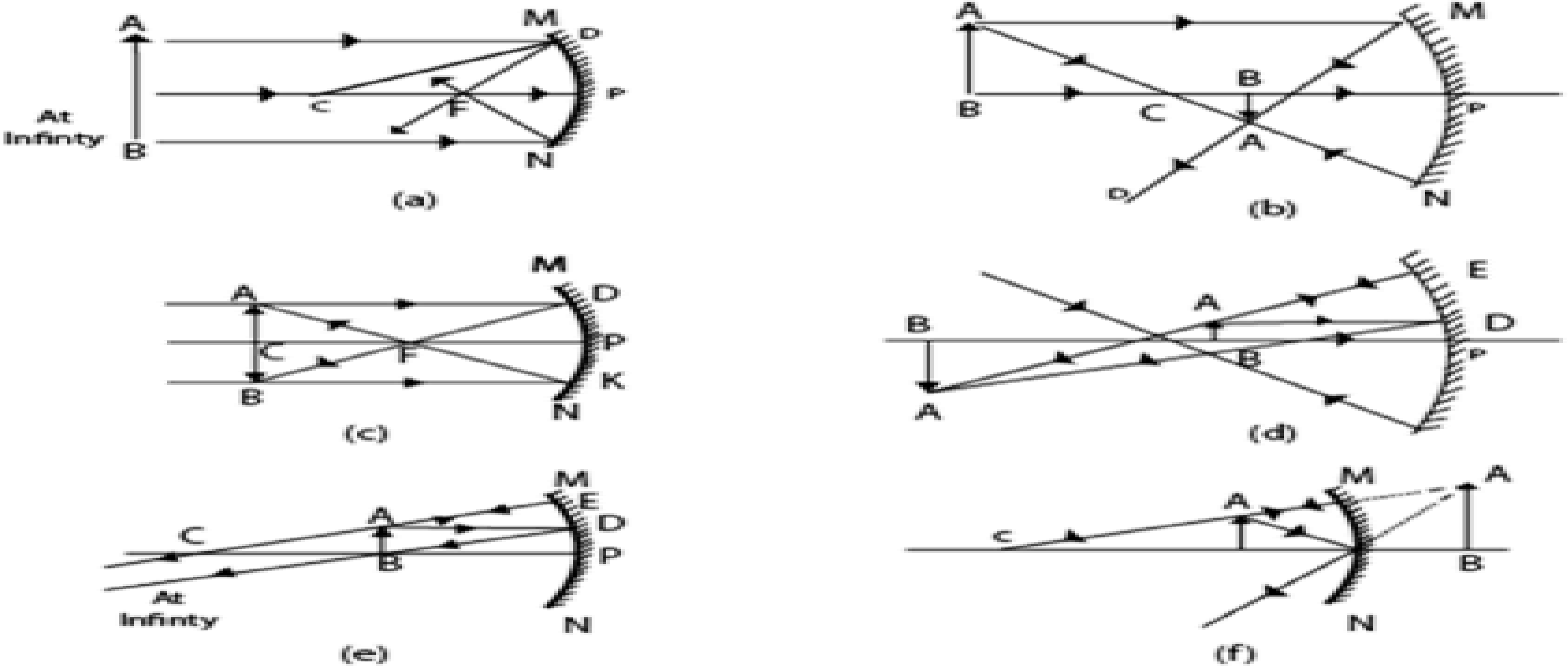
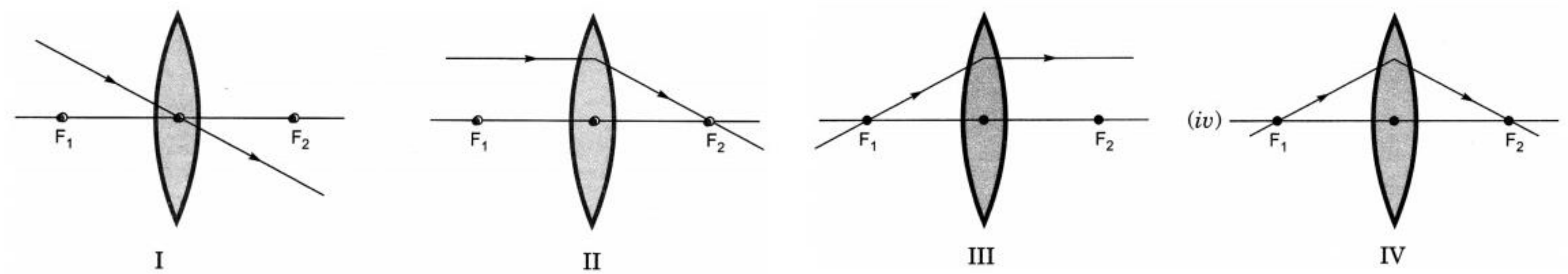


Q) The diagrams showing the correct path of the ray after passing through the



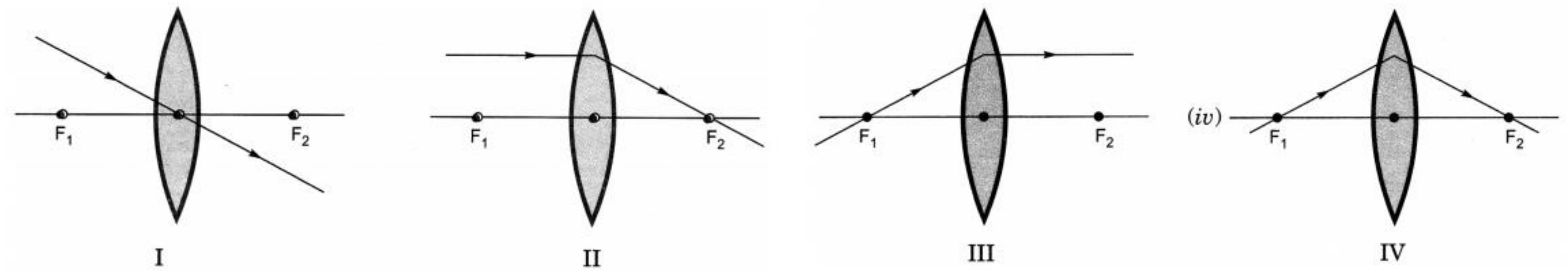
(a) II and III only

(b) I and II only

(c) I, II and III

(d) I, II and IV

Q) The diagrams showing the correct path of the ray after passing through the

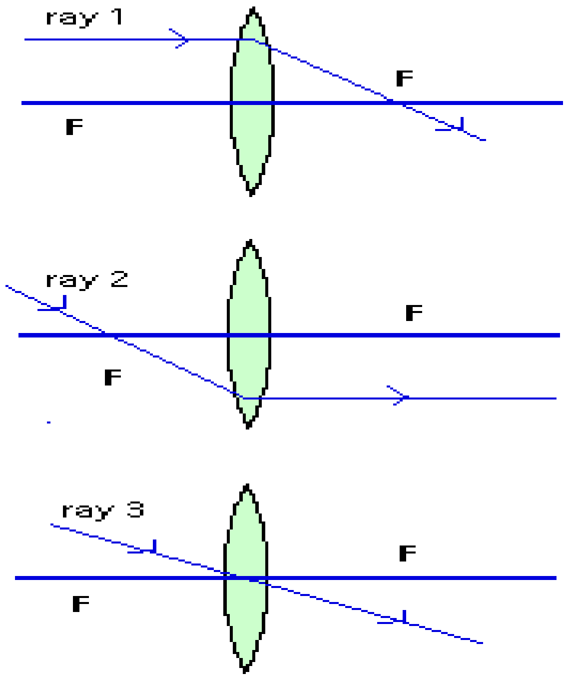


(a) II and III only

(b) I and II only

(c) I, II and III

(d) I, II and IV



Q) In India, the potential difference between live wire and neutral wire is

(a) 240 V

(b) 250 V

(c) 280 V

(d) 220 V

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(a) 240 V

(b) 250 V

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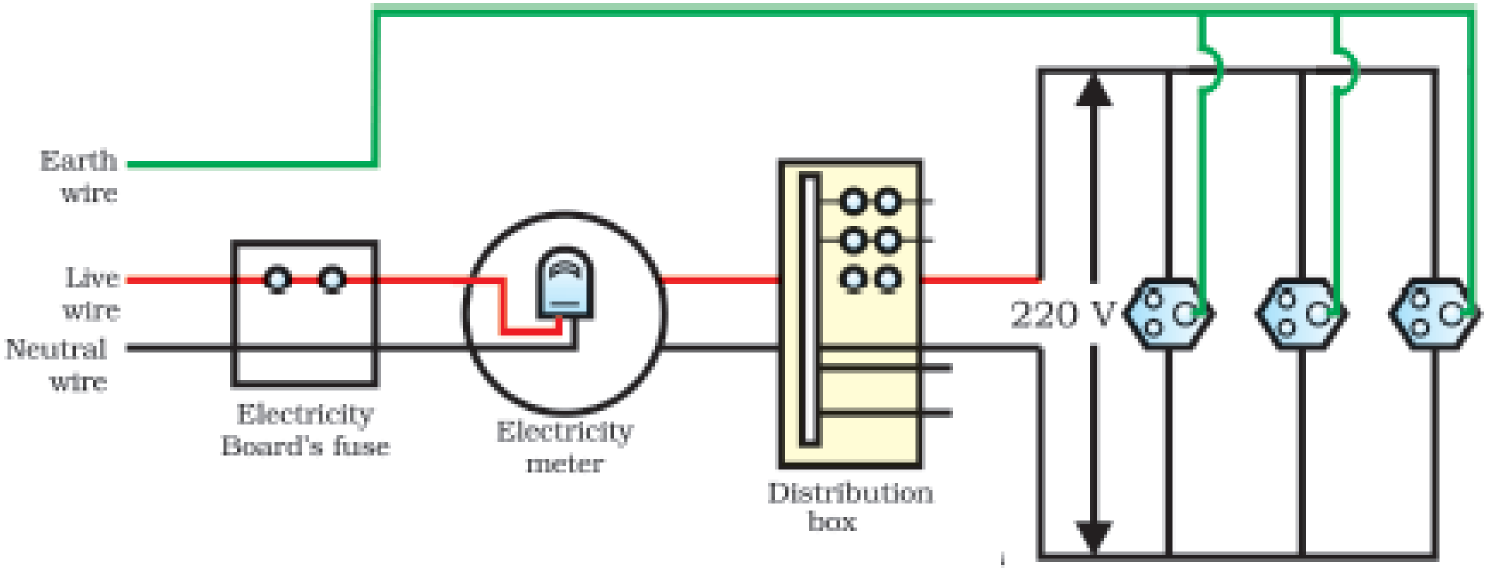

Q) By convention, the magnetic field lines emerge from …………… pole and merge at …………… pole.

(a) south, north

(b) north, south

(c) east, west

(d) west. east

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(a) south, north

(b) north, south

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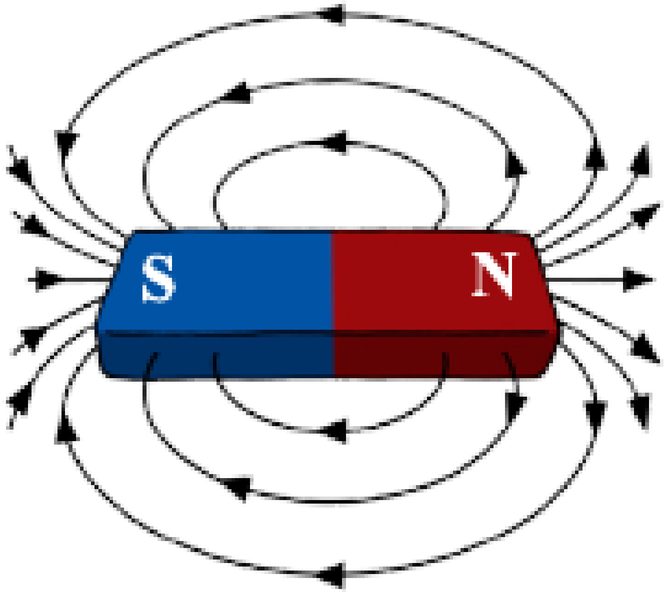

The direction of the magnetic field is taken to be the direction in which a north pole of the compass needle moves inside it. Therefore, it is taken by convention that the field lines emerge from north pole and merge at the south pole.

Q) A coil of many circular turns of insulated copper wire wrapped closely in shape of a cylinder is called a

(a) Bar magnet

(b) Horse-shoe magnet

(c) solenoid

(d) None of the above

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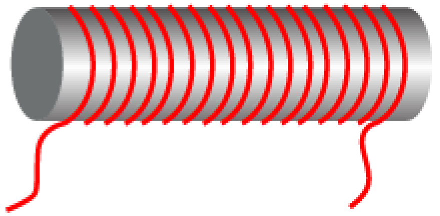
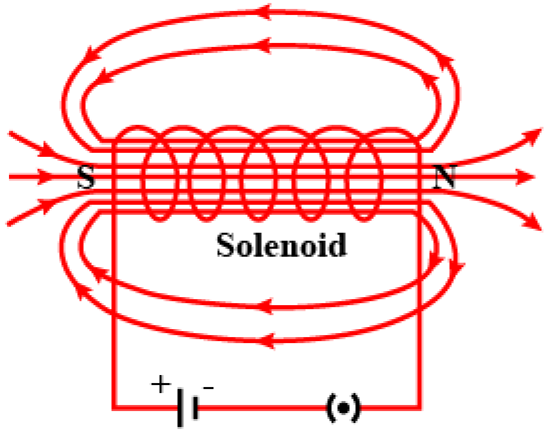


Solenoid



Magnetic field of solenoid

Q) The difference between the direct current and alternating current is that the direct current flows in …………… direction, whereas the alternating current …………… its direction periodically.

(a) one, reverses

(b) two, reverses

(c) many, distort

(d) None of the above

Q) The difference between the direct current and alternating current is that the direct current flows in ………….. direction, whereas the alternating current ………….. its direction periodically.

(a) one, reverses

(b) two, reverses

(c) many, distort

(d) None of the above

Direct current always flows in one direction but the alternating current reverses its direction periodically. The frequency of AC in India is 50 Hz, and, in each cycle, it alters direction twice. Therefore, AC changes direction $2 \times 50 = 100$ times in one second.

Q) At the centre of current carrying loop the magnetic field appears to be

(a) a straight line

(b) parabolic in nature

(c) can be both

(d) none of the above

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(a) a straight line

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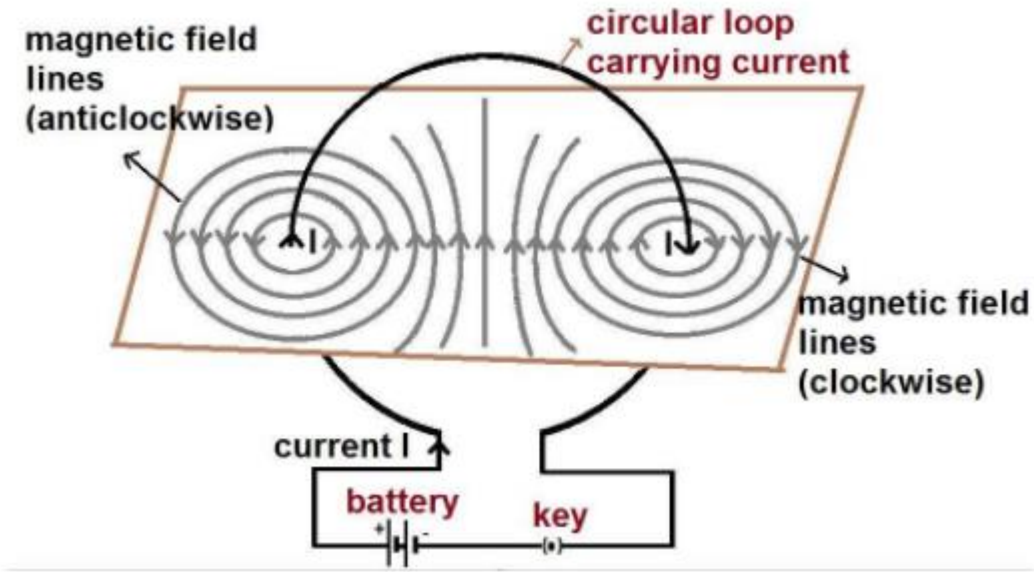

Q) Which is the most popular kitchen fuel in India?

(a) LPG

(b) Kerosene

(c) Coal

(d) Firewood

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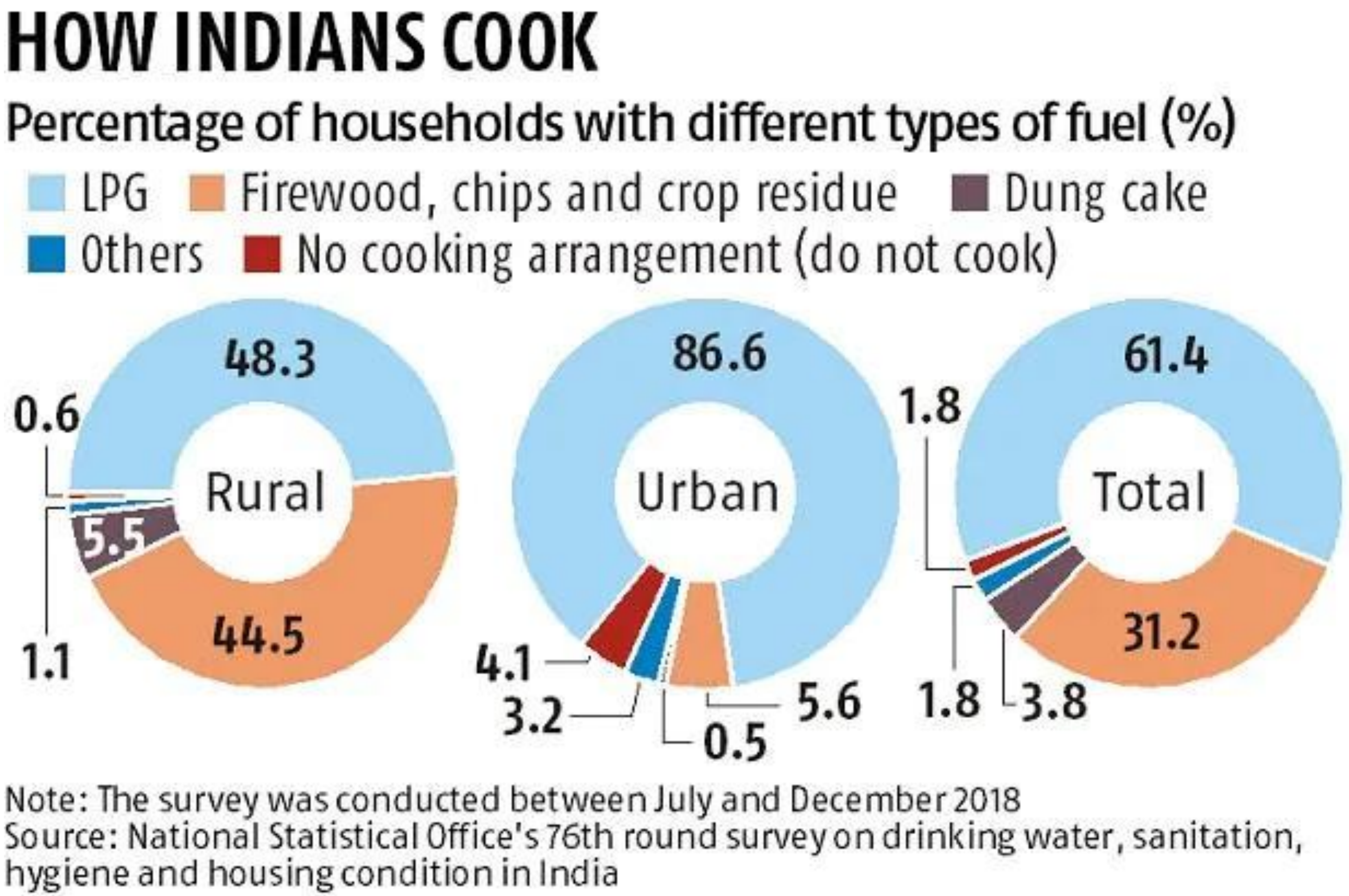

Q) Which method is used to produce electricity in hydroelectric power plant?

(a) By boiling the water to produce steam

(b) By ionizing wate

(c) By running dynamo by kinetic energy

(d) Any of the above

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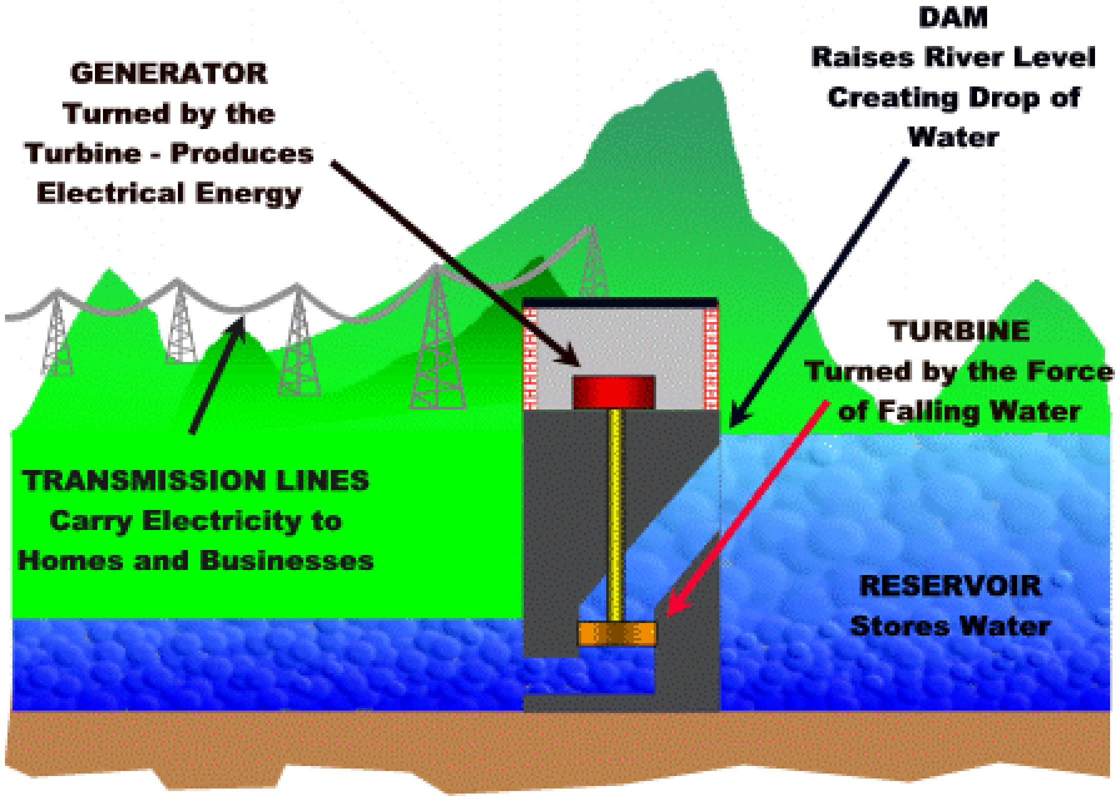

By running dynamo, the kinetic energy of water is used to produce electricity in hydro electric power plant.

Q) Which of the following is a component of bio-gas?

(a) Methane

(b) LPG

(c) CNG

(d) Hydrogen sulphide

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(a) Methane

(b) LPG

(c) CNG

(d) Hydrogen sulphide

Biogas comprises primarily methane (CH_4) and carbon dioxide (CO_2) and may have small amounts of hydrogen sulphide (H_2S), moisture and siloxanes.

Q) Which of the following is normally used in solar cookers for trapping solar energy?

(a) Solar panels

(b) Silicon cells

(c) Mirrors

(d) Any of above

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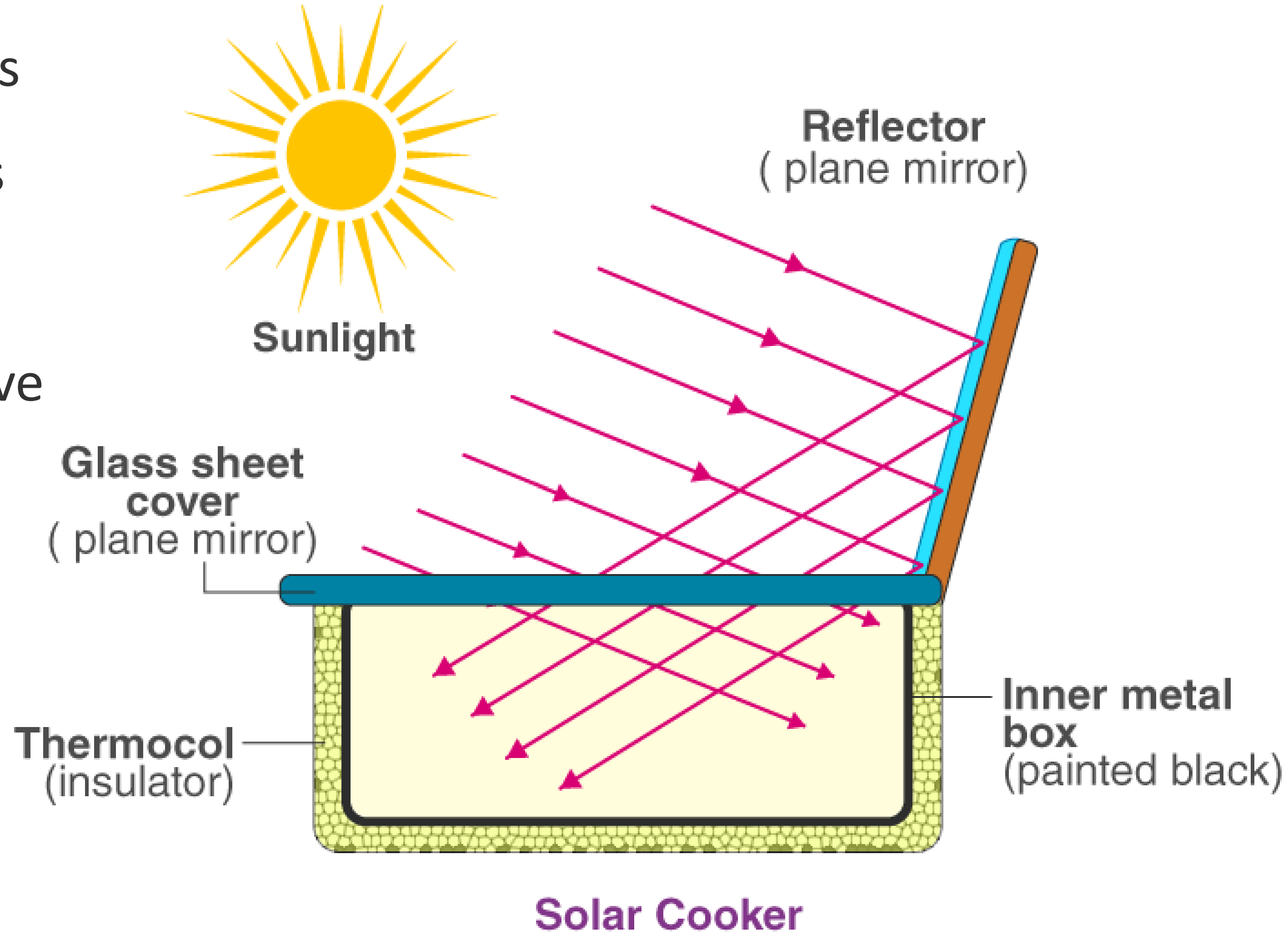

Q) In which of the following kinetic energy is converted into electrical energy?

(a) Tidal energy

(b) Hydro energy

(c) Wind energy

(d) All of these

Q) In which of the following kinetic energy is converted into electrical energy?

(a) Tidal energy

(b) Hydro energy

(c) Wind energy

(d) All of these

Tidal energy: The energy is obtained from the tides converted into the electrical energy. Here, the kinetic energy of the tides is converted into the electrical energy.
Hydro energy: The water is stored at some height. Then, the water is made to fall on the turbine. Here, the kinetic energy gets converted into the electrical energy.
Wind energy: In the windmill, the kinetic energy of the wind is converted into the mechanical energy. Then, the mechanical energy is converted into the electrical energy.
Therefore, the correct option is (D).

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Q) Which one of the following colours may be obtained by combining green and red colours?

(a) Blue

(b) Magenta

(c) Pink

(d) yellow

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(a) Blue

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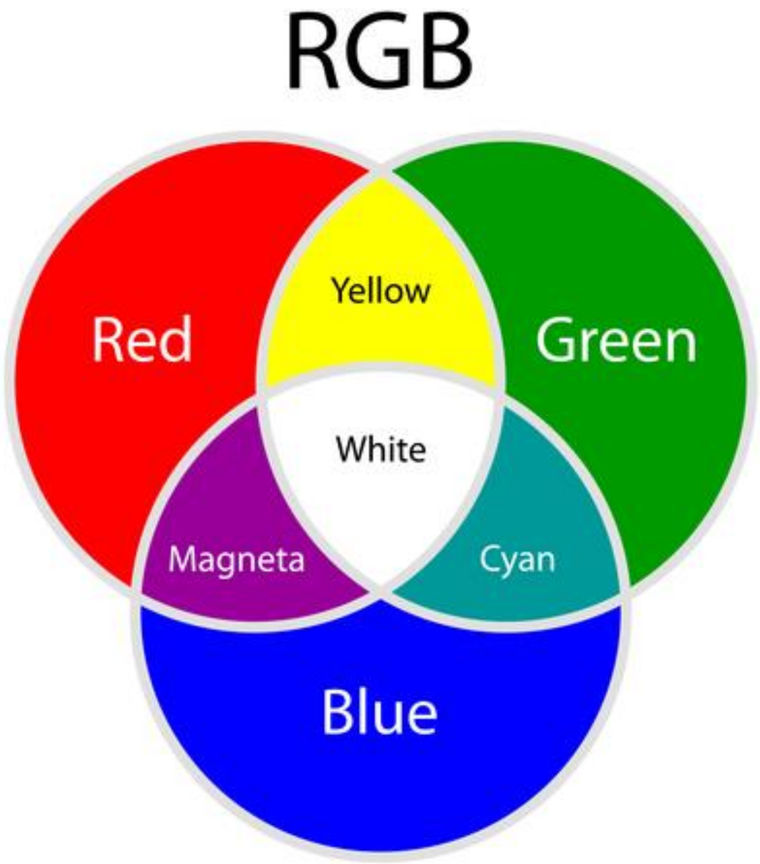

Q) A cyclist bends while taking turn in order to

(a) provide required centripetal force

(b) reduce apparent weight

(c) reduce speed

(d) reduce friction

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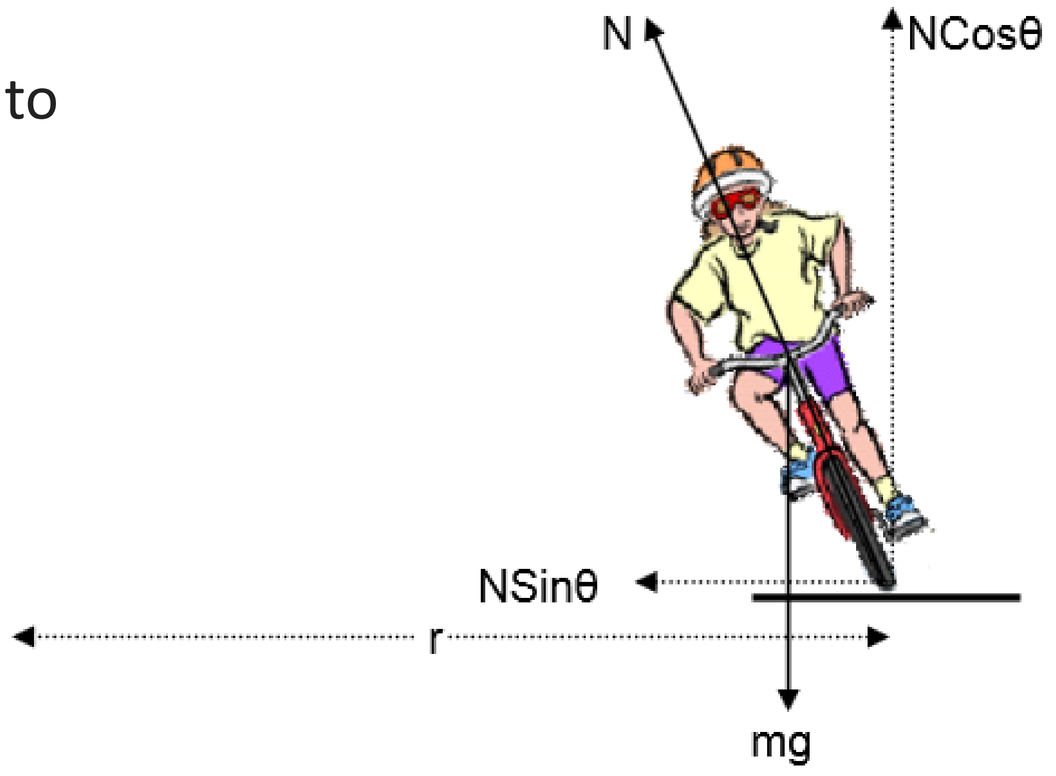

(i) the component R sin θ, acting towards the centre of the curve providing necessary centripetal force for circula

(ii) the component R cos θ, balancing the weight of the cyclist along with the bicycle.

Q) A car is moving on a horizontal road may be thrown out of the road in taking a turn

(a) due to the lack of proper centripetal force

(b) due to the rolling frictional force between the tyre and road

(c) due to the reaction of the ground

(d) by the gravitational force

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(a) due to the lack of proper centripetal force

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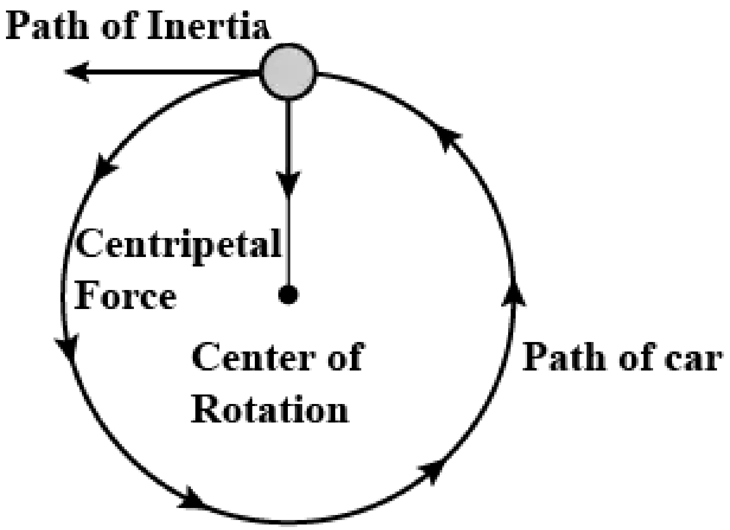
(c) due to the reaction of the ground

(d) by the gravitational force

When an object takes a turn two forces come to act.
1. centripetal force
2. centrifugal force
Centripetal force acts inward (towards the centre of the circular turn). This is provided by the frictional force. When the speed is large, required centripetal force to stay in the circular path increases. But friction is unable to provide large centripetal force and hence the body is thrown outwards.



Q) Lubrication reduces friction because

(a) the relative motion is between the liquid and solid.

(b) laws of limiting friction are not applicable.

(c) lubricant molecules act as ball bearings.

(d) none of the above.

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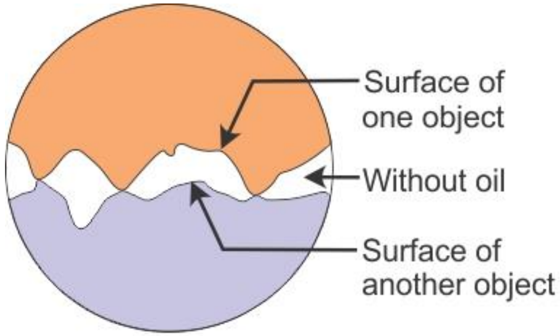
(b) laws of limiting friction are not applicable.

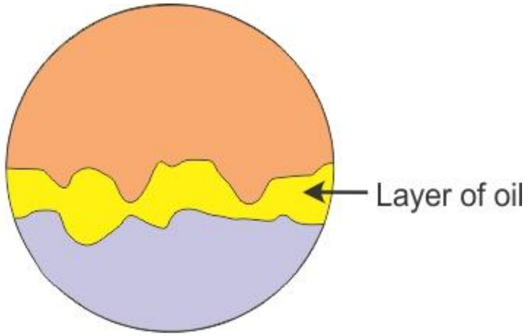
(c) lubricant molecules act as ball bearings.

(d) none of the above.

The lubricants spread over the irregularities on the surface that makes the contact. So, the relative motion is between the liquid and solid reduces the friction.



Two rubbing surfaces when no oil is present between them



A layer of oil separates the two rubbing surfaces a little and reduces friction

Q) A satellite's period in a circular orbit near a planet is unaffected by

(a) Planet's mass

(b) Planet's radius

(c) Satellite's mass

(d) All the mentioned

Q) A satellite's period in a circular orbit near a planet is unaffected by

(a) Planet's mass

(b) Planet's radius

(c) Satellite's mass

(d) All the mentioned

$$T = 2\pi\sqrt{\frac{r^3}{GM}}$$

A satellite's period in a circular orbit near a planet is unaffected by Satellite's mass.

Q) In a gravitational field, at a point where the gravitational potential is zero

(a) the gravitational field is necessarily zero

(b) the gravitational field is not necessarily zero

(c) nothing can be said definitely about the gravitational field

(d) none of these

Q) In a gravitational field, at a point where the gravitational potential is zero

(a) the gravitational field is necessarily zero

(b) the gravitational field is not necessarily zero

(c) nothing can be said definitely about the gravitational field

(d) none of these

At a point where the gravitational potential is zero it is not necessary that the gravitational field is also zero because at Infinity gravitational potential is zero but gravitational field is not.

Q) The mean radius of the earth is R, its angular speed on its own axis is ω and the acceleration due to gravity at earths surface is g. The cube of the radius of the orbit of a geo-stationary satellite will be

(a) r^2g / ω

(b) $R^2 \omega^2/ g$

(c) RG ω^2

(d) R^2g / ω^2

Q) The mean radius of the earth is R, its angular speed on its own axis is ω and the acceleration due to gravity at earths surface is g. The cube of the radius of the orbit of a geo-stationary satellite will be

(a) $R^2 g / \omega$

(b) $R^2 \omega^2 / g$

(c) $RG \omega^2$

(d) $R^2 g / \omega^2$

$$mr\omega^2 = \frac{GMm}{r^2}$$

$$\Rightarrow r\omega^2 = \frac{GM}{r^2}$$

$$\Rightarrow r^3 = \frac{GM}{\omega^2} = \frac{GM}{R^2} \cdot \frac{R^2}{\omega^2}$$

$$\Rightarrow r^3 = g\frac{R^2}{\omega^2}$$

Q) If the distance between the earth and the sun were half its present value, the number of day in a year would have been

(a) 64.5

(b) 129

(c) 182.5

(d) 730

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According to Kepler's law of period

$$\frac{T_1}{T_2} = \left(\frac{R_1}{R_2}\right)^{3/2} = \left(\frac{R_1}{R_1/2}\right)^{3/2} \quad \left(\because R_2 = \frac{R_1}{2}\right)$$

$$= (2)^{3/2} = 2\sqrt{2}$$

$$\therefore T_2 = \frac{T_1}{2\sqrt{2}} = \frac{365}{2\sqrt{2}} \text{ days}$$

$$= 129 \text{ days}$$

Q) The masses of two planets are in the ratio 1 : 2. Their radii are in the ratio 1 : 2. The acceleration due to gravity on the planets are in the ratio.

(a) 1 : 2

(b) 2 : 1

(c) 3 : 5

(d) 5 : 3

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(c) 3 : 5

(d) 5 : 3

Acceleration due to gravity on earth is given by

$$g = \frac{GM_e}{R_e^2}$$

$$\text{or } g \propto \frac{M_e}{R_e^2}$$

$$\text{Hence, } \frac{g_{P_1}}{g_{P_2}} = \frac{M_{P_1}}{M_{P_2}} \times \left(\frac{R_{P_2}}{R_{P_1}}\right)^2 \quad \text{...(i)}$$

$$\text{Given, } \frac{M_{P_1}}{M_{P_2}} = \frac{1}{2} \text{ and } \frac{R_{P_2}}{R_{P_1}} = \frac{1}{2}$$

Substituting the given value in Eq. (i), we get

$$\frac{g_{P_1}}{g_{P_2}} = \frac{1}{2} \times \left(\frac{2}{1}\right)^2 = \frac{2}{1}$$

$$\therefore g_{P_1} : g_{P_2} = 2 : 1$$

Q) The work done in increasing the size of a soap film from 10 cm x 6 cm to 10 cm x 11 cm is 3×10^{-4} J. The surface tension of the film is

(a) 3×10^{-2} N/m

(b) 11×10^{-2} N/m

(c) 6×10^{-2} N/m

(d) 1.5×10^{-2} N/m

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(d) 1.5 x 10^{-2} N/m

The surface tension acts on both faces of the film. Thus the change in area of both the surfaces is to be considered.

$$\Delta A = 2 \times [(0.1 \times 0.11 m^2) - (0.1 \times 0.06 m^2)] = 10^{-2} m^2$$

Work done $= T \times \Delta A$

$$\Rightarrow \text{Surface tension, } T = \frac{W}{\Delta A} = \frac{3 \times 10^{-4} J}{10^{-2} m^2} = 3.0 \times 10^{-2} N/m$$

Q) Myopia is a defect in human vision where an image of a

(a) nearby object is focused beyond the retina.

(b) nearby object is focused before the retina.

(c) distant object is focused before the retina.

(d) distant object is focused beyond the retina.

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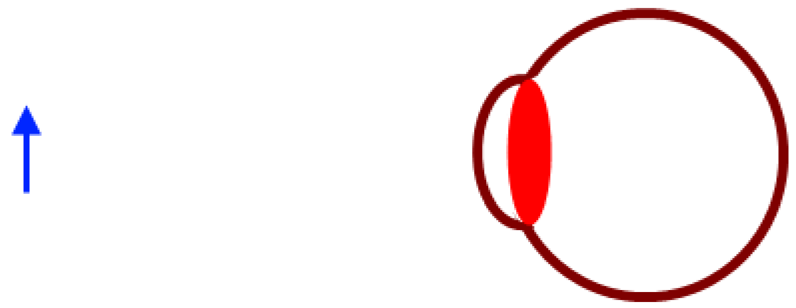
Myopia - defect and correction



Near sightedness (myopia) is a common vision condition in which you can see objects near to you clearly, but objects farther away are blurry.

Q) A beaker of radius 15 cm is filled with a liquid of surface tension 0.075 N/m. Force across an imaginary diameter on the surface of the liquid is

(a) 2.25×10^{-2} N

(b) 1.5×10^{-2} N

(c) 0.075 N

(d) 0.225 N

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(c) 0.075 N

(d) 0.225 N

Surface tension = 0.075 N/m, diameter = 30 cm = 0.30 m.

Force $= 0.075 \times 0.30 = 0.0225N = 2.25 \times 10^{-2}N$

Q) Liquid pressure depends upon

(a) height of the liquid column

(b) directions

(c) shape of the liquid surface

(d) area of the liquid surface

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(a) height of the liquid column

(b) directions

(c) shape of the liquid surface

(d) area of the liquid surface

The pressure exerted by a liquid depends on:
- density of the liquid
- acceleration due to gravity
- height of the liquid column

It doesn't depend on area or shape of the liquid surface; nor on volume of the liquid.

Q) The radii of two wires of a same material are in ratio 2 : 1. if the wires are stretched by equal forces, the ratio of stresses produced in them will be

(a) 2 : 1

(b) 4 : 1

(c) 1 : 4

(d) 1 : 2

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$$\text{stress} = \frac{F}{a}$$

$$\frac{S_1}{S_2} = \frac{\frac{F}{a_1}}{\frac{F}{a_2}} = \frac{a_2}{a_1}$$

$$\Rightarrow \frac{S_1}{S_2} = \left(\frac{r_2}{r_1}\right)^2 = \left(\frac{1}{2}\right)^2$$

$$\therefore \frac{S_1}{S_2} = \frac{1}{4}$$

Q) Tyndall effect is a phenomenon of

(a) scattering of light by the colloidal particles

(b) refraction of light by the colloidal particles

(c) dispersion of light by dust particles

(d) refraction of light by dust particles

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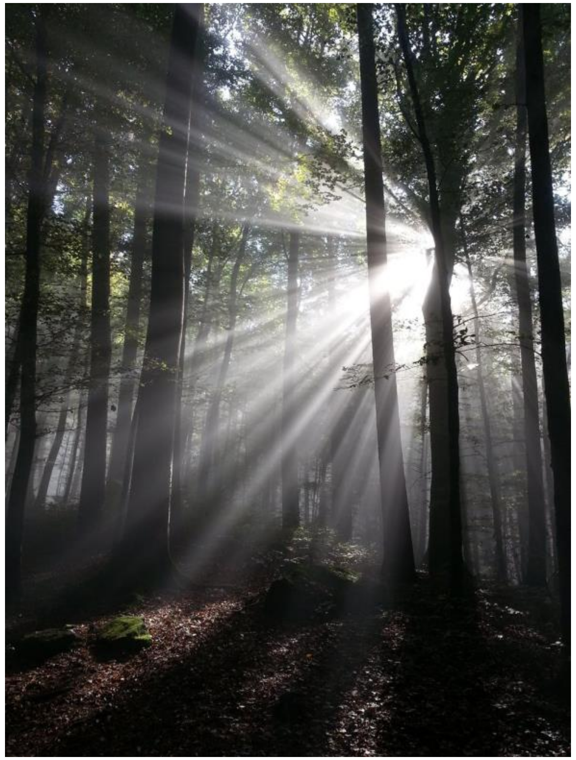

Tyndall effect, also called Tyndall phenomenon, scattering of a beam of light by a medium containing small suspended particles. For e.g., smoke or dust in a room, which makes visible a light beam entering a window

Q) The property of a body by virtue of which it tends to regain its original size and shape when the applied force is removed is called

(a) Elasticity

(b) plasticity

(c) rigidity

(d) compressibility

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- **Elasticity**: The ability of materials to return to their original shape after a deforming is called elasticity.
- **Plasticity**: The property due to which the material didn't return to its initial position after deformation is called plasticity.
- **Viscosity**: The relative motion between different layers of liquid or gases is opposed by a force, which is known as the Viscous force and this property is known as Viscosity.

Q) Substances which can be stretched to cause large strains are called

(a) brittle

(b) ductile

(c) plastic

(d) elastomer

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Substances which can be stretched to cause large strains are called elastomers. e.g., tissue of aorta, rubber etc.

Q) Shearing stress change ______________ of the body.

(a) length

(b) breadth

(c) shape

(d) volume

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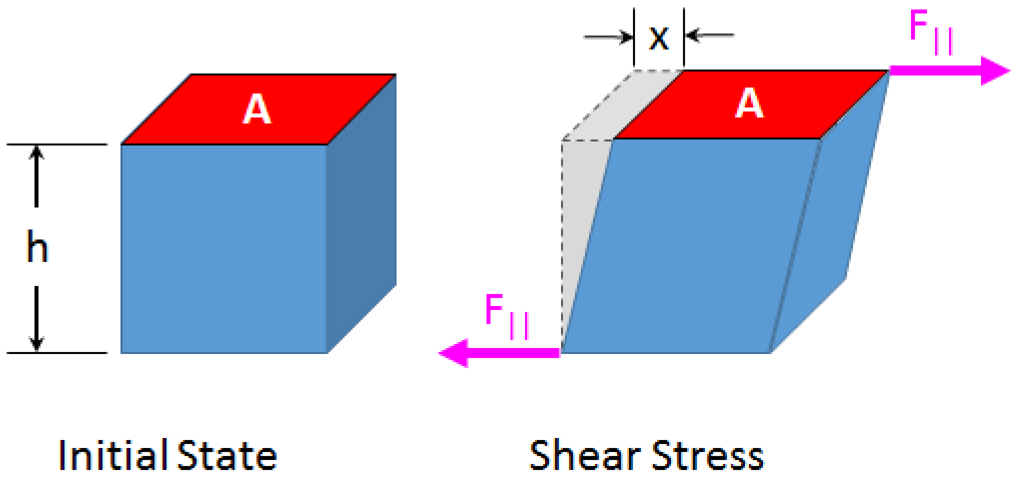

Q) Time of ascent and time of descent are always ……………. for a projectile fixed at some angle with the horizontal.

(a) twice

(b) thrice

(c) equal

(d) half

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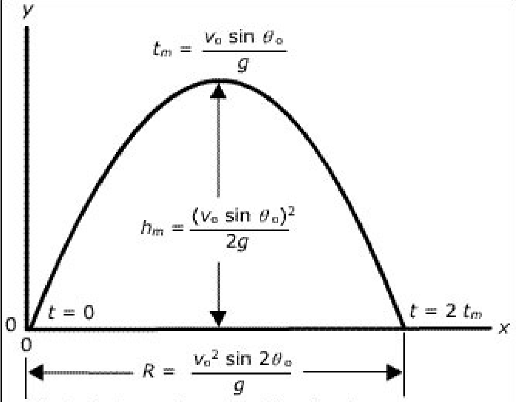

The trajectory of a projectile showing the maximum height and the horizontal range.

During ascent

g = 9.8

t_1 = time taken for ascent, u = Initial velocity, v = Final velocity (0)

Therefore,

$t_1 = (v – u)/-g$

$t_1 = (0 – u)/g$

$t_1 = u/g$

During descent

g = 9.8

u = Initial velocity (0), v = Final velocity, t_2 = Time taken for the descent

Therefore,

$t_2 = (v – u)/g$

$t_2 = (v – o)/g$

$t_2 = v/g$

The velocity with which the body is thrown = The velocity with which the body hits the ground.

Therefore,

$u/g = v/g$

Thus, t_1 is equal to t_2 or, the time of ascent is same as the time of descent.

Q) The angle between centripetal acceleration and tangential acceleration is?

(a) 180°

(b) 0°

(c) 90°

(d) 45°

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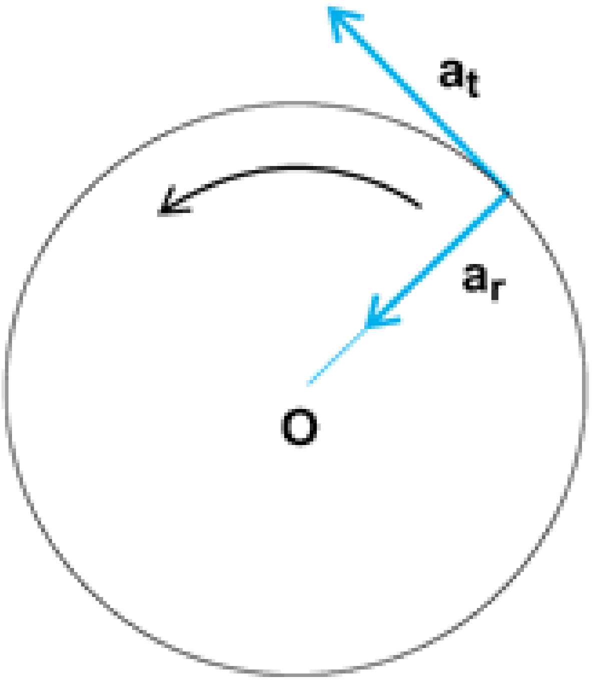

Centripetal acceleration is towards the center and tangential acceleration is along the tangent of the circle. So, the angle between both the accelerations is 90°.

Q) If $\vec{A} = \hat{\imath} + \hat{\jmath} + \hat{k}$ and $\vec{B} = 2\hat{\imath} - \hat{\jmath} + 4\hat{k}$ then the unit vector along $\vec{A} + \vec{B}$ is

a) $\frac{3\hat{\imath}+5\hat{k}}{\sqrt{34}}$

b) $\frac{3\hat{\imath}+5\hat{k}}{\sqrt{24}}$

c) $\frac{3\hat{\imath}-5\hat{k}}{\sqrt{34}}$

d) None of these

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If $\vec{A} = \hat{\imath} + \hat{\jmath} + \hat{k}$ and $\vec{B} = 2\hat{\imath} - \hat{\jmath} + 4\hat{k}$ then $\vec{A} + \vec{B} = 3\hat{\imath} + 5\hat{k}$

Now, unit vector along $3\hat{\imath} + 5\hat{k}$

$$\hat{a} = \frac{a_x\hat{\imath}+a_y\hat{\jmath}+a_z\hat{k}}{\sqrt{a_x{}^2+a_y{}^2+a_z{}^2}}$$

$$= \frac{3\hat{\imath}+5\hat{k}}{\sqrt{3^2+5^2}}$$

$$= \frac{3\hat{\imath}+5\hat{k}}{\sqrt{34}}$$

Q) Two vectors A and B lie in a plane, a third vector C lies outside this plane, the sum of these vectors A + B + C can

(a) never be zero

(b) be zero

(c) Both

(d) None of these

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Let the vectors lie in $X-Y$ plane.

We can write the vectors as $\vec{A}=A_x\hat{x}+A_y\hat{y}$ and $\vec{B}=B_x\hat{x}+B_y\hat{y}$

Vector C lies outside the plane, so $\vec{C}=C_x\hat{x}+C_y\hat{y}+C_z\hat{z}$

We get $\vec{A}+\vec{B}+\vec{C}=(A_x+B_x+C_x)\hat{x}+(A_y+B_y+C_y)\hat{y}+C_z\hat{z}$

We can have some values such that the value of $(A_x+B_x+C_x)$ can be zero and $(A_y+B_y+C_y)$ can be zero. But C_z can not be zero as it is given that $\vec{C}$ lies outside the plane.

Q) A body goes round the circumference of a circle of radius 3 m with an angular velocity of 2 rad/s. Its centripetal acceleration is

(a) 3 m/s^2

(b) 1 . 5 m/s^2

(c) 6 m/s^2

(d) 12 m/s^2

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(b) 1 . 5 m/s^2

(c) 6 m/s^2

(d) 12 m/s^2

Centripetal acceleration = $r\omega^2$

$a_c = 3 \text{ X } (2^2) = 12 m/s^2$

Q) According to the new cartesian sign convention which one of the following is correct in respect to the formula $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ where symbols have their usual meanings?

(a) It applies only to spherical mirrors

(b) It applies only to spherical lenses

(c) It applies to spherical mirrors as well as spherical lenses

(d) It is an invalid formula

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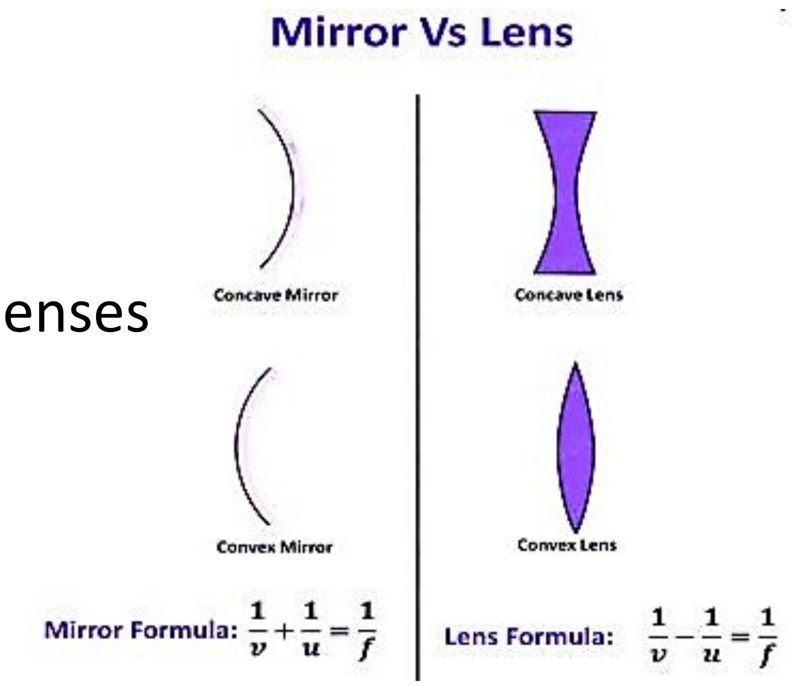

Q) Which one of the following statements is ***not*** correct for light rays?

(a) Light travels at different speeds in different media

(b) Light travels at almost 300 million meters per second in air

(c) Light speeds down as it leaves of water surface and enters the air

(d) Light speeds up as it leaves a glass surface and enters the air

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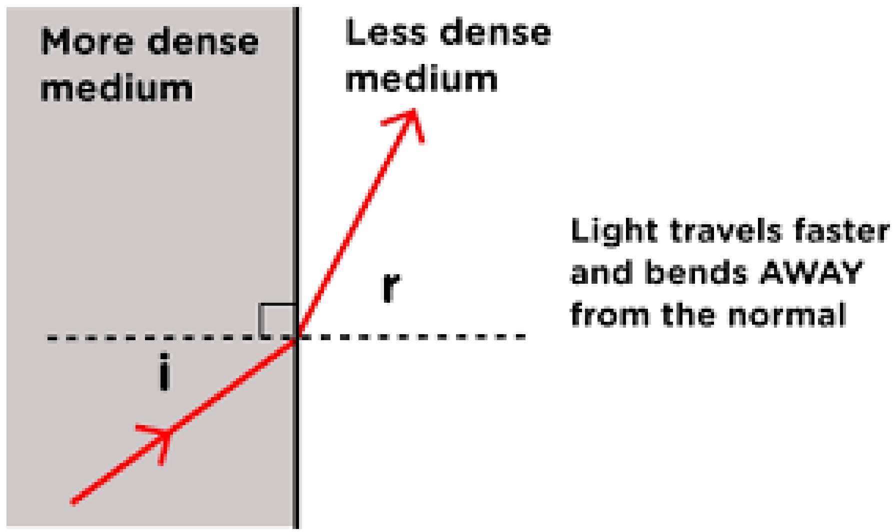

Q) Light waves are incident on an air-glass boundary. Some of the light waves are reflected and some are refracted in the glass. Which one of the following properties is the same for the incident wave and the refracted wave?

(a) Speed

(b) Direction

(c) Brightness

(d) Frequency

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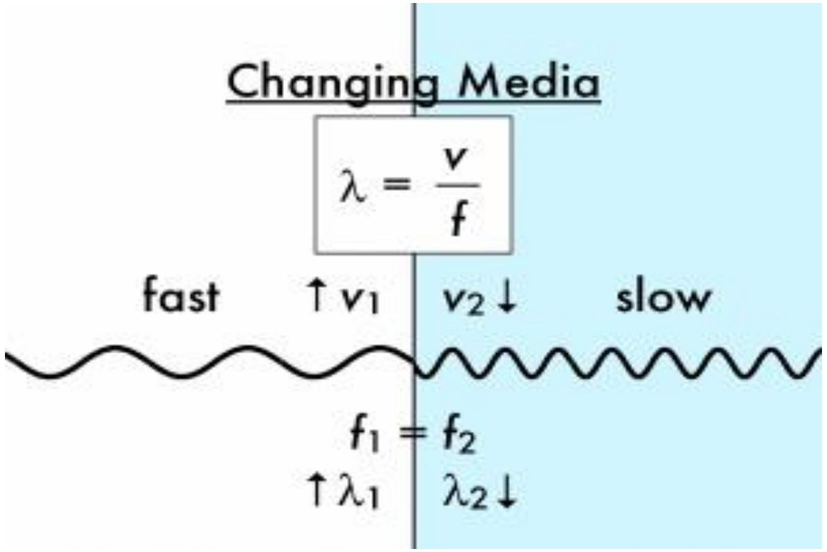

Q) If a ray of light enters from a rarer medium to denser medium at zero angle of incidence, it would

(a) reflect back

(b) go straight

(c) turned towards right

(d) bend at 45^0

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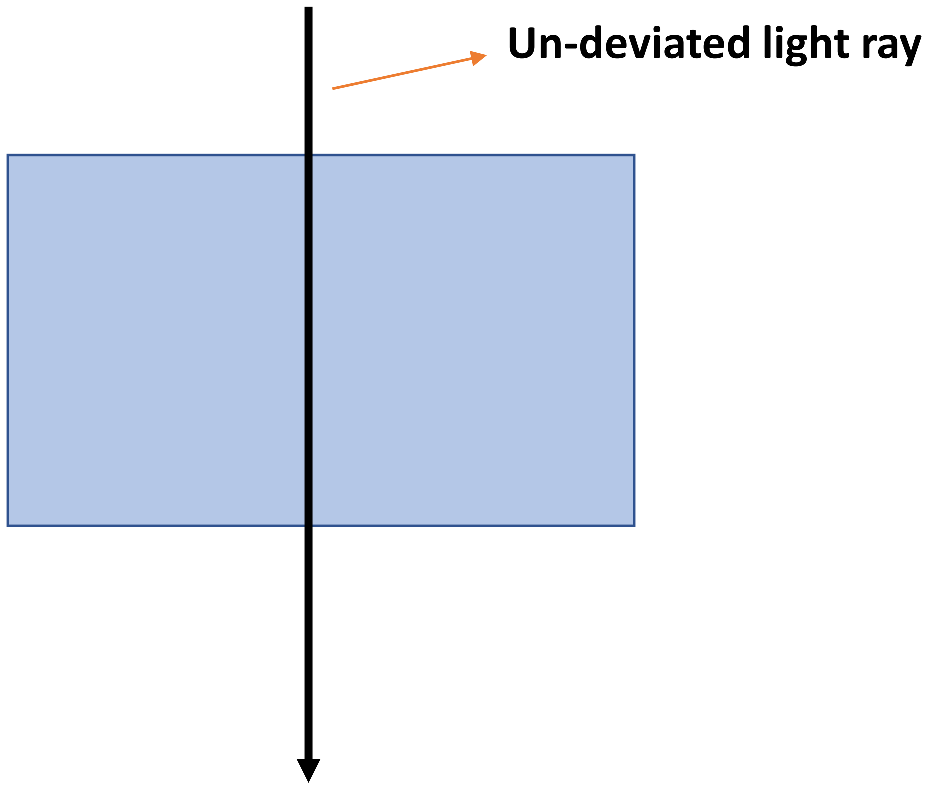

Q) The magnetic field lines inside a current carrying long solenoid are in the form of

(a) Ellipse

(b) Parabola

(c) Hyperbola

(d) parallel straight lines

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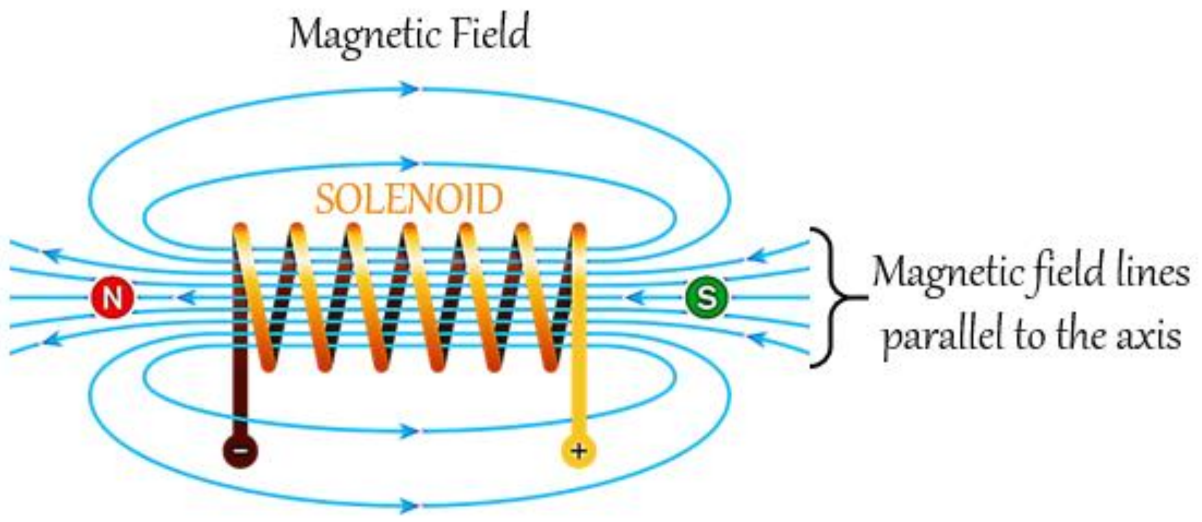

One end of the solenoid behaves as a magnetic North pole, while the other behaves as the South pole. The field lines inside the solenoid are in the form of parallel straight lines.

Q) According to Fleming's right-hand rule, if the forefinger indicates the direction of magnetic field in thumb show the direction of motion of conductor, then the stretched middle finger will predict the direction of

(a) force acting on the conductor

(b) electric field

(c) induced current

(d) current

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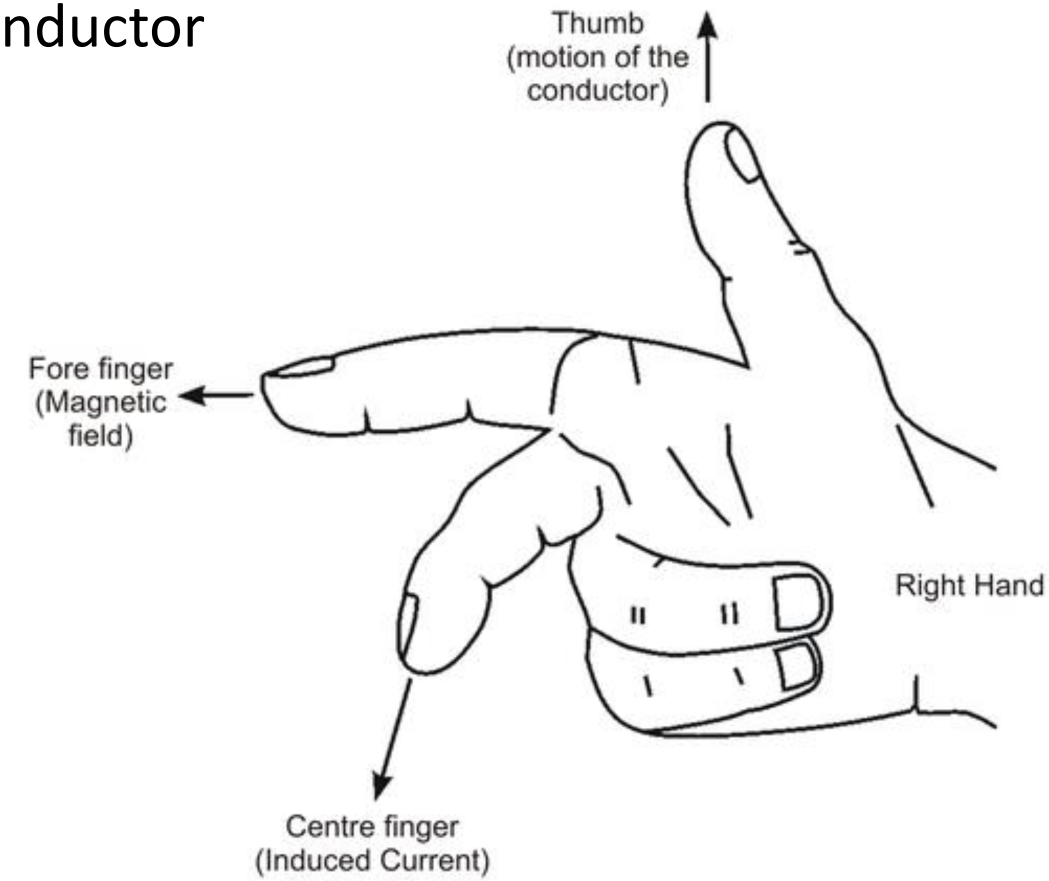

Q) Imagine a current-carrying straight conductor with magnetic field of lines in anti-clockwise direction. Then the direction of current is determined by

(a) the Right-Hand Thumb rule and it would be in the downward direction.

(b) the Left-Hand Thumb rule and it would be in the downward direction.

(c) the Right-Hand Thumb rule and it would be in the upward direction.

(d) the Left-Hand Thumb rule and it would be in the upward direction.

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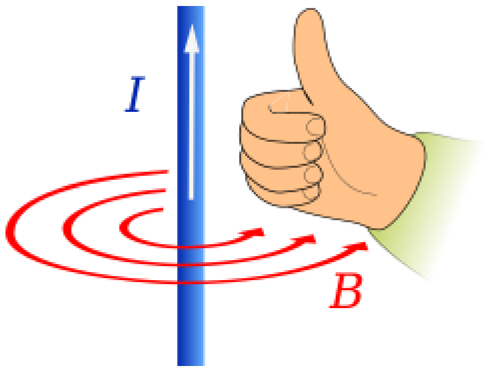
(c) the Right-Hand Thumb rule and it would be in the upward direction.

(d) the Left-Hand Thumb rule and it would be in the upward direction.

The right-hand thumb rule is used to find the direction of the magnetic field around a current carrying a straight conductor. Thus, a current-carrying straight conductor with the magnetic field of lines in the anti-clockwise direction would be in the upward direction according to the right-hand thumb rule.



Q) The device used to produce electric current is known as

(a) Motor

(b) Generator

(c) Ammeter

(d) galvanometer

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Q) Choose the incorrect statements from the following regarding magnetic lines of field.

(a) the direction of magnetic field at a point is taken to be the direction in which the north pole of a magnetic compass needle points

(b) magnetic field lines are closed curves

(c) if magnetic field lines are parallel and equidistant, they represent zero field strength

(d) relative strength of magnetic field is shown by the degree of closeness of the field lines

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(d) relative strength of magnetic field is shown by the degree of closeness of the field lines

If the magnetic field lines are parallel in a region of space, then it means that the region has a homogeneous field strength.

Q) Which of the following is a non-renewable source of energy?

(a) Wood

(b) Sun

(c) Fossil fuels

(d) Wind

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A non-renewable resource (also called a finite resource) is a resource that does not renew itself at a sufficient rate for sustainable economic extraction in meaningful human time-frames.
Fossil fuels are non-renewable resource.
Wind and wood are renewable as their localized replenishment can occur within time frames meaningful to humans.

Q) Acid rain happens because

(a) Sun heats up the upper layer of the atmosphere

(b) burning of fossil fuels releases oxides of carbon, nitrogen and Sulphur in the atmosphere

(c) electrical charges are produced due to friction amongst clouds

(d) earth atmosphere contains acids

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When atmospheric pollutants like oxides of nitrogen and Sulphur react with rainwater and come down with the rain, this results in Acid Rain and When atmospheric pollutants like oxides of nitrogen and Sulphur react with rainwater and come down with the rain, this results in Acid Rain.

Q) Fuel used in thermal power plants is

(a) water

(b) uranium

(c) biomass

(d) fossil fuels

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(b) uranium

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Coal is the major fuel used in thermal power plants and coal is a fossil fuel.

Q) In a hydro power plant

(a) potential energy possessed by stored water is converted into electricity

(b) kinetic energy possessed by stored water is converted into potential energy

(c) electricity is extracted from water

(d) water is converted into steam to produce electricity

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Hydroelectric power plants convert the potential energy of stored water to kinetic energy of falling water which then aids to run the generator producing electricity.
Water stored in dams possesses potential energy.
When it is released it possesses potential energy which is used to turn the turbines. Turbines produce electricity.

Q) Which is the ultimate source of energy?

(a) Water

(b) Sun

(c) Uranium

(d) Fossil fuels

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The sun is the ultimate source of almost all kinds of energy on earth, either directly or indirectly. Fossil fuels (coal, oil and gas) are the transformed forms of plants (and animals) which once lived on the earth and grew capturing the energy of the sun.

Q) An aeroplane rises because

(a) of upward reaction of air.

(b) the density of air above the plane is less than below it.

(c) the pressure above its wings is less than the pressure below them.

(d) its nose points upwards.

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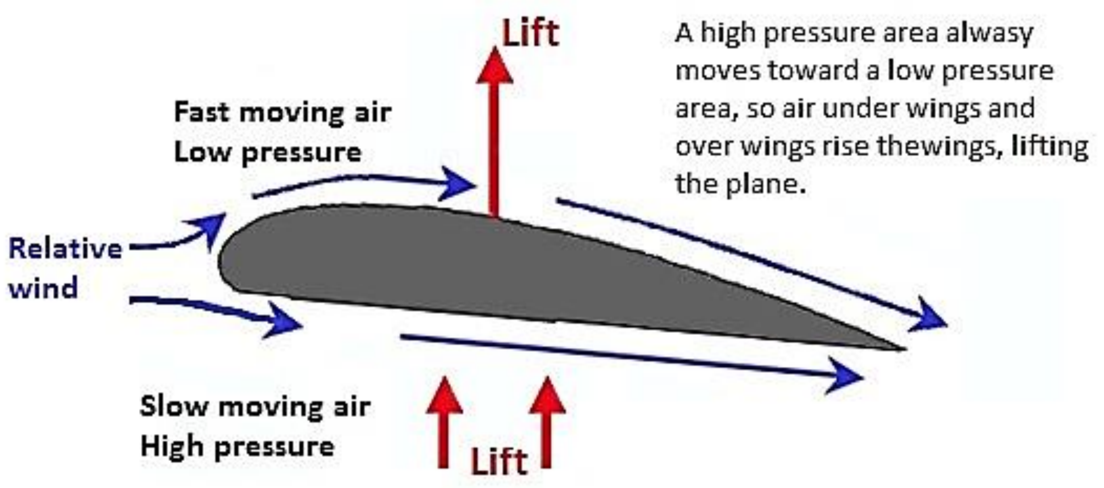

Q) Which one of the following statement regarding the sun is correct ?

(a) The sun is composed mainly of hydrogen.

(b) Its energy is generated by nuclear collision in its interior.

(c) It is calculated that the sun consumes about a trillion pounds of hydrogen every second.

(d) All of the above.

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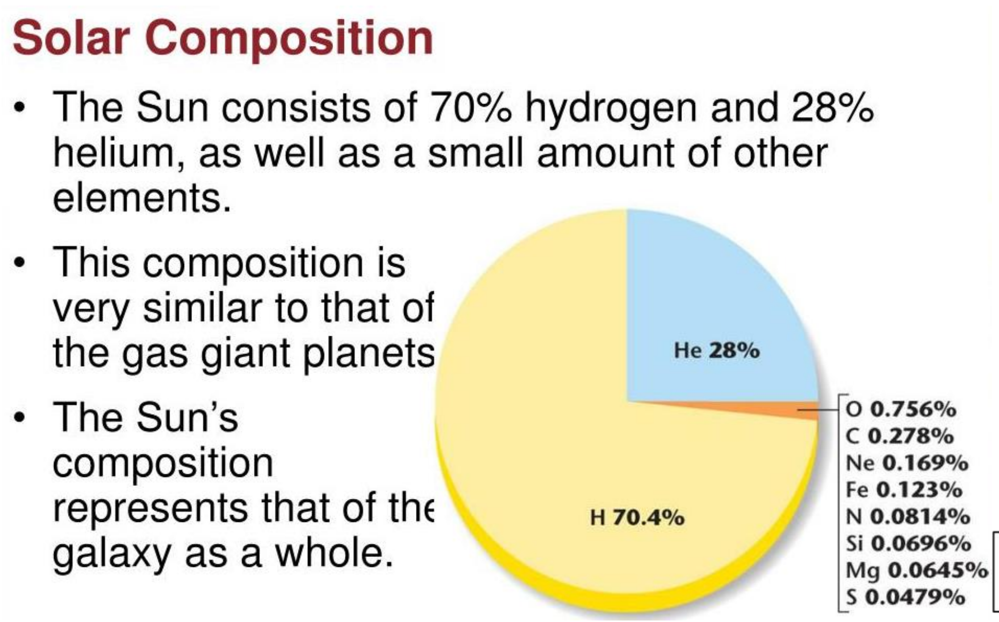
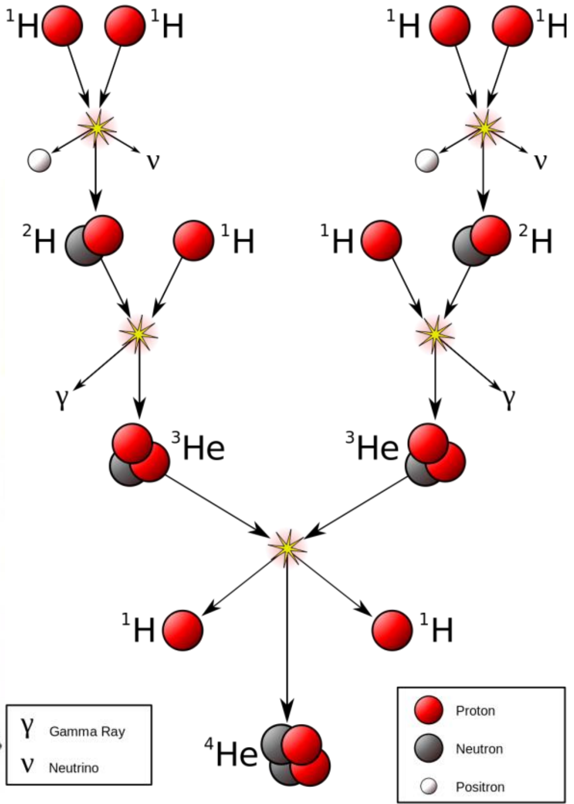
(d) All of the above.





Q) Supersonic speed is speed greater than the speed of sound (in air at sea level) that is to say around______ miles/hour.

(a) 760

(b) 860

(c) 960

(d) 1060

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(a) 760

(b) 860

(c) 960

(d) 1060

Supersonic speed is the speed of an object that exceeds the speed of sound (Mach 1). For objects traveling in dry air of a temperature of 20 °C (68 °F) at sea level, this speed is approximately 343.2 m/s (1,126 ft/s; **768 mph**; 667.1 kn; 1,236 km/h)

Q) On which of the following statements, is the kinetic theory of matter base?

(a) Matter is made up of molecules

(b) Molecules are in rapid motion

(c) Molecules experience forces of attraction between one another

(d) All of the above

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The kinetic molecular theory of matter states that:

- Matter is made up of particles that are constantly moving.
- All particles have energy, but the energy varies depending on the temperature the sample of matter is in. This in turn determines whether the substance exists in the solid, liquid, or gaseous state. Molecules in the solid phase have the least amount of energy, while gas particles have the greatest amount of energy.
- The temperature of a substance is a measure of the average kinetic energy of the particles.
- A change in phase may occur when the energy of the particles is changed.
- There are spaces between particles of matter. The average amount of empty space between molecules gets progressively larger as a sample of matter moves from the solid to the liquid and gas phases.
- There are attractive forces between atoms/molecules, and these become stronger as the particles move closer together. These attractive forces are called intermolecular forces.

Q) The image we see in plane mirror is

(a) real and thus can be photographed

(b) virtual and nearer than the object

(c) virtual and is laterally inverted

(d) real but cannot be photographed

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Q) When body is accelerated:

(a) Its velocity never changes

(b) Its speed will always change

(c) Its direction always changes

(d) Its speed may or may not change

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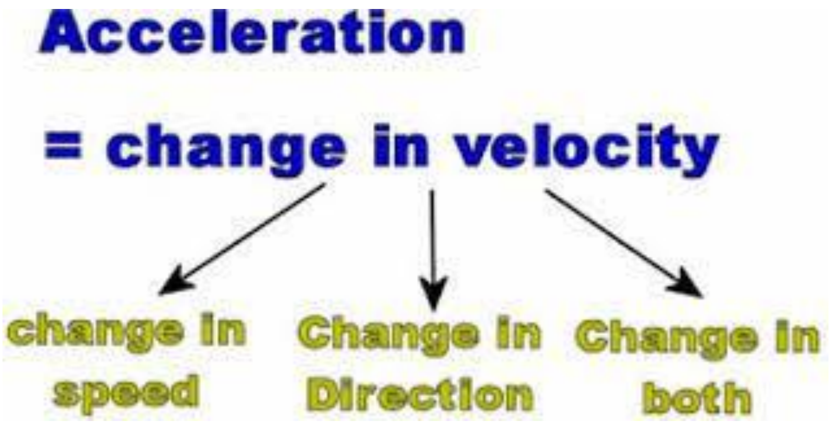
$$a = \frac{v - u}{t}$$



Q) Which of the following is not a unit of energy ?

(a) Calorie

(b) Joule

(c) Electron volt

(d) Watt

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(a) Calorie

(b) Joule

(c) Electron volt

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Non SI Unit of Energy	Abbreviation	Joule equivalent
Electron volt	eV	1.60×10^{-19} J
Calorie	cal	4.184 J
Kilocalorie	kcal	4184 J
British thermal unit	Btu	1054 J

Quantity of work performed

$$\text{POWER [Watt]} = \frac{\text{WORK [Joule]}}{\text{TIME [Sec]}}$$

Rate of work done

Time required for work completion

$$P = \frac{W}{t}$$

Q) Which one of the following best explains the occurrence of the solar eclipse?

(a) Position of the Moon between Sun & Earth

(b) Position of the Sun between Moon & Earth

(c) Position of the Earth between Sun & Moon

(d) None of these

Q) Which one of the following best explains the occurrence of the solar eclipse?

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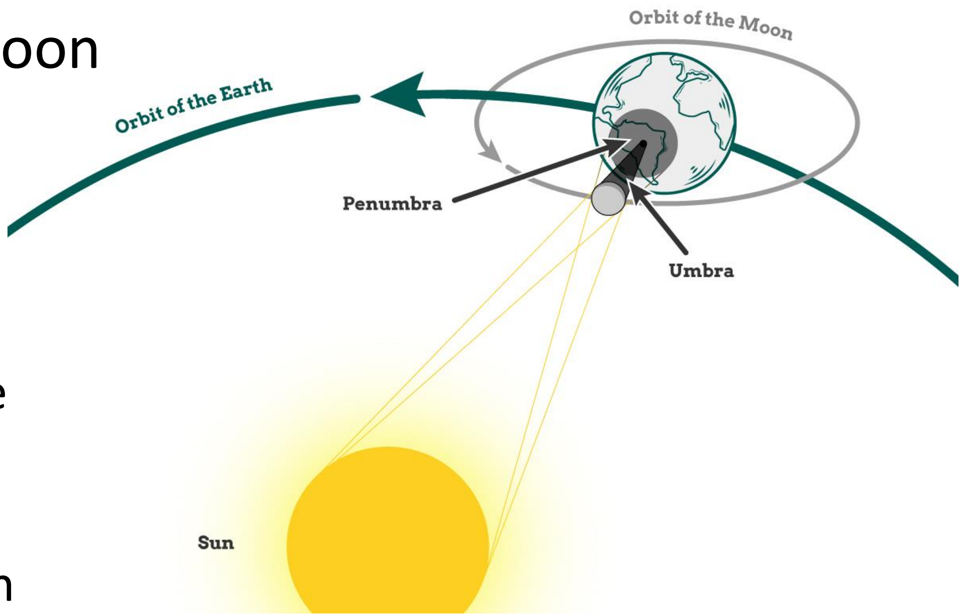

A solar eclipse is a type of eclipse that occurs when the Moon passes between the Sun and Earth, and when the Moon fully or partially blocks the Sun. This can happen only at new moon when the Sun and the Moon are in conjunction

Q) Two trains traveling in opposite direction crosses a man in 17 sec and 27 sec respectively and they cross each other in 23 sec. Find the ratio of their speeds.

(a) 1 : 2

(b) 2 : 1

(c) 2 : 3

(d) 5 : 7

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(a) 1 : 2

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Let the speeds of two train are a and b respectively.

Length of first train $= 17a$

[distance = speed · time]

Length of second train $= 27\ b$

Time taken to cross each other

= Distance/speed

$= \frac{17a+27b}{a+b}$

$\Rightarrow 23 = \frac{17a+27b}{a+b}$

$\Rightarrow 23a + 23b = 17a + 27b$

$\Rightarrow 6a = 4b$

$\therefore\ a/b = 4/6 = 2/3$

$\therefore$ Required ratio = 2 : 3

Q) Pascal is related to?

(a) Pressure

(b) length

(c) Mass

(d) Luminous intensity

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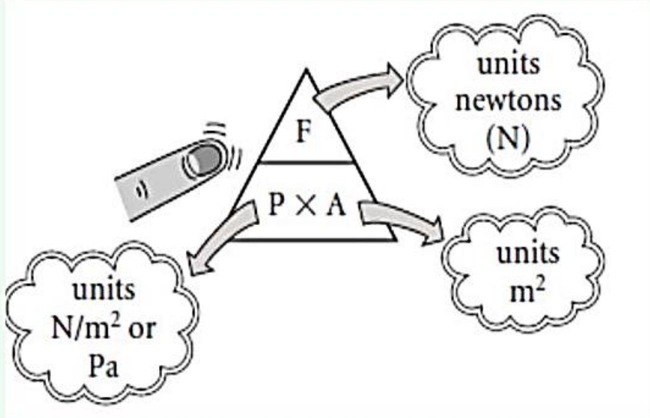
(a) Pressure

(b) length

(c) Mass

(d) Luminous intensity

- Pressure = Force / Area
- P = F / A
- Units N / m^2 special unit the pascal Pa



Q) Limiting velocity at which the streamlined flow converts into a turbulent flow?

(a) Terminal velocity

(b) critical velocity

(c) limiting velocity

(d) None of the above

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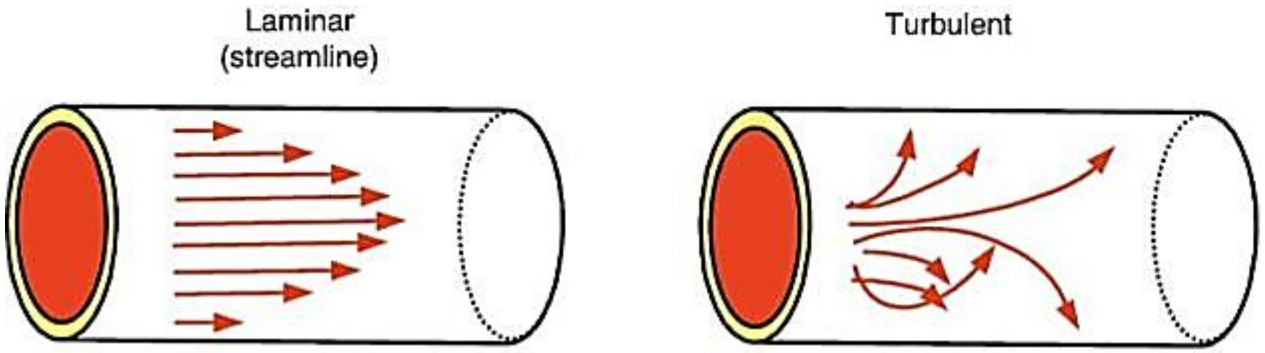

Q) What is the SI unit of luminous intensity?

(a) Mole

(b) Ampere

(c) Kelvin

(d) Candela

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(a) Mole

(b) Ampere

(c) Kelvin

(d) Candela

Base Quantity	Base Unit	
Name	Name	Symbol
Time	second	s
Length	metre	m
Mass	kilogram	kg
Temperature	kelvin	K
Electric Current	ampere	A
Amount of Substance	mole	mol
Luminous Intensity	candela	cd

Q) Inside the nucleus, two protons are held together by a force which overcomes the repulsion. This force is called

(a) gravitational force

(b) electrostatic force

(c) weak force

(d) strong force

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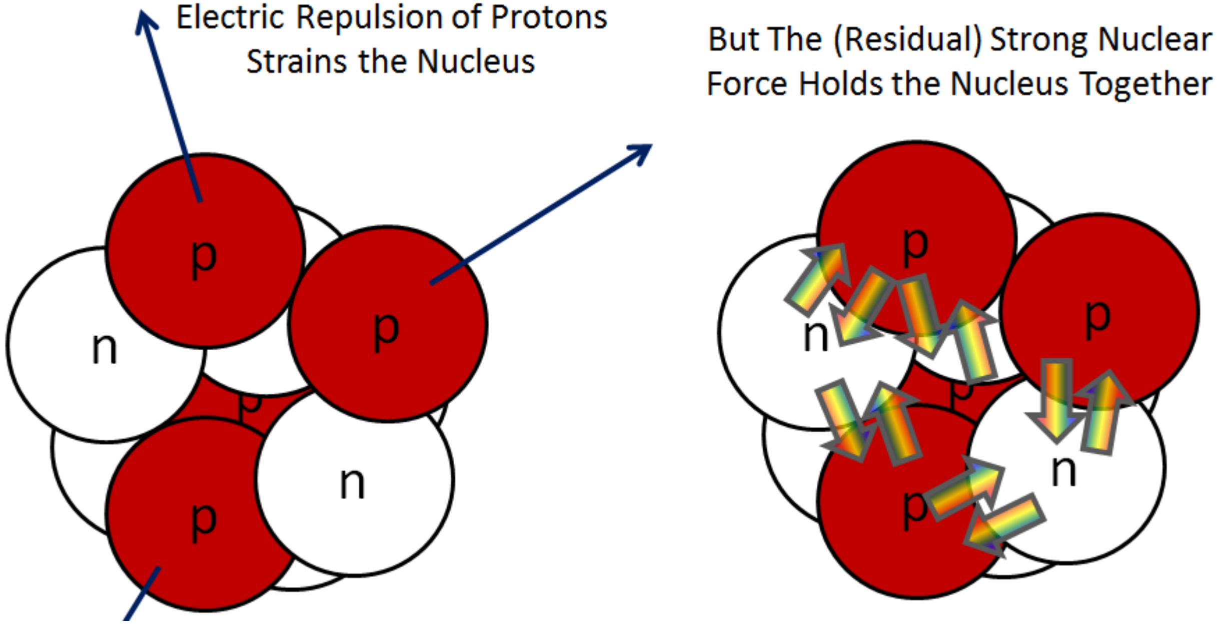

Inside the nucleus, two protons are held together by a force which overcomes the repulsion. This force is called strong force.

Q) A block of wood is placed on a surface. A force is applied parallel to the surface to move the body. The frictional force developed acts

(a) normal to the surface upwards

(b) normal to the surface downwards

(c) along the direction of the applied force

(d) opposite to the direction of the applied force

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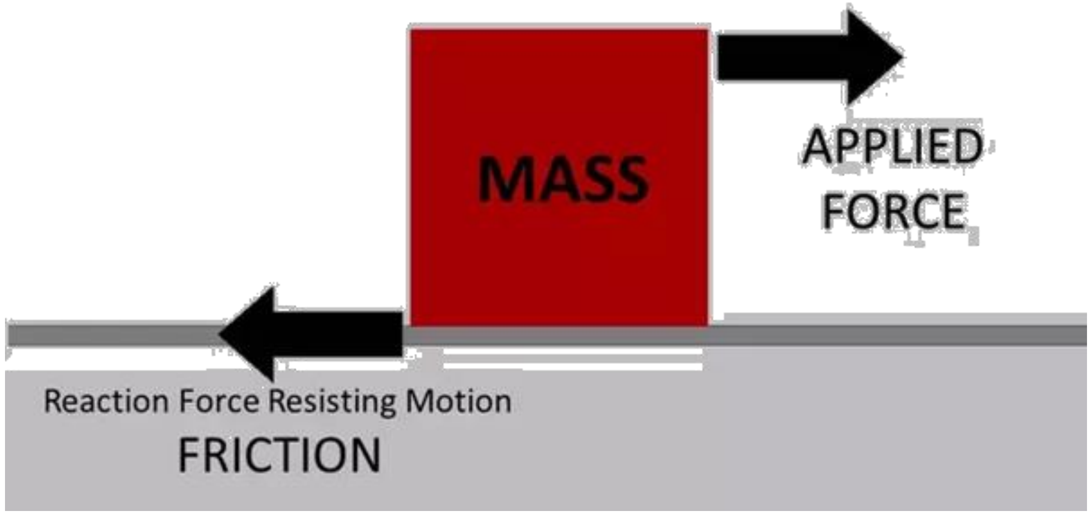

Q) Out of the basic forces , gravitational force

(a) ranks first in strength

(b) ranks second in strength

(c) ranks third in strength

(d) ranks fourth in strength

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Name	Relative Strength	Range	Operates among
Gravitational Force	10^{-39}	Infinite	All objects in universe
Weak nuclear force	10^{-13}	Very short, sub nuclear size (approx. 10^{-16})	Some elementary particle, particularly electrons and neutrino)
Electromagnetic force	10^{-2}	Infinite	Charged particles
Strong nuclear force	1	Short nuclear size (approx. 10^{-5})	Nucleons, heavier elementary particles

Q) The Time period of a satellite depends on

(a) the mass of the satellite

(b) radius of its orbit

(c) both mass of satellite and radius of the orbit

(d) neither mass of satellite nor radius of the orbit

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$$\text{Period} = \frac{\text{Circumference of orbit}}{\text{Critical velocity}}$$

$$\therefore \quad T = \frac{2\pi r}{\sqrt{\frac{GM}{r}}}$$

$$\therefore \quad T = 2\pi r\sqrt{\frac{r}{GM}}$$

$$\therefore \quad T = 2\pi\sqrt{\frac{r^3}{GM}}$$

Q) A body weighs 500 N on the surface of the earth. How much would it weight half-way below the surface of the earth?

(a) 1000 N

(b) 500 N

(c) 250 N

(d) 125 N

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(a) 1000 N

(b) 500 N

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(d) 125 N

Value of acceleration due to gravity decreases on going below the surface of the earth. weight(w) of a body is defined as product of mass(m) and acceleration due to gravity(g) w = mg.

The value of g below the surface of earth at a distance h is given by

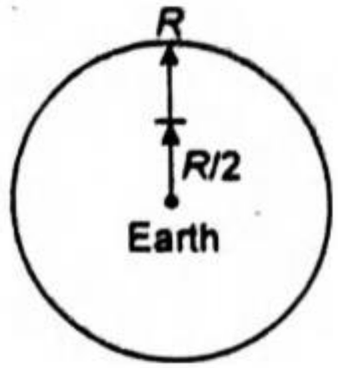
$$g' = g\left(1 - \frac{h}{R}\right)$$

$$\Rightarrow W' = W\left(1 - \frac{h}{R}\right)$$

Given, $h = \frac{R}{2}, W = 500N.$

$$W' = 500\left(1 - \frac{1}{2}\right)$$

$$= \frac{500}{2} = 250N.$$



Q) The time – period of a satellite of earth is 5 hours. If the separation between the earth and the satellite is increased to 4 times the previous value, the new time – period will become

(a) 10 hours

(b) 20 hours

(c) 40 hours

(d) 80 hours

Q) The time – period of a satellite of earth is 5 hours. If the separation between the earth and the satellite is increased to 4 times the previous value, the new time – period will become

(a) 10 hours

(b) 20 hours

(c) 40 hours

(d) 80 hours

The time period (T_1) = 5 hours

The final radius of the path of the satellite (r_2) = 4r

For the satellite:

$$T^2 \propto r^3$$

$$\frac{T_1^2}{T_2^2} = \frac{r_1^3}{r_2^3} \Rightarrow \frac{5^2}{T_2^2} = \frac{r_1^3}{(4r_1)^3} \Rightarrow \frac{25}{T_2^2} = \frac{1}{4^3}$$

$$T_2^2 = 25 \times 64 \Rightarrow T_2 = 5 \times 8 = 40 \text{ hours}$$

So the new time period for the satellite is 40 hours.

Q) What would be the duration of the year if the distance between the earth and the sun gets doubled?

(a) 1032 days

(b) 129 days

(c) 365 days

(d) 730 days

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(a) 1032 days

(b) 129 days

(c) 365 days

(d) 730 days

Radius of rotation become double, $a_2 = 2a_1$

By Kepler's law, $T^2 \alpha\ a^3$

$$\frac{T_1^2}{a_1^3} = \frac{T_2^2}{a_2^3}$$

$$T_2^2 = \left(\frac{a_2}{a_1}\right)^3 \times T_1^2$$

$$T_2^2 = \left(\frac{2}{1}\right)^3 \times T_1^2$$

$$T_2^2 = 8 \times T_1^2$$

$$T_2^2 = \sqrt{8} \times 365 \text{ days}$$

$$T_2 = 1032.37 \text{ days}$$

Hence, 1032 days in year.

Q) A man weighing 50 kgf carries a load of 10 kgf to the top of the building in 5 minutes. The work done by him is 10^5 J. If he carries the same load in 10 minutes, the work done by him will be:

(a) 10^5 J

(b) 5×10^5 J

(c) 12×10^5 J

(d) 2.5×10^5 J

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(c) 12×10^5 J

(d) 2.5×10^5 J

Work done. does not depend on time hence will be equal.

Q) On a new scale of temperature, which is linear and called the W scale, the freezing and boiling points of water are 39°W and 239°W respectively. What will be the temperature on the new scale corresponding to a temperature of 39°C on the Celsius scale?

(a) 78°W

(b) 117°W

(c) 200°W

(d) 139°W

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(c) 200°W

(d) 139°W

We know that

$$\frac{T_W - 39}{200} = \frac{T_C - 0}{100}$$

So, T_W-39 = 2 x 39

T_W =117°W

Q) If a graph is plotted between temperature of a body on degree Celsius (along y-axis) and degree Fahrenheit (along x-axis) at different temperatures, then the slope of the graph will be

(a) 5/9

(b) 9/5

(c) 3/5

(d) 5/3

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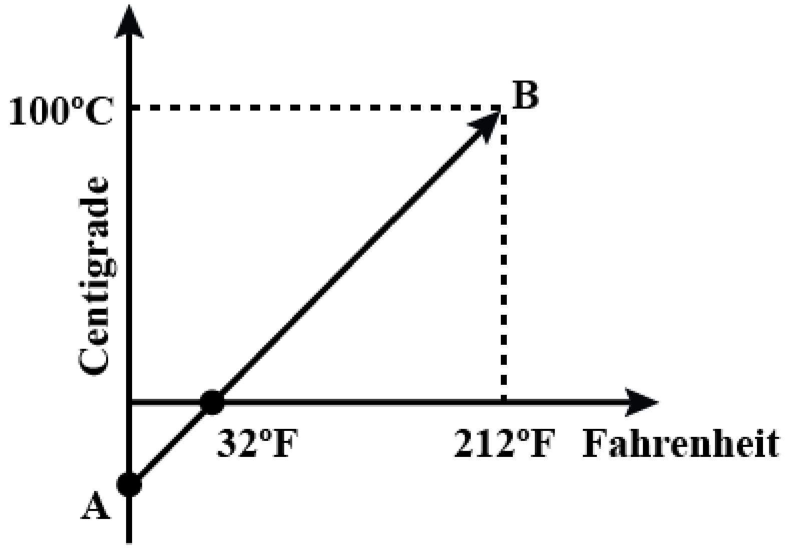
Relation between celsius and Fahrenheit scale of temperature is $\frac{C}{5} = \frac{F-32}{9}$

$$\Rightarrow \quad C = \frac{5}{9}F - \frac{160}{9}$$

Equating about with standard equation of the line y = mx c we slope of the line. AB is m = $\frac{5}{9}$



Q) A body of mass M accelerates uniformly from rest to a velocity v in time t. What is the instantaneous power delivered to the body at time T.

(a) $\frac{mv}{t}T$

(b) $\frac{mv^2}{t}T$

(c) $\frac{m^2v^2}{t^2}T$

(d) $\frac{mv^2}{t^2}T$

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(d) $\frac{mv^2}{t^2}T$

From $v = u + at,\ v_1 = 0 + at_1$

$\therefore a = \frac{v_1}{t_1}$

$F = ma = mv_1/t_1$

Velocity acquired in t sec $= at = \frac{v_1}{t_1}t$

$\text{Power} = F \times v = \frac{mv_1}{t_1} \times \frac{v_1 t}{t_1} = \frac{mv_1^2 t}{t_1^2}$

Q) Dancing of small pieces of camphor on the surface of water is due to

(a) viscosity

(b) Surface tension

(c) weight

(d) Lifting force

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(a) viscosity

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- When **impurities** are dissolved in **water,** the **surface tension** of **water decreases**.
- Hence, when **camphor** is dissolved in **water, surface tension** will **decrease**.
- As different amounts of **camphor** are dissolved from different sides so **Camphor** becomes non-symmetrical.
- Therefore **surface tension will be different on different sides of the camphor which sets up an unbalanced force** on the camphor due to which it dances on the surface of the water.

Q) Plants get water through the roots because of

(a) Capillarity

(b) Viscosity

(c) Gravity

(d) Elasticity

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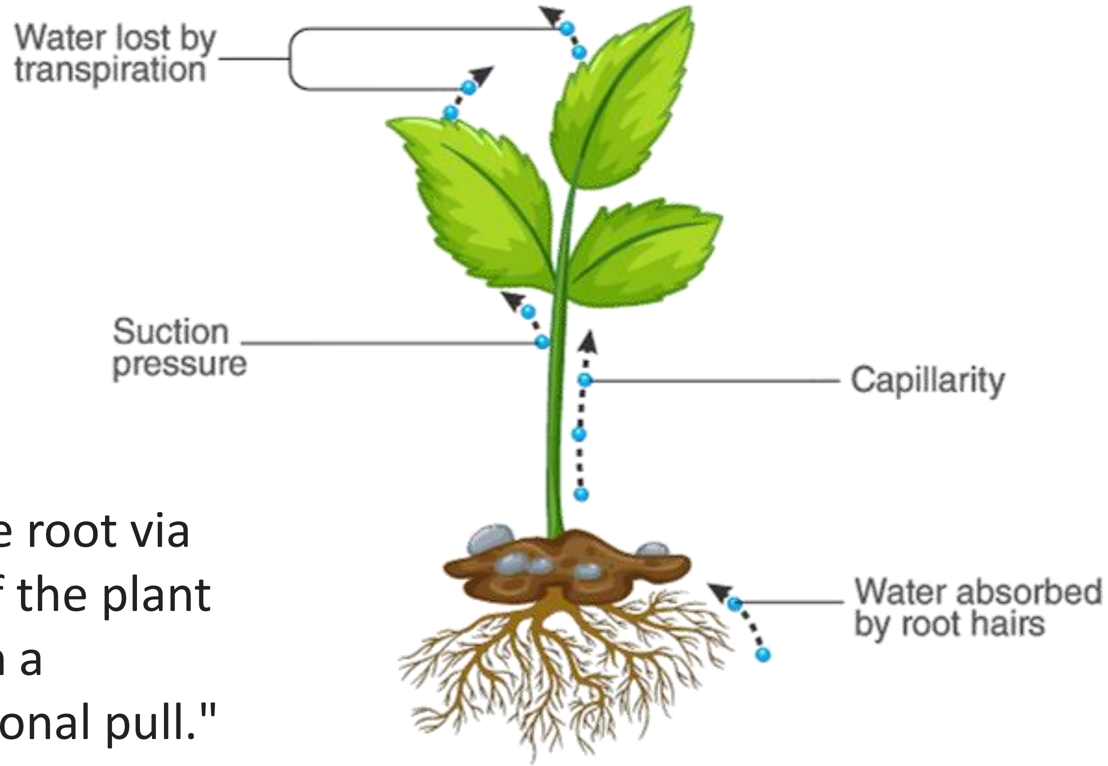

Plants absorb water from their root hairs on the root via osmosis. It is then transported to other parts of the plant (through the network of xylem vessels) through a combination of capillary action and "transipirational pull." Water moves through the plant by means of capillary action.

Q) Choose the wrong statement from the following.

(a) Small droplets of a liquid are spherical due to surface tension

(b) Oil rises through the wick due to capillarity

(c) In drinking the cold drinks through a straw, we use the phenomenon of capillarity

(d) Gum is used to stick two surfaces. In this process we use the property of Adhesion

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(c) In drinking the cold drinks through a straw, we use the phenomenon of capillarity

(d) Gum is used to stick two surfaces. In this process we use the property of Adhesion

For capillary action the diameter of tube should be very small. Liquid rises in the capillary tube due to surface tension. But while drinking cold drinks, we need to create low pressure closer to mouth and due to the pressure difference between the top and the bottom of the straw, cold drink rises. So the rise of cold drink in straw is not due to capillary action.

Q) A temperature of 100 ^oF (Fahrenheit scale) is equal to T K (Kelvin scale). The value of T is

(a) 310.9

(b) 37.8

(c) 100

(d) 122.4

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(a) 310.9

(b) 37.8

(c) 100

(d) 122.4

We can write that,

$T(\circ C)=(T(\circ F)-32)\times 5/9$

It has been already mentioned in the question that the value of temperature in Fahrenheit scale can be written as,

$T(\circ F)=100\circ F$

Substituting the values in it will give,

$T(\circ C)=(100-32)\times 59=37.778\circ C$

Therefore, the temperature in degree Celsius scale equivalent to the temperature in degree Fahrenheit scale has been obtained. Now let us calculate the temperature in Kelvin scale.

$T(K)=T(\circ C)+273.15$

Therefore, we can substitute the value of temperature in Celsius scale

$T(K)=37.778+273.15=310.928K$

Q) Heat always flows

(a) from a colder object to a hotter object

(b) from a hotter object to a colder object

(c) in both the directions

(d) heat never flows from one object to other

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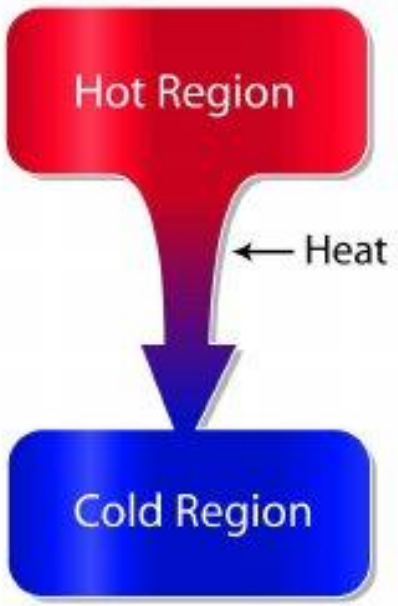

Heat will always be transferred from the hotter to the cooler object. The objects will exchange thermal energy, until thermal equilibrium is reached.

Q) A body of mass 1 kg is attached to one end of a wire and rotated in horizontal circle of diameter 40 cm with a constant speed of 2 m/s. what is the area of cross-section of the wire if the stress developed in the wire is 5×10^6 N/m^2?

(a) 2 mm^2

(b) 3 mm^2

(c) 4 mm^2

(d) 5 mm^2

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(a) 2 mm²

(b) 3 mm²

(c) 4 mm²

(d) 5 mm²

m=1kg, d=40cm, v=2m/s,
stress $S = 5 \text{ X } 10^6$ N/m²
r=20cm
When rotating the centripetal force is acting on the mass
$F = mv^2/r = 1 \text{ X } 4/0.2 = 20N$
Stress developed in the wire = force per unit area
S=F/A
Area of cross section A=F/S
$A=20/(5 \text{ X } 10^6) = 4 \text{ X } 10^{-6} = 4 \text{ mm}^2$
$A = 4\text{mm}^2$

Q) In a wire, when elongation is 2 cm energy stored is E. if it is stretched by 10 cm, then the energy stored will be

(a) E

(b) 2 E

(c) 4 E

(d) 25 E

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(a) E

(b) 2 E

(c) 4 E

(d) 25 E

$$\frac{E_2}{E_1} = \left(\frac{x_2}{x_1}\right)^2 = \left(\frac{10}{2}\right)^2 = 25$$

$$E_2 = 25E_1.$$

Q) Two wires A and B are of the same length. The diameters are in the ratio 1 : 2 and the Youngs modulus are in ratio 2 : 1. If they are pulled by the same force, then their elongations will be in ratio

(a) 4 : 1

(b) 1 : 4

(c) 1 : 2

(d) 2 : 1

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(a) 4 : 1

(b) 1 : 4

(c) 1 : 2

(d) 2 : 1

ratio of base area, $\frac{A_1}{A_2} = \frac{\frac{\pi D_1^2}{4}}{\frac{\pi D_2^2}{4}}$

$\frac{D_1^2}{D_2^2} = \left(\frac{1}{2}\right)^2 = \frac{1}{4} = \frac{A_1}{A_2}$

wires are given in the same length. $\frac{l_1}{l_2} = \frac{1}{1} = 1$

they are pulled by the same force. $\frac{F_1}{F_2} = \frac{1}{1} = 1$

ratio of Young's modulus , $\frac{Y_1}{Y_2} = \frac{2}{1}$

Young's modulus, $Y = \frac{Fl}{A\Delta l}$, where Δl is elongation.

so, $\frac{Y_1}{Y_2} = \frac{F_1}{F_2}\frac{l_1}{l_2}\frac{A_2}{A_1}\frac{\Delta l_2}{\Delta l_1}$

$\frac{2}{1} = \frac{1}{1} \times \frac{1}{1} \times \frac{4}{1} \times \frac{\Delta l_2}{\Delta l_1}$

$\Rightarrow \frac{\Delta l_1}{\Delta l_2} = \frac{2}{1}$

Q) Hooke’s law essentially defines

(a) Stress

(b) Strain

(c) Yield point

(d) Elastic limit

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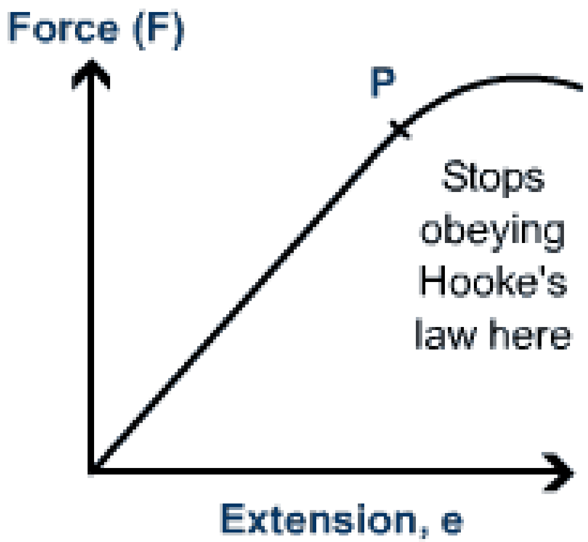

Hooke's law is a principle which states that the force needed to extend or compress a spring by some distance is proportional to that distance. This proportionality constant defines the Elastic limit

Q) Longitudinal strain is possible in the case of

(a) Gases

(b) Liquid

(c) Only solids

(d) Only gases & liquids

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(a) Gases

(b) Liquid

(c) Only solids

(d) Only gases & liquids

Longitudinal strain is possible-only in solids because only solids can have length which can be stretched by applying force. while molecules and liquid are loosely packed together and hence strain cannot occur in these mediums.

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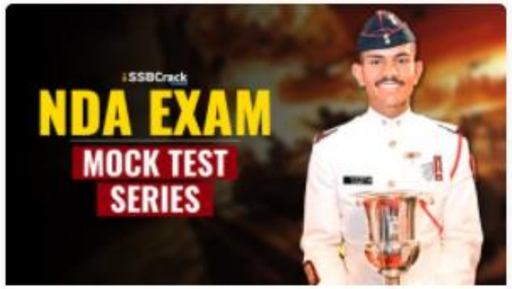

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