PHYSICS

BOOKS - CBSE MODEL PAPER

SAMPLE PAPER 2022

Section C Case Study Based Questions

1. 

The figure given alongside shows the path of a diver, when she takes a jump from the diving board. Clearly it is a parabola.

Annie was standing on a diving board, 48 feet

above the water level. She took a dive into the pool. Her height (in feet) above the water level at any time‘t’ in seconds is given by the polynomial h(t) such that

$h(t) = -16t^2 + 8t + k.$

What is the value of k?

A. 0

B. -48

C. 48

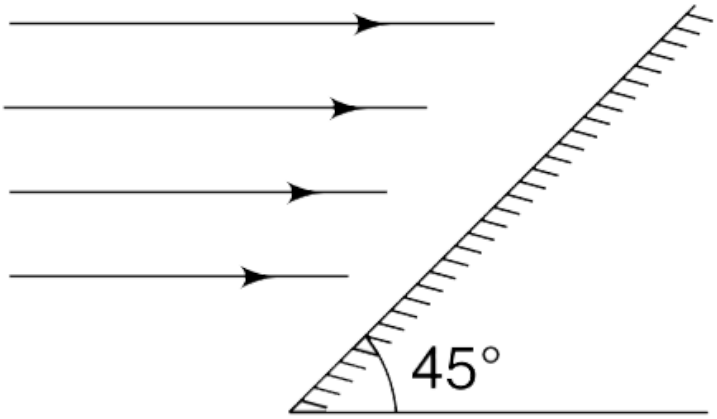
D. $48/-16$

Answer:

Watch Video Solution

2. A horizontal beam of light in incident on a plane mirror inclined at 45° to the horizontal. The percentage of light energy reflected from the mirror is $80\,\%$. Find the direction in which the mirror will experience

force due to the incident light.



A. 30 seconds

B. 2 seconds

C. 1.5 seconds

D. 0.5 seconds

Answer:

Watch Video Solution

3. 

The figure given alongside shows the path of a diver, when she takes a jump from the diving board. Clearly it is a parabola.

Annie was standing on a diving board, 48 feet above the water level. She took a dive into the pool. Her height (in feet) above the water level at any time‘t’ in seconds is given by the

polynomial h(t) such that

$h(t) = -16t^2 + 8t + k.$

Rita's height (in feet) above the water level is given by another polynomial p(t) with zeroes -1 and 2. Then p(t) is given by-

A. $t^2 + t - 2$

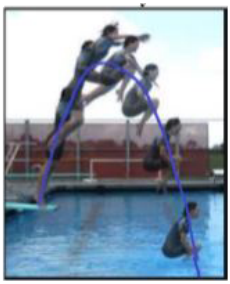
B. $t^2 + 2t - 1$

C. $24t^2 - 24t + 48$

D. $-24t^2 + 24t + 48$

Answer:

Watch Video Solution

4. 

The figure given alongside shows the path of a diver, when she takes a jump from the diving board. Clearly it is a parabola.

Annie was standing on a diving board, 48 feet above the water level. She took a dive into the pool. Her height (in feet) above the water level at any time‘t’ in seconds is given by the polynomial h(t) such that

$h(t) = -16t^2 + 8t + k.$

A polynomial q(t) with sum of zeroes as 1 and the product as -6 is modelling Anu's height in feet above the water at any time t(in seconds). Then q(t) is given by

A. $t^2 + t + 6$

B. $t^2 + t - 6$

C. $-8t^2 + 8t + 48$

D. $8t^2 - 8t + 48$

Answer:

Watch Video Solution

5. 

The figure given alongside shows the path of a diver, when she takes a jump from the diving board. Clearly it is a parabola.

Annie was standing on a diving board, 48 feet above the water level. She took a dive into the pool. Her height (in feet) above the water level at any time‘t’ in seconds is given by the polynomial h(t) such that

$h(t) = -16t^2 + 8t + k.$

The zeroes of the polynomial $r(t) = -12t^2 + (k-3)t + 48$ are negative of each other. Then k is

A. 3

B. 0

C. -1.5

D. -3

Answer:

Watch Video Solution

6. A hockey field is the playing surface for the game of hockey. Historically, the game was played on natural turf (grass) but nowadays it is predominantly played on an artificial turf.

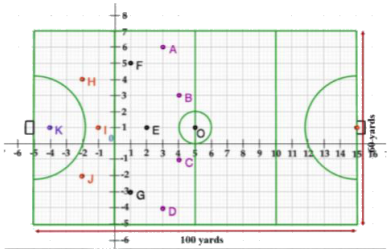
It is rectangular in shape - 100 yards by 60 yards. Goals consist of two upright posts placed equidistant from the centre of the backline, joined at the top by a horizontal crossbar. The inner edges of the posts must be 3.66 metres (4 yards) apart, and the lower edge of the crossbar must be 2.14 metres (7

feet) above the ground.

Each team plays with 11 players on the field during the game including the goalie. Positions you might play include-

- Forward: As shown by players A, B, C and D.
- Midfielders: As shown by players E, F and G.
- Fullbacks: As shown by players H, I and J.
- Goalie: As shown by player K

Using the picture of a hockey field below, answer the questions that follow:



The coordinates of the centroid of ΔEHJ are

A. $(-2/3, 1)$

B. $(1, -2/3)$

C. $(2/3, 1)$

D. $(-2/3, -1)$

Answer:

Watch Video Solution

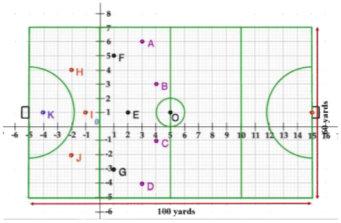
7. A hockey field is the playing surface for the game of hockey. Historically, the game was played on natural turf (grass) but nowadays it is predominantly played on an artificial turf.

It is rectangular in shape - 100 yards by 60 yards. Goals consist of two upright posts placed equidistant from the centre of the backline, joined at the top by a horizontal crossbar. The inner edges of the posts must be 3.66 metres (4 yards) apart, and the lower edge of the crossbar must be 2.14 metres (7 feet) above the ground.

Each team plays with 11 players on the field during the game including the goalie. Positions you might play include-

- Forward: As shown by players A, B, C and D.
- Midfielders: As shown by players E, F and G.
- Fullbacks: As shown by players H, I and J.
- Goalie: As shown by player K

Using the picture of a hockey field below, answer the questions that follow:



If a player P needs to be at equal distances

from A and G, such that A, P and G are in straight line, then position of P will be given by

A. $(-3/2, 2)$

B. $(2, -3/2)$

C. $(2, 3/2)$

D. $(-2, -3)$

Answer:

Watch Video Solution

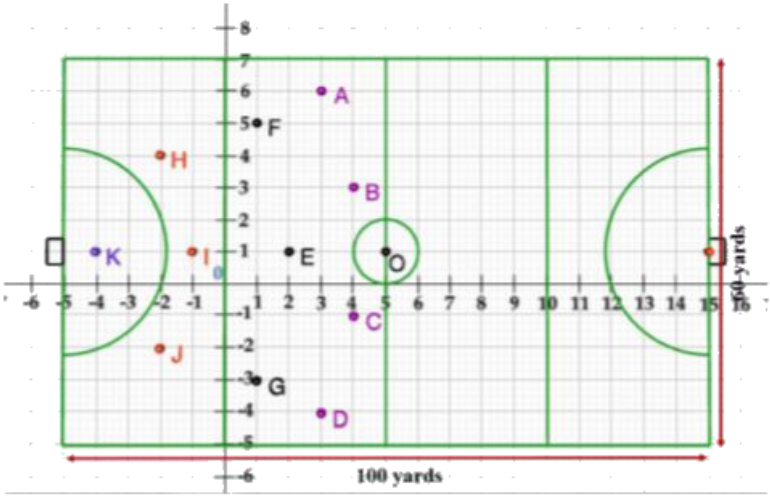
8. A hockey field is the playing surface for the game of hockey. Historically, the game was played on natural turf (grass) but nowadays it is predominantly played on an artificial turf.

It is rectangular in shape - 100 yards by 60 yards. Goals consist of two upright posts placed equidistant from the centre of the backline, joined at the top by a horizontal crossbar. The inner edges of the posts must be 3.66 metres (4 yards) apart, and the lower edge of the crossbar must be 2.14 metres (7 feet) above the ground.

Each team plays with 11 players on the field during the game including the goalie. Positions you might play include-

- Forward: As shown by players A, B, C and D.
- Midfielders: As shown by players E, F and G.
- Fullbacks: As shown by players H, I and J.
- Goalie: As shown by player K

Using the picture of a hockey field below, answer the questions that follow:



The point on x axis equidistant from I and E is

A. $(1/2, 0)$

B. $(0, -1/2)$

C. $(-1/2, 0)$

D. $(0, 1/2)$

Answer:

Watch Video Solution

9. A hockey field is the playing surface for the game of hockey. Historically, the game was played on natural turf (grass) but nowadays it is predominantly played on an artificial turf.

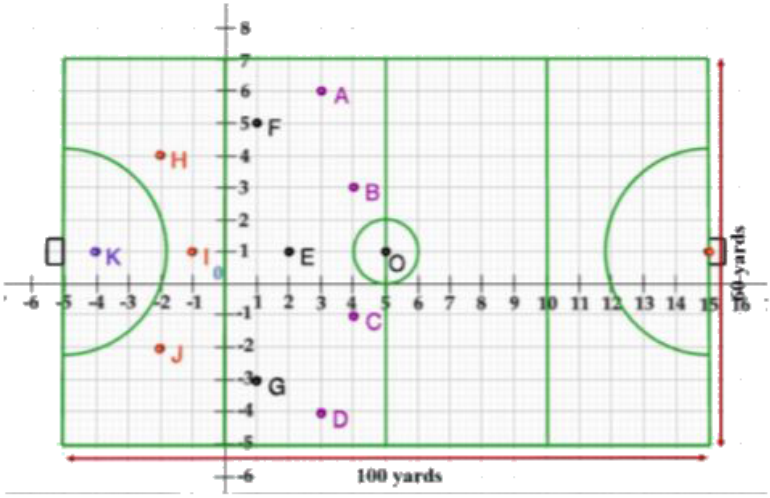
It is rectangular in shape - 100 yards by 60 yards. Goals consist of two upright posts placed equidistant from the centre of the backline, joined at the top by a horizontal crossbar. The inner edges of the posts must be 3.66 metres (4 yards) apart, and the lower

edge of the crossbar must be 2.14 metres (7 feet) above the ground.

Each team plays with 11 players on the field during the game including the goalie. Positions you might play include-

- Forward: As shown by players A, B, C and D.
- Midfielders: As shown by players E, F and G.
- Fullbacks: As shown by players H, I and J.
- Goalie: As shown by player K

Using the picture of a hockey field below, answer the questions that follow:



What are the coordinates of the position of a player Q such that his distance from K is twice his distance from E and K, Q and E are collinear?

A. (1, 0)

B. (0,1)

C. (-2,1)

D. (-1,0)

Answer:

Watch Video Solution

10. A hockey field is the playing surface for the game of hockey. Historically, the game was played on natural turf (grass) but nowadays it is predominantly played on an artificial turf.

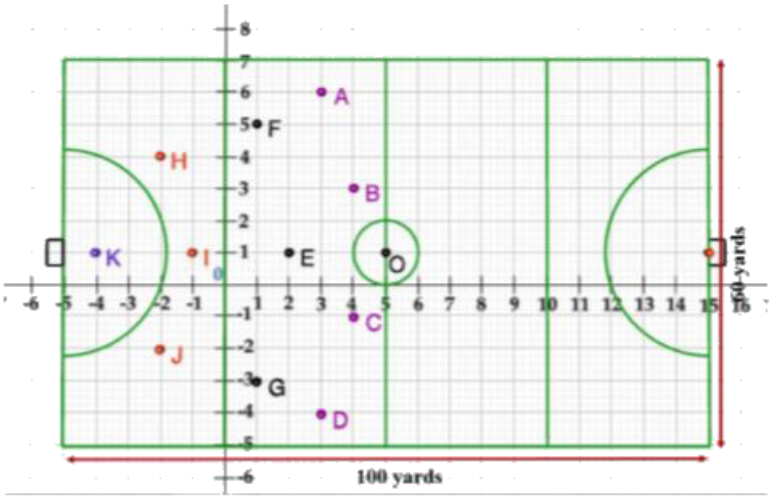
It is rectangular in shape - 100 yards by 60 yards. Goals consist of two upright posts

placed equidistant from the centre of the backline, joined at the top by a horizontal crossbar. The inner edges of the posts must be 3.66 metres (4 yards) apart, and the lower edge of the crossbar must be 2.14 metres (7 feet) above the ground.

Each team plays with 11 players on the field during the game including the goalie. Positions you might play include-

- Forward: As shown by players A, B, C and D.
- Midfielders: As shown by players E, F and G.
- Fullbacks: As shown by players H, I and J.
- Goalie: As shown by player K

Using the picture of a hockey field below, answer the questions that follow:



The point on y axis equidistant from B and C is

A. (-1, 0)

B. (0,-1)

C. (1,0)

D. (0,1)

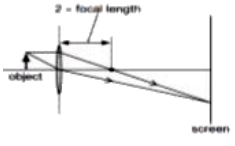
Answer:

Watch Video Solution

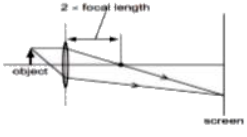
Section A

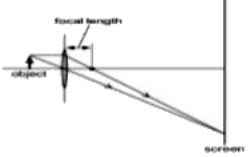
1. Which diagram shows image formation of an object on a screen by a converging lens?

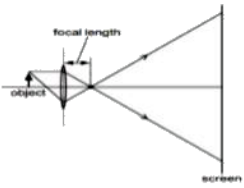
A.



B.



C. 

D. 

Answer:

Watch Video Solution

2. Which of the following can make a parallel beam of light from a point source is incident on it ?

A. Concave mirror as well as convex lens.

B. Convex mirror as well as concave lens.

C. Two plane mirrors placed at 90° to each others

D. Concave mirror as well as concave lens

Answer:

Watch Video Solution

3. Consider these indices of refraction: glass: 1.52, air: 1.0003, water: 1.333. Based on the refractive indices of three materials, arrange the speed of light through them in decreasing order.

A. The speed of light in water gt the speed of light in air gt the speed of light in glass

B. The speed of light in glass gt the speed of light in water gt the speed of light in

air.

C. The speed of light in air gt the speed of light in water gt the speed of light in glass.

D. The speed of light in glass gt the speed of light in air gt the speed of light in water.

Answer:

Watch Video Solution

4. If a beam of red light and a beam of violet light are incident at the same angle on the inclined surface of a prism from air medium and produce angles of refraction r and v respectively, which of the following is correct?

A. r = v

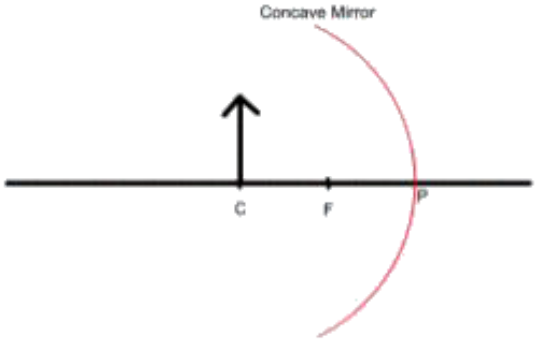
B. $r > v$

C. r = 1/v

D. $r < v$

Answer:

Watch Video Solution



5.

Examine the above figure and state which of the following option is correct? [one small box in the figure is equal to 1 cm]

A. The mirror has a focal length of -6 cm and will produce an image of

magnification +1.

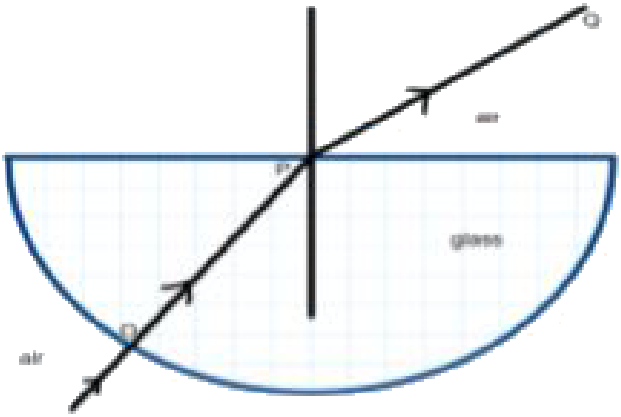
B. The mirror has a focal length of -3 cm and will produce an image of magnification -1.

C. The mirror has a focal length of -3 cm and will produce an image of magnification +1.

D. The mirror has a focal length of -6 cm and will produce an image of magnification -1.

Answer: 2

Watch Video Solution



6.

The angle of incidence from air to glass at the point O on the hemispherical glass slab is.

A. 45°

B. 0°

C. 90°

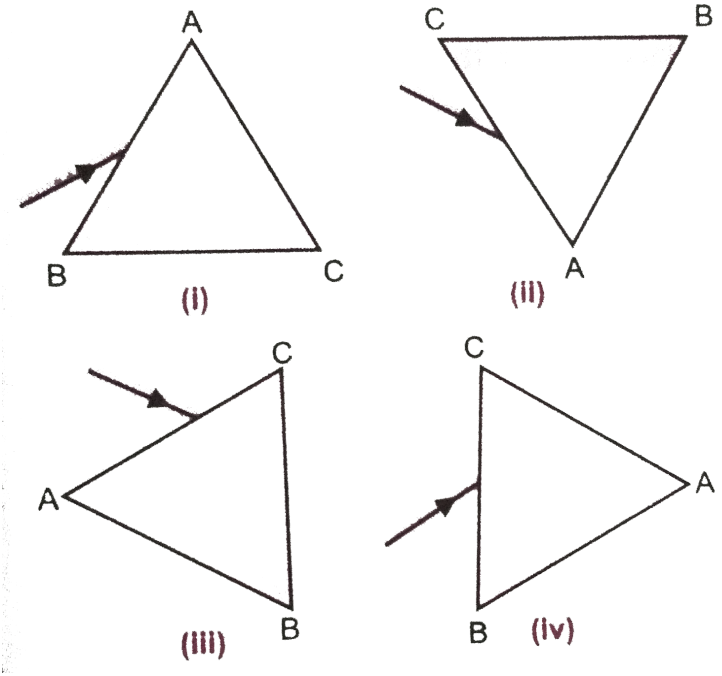
D. 180°

Answer:

Watch Video Solution

7. A prism ABC (with BC as base) is placed in different orientations. A narrow beam of white light is incident on the prism as shown in (figure 2.21) In which of the following cases,

after dispersion, the third colour from the top corresponds to the colour of the sky ?



A. (i)

B. (ii)

C. (iii)

D. (iv)

Answer:

Watch Video Solution

Section B

1. If the power of a lens is - 4.0 D, then it means that the lens is a

A. concave lens of focal length -50 m

B. convex lens of focal length +50 cm

C. concave lens of focal length -25 cm

D. convex lens of focal length -25 m

Answer:

Watch Video Solution

2. Rays from Sun converge at a point $15cm$ in front of a concave mirror. Where should an object be placed so that size of its image is equal to the size of the object ?

A. 30 cm in front of the mirror

B. 15 cm in front of the mirror

C. Between 15 cm and 30 cm in front of the mirror

D. More than 30 cm in front of the mirror

Answer:

Watch Video Solution

3. If the real image of a candle flame formed by a lens is three times the size of the flame and the distance between lens and image is 80 cm, at what distance should the candle be placed from the lens?

A. -80cm

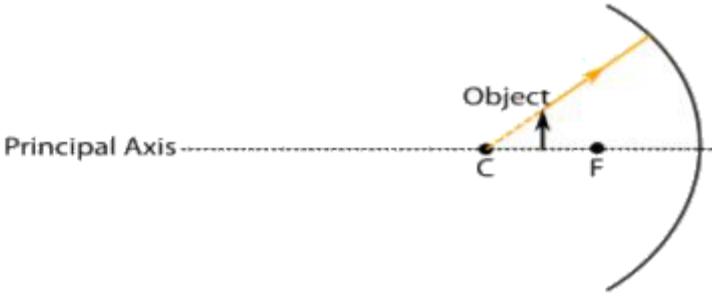
B. -40 cm

C. $-40/3$ cm

D. $-80/3$ cm

Answer:

Watch Video Solution



4.

While looking at the above diagram, Nalini concluded the following-

i. the image of the object will be a virtual one.

ii. the reflected ray will travel along the same path as the incident ray but in opposite direction.

iii. the image of the object will be inverted.

iv. this is a concave mirror and hence the focal length will be negative.

Which one of the above statements are correct?

A. i and ii

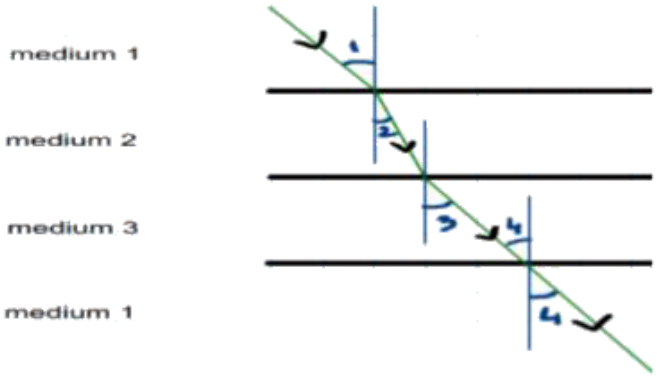
B. i and iii

C. ii, iii and iv

D. i, ii, iii and iv

Answer:

Watch Video Solution



5.

In the above diagram light is travelling through different media. It is noted by a scientist that $\angle 1 = \angle 3 = \angle 4$ but $\angle 2 < \angle 1$. Which of the following statement would be correct?

A. Medium 1 is the denser than medium 3 but it's density is equal to medium 2.

B. Medium 2 is the rarest medium

C. Medium 3 is denser than medium 1.

D. Medium 1 and 3 are essentially the same medium, but medium 2 is denser than 1 and 3.

Answer:

Watch Video Solution

6. The refractive index of flint glass is 1.65 and that for alcohol is 1.36 with respect to air. What is the refractive index of the flint glass with respect to alcohol ?

A. 0.82

B. 1.21

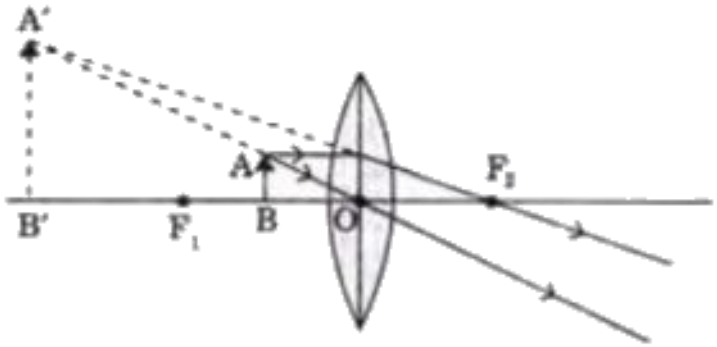
C. 1.11

D. 1.01

Answer:

Watch Video Solution

Watch Video Solution



7.

The above lens has a focal length of 10 cm. The object of height 2 mm is placed at a distance of 5 cm from the pole. Find the height of the image.

A. 4 cm

B. 6.67 mm

C. 4 mm

D. 3.33 mm

Answer:

8. A cable manufacturing unit tested few elements on the basisof their physical properties.

Properties	W	X	Y	Z
Malleable	Yes	No	No	Yes
Ductile	Yes	No	No	Yes
Electrical conductivity	Yes	Yes	Yes	No
Melting Point	High	Low	Low	High

Which of the above elements were dicarded for usage by the company?

A. W, X, Y

B. X, Y, Z

C. W, X, Z

D. W, X, Z

Answer:

Watch Video Solution

9. Assertion: Sky appears blue in the day time.

Reason: White light is composed of seven colours

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true and R is not the correct explanation of A

C. A is true but R is false

D. A is False but R is true

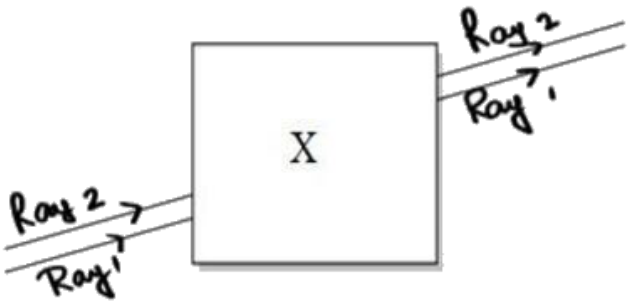
Answer:

Watch Video Solution

Section C

1. Noor, a young student, was trying to demonstrate some properties of light in her Science project work. She kept 'X' inside the box (as shown in the figure) and with the help of a laser pointer made light rays pass through the holes on one side of the box. She

had a small butter-paper screen to see the spots of light being cast as they emerged.



What could be the 'X' that she placed inside the box to make the rays behave as shown?

A. a converging lens

B. a parallel-sided glass block

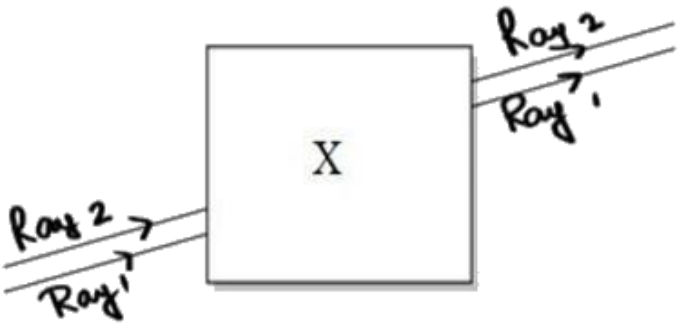
C. a plane mirror

D. a triangular prism

Answer:

Watch Video Solution

2. Noor, a young student, was trying to demonstrate some properties of light in her Science project work. She kept 'X' inside the box (as shown in the figure) and with the help of a laser pointer made light rays pass through the holes on one side of the box. She had a small butter-paper screen to see the spots of light being cast as they emerged.



She measured the angles of incidence for both the rays on the left side of the box to be 48.6°. She knew the refractive index of the material 'X' inside the box was 1.5. What will be the approximate value of angle of refraction?

(use the value: sin $48.6^\circ \approx 0.75$)

A. 45°

B. 40°

C. 30°

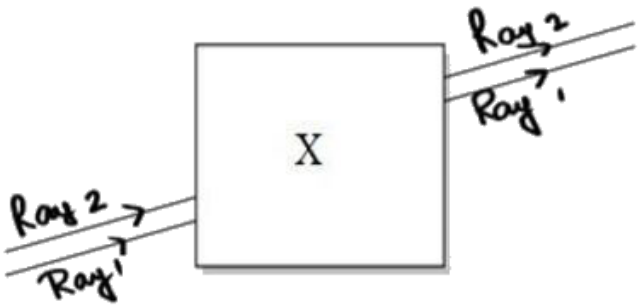
D. 60°

Answer:

Watch Video Solution

3. Noor, a young student, was trying to demonstrate some properties of light in her Science project work. She kept 'X' inside the box (as shown in the figure) and with the help of a laser pointer made light rays pass

through the holes on one side of the box. She had a small butter-paper screen to see the spots of light being cast as they emerged.



Her friend noted the following observations from this demonstration:

i. Glass is optically rarer than air.

ii. Air and glass allow light to pass through them with the same velocity.

iii. Air is optically rarer than glass.

iv. Speed of light through a denser medium is faster than that of a rarer medium.

v. The ratio: sin of angle of incidence in the first medium to the ratio of sin of angle of refraction in the second medium, gives the refractive index of the second material with respect to the first one.

Which one of the combination of the above statements given below is correct.

A. ii, iv and v are correct.

B. iii and iv are correct.

C. i, iv and v are correct.

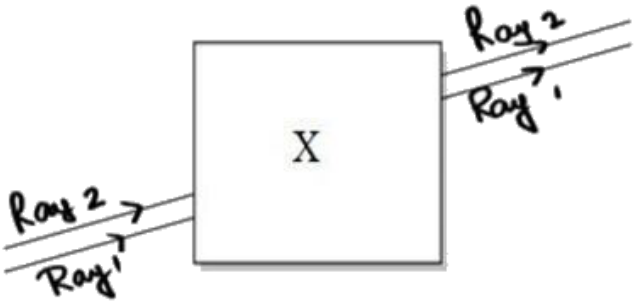
D. iii and v are correct.

Answer:

Watch Video Solution

4. Noor, a young student, was trying to demonstrate some properties of light in her Science project work. She kept 'X' inside the box (as shown in the figure) and with the help of a laser pointer made light rays pass through the holes on one side of the box. She

had a small butter-paper screen to see the spots of light being cast as they emerged.



If the object inside the box was made of a material with a refractive index less than 1.5 then the

A. lateral shift of the rays would have been less.

B. lateral shift of the rays would have been more.

C. lateral shift of the rays would remain the same as before.

D. there is not enough information to comment on any of the above statements

Answer:

Watch Video Solution

Alternative Questions Section A

1. If a virtual, erect and enlarged image is formed by a lens, then which of the following options are correct?

A. It is a concave lens and the object is placed between pole and focus.

B. It is a convex lens and the object is placed between focus and centre of curvature.

C. It is a convex lens and the object is placed between pole and focus.

D. It is a concave lens and the object is placed between focus and centre of curvature.

Answer:

 Watch Video Solution

2. Consider the situation where:

An object is 3 cm (height)

Mirror is concave with 6 cm focal length.

Object is placed at the centre of curvature.

Which of the following options are correct?

A. The mirror will produce an image of magnification +1.5.

B. The mirror will produce an image of magnification -1.

C. The mirror will produce an image of magnification +1.

D. The mirror will produce an image of magnification -1.5.

Answer:

Watch Video Solution

3. If a ray passes from air to glass in a spherical glass slab and passes through the centre of the slab without deviation, then the

angle of incidence from air to glass at the point on the glass slab is.

A. 45°

B. 0°

C. 90°

D. 180°

Answer:

Watch Video Solution

4. Out of all colours making the white light, which one will deviate the most while it passes through a prism?

A. Red

B. Violet

C. Blue

D. Green

Answer:

Watch Video Solution

Alternative Questions Section B

1. NalinI draws a ray diagram for an object in front of a concave mirror. She draws a ray starting from the top of the object and falling on the mirror perpendicularly.

The ray after reflection will

A. pass through focus.

B. pass through pole.

C. pass through the centre of curvature.

D. pass through any point on the principal axis.

Answer:

Watch Video Solution

2. If the refractive index of water with respect to air is 1.33 and of that of glass with respect to air is 1.5 then

A. water is optically denser than glass.

B. air is optically densest of all the three media.

C. air's optical density is between glass and air.

D. glass is optically denser than water.

Answer:

 Watch Video Solution

3. A convex lens has a focal length of 10 cm. The object of height 2 mm is placed at a distance of 5 cm from the pole. Find the height of the image.

A. 4 cm

B. 6.67 mm

C. 4 mm

D. 3.33 mm

Answer:

Watch Video Solution

Watch Video Solution

Alternative Questions Section C

1. In an experiment, Pooja used a equilateral triangular glass prism and projected a narrow beam of white light source from one side of the surface of the prism. She placed a screen on the other side and saw many colours appearing as patches on the screen. But when she used a red light source, she could only see a red patch on the screen. Similarly she used a

blue and green light source and could only see one colour patch on both occasions.

The phenomenon that she was trying to demonstrate was:

A. Dispersion

B. Reflection

C. Refraction

D. Scattering

Answer:

Watch Video Solution

2. In an experiment, Pooja used a equilateral triangular glass prism and projected a narrow beam of white light source from one side of the surface of the prism. She placed a screen on the other side and saw many colours appearing as patches on the screen. But when she used a red light source, she could only see a red patch on the screen. Similarly she used a blue and green light source and could only see one colour patch on both occasions.

The reason why she could no see any other

colour when the red light was used was because:

A. Red colour does not refract in prism.

B. Red colour is monochromatic.

C. The prism was defective.

D. The prism is opaque to red colour.

Answer:

Watch Video Solution

3. In an experiment, Pooja used a equilateral triangular glass prism and projected a narrow beam of white light source from one side of the surface of the prism. She placed a screen on the other side and saw many colours appearing as patches on the screen. But when she used a red light source, she could only see a red patch on the screen. Similarly she used a blue and green light source and could only see one colour patch on both occasions.

Which of the following can be the correct

explanation that Pooja can give to her friends to explain this phenomenon?

A. Different lights travel faster in the glass prism at different rates.

B. Any light would disperse in the prism.

C. Enough data is not available to make a scientific explanation in this case.

D. Different wavelengths travel at different speeds in the glass.

Answer:

Watch Video Solution

4. In an experiment, Pooja used a equilateral triangular glass prism and projected a narrow beam of white light source from one side of the surface of the prism. She placed a screen on the other side and saw many colours appearing as patches on the screen. But when she used a red light source, she could only see a red patch on the screen. Similarly she used a blue and green light source and could only see one colour patch on both occasions.

She also could relate to another natural phenomenon that we observe on a rainy humid day as the sun comes out. What could be that phenomenon?

A. Lightning

B. Blueness of the sky.

C. Rainbow.

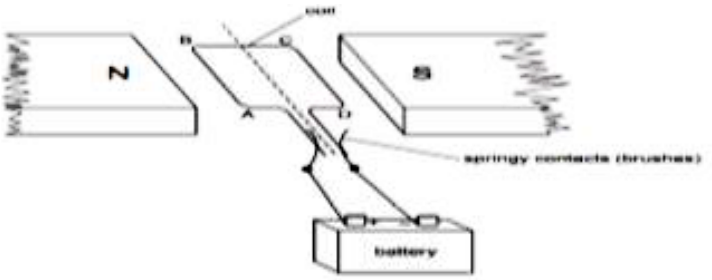
D. Scattering of light.

Answer:

Watch Video Solution

Section A

1. A simple motor is made in a school laboratory. A coil of wire is mounted on an axle between the poles of a horseshoe magnet, as illustrated.



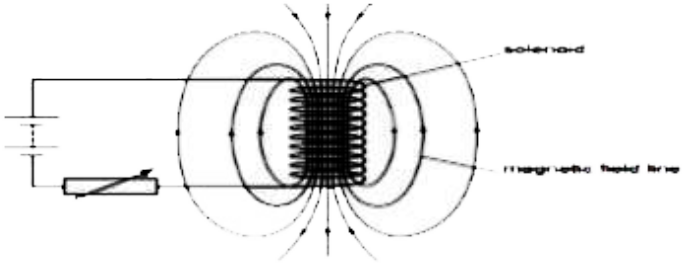
In the example above, coil ABCD is horizontal and the battery is connected as shown.

a. For this position, state the direction of the force on the arm AB.

b. Why does the current in the arm BC not contribute to the turning force on the coil ?

Watch Video Solution

2. A circuit contains a battery, a variable resistor and a solenoid. The figure below shows the magnetic field pattern produced by the current in the solenoid.



a. State how the magnetic field pattern indicates regions where the magnetic field is stronger.

b. What happens to the magnetic field when the current in the circuit is reversed ?

Watch Video Solution

Section B

1. a. It would cost a man Rs. 3.50 to buy 1.0 kW h of electrical energy from the Main Electricity Board. His generator has a maximum power of 2.0 kW. The generator produces energy at this maximum power for 3 hours.

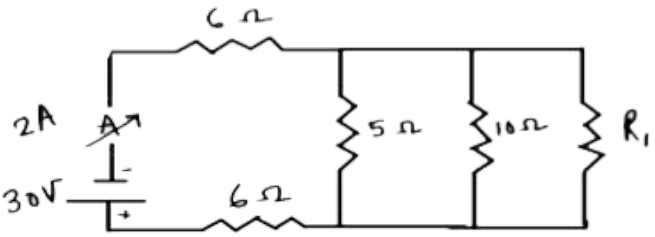
Calculate how much it would cost to buy the same amount of energy from the Main Electricity Board.

b. A student boils water in an electric kettle for 20 minutes. Using the same mains supply he wants to reduce the boiling time of water. To do so should he increase or decrease the

length of the heating element? Justify your answer.

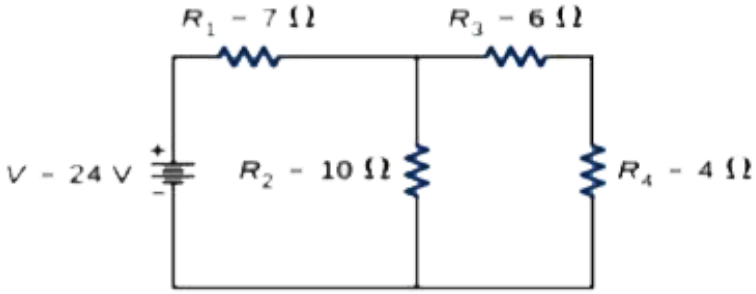
Watch Video Solution

2.



In the above circuit, if the current reading in the ammeter A is 2A, what would be the value of R_1?

Watch Video Solution



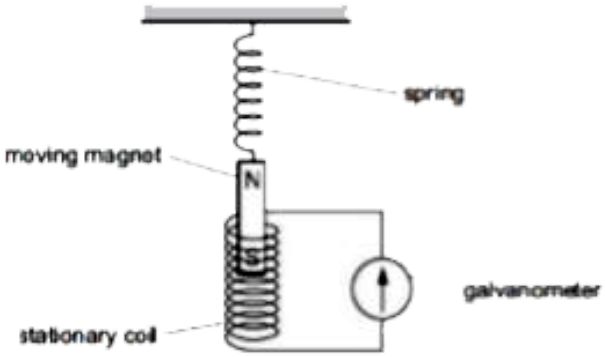
3.

Calculate the total resistance of the circuit and find the total current in the circuit.

Watch Video Solution

Section C

1. Ansari Sir was demonstrating an experiment in his class with the setup as shown in the figure below.



A magnet is attached to a spring. The magnet can go in and out of the stationary coil. He lifted the Magnet and released it to make it oscillate through the coil. Based on your understanding of the phenomenon, answer

the following questions.

a. What is the principle which Ansari Sir is trying to demonstrate?

b. What will be observed when the Magnet starts oscillating through the coil. Explain the reason behind this observation.

c. Consider the situation where the Magnet goes in and out of the coil. State two changes which could be made to increase the deflection in the galvanometer.

Watch Video Solution

2. Is there any difference in the observations in the galvanometer when the Magnet swings in and then out of the stationary coil ? Justify your answer.

Watch Video Solution