AL Physics MC Answers

Year:1992

Question Number: 1,3,16,19,22,27,31,33,34,35,36,37,38,40

1992MC(1)

Acceleration of the whole system, a $= \dfrac{F}{m + 2m + 2m} = \dfrac{F}{5m}$

Net force acting on B $= m_B a = 2m \dfrac{F}{5m} = \dfrac{2F}{5}$

1992MC (3)

Two forces are acting on the bob----one is its own weight and the other is the tension is the string.

Centripetal is NOT a force.   It is **_very wrong_** to think " a circular motion produces a force which is called centripetal force."
The net force which produces the circular motion is called centripetal force. The net force, here, is provided by tension and the radial component of weight.

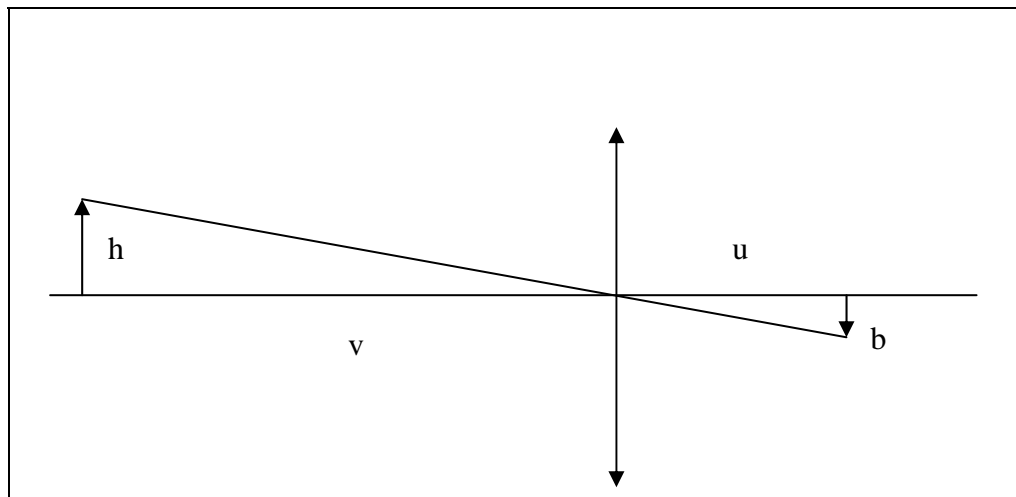1992MC (16)

Let h be the height of the object
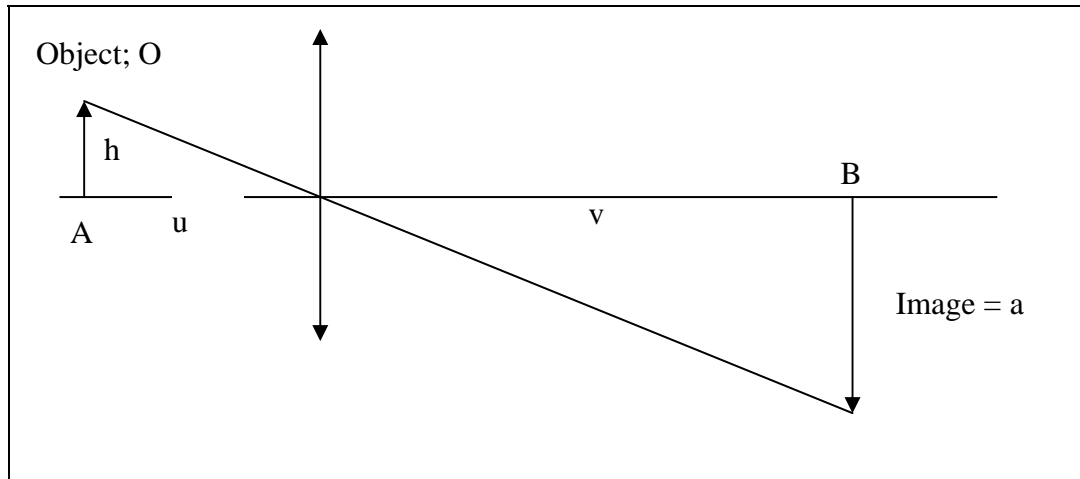
Magnification $\dfrac{v}{u} = \dfrac{a}{h}$ ………………(1)

One big concept:

Light is reversible.   If the image is placed B, then the image will be formed at A.

The lens is moved towards the screen.　　A new image is formed on the screen when the new object distance = v and the new image distance = u.
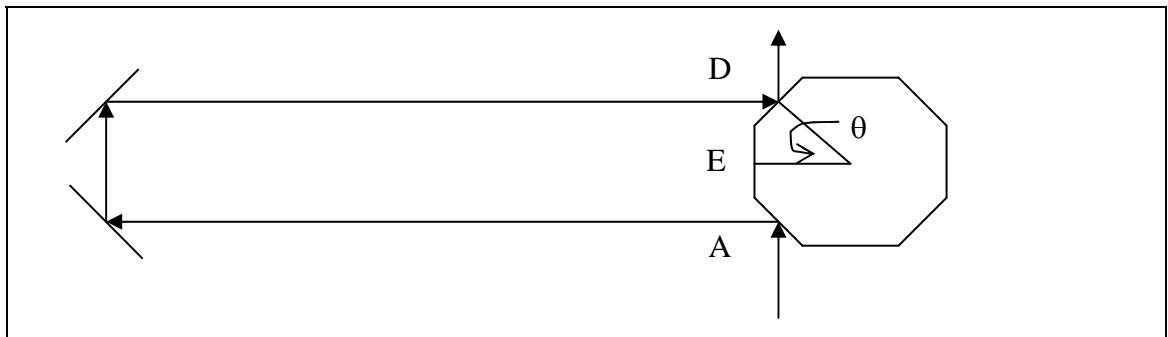

New magnification $\dfrac{new\ image\ dis\tan ce}{new\ object\ dis\tan ce} = \dfrac{u}{v} = \dfrac{b}{h}$ ………………(2)

From (1) and (2)

$\dfrac{a}{h} = \dfrac{h}{b}$　　$so\ h = \sqrt{ab}$

1992MC(19)

The octagonal mirror is made to rotate such that the path of ray is the same as above.

After a ray is reflected at A, the mirror rotates by the angle θ when it returns.　　In other words, <u>face E should go to the position of face D during the time interval　L/c</u>.

$\theta = 2\pi/8 = \omega(L/c)$　　　$so\ \omega = \pi c/(4L)$

1992MC (22)

Path Difference = mλ

3.30 -3.22 = mλ

    m = 1 λ = 0.08 m ←-

    m = 2 λ = 0.04 m ←

    m = 3 λ = 0.027 m

    [If λ = 0.16 m, m = 0.5, it is impossible !!!]

1992MC(27)

The electric field from a positive charge is radial outwards.

As we walk away from the center, both E and V will decrease

The potential due to a positive charge is positive and inversely proportional to r.

Electric field intensity is inversely proportional to r^2.

1992MC (31)

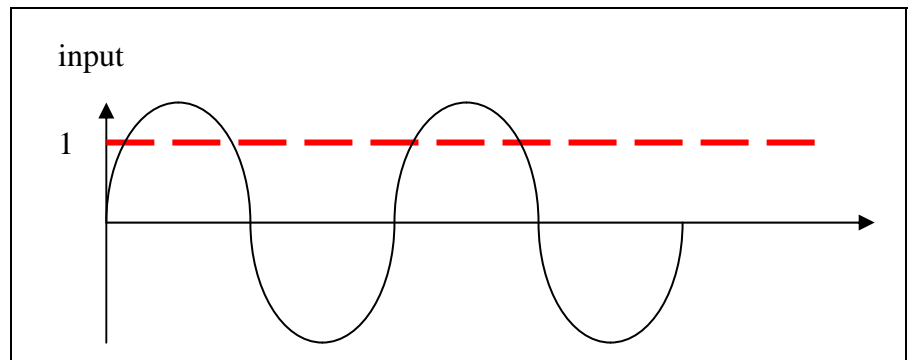From the output-input graph, we know

When input < 1 V, output = 4V

When input >1 V, output = 0 V.

In the input-time graph,

When input above red line, output = 0 V; below red line, output = 4V.

Time for 0V (shorter than half a period) < time for 4 V (longer than half a period)

The output is a square waveform with lower part < upper part.

1992MC(33)

Torque = NBAI

To produce the same deflection, same torque is required.

NBAi = (2N)B(3A)I

I = i/6

1992 MC (34)

Torque produced by passing a current in a coil = NBAI sin θ, where θ is the angle between the normal of the coil and the magnetic field.

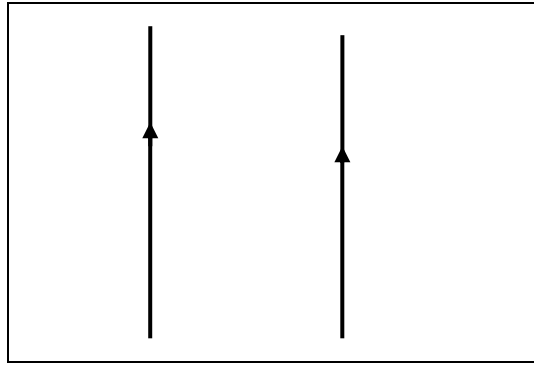Referring to the definition of θ in the figure, the torque is BANIcosθ

1992 MC (35)

The 50 Hz a.c will make the iron core to **attract the steel strip twice in each cycle**.

Either a south pole (one direction of current) or a north pole (the reverse direction of current, half a cycle later) will attract the steel strip.

1992MC (36)

The two current attract each other

B is proportional to 1/r, so does the force between them.

At the midway between them, the field is zero because the fields produced by the two currents are equal in magnitude and opposite in direction.

1992 MC (37)

(1) At t = 0, I = 0, so the p.d. across the 8Ω resistor = 0, The 12 V is totally dropped

   across the inductor, so $2\dfrac{dI}{dt} = 12$. $\dfrac{dI}{dt} = 6As^{-1}$

(2) Finally, the current is steady, the inductor has no effect.   I = 12V/8Ω = 1.5 A

(3) Energy stored in L = $\dfrac{1}{2}LI^2 = \dfrac{1}{2}(2)(1.5)^2 = 2.25\,J$

1992 MC (38)

(1)   ε = BLv
(2)   Current flow from low potential (-) to high potential (+) inside a source of emf
(3)   No induced current because it is not a complete circuit. No current, no force.

1992MC (40)

(1) Magnetic force on the ring depends on the current induced in the ring.   The current depends on the resistivity. [Imagine the ring is made of wood (infinite resistivity), will the ring float?]

(2) If the weight of the metallic ring is 1000 tones, will it float?

(3) If the frequency is 0Hz (d.c.) , will the ring float?