

PHYSICS FORM THREE

MARKING SCHEME:

1. Define the terms velocity and acceleration. (2mks)
Velocity is the speed of a body in a specified direction while acceleration is change of velocity per unit time, it is a vector quantity.

2. Give a reason why it is necessary to leave the caps of the cell open when charging on accumulator. (1mk)
To allow the hydrogen and oxygen gases produce electrodes to escape.

3. One method of producing a weak magnet is to hold a steel rod in the north south direction and hammer it continuously for some time using the domain theory of magnetism. Explain how this method works. (2mks)
Hammering causes domains to vibrate; as they settle, some face north south direction due to the earth's magnetic field.

4. A body accelerates uniformly from its initial velocity u , to the final velocity, v , in time t . the distance travelled during this is s . If acceleration is donated by letter a , show that;
 - i) $v = u + at$ (2mks)
 $t \times a = \frac{v-u}{t} \times t$
 $at = v - u$
 $v = u + at \dots\dots (i)$

 - ii) $s = ut + \frac{1}{2} at^2$. (3mks)
 $S = \left(\frac{u+v}{2}\right) t$
but from eqn (i)
 $v = u + at$
 $S = \left(\frac{2u}{2} + \frac{1}{2} at\right) t$
 $S = \left(u + \frac{1}{2} at\right) t$
 $S = ut + \frac{1}{2} at^2 \dots\dots (ii)$

 - iii) $v^2 = u^2 + 2as$. (2mks)
 $S = \left(\frac{u+v}{2}\right) t$ **but t from eqn (i) = $\frac{v-u}{a}$**
 $2a \times s = \left(\frac{u+v}{2}\right) \left(\frac{v-u}{a}\right) \times 2a$
 $2as = (u + v)(v - u)$

$$2as = uv - u^2 + u^2 + v^2 - uv$$

$$2as = v^2 - u^2$$

$$v^2 = u^2 + 2as \dots\dots (iii)$$

5. State two uses of a charged gold leaf electroscope. (2mks)
- **To identify conductors and insulators**
 - **To detect charge**
 - **To determine quantity of charge.**
 - **To identify type of charge.**

6. State the number of images formed when an object is between two plane mirrors placed in parallel axis. (1mk)
- Infinite .**

7.

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

$$\frac{1}{10} = \frac{1}{v} + \frac{1}{15}$$
$$\frac{1}{10} = \frac{1}{v} + \frac{1}{15}$$

$$\frac{1}{30} = \frac{1}{v}$$

V=30cm

8. (a) Define the term spring constant K. (1mk)

Measure of stiffness of an elastic material or ratio of force to extension of an elastic material

- (b) The three springs shown below are identical and have negligible weight. The extension produced on the system of the is 20cm.

diagram

Determine spring constant of each spring. (3mks)

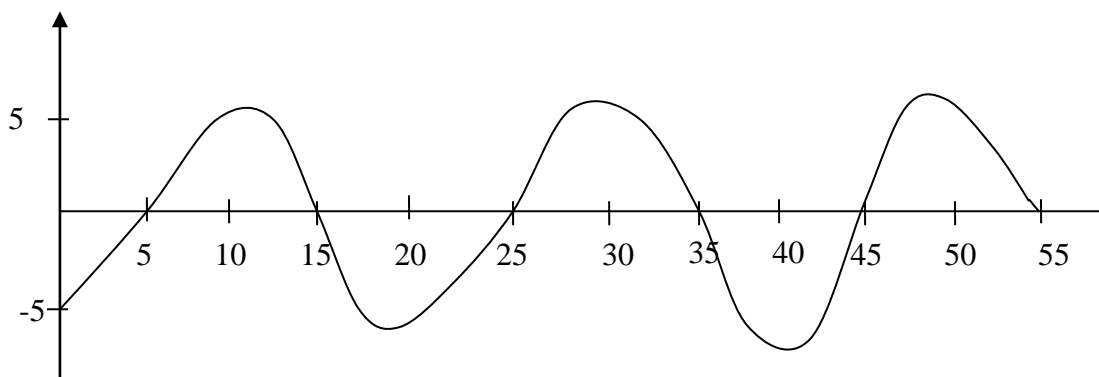
Parallel $\rightarrow F=2ke_1 \Rightarrow 40 = ke_1 \Rightarrow e_1 = \frac{20}{k}$

Single $\rightarrow F = 2ke_2 \Rightarrow 20 = ke_2 \Rightarrow e_2 = \frac{20}{k}$

$e_T = e_1 + e_2 \Rightarrow \frac{20}{k} = \frac{20}{k} + \frac{20}{k} = \frac{40}{k} = k = 2N/cm$

**extension of each spring = 10, $k = \frac{20N}{10cm}$
= 2N/cm**

9. Figure below shows a displacement – time graph per a progressive wave.



i) State the amplitude of the wave. (1mk)
5 cm

ii) Determine the frequency of the wave. (2mks)
Periodic time $T = 25 - 5 = 20$.
Frequency = $\frac{1}{T} = \frac{1}{20} = 0.05Hz$

iii) Given that the velocity of the wave is 20m/s, determine its wavelength. (2mks)

$V + Fh \Rightarrow h = \frac{v}{F} = \frac{20}{0.05} = 400m$

F

10. A ray of light passing from air to glass is incident at angle of 30°. Calculate the angle of refraction in the glass if the refractive index of glass is 1.50. (3mks)

Refractive index of glass $n_g = \frac{\sin i}{\sin r}$

$\therefore \sin r = \frac{\sin i}{n_g} = \frac{\sin 30^\circ}{1.50} = \frac{0.5}{1.50} = 0.3$

$r = 19.5^\circ$

11. A ball is thrown horizontally from the top of a vertical tower and strike the ground at point 50m from the bottom of the tower given that the height of the tower is 45m, determine the;
- i) Time taken by the ball to hit the ground. (3mks)
**Since $u=0$ $s = \frac{1}{2} gt^2 \Rightarrow$
 $45 = \frac{1}{2} \times 10 \times t^2 \Rightarrow t = 3s$**
- ii) The initial horizontal velocity of the ball. (3mks)
 $S = ut$ $50 = u \times 3 \Rightarrow u = 16.7m/s$
- iii) Vertical velocity of the ball just before striking the ground (Take $g=10m/s^{-2}$)
 $v = u + gt = 0 + 10 \times 3 = 30m/s$
12. Explain how the pressure in a moving fluid varies with the speed of the fluid. (1mk)
Pressure is inversely proportional to the speed.
13. State snells law of refraction. Describe an experiment to verify it. (5mks)
The ratio of the sine of angle of incidence to the sine of the angle of refraction is a constant for a given pair of media $\frac{\sin i}{\sin r} = \text{constant}$
14. Define critical angle. (1mk)
This is the angle of incidence for which the angle of refraction in air is 90°
15. A stone is let to fall vertically down from a window on the 10th floor of a building 40m above the ground. Find the time taken by the stone to reach the ground. (3mks)
 **$u = 0$
 $s = 40$
 $g = 10m/s^2$
 $S = ut + \frac{1}{2} gt^2$
 $\frac{40}{5} = 0 \times t + \frac{1}{2} \times 10 \times t^2$
 $= 2.46 s$**
16. What is the difference between longitudinal and transverse wave. (1mk)
In longitudinal waves, particles of the transmitting medium vibrate in the direction of the wave while in transverse waves, particles of the transmitting medium vibrate at right angles.

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