

**PHYSICS F 4 M/S PP2**

1. Rectilinear propagation. ✓<sup>1</sup>

4. (a) Unlike poles attract, like poles repel ✓<sup>1</sup>

(b) The keepers become magnetized thus neutralizing ✓ the pole; this reduces repulsion at the poles ✓ thus helping in retention of magnetism.

5. It has a wider field of view than that of a plane mirror. ✓

6  
 Total resistance  $R = 6 + 6 + 0.5\Omega = 12.5\Omega$   
 Current  $I = V/R = 3.0/12.5 = 0.24A$

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7. When the terminals of the heater are at a p.d of 240V and connected to an alternating current of frequency 50Hz, it converts 2500J of electrical energy to 2500 J of heat energy per second.

8. TV waves----microwaves—blue light---Ultra-violet—gamma rays.

9. Transformer uses a.c only while induction coil uses d.c

Transformer produces a humming sound while induction coil is quiet

10, (a) 

Transverse	Longitudinal wave
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1.	Displacement of particles in the wave is perpendicular to the direction of wave motion.	- Displacement of particles in the wave is parallel to the direction of wave motion.
2.	Requires no medium for propagation.	- Requires a material medium for propagation.
3.	Can be mechanical or electromagnetic in nature.	- Purely mechanical wave.

Any 1 combination

$$(b) \quad f = \frac{1}{T} T = 2(S)$$

$$\text{Hence } f = \frac{1}{2} = 0.5H_z$$

- (c) (i) Can travel for long distances as a beam without getting scattered.  
(ii) It can be reflected by tiny particles like grains hence can defect them. ✓<sup>1</sup>

Any 1

$$12. P = VI \quad \checkmark^1$$

$$I = \frac{P}{V} = \frac{3000}{240}$$

$$= 12.5A \checkmark^1$$

The fuse is not suitable since the appliance is drawing more current than the fuse rating ✓<sup>1</sup> the fuse will blow off.

13. His car gets charged by friction during the day. He then acts as earth wire when he step on the ground holding the metal handle.

### SECTION

$$14. \quad (a) \quad (i) \quad \frac{V_P}{V_S} = \frac{N_P}{N_S} \checkmark^1$$

$$\frac{800}{V_S} = \frac{2000}{150}$$

$$V_S = \frac{800 \times 150}{2000}$$

$$= 60V \checkmark^1$$

(ii) Power input = Power output ✓<sup>1</sup>

$$I_P = \frac{1000}{800}$$

$$= 1.25A \checkmark^1$$

$$(iii) \quad I_s = \frac{\text{Power output}}{\text{Output voltage}} = \frac{1000}{60}$$

$$= 16.67A \checkmark^1$$

(iv) Step-down transformer  $\checkmark^1$

- (b) (i) - To minimize power loss.  
 - Thick cables minimizes resistance.

$$(ii) \quad \frac{2000}{1000} \times 2 \times 30 = 120kwh \checkmark^1$$

$$\frac{75}{1000} \times 10 \times 30 = 22kwh \checkmark^1$$

$$\frac{1500}{1000} \times 1 \times 30 = \frac{45kwh}{\text{Total } 189kwh}$$

$$\text{Cost } 187 \times 9.50$$

$$= \text{Ksh.}1776.50 \checkmark^1$$

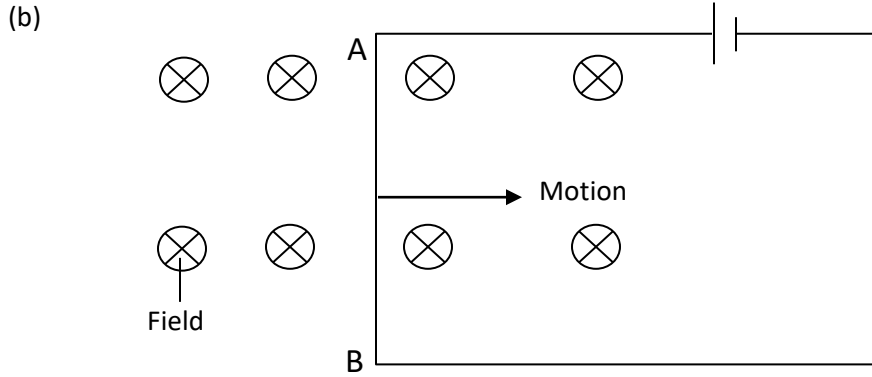
(ii)	No of units	= 187
	Fuel levy	$187 \times \frac{70}{100}$
		= 130.90
	Standing charge=	200.00
	Total charge	= 1776.50 + 330.90
		= Ksh.2107.40

15. (a) (i) Increasing the number of turns in the coil.

(ii) Increasing the size of current.

(iii) Using a soft iron core.

(iv) Reducing the length of the core.



(b)

$$E = IR + Ir$$

$$= 5 \times 1.6 + 5r \quad \text{--- (i)}$$

$$E = 3.2 \times 2.8 + 3.2r \quad \text{---- (ii)}$$

Hence

$$5 \times 1.6 + 5r = 3.2 \times 2.8 + 3.2r$$

$$1.8r = 8.96 + 8$$

$$1.8r = 0.96$$

$$r = \frac{0.96}{1.8} = \underline{\underline{0.5333}}$$

$$E = 5 \times 1.6 + 5 \times 0.53$$

$$= 8 + 2.65$$

$$= 10.65V$$

(d)  $\mathcal{E} = \frac{RA}{l} \checkmark \textcircled{1}$

$$l = \frac{10 \times 7 \times 10^{-8}}{1.1 \times 10^{-6}} \checkmark \textcircled{1}$$

$$= \frac{70}{1.1} \times 10^{-2} m$$

$$= 63.6 \times 10^{-2} m$$

or

$$63.6 \text{ cm } \checkmark \textcircled{1}$$

(e) P.d across R = p.d across  $10\Omega$  resistor.  $\checkmark \textcircled{1}$

$$V + IR = 2 \times 10 = 20V \checkmark \textcircled{1}$$

16. (a) (i)

**Long sight**

(ii) --eye ball being too long

--focal length too short

b. It is the ability of the eye to focus the image on the retina

c. (i).  $1/u + 1/v = 1/f$

$$1/u + 1/45 = 1/15$$

$$1/u = 1/15 - 1/45 = 2/45$$

$$U = 45/2 = 22.5 \text{ cm}$$

**Apparent depth = 22.5 cm**

(ii)  $n = \text{real depth} / \text{apparent depth}$

**real depth =  $n \times \text{AD}$**

$$= 4/3 \times 45/2$$

$$= 15 \times 2$$

$$= 30 \text{ cm.}$$

$$n_1 \sin i = n_2 \sin r$$

$$\sin r = \frac{1.4 \sin 45^\circ}{1.6}$$

$$= 0.742$$

$$r = 47.3^\circ$$

d. (i).  $i = 45^\circ$

17. (a) (i) Increasing the surface area of the liquid. ✓ ①

(ii) Reducing the pressure on the liquid surface. ✓ ①

(b) Heat gained by water = Heat lost by metal block

$$M_w C_w \theta_w = M_m C_m \theta_m \quad \checkmark \text{ ①}$$

$$2 \times 4200 \times (50 - T_1) = 10 \times 450 \times 70$$

$$50 T_1 = \frac{10 \times 450 \times 70}{2 \times 4200} = 37.5 \quad \checkmark \text{ ①}$$

$$T_1 = 50 - 37.5 = 12.5^\circ\text{C} \quad \checkmark \text{ ①}$$

(c) Water has a high heat capacity hence can absorb a lot of heat ✓ ①

(d) (i) Increasing the pressure on the ice. ✓ ①

(ii) Adding impurities e.g. salt ✓ ①

(f) As ether evaporates, it extra it's the latent heat of vaporization from its surroundings

hence the water is cooled. ✓①

Heat	Temperature
<ul style="list-style-type: none"> <li>- Form of energy which flows from a hotter to a cooler part of an object</li> <li>- Measured in joules</li> <li>- Measured using a calorimeter</li> </ul>	<ul style="list-style-type: none"> <li>- Degree of hotness or coldness of an object measured on a given scale.</li> <li>- Measured in Kelvin or °C.</li> <li>- Measured using a thermometer.</li> </ul>
Any two	

18. Last...

(i)  $\left. \begin{array}{l} \text{Up motion } h_1 = 40t - 5t^2 \\ \text{Down motion } h_2 = 5t^2 \end{array} \right\} \checkmark 1$   
 But  $h_1 + h_2 = 100\text{m}$   
 $100 = 5t^2 + -5t^2 + 40t \checkmark 1$   
 $t = \frac{100}{40} = 2.5 \text{ seconds } \checkmark 1$

(ii)  $h_i = 40t - 5t^2$   
 $= (40 \times 2.2) - 5(2.5)^2 \checkmark 1$   
 $= 100 - 31.25$   
 $= 68.75\text{m} \checkmark 1$  from the ground

(b)  
 (i)  $w = 2\pi f$   
 $= 2 \times \frac{22}{7} \times 6 \checkmark$   
 $= 37.7 \text{ radis} \checkmark$

(ii)  $a = rw^2$   
 $= 0.6 \times (37.7^2) \checkmark$   
 $= 853.42 \text{ radis} \checkmark$

(iii)  $F = ma$   
 $= 0.045 \times 853.42 \checkmark$   
 $= 38.4\text{N} \checkmark$

(iv)  $v = rw$   
 $= 0.6 \times 37.7$   
 $= 22.62 \text{ m/s } \checkmark$