

TEACHER.CO.KE EXAMINATION OPENER TERM 1 2022

FORM FOUR

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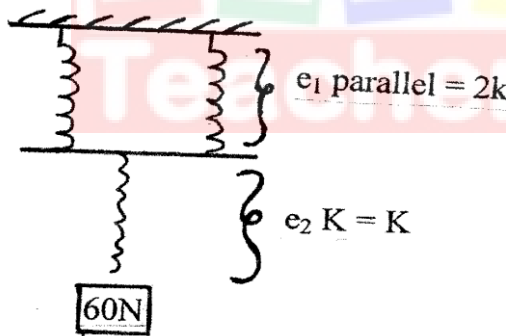
PHYSICS

PAPER 1

MARKING SCHEME

SECTION A: (25MKS)

1. Thickness of 10 cover slips = $2.56 + 0.01 = 2.57\text{mm}$ \square
2. Thickness of each cover slip \square (2mks) Adhesion force between glass and water molecules is greater than cohesion force between water molecules \checkmark
Cohesion force between mercury molecules is greater than adhesion force between mercury and glass molecules \checkmark
3. $5 \times 0.3 + 2 \times 0.7 = w \times 0.2$ \checkmark
 $1.5 + 1.4 = 0.2w$
 $2.9 = 0.2w$ \checkmark
 $W = 14.5\text{N}$ \checkmark
4. Pressure due to mercury column = pressure due to air column \checkmark
 $(0.75 - X) 13600 \times 10 = 1088 \times 1.25 \times 10$ \checkmark
 $0.75 - X = 0.1$
 $X = 0.65$
Reading = 65cm Hg \checkmark
5. a) Stability of the block reduces
b) Addition of water \checkmark raises the position C.O.G \checkmark
- 6.



- $$e_1 + e_2 = 6 \checkmark$$
- $$e_1 = \frac{60}{2K}$$
- $$e_2 = \frac{60}{K}$$
- $$= \frac{6}{2K} + \frac{60}{K} = 6 \checkmark$$
- $$= \frac{60+120}{2K} = 6$$
- $$180 = 12K$$
- $$K = 15\text{N/cm} \checkmark$$
7. Balloon will expand, therefore Upthrust on the balloon increases, \checkmark thus clockwise moments increases more than anti clockwise moments \checkmark .
 8. Having a thinner capillary tube \checkmark
 9. Gas inside the bottle expands, pushing the cork. \checkmark
The cork expands more than the bottle hence becoming loose \checkmark
 10. $a = \frac{v-u}{t} = \frac{0-30}{0.05}$ **OR** $Ft = m4v$

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$$= \frac{-30}{0.05}$$

$$= -600 \text{m/s}^2$$

$$f = \frac{m4v}{t}$$

$$= \frac{0.02 \times 30}{0.05} = -12 \text{N}$$

$$F = ma$$

$$= \frac{20}{1000} \times -600 \checkmark$$

$$= -12 \text{N}$$

Retarding force = 12N ✓

11. Iron gate when touched conducts heat away from the hand while wood does not because it is a poor conductor of heat ✓

SECTION B

12. a) Stream line flow where all the particles of the fluid move in the same direction at the same velocity at a particular point: ✓ Turbulent: particle moves with different velocities. ✓

- b) The papers are observed to separate ✓ because of low pressure on the sides ✓ A and B

c) $A_1V_1 = A_2V_2$

$$0.05 \times 2.6 = 0.1 \times A_2 \checkmark$$

$$A_2 = \frac{0.05 \times 2.6}{0.1} = 1.3 \text{m}^2 \text{ OR } 13000 \text{cm}^2$$

$$U \text{ sin g } \pi r^2 = A$$

$$\pi r^2 = 13000$$

$$3.142r^2 = \frac{13000}{3.142}$$

$$r^2 = 4237$$

$$d = 2r$$

$$d = (\sqrt{r^2}) \times 2$$

$$d = 128.65 \text{cm} \checkmark$$

- d) i) Gas pressure ✓

ii) 56mm Hg ✓

iii) $760 \text{mmHg} + 56 \text{mmHg} = 816 \text{mmHg} \checkmark$

13. (a) Surface tension of water is stronger than that of oil

(b) (i) $\text{Vol.} = \frac{4}{3} \pi r^3 \checkmark$

$$= \frac{4}{3} \times \frac{22}{7} \times \left(\frac{0.05}{2}\right)^3$$

$$= 6.5476 \times 10^{-5} \text{cm}^3 \checkmark$$

(ii) $A = \pi r^2$

$$= \frac{22}{7} \times \left(\frac{15}{2}\right)^2 \checkmark$$

$$= 176.786 \text{cm}^2 \checkmark$$

(iii) $\text{Vol.} = \pi r^2 h \checkmark$

$$h = \frac{6.5476 \times 10^{-5}}{176.786} \checkmark$$

$$= 3.7037 \times 10^{-7} \text{cm} \checkmark$$

- (c) - Oil drop is perfectly spherical

- Size of oil molecule is same as

- Patch is one molecule thick.

thickness of patch.

(Max. 2 marks)

14. a) OA : object is accelerating
 AB: object is accelerating gently and non-uniformly
 BC: Object moving at constant speed

b) i) (I) $u = 10 \text{m/s}$ $v = u + at$
 $a = -2.5 \text{m/s}^2$ $= 10 - 2.5 \times 1.5 \checkmark$

$$t = 1.5\text{sec} = 6.25\text{m/s}\checkmark$$

$$(II) s = ut + \frac{1}{2}at^2$$

$$= 10(1.5) - \frac{1}{2}(2.5)(1.5)^2 \checkmark$$

$$= 12.1875\checkmark$$

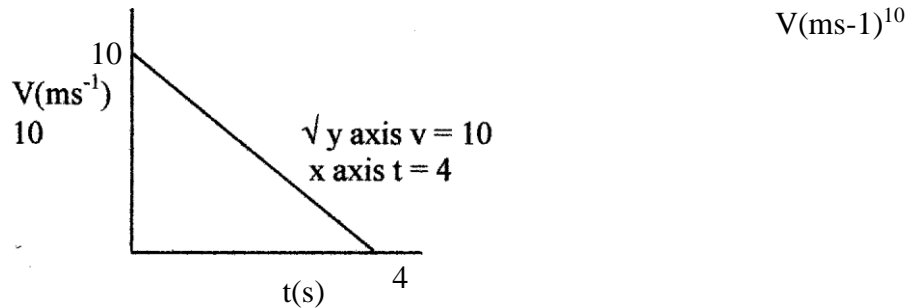
$$= 12.19$$

$$(III) v = 0 \quad v = u + at$$

$$0 = 10 - 2.5t\checkmark$$

$$t = \frac{10}{2.5} = 4\text{s}\checkmark$$

ii)

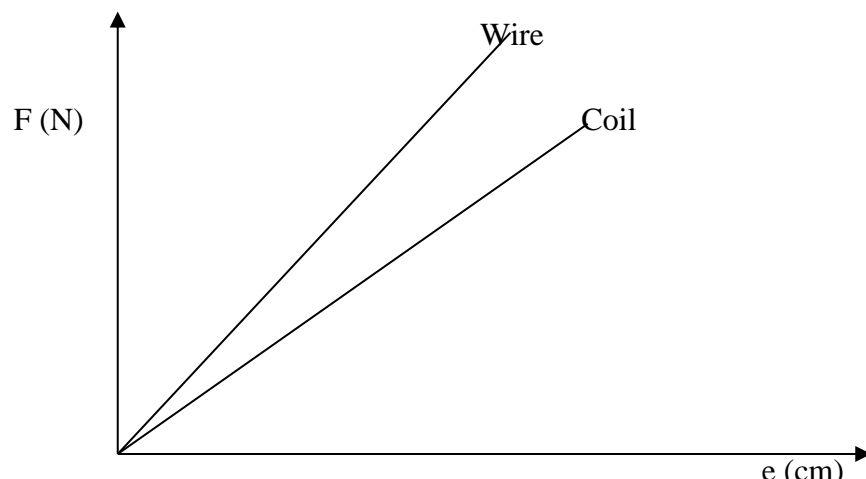


iii) Distance = Area of triangle \checkmark
 $\frac{1}{2} \times 4 \times 10$
 $20\text{m}\checkmark$

15.(a)	- A small force (effort) is used to overcome a large force (Load) - Less energy is expended in doing work - Less time is used in accomplishing the task	$\checkmark 2$ for any two correct responses(2)
15.(b)(i)	- In one revolution, both wheel and axle complete one circumference - $V.R = \text{Effort Distance}/\text{Load distance} = 2\pi R/2\pi r$ - $V.R = R/r$	$\checkmark 1$ mark for each bullet
15.(b)(ii)	$V.R = 50/5 = 10$ $M.A = \text{efficiency} \times V.R/100 = 90 \times 10/100 = 9$ $\text{Effort} = \text{Load}/M.A = 200/9 = 22.22\text{N}$	$\checkmark 1$ mark $\checkmark 1$ mark $\checkmark 1$ mark

16.(a) For an elastic material, the extension is directly proportional to the force producing it provided the elastic limit is not exceeded. $\checkmark 1$

b (i)



(ii).The wire has a greater constant of elasticity $\checkmark 1$ than material hence coil of the same greater gradient.

iii).

Load	0.00	1.00	2.00	4.00	5.00	6.00	
L	10.00	11.50	13.50	16.00	18.00	24.00	
E	0.00	1.50	3.50	6.00	8.00	14.00	√1

iv) Suitable axes labelled √1

All points correct √1

Suitable line √1

v) Springs constant $K = \frac{\Delta F}{\Delta e}$ √1 Δe

Use students graph

Correct units √1

