MARKING SCHEME

THE ROYAL EXAM SERIES

Kenya Certificate of Secondary Education

PHYSICS 232/1

1. (a) 5.50 mm + 0.21 mm = 5.71 mm
   5.71 mm – 0.11 mm = 5.60 mm

   (b) $\varrho = m/v$
   $v = 4/3\ \pi r^3 = 4/3 \times 3.142 \times 0.28^3 = 0.09196\ cm^3$
   $\varrho = 2.4\ g / 0.09196\ cm^3 = 26.098\ g/cm^3$

2. In A the C.O.G stays at the same place throughout while in B, C.O.G changes ✓hence resisting motion. ✓

3. . Density of gases is lower than in liquids -Intermolecular forces in gasesare weaker than in liquids. - Kinetic energy of gas particles is higher than that of liquids

4. Copper being a better conductor of heat compared to glass, conducts away heat faster than glass

5. The surface tension of water holds the needle making it to float. Detergent lowers the surface tension of water making the needle to break it hence sinking

6. *Correct diagram*

7. .F= Ke
   e= f/k
   e= 150/300 = 0.5m ✓

   For 3 parallel $e = \frac{0.5}{3} = 0.1667$
   For 2 springs parallel in $e = \frac{0.5}{2} = 0.25m$
   Total extension 0.1667 + 0.25 = 0.4167m ✓

8. Clockwise moment = Anticlockwise moment
   0.48 x = 0.34 x 2.0
   $w = \frac{0.34\ x\ 2}{0.48} = 1.4167$
   $m = \frac{w}{g} = \frac{1.4167}{10}\ x\ 1000$
   = 141.67g

9. $P_1 = (PA + 5)$ cmHg
   $P_2 = (PA - 5)$ cmHg
   $V_1 = 14cm$
   $V_2 = 16cm$
   $P_1V_1 = P_2V_2$ ✓
   $(P_A + 5)(14) = (P_A - 5)16$✓
   $\Rightarrow 14P_A + 70 = 16P_A - 80$
   $2P_A = 150$
   $P_A = 75cmHg$

10. As it rises the pressure decreases hence volume increases. ✓

11. Shinny surface reduce heat loss through radiation since they are emitters of heat. ✓

12. Smaller area $A_1 = \pi r^2$
= 3.14 x 3 x 3
= 28.26mm^2
Wider area $A_2 = \pi r^2$
= 3.14 x 9 x 9
= 254.34m^2
$A_1V_1 = A_2V_2$
28.26 x V1 = 254.34 x 2 ✓
$V_1 = \frac{254.34\ x\ 2}{28.28}$
= 18m/s ✓

SECTION B

13. (a) The direction of velocity of the moon keeps on changing due to the changes in direction moon as it revolves around the earth.

(b) (i) $\omega = 2\pi f$ ✓ 1mk = 2 x 3.142 x 6 = 37.704 rad/s ✓ 1mk

(ii) a = $\frac{v^2}{r}$ = rω^2 ✓ 1mk = 37.7042 x 0.6 = 852.955m/s^2 ✓ 1mk

(iii) T = Fc = mrw^2 ✓ 1mk

= 0.045 x 0.6 x (37.704)^2 = 38.38N ✓ 1mk

(iv) v = wr = 0.6 x 37.704 ✓ 1mk = 22.62m/s

(c) (i) Slope = $\frac{\Delta Y}{\Delta X} = \frac{90-30}{(4.5-1.5)x\ 10^{-2}}$ ✓ 1mk $= \frac{60}{3x10^{-2}}$ = 2000N/kg ✓ 1mk

(ii) $\frac{P}{m} = Slope = P = m\ x\ 2000$ ✓ 1mk

= 0.2 x 2000 = 400N ✓ 1mk

(iii) Centripetal force ✓ 1mk

14. (a) A floating object displaces its own weight of the fluid in which it is floating

(b) m = ϱv
V = Ah = 5 x 50 = 250 cm^3
m = 1.4 x 250 = 350 g

(c) apparent weight = weight in air – upthrust
Weight in air W = mg = 0.35 x 10 = 3.5 N ✓ 1mk
Upthrust = ϱvg = (250 x 10^{-6}) x 1080 x 10 = 2.7 N ✓ 1mk
Apparent weight = 3.5 – 2.7 = 0.8 N ✓ 1mk

15. (a) quantity of heat required to raise the temperature of a given mass of a material by one degree or one Kelvin

(b) i. Q = CΘ

$Q = 40 \times 9 = 360$ J/kg/K

ii. $Q = mc\Theta$
$Q = 0.1 \times 4200 \times 9 = 3780$ J/kg/K

iii. $Q = mc\Theta$
$Q = 0.51 \times 66 \times c$
$Q = 9.9c$

iv. Heat gained = heat lost
$360 + 3780 = 9.9c$
$c = 418.181$ J/kg/K

16. (a) i. ratio of DE to DL

ii. *correct diagram*

iii. - Some energy is used to overcome friction
- Some energy is used to lift/move parts of the machine

(b) i. $VR = R^2/r^2 = 14^2/2.8^2$
$VR = 25$

ii. $n = (MA/VR) \times 100\%$
$80 = (MA/25) \times 100\ \%$
$MA = 20$

iii. $MA = L/E$
$20 = 1200/E$
$E = 60$ N

17. (a) i. The rate of change of momentum of a body is directly proportional to the resultant external force producing the change and takes place in the direction of the force

ii. $MV = Ft$
$0.25V = 75 \times 0.1$
$V = 30$ m/s

(b) i. m1u1 + m2u2 = (m1 + m2) v
$(0.02 \times 400) + 0 = (0.02 + 3.5)\ v$
$v = 2.2727$ m/s

ii. $F = ma$
$4 = (0.02 + 3.5)\ a$
$a = 11.364$ m/s

18. (a) Gas that obey gas law ✓1

b) $$\frac{2.0x10^5 - .1.0x10^5}{2.4x10^6 x1.2x10^6} = \frac{1}{12}x10^{-1}$$

$= 0.0833\text{pa m}^3$ (*Extract value from graph*)

c)

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$ ✓1

$$\frac{4000}{310} = \frac{V_2}{340}$$ ✓1 V_2=4387.097litres ✓1