**MWAKICAN JOINT EXAMINATION 2016**

**PHYSICS PAPER 232/1**

**MARKING SCHEME**

1. Main scale reading = 3.50

Vernier scale reading = 0.44

 3.94 ✓ 1

 Add error +0.30

 4.24mm ✓ 1

1. (i)

✓ 1

(ii) Cohesive forces between mercury molecules are stronger than adhesive forces between mercury and

glass molecules, hence more mercury molecules are contact with each other.

1. Vacuum

- In vacuum there is no foreign particles of matter which may collide with the coloured gas molecules

 hence the gas diffuses faster than in air ✓ 1 where foreign molecules may interfere with the movement of the coloured gas molecules slowing them down. ✓ 1

1. - Number of turns per unit length. ✓ 1

- Length of the spring ✓ 1

- Diameter of the wire ✓ 1

1. Sum of anticlockwise = Sum of clockwise movement.

24 x 0.5m = 16(1 – x) ✓ 1

12 = 16 – 16x

16x = 16 – 12 = 4

x = $\frac{4}{16}$ = 0.25m✓ 1 = 25cm✓ 1

1. (i) $\frac{20N}{2}$ = 10N✓ 1

(ii) Extension of A = $\frac{F}{K}$ = $\frac{20+5}{75}$

= 0.333 ✓ 1

Extension of B and C = $\frac{F}{2K}$ = $\frac{20}{150}$

= 0.133

Total extension 0.333

 0.133

 0.467m

1. Clinical thermometer measures to a maximum value of 430 ✓ 1 and water boils at 1000C hence it will burst. ✓ 1
2. (i) For an incomprehensive non viscous fluid in streamline flow an increase in velocity leads to a

corresponding decrease in pressure it exerts.

(ii) Gas rises in the barrel at high speed reducing pressure in the barrel, higher atmospheric pressure

outside barrel forces air into the barrel.

1. Heat capacity – Amount of heat required to raise the temperature of a body by one Kelvin. ✓ 1

Specific heat capacity – is the amount of heat required to raise the temperature of 1kg of a substance by 1 Kelvin. ✓ 1

1. Ft = Mv – Mu ✓ 1

But Mu = 0 So Ft = Mv

V = $\frac{Ft}{M}$ = $\frac{Ft}{m}$ = $\frac{720 x 0.1}{0.6}$ ✓ 1

= 120m/sec ✓ 1

**SECTION B**

1. (a) A body remains in a state of rest or uniform motion in straight line unless acted upon by an external force. ✓ 1

(b) (i) ✓ 2

R

F

(F) Friction

W = mg

 (ii) I. F = μR ✓ 1

 3.2 = μ (0.8 x 10) = μ = $\frac{3.2}{8}$ = 0.4 ✓ 1

 II. Reading reduces ✓ 1 force required to move the body at constant velocity is less than force

 required to cause motion. ✓ 1

 III. Fnet = Ma ✓ 1

 5.0 – 3.2 = 0.8a✓ 1

 $\frac{1.8}{0.8}$ = a

 = $\frac{0.8a}{0.8}$

 a = 2.25m/s2 ✓ 1

1. (a) (i) P.e = mgh = 10 x 10 x 2 = 200J✓ 1

(ii) Effort distance = 2 x 2 = 4m ✓ 1

(iii) eff x Ed = 80 x 4 = 320J ✓ 1

(iv) $\frac{200}{320}$ x 100% = 62.5% ✓ 1

(v) 16N ✓ 1

 (b) (i) VR = $\frac{Effort distance}{Load distance}$ = $\frac{2πR}{2πr}$ ✓ 1= $\frac{R}{r}$ ✓ 1

 (ii) VR = $\frac{8}{5}$

 80% = $\frac{L}{E}$ x $\frac{5}{8}$ x 100% ✓ 1

 $\frac{8 x 80e}{8 x 80}$ = $\frac{20}{E}$ x $\frac{5}{8}$ x 100% x $\frac{8}{8 x 80}$ ✓ 1

 E = $\frac{20 X 5 x 10}{8 x 8}$ = 15.62N✓ 1

1. (a) (i) A – Vacuum ✓ 1

 B – Silvered surfaces ✓ 1

 (ii) The silvered wall prevent losses by radiation ✓ 1 while the vacuum prevent losses through

 conduction ✓ 1 and convection. ✓ 1

 (iii) B will have a higher temperature ✓ 1 because in A the space left will contain air and conduct

 heat away through conduction ✓ 1 and convection. ✓ 1

 (b) mgh = MC∆θ

 5 x 10 x 315 = 5 x 4200 x Δ θ ✓ 1

 Δθ = $\frac{5 x 10 x 315}{5 x 4200}$ = 0.750C ✓ 1

 Final temperature = 290 + 0.75

 = 290.750C ✓ 1

1. (a) Quantity of heat required to change a unit mass of ice from solid ice to liquid water without change in

 temperature. ✓ 1

(b) (i) Current ✓ 1

 Voltage ✓ 1

 Time ✓ 1

 Mass of condensed vapour

(ii) Vapourise the liquid for some time t. Measure the mass M of the vapourised liquid which is equal

 to the mass of condensed vapour then heat supplied by heater is equal to heat of vaporization.

 i.e. Vit = ML ✓ 1

(iii) Lv = $\frac{Vit}{m}$ ✓ 1 = but VI = power = 0.1kw

 = 100w

 Lv = $\frac{100 x 5 x 60}{0.02}$ ✓ 1 = 1.5 x 106J/kg ✓ 1

1. (a) (i) The pressure of a fixed mass of an ideal gas is directly proportional to the absolute temperature

provided that volume is held constant. ✓ 1

 (ii)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| $$\frac{1}{V}$$ | 40 | 50 | 58.8 | 71.4 | 83.3 | 90.9 |
| $\frac{1}{P}$ x 105 | 0.5 | 0.4 | 0.33 | 0.29 | 0.25 | 0.22 |

A graph of P against $\frac{1}{V}$ 5 Marks

Slope = $\frac{\left(4.24-2\right)x 10^{5}}{86-40}$ = 4.94 x 103 ± 0.065

Slope = 2RT ✓ 1

R = $\frac{4.87 x 10^{3}}{ 2 x 300}$ ✓ 1 = 8.23± 0.011 ✓ 1

(b) $\frac{P\_{1}}{T\_{1}}$ = $\frac{P\_{2}}{T\_{2}}$

 T1 = 12 + 273 = 285

 T2 = 88 + 273 = 361 ✓ 1

 P2 = $\frac{1.0 x 10^{5} x 361}{285}$ = 1.27 x 105 pa