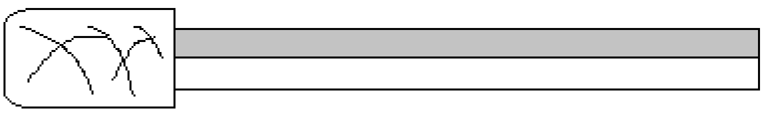
232/1
PHYSICS
PAPER 1
MARKING SCHEME

1. Diameter of wire $\frac{20}{15} = 1.33$
   Radius of wire 1.33÷2✓1=0.67cm✓1
2. To increase the time take to come to a stop which reduces the rate of change of momentum or reducing the impulsive force producing a small reaction on him by floor✓1
3. Clean water has a high surface tension addition of detergent reduces/breaks/lowers the surface tension ✓1

4. Upthrust = weight + Tension
   $\rho Vg = mg + T$ ✓1
   $1.3 \times 200 \times 10 = 0.18 \times 200 \times 10 + 1000 + T$ ✓1
   T =1240N ✓1

5. $A_1V_1 = A_2V_2$ ✓1
   $\pi \frac{7}{2} x \frac{7}{2} x5 = \pi x20x \frac{0.7}{2} x \frac{0.7}{2} xV2$ ✓1
   $V_2 = \frac{7x7x5}{20x0.7x0.7} = 2.5m/s$ ✓1
6.
   a) Pressure is developed at the point of application of the force. ✓1Since the liquid is incompressible, pressure is uniformly transmitted and force is generated.✓1
   b) Hydraulic machines (brakes, press,lift)✓1
7. $F = \frac{mv^2}{r} + mg$ ✓1
   $9.5 = \frac{150}{1000} x \frac{v^2}{30/100} + \frac{150}{1000} x10$ ✓1
   $v^2 = \frac{8.0x1000x30}{150x100} = 16$
   V=4.00m/s✓1
8. e=4.25-4.00=0.25m
   F=Ke
   75=0.25k✓1
   K=300N/m✓1
9. The level of water in the tube first drops and then rises. ✓1Due to expansion of the glass boiling tube.✓1
10. The c.o.g is raised when the carrier is at the top lowering the stability.✓1
11. Copper a good conductor of heat conducts the heat away hence paper does not char/burn.✓1
12. Wx5=4x20√
    $W = \frac{80}{5} = 16N$ √
13.  √1

14.
    a) The temperature at which the volume/ pressure/K.E of a gas is **assumed** to be zero.✓1

b) Reducing the volume increases the number of collisions of gas particles with the walls of the container per unit time.✓1Therefore the rate of change of momentum will also increase leading an increase in pressure.✓1

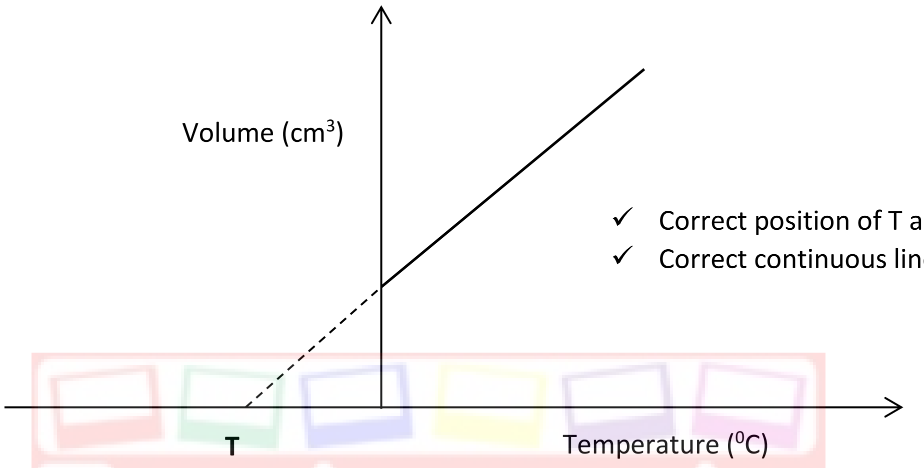
c)

i) I -Serves as a pointer to the volume on scale or
- To trap the gas in the tube or
-A drying agent for the gas✓1

II -To make the temperature of the bath uniform.✓1

ii) Heat the bath and record the temperature and height/volume of air trapped at suitable temperature interval.✓1 Plot a graph of volume/height against temperature.✓1 The graph is a straight line indicating proportional change in volume and temperature. ✓1

iii) See sketch on grid.



d) $P_1V_1=P_2V_2$

$(76+6)(20)=(76-6)x$ ✓1

$X=\frac{82x20}{70}=23.429cm$✓1

15.

a) Introduce the oil drop on the water surface. The surface tension of water reduces and the net force✓1 of the surrounding water pulls oil molecules outwards hence spreading.✓1

b)

i) $\frac{Ah}{2}$=volume✓1

$\pi x\left(\frac{21}{2}\right)h=\pi x\frac{4}{3}(0.028)^3$✓1

$h=\frac{2.92693}{110.25}=2.655x10^{-7}m$✓1

ii) Oil patch is a perfect circle, a monolayer✓1
Oil drop is perfect sphere✓1

c) To make boundary of oil patch visible or
To reduce surface tension of water✓1

d) Trapping oil in a loop of wire and holding it against a mm scale.✓1View the oil drop under a magnifying lens (glass) to enable correct measurement of diameter.✓1 or

Run known number of drops of oil from a burette, obtain the volume of one drop (volume run out/number of drops). ✓1

Then use the formula $V=\frac{4\pi r^3}{3}$ to obtain the radius hence the diameter. ✓1

16.

i) $t = \frac{1}{50} = 0.02seconds$

$u = \frac{s}{t} = \frac{1}{0.02}$ ✓1 $= 50cm/s$ ✓1

ii) $v = \frac{5}{0.04}$ ✓1 $= 125cm/s$ ✓1

iii) $a = \frac{v-u}{t} = \frac{125-50}{0.02x4..5}$ ✓1 $= 833.33cm/s^2 or 8.3333ms^{-2}$ ✓1

b) i) $h = \frac{1}{2}gt^2$ ✓1

$45 = \frac{1}{2}x10t^2$ ✓1

T=3sec ✓1

or

$u = \sqrt{2gs} = \sqrt{2x10x45}$

= 30m/s ✓1

V = u-gt ✓1

O = 30-10t, ✓1 t=3sec ✓1

ii) T =2t

=2(3)

=6sec ✓1

or

s = vt

= 50x6√1

= 300m√1

17. a)

i. V.R= $\frac{Effort\ distance}{load\ distance}$ ✓1

$= \frac{AB}{BC}$

But $\sin\theta = \frac{BC}{AB}$ ✓1

V.R= $\frac{1}{\sin 30}$ ✓1

ii. $\eta = \frac{MA}{VR} x100$ ✓1

$65 = \frac{MA}{\frac{1}{\sin 30^0}}$ x 100 √1

$65 = \frac{MA}{2} x100$

MA=1.3 ✓1

iii. Energy is lost in overcoming frictional force on the inclined surface/plane ✓1

b)

i. V.R=4

ii. M.A increases as the load increases

c) P.E ⟶ K.E ⟶ heat+sound

18. a)

This is the quantity of heat required to raise the temperature of unit mass of substance by one kelvin or one degree Celsius. ✓1

b)

i) Some of the heat is used to warm the insulating cover and surrounding area. ✓1

ii) The heater was still hot (at a higher temperature than the block) continues heating before cooling. ✓1

iii) Power supplied= IV=10x22=220W ✓1

Slope= $\frac{\Delta\theta}{\Delta t} = \frac{52-30}{(5-2)(60)✓1} = \frac{22}{180}\ {}^0c/_s$

Pt=McΔθ

M=2kg

$C = \frac{p}{m} x \frac{t}{\Delta\theta} = \frac{220}{2} x \frac{180}{22} = 900 {}^{j}/_{kgk}$ ✓1

OR

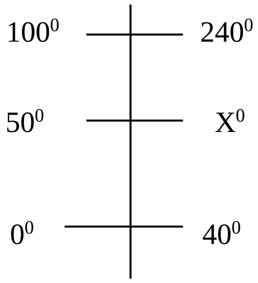
Pt=VIt =McΔθ ✓1

22 x 10 x 180 = 2x c x 22 ✓1

c = 900J/kgK ✓1

c) Heat lost to the surrounding,✓1 heat used to warm up the insulating cover and thermometer✓1 or heat is lost to warm insulating cover and thermometer.✓✓

d)



$$\frac{100-0}{240-40} = \frac{50-0}{X-40} \surd 1$$

$$\frac{100}{200} = \frac{50}{X-40} \surd 1$$

$$= 140^0 \surd 1$$