**Name: …………………………………………… Adm. No………...... Date……………………...**

**232/1**

**PHYSICS THEORY PAPER 1**

**FORM 4**

**OPENER EXAMINATION TERM 3, 2022**

**Time: 2 Hours**

**Instructions to candidates**

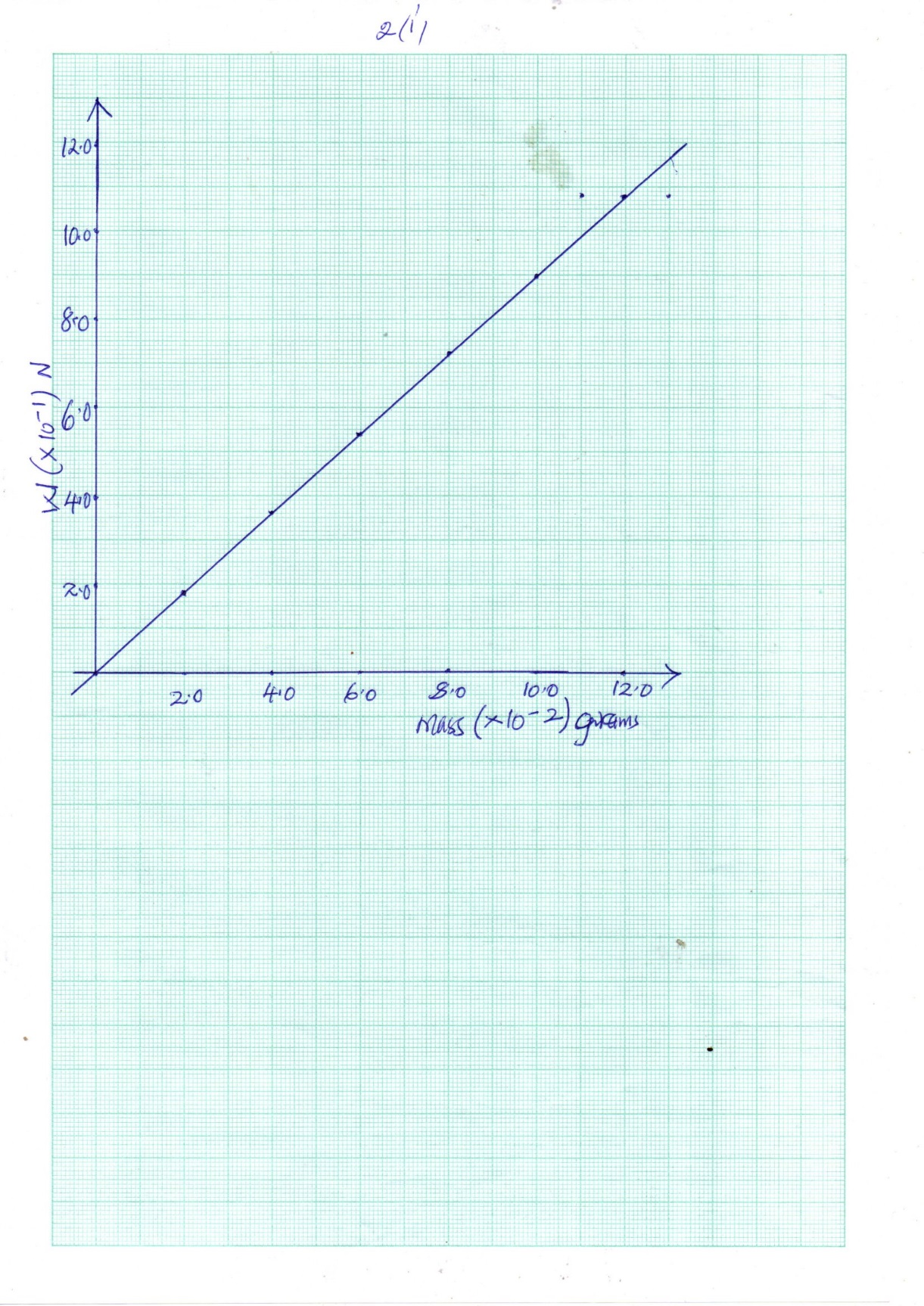
1. Write your name and admission number in the spaces provided above
2. Answer all the question in the spaces provided.
3. All working must be clearly shown in the spaces provided
4. Mathematical tables and calculators maybe used.
5. All questions amount to 100 marks.

**SECTION A (25MKS)**

1. A 60000cm3 litre giant density bottle has its weight stated as 100N when empty. What would be its weight when filled with a liquid W, whose density is 0.72 g/cm3 (3mks)

.....................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................

1. Given the following graph below



* + 1. Determine the gradient (2mks)

....................................................................................................................................................................................................................................................................................................................................

* + 1. State what the gradient represents (1mk)

....................................................................................................................................................................................................................................................................................................................................

1. State one negative effects of ANOMALOUS EXPANSION of water (1mk)

....................................................................................................................................................................................................................................................................................................................................

1. Sketch the variation of density of water with temperature between 0°C to 10°C (2mk)

....................................................................................................................................................................................................................................................................................................................................

....................................................................................................................................................................................................................................................................................................................................

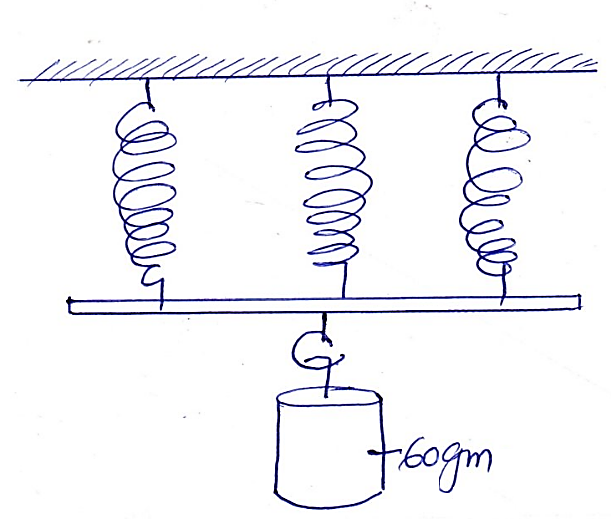
1. Apart from conductivity of a material, state other factor which determine rate of heat flow in a material (1mk)

....................................................................................................................................................................................................................................................................................................................................

1. Give one reason why liquids are poor conductors of heat. (1mks)

....................................................................................................................................................................................................................................................................................................................................

1. Three springs are arranged in parallel as shown and a 600gm mass hanged as shown below. If each spiral spring has 24 N/m spring constant.



Determine the:

* 1. Effective spring constant (2 mks)

....................................................................................................................................................................................................................................................................................................................................

..................................................................................................................................................................

* 1. Extension produced (2 mks)

....................................................................................................................................................................................................................................................................................................................................

..................................................................................................................................................................

1. A ball is thrown horizontally from the top of a cliff 20m high with a horizontal velocity of 10m/s. Calculate the time taken by the ball to strike the ground (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

1. State one (1) factor that affect the diffusion of gas (1mk)

..................................................................................................................................................................

1. A trolley of mass 1.5 kg is pulled along by an elastic cord and given an acceleration of 2m/s2. Find the frictional force acting on the trolley if the tension in the cord is 5N. (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

1. State the law of conservation of linear momentum (1mks)

..................................................................................................................................................................

..................................................................................................................................................................

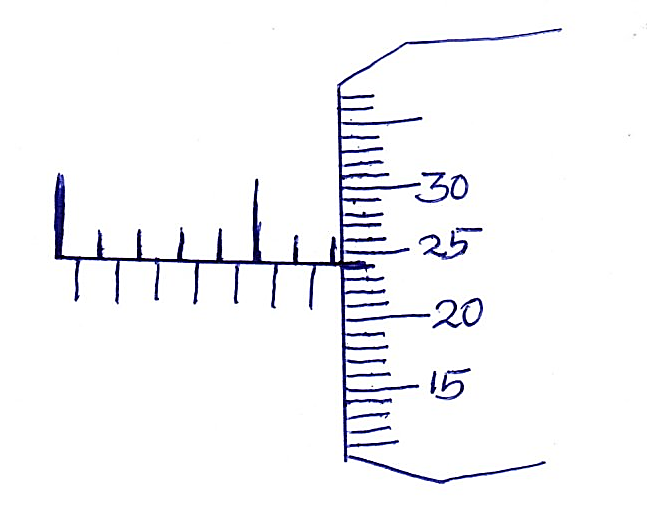
1. A point in the rim of a wheel has a velocity of 5.6 m/s. if the rim has a radius of 0.4m, determine the angular velocity of the point (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

1. A form 2 student measured the diameter of a ball bearing using a micro meter screw gauge as shown below



**10**

**5**

State the diameter of the ball as read from above if it has an error of -0.02 (2mks)

..................................................................................................................................................................

**SECTION B (55 MARKS)**

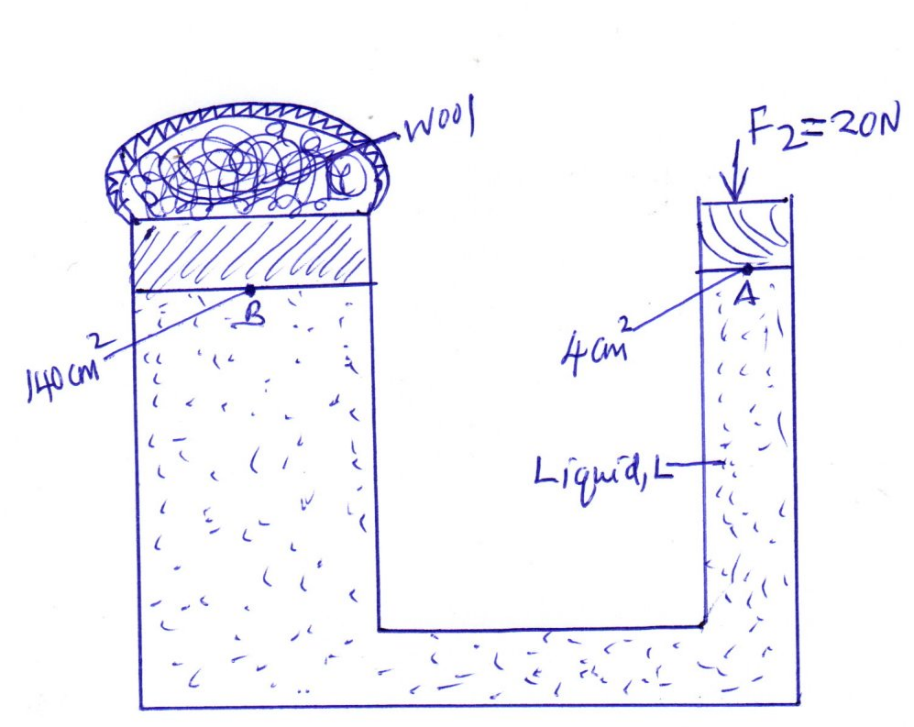
1. (a) State the principle of transmission of pressure in liquids (1mk)

..................................................................................................................................................................

..................................................................................................................................................................

.................................................................................................................................................................

(b) The figure below shows two masses placed on light pistons. The pistons are held stationery by the liquid, L as shown.



Determine

* + 1. Pressure exerted by force F2 = 20N at point A of the liquid (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

* + 1. Pressure at point B (1mks)

..................................................................................................................................................................

..................................................................................................................................................................

* + 1. Force F1 produced on B to press wool enclosed (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

c. An electric motor raises a 50 kg load at a constant velocity, if it takes 40 seconds to raise the load through a height of 24m, determine

1. The work done (g = 10N/Kg)(2mks)

..................................................................................................................................................................

..................................................................................................................................................................

1. The power of the motor (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

d. State two (2) factors which determines the mechanical advantage of a machine (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

1. (a) Define centre of gravity (1mk)

..................................................................................................................................................................

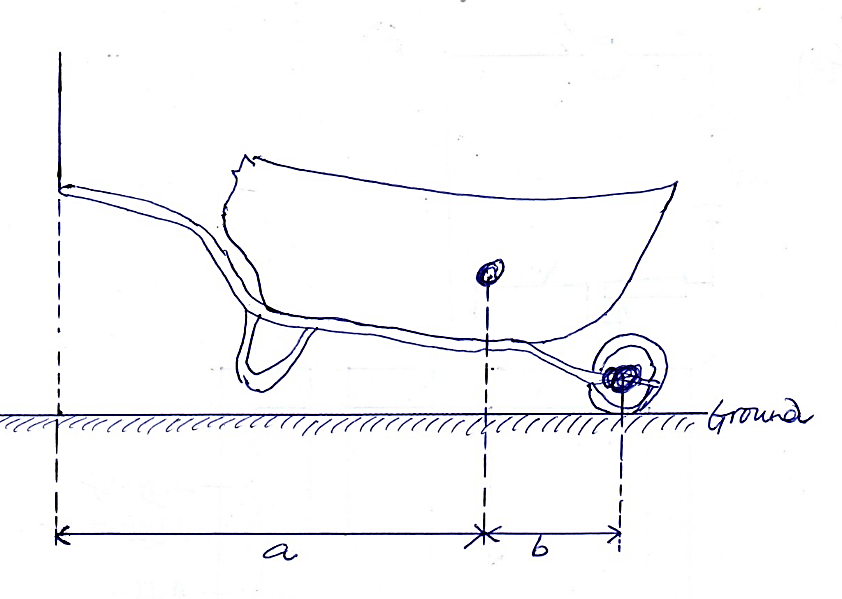
.................................................................................................................................................................

(b) State the principle of moments (1mk)

..................................................................................................................................................................

..................................................................................................................................................................

(c) Calculate the force F required to be applied vertically to the wheelbarrow handles in the figure below to lift a 50kg load at the centre of gravity indicated. Disregard the mass of the wheel barrow. (3mks)



**C.O.G**

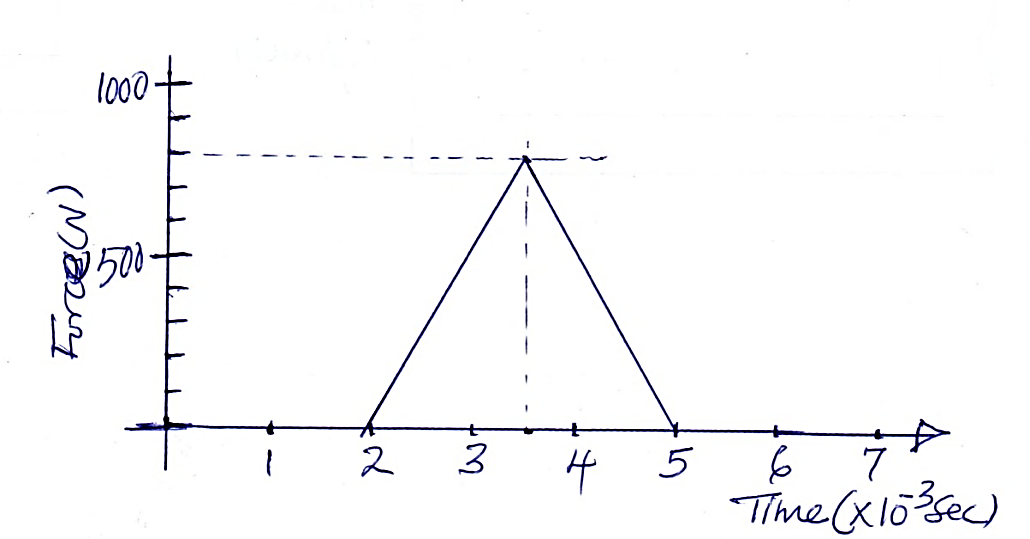
**F**

Take a =70cm, and b = 30cm.

Clockwise moments = anticlockwise moments

..................................................................................................................................................................

(d) The graph below shows the force on a tennis ball when served during game. Assuming the ball is stationery before it is struck and it is struck with velocity of 40m/sec.



Find

1. The impulsive force on the ball (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

1. The mass of the racket (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

(e) A passenger of mass 80kg stands on the floor of a lift car. Determine the

Reaction of the floor when the car

1. Accelerates at 1.2 m/s2 downwards (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

1. Decelerates at 0.8 m/s2 upwards (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

1. (a) State Charles law as it relates to ideal gas (1mk)

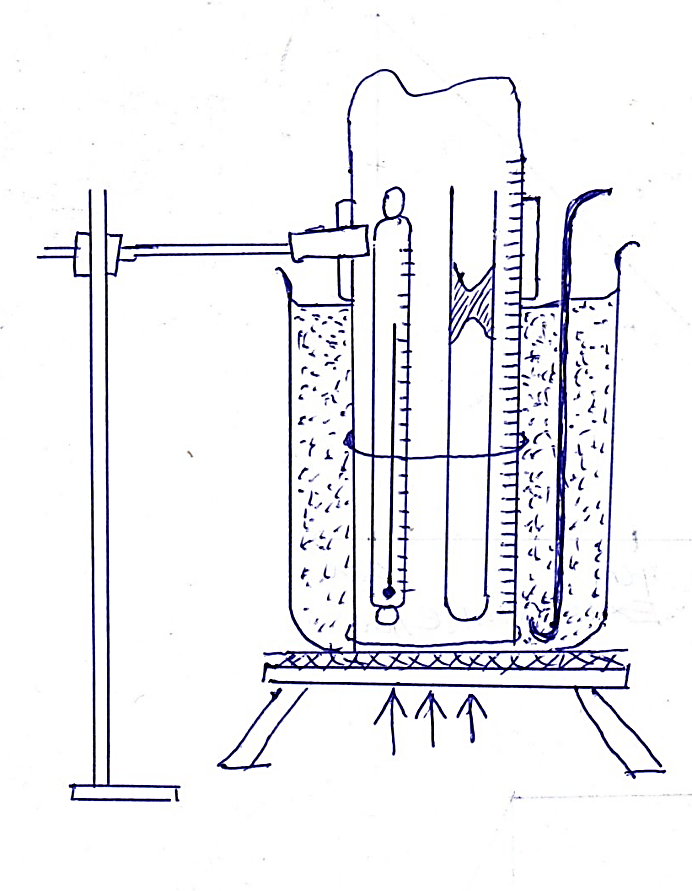
..................................................................................................................................................................

..................................................................................................................................................................

(b) Distinguish between evaporation and boiling (2mks)

|  |  |
| --- | --- |
| Evaporation | boiling |
|  |  |

(c) Study the diagram below



1. State two quantities to be measured (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

1. Explain how the measurements obtained above can be used to verify Charles law (4mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

(iii) A mass of a gas has a volume of 800cm3 and is heated at a constant pressure from 10°C to 100°C. Calculate the final volume of the gas (3mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

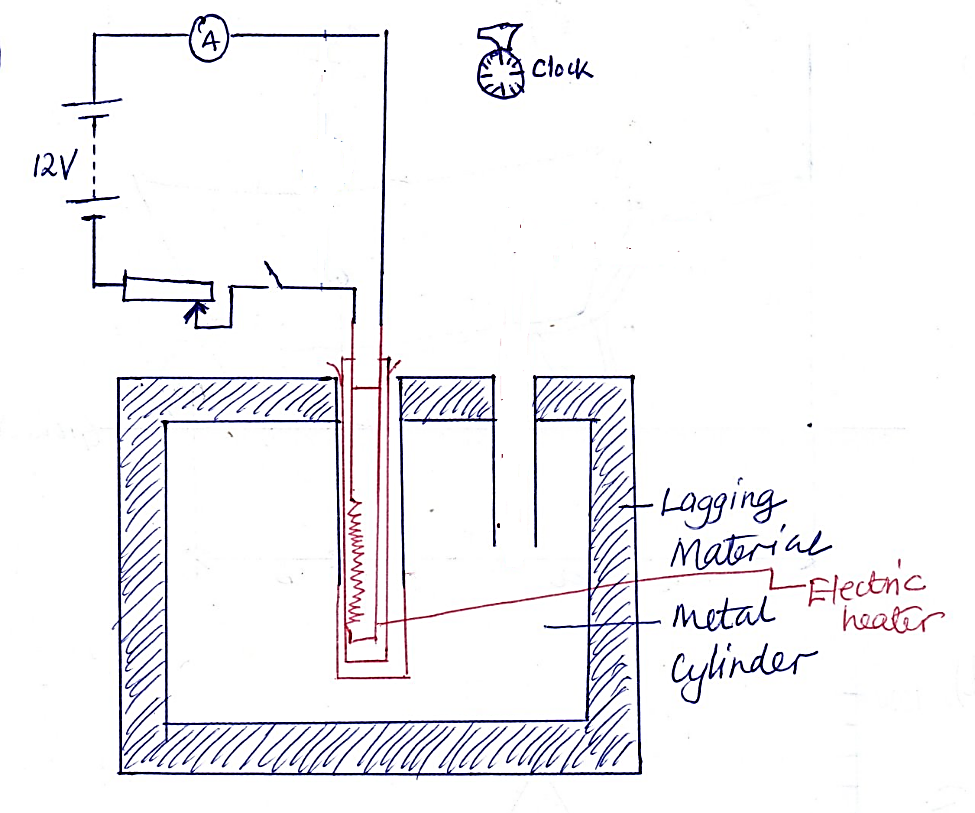
1. (a) Define heat capacity (1 mk)

..................................................................................................................................................................

..................................................................................................................................................................

(b) The figure below illustrates an experiment in which electrical energy is

Used to determine specific heat capacity of a metal heated for a period of time.



* + 1. Complete the circuit to show connection of the essential circuit components and name them (2mks)
    2. Outline the procedure on how to determine the value of specific heat capacity, C, of the metal block. (3mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

In a similar experiment the following readings were obtained when the heater was switched on for 10 minutes

Voltmeter reading = 15v

Ammeter reading = 3A

Temp after 10min = 80c

If the mass of the metal cylinder was 0.5kg and the initial temperature of the metal block before switching on current was 20°c. Determine the specific heat capacity of the metal cylinder (3mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

1. (a) State Archimedes principle (1mk)

..................................................................................................................................................................

..................................................................................................................................................................

(b) A cylinder of length 5cm and uniform cross section area 50.24cm2 is suspended from a spring balance and totally immersed in water. If the density of the material of the cylinder is 1.25g/cm3 determine:

* + 1. The up thrust on the cylinder (3mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

* + 1. Weight of the cylinder (3mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................

* + 1. The reading on the spring balance (2mks) (take g = 10m/s2 or N/kg Sh2O =1000kg/m3) (2mks)

..................................................................................................................................................................

..................................................................................................................................................................

..................................................................................................................................................................