<u>**FORM 4**</u>	**PHYSICS**	<u>**Time: 1 h. 30 min.**</u>

NAME: _____   **CLASS:** _____

Answer all the questions in the spaces provided on the Examination Paper. All working must be shown. The use of a calculator is allowed.

Where necessary take the acceleration due to gravity, g = 10 m/s^2

You may find some of these formulae useful.

Pressure = force/area   Force = mass x acceleration

$$a = \frac{v - u}{t}$$

Momentum = mass x velocity   Energy = Power x Time
Heat energy = mass x specific heat capacity x temperature change

V = IR   P = VI   Charge = Current x time   Energy = Vit

<u>**Section A:**</u>   **Answer ALL questions in this section in the spaces provided.**
                    This section carries 55 marks.

1   (a) The pressure produced on the ground by a pointed heel is greater than that

          produced by a wider heel because _____

                                               (2 marks)

     (b) A boy of mass 48 kg wears a pair of running shoes. The area of each shoe
          in contact with the ground is 80cm^2. Find the pressure exerted on the
          ground when the boy stands

          (i)   on one leg _____

          (ii)   on two legs _____

                                               (2,2 marks)

2. A motorist on a road travelling at 30m/s applied the brakes in front of a clothes shop and managed to bring his car to a halt in front of a coffee shop 60m away, in 10 seconds, using a breaking force of 1500N.

    (a)   initial velocity of car is _____

    (b)   final velocity of car is _____

    (c)   acceleration of car is _____

    (d)   mass of car is _____

                                               (2,2,3,3 marks)

3. While ice-skating, Alex of mass 60 kg, holds his female partner, Mary, of the same mass, and both skate together at 20m/s.

    (a)   Momentum of Alex and Mary together is

    _____

                                              (2 marks)

    (b)   Alex suddenly stops and at the same time releases Mary, transferring all the momentum to her, so she continues to slide freely.

        (i)   Velocity with which Mary continues to move is

            _____

        (ii)   Momentum of Mary is

            _____

                                            (3,2 marks)

4.   (a)   Louisa rubs a polythene rod with a piece of cloth. The polythene becomes _____ charged while the cloth is _____ charged. This happens because polythene _____ electrons, while the cloth _____ electrons.

                                            (4 marks)

    (b)

        (i)   A trailing strip attached to the back of a car and hanging so that it touches the ground, stops it from overcharging with static elctricity. The strip is made of _____.

        (ii)   In places where it rains all the time, the strip is not needed. Why?
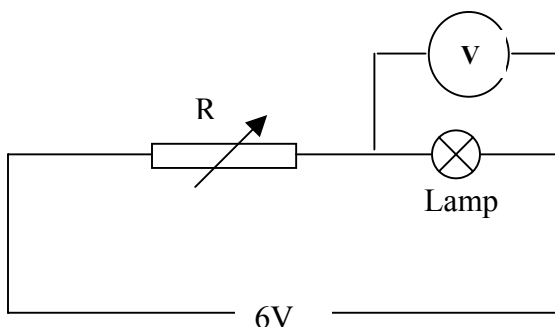
            _____

                                            (1,1 mark)

5. (a) In a domestic electrical appliance, the colour of:
        (i)   Live wire is _____
        (ii) Neutral colour is _____
        (iii) Earth wire is _____

                                                    (6 marks)

    (b) A fuse protects the power circuit from burning out if a short occurs.

        (i)   A short circuit occurs when _____

        (ii) The fuse wire must be fitted on the _____ wire.

                                                    (2,1 marks)

6.

The above circuit can be used to vary the brightness of the lamp

    (i)   Component R is called _____ (1 mark)

    (ii) R is used to _____ (2 marks)

    (iii) Draw an ammeter on the circuit to measure the current flowing through
          the lamp.   (1 mark)

    (iv) If the ammeter reads 1.0 amperes, what charge passes through the lamp in
          10 seconds?

          _____

          _____ (3 marks)

    (v)   When the voltmeter in the circuit reads 5V and the ammeter reads 1A, the
          electrical energy changed to light and heat by the lamp in 10 seconds is

          _____

          _____ (3 marks)

3

7   A 2kW electric kettle is switched on for 3 minutes every day for 30 days to heat
        water for tea. Electricty costs 6c per unit.

      (i)   the kettle is switched on for a total time of _____ hours. (2 mark)

      (ii)   the number of units of electrical energy used is _____ (2 marks)

      (iii)   the total cost of running the kettle is _____ (2 marks)

Section B: **Answer ALL questions in this section in the spaces provided.**
                   This section carries 45 marks.

8   The apparatus below can be used to test the conductivity of different materials
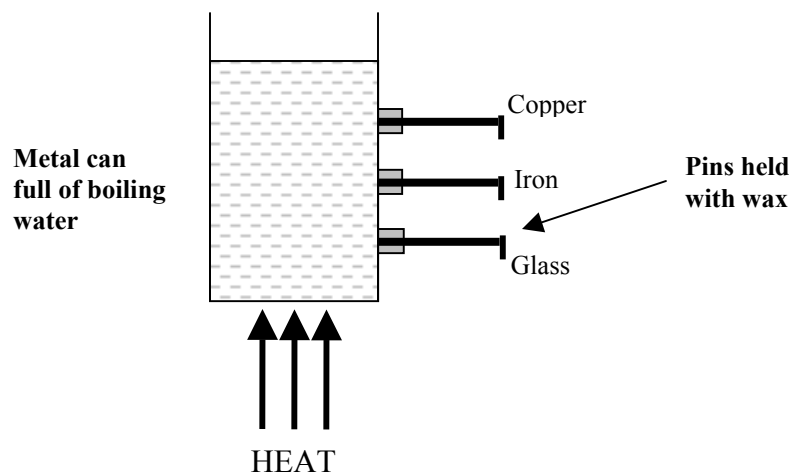
(a)   Explain why pins are attached with wax to the rods.

_____
                                                        (4 marks)

4

(b)   What method of heat transfer is used when heat energy travels:

    (i)   through the metal can to heat the water,

_____
                                                                       (2 mark)

    (ii)   through the water to the surface?

_____
                                                                       (2 mark)

(c)   The specific heat capacity of water is $4200J/kg^0C$. This means that to raise the _____ of 1kg of water by _____,
4200 _____ of heat energy are needed.

                                                                      (3 marks)
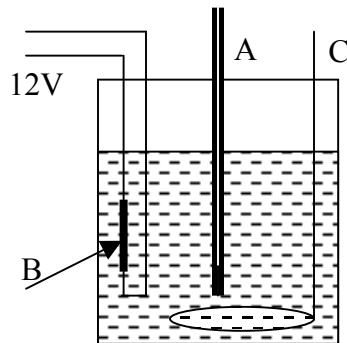
(d)   In an experiment to find the specific heat capacity of oil, Mary used the apparatus shown below.

    (i)   A is a _____

    (ii)   B is a _____

    (iii)   C is a _____

    (iv)   To get a more accurate result, _____ is needed.

                                                          (4 marks)

12V   A   C

B

9   This question is about electrical circuits
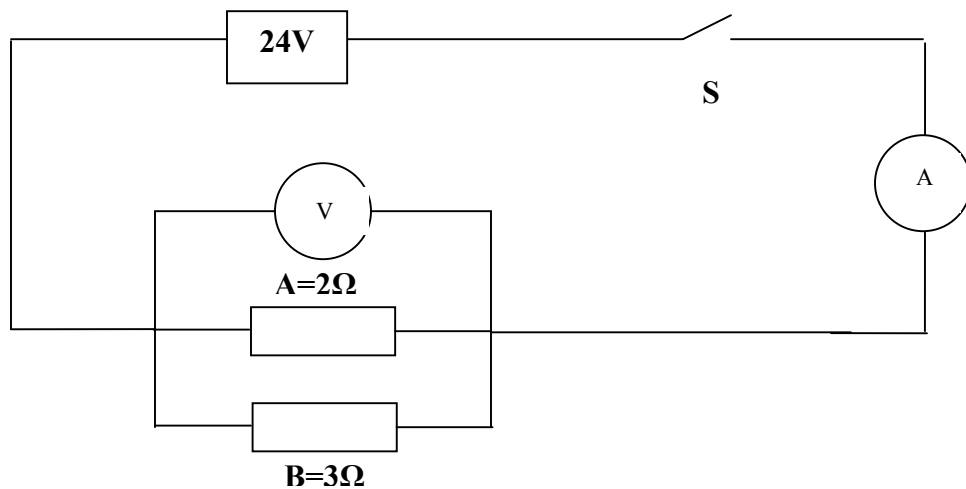
(a)   20 lamps are connected in series in a festa decoration circuit. Explain why all the lamps switch off when one lamp goes out.

_____
                                                                    (3 marks)

(b)   How must the 20 lamps be connected so that the remaining 19 lamps continue to light when one lamp burns out?

_____
                                                                    (3 marks)

(c)   The circuit below is connected to a 24V supply.

When switch S is closed, calculate,

(i)   current in resistor **A**: _____
                                                                    (3 marks)

(ii)   current in resistor **B**: _____
                                                                    (3 marks)

(iii)   current passing through ammeter A: _____
                                                                    (2 marks)

(d)   What is the reading of the voltmeter V when switch S is opened?

_____   (1 mark)

10   This question is about pressure on divers.

A diver noted the pressure every metre as he descended to a depth of 7 metres. His results were as follows:

Pressure (kPa)	100	110	120	130	140	150	160	170
Depth (m)	0	1	2	3	4	5	6	7

(a)   Use the graph paper provided to plot a graph of pressure on the Y-axis against depth of water on the x-axis.

(7 marks)

(b)   What is the pressure 5.5m below the surface?

_____

(2 marks)

(c)   At what depth of water was the diver at a pressure of 137 kPa?

_____

(2 marks)

(d)   What is the atmospheric pressure at the surface of the water?

_____

(2 marks)

(e)   What happens to the pressure as the diver descends to a greater depth?

_____

(2 marks)