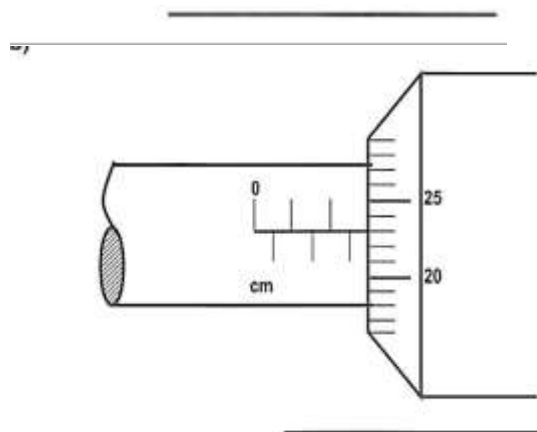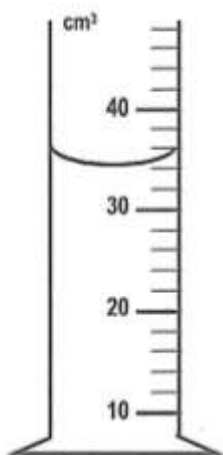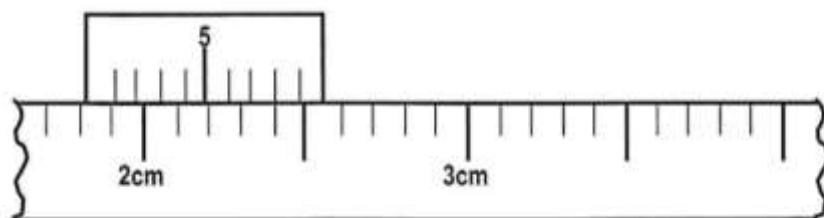**YEAR 2003, PAPER 2: 13th November 2003**

The diagrams show the measuring cylinder, the vernier caliper and the micrometer screw gauge- What are the readings Indicated?
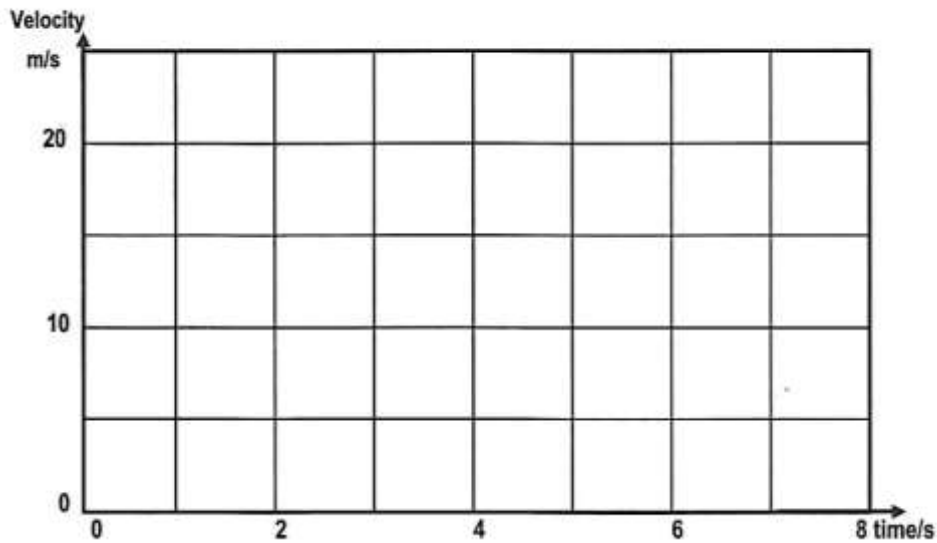

[1]

[1]

2. The table below shows the readings obtained fay a group of pupils performing an experiment to determine variation of velocity with time for car starting from rest

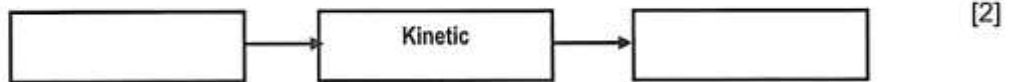| velocity	0	10	29	20	20
time, s	0	2	4	6	8

a. On the axes above, draw the velocity time graph.

b. Calculate the acceleration of the car for the first 4 seconds of the journey.

c. Determine the total distance travelled by the car.

3. A measuring cylinder contains 3Gem^s of liquid. When a atone of mass S2g Is dropped Into the liquid, it sinks to the bottom and the liquid rises to The 70cm^3 mark.

   a. What is the volume of the Stone?

   b. Calculate the density of the stone.   v

   c. Explain why it would not be possible to use this method to determine the density of cork Which would float in the liquid

4. A conveyor lift can carry a maximum load of 1500N in s high rise flat of 4 storeys. Each storey has a height-of 2.5m.

   a. Describe the energy changes which-take place when the lift moves from the basement to the third floor.

   b. Calculate the energy which the lift has when it is on the third floor/storey if it has a total mass of 125Kg.

   c. The rope of the lift is cut when it Is on the third floor. What will be the speed of the cabin of the lift Just before it hits the floor of the basement if we neglect all frictional forces?
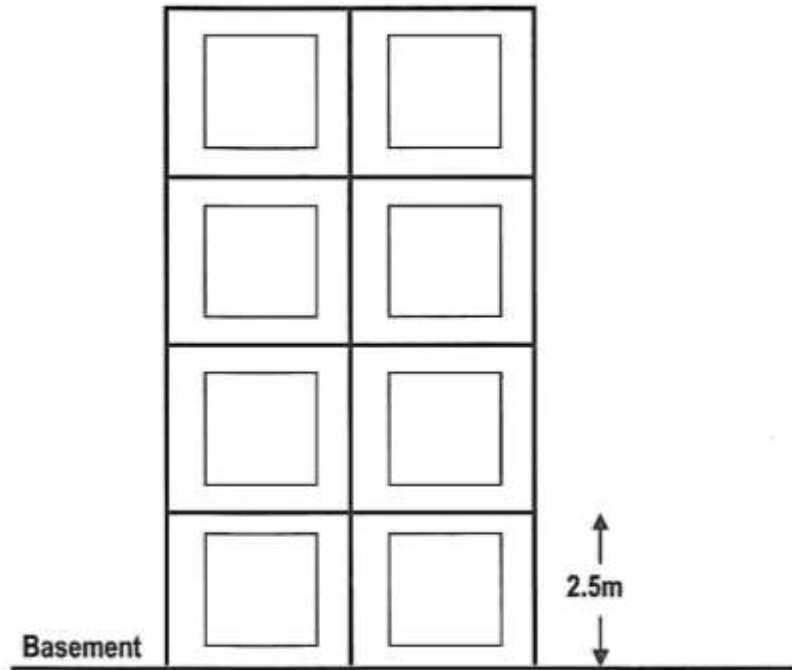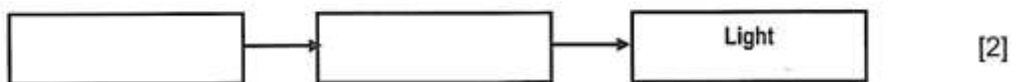
5. Complete the energy changes in

    a. The production of electricity from water.
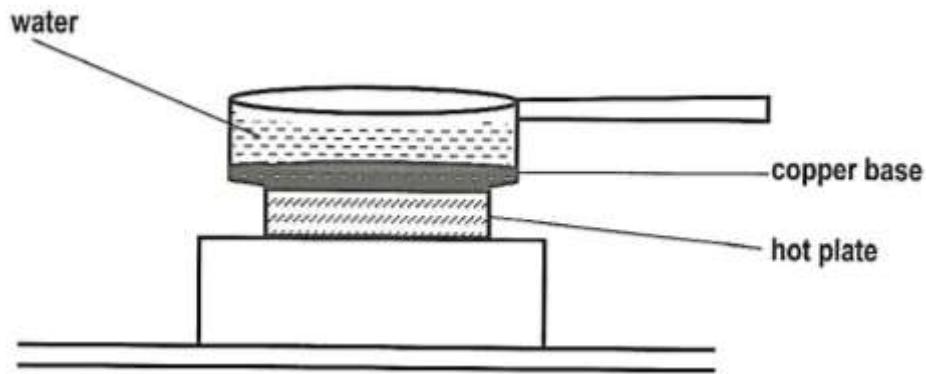
(a) the production of electricity from water.

```
┌──────────────┐      ┌──────────────┐      ┌──────────────┐
│              │ ───▶ │   Kinetic    │ ───▶ │              │      [2]
└──────────────┘      └──────────────┘      └──────────────┘
```

(b) lighting a bulb using a cell.

```
┌──────────────┐      ┌──────────────┐      ┌──────────────┐
│              │ ───▶ │              │ ───▶ │    Light     │      [2]
└──────────────┘      └──────────────┘      └──────────────┘
```

(c) lifting a box from the floor to the platform using an electric motor.

```
┌──────────────┐      ┌──────────────┐      ┌──────────────┐
│  Electrical  │ ───▶ │              │ ───▶ │              │      [2]
└──────────────┘      └──────────────┘      └──────────────┘
```

The diagram below shows a saucepan with a thick copper base containing water. T15s placed on a flat electric hot plate.

water

copper base

hot plate

a. State the process by which energy is

(i) transferred from the hot plate to the water

(ii) spread through the water.

b. The sides of a saucepan are often polished, how does this reduce heat toss?

6. (a) Figure 7.1 shows a view from above of a compass needle placed near a solenoid-with a bar of unmagnetised steel AS. In the diagram the switch has been opened and the compass needle is pointing North.
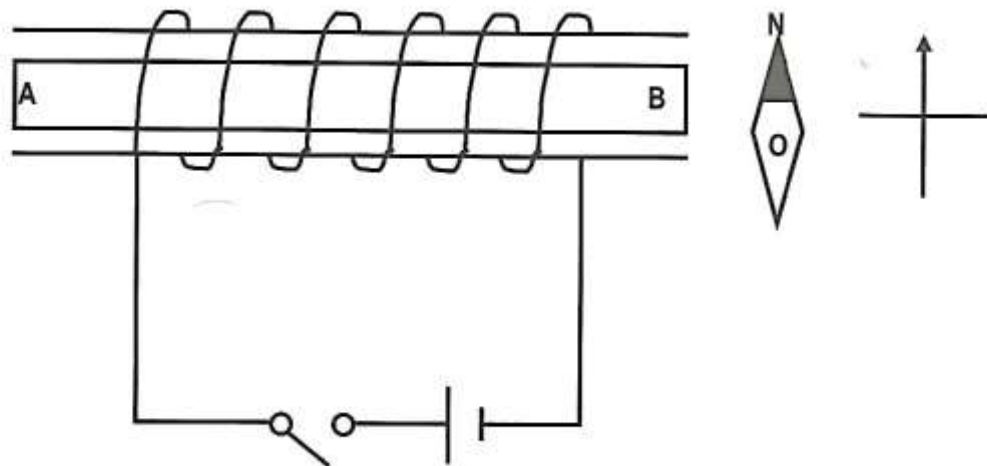

Figure 7.1

(i) Mark the direction of current in the wire after the switch has been closed,

(ii) What is the polarity of end of A of the steel bar?

(iii) Draw the direction of the compass needle after the switch has been closed.

b.

(i) State what happens to toe compass needles when the switch la opened again.

(ii) Explain your answer in (b) {i)

7. The figure below shows 8 circuit diagram connected to battery of e.m.f. 3.0 volts.
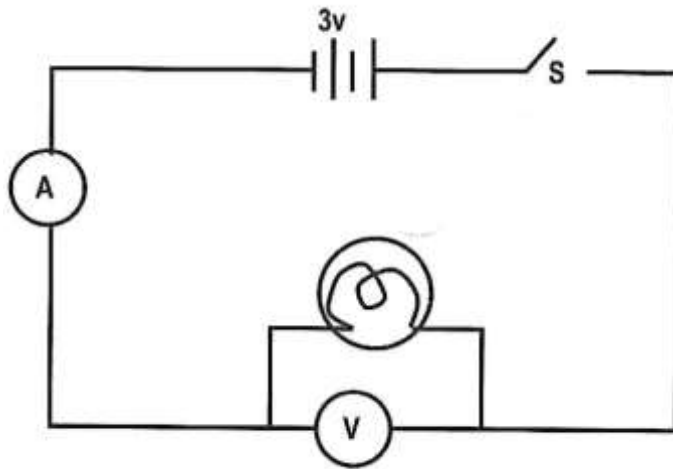
a. Calculate the charge that flows in 5 seconds if the Ammeter Reading 2 amps.

b. What is the resistance of the lamp in the circuit?

c. Calculate the power consumption of the lamp

d. Calculate the energy consumptions which take place in the lamp when the lamp is working.

8. An electric lamp has a power rating of 60W when used on a 240V supply. Calculate :

a. The electrical energy used 13/ h a lamp in 2 minutes.

b. the current taken by the temp

c. The charge passing through the a tamp in 2 minutes.

9. The figure below illustrates some of the stages in the charging of a metal sphere mounted d on a stand made of an insulator.

Stage 1   Stage 2   Stage 3
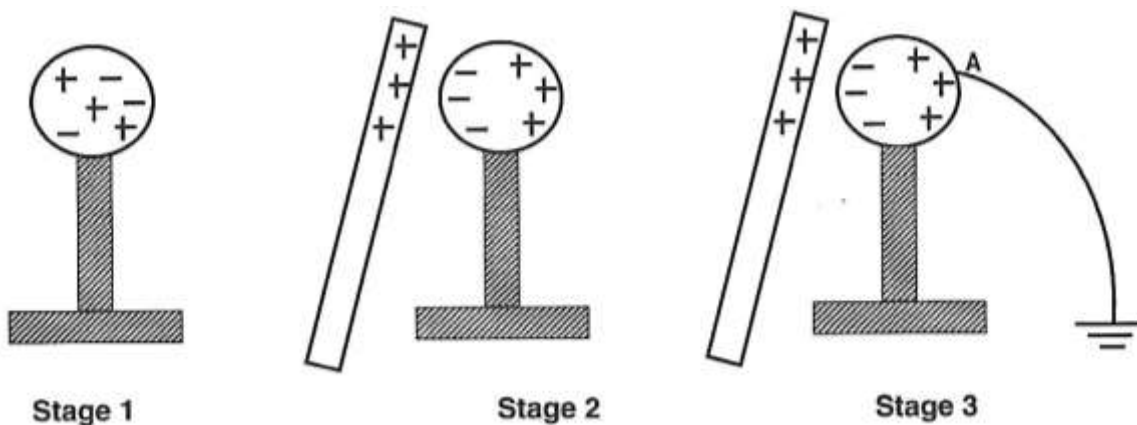
a. Briefly describe the reasons why the charges rearrange themselves as shown in (he diagram in

stage 2.

b. What is the direction of movement t of negative charges in stage 3 when a connection Is made between the ground and point A

c. State the first taw of electrostatics.

10. (a) Describe an experiment to determine the period of a pendulum, given a metal bob. a string and a stop clock. Mention at least one precaution you would take.

(b) Explain how the motion performed by the metal bob is similar to wave motion.

(c) State' the was equation and use it to calculate the speed of a wave with wavelength 2 cm. if 10 complete waves pass through *a certain* point in 1 second.

11. (a) Describe a simple experiment to show that dud black metal surfaces are better absorbers of radiant heat than shiny polished ones.

(b) How does conduction and convection differ from each other as processes of heat transfer?

(c) Distinguish between evaporation and tailing in liquids

(d) Why is it advisable to use a thermocouple thermometer in a furnace?

13. (a) State the natures of alpha emissions and beta emissions.

(b) A sample of a radioactive material produced the following results when its emission was measured, at a fixed distance.

Count-rate/ minute	490	310	190	118	82
Time (minutes)	0	15	30	45	60

(i) Plot a graph of count-rate (y-axis) against time (x-axis)

(ii) What do you understand by the term half-life?

(iii) Use your graph to determine the half-life of the sample.