



BOTSWANA EXAMINATIONS COUNCIL
JUNIOR CERTIFICATE EXAMINATION

SCIENCE

14/2

Paper 2

October/November 2018

Marks: 80

Time: 2 Hours

Candidate
Full Names:

Centre Number:

J	C				
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Candidate Number:

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INSTRUCTIONS

1. Write your full names and examination number in the spaces provided above.
2. Answer **ALL** questions.
3. All answers must be written in the spaces provided.
4. Show **ALL** the necessary working.
5. Calculators may be used in this paper.
6. A copy of the Periodic Table is printed on page 18.

FOR EXAMINER'S USE ONLY

Section	Marks Scored
A	
B	
Total Marks	

This question paper contains 17 printed pages.

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO



SECTION A

(60 Marks)

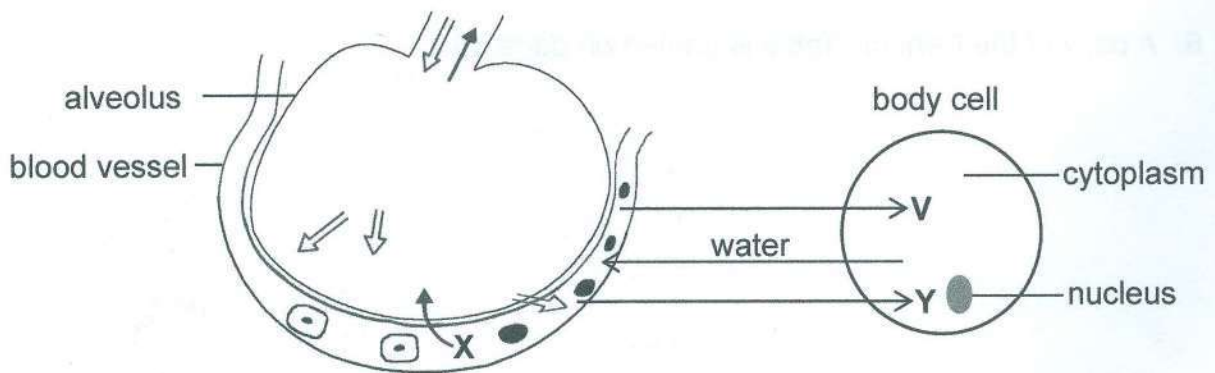
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1. Below is a list of some male reproductive system structures and their functions. Draw a line to match each structure with its function. One has already been done for you.

Structure	Function
Urethra	Keeps temperature of testes below body temperature
Epididymis	Produces sperms
Testicles	Stores sperms
Scrotum	Produces progesterone
	Passage for semen

(3)

The diagram below illustrates gaseous and material exchange in the human body. Use it to answer question 2.



2. (a) During gaseous exchange, gas X leaves the blood vessel and enters the alveolus.

(i) Name gas X.

..... (1)

(ii) State the process through which gas X enters the alveolus from the blood vessel.

..... (1)

(iii) Name the organ where the alveolus is found.

..... (1)

(b) Substance V and gas Y combine to release energy in the body cell.

(i) Identify substance V.

..... (1)

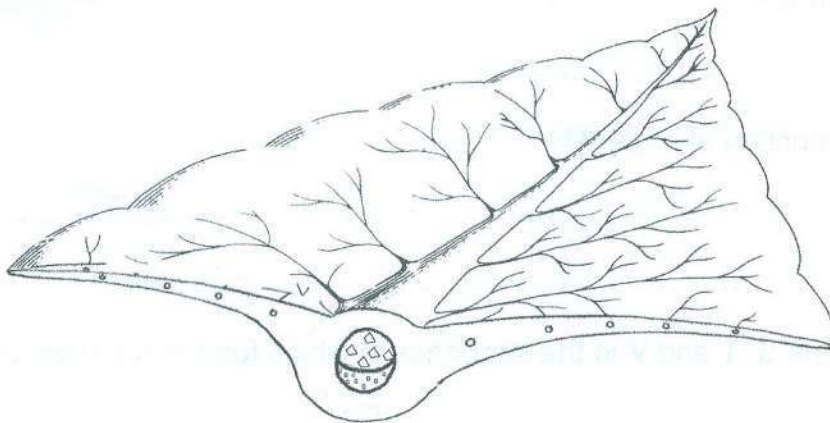
(ii) Name the process that releases the energy.

..... (1)

(c) State the function of the nucleus.

.....
..... (1)

The diagram below shows a cross section of a plant leaf, not drawn to scale. Use it to answer question 3.



3. (a) Label the xylem on the diagram. (1)

(b) State the function of the xylem vessel.

.....
..... (1)

(c) A student cut a leaf from a plant to test it for starch.

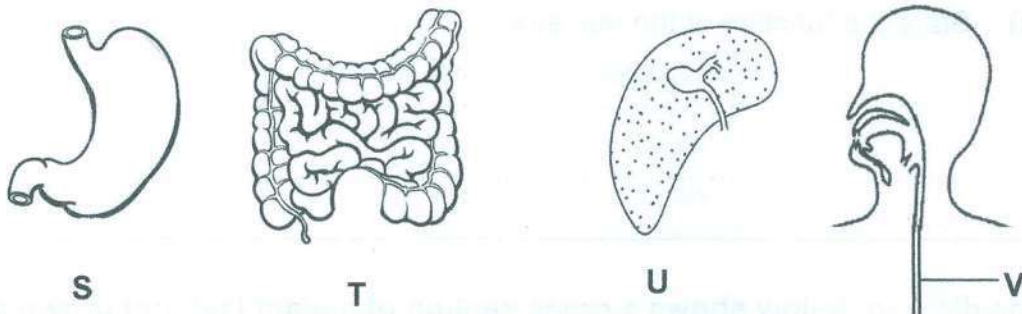
(i) State the first step taken when testing a leaf for starch.

.....
..... (1)

(ii) Give a reason for carrying out the step in (c) (i).

.....
..... (1)

The diagrams below show some organs of the digestive system labelled S, T, U and V. Use them to answer question 4.



4.

(a) (i) Name organ U.

..... (1)

(ii) State **one** function of organ U.

.....
..... (1)

(b) Arrange the organs S, T and V in the sequence in which food reach them after taking a meal.

..... → → (2)

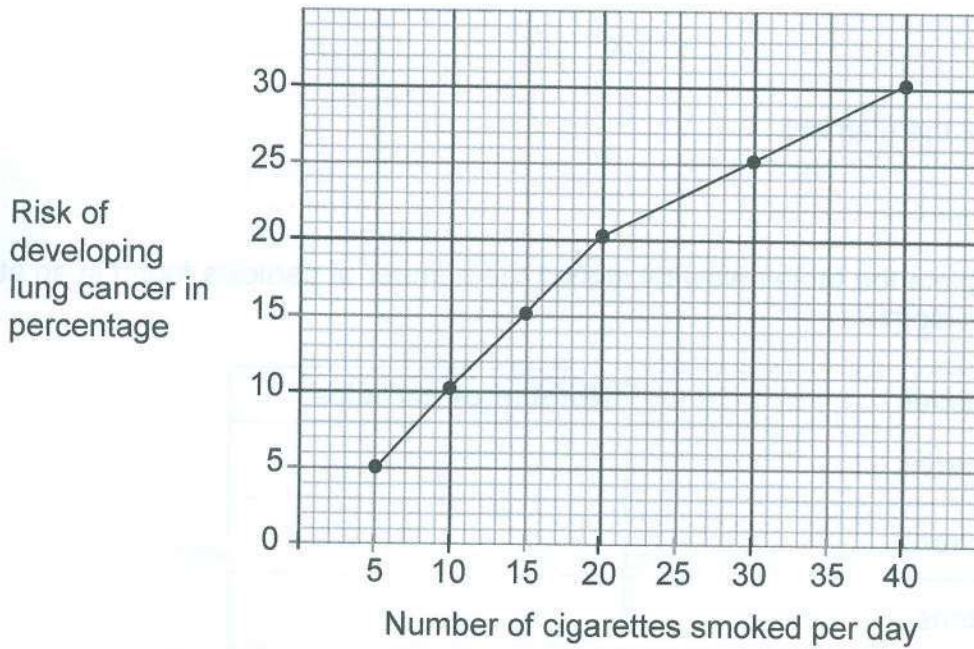
(c) State how food is moved through organ V.

.....
..... (1)

(d) Name the enzyme found in the mouth.

..... (1)

The graph below shows the relationship between the number of cigarettes smoked and the risk of developing lung cancer. Use it to answer question 5.



5. (a) From the graph, what is the percentage risk of developing lung cancer for people who smoke 30 cigarettes per day?

.....% (1)

(b) What conclusion can be made from the graph?

.....
..... (2)

(c) Name the substance in cigarette smoke that damages the lungs.

..... (1)



An element is represented as shown below.
Use it to answer question 6.



6. (a) Name the element.

..... (1)

(b) Complete the table below by stating the number of particles found in an atom of the element.

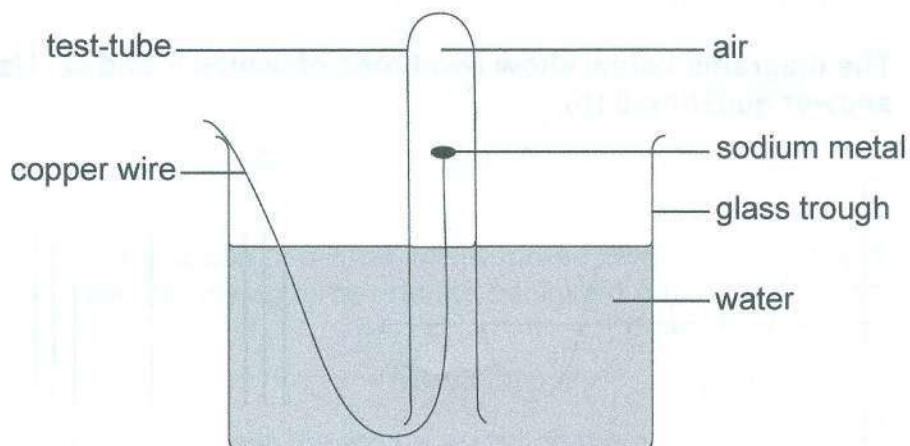
Particles	Number of particles
Electrons	
Neutrons	
Protons	

(3)

(c) Draw the atomic structure of the element.

(2)

A piece of sodium metal attached to a copper wire was left for a few days as shown in the diagram below. Use the diagram to answer question 7.



7. The sodium metal reacted with one of the gases in the air under the test tube to form an oxide.

(a) (i) Name the gas which reacted with the sodium metal.

..... (1)

(ii) Write the word equation for the reaction.

..... (2)

(b) (i) What happened to the water level inside the test-tube after the reaction?

..... (1)

(ii) Explain your answer to (b) (i).

..... (1)

(c) Give **one** physical property of water.

..... (1)

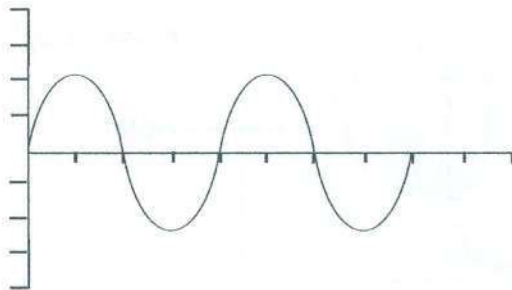
(d) Name **one** element found in the same group as sodium in the periodic table.

..... (1)

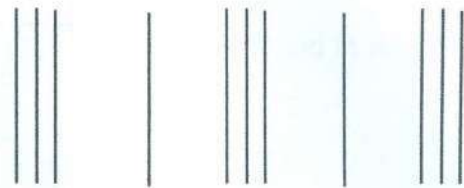


8. (a) Define frequency of a wave.
 (1)

The diagrams below show two types of waves P and Q. Use them to answer question 8 (b).



wave P



wave Q

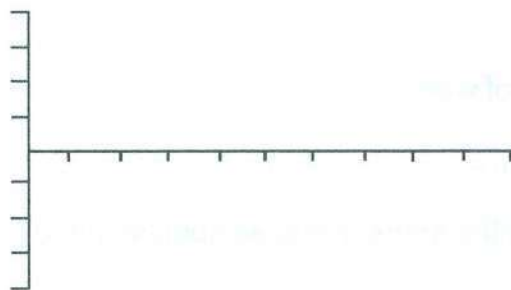
- (b) State **two** differences between waves P and Q.

 (2)

- (c) On wave Q, show and label the wavelength. (1)

- (d) Wave P was produced by a guitar string. The string was tightened and it was struck to produce a sound of the same loudness.

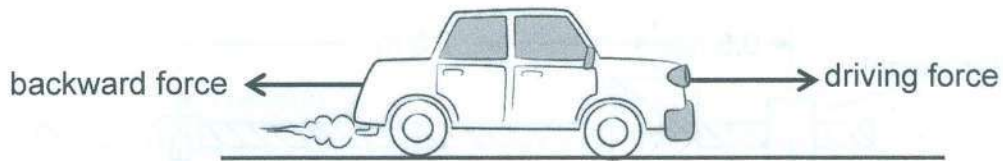
Draw the wave in the axes below to show how it would appear.



(2)



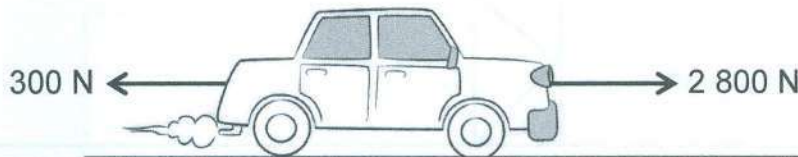
The diagram below shows a car moving along a level road.
Use it to answer question 9.



9. (a) State whether the speed of the car will **increase**, **decrease** or **remain constant** when the driving force and the backward force are equal.

..... (1)

- (b) The diagram below shows the forces acting on the car later in the journey.



Calculate the resultant force on the car and state its direction.

Resultant force

Direction (2)

- (c) The mass of the car is 1 000 kg.

Calculate the acceleration of the car.

Acceleration (2)

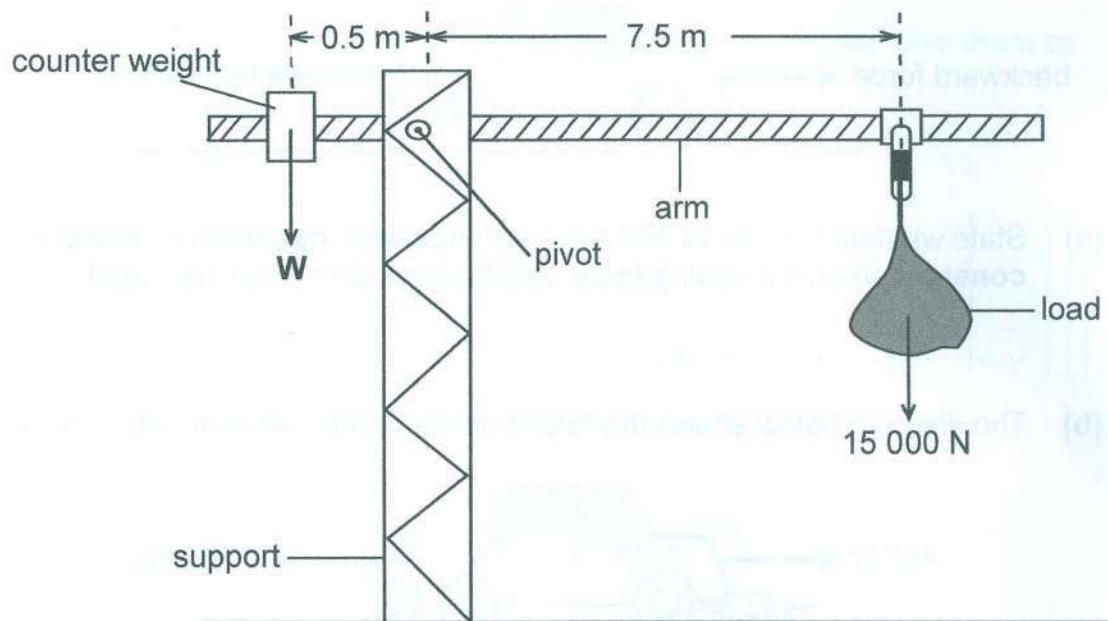
- (d) At the end of the journey, the driver applied some brakes and the car stopped.

Name the force that caused the car to stop.

..... (1)



The diagram below shows a crane used to lift heavy loads. W is the weight of the counter weight. Use the diagram to answer question 10.



10. The crane is in equilibrium.

(a) Tick a box next to the statement which is correct.

- If the load is increased the arm moves up.
- The turning effect on the arm is zero.
- Counter weight is equal to load.

(1)

(b) Calculate the moment of the load about the pivot.

Moment (2)

(c) Calculate force W of the counter weight.

$W =$ N (2)



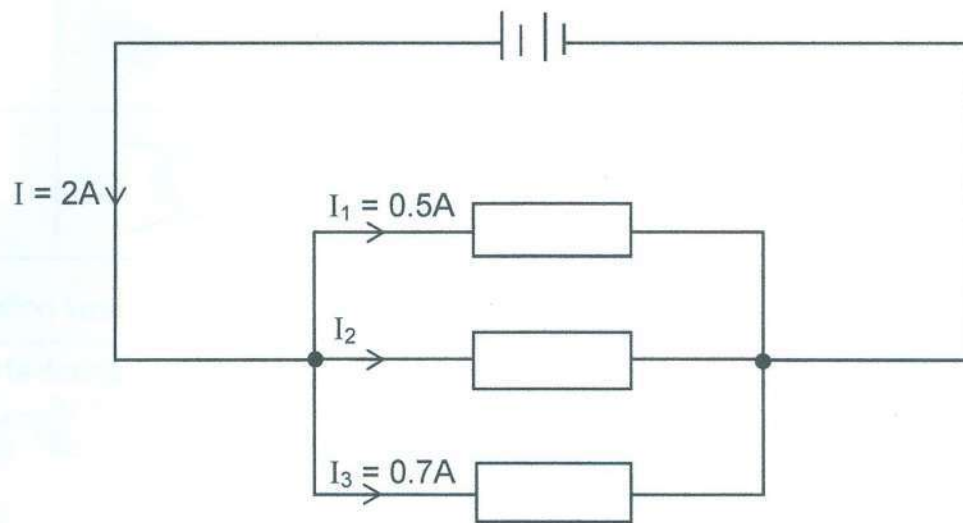
- (d) (i) The load is slightly moved to the right. State whether the arm will **move up**, **move down** or **does not move**.

..... (1)

- (ii) Give a reason for your answer to (d) (i).

.....
..... (1)

11. (a) The diagram below shows an electric circuit with current I , I_1 , I_2 and I_3 .



Calculate the current I_2 .

$I_2 = \dots\dots\dots A$ (2)

- (b) Draw a circuit symbol of an ammeter in the space below.

(1)



12. (a) State the meaning of geo-science.

.....
..... (1)

(b) Name the sphere of the earth where rocks are found.

..... (1)

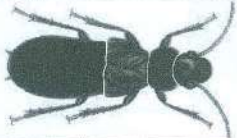
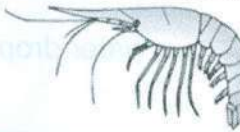

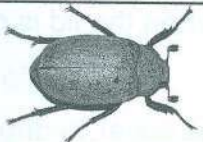


SECTION B

(20 Marks)

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The diagrams show organisms W, X, Y and Z. Identification key is given below the diagrams of the organisms. Use the diagrams and the key to answer question 13 (a).

W	
X	
Y	
Z	

Identification key:

Characteristics	Name of organism
1 (a) Body has 4 or more segments	Go to 2
(b) Body has 3 segments	Go to 3
2 (a) Limbs all the same	<i>Cingulata</i>
(b) Limbs not all the same	<i>Abludomelita</i>
3 (a) Has short wings	<i>Cerambycidae</i>
(b) Has long wings	<i>Melolontha</i>

13. (a) Use the identification key to name the organisms.

W.....

X.....

Y.....

Z.....

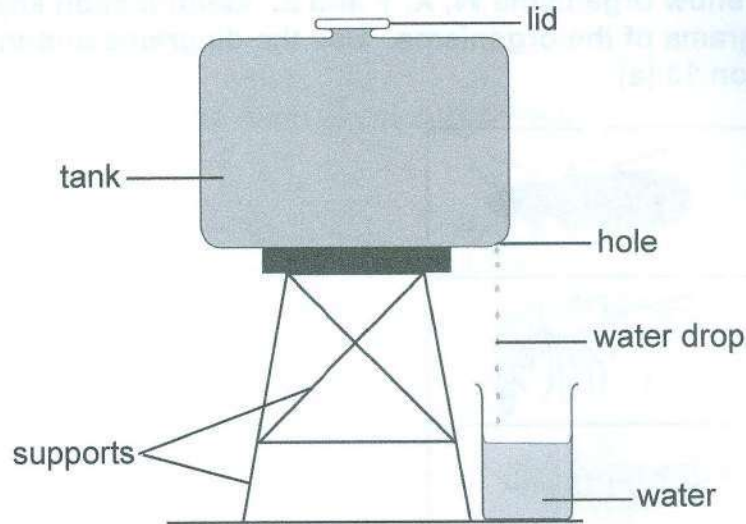
(4)

(b) State one characteristic of invertebrates.

..... (1)



The diagram below shows a set-up used by a farmer to investigate the rate at which water was dripping from a tank with a hole at the bottom. Use it to answer question 14.



14. When the lid is closed, there is no dripping and when the lid is open, water drips through the hole.

(a) What is the name of the quantity that causes water to drip from the tank? Tick the correct box.

Density

Atmospheric pressure

Terminal velocity

(1)

(b) The farmer used a stopwatch to measure the time between any two drops of water. The farmer repeated the measurement one more time. The stopwatch was starting from zero for both measurements.

The display of the measurements are as shown below.



First measurement



Second measurement

(i) Record the time for the first measurement.

First measurementseconds (1)

(ii) State **one** reason why the two measurements are different.

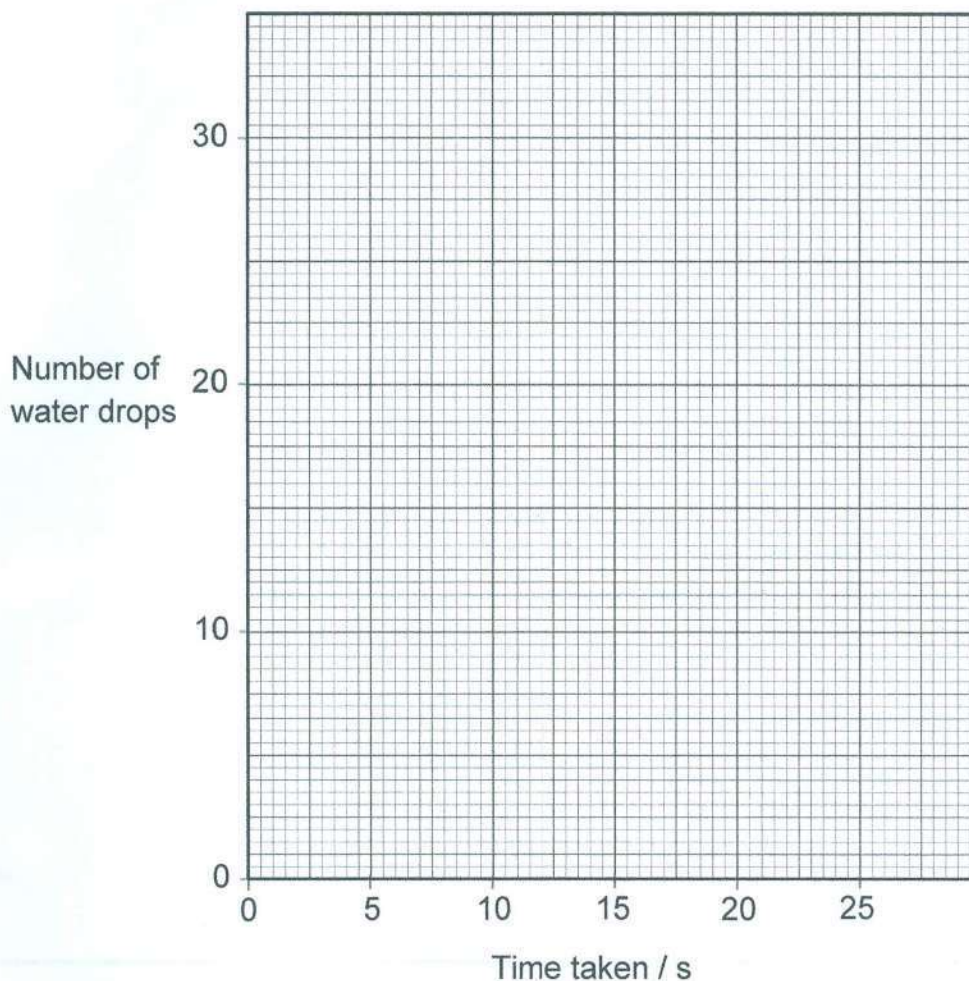
.....

..... (1)

The number of water drops and the time taken were recorded in the table below. Use it to answer question (c) (i).

Number of water drops	0	5	10	15	20	25	30
Time taken/s	0	4	8	12	16	20	24

- (c) (i) On the grid below, plot a graph of number of water drops against time taken.



(4)

- (ii) The rate at which water was dripping is given by the gradient of the graph.

Determine the rate at which water was dripping from the tank.
Show your working.

Rate of dripping (3)



15. A student was asked to separate a mixture consisting of copper metal powder and sodium chloride powder. Copper metal powder is insoluble in water. Sodium chloride powder is soluble in water.

Using the list of apparatus and materials below, describe a procedure that the student can follow to obtain copper metal from the mixture. You may use a diagram to support your answer.

Apparatus: funnel, filter paper, 2 beakers, stirring rod and 150 cm³ of water.



(5)

