BOTSWANA EXAMINATIONS COUNCIL

JUNIOR CERTIFICATE EXAMINATION

SCIENCE

14/2

Paper 2

October/November 2013

Marks: 80

Time: 2 Hours

	Centre						Candidate			
Candidate's Examination Number:										

INSTRUCTIONS

1. Write your examination number in the space 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 20.

FOR EXAMINER'S USE ONLY

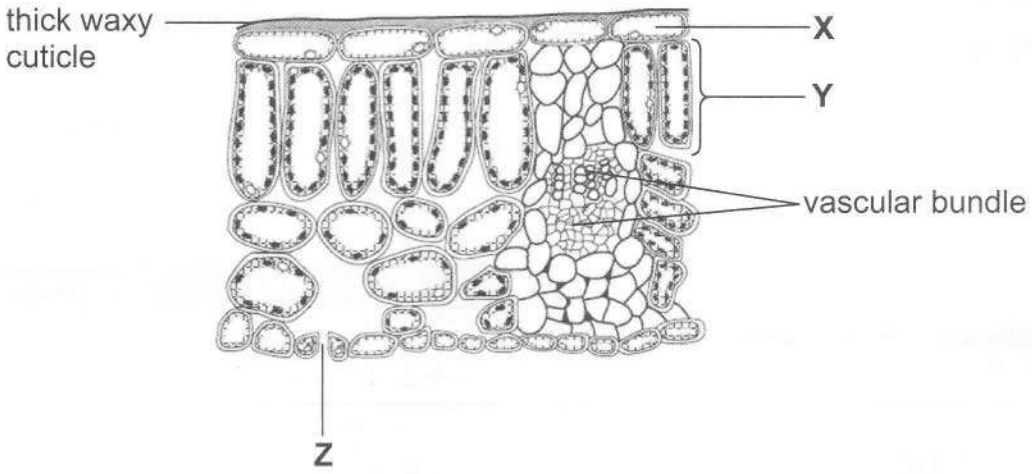
Section	Marks Scored
A	
B	
Total Marks	

*This question paper contains **17** printed pages and **3** blank pages.*

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

SECTION A (60 Marks)

The diagram below shows a cross section through a leaf. Use it to answer question 1.



1. **(a)** Name the structures labelled **X**, **Y** and **Z**.

X.....

Y.....

Z..... (3)

(b) Why do the structures marked **Y** have more chloroplasts than any other part of the leaf?

.....

.....

..... (2)

(c) Why are the structures marked **X** lined with a thick waxy cuticle?

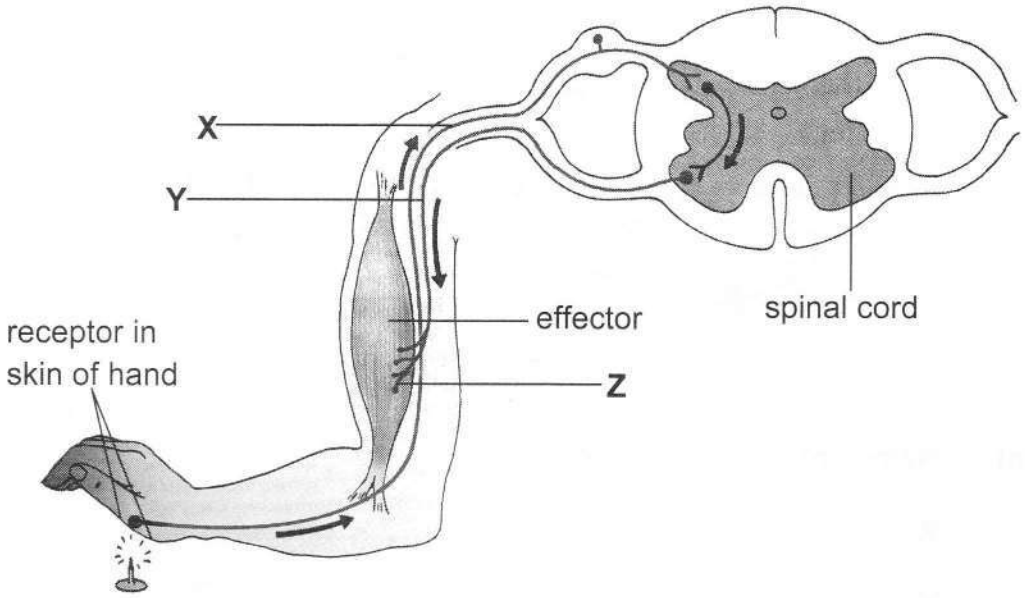
.....

.....

..... (2)

For Examiner's Use

The diagram below shows parts of the nervous system which are used to coordinate the response of a hand as it accidentally touches a hot object. Use it to answer questions 2 (a) and (b).



2. **(a)** Name the neurones **X** and **Y**.

X .....

Y ..... (2)

(b) Describe what happens when nerve impulses arrive at point **Z**?

.....

.....

..... (2)

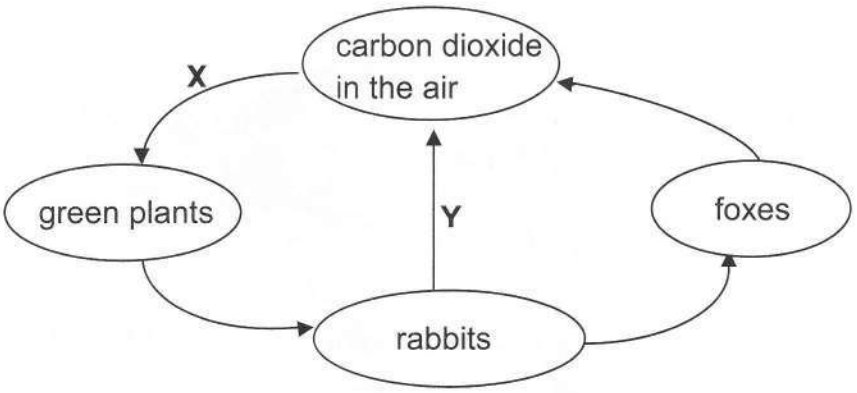
(c) From the list below, circle the **two** voluntary actions.

playing **swallowing** **blinking**

singing **breathing** (2)

For Examiner's Use

The diagram below shows part of the carbon cycle.
Use it to answer question 3.



3. **(a)** Name processes **X** and **Y**.

X ..... (1)

Y ..... (1)

(b) How is the carbon in the green plants passed on to the foxes?

.....

.....

..... (2)

(c) A lot of green plants are cut down.
Explain the effect on this on the amount of carbon dioxide in the air.

.....

.....

..... (2)

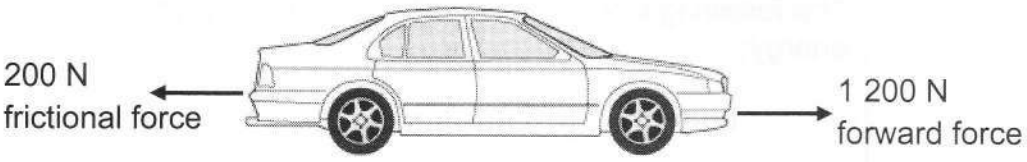
For Examiner's Use

4. **(a)** Define a vector quantity.

.....

..... (1)

The diagram below shows two forces acting on a moving car.
Use it to answer question 4 (b).



(b) **(i)** Calculate the resultant force acting on the car.

..... (1)

(ii) The mass of the car is 500 kg.
Calculate the acceleration of the car.

..... (2)

For Examiner's Use

5. **(a)** What is a renewable source of energy?

.....

..... (1)

Use the information below to answer question 5 (b).

The following is a list of some forms of energy and some sources of energy;

light **kinetic** **gravitational**

paraffin **radio**

(b) Using the list above, complete the table below to match the form of energy to its source.

Form of energy	Source of energy
Chemical	
	Bulb
Sound	

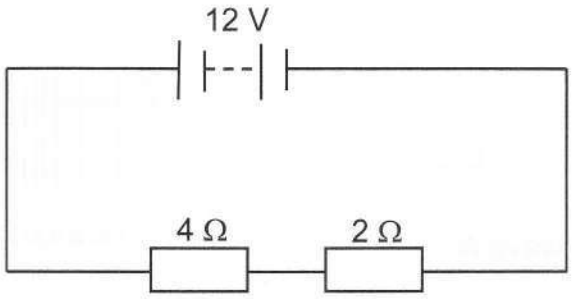
(3)

(c) State the main change of energy which takes place in a bicycle dynamo.

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

For Examiner's Use

The diagram below shows an electric circuit. Use it to answer question 6.



6. **(a)** Name the type of circuit shown.

..... (1)

(b) Calculate;

(i) the total resistance of the circuit,

resistance =..... Ω (2)

(ii) the total current in the circuit.

current = ... A (2)

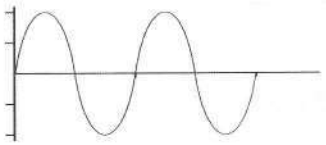
(c) On the diagram, draw a voltmeter to measure the potential difference across the 4 Ω resistor. (2)

(d) In the space below, draw the symbol of a bulb.

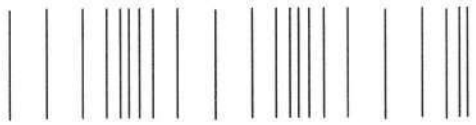
(1)

For Examiner's Use

The diagrams below show two types of waves, A and B.
Use the diagrams to answer question 7.



wave **A**



wave **B**

7. **(a)** What type of wave is **B**?

..... (1)

(b) **(i)** On wave **A**, show the amplitude. (1)

(ii) On wave **B**, show the wavelength. (1)

---

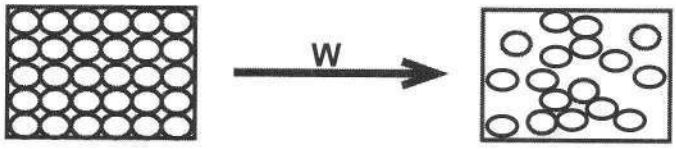
8. Each box below contains a description of a term.
Join each box to the correct term. The first one has been done for you.

Description	Term
The solid mass of water found on, under and over the surface of a planet.	• hydrosphere
The solid part of the earth consisting of the crust and the other mantle.	• geosphere
A larger amount of gases surrounding a material body held in place by the gravity of the body.	• atmosphere
	• biosphere

(2)

For Examiner's Use

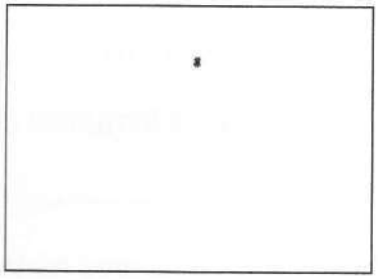
The diagram below illustrates the change of state of matter of a certain substance. Use it to answer question 9 (a).



9. **(a)** Name the process represented by letter **W**.

..... (1)

(b) A substance melts at 7°C and boils at 78°C. In the box below, draw the arrangement of particles of the substance at 15°C.



(1)

(c) Explain why 10 g of water vapour occupies more space than 10 g of ice.

.....

..... (1)

(d) **(i)** In which state of matter, **solid**, **liquid** or **gas**, does diffusion occur fastest?

..... (1)

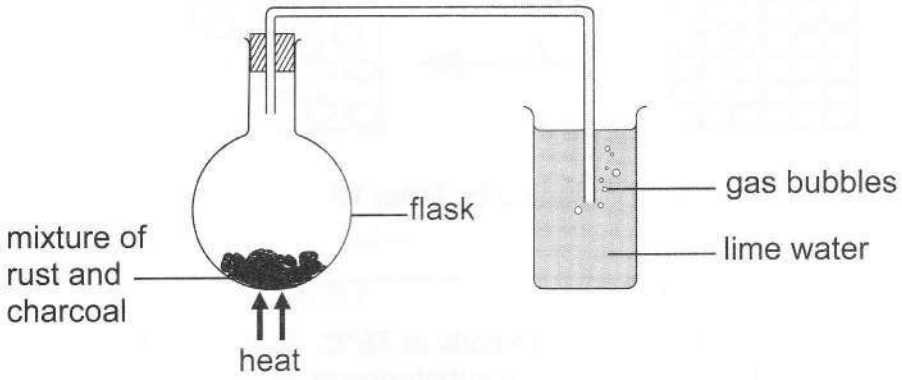
(ii) Explain your answer in **(d) (i)**.

.....

..... (1)

For Examiner's Use

The diagram below shows an experimental set-up used to demonstrate the extraction of iron from its ore. Use it to answer question 10.



10. **(a)** What is the chemical name for **rust**?

..... (1)

(b) Write a word equation for the formation of **rust**.

..... (2)

(c) At the end of the experiment a grey metal remained in the flask.

(i) Name the grey metal.

..... (1)

(ii) State what will be observed as the gas produces bubbles through the lime water.

.....

..... (1)

(iii) Explain your answer to **(c) (ii)**.

.....

.....

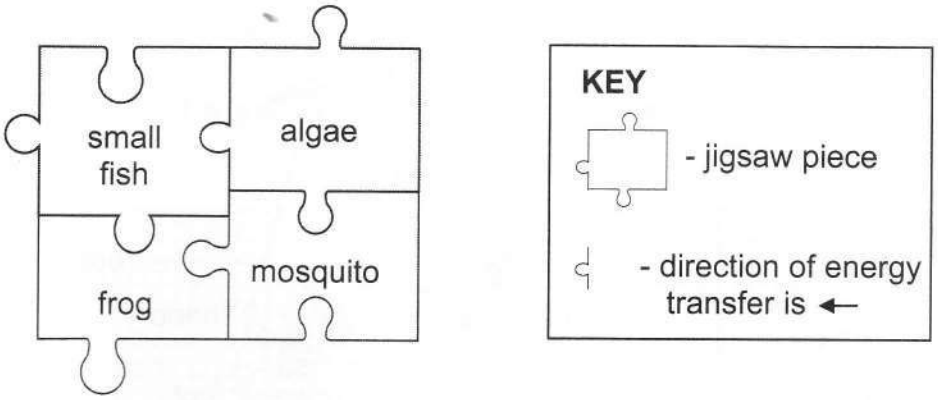
..... (2)

(d) Lime water is alkaline.
Define an alkali.

.....

..... (1)

The diagram below shows a jigsaw representing energy transfer between organisms in an ecosystem. Use it to answer question 11.



11. **(a)** What is an ecosystem?

.....

..... (1)

(b) State the form in which energy is transferred between the organisms in the jigsaw.

..... (1)

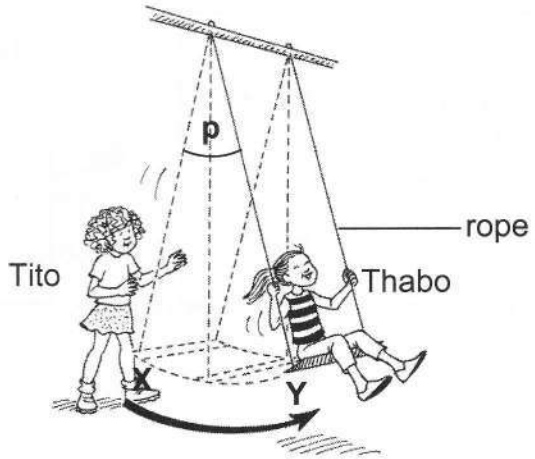
(c) Use the organisms from the jigsaw to draw a food chain showing **three** energy levels.

(2)

(d) A student is given a jigsaw piece of decomposers. On the jigsaw diagram above, show by drawing, where the piece should be placed. (1)

SECTION B (20 Marks)

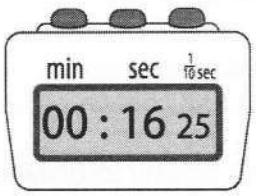
12. The diagram below shows Tito pushing Thabo on a dangler. One swing of the dangler is when Thabo moves from point **X** to point **Y** and back to point **X**.



(a) Measure and record angle **p**.

angle **p** = ... (1)

(b) The diagram below shows a stop watch displaying the time taken to complete **five** swings.



(i) Write down the time taken for the **five** swings.

time for five swings = ... (2)

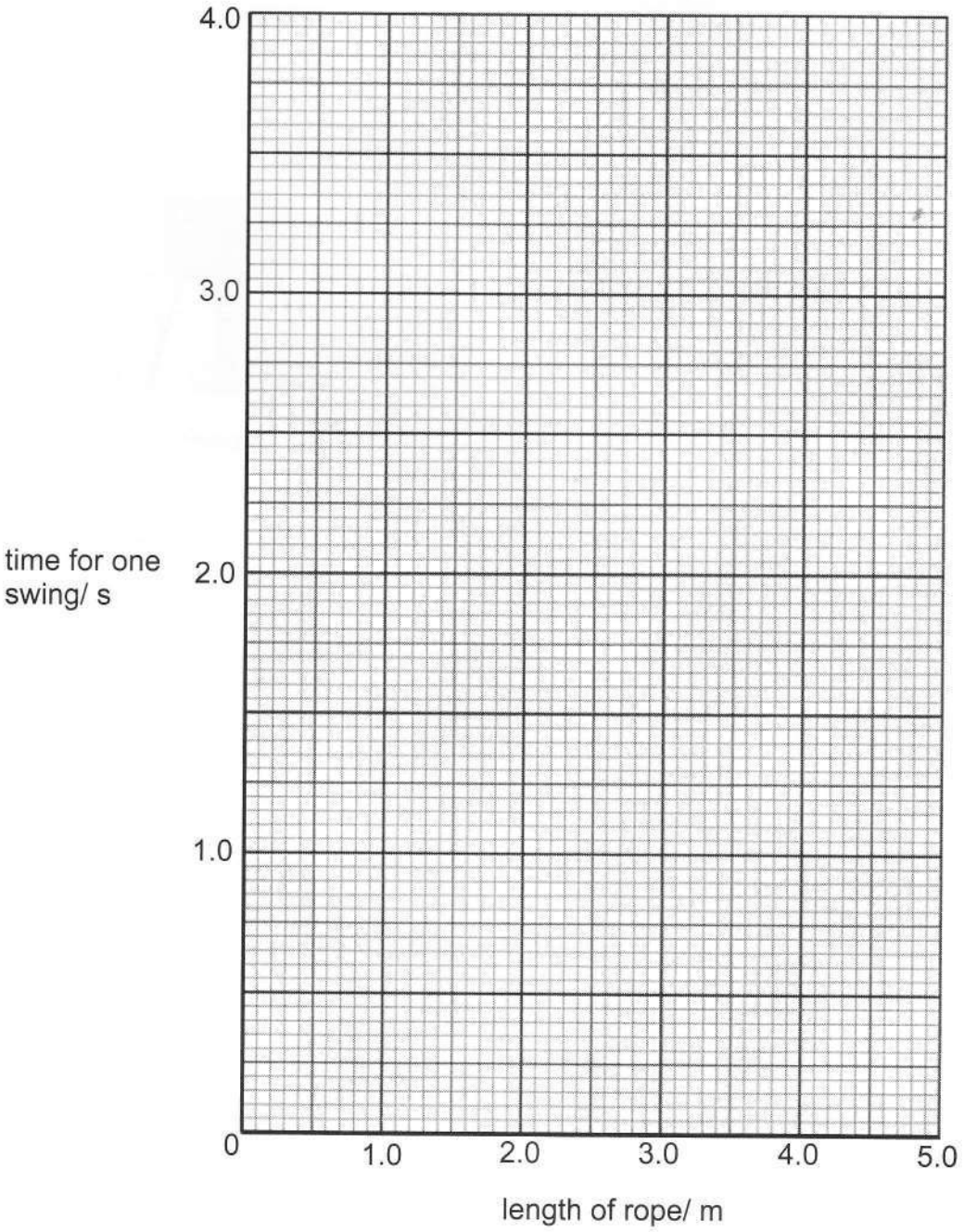
(ii) Use your answer to **(b) (i)** to calculate the time taken by Thabo to complete **one** swing.

time for one swing = ... (2)

Thabo and Tito repeated their play on the dangler using eight different lengths of the rope. The time taken to complete one swing of each length of rope was calculated and recorded in the table below.

Length of rope/ m	0.5	0.8	1.4	1.9	2.4	2.9	3.4	3.9
Time for one swing/ s	1.4	1.9	2.5	2.9	3.2	3.1	3.7	3.9

(c) On the grid below, plot a graph of the time taken for one swing against the length of the rope.



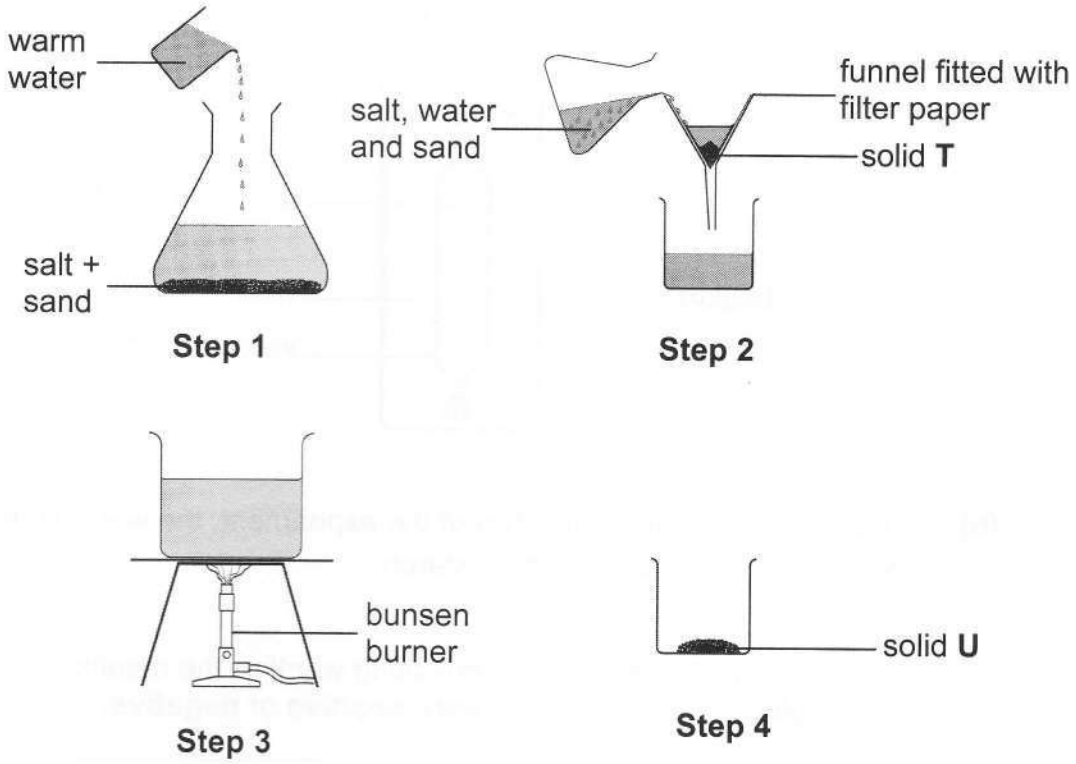
(4)

For Examiner's Use

(d) Use your graph to determine the time taken for one swing when using a rope that is 1.5 m long.

..... (1)

The diagrams below show steps which were followed by a student when separating salt from sand. Use the diagrams to answer question 13 (a).



13. **(a)** **(i)** Name the solids labelled **T** and **U**.

T..... (1)

U..... (1)

(ii) Name processes in **steps 2** and **3**.

Step 2 ..... (1)

Step 3 ..... (1)

(iii) Suggest a reason for using warm water at **step 1**.

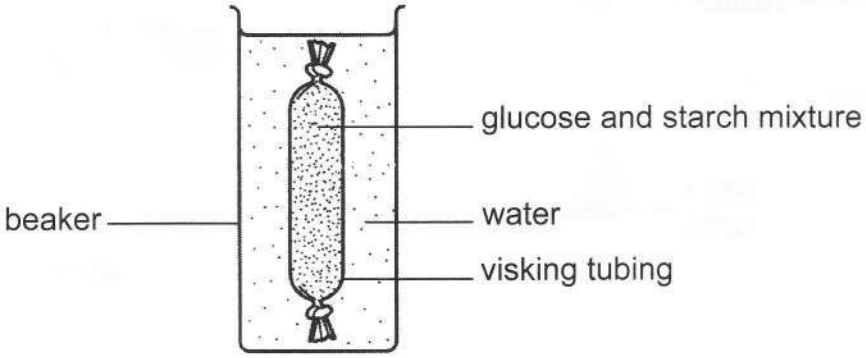
.....

..... (1)

For Examiner's Use

Use the information and the diagram below to answer question 13 (b).

The set-up below represents an experiment that was conducted by some students to demonstrate absorption of end products of digestion.



(b) After 15 minutes from the start of the experiment, the water in the beaker was tested for glucose and for starch.

(i) Complete the table by indicating whether the results of the test for glucose and for starch were **positive** or **negative**.

Test of nutrient	Result
Starch	
Glucose	

(2)

(ii) Explain the results of the starch test in **(b) (i)**.

.....

.....

..... (2)

(iii) Suggest the name of the substance in the human body that is represented by water in the set-up above.

..... (1)