



BOTSWANA EXAMINATIONS COUNCIL
JUNIOR CERTIFICATE EXAMINATION

SCIENCE

14/2

Paper 2

October/November 2017

Marks: 80

Time: 2 Hours

Candidate
Full Names:

Centre Number:

J	C				
---	---	--	--	--	--

Candidate Number:

--	--	--	--

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 16.

FOR EXAMINER'S USE ONLY

Section	Marks Scored
A	
B	
Total Marks	

This question paper contains 16 printed pages.

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



SECTION A

(60 marks)

1. Below is a list of terms and the definitions.
Draw a line to connect a term with its definition.
The first one has been done for you.

Term	Definition
Transverse wave	
Scalar	The distance between two identical crests in a wave
Displacement	Distance moved in a given direction
Frequency	A quantity having only magnitude but with no direction
Longitudinal wave	Whereby the direction of vibration is parallel to the direction of the wave
Wavelength	

(3)

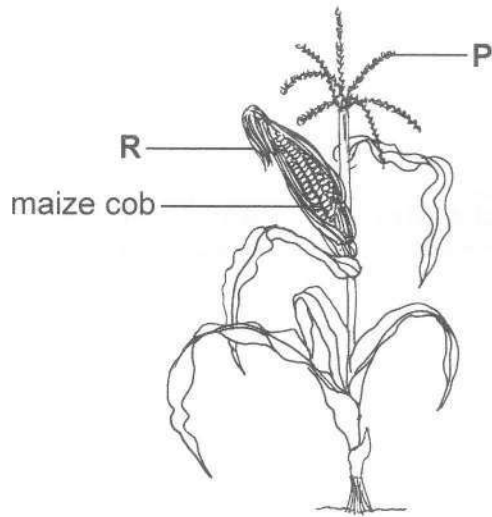
-
2. State **two** effects of volcanic eruptions on people.

.....

..... (2)



The diagram below shows a maize plant with flowers labelled P and R.
Use it to answer question 3.



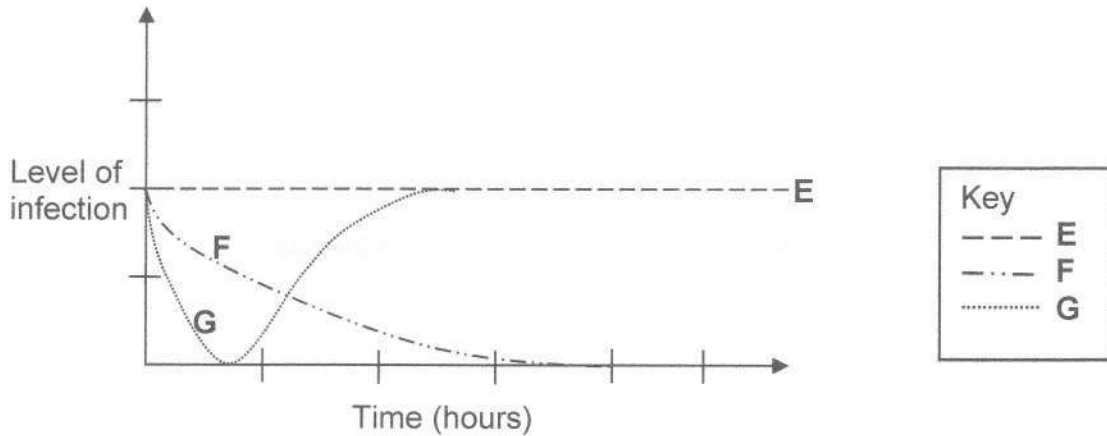
3. (a) (i) Which letter represents the female flower of the plant?
..... (1)
- (ii) Explain your answer to (a) (i).
..... (1)
- (b) (i) Suggest the agent of pollination for the plant.
..... (1)
- (ii) Explain your answer to (b) (i).
.....
..... (2)



4. (a) What is a *drug*?

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

The graph below shows the effect of drugs E, F and G on the level of infection in a human body over a period of time. Use it to answer questions (b) and (c).



(b) (i) From the graph, identify the drug that is **most** effective on the infection.

..... (1)

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

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

(c) (i) Which drug is **most** likely to be abused?

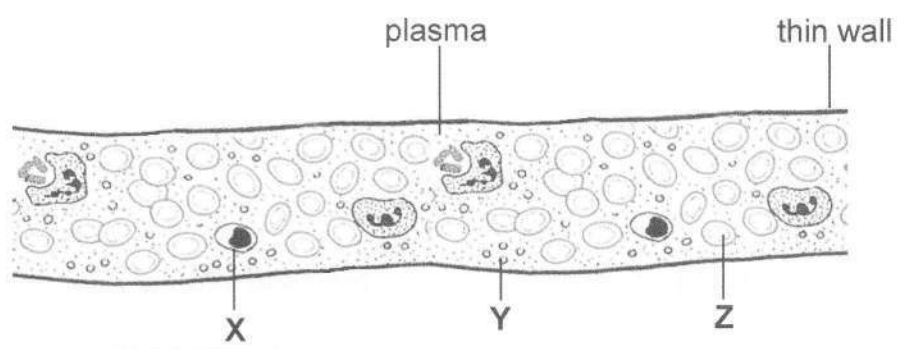
..... (1)

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

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



The diagram below shows different components of blood labelled X, Y and Z, in a blood vessel of a healthy person. Use it to answer question 5.



5. (a) Name blood components X, Y and Z.

X

Y

Z

(3)

(b) State **two** ways in which the structure of component X differs from that of component Z.

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

(c) Name the type of blood vessel shown in the diagram.

..... (1)

(d) What will be the effect of having fewer than normal of component Y in the blood?

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



6. Copper sulphide is one of the ores of copper. When copper sulphide is heated in air, copper oxide and sulphur dioxide gas are produced.

(a) Write a word equation for the reaction when the ore, copper sulphide, is heated in air.

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

(b) Sulphur dioxide gas produced is often released into the atmosphere.

State and explain the effects of sulphur dioxide gas on the environment.

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

(c) Name any gas produced, when the ores of copper are heated, other than sulphur dioxide.

..... (1)

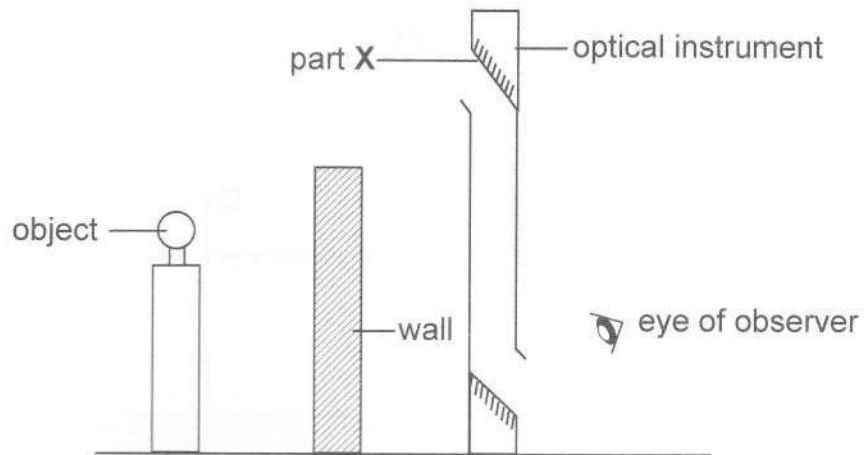
(d) The copper oxide is burned with carbon.

State **two** substances produced when copper oxide is heated in carbon.

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



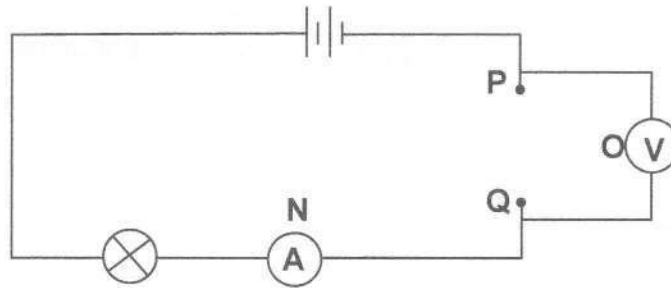
The diagram below shows how a certain optical instrument works.
Use it to answer question 7.



7. (a) (i) Name part X of the optical instrument.
..... (1)
- (ii) Which property of light does the optical instrument use?
..... (1)
- (iii) On the diagram, show how it is possible for the observer to see the object on the other side of the wall. (2)
- (b) State any **two** uses of a convex mirror.
.....
..... (2)



The diagram below shows a circuit used to investigate one of the factors affecting resistance of a wire. Use it to answer question 8.



8. (a) Name instrument **N**.
 (1)
- (b) How many cells are there in the circuit?
 (1)

Three wires **S**, **T** and **U** of the same material, same thickness but with different lengths were used. Each wire was connected to the circuit between points **P** and **Q** at different times. The table below describes the brightness of the bulb when wires **S**, **T** and **U** were connected to the circuit.

Wire	Brightness of bulb
S	dim
T	bright
U	very dim

- (c) Arrange the wires **S**, **T** and **U** in the order of increasing resistance.
 (2)
- (d) When each of the wires was connected to the circuit, it became warm after some time.
- (i) State why the wires became warm when connected to the circuit.

 (1)
- (ii) Which of the wires became warm **fastest**?
 (1)



- (e) When wire **T** was connected to the circuit, the readings obtained from instruments **N** and **O** were 0.10 A and 12 V, respectively.

Calculate the resistance of the wire.

Resistance = Ω (2)

9. A list of materials is given below.

- Water
- Copper wire
- Oxygen gas

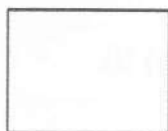
- (a) (i) In which of the given materials would sound travel **slowest**?

..... (1)

- (ii) Explain your answer to (a) (i).

..... (1)

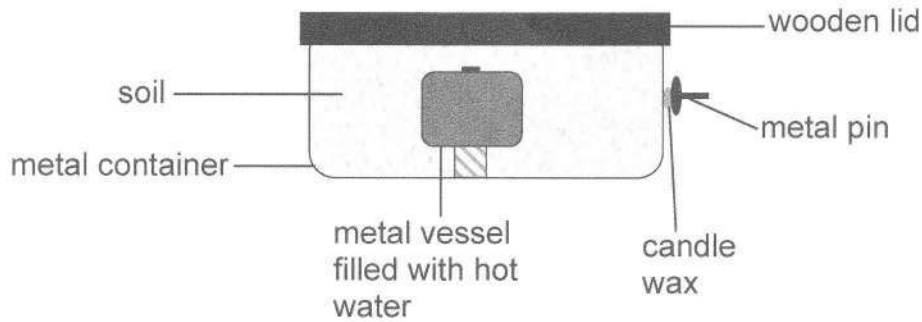
- (b) In the box provided below, draw the arrangement of particles in a copper wire.



(1)



10. A metal vessel, filled with hot water at 90°C, is placed on top of a wooden block at the centre of a large metal container. The metal container is filled with soil and covered with a wooden lid. A metal pin was attached to the metal container with candle wax. The set-up is shown below.



When the candle wax gets heated up, the pin falls. The time taken for the pin to fall off was measured when the metal container was filled with soil. The experiment was repeated by replacing the soil with cold water and later with cotton wool.

The table below shows the time taken for the pin to fall off when each of the materials was used.

Material	Time taken for pin to fall / minutes
Soil	8
Cotton wool	20
Cold water	12

- (a) (i) Which of the materials is a poor insulator of heat?
 (1)
- (ii) Explain your answer in (a) (i).
 (1)
- (b) State **two** processes through which heat reaches the candle wax.

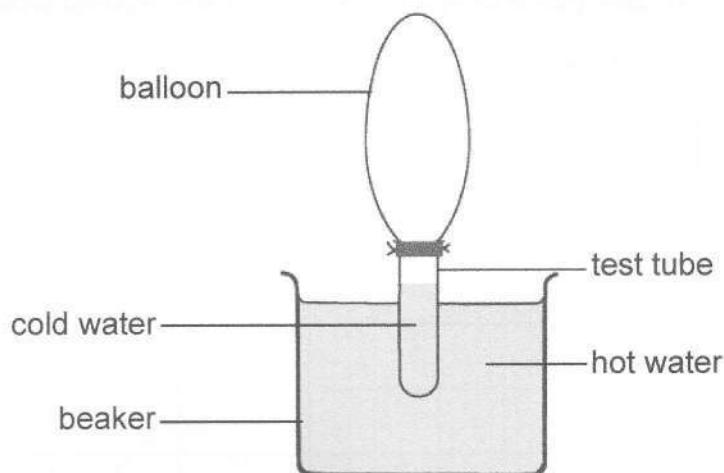
 (2)
- (c) The inside wall of the metal container is painted white.
 How will this affect the time taken for the pin to fall off?
 (1)



(d) Explain why a wooden lid is used in the set-up.

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

11. An inflated balloon is tied to a test-tube containing cold water. The test-tube is then placed in a beaker containing hot water. The set-up is shown below.



(a) (i) What happens to the size of the balloon after a few minutes?

..... (1)

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

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

(b) After some time water droplets were found on the outside surface of the balloon.

Describe how the water droplets were formed.

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

(c) State **one** property of matter.

..... (1)



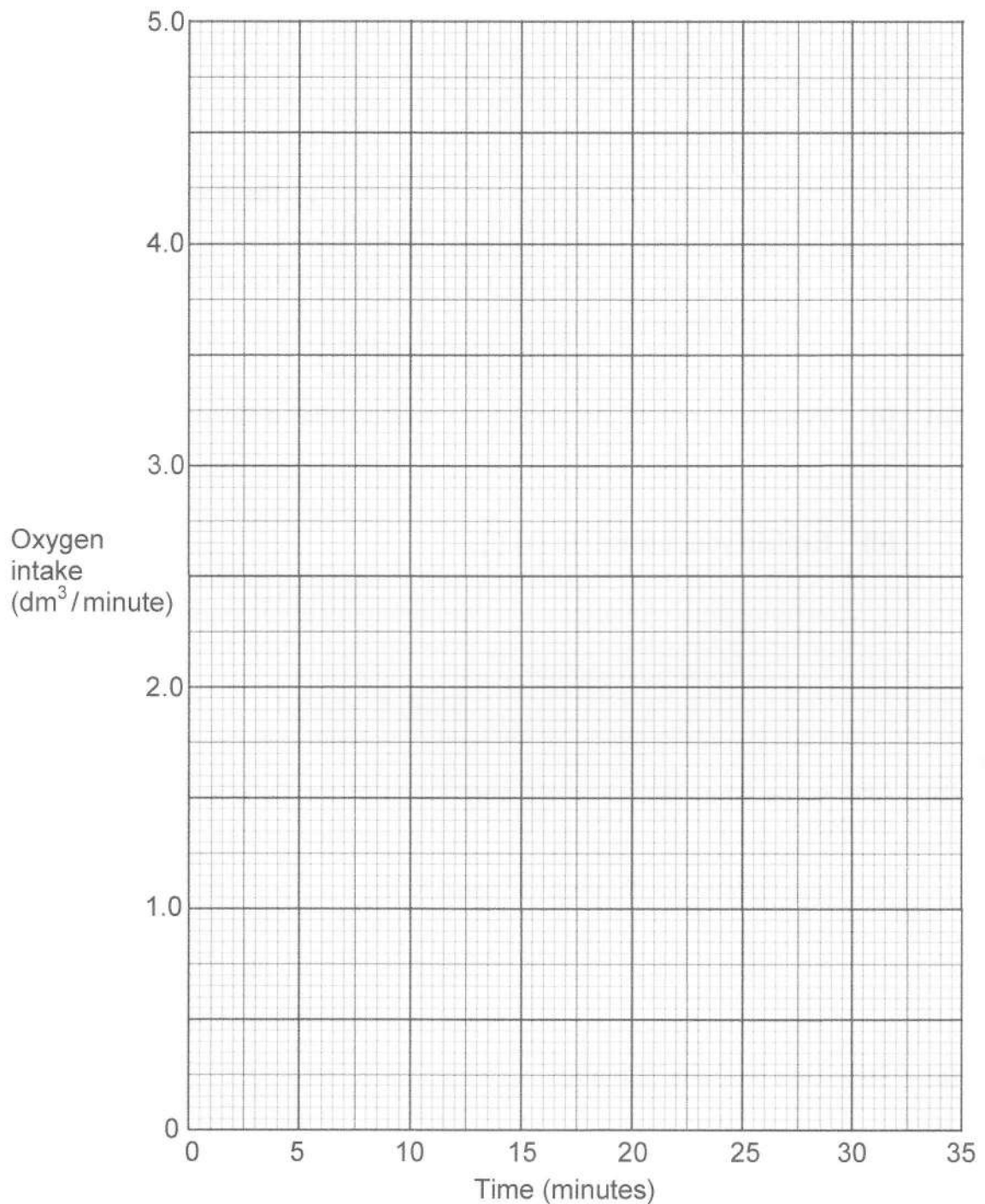
SECTION B

(20 marks)

12. The intake of oxygen by an athlete was measured at the start, during and after a 5000 m race at time intervals of 3 minutes. The results obtained are shown in the table below.

Time (minute)	0	3	6	9	12	15	18	21	24	27	30	33
Oxygen intake ($\text{dm}^3 / \text{minute}$)	0.4	1.6	3.8	4.8	5.0	5.0	5.0	4.2	1.8	0.6	0.4	0.4

- (a) On the grid below, plot a graph of oxygen intake against time. (4)



(b) What is the amount of oxygen intake at rest?
..... (1)

(c) (i) How much time did the athlete take to complete the race?
..... (1)

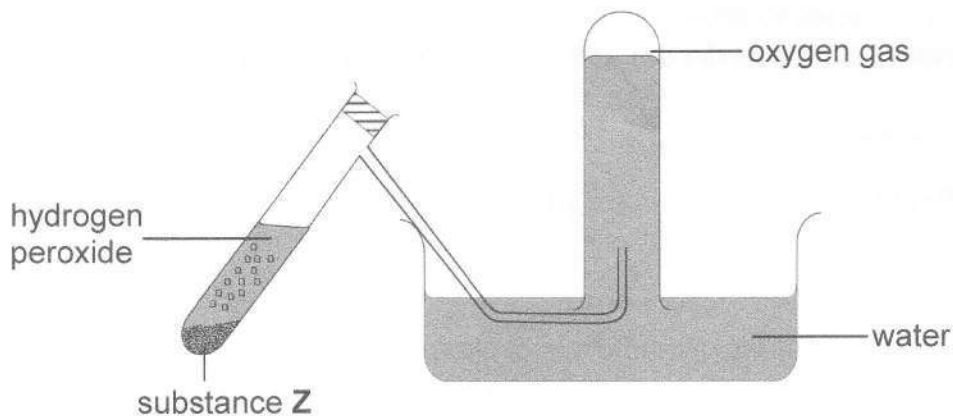
(ii) Explain your answer in (c) (i).
..... (1)

(d) (i) From the values given below, circle the likely percentage of carbon dioxide in exhaled air during the race.
0.02% 0.04% 4.0% 78.0% (1)

(ii) Explain your answer in (d) (i).
.....
.....
..... (2)



The diagram below shows a set-up used to prepare oxygen.
Use it to answer question 13.



13. (a) Substance Z is used to speed up the production of oxygen.

Name substance Z.

..... (1)

(b) What would be the effect of carrying out the experiment at a higher temperature?

..... (1)

(c) State **one** property of oxygen that allows it to be collected as shown in the diagram.

..... (1)

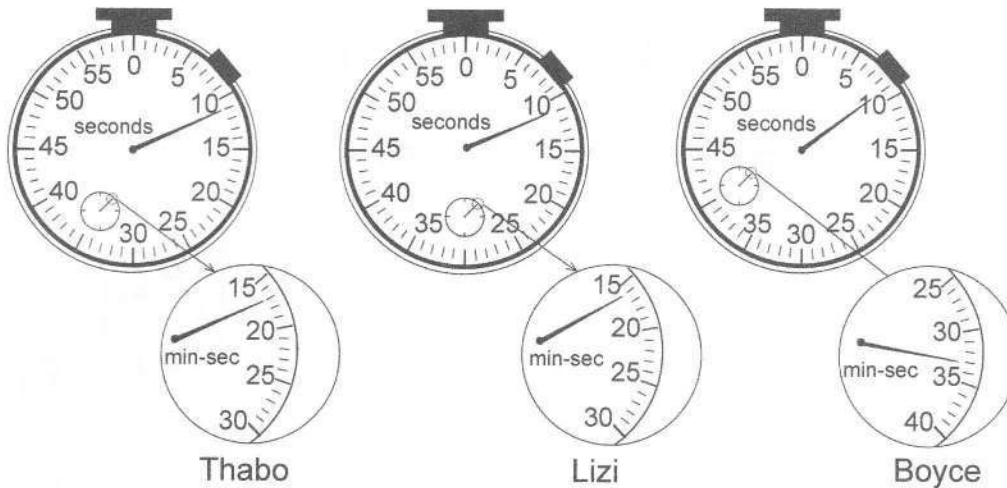
(d) Describe a test that can be performed to confirm that the gas collected is oxygen.

Test:

Result: (2)



14. In a 100 m race, three timekeepers Thabo, Lizi and Boyce were assigned to measure the time taken by an athlete at position 1. Thabo and Lizi started their stop clocks when they saw smoke coming from the starter gun. Boyce started his stop clock when he heard the sound of the gun. The times measured by the three timekeepers are as shown on the stop clocks below.



- (a) In the table below, record the time shown on the stop clock for each timekeeper.

Timekeeper	Time (s)
Thabo	
Lizi	
Boyce	

(2)

- (b) (i) Who of the timekeepers was **not** accurate?

..... (1)

- (ii) Explain your answer for (b) (i).

..... (1)

- (c) On the display below, transform the time on the stop clock operated by Thabo to a digital form.

Hour	Minutes	Seconds	$\frac{1}{100}$
<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>

(1)

