



BOTSWANA EXAMINATIONS COUNCIL
JUNIOR CERTIFICATE EXAMINATION

SCIENCE

14/2

Paper 2

October/November 2012

Marks: 80

Time: 2 Hours

Candidate's Examination Number:

Centre					Candidate			

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. Marks will be lost if all necessary working is not shown.
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.

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



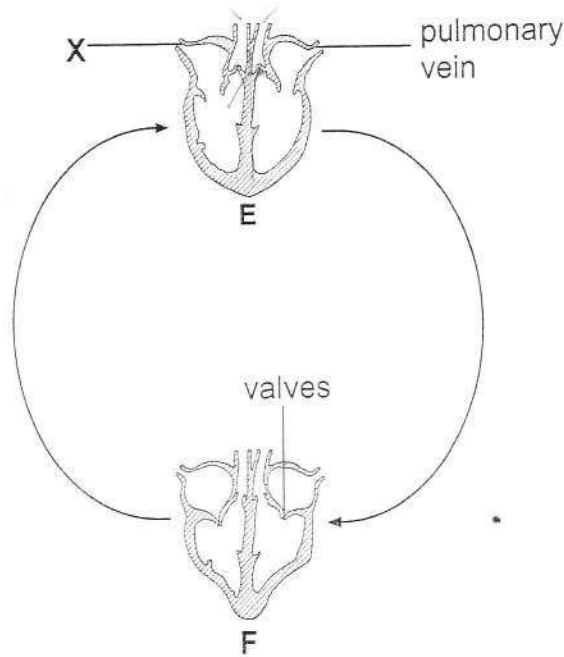
SECTION A

(60 Marks)

For
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Use

Answer all questions in this section.

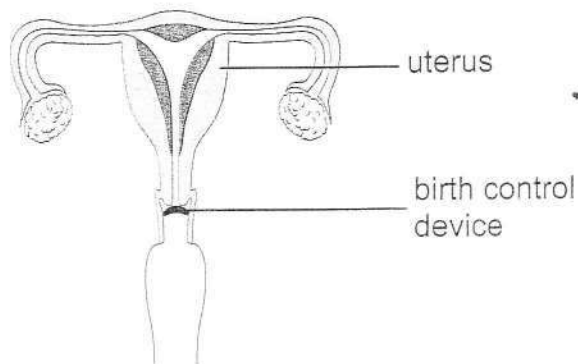
The diagram below shows the heart at different stages, E and F, during a heart-beat. Use it to answer questions 1 (a) and (b).



1. (a) (i) Name blood vessel, X.
..... (1)
- (ii) Which of the blood vessels, X or the pulmonary vein, carries blood with more oxygen?
..... (1)
- (iii) Explain your answer in (a) (ii).
.....
..... (1)
- (b) Describe what happens at stage E.
.....
.....
.....
..... (2)

- (c) What is the function of the valves at stage F?
..... (1)

The diagram below shows a birth control device used in a part of a female reproductive system. Use it to answer question 2.



2. (a) On the diagram, label with a letter;
- (i) U, the part where hormones are produced. (1)
 - (ii) T, the part where implantation normally takes place. (1)
- (b) (i) Name the birth control device shown.
..... (1)
- (ii) Explain how the device works in birth control.
.....
.....
..... (2)
 - (iii) State **one** disadvantage of using this device of birth control.
.....
..... (1)

The table below shows the average percentage composition of gases in inhaled air and in exhaled air by human beings. Use it to answer questions 3 (a) and (b).

Composition of gases in		
Gas	Inhaled air	Exhaled air
Nitrogen	79%	78.7%
Oxygen	20%	16%
Carbon dioxide	0.03%	4.2%

3. (a) Calculate the percentage of oxygen absorbed into the blood from the inhaled air. Show your working.

percentage of oxygen = % (2)

- (b) Explain why 4.2% of carbon dioxide was exhaled whereas 0.03% was inhaled.

.....

 (2)

- (c) Gaseous exchange occurs in the lungs.

(i) Name the part of the lungs where gaseous exchange occurs.
 (1)

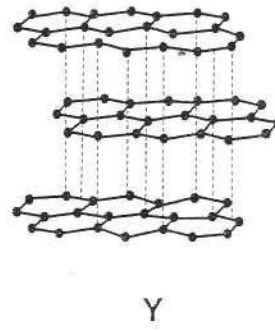
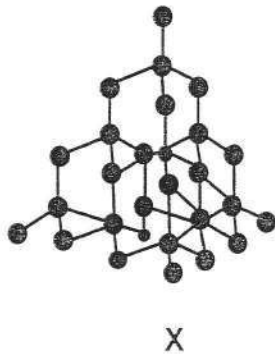
(ii) State **one** characteristic of the part named in (c) (i).
 (1)

The table below shows the pH values of five substances.
Use it to answer question 4.

Substance	P	Q	R	S	T
pH value	5	7	13	9	1

4. (a) Which of the substances P, Q, R, S or T;
- (i) is a weak acid?
..... (1)
- (ii) could be pure water?
..... (1)
- (iii) would be the best to neutralise excess acid in the stomach?
..... (1)
- (b) What will be the colour of a Universal Indicator liquid in substances S and T?
- S.....
- T..... (2)
-

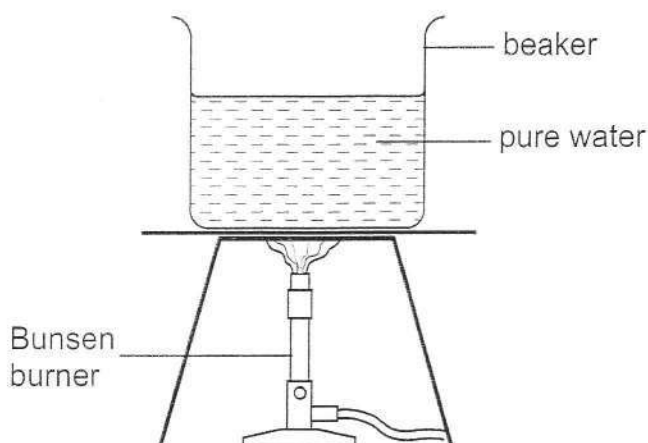
Diagrams X and Y represent allotropes of carbon.
Use the diagrams to answer question 5.



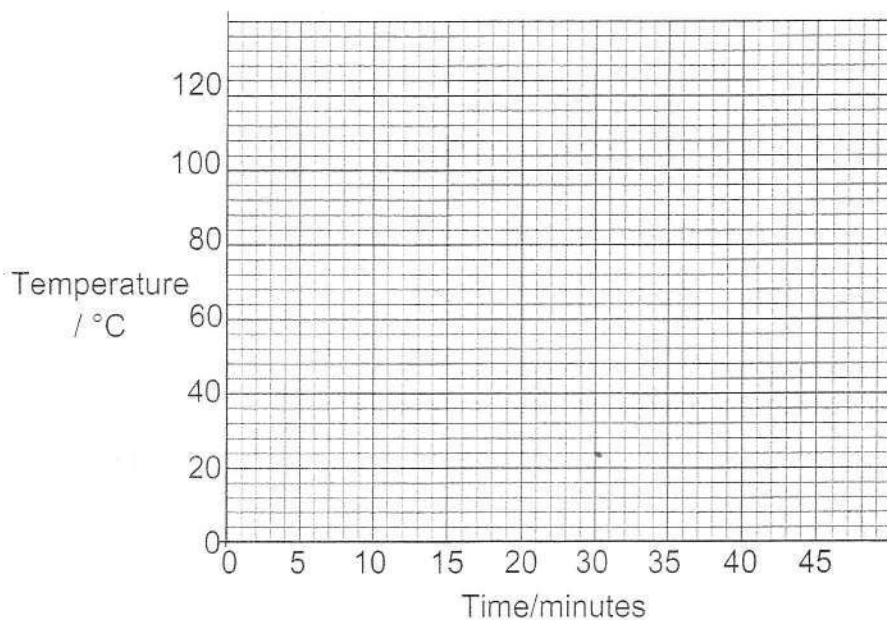
5. (a) In which group in the Periodic Table is carbon found?
..... (1)
- (b) Define allotropes.
.....
..... (1)
- (c) (i) Which of the allotropes, X or Y, conducts electricity?
..... (1)
- (ii) State the reason for your answer in (c) (i).
.....
..... (1)
-

Use the diagram and the information below to answer question 6.

The diagram shows an incomplete set-up used to investigate the change in the temperature of pure water when heated. The pure water used in the experiment was at room temperature of 25°C and was heated until it boiled. The boiling point of water is 96°C and the water took 20 minutes to boil.

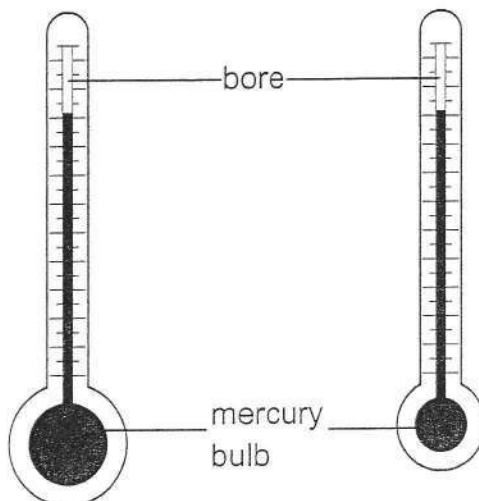


6. (a) A thermometer is missing from the set-up. Use a cross (x) to show the position where the bulb of the thermometer should be placed in the beaker. (1)
- (b) Using the grid below, sketch the heating curve of the water in the investigation above. Label the curve with letter **A**.



- (c) The experiment was repeated, now heating with **two** Bunsen burners to double the amount of heat. On the grid above, sketch the expected heating curve of the repeated experiment and label it **B**. (2)

The diagrams below show two laboratory mercury thermometers A and B. Use them to answer question 7.



Thermometer A

Thermometer B

7. (a) State the difference between the **two** thermometers.

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

(b) (i) Which of the thermometers can be used to measure a wider range of temperatures?

..... (1)

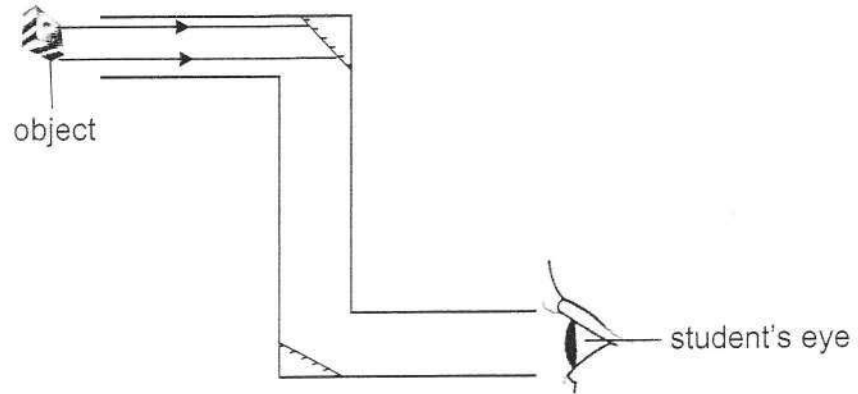
(ii) Explain your answer in (b) (i).

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

(c) The reading on thermometer **A** is 27°C .
What will be the reading in the Kelvin scale?

.....K (2)

The diagram below shows an optical instrument used by a student to view an object. Use it to answer questions 8 (a) and (b).



8. (a) Name the type of the mirrors used in the optical instrument.
..... (1)
- (b) On the diagram, show how the light rays reach the student's eye. (2)
- (c) State any of the laws of reflection.
..... (1)
- (d) (i) Describe a transverse wave.
.....
..... (1)
- (ii) Give **one** example of a transverse wave.
..... (1)

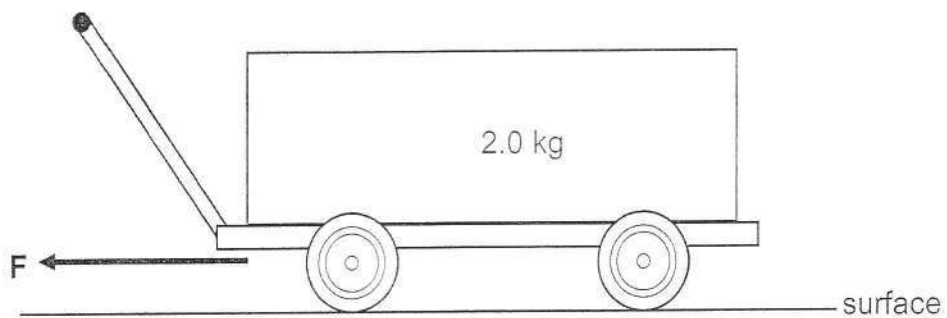
9. (a) (i) State any **two** effects of a force on the motion of a body.

.....
 (2)

- (ii) Define acceleration.

.....
 (1)

The diagram below shows a trolley of mass 2.0 kg pulled along a smooth surface with a constant force, F .
 Use it to answer question 9 (b).



- (b) (i) The acceleration of the trolley is 1.5 m/s^2 .
 Calculate the magnitude of force F .

..... (3)

- (ii) Another force of 2.0 N is applied on the trolley in the opposite direction.
 Suggest what will happen to the motion of the trolley.

.....
 (1)

- (iii) Apart from force F , name any other force acting on the body.

..... (1)

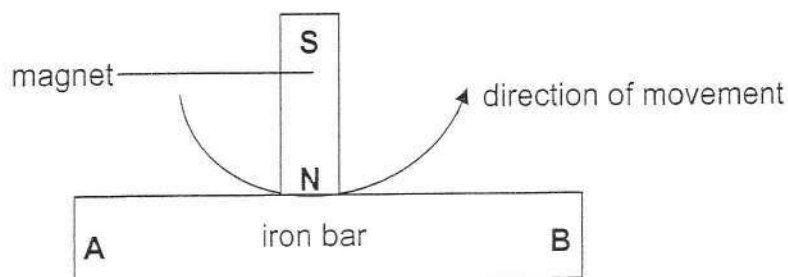
(c) A bus leaves the bus rank and its speed increases from 0 to 60 m/s in 30 seconds. Calculate the acceleration of the bus.

.....m/s² (2)

10. Name any **two** layers of the Earth.

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

The diagram below shows one of the methods that can be used to magnetise a piece of an iron bar. Use it to answer question 11.



11. (a) Name the method used in the diagram above to magnetise the iron bar.
..... (1)
- (b) What pole would be induced at end **B** on the iron bar?
..... (1)
- (c) (i) What type of magnet would be formed?
..... (1)
- (ii) Explain your answer in (c) (i).
..... (1)
- (d) Name another method that can be used to magnetise the iron bar.
..... (1)

SECTION B

(20 Marks)

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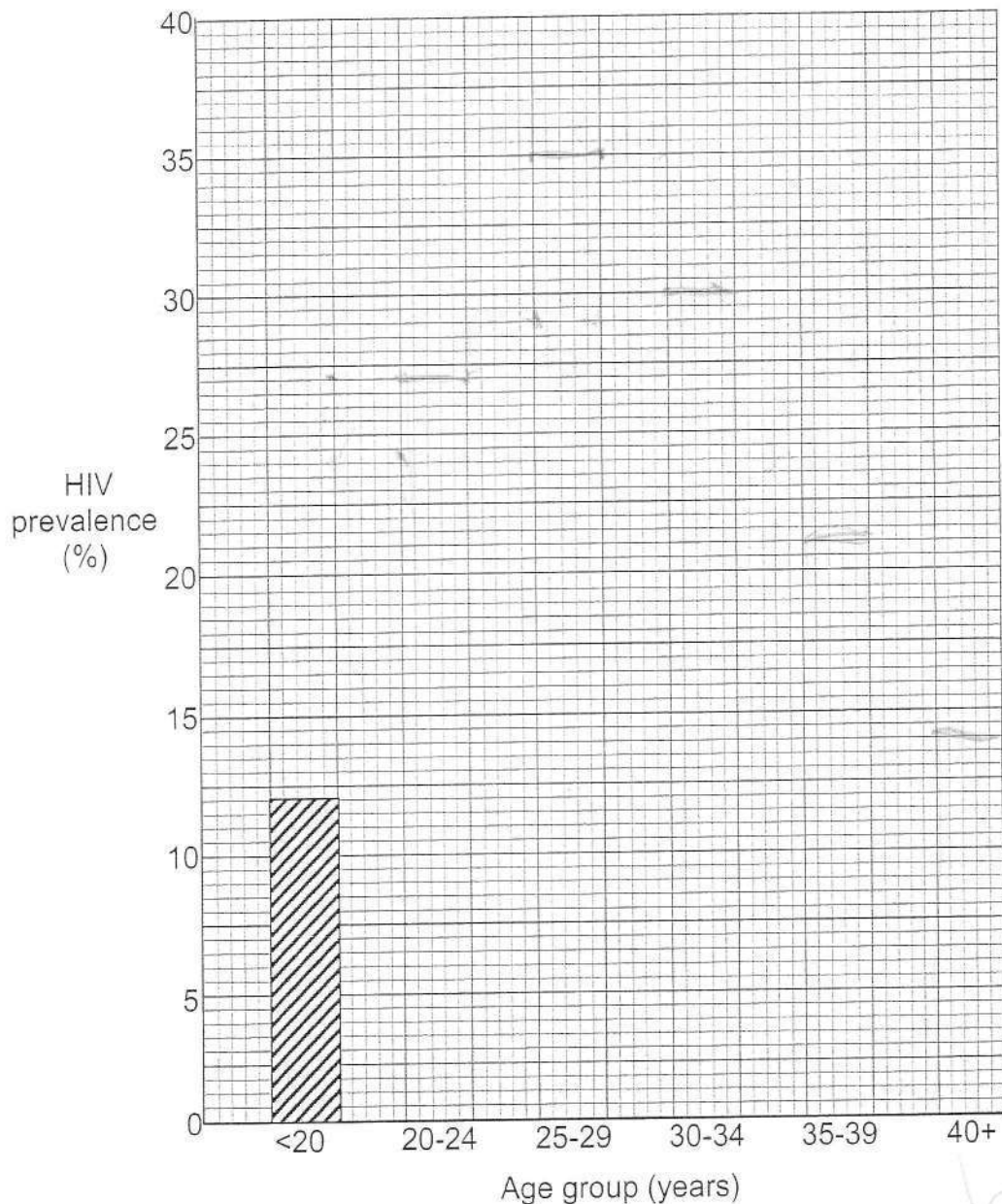
Answer all questions in this section.

Use the information below to answer question 12.

The table shows the estimated HIV prevalence in 2004 among women of different age groups who attended an antenatal clinic in Marula town.

Age group (years)	<20	20-24	25-29	30-34	35-39	40+
HIV prevalence (%)	12	27	35	30	21	14

12. (a) On the grid below, draw a bar chart using the information in the table. The first bar has been drawn for you.



(4)

(b) Which age group has the highest percentage of HIV prevalence among women?

..... (1)

(c) A 27 years old woman attended the Marula antenatal clinic.
What is the percentage chance that the woman is HIV positive?

..... (1)

(d) Describe the trend of the spread of HIV amongst women attending the antenatal clinic in Marula town.

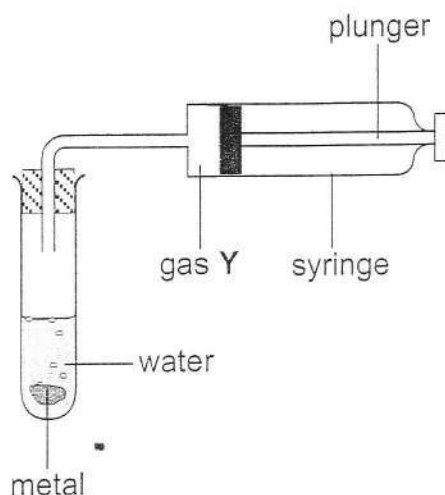
.....
.....
..... (2)

(e) Suggest any **two** reasons why the results of this study may **not** be a true reflection of the percentage of women who are HIV positive in Marula town.

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

Use the diagram and the information below to answer questions 13 (a) to (d).

The diagram shows a set-up used to compare the reaction of calcium with water and that of barium with water. To make the comparison of the reactions fair, the mass of barium and the mass of calcium should be the **same**. The two metals are found in Group 2 in the Periodic Table.



13. (a) Name gas Y.
 (1)
- (b) Suggest **two** other factors which should be the same to make the comparison fair.

 (2)
- (c) After two minutes from the start of the experiment, the plunger of the syringe in the barium experiment had moved out further than in the calcium experiment.
 Explain this observation.

 (1)
- (d) Which substance other than water can be used in the experiment?
 (1)

Use the information below to answer question 13 (e).

A student was provided with the following apparatus:

- ruler
- triple-beam balance
- 250 ml beaker
- 250 ml measuring cylinder
- 500 ml of water in a beaker
- a string
- a metal ball with a hook
- a cork

(e) Describe how the volume of the cork can be determined using the apparatus listed above. You may use diagrams in your description.

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(5)