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COMBINED SCIENCE

PAPER 2 3102/2

Thursday **9 JUNE 2022** 1:30 P.M.–3:00 P.M.

No additional materials required.

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your school number, candidate number, surname and initials in the spaces provided on this question booklet.

Answer **ALL** questions on this paper in the spaces provided in this question booklet.

Read each question carefully and make sure you know what you have been asked to do before starting your answer.

The number of marks is given in brackets [] at the end of each question or part question.

A copy of the Periodic Table is printed on page 2.

Calculators are permitted, however **NO** graphing calculators are allowed.

For Examiner's Use	
1	
2	
3	
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6	
7	
8	
TOTAL	

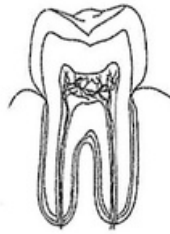
This question paper consists of 16 printed pages.

[illegible]

Key

a	a = relative atomic mass
X	X = atomic symbol
b	b = proton (atomic) number

1. The diagram represents one of the four kinds of permanent teeth found in the human mouth.



- (a) (i) What type of tooth is shown in the diagram and what is its function?

Name _____

Function _____ [2]

- (ii) Name **one** other type of tooth and give its function.

Name _____

Function _____ [2]

- (b) Explain how a diet rich in refined sugar may result in tooth decay.

_____ [3]

- (c) After food leaves the mouth, it travels down the oesophagus as a bolus.

- (i) State the name for this process.

_____ [1]

- (ii) Describe how food is moved along the oesophagus.

_____ [2]

TOTAL MARKS [10]



2. In the lab a student uses blue and red litmus paper to test and classify the chemicals contained in three bottles, **A**, **B** and **C** with missing labels.

The results obtained by the student are shown in the table below.

Chemical	Observation	
	<i>Blue litmus paper</i>	<i>Red litmus paper</i>
A	remains blue	remains red
B	turns red	remains red
C	remains blue	turns blue

- (a) Use the observations given in the table to classify substances **A**, **B** and **C** as either an acid, a base or a neutral substance.

A _____

B _____

C _____ [3]

- (b) Another student spills some acid on the lab desk and wanted to neutralise the acid before wiping the desk.

Which of the chemicals tested would you recommend the student use to neutralise the acid on the lab desk?

_____ [1]



- (c) A common acid and base used in the lab is shown below.

Acid: HCl

Base: NaOH

- (i) Acids and bases change the colour of pH indicators.

State **one** other property that is different between acids and bases.

_____ [1]

- (ii) Name the **two** products formed when the acid and base in (c) react together.

_____ [1]

- (d) Magnesium reacts vigorously with dilute hydrochloric acid.

- (i) Write the word equation for this reaction.

_____ [2]

- (ii) Describe what you can see occurring in the reaction vessel as this reaction proceeds.

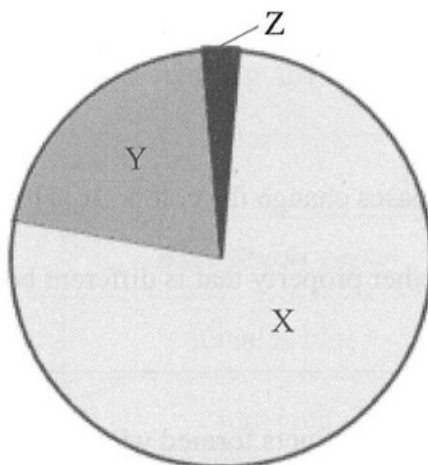
Observation 1 _____

Observation 2 _____ [2]

TOTAL MARKS [10]



3. The pie chart shows the composition of gases in dry air.



- (a) Which letter represents oxygen gas?
_____ [1]
- (b) State the name of a natural process that produces oxygen.
_____ [1]
- (c) Name another element found in dry air.
_____ [1]
- (d) Oxygen is used in many processes.
- (i) Complete the word equation for the reaction that takes place between fossil fuels and excess oxygen.
Fossil fuels + oxygen $\longrightarrow$ _____ + _____ [2]
- (ii) Name the type of reaction in (d) (i) taking place between fossil fuels and oxygen.
_____ [1]



- (iii) State **one** reason why this reaction is important.

_____ [1]

- (e) When fossil fuels are burned in power stations, air pollutants are produced.

- (i) Name an air pollutant that contributes to the formation of acid rain.

_____ [1]

- (ii) Name **two** negative effects of acid rain on living things.

1. _____

2. _____ [2]

TOTAL MARKS [10]



4. (a) The symbol equation shows the metal potassium reacting with the non-metal sulphur to form potassium sulphide.



- (i) Give **one** property of sulphur that indicates it is a non-metal.

_____ [1]

- (ii) Explain why chemical bonds are formed.

_____ [2]

- (iii) Use information in the symbol equation to describe what happens to the outer electrons when potassium reacts with sulphur.

_____ [2]

- (b) Methane is a covalently-bonded compound.

- (i) Write the chemical formula of methane.

_____ [1]

- (ii) Draw a dot-and-cross diagram to show the bonding in methane.



- (iii) At room temperature and pressure, methane is a gas.

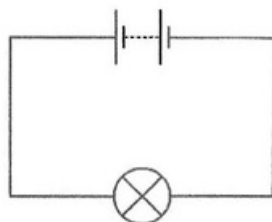
Describe what would happen to the gas particles if the temperature was lowered so that they condense.

[2]

TOTAL MARKS [10]



5. This simple circuit can be used to light a bulb.



The current from a battery is direct current. The current from the mains supply is alternating current.

- (a) (i) Define current electricity.

_____ [1]

- (ii) Explain the difference between direct current and alternating current.

_____ [2]

- (iii) Give **one** advantage of using alternating current over direct current.

_____ [1]

- (b) In a room in a house there are four electrical lamps in parallel with each other, controlled by a single switch. With all the lamps working, one of the lamp filaments suddenly breaks.

What, if anything, happens to the remaining lamps? Give a reason for your answer.

_____ [2]



(c) A voltmeter is used to measure the potential difference across resistors.

(i) Define potential difference.

[2]

(ii) Give the unit used to measure potential difference.

[1]

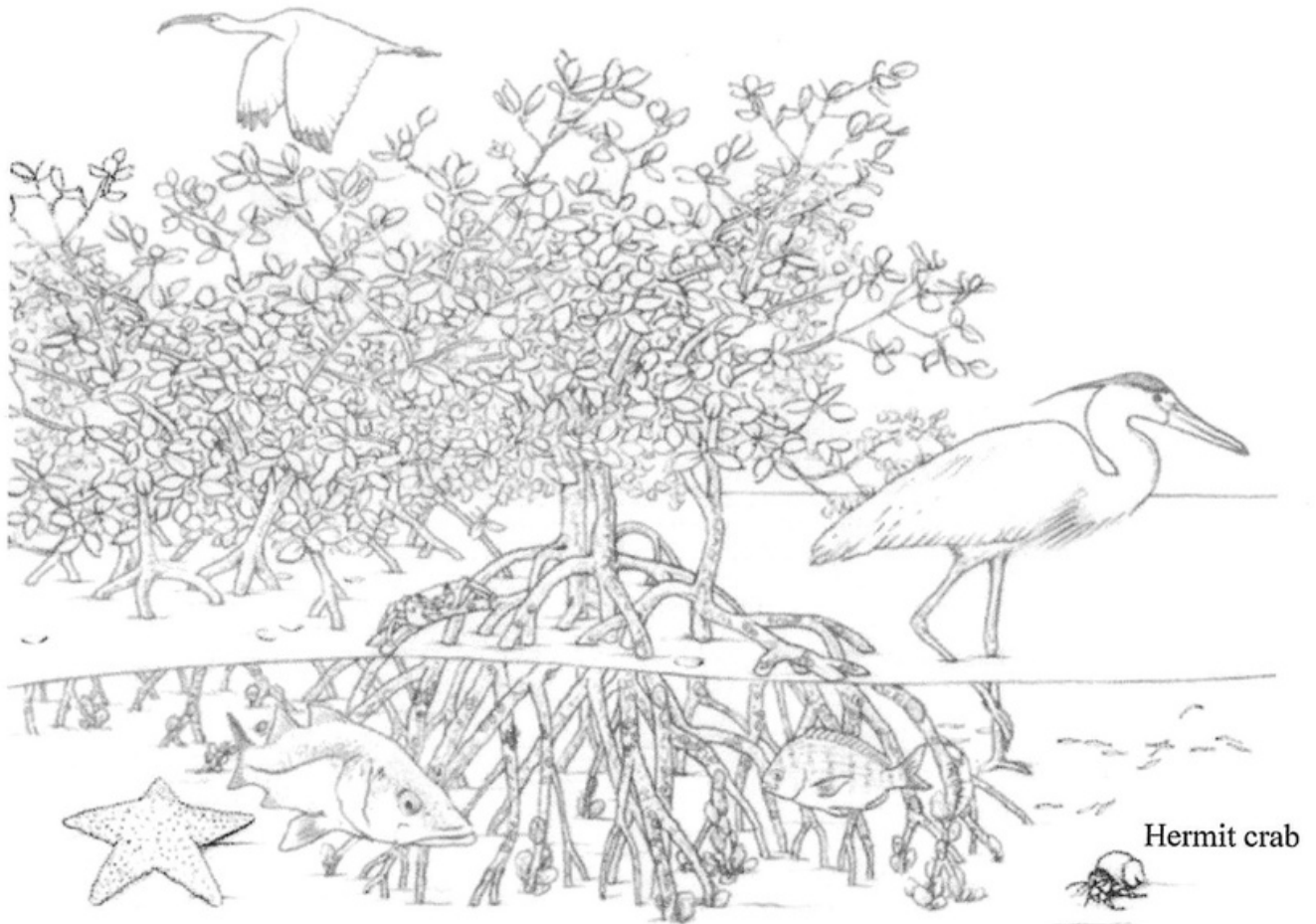
(iii) Describe the function of a resistor.

[1]

TOTAL MARKS [10]



6. The diagram shows an ecosystem in The Bahamas.



- (a) (i) Define the term ecosystem.

_____ [2]

- (ii) What is the principal source of energy for any biological system?

_____ [1]

- (b) (i) Name the plant shown in the diagram.

_____ [1]

- (ii) Identify **one** feature seen in this plant that allows it to adapt to its environment.

_____ [1]



- (iii) Give **one** benefit of this plant to The Bahamas.

_____ [1]

- (c) The hermit crab shown in the diagram can also be found in another ecosystem in The Bahamas.

Name that ecosystem.

_____ [1]

- (d) (i) The ecosystem shown in the diagram is very biodiverse.

Explain the term biodiverse.

_____ [2]

- (ii) State **one** way in which human activities can prevent ecosystems from being biodiverse.

_____ [1]

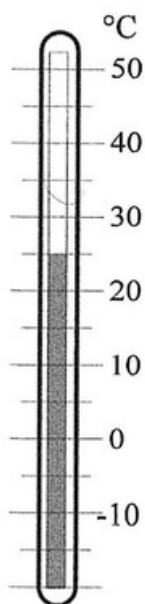
TOTAL MARKS [10]



7. (a) Define temperature in terms of the *kinetic theory*.

[2]

- (b) The diagram shows a thermometer reading in degrees Celsius.



- (i) Convert this value to Kelvin. (Include the unit in your answer.)

[2]

- (ii) State the freezing and boiling points of water on the Celsius scale.

Freezing point _____ °C

Boiling point _____ °C

[1]



- (c) The diagram shows a pot being heated on a stovetop.



Three types of heat transfer, **A**, **B** and **C**, are shown.

- (i) Name the three types of heat transfer.

A _____

B _____

C _____

[3]

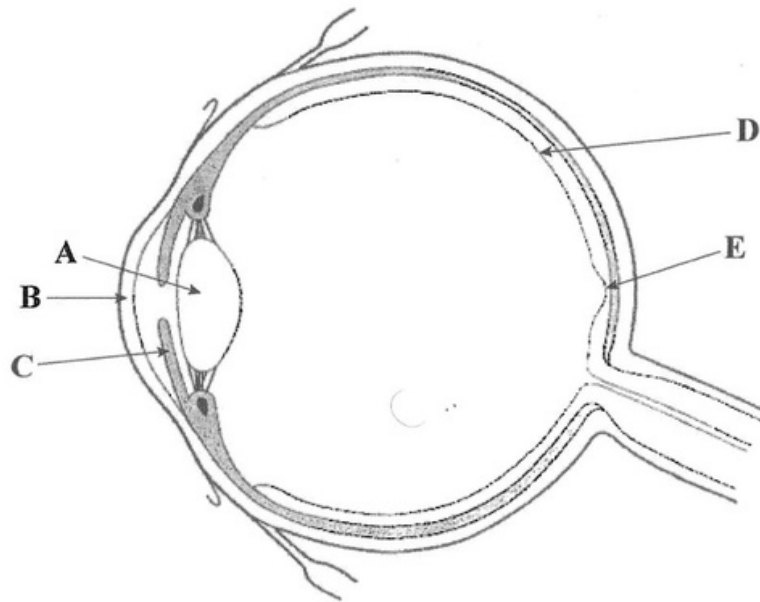
- (ii) Energy is passed from the heated pot throughout the liquid.

In terms of particle behaviour, explain how this type of heat transfer occurs.

[2]

TOTAL MARKS [10]

8. The diagram shows a section of the human eye.



- (a) (i) Name the structures labelled **A**, **B**, **C** and **D**.

A _____ **B** _____
C _____ **D** _____ [4]

- (ii) State the functions of **B** and **E**.

B _____
E _____ [2]

- (b) Name the nerve that connects the eye with the brain.

_____ [1]

- (c) Explain why it is necessary to control the amount of light entering the eye.

_____ [1]

- (d) Name **two** kinds of cells found in **D**.

_____ [2]

TOTAL MARKS [10]

End]

