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# COMBINED SCIENCE

PAPER 5

# ALTERNATIVE TO COURSEWORK

Wednesday **5 JUNE 2024** 10:45 a.m. – 12 noon

**Additional materials required:**
**Calculators (not graphing)**

## MINISTRY OF EDUCATION
## NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

**INSTRUCTIONS AND INFORMATION FOR CANDIDATES**

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

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

Answer **ALL** questions.

Written answers should be kept to the lines provided and drawings should be made in the spaces provided.

**No** additional sheets of paper should be inserted in this booklet.

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.

| FOR EXAMINER'S USE | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| TOTAL | |

This question paper consists of 13 printed pages and 3 blank pages.

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## The Periodic Table of the Elements

Group

| I | II | | | | | | | | | | | III | IV | V | VI | VII | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1<br>H<br>Hydrogen<br>1 | | | | | | | | | | 4<br>He<br>Helium<br>2 |
| 7<br>Li<br>Lithium<br>3 | 9<br>Be<br>Beryllium<br>4 | | | | | | | | | | | 11<br>B<br>Boron<br>5 | 12<br>C<br>Carbon<br>6 | 14<br>N<br>Nitrogen<br>7 | 16<br>O<br>Oxygen<br>8 | 19<br>F<br>Fluorine<br>9 | 20<br>Ne<br>Neon<br>10 |
| 23<br>Na<br>Sodium<br>11 | 24<br>Mg<br>Magnesium<br>12 | | | | | | | | | | | 27<br>Al<br>Aluminium<br>13 | 28<br>Si<br>Silicon<br>14 | 31<br>P<br>Phosphorous<br>15 | 32<br>S<br>Sulfur<br>16 | 35.5<br>Cl<br>Chlorine<br>17 | 40<br>Ar<br>Argon<br>18 |
| 39<br>K<br>Potassium<br>19 | 40<br>Ca<br>Calcium<br>20 | 45<br>Sc<br>Scandium<br>21 | 48<br>Ti<br>Titanium<br>22 | 51<br>V<br>Vanadium<br>23 | 52<br>Cr<br>Chromium<br>24 | 55<br>Mn<br>Manganese<br>25 | 56<br>Fe<br>Iron<br>26 | 58<br>Co<br>Cobalt<br>27 | 59<br>Ni<br>Nickel<br>28 | 64<br>Cu<br>Copper<br>29 | 69<br>Zn<br>Zinc<br>30 | 70<br>Ga<br>Gallium<br>31 | 73<br>Ge<br>Germanium<br>32 | 75<br>As<br>Arsenic<br>33 | 79<br>Se<br>Selenium<br>34 | 80<br>Br<br>Bromine<br>35 | 84<br>Kr<br>Krypton<br>36 |
| 85<br>Rb<br>Rubidium<br>37 | 86<br>Sr<br>Strontium<br>38 | 89<br>Y<br>Yttrium<br>39 | 91<br>Zr<br>Zirconium<br>40 | 93<br>Nb<br>Niobium<br>41 | 95<br>Mo<br>Molybdenum<br>42 | Tc<br>Technetium<br>43 | 101<br>Ru<br>Ruthenium<br>44 | 103<br>Rh<br>Rhodium<br>45 | 106<br>Pd<br>Palladium<br>46 | 108<br>Ag<br>Silver<br>47 | 112<br>Cd<br>Cadmium<br>48 | 115<br>In<br>Indium<br>49 | 119<br>Sn<br>Tin<br>50 | 122<br>Sb<br>Antimony<br>51 | 126<br>Te<br>Tellurium<br>52 | 127<br>I<br>Iodine<br>53 | 131<br>Xe<br>Xenon<br>54 |
| 133<br>Cs<br>Cesium<br>55 | 137<br>Ba<br>Barium<br>56 | 138<br>La<br>Lanthanum<br>57 | 178<br>Hf<br>Hafnium<br>*72 | 181<br>Ta<br>Tantalum<br>73 | 184<br>W<br>Tungsten<br>74 | 188<br>Re<br>Rhenium<br>75 | 190<br>Os<br>Osmium<br>76 | 192<br>Ir<br>Iridium<br>77 | 195<br>Pt<br>Platinum<br>78 | 197<br>Au<br>Gold<br>79 | 201<br>Hg<br>Mercury<br>80 | 204<br>Tl<br>Thallium<br>81 | 207<br>Pb<br>Lead<br>82 | 209<br>Bi<br>Bismuth<br>83 | Po<br>Polonium<br>84 | At<br>Astatine<br>85 | Rn<br>Radon<br>86 |
| Fr<br>Francium<br>87 | 226<br>Ra<br>Radium<br>88 | 227<br>Ac<br>Actinium<br>†89 | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 140<br>Ce<br>Cerium<br>58 | 141<br>Pr<br>Praseodymium<br>59 | 144<br>Nd<br>Neodymium<br>60 | Pm<br>Promethium<br>61 | 150<br>Sm<br>Samarium<br>62 | 152<br>Eu<br>Europium<br>63 | 157<br>Gd<br>Gadolinium<br>64 | 159<br>Tb<br>Terbium<br>65 | 162<br>Dy<br>Dysprosium<br>66 | 165<br>Ho<br>Holmium<br>67 | 167<br>Er<br>Erbium<br>68 | 169<br>Tm<br>Thulium<br>69 | 173<br>Yb<br>Ytterbium<br>70 | 175<br>Lu<br>Lutetium<br>71 |
| 232<br>Th<br>Thorium<br>90 | Pa<br>Protactinium<br>91 | 238<br>U<br>Uranium<br>92 | Np<br>Neptium<br>93 | Pu<br>Plutonium<br>94 | Am<br>Americium<br>95 | Cm<br>Curium<br>96 | Bk<br>Berkelium<br>97 | Cf<br>Californium<br>98 | Es<br>Einsteinium<br>99 | Fm<br>Fermium<br>100 | Md<br>Mendelevium<br>101 | No<br>Nobelium<br>102 | Lr<br>Lawrencium<br>103 |

*58 - 71 Lanthonoid series
†190 - 103 Actinoid seried

Key

| | |
|---|---|
| a<br>X<br>b | a = relative atomic mass<br>X = static symbol<br>b = proton (atomic number) |

1. Air is a mixture of gases.

(a) **Fig 1.1** shows the apparatus a student uses to prepare and collect a sample of oxygen gas for testing in the lab.

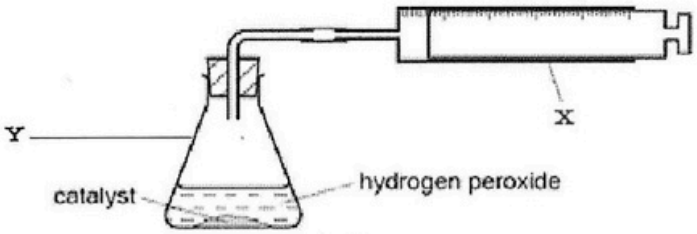


**Fig 1.1**

(i) Name the apparatus labelled **X** used to collect the oxygen gas.

_____ [1]

(ii) Name the apparatus labelled **Y** where the reactants are placed.

_____ [1]

(b) Describe the test for oxygen and state the positive result.

Test _____

Positive result _____

[2]

(c) (i) Describe a method to show how to collect carbon dioxide gas in the laboratory. Include the equipment and material to be used.

_____

_____

_____

_____

_____ [3]

(ii) Describe what you would see happening in the reaction vessel in (c) (i).

_____ [1]

**[Turn over**

(d) When the carbon dioxide is prepared and collected it can be tested.

Describe the test for carbon dioxide.

Description _____

Positive result _____

[2

**Total marks [1**

**BLANK PAGE**

**[Turn over**

2. Christopher is a long distance runner. He decides to investigate various food items on his diet plan. **Fig 2.1** shows how he set up the experiment. The amount of water in the boiling tube is 20 $cm^3$ (1 $cm^3$ of water = 1 g)

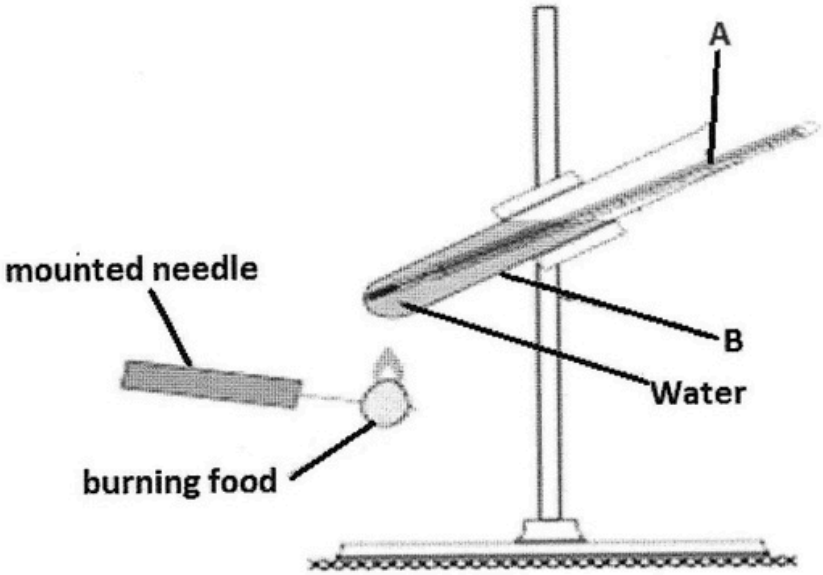


**Fig 2.1**

(a) (i) State the aim of the experiment.

_____

_____ [

(ii) Identify **two** variables to be controlled in this experiment.

1 _____

_____

2 _____

_____

(iii) Give the names of the pieces of equipment labeled apparatus **A** and **B**.

**A** _____

**B** _____

[2]

(iv) Suggest **two** safety precautions necessary when performing this experiment.

1 _____

_____

2 _____

_____

[2]

(b) Christopher conducted the experiment and obtained the results shown in the table.

| Food Sample | Initial mass /g | Initial temperature of water /°C | Final temperature of water /°C |
|---|---|---|---|
| **A** | 3.17 | 36.6 | 53.3 |
| **B** | 3.17 | 41.5 | 52.1 |

Use the equation shown to calculate the energy per g in sample **A**.

$$\text{Energy released from food per gram} \quad \frac{\text{Mass of water /g x temperature rise /°C x 4.2}}{\text{Mass of food sample / g}}$$

[2]

**Total Marks [10]**

**[Turn over**

3. This question is about the effect of heat on matter.

(a) **Fig. 3.1** shows a mercury thermometer.

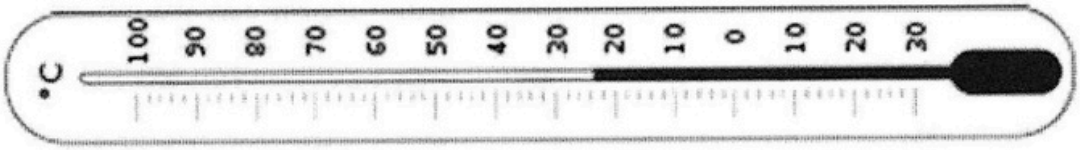


**Fig. 3.1**

State the temperature shown in **Fig. 3.1**.

_____ [

(b) A student conducted an experiment to observe the rate of heat transfer in different metals. The apparatus is shown in **Fig.3.2**.

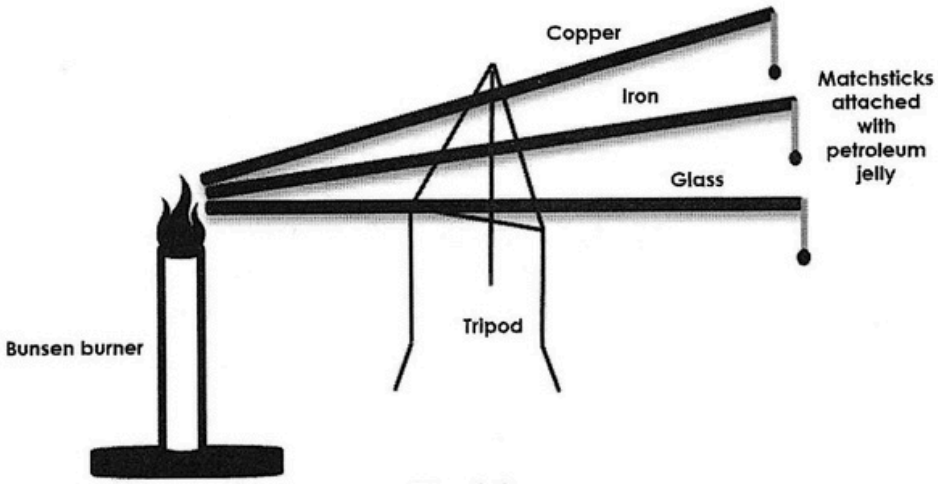


**Fig. 3.2**

(i) State which heat transfer method is being investigated in this experiment.

_____ [

(ii) Explain how the student will know which metal has the highest rate of heat transfer.

_____ [

(iii) State **two** experimental variables that must be controlled in this experiment.

Variable 1 _____

Variable 2 _____

[2]

(c) Another student conducts a similar experiment using the apparatus shown in Fig. 3.3. Two identical pieces of cork are placed onto metal plates with petroleum jelly.

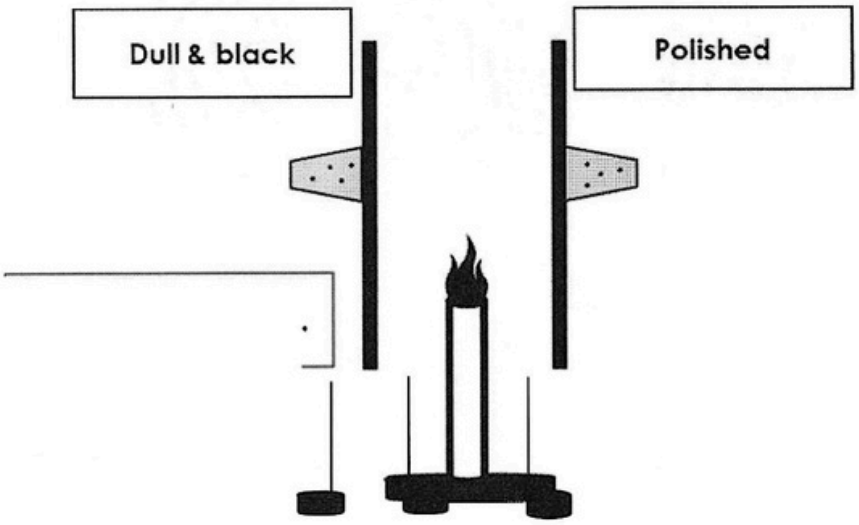


**Fig. 3.3**

(i) State which heat transfer method is being investigated.

_____ [1]

(ii) State **two** experimental variables that must be controlled.

Variable 1 _____

Variable 2 _____

[2]

(iii) Give a possible conclusion for this experiment.

_____

_____ [2]

**Total Marks [10]**
**[Turn over**

4. This question is about magnetism.

Iron filings were poured over two magnets and the field lines shown below were revealed.

(a) Correctly label the North and South Poles for each magnet **in Fig 4.1**.

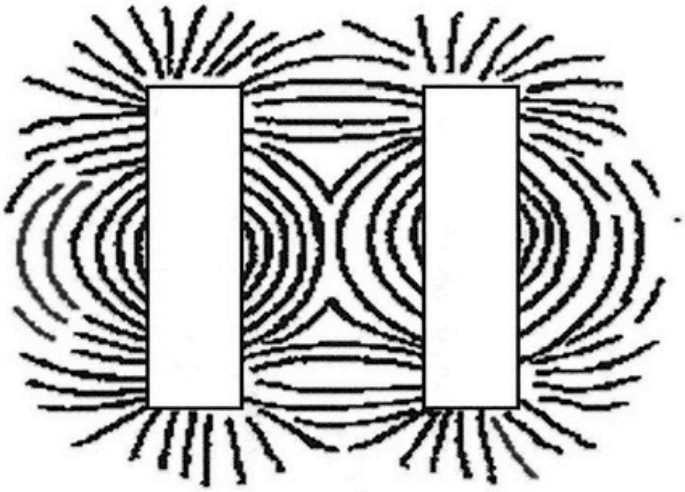

**Fig. 4.1**

[2]

(b) A bar magnet is hovered over a cluster of paper clips. The paper clips are attracted to the magnet.

(i) Write a hypothesis to express what you expect to see in this investigation.

_____

_____ [1]

(ii) Label the poles of the magnet and draw the position of two of the paper clips on **Fig. 4.2** to show the behavior of the paper clips in response to the magnet.

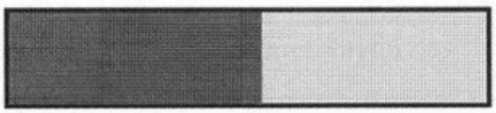

**Fig. 4.2**

[1]

(iii) A student cuts the bar magnet in half.
Describe what the student observed when the two new magnets are moved towards the paper clips.

_____

_____ [1]

(c) Using an iron nail, a wire, and a battery, describe how to construct an electromagnet.

(i) A labelled diagram of the apparatus must be included in your response.

_____

_____

_____

_____

[3]

(ii) Describe **two** ways students can modify the electromagnet to make it stronger.

1 _____

2 _____

[2]

5. An experiment was set up to investigate photosynthesis using an aquatic plant.

Gas bubbles were formed and the gas collected in the test-tube as shown.

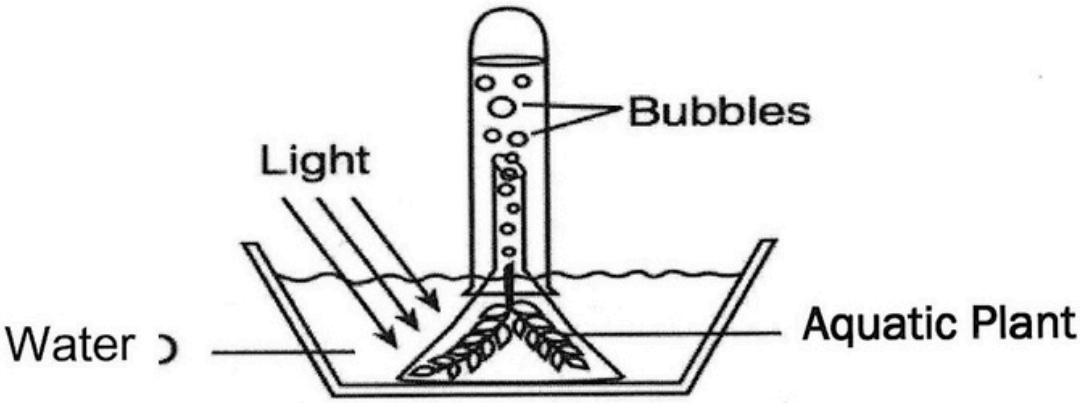


**Fig. 5.1**

(a) Write a hypothesis for this experiment.

_____

_____ [1]

(b) In the presence of sunlight plants produce a gas.

Identify the gas collected in the test-tube.

_____ [1]

(c) Suggest **one** variable that can affect the results of this experiment.

_____

_____ [1]

(d) To further investigate the activity of aquatic plants, the plants were allowed to grow in the dark. Describe what was observed when the aquatic plants were in the dark.

_____

_____ [1

(e) Give an explanation of the observations made when the aquatic plants were in the dark.

_____

_____ [2]

(f) When plants carry out photosynthesis, glucose is produced. Glucose is then converted to the storage material, starch.

Describe how to test a leaf for the presence of starch.

_____

_____

_____

_____

_____

_____ [4]

**Total Marks [10]**

**End]**

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**[Turn over**

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