student BGCSE exam Past Paper Booklet Combined Science
BGCSE
Combined Science
Year 2003
Papers 1, 2, & 3
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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 initials in the spaces provided above and on the answer booklet.

Answer ALL questions in Section A (1-4) in the spaces provided.

Answer ANY two (2) out of three (3) questions from Section B in the answer booklet provided which must be attached to the back of the question booklet.

Candidates are advised to spend no more than 35 minutes on Section A.

The mark for each part question is given in brackets [ ].
1. Which piece of apparatus is used to find the mass of a solid?

![Apparatus Options]

A  
B  
C  
D  

2. The diagram shows the level of liquid in a measuring cylinder.

![Liquid Level Diagram]

What is the volume of the liquid?

A  \(24 \text{ cm}^3\)
B  \(28 \text{ cm}^3\)
C  \(29 \text{ cm}^3\)
D  \(32 \text{ cm}^3\)
3. At which level of organization is the stomach?
   A  cell
   B  organ
   C  system
   D  tissue

4. Which is the symbol for a cell?
   - [Image of symbols A, B, C, D]

5. Which form of energy is stored in a battery?
   A  chemical
   B  electrical
   C  kinetic
   D  light

6. The diagram below shows the approximate percentage of gases in the atmosphere.
   - [Pie chart with percentages: 79%, 20%, 1%]
   Which gas makes up 79% of the atmosphere?
   A  carbon dioxide
   B  nitrogen
   C  oxygen
   D  sulphur dioxide
7. The diagram shows the teeth in a man's upper jaw.

Which letter shows a canine tooth?

![Diagram of teeth]

8. Which process occurs only in plants?

A. excretion
B. photosynthesis
C. respiration
D. reproduction

9. The diagram represents the structure of an atom of an element.

What is the atomic mass of this element?

A. 3
B. 4
C. 7
D. 11
10. Which gas is produced when hydrochloric acid reacts with zinc?
   A  carbon dioxide
   B  chlorine
   C  hydrogen
   D  oxygen

11. Which process is shown in the diagram of the oesophagus (gullet)?

   - circular muscle contracting
   - bodies of food moved along

   A  assimilation
   B  chewing
   C  egestion
   D  peristalsis

12. Which seed is dispersed by an explosive mechanism?

   A  
   B  
   C  
   D  

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13. The diagram shows an electromagnet.

If the current is increased what effect would this have on the strength of the magnet?

A becomes zero
B decreases
C increases
D remains the same

14. Which substance has ionic bonds?

A \( \text{CH}_4 \)
B \( \text{H}_2\text{O} \)
C \( \text{NaCl} \)
D \( \text{NH}_3 \)
15. The sketch below represents the arrangements of atoms in a substance.

What is the substance likely to be?
A. A compound
B. A mixture of compounds
C. A mixture of elements
D. An element

16. The diagram shows TWO components of blood.

What are the functions of these components?

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>causes blood to clot</td>
<td>produces antibodies</td>
</tr>
<tr>
<td>B</td>
<td>carries oxygen</td>
<td>causes blood to clot</td>
</tr>
<tr>
<td>C</td>
<td>engulfs bacteria</td>
<td>carries oxygen</td>
</tr>
<tr>
<td>D</td>
<td>produces antibodies</td>
<td>engulfs bacteria</td>
</tr>
</tbody>
</table>
17. The diagram shows an open bottle of perfume in a room. Which process will cause the person at the other end of the room to smell the perfume?

A conduction  
B diffusion  
C evaporation  
D osmosis

18. The number 9 was drawn on a piece of paper and placed in front of a plane mirror as shown.

Which image would be seen in the mirror?

A  
B  
C  
D
19. Which arrangement of magnets would produce repulsion?

A  N  S
B  S  N
C  N  N
D  S  Steel

20. The diagram shows a glass of ice and water?

Which process causes the moisture film to form?
A  condensation
B  evaporation
C  melting
D  sublimation

21. Listed are FOUR substances you find in a kitchen with their approximate pH values.

<table>
<thead>
<tr>
<th>Substances</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  baking soda</td>
<td>9</td>
</tr>
<tr>
<td>B  water</td>
<td>7</td>
</tr>
<tr>
<td>C  salt water</td>
<td>7</td>
</tr>
<tr>
<td>D  vinegar</td>
<td>3</td>
</tr>
</tbody>
</table>

Which substance can neutralize ammonia solution?
22. Which is a biological catalyst?
   A antibody
   B enzyme
   C hormone
   D solvent

23. How is alcohol classified?
   A depressant
   B hallucinogen
   C sedative
   D stimulant

24. The diagram represents a transverse wave.

![Diagram of a transverse wave with a wavelength of 0.5 m]

What is the speed of the wave if its frequency is 2 Hz?
   A 1.0 m/s
   B 1.5 m/s
   C 2.5 m/s
   D 10.0 m/s
25. Magnesium + oxygen → magnesium oxide

Why is this reaction a chemical change?
A a new substance has been formed
B all reactions produce light
C oxygen is present in the air
D there is no change in mass

26. Which reaction absorbs heat energy?
A an endothermic reaction
B an exothermic reaction
C combustion of fuels
D oxidation of glucose

27. The table lists FOUR substances that can be found in water.

<table>
<thead>
<tr>
<th>substance</th>
<th>source</th>
</tr>
</thead>
<tbody>
<tr>
<td>A chlorine</td>
<td>added to water for purification</td>
</tr>
<tr>
<td>B detergent</td>
<td>dissolved in water from homes and factories</td>
</tr>
<tr>
<td>C fertilizer</td>
<td>dissolves from plant food</td>
</tr>
<tr>
<td>D sand</td>
<td>rain washes it into river</td>
</tr>
</tbody>
</table>

Which substance can be removed from the water by filtration?
28. The diagram shows the pathway of water through a plant:

Where does transpiration occur?

29. For which purpose are the structures labelled X on the mangrove plant adapted?

A  gaseous exchange  
B  destroys coral reef  
C  photosynthesis  
D  transpiration  

30. What undesirable effect does bleach have when used to catch lobsters?

A  causes bacteria to grow rapidly  
B  destroys the coral reefs  
C  produces an excessive amount of carbon  
D  produces an excessive amount of fungus
31. The diagram shows muscles in a human arm.

What happens to muscles X and muscles Y when the lower arm is lowered?

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>contracts</td>
<td>contracts</td>
</tr>
<tr>
<td>B</td>
<td>contracts</td>
<td>relaxes</td>
</tr>
<tr>
<td>C</td>
<td>relaxes</td>
<td>contracts</td>
</tr>
<tr>
<td>D</td>
<td>relaxes</td>
<td>relaxes</td>
</tr>
</tbody>
</table>

32. The diagram shows how a gas may be identified.

Which gas will this test identify?

A  ammonia
B  carbon dioxide
C  hydrogen
D  sulphur dioxide
33. Which air pollutant is responsible for acid rain?
   A. carbon monoxide
   B. carbon dioxide
   C. ozone
   D. sulphur dioxide

34. Power is a measure of the
   A. force which produces motion.
   B. rate of change of energy
   C. rate of change of momentum
   D. total work done.

35. The diagram shows four cubes.

![Diagram of cubes]

<table>
<thead>
<tr>
<th>Cube</th>
<th>Mass</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20 g</td>
<td>5 cm³</td>
</tr>
<tr>
<td>B</td>
<td>48 g</td>
<td>8 cm³</td>
</tr>
<tr>
<td>C</td>
<td>75 g</td>
<td>15 cm³</td>
</tr>
<tr>
<td>D</td>
<td>100 g</td>
<td>30 cm³</td>
</tr>
</tbody>
</table>

Which cube has the greatest density?

36. A newly discovered organism is classified. It is made of fine threads (hyphae), reproduces by spores and feeds saprotophically.

To which kingdom does this organism belong?
   A. fungi
   B. monera
   C. protista
   D. plant
37. Diagram X shows a leaf in which area Z was partially covered. Diagram Y shows a result of a starch test on the same leaf one week later.

Why is the area Z not blue/black in colour?

A  absence of starch  
B  absence of light  
C  presence of light  
D  presence of starch  

38. What process is shown occurring in the diagram below?

A  Dispersal  
B  Fertilization  
C  Germination  
D  Pollination
39. The diagram shows TWO beakers containing water at a temperature of 20 °C and 30 °C respectively.

![](image)

Compared with the molecules in beaker X, the molecules in Y have

A  more energy and move slower.

B  more energy and move faster.

C  the same energy and same speed.

D  less energy to evaporate.

40. Iron nails are often coated with paint or zinc metal to stop rusting. One purpose of the coating is to stop iron coming into contact with

A  carbon dioxide.

B  hydrogen.

C  nitrogen.

D  oxygen.
41. Two workers X and Y are lifting boxes of equal weight onto a van.

Which quantity will NOT affect the total amount of work done by worker Y?

A the height of the platform above the ground
B the number of boxes lifted
C the time taken to lift the boxes
D the weight of the boxes

42. The diagram shows a circuit in which all the lamps are lit

The bulb marked X blows and breaks part of the circuit.

How many lamps will remain on?

A 0
B 1
C 2
D 3
43. Which diagram correctly shows what happens when light rays strike a convex lens?

A  B  C  D

44. The diagram shows the female reproductive system of a mammal.

Where would a doctor place a diaphragm?

45. The diagram illustrates a method of separating a mixture.

Which letter labels the residue?
46. This apparatus is used to detect the presence of water and carbon dioxide in air.

What results would be expected?

<table>
<thead>
<tr>
<th>Results</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>blue</td>
<td>clear</td>
</tr>
<tr>
<td>B</td>
<td>blue</td>
<td>cloudy</td>
</tr>
<tr>
<td>C</td>
<td>white</td>
<td>clear</td>
</tr>
<tr>
<td>D</td>
<td>white</td>
<td>cloudy</td>
</tr>
</tbody>
</table>

47. Which diagram shows the flow of energy in an ecosystem?

A  producer → consumers
   ↓ decomposers

B  producers → consumers
   ↓ decomposers

C  producers → consumers
   ↓ decomposers

D  producers → consumers
   ↓ producers
48. The diagram shows a food web:

```
  robins  
  |      |  raccoons  
  |      |  ground beetles
  |      |  black crows
  |      |  
  |      |  insects and mites
  |      |  fungi
  |      |  rotting leaves
  |      |  
  earthworms
```

What will happen to this food web if the earthworms, insects and mites are removed?

A  Population of black crows will increase.
B  Population of fungi will increase.
C  Population of raccoons will increase.
D  Population of robins will increase.

49. The diagram below shows an unloaded spring hanging from a support and an identical spring loaded with a 6 kg mass.

```
support
```

What will be the length of the spring when it is loaded with a 2 kg mass?

A  2 m
B  3 m
C  4 m
D  5 m
50. The diagram shows the junction of three wires.

What is the amount of current and its direction as it flows through X?

A  1 A, toward the junction
B  1 A, away from the junction
C  5 A, toward the junction
D  5 A, away from the junction
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Write your school number, candidate number, surname and initials in the spaces provided at the top right hand corner of this page.

Answer ALL questions on this paper.

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

Write your answers in the spaces provided on the question paper. Confine your answer to the lines following each question.

The mark for each part-question is given in brackets [ ].

This question paper consists of 15 printed pages and 1 blank page.
1. The diagram shows an electrical circuit.

![Diagram of an electrical circuit](image)

Name the components labelled A, B, C, D and E and give a function of each in the circuit.

<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
</tr>
</tbody>
</table>

Total marks [10]
2. Water is a common substance that is essential to life. There are two kinds of water, hard water and soft water.

(a) Define the term **hard water**.

(b) Describe how you would test a liquid to show that it is water.

(c) Describe **ONE** effect of soap on hard water.

(d) Explain briefly why water is called the Universal Solvent.

(e) Here is a list of substances that may get into a natural water supply.

   A – crude oil
   B – detergents
   C – pesticides
   D – treated sewage

From the list choose the letter of the substance that

(i) may cause river water to foam;  

(ii) cause problems for birds and beaches;  

(iii) may build up in the bodies of some birds;  

(iv) would not pollute river water.  

Total marks [9]
3. The diagram shows a human reproductive system.

(a) Name the parts labelled A, B, D and E.

A

B

D

E [4]

(b) Name the gamete produced and state the site where it is produced.

name of gamete

site of production [2]

(c) Name the main hormone produced by a male at puberty and state where it is produced.

hormone

produced [2]

(d) Name a common problem associated with structure A after the age of 40.

[1]
(e) Name the substance which fills the soft tissue of structure C resulting in an erection.

______________________________ [1]

Total marks [10]
4. The diagram shows three molecules A, B and C.

The circles show the outer orbitals of the atoms which make up these three molecules.

(a) Complete the diagrams to show the arrangement of the electrons in these orbitals. Use the dot and cross method. [3]

(b) (i) Name the type of bonding shown in these molecules. [1]

(ii) All the atoms in the molecules are stable.
Define the term stable. [2]
(c) Select from A, B or C to complete the table.

Each letter may be used once, more than once or not at all.

<table>
<thead>
<tr>
<th>characteristic</th>
<th>molecule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exists as a liquid at room temperature</td>
<td></td>
</tr>
<tr>
<td>Is an element</td>
<td></td>
</tr>
<tr>
<td>Has the formula H₂O</td>
<td></td>
</tr>
<tr>
<td>Is denser than air</td>
<td></td>
</tr>
</tbody>
</table>

[4]

Total marks [10]
5. Excretion is a characteristic of ALL living things.

(a) Define excretion.

(b) The table below shows the main excretory organs, their waste products and the process by which each is produced.

Complete the table.

<table>
<thead>
<tr>
<th>organ</th>
<th>waste products</th>
<th>process</th>
</tr>
</thead>
<tbody>
<tr>
<td>liver</td>
<td></td>
<td>detoxification</td>
</tr>
<tr>
<td>urine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>skin</td>
<td>urea, salt, water</td>
<td></td>
</tr>
</tbody>
</table>
The table below shows average amounts of sweat and urine loss in 3 days. (Assume that food and drinks are approximately the same on all 3 days).

<table>
<thead>
<tr>
<th>conditions</th>
<th>urine loss per day in dm³</th>
<th>sweat loss per day in dm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>day 1 normal</td>
<td>1.5</td>
<td>0.5</td>
</tr>
<tr>
<td>day 2</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>day 3</td>
<td>0.36</td>
<td>2.0</td>
</tr>
</tbody>
</table>

(i) On which day was the temperature hottest?

Give one reason for your choice.

day ____________________________
reason ____________________________ [2]

(ii) Suggest the colour of the urine on day 2. Give one reason for your answer.

colour ____________________________
reason ____________________________ [2]

Total marks [11]
6. The question below is about the behaviour of gas particles.

(a) Complete B in the diagram to show how gas Y molecules would appear five minutes after the card was removed. [1]

(b) Name the process occurring in the diagram above. [1]

(c) Gas Y has a brown colour, Gas X is colourless.
State a visible change which will be seen when A is compared to B. [1]

(d) Give an everyday example of this process. [1]
(e) The process shown in the diagram also takes place in the lungs. The diagram represents a region of the lungs.

(i) On the diagram use a broken line to show the direction of the movement of \( O_2 \) (oxygen) and a solid line to show the direction of the movement of \( CO_2 \) (carbon dioxide). [2]

(ii) Name the structure labelled X.

______________________________________________________________________________ [1]

(iii) Name structure Y and say why it is important.

name ____________________________

importance ______________________

______________________________________________________________________________ [2]

(iv) State why the rate of flow of \( CO_2 \) is slower than \( O_2 \). [1]

______________________________________________________________________________

Total marks [10]
7. A piece of metal with a mass of 125 g has a density of 5.0 g/cm³.

A piece of wood has a mass of 50 g.

Both the piece of metal and the piece of wood are tied together and totally submerged in water. It is discovered that together they displace 90 g of water.

The density of water is 1.00 g/cm³.

(a) Define the term density.


[2]

(b) Determine the following (show all working).

(i) volume of water displaced;


[2]

(ii) volume of the piece of metal;


[2]

(iii) volume of the wood;


[2]

(iv) the density of the wood.


[2]

Total marks [10]
8. The table shows the heart rate of an athlete before, during and after a race.

<table>
<thead>
<tr>
<th>time (minutes)</th>
<th>0</th>
<th>10</th>
<th>30</th>
<th>50</th>
<th>60</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>heart rate (beats per minute)</td>
<td>60</td>
<td>60</td>
<td>62</td>
<td>105</td>
<td>108</td>
<td>70</td>
<td>64</td>
</tr>
</tbody>
</table>

(a) Complete the graph opposite using the information from the chart. [4]

(b) What is the heart rate at rest? [1]

(c) State the time the athlete stopped running. Give a reason for your answer.

- time [1]
- reason [1]

(d) The heart muscles need a supply of blood.

(i) Name the blood vessel which supplies the heart muscles with blood. [1]

(ii) State what will happen to the heart muscle if a branch of this blood vessel became blocked. [1]

(iii) State the main cause of blockage of these vessels. [1]

Total marks [10]
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The mark for each part question is given in brackets [ ].
SECTION A

Answer ALL questions in this section.

1. The diagram shows the activated sludge method of sewage treatment.

(a) Define the term raw sewage.

(b) Explain the function of the screen in this process.

(c) Explain what happens in the anaerobic digester.

(d) Give ONE use of sludge.
(e) Investigations suggest that raw sewage is being pumped into Nassau Harbour at Potter's Cay. The graph below shows the results of a study made on some of the organisms and chemicals in the area.

(i) Describe and explain the shape of the dissolved oxygen curve.

(ii) Use the information in the graphs to suggest which factor controls the number of fish.
If the sewage being discharged into the harbour had been properly treated before discharge, what differences would you expect to see in the levels of each of the THREE factors shown on the curves.

- dissolved oxygen
- fish
- bacteria [3]

Total marks [15]
2. The diagram shows information about the extraction of a metal from its ore haematite.

(a) (i) Name the metal being extracted from its ore.

_________________________________________________________ [1]

(ii) Write the formula for haematite.

_________________________________________________________ [1]

(iii) State the function of the limestone in this process.

_________________________________________________________ [1]

(iv) Name the substances drawn off at X and Y.

X ______________________________________________________ [2]

Y ______________________________________________________ [2]
(b) (i) The extraction of a metal depends on the two chemical reactions A and B. Complete the WORD equations for these TWO reactions by filling in the blank spaces.

Reaction A:
Carbon dioxide + _______________ → carbon monoxide

Reaction B:
Carbon monoxide + metal ore → metal + _______________ [2]

(ii) Write down the balanced formula equations for reactions A and B.

A ____________________________________________ [2]

B ____________________________________________ [2]

(iii) Find the molecular mass for the product of reaction A.

[1]

(iv) Name the type of reaction shown in B.

______________________________________________ [1]

(c) The metal produced can be used to manufacture cooking pots.

Give ONE advantage and ONE disadvantage of using this metal.

Advantage ___________________________________

____________________________________________

Disadvantage __________________________________

____________________________________________ [2]

Total marks [15]
3. The Ministry of Health is encouraging the Bahamian public to consume a balanced diet in an attempt to reduce a number of common diseases.

(a) Define balanced diet.

(b) Use the information given on nutritional facts on a breakfast cereal box to answer the questions given.

<table>
<thead>
<tr>
<th>NUTRITION FACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving Size: ½ cup dry (40 g)</td>
</tr>
<tr>
<td>Servings Per Container: 13</td>
</tr>
<tr>
<td>Amount Per Serving</td>
</tr>
<tr>
<td>Calories</td>
</tr>
<tr>
<td>Calories From Fat</td>
</tr>
<tr>
<td>Total Fat</td>
</tr>
<tr>
<td>Saturated Fat</td>
</tr>
<tr>
<td>Polyunsaturated Fat</td>
</tr>
<tr>
<td>Monounsaturated Fat</td>
</tr>
<tr>
<td>Cholesterol</td>
</tr>
<tr>
<td>Sodium</td>
</tr>
<tr>
<td>Total Carb</td>
</tr>
<tr>
<td>Soluble Fiber</td>
</tr>
<tr>
<td>Insoluble Fiber</td>
</tr>
<tr>
<td>Sugars</td>
</tr>
<tr>
<td>Protein</td>
</tr>
<tr>
<td>Vitamin A</td>
</tr>
<tr>
<td>Vitamin C</td>
</tr>
<tr>
<td>Calcium</td>
</tr>
<tr>
<td>Iron</td>
</tr>
</tbody>
</table>
Giving a different reason in each case, suggest why this cereal alone is unsuitable for the development of healthy teeth and bones;

(ii) suitable for someone with heart disease;

(iii) suitable for a diabetic;

(iv) suitable for someone with high blood pressure.

(c) (i) Give the value for the total fibre content of a serving of the cereal.

(ii) State why fibre is important in the diet.

(d) (i) Name a deficiency disease which could result from this particular cereal being used as a main food source in the diet.

(ii) State ONE symptom of this disease.

(e) Goitre is another deficiency disease. State the cause and give ONE symptom of this disease.

Cause

Symptom
(f) Kwashiokhor is a common deficiency disease in poor developing countries. It affects infants once they have been weaned from the mother’s breast milk.

Explain the reason for this.

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

[2]

Total marks [15]
4. Today there are many alternative ways being used to generate the energy required for our everyday lives.

The diagram shows a wind turbine in a plant using the wind as an energy source.

(a) State the energy change which occurs in the turbine.

________________________________________________________________________ [1]

(b) The method shown in the diagram is using a renewable energy resource to generate power.

Explain what the phrase renewable energy resource means.

________________________________________________________________________

________________________________________________________________________ [2]
(c) The chart below gives some information concerning the power output a single turbine can generate.

<table>
<thead>
<tr>
<th>Wind Speed km/h</th>
<th>Power output for single turbine/kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.6</td>
<td>6</td>
</tr>
<tr>
<td>7.2</td>
<td>25</td>
</tr>
<tr>
<td>11.0</td>
<td>85</td>
</tr>
<tr>
<td>14.5</td>
<td>200</td>
</tr>
<tr>
<td>18.0</td>
<td>390</td>
</tr>
</tbody>
</table>

An average wind farm contains about 100 turbines.

(i) Calculate energy output for the farm if wind speed is 18 km/h.

(ii) Calculate the fall in energy output of the farm if wind speed dropped to 7.2 km/h.

(iii) If the power output of the farm on a given day is 2,200 kW, find the power output of a single turbine for that day.
(d) Give ONE advantage and TWO disadvantages not already mentioned in the question, for this method of power generation.

Advantage________________________________________ [1]

Disadvantage 1________________________________________

Disadvantage 2________________________________________ [2]

(e) Suggest a renewable method for generating power in The Bahamas, giving a reason for your method.

Method________________________________________ [1]

Reason________________________________________ [1]

Total marks [15]
SECTION B

Answer any TWO questions

5. Ecology is the study of the relationship between living things and their environment. The coral reef is a very important ecosystem in The Bahamas.

(a) Define the following terms
   (i) Environment
   (ii) Ecosystem

(b) The diagram below shows organisms found on a coral reef.

(i) Using the diagram suggest a food source for the octopus and the turtle and describe their adaptation for feeding on this food source. [4]

(ii) Give the feeding level of organism P in the food chain and state its function. [2]

(iii) Describe the mutual relationship which exists between organism P and the grouper. [2]

(iv) Give THREE conditions necessary for the formation of a coral reef. [3]
(c) (i) State THREE benefits of the reef ecosystem to the Bahamian society. [3]

(ii) Identify TWO destructive forces experienced on the coral reef, ONE caused by nature and ONE caused by man. [2]

Total marks [20]
6. The following diagram illustrates the apparatus used to measure heat energy produced from the combustion of a named fuel.

The chart of the data shows some measurements made by a student during an investigation.

![Diagram of apparatus](attachment:image.png)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Before heating with alcohol</th>
<th>After heating with alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water temperature</td>
<td>19 °C</td>
<td>34 °C</td>
</tr>
<tr>
<td>Mass of alcohol lamp</td>
<td>21.84 g</td>
<td>20.94 g</td>
</tr>
</tbody>
</table>

(a) Give ONE piece of evidence which supports the statement that combustion is an example of an exothermic reaction. [1]

(b) Explain fully the relationship between bond making and bond breaking in an exothermic reaction. [4]

(c) (i) The formula for ethanol is C₂H₅OH. Write the balanced formula equation for the complete combustion of ethanol. [3]

(ii) Given that 1 g of ethanol releases 29.7 kJ of energy during combustion. Calculate how much energy was released during this experiment. [3]

(iii) State ONE way in which this experiment could be improved. [1]
(d) A fossil fuel used in The Bahamas is propane \( \text{C}_3\text{H}_8 \).

(i) Explain the meaning of the term fossil fuel. [3]

(ii) State ONE use of propane in The Bahamas. [1]

(iii) 44 g of propane can produce 2,219 kJ of energy. Calculate how much 1 g will produce? [3]

(e) Choose the better fuel, propane or ethanol. Give a reason for your choice. [2]

Total marks [20]
7. The diagram shows different methods of heat transfer.

![Diagram of heat transfer]

Fig. 1

![Figures 2 and 3 showing heat transfer](image)

Fig. 2

Fig. 3

Fig. 1 shows a piece of paper taped at the top of a metal/wooden rod being heated gently.

(a) On which side of the rod would the paper first start to burn, give a reason for your answer. [4]

(b) Fig. 2 shows an aluminium saucepan of water on a hot plate.

(i) State the method by which heat is transferred through the saucepan to the water. [1]

(ii) Describe how heat is transferred within the contents of the saucepan. [3]

(iii) The Cook felt the heat from the hot plate when the saucepan is removed.

Name the method of heat transfer responsible for the heat felt by the Cook. [1]
(c) During the experiment shown in Fig. 3, the ice remains solid for several minutes as heating continued. Explain the reason for this. [3]

(d) Explain why you should crawl close to the floor in a room filled with smoke during a fire. [2]

(e) Briefly explain why there is a sea breeze during the day and an offshore breeze at night. You may use a diagram to help explain your answer. [4]

(f) Allana’s recipe called for a preheated oven at a temperature of 150 °C. However, the oven had a Fahrenheit scale. Calculate the temperature that Allana must set on the Fahrenheit thermometer scale (show all working). [2]

Total marks [20]
COMBINED SCIENCE

PAPER 3

Monday 2 JUNE 2003 12.30 – 2.00 P.M.

Additional materials:
Answer Booklet for Section B
Graph paper

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 initials in the spaces provided above and on the answer booklet.

Answer ALL questions in Section A (1–4) in the spaces provided.

Answer ANY two (2) out of three (3) questions from Section B in the answer booklet provided which must be attached to the back of the question booklet.

Candidates are advised to spend no more than 35 minutes on Section A.

The mark for each part question is given in brackets [ ].
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