3102/3

BGCSE

School Number	Candidate Number
Surname and Initials	

COMBINED SCIENCE

PAPER 3 3102/3

Tuesday 8 JUNE 2010 9.00 – 10.30 A.M.

Additional materials:
Scientific calculators
Answer Booklet for Section B

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 on this question paper and on the answer booklet.

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

Answer **ANY** two (2) out of the 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 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.

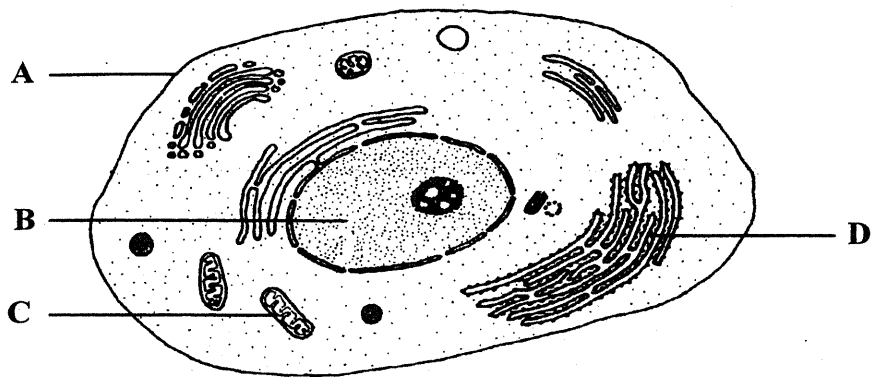
Calculators are permitted, however **NO** graphing calculators are allowed.

For Examiner's Use	
Section A	
1	
2	
3	
4	
Section B	
5	
6	
7	
TOTAL	

This question paper consists of 12 printed pages and 4 blank pages.

Section A

1. The diagram shows an animal cell.



(a) Name parts **A**, **B** and **D**.

A _____

B _____

D _____ [3]

(b) State the function of structure **C**.

_____

_____ [1]

(c) Measure and record the length of structure **C** in mm.

Length _____ mm [1]

If the magnification of structure **C** is ×15 000, use the length recorded in (c) to find the actual size of the structure.

[1]

(d) Draw a diagram of a plant cell labelling any **THREE** of the structures which clearly show that it is **not** an animal cell.

[4]

Total marks [10]

2. Use the Periodic Table to answer this question.

Magnesium will burn in oxygen with a blinding white light, forming magnesium oxide.

(a) Draw a dot and cross diagram to show the structure of a magnesium atom.

[2]

(b) Draw an **outer orbit** diagram to show the arrangement of electrons between magnesium and oxygen in a molecule of magnesium oxide and name the type of bonding shown. Label the atoms.

[3]

type of bond _____ [1]

(c) Write the balanced symbolic equation for the reaction of magnesium with oxygen.

[2]

(d) Calculate the relative molecular mass of magnesium oxide.

[1]

(e) Give a reason why sulphuric acid can be neutralized by magnesium oxide.

_____ [1]

Total marks [10]

3. The table shows the composition of a junior combo meal from a fast food chain.

food item	protein in g	fat in g	carbohydrates in g
Junior whopper hamburger	17.6	16.4	30.2
Small fries	4.2		35.8
Small chocolate milkshake	13.8	13.0	66.0
Total		47.6	132

(a) Complete the table to show the missing information. [1]

(b) Find the percentage of carbohydrate provided by the hamburger and fries.

[2]

(c) Suggest which food item poses the greatest health risk, explain why.

Food _____

Explanation _____

_____ [2]

(d) Calculate the amount of energy from the chocolate milkshake if 1 g of protein has an energy value of 17 kJ, 1 g of fat has an energy value of 37 kJ and 1 g of carbohydrate has an energy value of 16 kJ. Show **ALL** working.

[2]

(e) Starch and protein undergo chemical digestion in various parts of the digestive system. Explain why protein can be digested in the stomach but starch cannot.

_____

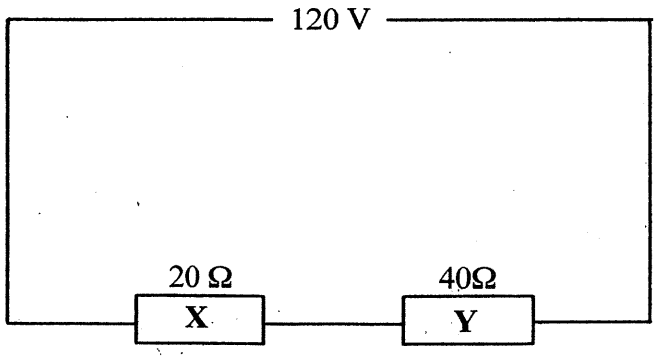
_____

_____

_____

_____ [3]

4. The circuit shows two electrical resistors, **X** and **Y** connected to a 120 V supply.



(a) (i) Calculate the total resistance of the circuit.

[1]

(ii) Define electrical resistance.

[1]

(iii) Calculate the flow of current through the circuit.

[2]

(b) (i) Redraw the circuit to show resistors **X** and **Y** connected in parallel.

[1]

(ii) Find the difference in the amount of current now flowing through resistors **X** and **Y** connected in parallel;

[2]

(iii) the amount of energy used by resistor **X** in 2 hours and 20 minutes.

[3]

Total marks [10]

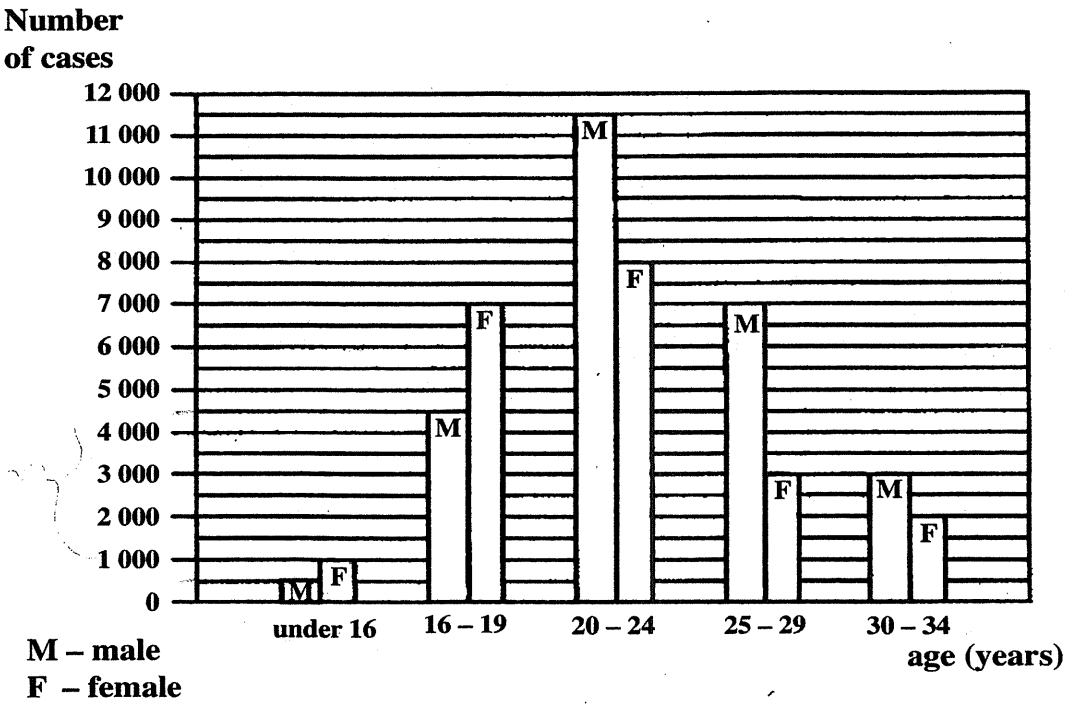
Section B

5. (a) (i) Draw a simple diagram of the female reproductive system and label the structures
- fallopian tube
- vagina
- uterus
- cervix womb
- ovary [5]

When a girl reaches puberty, changes occur in her body.

(ii) Describe **TWO** of these changes. [2]

(b) The graph shows data from the Ministry of Health on sexually transmitted diseases (STDs).



(i) Name one sexually transmitted disease, identify its causative agent and give one early symptom in **males**. [3]

(ii) Using the data, which age group has the most reported cases of sexually transmitted diseases in both **males** and **females**. [1]

(iii) Calculate the difference in the increase of STD cases between females in the under 16 age group and those in the 16–19 age group. Suggest **ONE** reason for the change. [3]

(d) Three methods of contraception commonly used are the condom, tubal ligation and the contraceptive pill. Assess the effectiveness of each of these methods in preventing

(i) pregnancy

(ii) sexually transmitted diseases (STDs). [6]

Total marks [20]

6. Ricardo and Emma set up an experiment to investigate the effects of two different catalysts on the rate of decomposition of hydrogen peroxide, at 60°C.

The table shows the results collected from the investigation.

time in minutes	0	5	10	15	20	25	30	35
volume of oxygen with catalyst A/cm^3	0	4	8	12	16	17	18	18
volume of oxygen with catalyst B/cm^3	0	5	10	15	16.5	18	18	18

(a) Define a catalyst and state how it works. [3]

(b) Write the balanced equation for the reaction. [2]

(c) Plot a suitable graph of all the data collected from the experiment. [5]

(d) (i) State which catalyst was the best, giving a reason for your choice. [2]

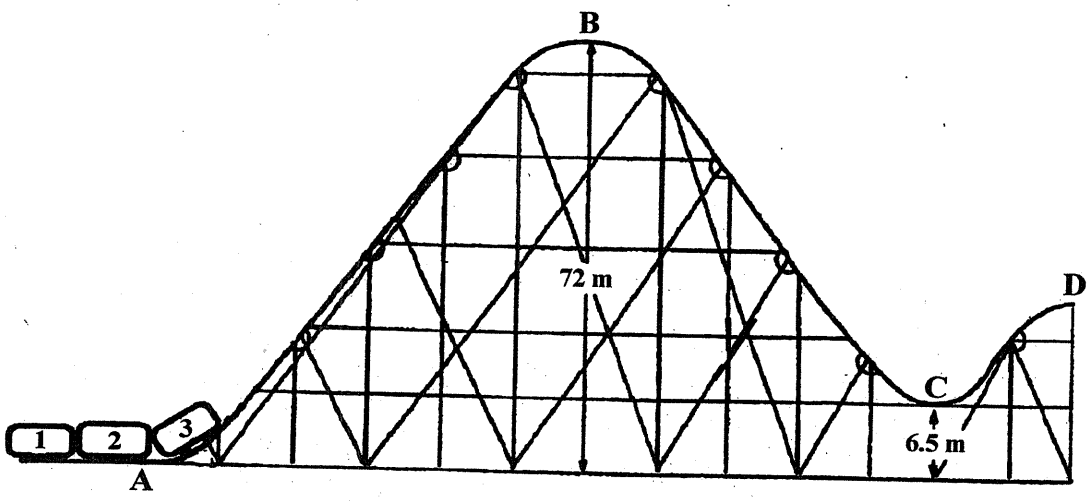
(ii) State why both catalysts produce the same amount of gas after 30 minutes. [1]

(e) Explain why the experiment was carried out at 60°C and not 20°C. [3]

(f) The same investigation was carried out in a biology class using catalase instead of catalyst A and B, explain why the experiment failed. [4]

Total marks [20]

7. (a) The diagram represents a roller coaster at a carnival site.



The carriages are pulled up to a point **B** by an electric motor. Once the carriage is at point **B** it is released and free-wheels down the track towards point **C**.

(i) The total mass of carriage 3 and passengers is 3 100 kg. Calculate how much gravitational potential energy will be gained in moving from point **A** to point **B**? (Use $g = 9.81\ m/s^2$). [3]

(ii) The power rating of the electric motor is a constant 60 kW. Calculate the time it would take for carriage 3 and passengers to move from point **A** to point **B**. [3]

(iii) In practice, the time taken to reach point **B** will be longer than that calculated. Explain why. [2]

(b) (i) On release from point **B**, carriage 3 moves down towards point **C**. State the main energy transfer taking place. [1]

(ii) By using energy considerations, calculate the maximum possible speed of carriage 3 as it passes through point **C**. [6]

(iii) Give **TWO** reasons why the height of the next peak at **D** has to be less than at **B**. [2]

(c) Carriage 2 and its passengers have a total mass of 3 200 kg. Explain why it would take a longer time than carriage 3 to reach point **B**, yet travels at the same speed when passing through point **C**. [3]

Total marks [20]

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COMBINED SCIENCE

PAPER 3 3102/3

JUNE 2011 12.30 – 2.00 P.M.

Additional materials:
Answer booklet for Section B
Graph paper

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

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TOTAL	

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Section A

Answer **ALL** questions in this section.

1. A student conducts an experiment to investigate the effect of pH on amylase activity using the starch amylase reaction. The results are recorded in the table.

pH	time taken for blue black to disappear (minutes)
2	200
4	100
7	20
8	25
10	80
12	140

(a) The initial colour of the starch amylase mixture was greyish. A reagent was added which turned the mixture blue-black.

(i) Name the additional chemical present in the mixture causing it to be blue-black in colour.

_____ [1]

(ii) Briefly explain why the blue-black colour disappears during the experiments.

_____

_____ [2]

(b) (i) State the optimum pH for the amylase starch reaction and give a reason for your answer.

optimum pH _____ [1]

reason _____ [1]

(ii) Explain the effect of lowering pH on amylase activity.

_____

_____

_____ [3]

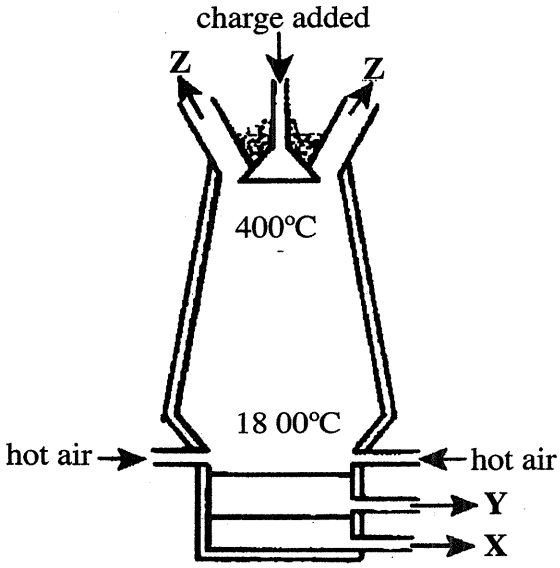
(c) Excluding pH, state **TWO** other factors which affect enzyme action.

1 _____

2 _____ [2]

Total marks [10]

2. The diagram shows a blast furnace used in the extraction of iron



(a) Name the **TWO** parts of the charge, other than the iron ore.

1 _____

2 _____ [2]

(b) Give the point at which the iron is drained off.

_____ [1]

(c) (i) Write the balanced equation for the reduction of iron ore to iron in the blast furnace.

[2]

(ii) Explain why this is classified as a reduction reaction.

_____

_____ [2]

(d) Waste gases, carbon dioxide and sulphur dioxide may be released at **Z**.

Give **TWO** reasons why it would be a good idea to prevent this from taking place.

carbon dioxide _____

_____

sulfur dioxide _____

_____ [2]

(e) Hydrogen can also be used to reduce iron ore to iron.

State why is this method not used on a large scale.

_____ [1]

Total marks [10]

3. (a) Respiration is a characteristic of life. State why it is important to all organisms.

_____

_____ [1]

(b) State **TWO** ways **aerobic** respiration differs from **anaerobic** respiration.

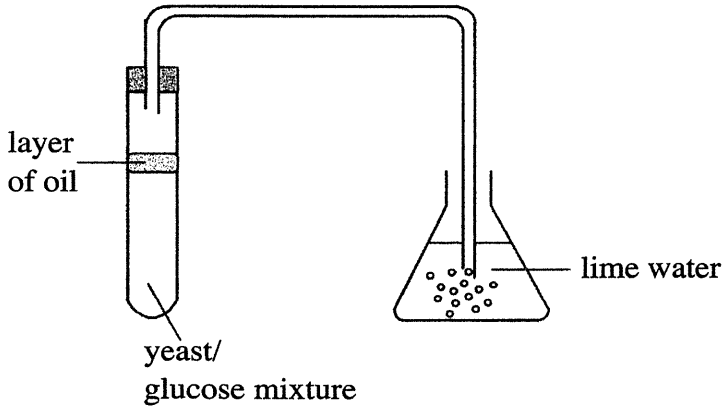
1 _____

_____

2 _____

_____ [2]

(c) An investigation is carried out to study anaerobic respiration in yeast.



(i) State the purpose of the layer of oil.

_____

_____ [1]

(ii) State **TWO** observations during the investigation which show that respiration is occurring.

1 _____

2 _____ [2]

(iii) Give **TWO** reasons why the yeast cells would die if the experiment was left for one week.

1 _____

2 _____ [2]

(d) Write the balanced chemical equation for anaerobic respiration in yeast.

[2]

Total marks [10]

4. A common piece of laboratory equipment is the thermometer, used to measure temperature.

(a) Define the term ***temperature***.

_____

_____ [1]

(b) Give **ONE** advantage and **ONE** disadvantage of using an alcohol thermometer compared to a mercury thermometer.

advantage _____

_____ [1]

disadvantage _____

_____ [1]

(c) (i) State the value of the lowest theoretical temperature which can be measured.

_____ [1]

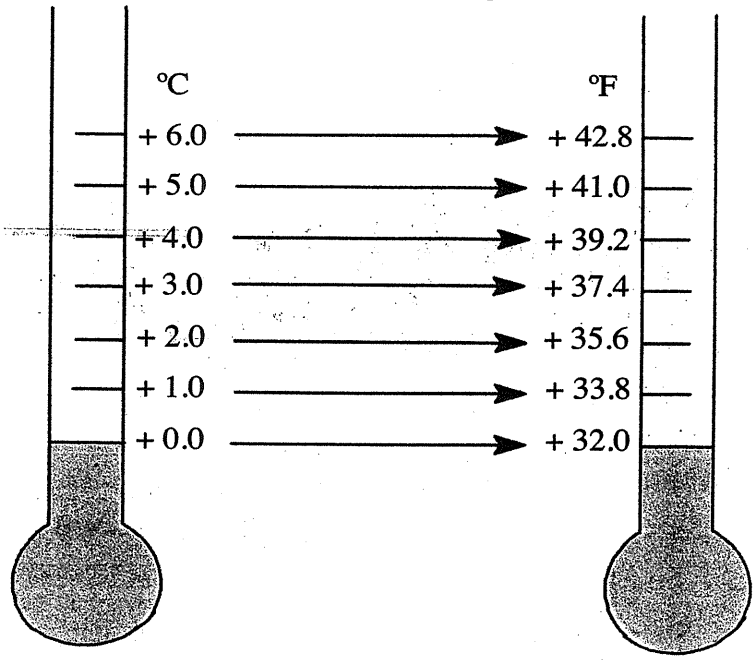
(ii) Explain why this value cannot actually be measured in a school laboratory.

_____

_____ [1]

(d) The diagram shows that a temperature rise of 2°C is equivalent to a temperature rise of 3.6°F.

Celsius and Fahrenheit degree scales



(i) Find the equivalent temperature of +8°C in °F.

[2]

(ii) A patient with H1N1 flu has a body temperature of 106°F. Find the equivalent temperature value on the Celsius scale.

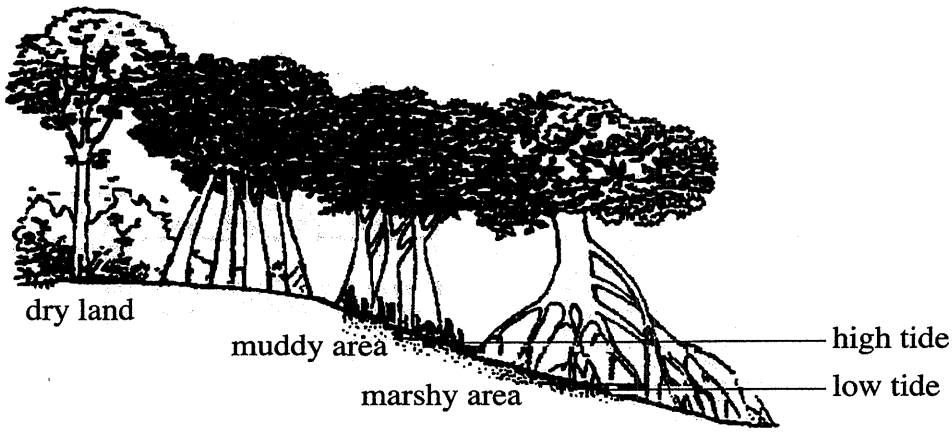
[3]

Total marks [10]

SECTION B

You are required to answer any **TWO** out of the three questions. Write your answers in the answer booklet provided.

5. The diagram represents one of the coastal ecosystems found in The Bahamas.



(a) (i) Define the term ***ecosystem***. [2]

(ii) Name the ecosystem. [1]

(b) (i) State **THREE** abiotic environmental conditions (**NOT** caused by man) that affect organisms living in this ecosystem. [3]

(ii) Name **ONE** of the three dominant plants and give **THREE** adaptations for survival in the ecosystem. [4]

(iii) For each adaptation state its benefit to the organism. [3]

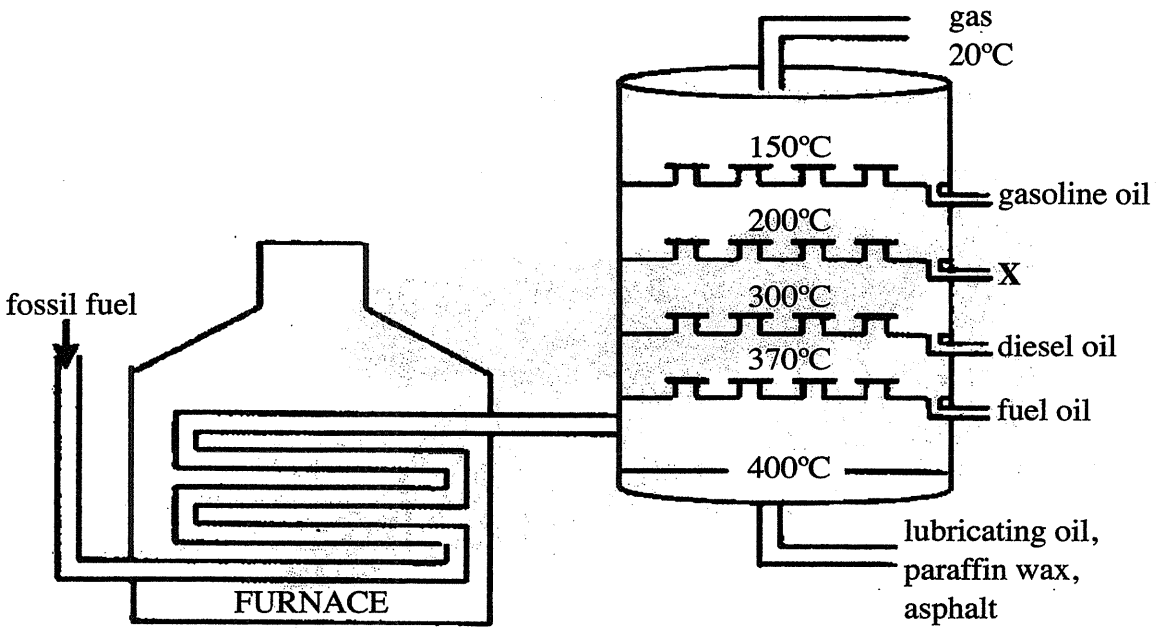
(c) (i) State **FOUR** ways in which this ecosystem is beneficial to The Bahamas. [4]

(ii) The activities of man is harming this ecosystem. Describe **THREE** activities of man which are damaging this ecosystem. [3]

Total marks [20]

6. The diagram shows how a fossil fuel can be separated into its component parts.

(a) define the term ***fossil fuel***. [3]



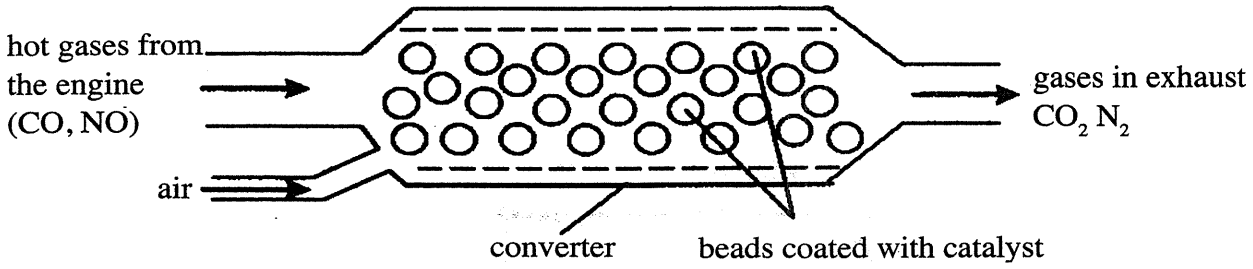
(b) Write a detailed description of how the process shown in the diagram is used to separate a named fossil fuel.

In your answer include

– the name of the fossil fuel used in the process [1]
– the name of the separation process [1]
– the part played by the furnace in this process [1]
– how the fuel is separated into its different components. [4]

(c) Identify the fraction that would be produced at **X** and give a use for this fraction. [2]

(d) Many cars nowadays have catalytic converters fitted to their exhaust system. The diagram illustrates how the converter works.



Give a detailed description of what takes place in the converter.

Your answer should include

– the purpose of the converter [1]
– the role of the catalyst [1]
– a balanced equation showing what happens to engine gases. [2]

(e) With the growing trend towards eco-friendly energy production, many countries are looking to alternative sources of energy. One such alternative involves using solar energy.

(i) State **TWO** advantages of using solar energy. [2]

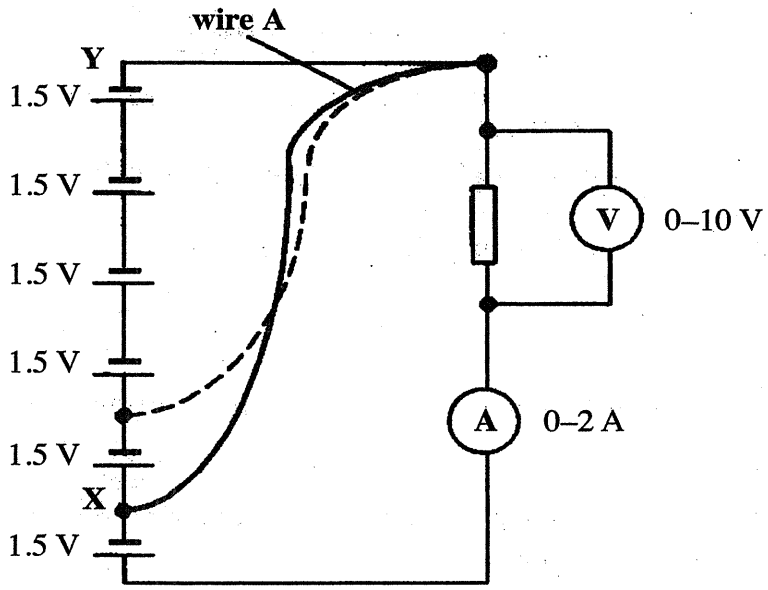
(ii) State **TWO** disadvantages of using solar energy. [2]

Total marks [20]

7. This question is about electricity.

(a) Distinguish between the terms ***current*** and ***potential difference***. [2]

(b) An electrical circuit is set up as shown using a conductor connected to a series of cells.



The results in the table were obtained by altering the position of **wire A** from point **X** to point **Y**, moving it along one cell at a time.

potential difference/V	1.50	3.00	4.50	6.00	7.50	9.00
current/A	0.25	0.50	0.75	1.00	1.25	1.50

(i) Plot a suitable graph of the data. [5]

(ii) From the graph, find the current when the potential difference is 7 V. [1]

(iii) Suggest a relationship which can be concluded from the graph. [1]

(c) In a second experiment the same circuit as in (b), but instead of altering the position of wire **A** across the cells, **THREE** different types of metal wires were used. Using a current of 0.8 A the voltage was recorded when each wire was placed in the circuit.

wire	voltage/V
A	5.2
B	0.6
C	12.4

(i) State which wire is the best conductor of electricity. Explain your choice. [2]

(ii) Calculate the resistance of wire **B**. [2]

(iii) Calculate the quantity of electric charge that passes through each wire in 1 minute. [3]

(iv) Calculate the amount of heat energy in wire **C**. [3]

(v) State **ONE** reason why wire **C** will have a higher heat energy value than wire **B**. [1]

Total marks [20]

End]

SCIENCE GRAPH PAPER

MINISTRY OF EDUCATION
BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

AB7

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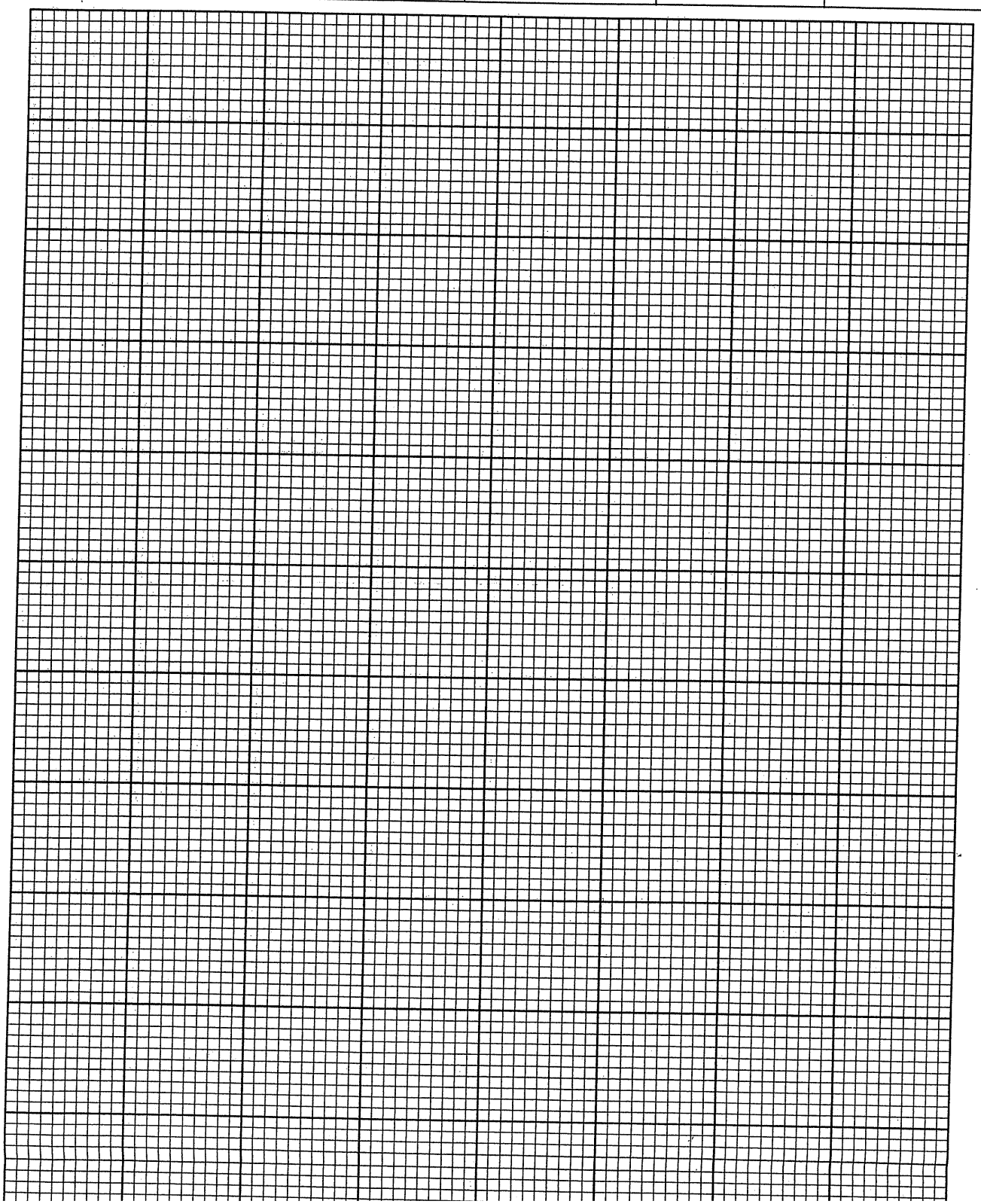

MINISTRY OF EDUCATION **AB7**
BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

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