

# HILLCREST HIGH SCHOOL



## NATURAL SCIENCE EXAM

**GRADE 9**

**TIME : 2 HRS**

**EXAMINERS: MRS SMITH & MRS KNOX-WHITEHEAD**

**NOVEMBER 2022**

**TOTAL : 100**

### INSTRUCTIONS

1. This question paper consists of **11 PAGES** and **2 SECTIONS: A AND B**.
  2. Answer all of the questions from **SECTIONS A** and **SECTION B** in the answer book provided.
  3. Non-programmable calculators may be used. Round answers off to **TWO DECIMAL PLACES** where applicable.
  4. Number the answers correctly according to the numbering system used in this question paper.
  5. Write neatly and in pen.
  6. **LEAVE A LINE** between each answer.
  7. **RULE OFF** after each question.
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## FORMULA SHEET

### Forces:

$$F_{\text{res}} = F_1 + F_2 + \dots$$

$$W = m \times g$$

$$g = 9,8 \text{ m}\cdot\text{s}^{-2}$$

### Circuits:

$$R = \frac{V}{I}$$

$$R_s = R_1 + R_2 + R_3 \dots\dots$$

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \dots\dots$$

## SECTION A : ENERGY AND CHANGE

[60]

### QUESTION 1: MULTIPLE CHOICE QUESTIONS

[1 x 5 = 5]

Four options are provided as possible answers to the following questions. Each question has only one correct answer. Write only the letter (A-D) next to the question number (1.1 – 1.5) in the answer book.

1.1 An object becomes negatively charged when...

- |   |                    |   |                  |
|---|--------------------|---|------------------|
| A | it gains electrons | C | it gains protons |
| B | it loses electrons | D | it loses protons |

1.2 The force that causes wear and tear

- |   |             |   |                     |
|---|-------------|---|---------------------|
| A | compression | C | tension             |
| B | friction    | D | electrostatic force |

1.3 Which statement is true about current in a PARALLEL circuit?

- A It is directly proportional to resistance.
- B It is used up as the charge moves around the circuit.
- C It is the same at all points.
- D It divides across each branch according to the resistance in the branch.

1.4 Which statement is true about an AMMETER?

- A It is connected in series and measures current strength
- B It is connected in series and measures potential difference
- C It is connected in parallel and measures potential difference
- D It is connected in parallel and measures current strength

1.5 The current in an electrical appliance with a resistance of  $50\Omega$  when it is connected to a 220V electrical power source is...

- |   |        |   |          |
|---|--------|---|----------|
| A | 0,22 A | C | 4,4 A    |
| B | 0,23 A | D | 11 000 A |

## QUESTION 2 : TERMINOLOGY

[5]

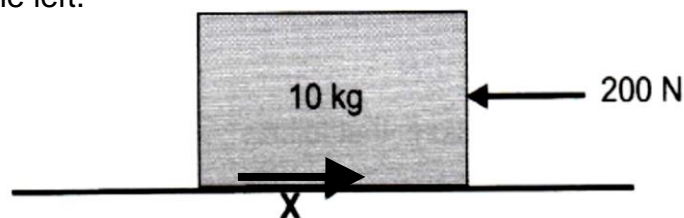
Write down only the correct scientific term / words for the following descriptions.

- 2.1 The force that causes an object to change shape. (1)
  - 2.2 Unit of measurement for Weight. (1)
  - 2.3 Device that produces electricity by converting chemical energy to electrical energy. (1)
  - 2.4 A safety device used to protect people from electric shock by redirecting the current into the ground. (1)
  - 2.5 Power generated by falling water released from dams directly onto a turbine. (1)
- 

## QUESTION 3

[13]

- 3.1 Study the picture below of forces applied to a box. The force applied to the box is given as 200 N to the left.



- 3.1.1 Give the name of the opposing force represented by **X**. (1)
  - 3.1.2 Calculate the weight, **W**, of the box. (3)
  - 3.1.3 If **X** has a value of 15N, calculate the net / resultant force being applied to the box. (3)
- 3.2 Study the picture below of a women vs men tug of war. The force applied by the men's team is given as 300N to the right.



- 3.2.1 Calculate the size of the average force exerted by each man. (2)

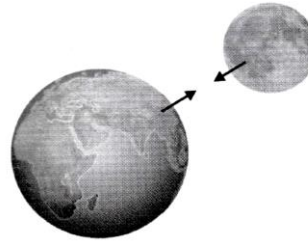
- 3.2.2 If the men win the tug of war with a net / resultant force of 56 N to the right, calculate the force the women's team applied. (4)

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**QUESTION 4**

[6]

The diagram alongside represents the gravitational force between the Moon and the Earth.



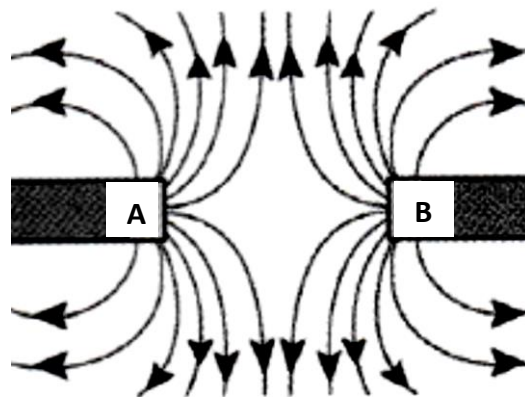
- 4.1 Choose the correct answer from the words in **bold** to make the following statements TRUE. Write down only the correct word:
- 4.1.1 The force that exists between the Moon and the Earth is a force of **attraction / repulsion**. (1)
- 4.1.2 This force would **increase / decrease** if the distance between Earth and Moon was greater. (1)
- 4.2 Simphiwe's weight on Earth is 485 N.
- 4.2.1 Calculate Simphiwe's mass. (3)
- 4.2.2 If Simphiwe went to the Moon, what could you say about her weight compared to when she was on Earth?  
Choose from GREATER THAN, LESS THAN or REMAINS THE SAME. (1)

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**QUESTION 5**

[5]

- 5.1 Study the diagram below:



- 5.1.1 Give labels (**N** or **S**) for the poles marked **A** and **B**. (2)
- 5.1.2 Does this diagram show **ATTRACTION** or **REPULSION**? (1)
- 5.2 Magnetic forces are non-contact forces. Give another term that can be used to describe this type of force. (1)
- 5.3 Name any material that a magnet can be made from. (1)

**QUESTION 6**

**[8]**

6.1 Match the answers in **Column B** to the descriptions given in **Column A**. Write only the letter for each answer next to the question number. (e.g. 6.1.1 A.) (5)

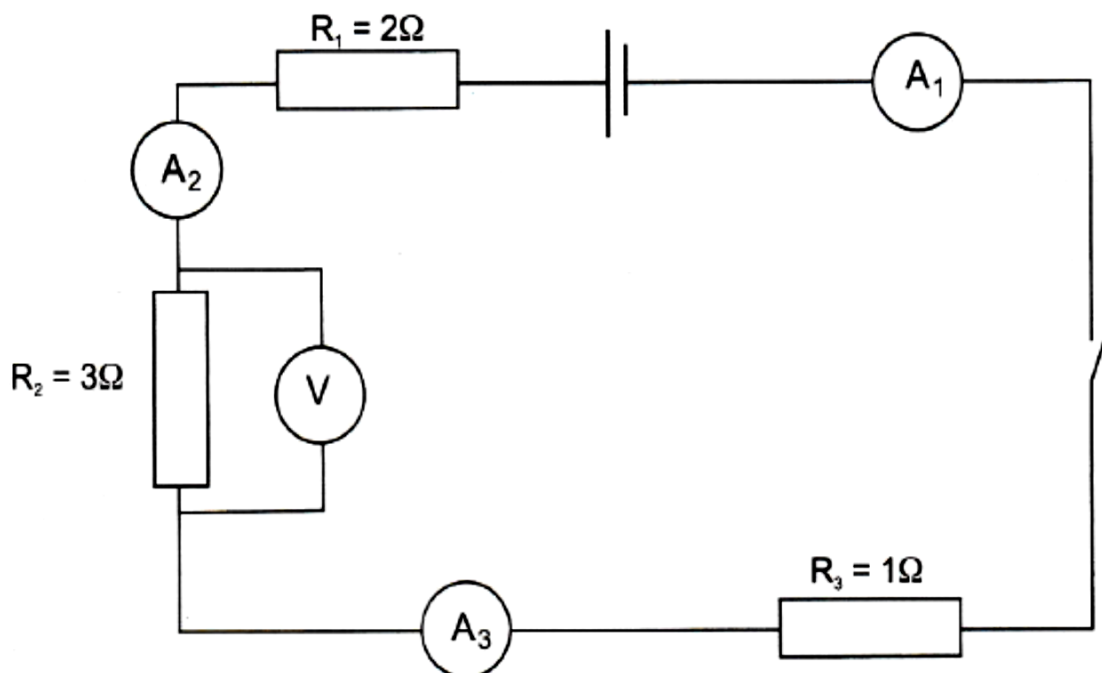
	<b>Column A</b>	<b>Column B</b>
6.1.1	Location of low level nuclear waste disposal	A. Heliostats
6.1.2	Location of many of the coal power stations in South Africa	B. Fusion
6.1.3	Mirrors used to focus the sun's energy on a collector tower	C. Vaalputs, Northern Cape
6.1.4	Electricity generated by releasing water from reservoirs onto turbines and then recycling the water to be used again	D. Pumped storage
6.1.5	Release of energy from an atom when its nucleus is split and the atom divides into two smaller atoms	E. Koeberg, Western Cape
		F. Mpumalanga
		G. Turbines
		H. Sea waves
		I. Fission

6.2 If the municipality in your area charges R2,71 per kWh of electricity, calculate how much it will cost to keep a 60 W light bulb on for 12 hours. (**Hint:** 1 kW = 1 000 W) (3)

**QUESTION 7**

**[18]**

7.1 Study the diagram below. Assume the resistance of the ammeters can be ignored.



7.1.1 Calculate the total resistance of this series circuit. (3)

When the switch is closed, the reading on  $A_1$  is 2A.

7.1.2 Give the reading on  $A_3$ . (1)

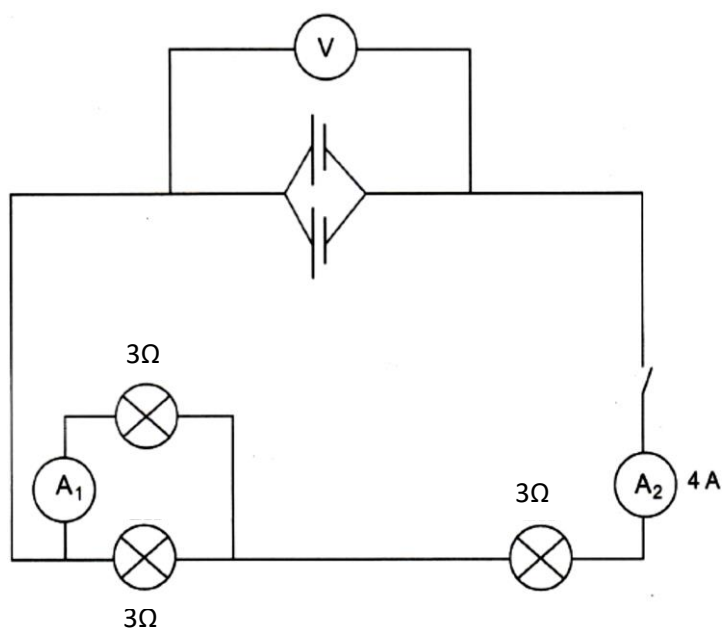
7.1.3 Calculate the reading on voltmeter,  $V$ . (3)

If the voltage across  $R_1$  is 4V:

7.1.4 Calculate the voltage across  $R_3$ . (2)

7.1.5 Calculate the total voltage of the cell. (2)

7.2 Study the parallel circuit in the diagram below containing 3 identical bulbs:



7.2.1 Calculate the total PARALLEL resistance in the circuit shown above. (4)

7.2.2 Calculate the reading on  $A_1$ . (2)

7.2.3 If the reading on  $V$  is 18 V, what is the voltage of each cell? (1)

**TOTAL SECTION A : [60]**

**(START THIS SECTION AT THE TOP OF A CLEAN PAGE )**

**SECTION B : EARTH AS A SYSTEM**

**[40]**

**QUESTION 8: MULTIPLE CHOICE QUESTIONS**

**[1 x 3 = 3]**

Four options are provided as possible answers to the following questions. Write only the letter (A-D) next to the question number (8.1 – 8.3) in the answer book.

8.1 The gas released when fossil fuels are burned

- |   |                     |   |                |
|---|---------------------|---|----------------|
| A | chlorofluorocarbons | C | oxygen         |
| B | methane             | D | carbon dioxide |

8.2 The sphere in which all living organisms are found

- |   |              |   |            |
|---|--------------|---|------------|
| A | hydrosphere  | C | biosphere  |
| B | stratosphere | D | atmosphere |

8.3 Which of the following is NOT one of the Earth's atmospheric layers?

- |   |               |   |              |
|---|---------------|---|--------------|
| A | mesosphere    | C | stratosphere |
| B | magnetosphere | D | troposphere  |

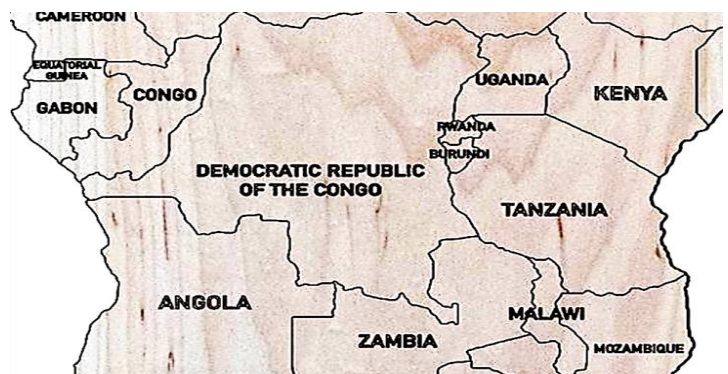
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**QUESTION 9**

**[7]**

***Nestled between Kenya and Mozambique on Africa's East Coast is the continent's highest mountain. Standing at 5895 m tall, Mt Kilimanjaro is a source of pride for the Tanzanian people.***

***Although it is situated just 3° South of the equator, it has a peak that is permanently covered in snow.***



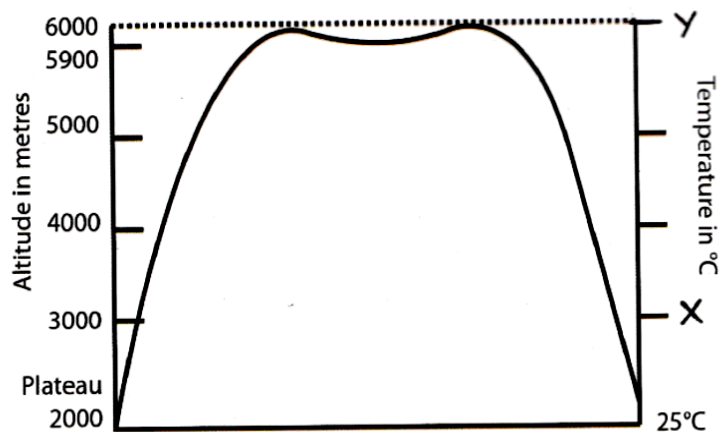
***Mt Kilimanjaro rises from a plateau that is already 2000m above sea level, and temperature continues to decrease at an average rate of about 6,5°C for every 1000m in height. This is known as the environmental lapse rate (ELP).***

**On the lower slope of the mountain there is thick forest with tall trees, a favourite of the giraffe. Higher up, the vegetation changes to grassland until eventually nothing grows because of the snow.**

**Thousands of people come to Africa to climb the mountain. This has caused the water in the streams to become polluted and there is now a significant litter problem on the slopes.**

- 9.1 In which country is Mt Kilimanjaro situated? (1)
- 9.2 How do you think this country benefits from allowing so many people to climb the mountain each year? (2)
- 9.3 State two environmental problems that the climbers bring to the area. (2)

**Consult the graph below and answer the questions that follow:**



**A graph showing temperature vs altitude on Mt Kilimanjaro**

- 9.4 Using the environmental lapse rate (ELP) stated in the paragraph, and showing all your working, provide temperatures for the altitude labelled Y. (2)

**QUESTION 10**

**[5]**

The Earth's atmosphere contains different gases. Refer to the table below and answer the questions that follow. (DO NOT copy the table into your answer booklet.)

<b>Gases in the atmosphere</b>	<b>Percentage abundance (%)</b>
<b>A</b>	78
<b>B</b>	21
argon	0,9
<b>C - other gases</b>	<b>D</b>

10.1 Give the names of TWO **other gases (C)** referred to in the table above . (2)

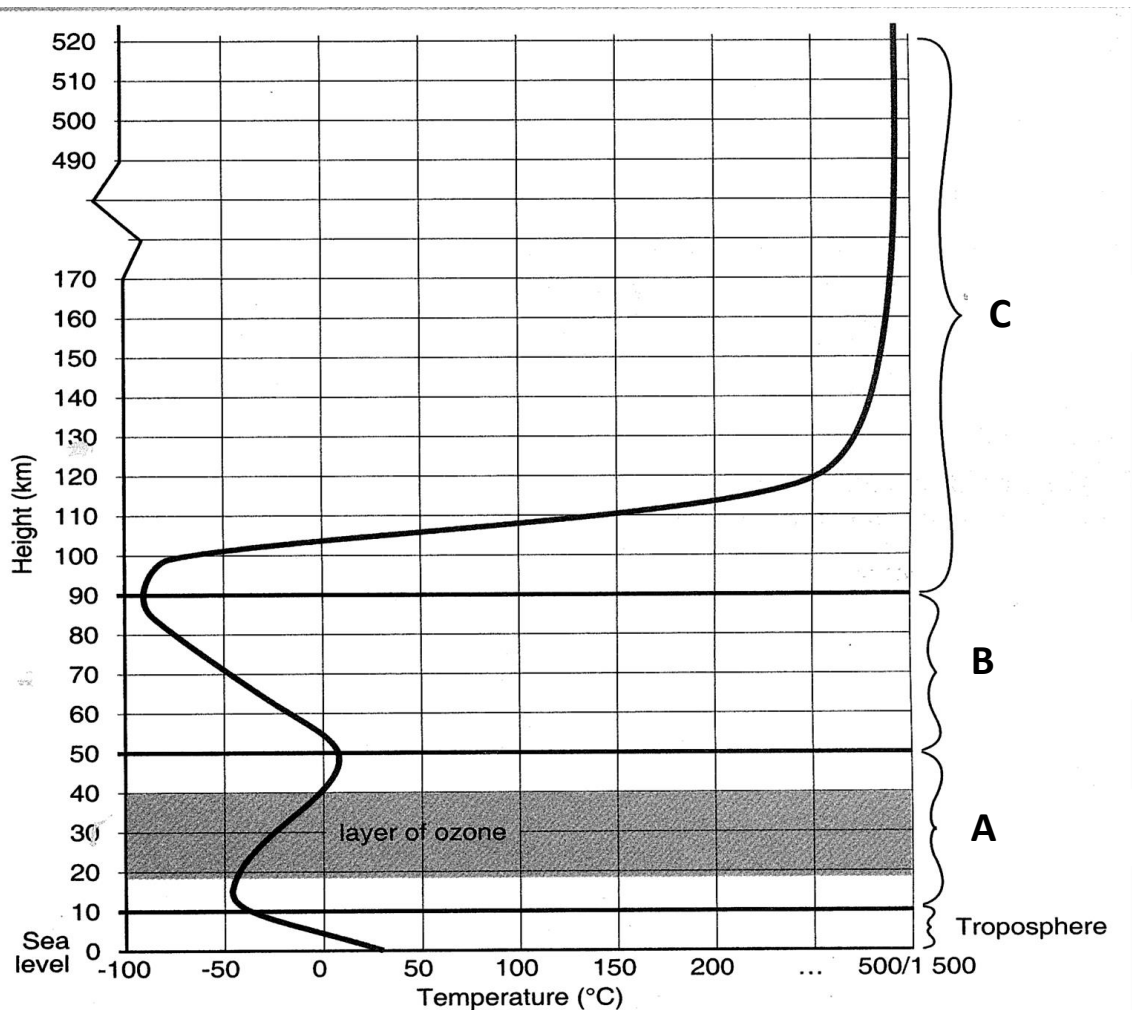
10.2 Complete the table by writing down only labels **A, B** and **D** and filling in the correct answers for each label in your answer booklet. (3)

**QUESTION 11**

**[10]**

The graph below shows how temperature varies with altitude in the Earth's atmosphere.

Refer to the graph and answer the questions that follow.



*A graph showing temperature changes in the atmosphere*

11.1 Supply a label for the layers marked

11.1.1 **A** (1)

11.1.2 **B** (1)

11.2 Write down the temperature (in °C) of the atmosphere at

11.2.1 an altitude of 70 km above sea level (1)

11.2.2 the maximum height of the ozone layer (1)

- 11.3 Identify the layer **C** and explain in full sentences why the temperature increases so dramatically at this altitude. (2)
- 11.4 Explain the function of the ozone layer. (2)
- 11.5 Pilots fly their aircraft on inter-continental routes at altitudes above 10km. Suggest two reasons why they do this. (Do not exceed 4 lines in your answer.) (2)
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**QUESTION 12**

**[10]**

In a certain part of the world, scientists investigated how the annual average atmospheric temperatures of the area changed over a period, between 1996 and 2018. The results are as follows:

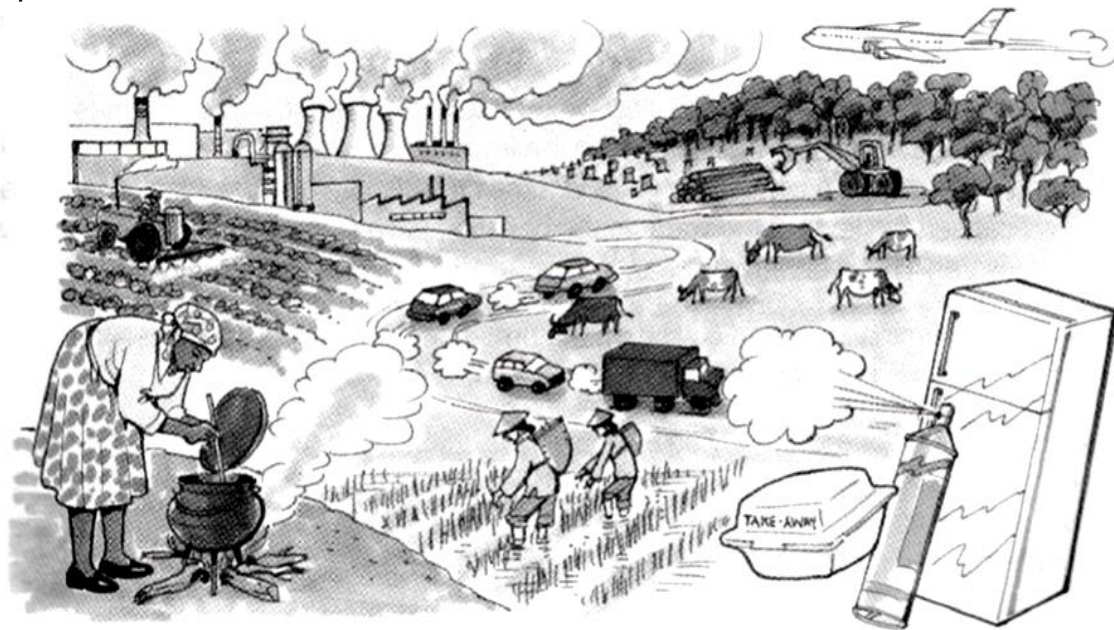
YEAR	AVE TEMP °C	YEAR	AVE TEMP °C
1	18,0	13	18,4
3	18,1	15	18,6
5	18,0	17	18,7
7	18,1	19	18,9
9	18,2	21	18,9
11	18,4	23	18,9

- 12.1 Draw a line graph which clearly shows the changing temperatures over time. Your graph should have a heading as well as correctly labeled axes. (5)
- 12.2 What phenomenon is suggested by the information given in the table? (1)
- 12.3 Provide a possible explanation for the temperature changes. (2)
- 12.4 Discuss **one** negative **cause** and **effect** that this phenomenon has had on the biosphere. (Do not exceed more than 4 lines in your answer.) (2)
-

**QUESTION 13**

**[5]**

The picture below shows how people’s activities can change the composition of the atmosphere due to the Greenhouse Effect.



*Some activities produce greenhouse gases*



13.1 Define the term ‘Greenhouse Effect’. (1)

13.2 Copy the table below into your answer booklet. Looking at the picture, identify any 2 different activities which are contributing to the Greenhouse Effect, and the name of the gases that are produced in each activity. (4)

PEOPLE’S ACTIVITIES	GREENHOUSE GAS PRODUCED

**TOTAL SECTION B: [40]  
GRAND TOTAL : [100]**