

HILLCREST HIGH SCHOOL



NATURAL SCIENCE EXAM

GRADE 9

TIME : 2 HRS

EXAMINERS: MRS SMITH MRS KNOX-WHITEHEAD

NOVEMBER 2021

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:

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

$$W = m \times g$$

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

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 The measure of the size of the force of gravity acting on an object:

- A gravitational acceleration
- B weight
- C resultant force
- D mass

1.2 Choose the answer below that correctly fills BOTH gaps in these statements:

The ...(1)..... the mass of two objects, the larger the gravitational force between them.

The ...(2)..... the distance between the two objects, the larger the gravitational force between them.

- A (1) larger (2) smaller
- B (1) smaller (2) larger
- C (1) smaller (2) smaller
- D (1) larger (2) larger

1.3 During a thunderstorm, which of the following activities would be considered safe?

- A Showering or washing dishes
- B Driving in a car
- C Taking shelter under a tall tree
- D Using appliances that conduct electricity

1.4 When you rub your hands together very quickly they get warm. The force that causes this is called:

- A Compression
- B Electrostatic force
- C Friction
- D Tension

1.5 Which statement is true about current in a SERIES circuit?

- A It divides over the resistors.
- B It is used up as the charge moves around the circuit.
- C It is caused by the movement of positive charges.
- D It is the same at all points.

QUESTION 2 : TERMINOLOGY

(4)

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

- 2.1 Another term to describe non-contact forces. (1)
- 2.2 The most common material used to generate electricity in South Africa. (1)
- 2.3 Network of cables and transformers that carry electricity to all parts of the country. (1)
- 2.4 Non-contact force between charged objects. (1)

QUESTION 3

(22)

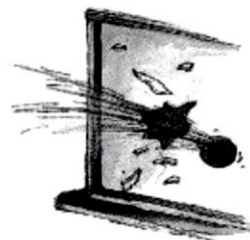
3.1 Study the following diagrams and write down the letter/s of the diagrams showing **BALANCED** forces. (1)



A: Two boys playing tug of war; one boy winning and pulling the other towards him



B: A boy and girl leaning against one another



C: Cricket ball breaking a window

3.2 Look at the image below and answer the questions which follow:



3.2.1 If the total applied force of the boys pushing the car is 1850 N, what is the **average** force which each boy is applying to the car? (2)

3.2.2 If the force of the friction of the car tyres on the road is 725 N, calculate the resultant (net) force on the car. (4)

3.3 Which of the following materials are magnetic? (2)

copper, zinc, plastic, nickel, aluminium, wood, steel

3.4 Bongwiwe has a mass of 52 kg.

3.4.1 Calculate her weight on Earth. (3)

3.4.2 Imagine that Bongwiwe goes to the planet Ugg where the acceleration due to gravity (g) is $5 \text{ m}\cdot\text{s}^{-2}$. Calculate what her weight would be on Ugg. (2)

3.4.3 Back on Earth, Bongwiwe hangs her school bag on a spring balance. The reading is 58 N. What is the mass of Bongwiwe's school bag? (3)

3.4.4 What would the school bag's mass be on planet Ugg? (1)

3.5 Re-write the following sentence and fill in the missing words:

The direction of a magnetic field runs from the _____ pole to the _____ pole of a bar magnet. (2)

3.6 Choose the correct answer in each of the following sentences:

3.6.1 Like charges **attract / repel** each other. (1)

3.6.2 The force mentioned in QUESTION 3.6.1 is a **push / pull / twist**. (1)

QUESTION 4

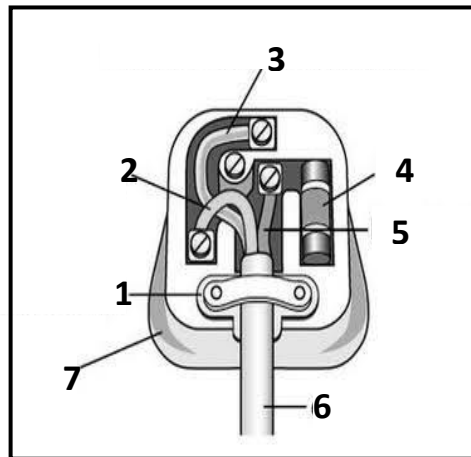
(6)

4.1 If the municipality in your area charges R0,71 per kWh of electricity, calculate how much it will cost to keep a 100 W light bulb on for one night (12 hours).
(Hint: 1 kW = 1 000 W)

(3)

4.2 The wires in the diagram below are coloured blue (2), green-yellow (3) and brown (5). Provide suitable labels for each of the wires numbered 2, 3 and 5.

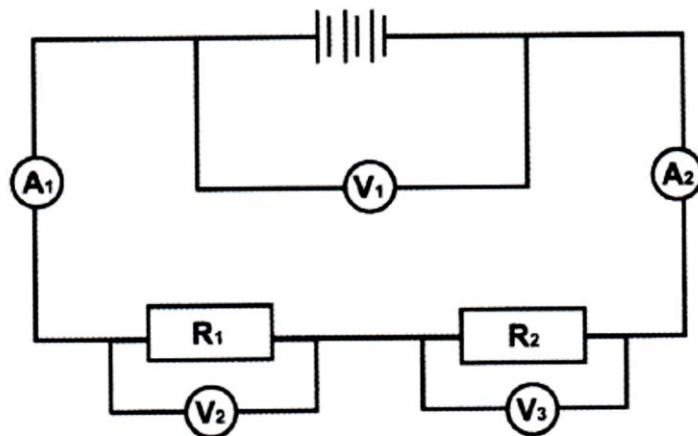
(3)



QUESTION 5

(14)

5.1 In the diagram below R_1 is 3Ω and R_2 is 5Ω . Assume the resistance of the ammeters can be ignored.



5.1.1 What is the total resistance of the circuit?

(3)

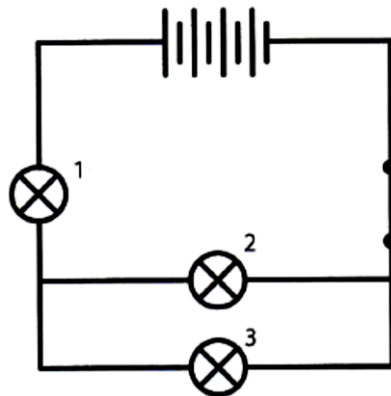
5.1.2 If the reading on A_1 is 2 A, calculate the reading on V_2 .

(3)

5.1.3 Calculate the reading on V_1 .

(3)

5.2 Study the diagram below and answer the questions which follow. All the light bulbs are identical.



- 5.2.1 If the voltage of one cell is 3 V, determine the voltage of the battery. (1)
- 5.2.2 State what you know about the current through light bulb 1 compared to the current through light bulb 2. (1)
- 5.2.3 If the bulbs each have a resistance of 1,5 Ω, calculate the total resistance over the **parallel** part of the circuit. (3)

QUESTION 6 : DATA RESPONSE

(9)

Read the passage below and answer the questions that follow:

This sound engineer makes charcoal from agricultural waste. He now supplies Pick n Pay.

[Phumi Ramalepe](#) , Business Insider SA

Sep 04, 2021, 08:15 AM



Given Ngwamba is a qualified sound engineer who, for several years, struggled to find a job. Then he started making charcoal* – which has now found its way on to the shelves of his local Pick n Pay.

Ngwamba knew he wanted to make something different: effective, yet environmentally friendly. "I discovered that the old way of making charcoal, of going to the forest and cutting down trees, is harmful to the environment and it is not sustainable," he said.

While doing his research, Ngwamba discovered that one can make charcoal out of agricultural waste such as sugarcane, coconut, waste from mango trees, and banana trees.

"I saw that this is something sustainable and it's the future," said Ngwamba. "It solves the problem of deforestation and doesn't add to carbon emission and climate change."

"In one week we do carbonisation, like converting the waste. In the second week, we do the final processing of the charcoal making them into the donut shaped briquette," he said. He says the company can easily make 200kg of charcoal dust in a day when using about five big drums. The price for one bag is R35 for retailers and R40 for individuals buying directly from him.

*** Charcoal: A porous black solid consisting of carbon obtained as a residue when wood or other organic matter is heated in the absence of air to remove water**

- 6.1 The slogan on the advert for Mr Ngwamba's charcoal briquettes says "*Go get your pack and braai green.*" Making reference to the information in the above article, explain what this means. (2)
- 6.2 Mr Ngwamba's charcoal is made from agricultural waste.
- 6.2.1 Is this a RENEWABLE or NON-RENEWABLE source of energy? (1)
- 6.2.2 Name ONE waste product he uses to make the briquettes. (1)
- 6.3 It takes two weeks to convert the waste into briquettes. What are the two stages in this process? (2)
- 6.4 Mr Ngwamba's team can process 200 kg of waste per day. If all of this mass is packaged as briquettes in 4 kg bags, how much money would this amount of waste bring in when Mr Ngwamba sells it to Pick 'n Pay? (3)

TOTAL SECTION A : (60)

SECTION B : EARTH AS A SYSTEM

(40)

QUESTION 1: 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 (1.1 – 1.3) in the answer book.

- 1.1 The atmosphere has four layers, namely the
- A. lithosphere, hydrosphere, atmosphere, biosphere
 - B. mesosphere, thermosphere, stratosphere, troposphere
 - C. water vapour, carbon dioxide, oxygen, nitrogen
 - D. thermosphere, mesosphere, biosphere and hydrosphere
- 1.2 Most meteorites burn up in this layer of the atmosphere.
- A. Troposphere
 - B. Mesosphere
 - C. Stratosphere
 - D. Thermosphere
- 1.3 Stars are born inside huge clouds of gas and dust called...
- A. nebulae
 - B. constellations
 - C. comets
 - D. galaxies

QUESTION 2: ROCK IDENTIFICATION

(4)

Write down only one word to replace the following descriptions.

- 2.1 The type of igneous rock formed when magma cools down slowly in the crust, producing large crystals.
- 2.2 A type of sedimentary rock made from sand.
- 2.3 A metamorphic rock that forms from sedimentary shale.
- 2.4 The type of rock that forms when lava erupts under water and cools rapidly.

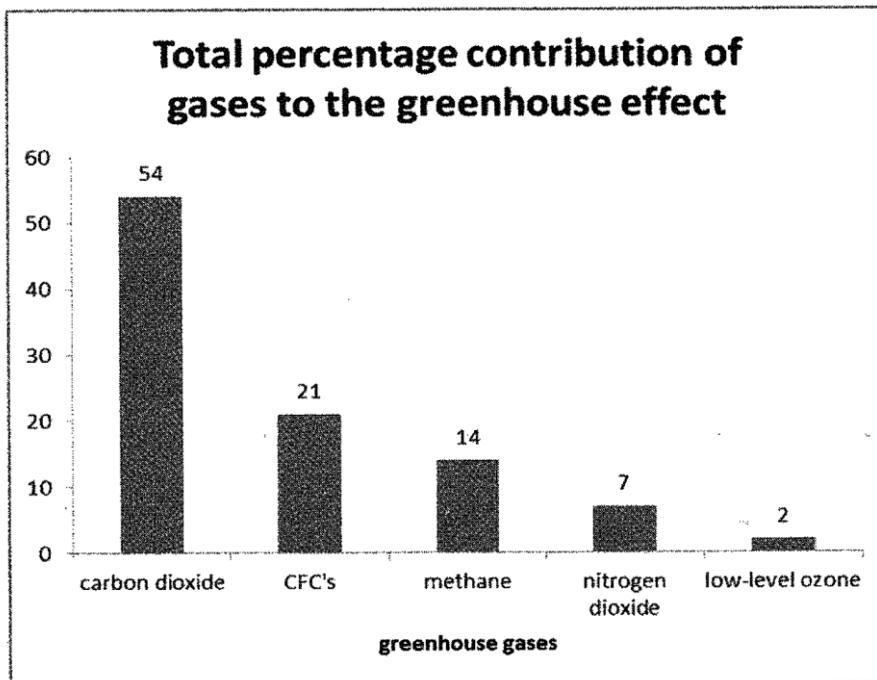
QUESTION 3

(7)

Burning coal releases greenhouse gases into the atmosphere. These greenhouse gases cause global warming.

The following bar graph displays information about an investigation between the sources and amounts of greenhouse gases on Earth.

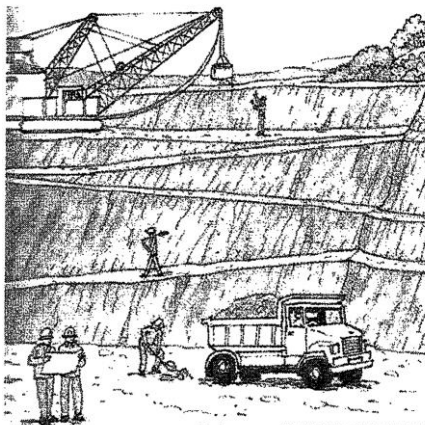
Refer to the following bar graph and answer the questions that follow.



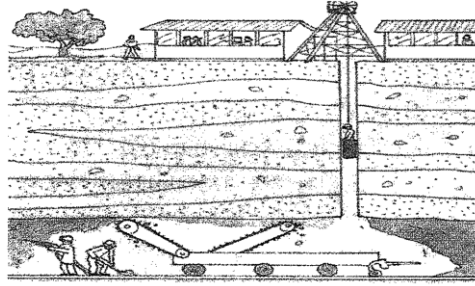
- 3.1 A greenhouse gas (not mentioned on the graph) is water vapour. Calculate the percentage contribution of water vapour to the greenhouse effect from the data provided. Show all working. (2)
- 3.2 Identify the gas produced by:
- 3.2.1 the excessive use of nitrogen based fertilizer (1)
 - 3.2.2 cattle, pig and sheep farming (1)
 - 3.2.3 the cellular respiration of animals and plants. (1)
- 3.3 Discuss **one** negative **cause** and **effect** that global warming has had on the biosphere. (Do not exceed more than 4 lines in your answer.) (2)

QUESTION 4 (10)

- 4.1.1 Identify the type of mining illustrated below. (1)



4.1.2 Identify the type of mining illustrated below. (1)



4.1.3 Which of these methods above is used to mine coal in South Africa? (1)

4.2 Say whether the following minerals are extracted by either **physical** methods or **chemical** methods.

4.2.1 iron in banded iron stone (1)

4.2.2 alluvial diamonds (1)

4.3 List TWO reasons how South Africa's mining industry has had benefits for the country. (2)

4.4 Discuss how mining has a negative impact on the environment. (3)
(Do not exceed more than 4 lines in your answer.)

QUESTION 5 (6)

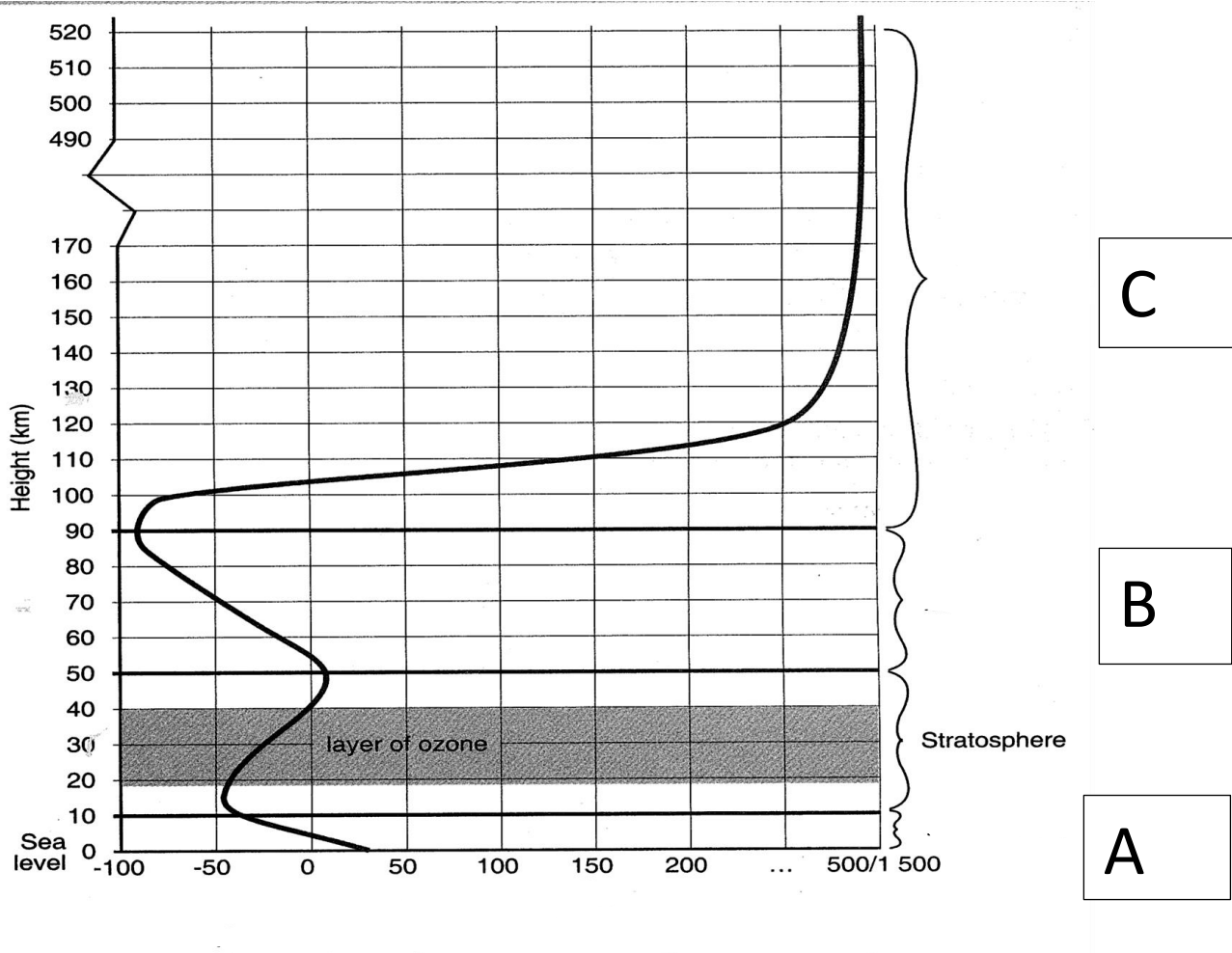
Read the following paragraph on stars. Select the correct answer from the choice in the brackets. Write down only the question number and the answer.

Do **NOT** re-write the paragraph.

For most of its life, a star converts the gas (**5.1 helium / hydrogen**) into (**5.2 helium / hydrogen**) during a process known as nuclear (**5.3 fission / fusion**). Stars that look blue are (**5.4 cooler / hotter**) and (**5.5 younger / older**) than stars that appear red. As stars age and run out of fuel, all nuclear reactions will cease, and they will eventually contract to form (**5.6 red giants / white dwarfs**).

QUESTION 6
(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.



- 6.1 Suggest a suitable label (with units) for the x-axis. (2)
- 6.2 Supply a label for the layers marked
- 6.2.1 **A** (1)
- 6.2.2 **B** (1)
- 6.2.3 **C** (1)
- 6.3 Explain why the temperature in the stratosphere increases so dramatically. (2)
- 6.4 The current temperature in Durban is 32°C. Estimate the temperature in Hillcrest, which is approximately 550m above sea level. Show your working. (**Hint:** temperature changes by 1°C for every 100m change in altitude.) (3)

TOTAL SECTION B: (40)

GRAND TOTAL : (100)