GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PROVINCIAL EXAMINATION

NOVEMBER 2021

GRADE 9

NATURAL SCIENCES

EXEMPLAR

NAME OF LEARNER: _____

GRADE 9: _____

TIME: 2 hours

MARKS: 100

19 pages + 1 data sheet

QUESTIONS	1	2	3	4	5	6	7	8	9	10	TOTAL
LEARNER'S MARKS											
MARKS	9	6	5	15	14	11	9	21	7	3	100

INSTRUCTIONS AND INFORMATION

1. Write your name and grade on the cover page of this question paper that serves as an ANSWER SHEET.

2. Answer all questions in the spaces provided.

3. This question paper consists of SECTION A and SECTION B based on the prescribed content framework in the CAPS document.

4. Allocation of marks:

   SECTION A: 20
   SECTION B: 80

5. This question paper consists of TEN questions.

6. All drawings should be done in pencil only and must be labelled in blue or black ink only.

7. Write neatly and legibly.

EXEMPLAR

SECTION A

QUESTION 1

MULTIPLE CHOICE QUESTIONS

Various options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the correct option and write the correct letter (A – D) in the blocks provided.

1.1 A cup falling off the table involves which pair of forces?

A Gravity and reaction forces
B Lift and friction forces
C Positive charge and negative charge forces
D North and south forces (1)

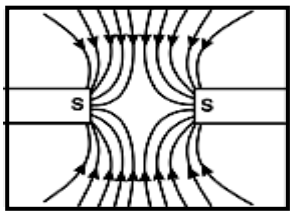
1.2 The three main rock types are formed from molten rock in the following order:

A Sedimentary, Metamorphic, Magma, Igneous
B Metamorphic, Sedimentary, Igneous, Magma
C Magma, Igneous, Sedimentary, Metamorphic
D Igneous, Magma, Metamorphic, Sedimentary (1)

1.3 Which of the following is not a greenhouse gas?

A Water vapour
B Helium
C Carbon dioxide
D Methane (1)

1.4 The following diagram shows the force of:



A Attraction
B Repulsion
C Attraction and repulsion
D Gravity (1)

EXEMPLAR

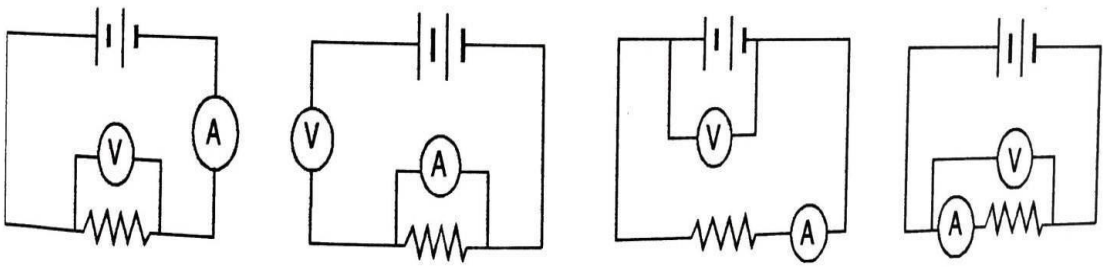
1.5 For stars like the sun, the core of the star contracts to become a ...

A white dwarf.
B yellow star.
C red giant.
D blue star. (1)

1.6 A field force …

A is always a force of attraction.
B occurs only between magnetic and electrical charges.
C results in an action over a distance between two bodies.
D is the only type of force that is able to change the speed of an object. (1)

1.7 In which of the following diagrams are the voltmeter and ammeter connected incorrectly?



A **B** **C** **D**

(1)

1.8 If all the conductors are made of copper wire, which has the greatest resistance?

A Long, thin and hot
B Short, thin and cool
C Long, thick and hot
D Short, thin and cool (1)

1.9 Generating electricity by falling water is called …

A nuclear power.
B hydroelectricity.
C transformation.
D earth leakage. (1)

[9]

EXEMPLAR

QUESTION 2

TERMINOLOGY

Give the correct scientific term for each of the following descriptions. Write ONLY the term in the spaces provided.

2.1 A group of electric cells that are connected together.

_____ (1)

2.2 The amount of matter that a substance or object consists of.

_____ (1)

2.3 A safety device in a circuit that melts and breaks if the current exceeds a safe level.

_____ (1)

2.4 The mixture of gases held around the earth by gravity.

_____ (1)

2.5 The system of power stations, generators, transmission lines and transformers.

_____ (1)

2.6 The fragments of other rocks that settle to form layers.

_____ (1)
(6)

EXEMPLAR

QUESTION 3

MATCHING ITEMS

Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A – G) next to the question numbers (3.1 to 3.5) in the spaces provided.

COLUMN A	COLUMN B	
3.1 Rock from which a metal can be extracted.	A Stratosphere	3.1
3.2 The sphere that consists of water in all forms.	B Biosphere	3.2
3.3 Part of the atmosphere that contains the Ozone layer(O_3).	C Planetary Nebulae	3.3
3.4 The sphere that consists of all living organisms with their interactions	D Hydrosphere	3.4
3.5 The outer gases of a white dwarf that are ejected into space and form an expanding cloud.	E Open cast	3.5
	F Ore	
	G Mesosphere	

(1 x 5) **[5]**

TOTAL SECTION A: [20]

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SECTION B

QUESTION 4

FORCES

4.1 Study the diagram below and answer the questions that follow.



4.1.1 Identify the name of the force that the woman is exerting on the trolley.

_____ (2)

4.1.2 What effect does the woman's force have on the trolley?

_____ (2)

4.2 The woman has a mass of 55 kg, calculate her weight on the moon.
You may use the formula: **Weight = Mass in kg X 9,8 N**

_____

_____

_____

_____ (3)

4.3 Explain the difference between the mass and weight of an object.

_____

_____

_____

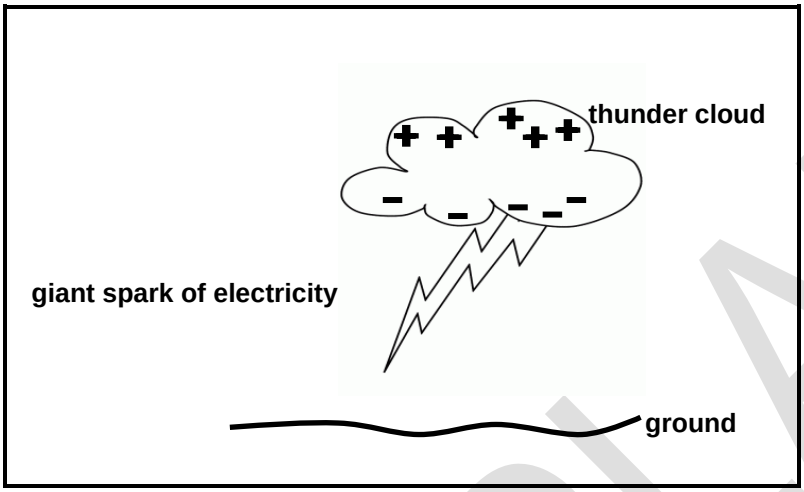
_____ (2)

EXEMPLAR

4.4 Name any two non-contact forces

_____ (2)

4.5 Study the diagram below and answer the question that follows.



Give the scientific explanation of how lightning occurs.

_____

_____

_____

_____

_____ (4)

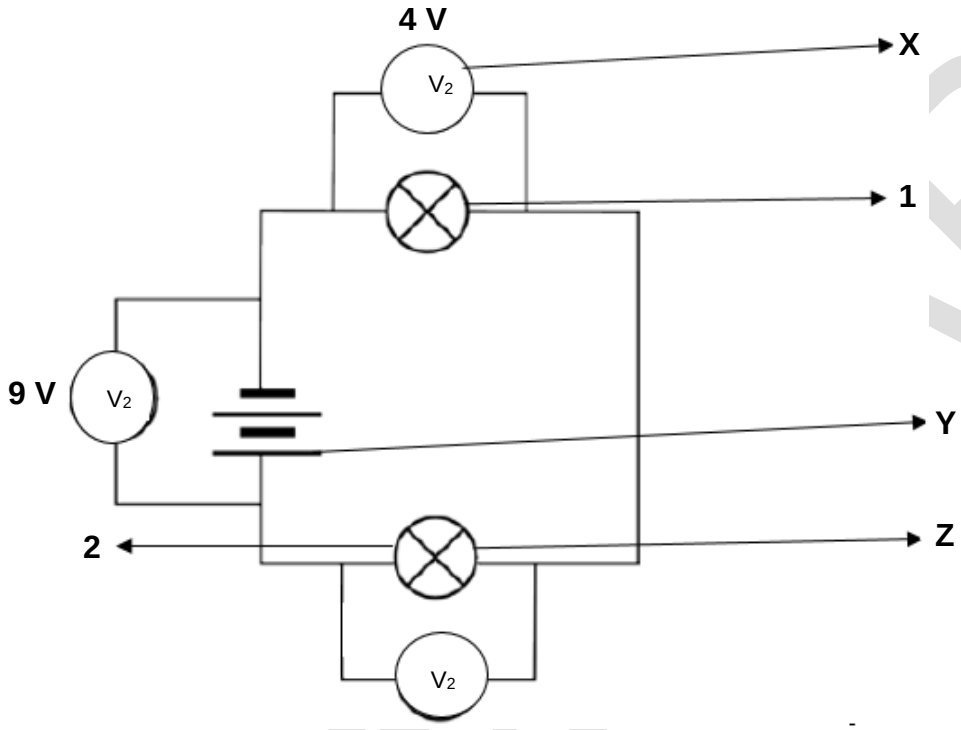
[15]

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QUESTION 5

CURRENT ELECTRICITY

5.1 Study the circuit diagram below and answer the questions that follow.



5.1.1 Provide labels for the components **X**, **Y** and **Z**.

_____

_____

_____ (3)

5.1.2 What energy conversion takes place in an electrical cell?

_____ (1)

5.1.3 State how the bulbs are connected in the above circuit.

_____ (1)

5.1.4 If both cells have equal voltage, determine the voltage of each cell.

_____

_____ (2)

5.1.5 Explain what would happen to bulb **1** if bulb **2** was removed from the circuit.

_____

_____ (3)

5.2 The picture below shows municipal workers removing cables used for illegal connection of electricity.



[Source:www.ewn.co.za/images]

Discuss ONE negative impact of illegal connection of electricity with regard to the following aspects:

5.2.1 Community safety

_____

_____ (2)

5.2.2 Economic growth

_____

_____ (2)
[14]

EXEMPLAR

QUESTION 6

RESISTANCE

6.1 Learners investigated the effect of the length of a conductor on its resistance. Study the information below and answer the questions that follow.

The Grade 9 learners conducted the following experiment. They wanted to investigate the effect of length of a conductor on its resistance. They used a cell, a light bulb, an ammeter and four pieces of copper wire of the same thickness but of different lengths (50 mm, 100 mm, 150 mm and 200 mm).

Procedure

- Set up the above components in a circuit using one conductor at a time.
- Close the switch.
- Use the ammeter to measure the current for each connected conductor.

6.1.1 Write down the hypothesis for the investigation.

_____

_____ (2)

6.1.2 Write the investigative question.

_____

_____ (2)

6.1.3 Identify the dependent variable.

_____

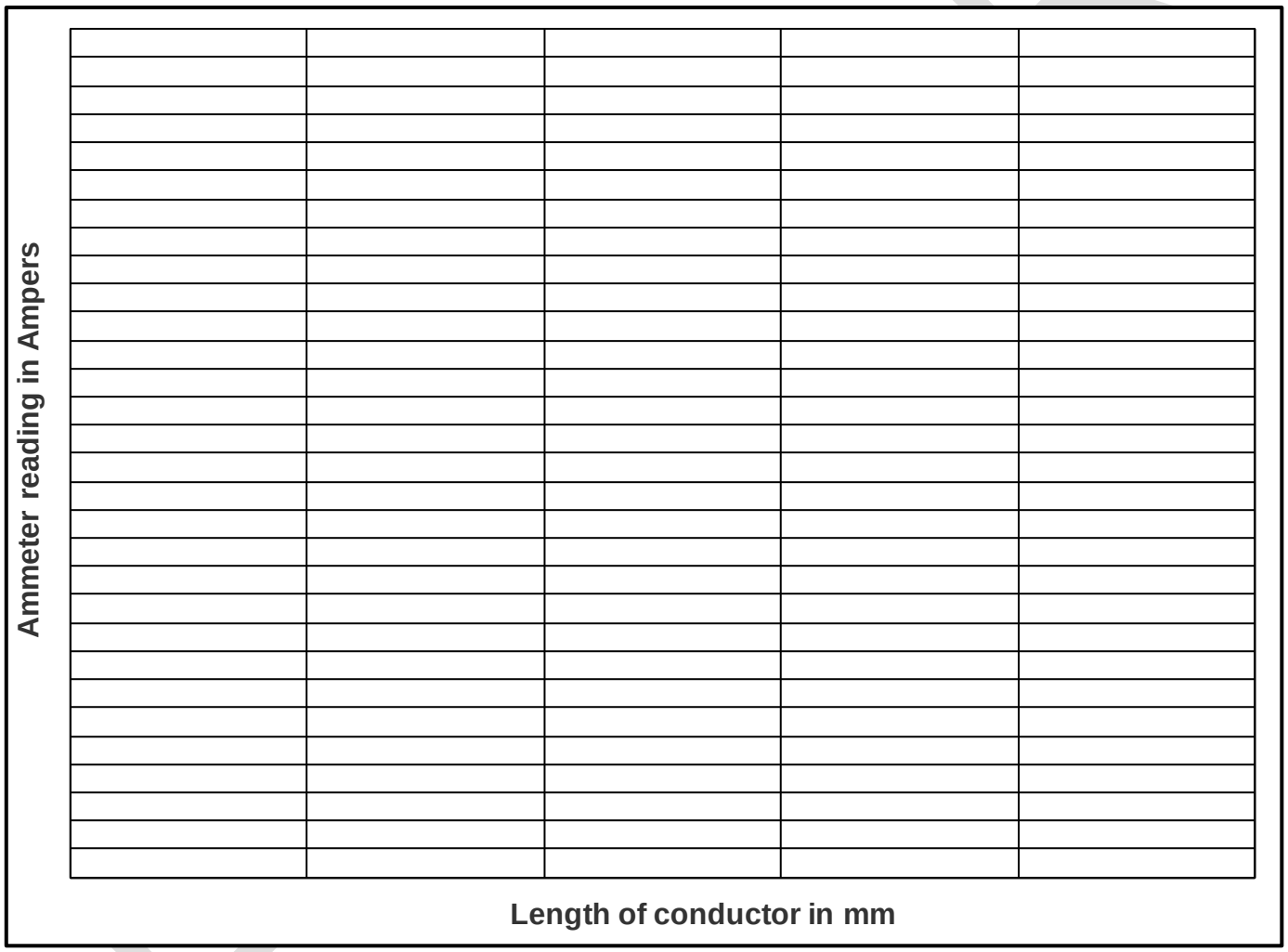
_____ (1)

EXEMPLAR

6.2 Learners recorded their observations in the following table.

Length of copper wire	Reading on ammeter
50 mm	5 A
100 mm	4 A
150 mm	3 A
200 mm	2 A

Draw the line graph using the above table.



(6)
(11)]

QUESTION 7

COST OF POWER CONSUMPTION

7.1 Mr Maloka stays in the Majuba Municipality area and uses a kettle that has a power rating 1 500 W for 12 minutes daily.

7.1.1 Determine the power rating of the kettle in kW.

(2)

7.1.2 In October 2020, the Municipality charged Mr Maloka R130,00 for using the kettle. Mr Maloka claims that he was overcharged. If the Majuba Municipality charges 199 c/kWh, verify his claim.

You may use the formula:
Cost = power rating in kW $\times$ time $\times$ unit price

(5)

7.2 7.2.1 List ONE disadvantage of coal-fired power stations.

(1)

7.2.2 Mention only ONE source of energy, other than coal, that can be used to generate electricity.

(1)
[9]

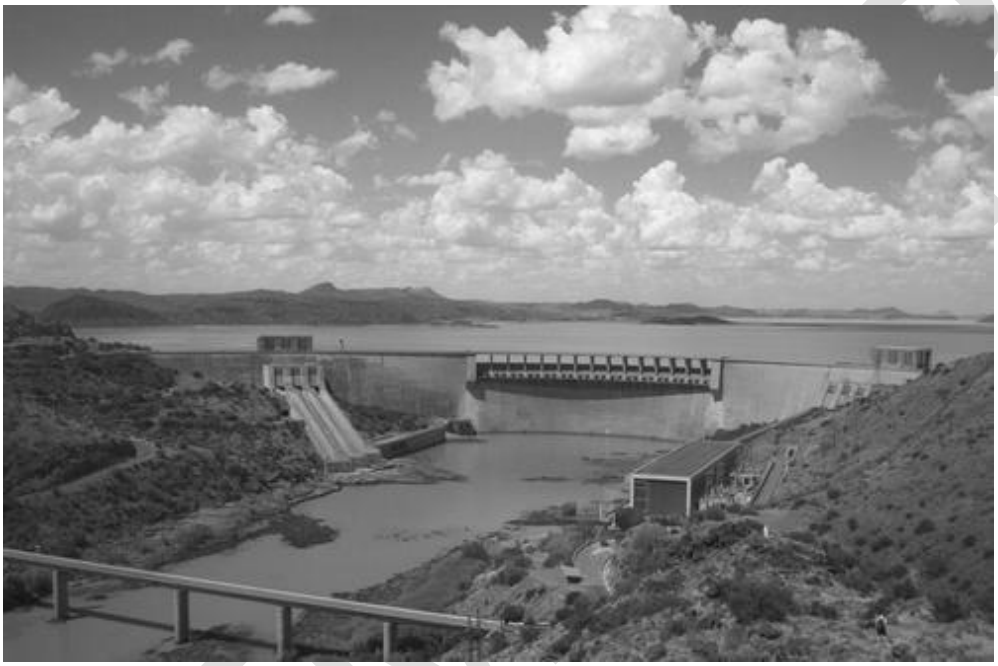
EXEMPLAR

QUESTION 8

SPHERES OF THE EARTH

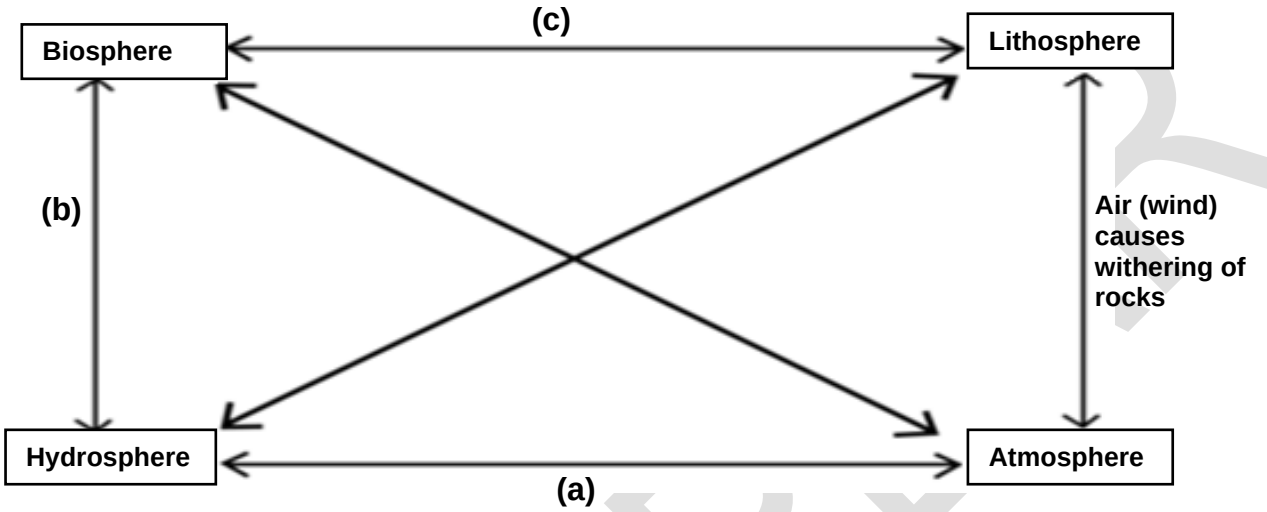
The picture below is of the dam wall that was built for the Gariep Dam on the border of the Free State and the Eastern Cape. The wall is used to generate hydroelectric power.

Figure 1: Gariep Dam in the Orange River



EXEMPLAR

8.1 Discuss the interaction between any three spheres of the earth as shown by each arrow linking the spheres on the diagram below. For example: there is an interaction between the lithosphere and the atmosphere in that the wind (moving air) will cause erosion/withering of the rocks surrounding the dam.
(Figure 1 can be used in the discussion.)



8.1.1 Interaction between Atmosphere and Hydrosphere.

_____

_____ (2)

8.1.2 Interaction between Biosphere and Hydrosphere.

_____

_____ (2)

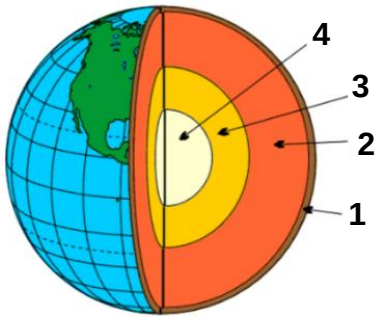
8.1.3 Interaction between Biosphere and Lithosphere.

_____

_____ (2)

EXEMPLAR

8.2 Study the following diagram showing the different layers of the earth and answer the questions that follow.



8.2.1 Provide suitable labels for **1** to **4** on the diagram

1 _____ **2** _____

3 _____ **4** _____ (4)

8.2.2 Write down the names of the THREE main rock types that are found in the earth's lithosphere.

1 _____ 2 _____

3 _____ (3)

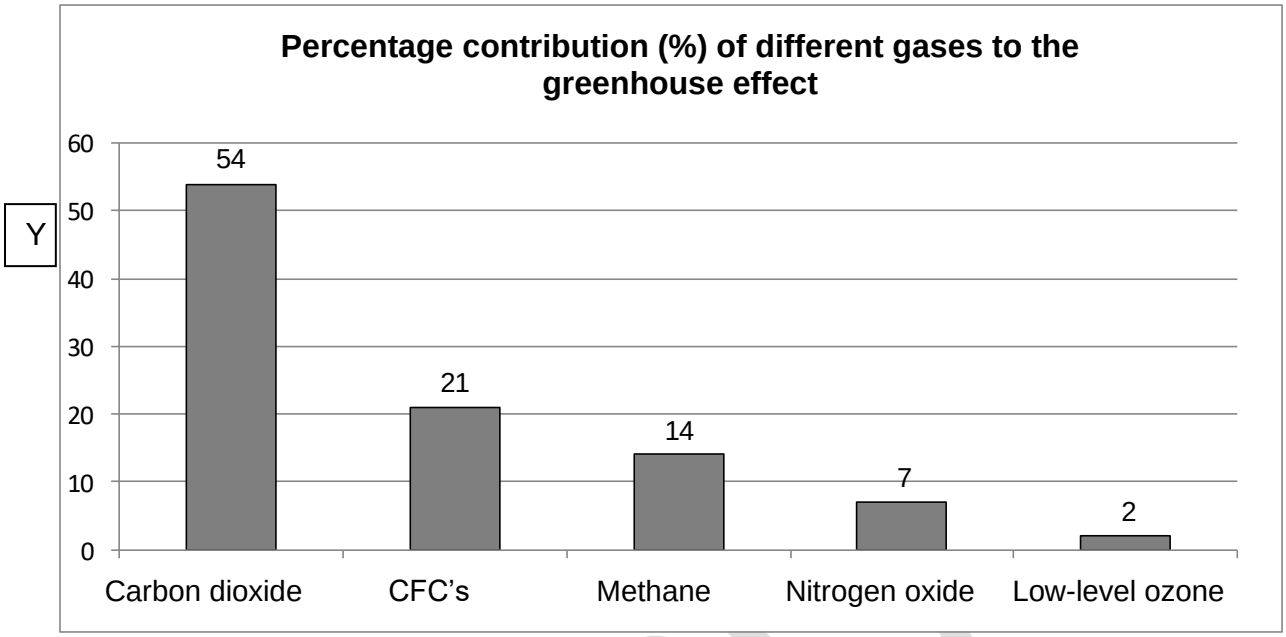
8.2.3 Explain how sandstone is formed in nature.

_____

_____ (2)

EXEMPLAR

8.3 Study the graph below and answer the questions that follow.



8.3.1 A greenhouse gas left out of the graph, is water vapour. Use the data in the graph to calculate the percentage contribution of water vapour to the greenhouse effect. Show your calculations.

_____

_____

_____

_____ (2)

8.3.2 Suggest a suitable label for the Y-axis of the graph.

_____ (1)

8.3.3 Identify ONE gas from the graph that is produced by natural processes.

_____ (1)

8.3.4 Identify ONE gas from the graph that is responsible for destroying the ozone layer.

_____ (1)

8.3.5 Which natural process produces the gas named in QUESTION 8.3.3?

_____ (1)

[21]

EXEMPLAR

QUESTION 9

MINING OF MINERAL RESOURCES

Read the article below and answer the questions that follow.

Iron ore mining takes place in the Northern Cape, South Africa.

The Sishen Mine is the largest iron ore, open cast mine in the world. It is located in the Northern Cape in South Africa. In 2011, 38,9 million tons of iron ore (haematite) was mined there. The mine has a lifespan of 21 years.

Once the rock has been removed from the ground by blasting, it is carried by large trucks to the beneficiation plant where the iron is extracted from the ore. There are several steps involved in this process. The iron ore is first crushed, then screened (sifted) and then beneficiated. Beneficiation involves processing the iron by physical methods namely magnetism, flotation, gravity, separation and a chemical method namely carbon reduction. These processes are necessary in order to change the low grade iron, which contains other minerals such as titanium, chrome, tungsten and nickel to high grade, pure iron that is needed to meet the requirements for making steel products.

[Source: adapted from: http//www.kumba.co.za/ob Ssishen.php and Http//www.crusherasia.com/ore-crusher/iron-orebeneficiation.htm]

9.1.1 In which part of South Africa is the Sishen mine located?

_____ (1)

9.1.2 Where does mining take place in an open cast mine?

_____ (1)

9.1.3 Is iron ore a mixture or a compound? Give a reason for your answer.

_____

_____ (2)

9.1.4 State the physical method of extracting iron from the ore.

_____ (1)

9.1.5 Name and discuss ONE impact of mining on the environment.

_____

_____ (2)

[7]

EXEMPLAR

QUESTION 10

BIRTH, LIFE AND DEATH OF STARS

10.1 Why are stars seen as different colours in the sky?

_____ (2)

10.2 Massive stars die in powerful explosions. What are these explosions called?

_____ (1)
[3]

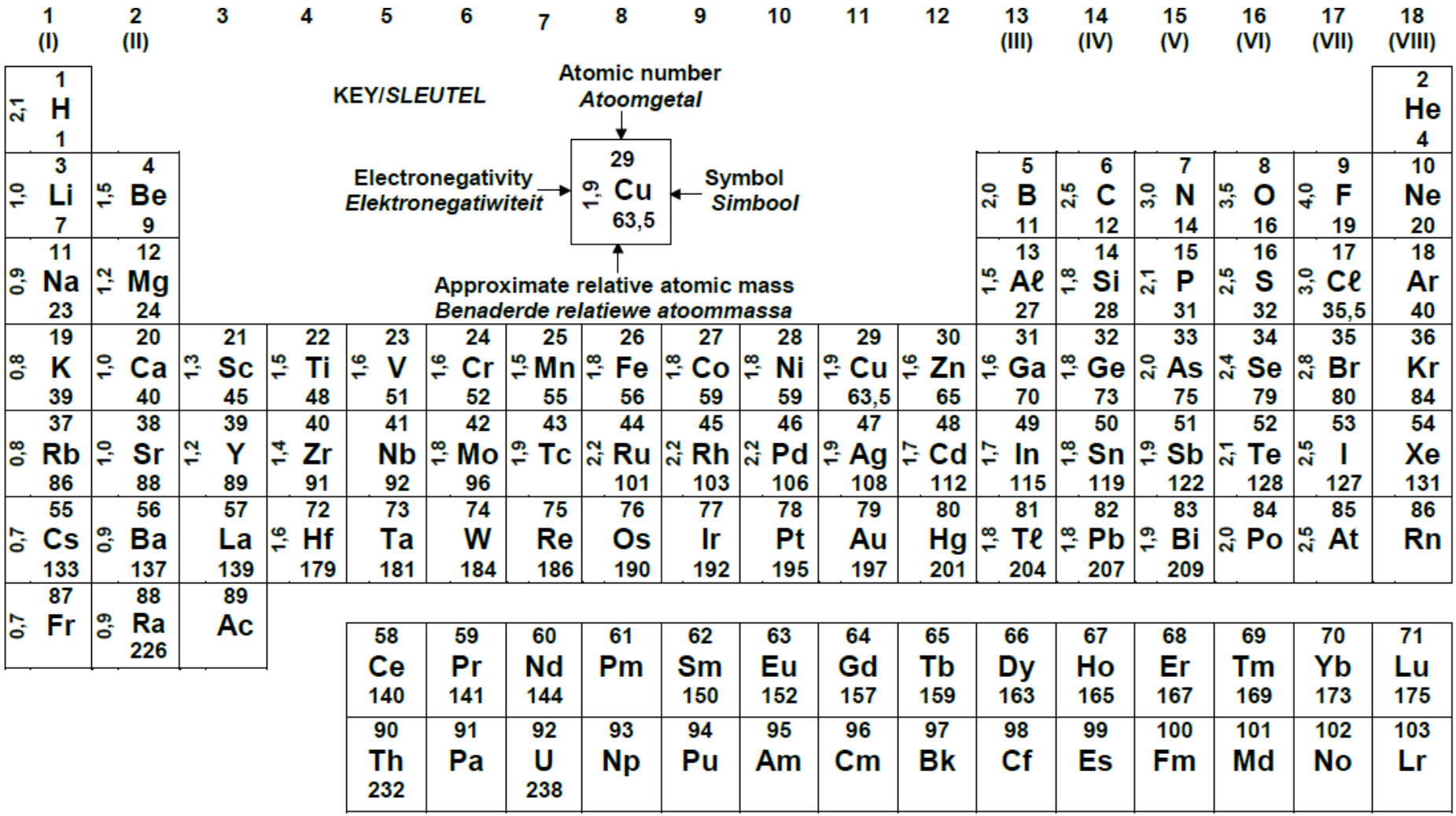
TOTAL SECTION B: [80]

TOTAL: 100

EXEMPLAR

END

THE PERIODIC TABLE OF ELEMENTS/*DIE PERIODIEKE TABEL VAN ELEMENTE*



1 (I)	2 (II)	3	4	5	6	7	8	9	10	11	12	13 (III)	14 (IV)	15 (V)	16 (VI)	17 (VII)	18 (VIII)
2,1 H 1																	2 He 4
1,0 Li 7	1,5 Be 9											2,0 B 11	2,5 C 12	3,0 N 14	3,5 O 16	4,0 F 19	Ne 20
0,9 Na 23	1,2 Mg 24											1,5 Aℓ 27	1,8 Si 28	2,1 P 31	2,5 S 32	3,0 Cℓ 35,5	Ar 40
0,8 K 39	1,0 Ca 40	1,3 Sc 45	1,5 Ti 48	1,6 V 51	1,6 Cr 52	1,5 Mn 55	1,8 Fe 56	1,8 Co 59	1,8 Ni 59	1,9 Cu 63,5	1,6 Zn 65	1,6 Ga 70	1,8 Ge 73	2,0 As 75	2,4 Se 79	2,8 Br 80	Kr 84
0,8 Rb 86	1,0 Sr 88	1,2 Y 89	1,4 Zr 91	Nb 92	1,8 Mo 96	1,9 Tc	2,2 Ru 101	2,2 Rh 103	2,2 Pd 106	1,9 Ag 108	1,7 Cd 112	1,7 In 115	1,8 Sn 119	1,9 Sb 122	2,1 Te 128	2,5 I 127	Xe 131
0,7 Cs 133	0,9 Ba 137	La 139	1,6 Hf 179	Ta 181	W 184	Re 186	Os 190	Ir 192	Pt 195	Au 197	Hg 201	1,8 Tℓ 204	1,8 Pb 207	1,9 Bi 209	2,0 Po	2,5 At	Rn
0,7 Fr	0,9 Ra 226	Ac															

58 Ce 140	59 Pr 141	60 Nd 144	61 Pm	62 Sm 150	63 Eu 152	64 Gd 157	65 Tb 159	66 Dy 163	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173	71 Lu 175
90 Th 232	91 Pa	92 U 238	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr