education

Department of Education
FREE STATE PROVINCE

GRADE 9

NATURAL SCIENCES

NOVEMBER 2018

MARKS: 100

TIME: 2 HOURS

This question paper consists of 16 pages

INSTRUCTIONS AND INFORMATION:

1. Answer ALL questions in this question paper.
2. This question paper consists of TWO sections:

   SECTION A: 20 MARKS

   SECTION B: 80 MARKS

3. This question paper consists of NINE questions.
4. Number all your answers according to the numbering system used in the question paper.
5. You may use a non-programmable calculator where necessary.
6. In case of calculations, show all steps.
7. Use pencil for drawings.
8. Write neatly and legibly.

SECTION A

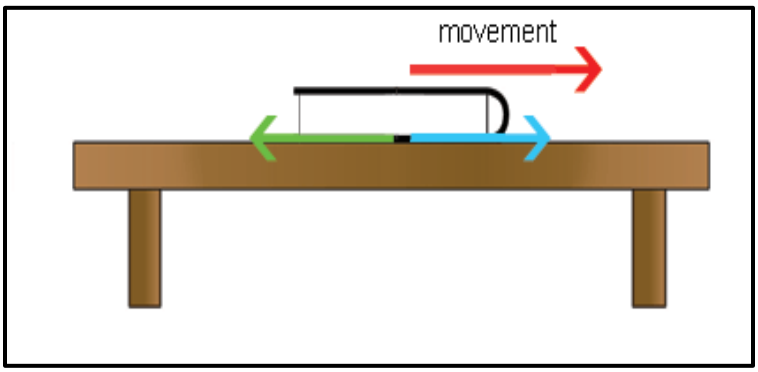
QUESTION 1

Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A – D) next to the question number (1.1 – 1.10), e.g. 1.11 F.

1.1 Which one of the following is NOT an example of a contact force?

A Pushing force.
B Tension.
C Gravitational force.
D Frictional force. (1)

1.2 A book is placed on the table. It is moved towards the right. Which one of the forces acts on the book while it is moving?



A Compression.
B Tension.
C Friction.
D Magnetic force. (1)

1.3 A lightweight conducting ball, **S**, hangs from a nylon thread. When a charged bar is brought close to **S**, it is attracted by the bar. Which ONE of the following best represents the charges on the bar and on **S**?

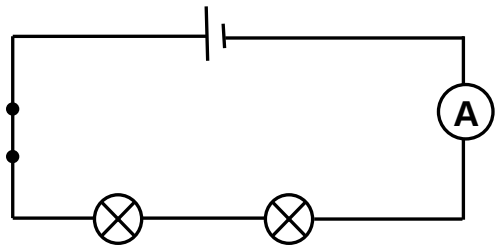
	CHARGE ON THE BAR	**CHARGE ON S**
A	Negative	Negative
B	Neutral	Neutral
C	Positive	Positive
D	Negative	Neutral

(1)

1.4 The apparatus used to measure electric current strength is the ...

A voltmeter.
B spring balance.
C electrometer.
D ammeter. (1)

1.5 Study the circuit diagram below and answer the question that follows.



The reading on the ammeter is 2A. A second identical ammeter is now connected between the two light bulbs. The reading on this ammeter is ... A.

A 1
B 2
C 4
D 8 (1)

1.6 Electricity generated by falling water is called...

A nuclear power.
B hydroelectricity.
C solar power.
D wind power. (1)

1.7 Large inter-continental jet planes are able to fly in the following two spheres of the atmosphere.

A Troposphere and Mesosphere.
B Atmosphere and Troposphere.
C Thermosphere and Mesosphere.
D Troposphere and Stratosphere. (1)

1.8 The slow increase in the average temperature of the earth's atmosphere is called ...

A global warming.
B greenhouse effect.
C weathering.
D ozone. (1)

1.9 Acid rain is caused by…

A water.
B sulphur dioxide, nitrous oxide and carbon dioxide.
C helium, neon and argon.
D rusting of metals. (1)

1.10 Greenhouse gases ...

A trap the ultraviolet radiation, which warms air close to the surface of the earth.
B cannot cause global warming.
C generates ultraviolet light which heats up the earth.
D damage the ozone layer and cause high levels of evaporation. (1)

[10]

QUESTION 2

Give ONE word/term for each of the following descriptions. Write ONLY the word/term next to the question number (2.1 - 2.5) in your answer book.

2.1 The SI unit of force. (1)

2.2 The force between two charged objects. (1)

2.3 A component that opposes the flow of electric current in a circuit. (1)

2.4 A group electric cells that are connected to each other. (1)

2.5 A sphere of the earth which is rocky. (1)

[5]

QUESTION 3

Choose a word from COLUMN B that matches the description in COLUMN A. Write only the letter (A – I) next to the question number (3.1 – 3.5) in your answer book.

COLUMN A	COLUMN B
3.1 An instrument with a high resistance.	A rheostat
3.2 Resistors in series.	B ammeter
3.3 The unit of electrical power.	C coulomb
3.4 The rate of flow of charge.	D current dividers
3.5 Variable resistor.	E joule
	F potential dividers
	G watt
	H voltmeter
	I measured in amperes

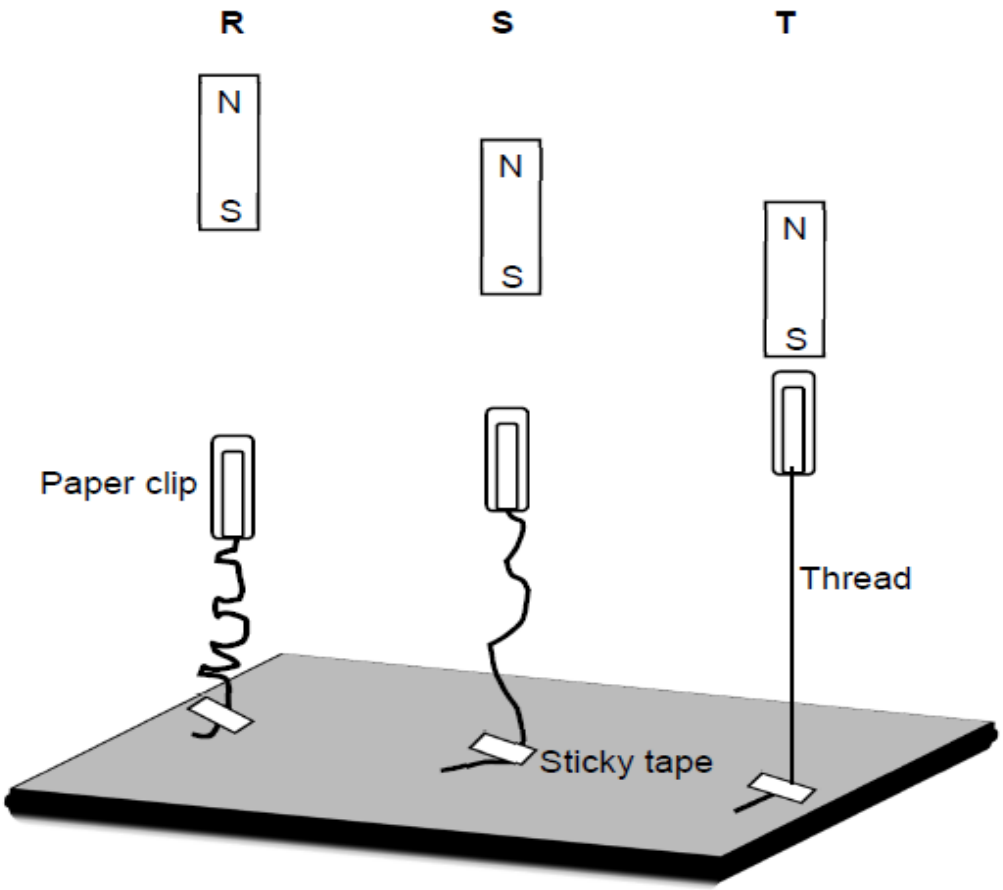
(5)
[5]

TOTAL SECTION A: 20

SECTION B

QUESTION 4

4.1 Three grade 9 learners want to know what the effect of the distance between a magnet and an object is on the strength of a magnetic force. They tie three pieces of thread to three identical iron paper clips. They attach the pieces of string onto a flat surface with sticky tape. Each learner holds a magnet above one of the paper clips, shown in the diagram as **R**, **S** and **T**. The three magnets are identical. The learners hold the magnets different distances from the surface on which the paper clips are attached. They observe that the magnets lift the paper clips from the surface.



4.1.1 In which trial (**R**, **S** or **T)** is the magnetic force on the paper clip the weakest? (1)

4.1.2 Motivate your answer in QUESTION 4.1.1 by referring to the observations made during the investigation. (1)

4.1.3 Name one controlled variable in this investigation. (1)

4.1.4 Identify the independent variable in the investigation. (1)

4.2 Draw a diagram to illustrate the magnetic field around a bar magnet. (3)

4.3 A group of learners performs an investigation to determine the charge on each of four objects, Q, R, S and T. They use a negatively charged rod X and a neutral object P. The following observations are made:

Observation 1: Q attracts P

Observation 2: R repels Q

Observation 3: S attracts R, but repels T

Observation 4: T attracts X

Use the observations above to identify each of the charges on Q, R, S and T as POSITIVE or NEGATIVE.

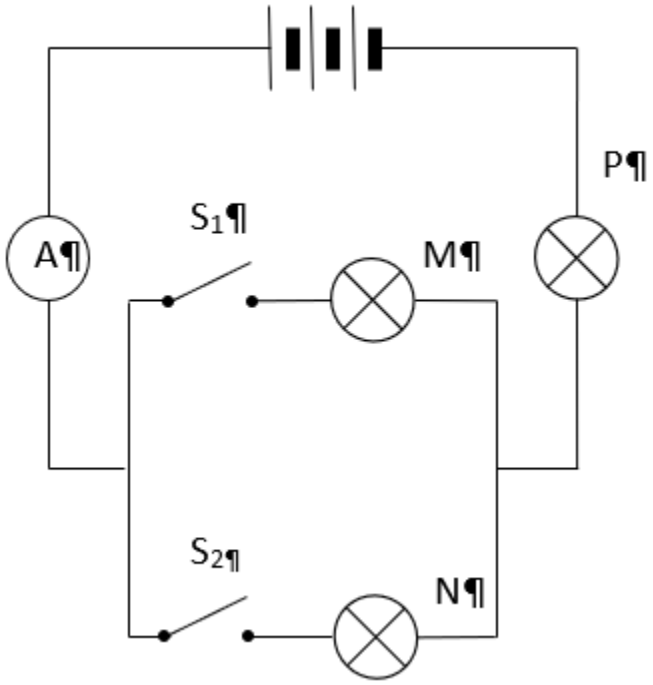
Draw the following table in your ANSWER BOOK. Complete the table to show the charge on each object.

CHARGED OBJECT	**CHARGE (POSITIVE OR NEGATIVE)**
Q	
R	
S	
T	

(4)
[11]

QUESTION 5

5.1 In the circuit diagram below, three identical bulbs are connected as shown. The ammeter, connecting wires and battery have negligible resistance. Study the diagram and answer the questions that follow:



5.1.1 Switches S_1 and S_2 are open. Which bulbs, if any, will light up? (2)

5.1.2 Switch S_1 is closed and S_2 is open. Compare the brightness of bulbs M, N and P. (3)

5.1.3 Switches S_1 and S_2 are closed. Compare the potential differences across bulbs M, N and P. (2)

For QUESTIONS 5.1.4 and 5.1.5, choose the correct answer from those given in brackets. Only write down the answer next to the question number in the answer book.

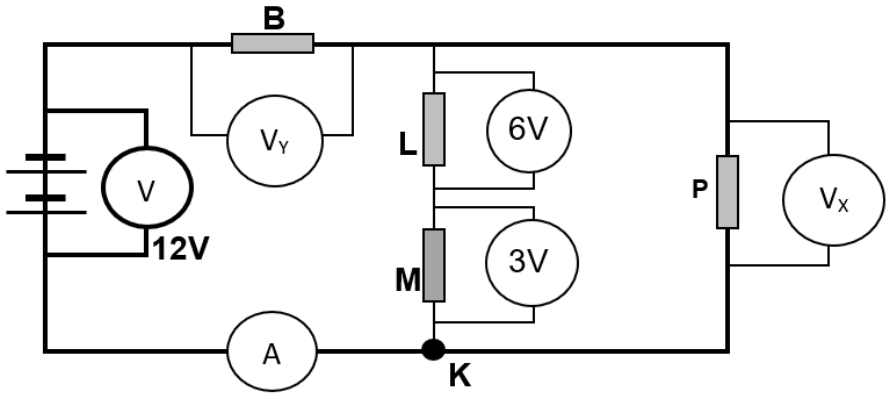
5.1.4 Adding bulbs in parallel causes the:

5.1 4.1 resistance in the circuit to (increase / decrease / remain the same). (1)

5.1.4.2 potential difference across the battery to (increase / decrease / remain the same). (1)

5.1.5 Resistors in parallel can be regarded as (current / potential) dividers. (1)

5.2 In the circuit diagram that follows, the total voltage across the battery is 12 V. The readings on voltmeter X and voltmeter Y are unknown. The readings on the two remaining voltmeters are indicated.



5.2.1 What happens with the current at point K in the circuit? (1)

5.2.2 Which resistor, L or M, has the lowest resistance? Give a reason for your answer. (2)

5.2.3 What is the reading on voltmeter V_X? (2)

5.2.4 What is the reading on voltmeter V_Y? (1)

5.2.5 How will the ammeter reading change if resistor B is removed from the circuit and replaced by a piece of connecting wire? Explain your answer. (2)
[18]

QUESTION 6

The table below compares the usage of electricity by a stove, a 2-plate hotplate, a geyser and a hairdryer. The readings are taken after a month of 30 days.

Appliance	Power rating (Watt)	Hours used per day	Number of days used per month	kWh used per month	Monthly cost at 79,50 c/kWh
Stove	3000	2	25	150	R119,25
2-Plate hotplate	1500	3	30		
Geyser	2000	5	30	300	
Hairdryer	1100				R6,55

Answer the following questions, using the information in the table.

6.1 Which appliance has the highest power rating? (1)

6.2 For how many hours is the hotplate used in a month? (2)

6.3 Calculate the monthly cost of using the 2-plate hotplate in the table above. (3)

6.4 Calculate the monthly cost of using the geyser in the table above. (2)

6.5 For how many hours per month is the hairdryer used? (4)
[12]

QUESTION 7

Carefully read the research article on '**CARBON DIOXIDE EMISSION IN THE ATMOSPHERE'**, and answer the questions that follow:

Carbon dioxide (CO_2), Methane (CH_4) and Nitrous oxide (N_2O) form the biggest part of the greenhouse gases found in the atmosphere of South Africa. The most significant of these three greenhouse gases is carbon dioxide which contributed more than 80% of the total greenhouse gas emissions for both the years 1990 and 1994.

The largest contribution of CO_2-gas came from the **energy sector**, which generated 89,7% of the total CO_2-gas emission in 1990 and 91,1% of the emission in 1994. The high emission levels from this sector are due to the high energy demand of SA's economy which depends on large-scale extraction and processing in the mining and mineral sector.

The following table shows the contribution of certain **sub-sectors** in our economy to the total CO_2-gas emission by the **energy sector**. This data was collected in 1994.

Sub-sector	**CO_2-gas emission**
Residential	2,5 %
Agriculture	5,6%
Commercial	0,3 %
Transport	14,6 %
Industry	18 %
Electricity and Heat	56,7 %
Fugitive products / Wasteful	2,3 %

The planting of forests is currently recognized as the only significant factor which can decrease the amount of CO_2-gas in South Africa's atmosphere.

The total uptake of CO_2-gas by trees during photosynthesis increased in the 1990s due to afforestation (planting of forests) activities. South Africa's forestry industry grew in that period to support expanded exports of woodchips, pulp and paper. The total uptake of CO_2-gas through afforestation activities increased from 16,98 million tons in 1990 to 18,61 million tons in 1994.

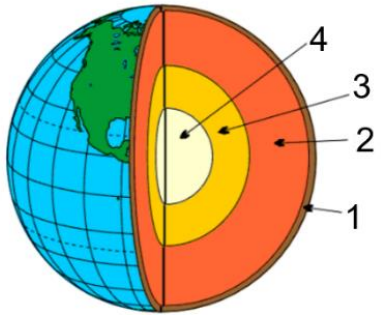
Further expansion of forest plantations after 1994 was however, constrained by limited natural resources, notably water, as well as social and environmental challenges.

SOURCE: Department of Environmental Affairs and Tourism (2003)

7.1	Name TWO gases which are responsible for the greenhouse effect.	(2)
7.2	Which ONE of the three gases mentioned in the article, contributed the most towards greenhouse gas emissions between 1990 and 1994?	(1)
7.3	Which **sector** has contributed to the largest amount of carbon dioxide emitted in South-Africa in the period, 1990 to 1994?	(1)
7.4	Which **sub-sector** contributed the smallest amount of carbon dioxide emitted in the same period?	(1)
7.5	What was responsible for an increase in the CO_2-gas uptake from the atmosphere in the early nineties (1990 - 1994)?	(1)
7.6	Why is South Africa unable to continue to increase the CO_2-gas uptake from the atmosphere like in the early nineties (1990 - 1994)?	(1)
7.7	What is the phenomenon called which is caused by an uncontrolled increase in the greenhouse effect?	(1)
7.8	What effect will a complete absence of greenhouse gases in the Earth's atmosphere has on Earth's climate? Explain your answer.	(2)
7.9	Write down THREE negative effects of global warming.	(3)
		[13]

QUESTION 8

Study the diagram showing the different layers of the Earth and answer the questions that follow:

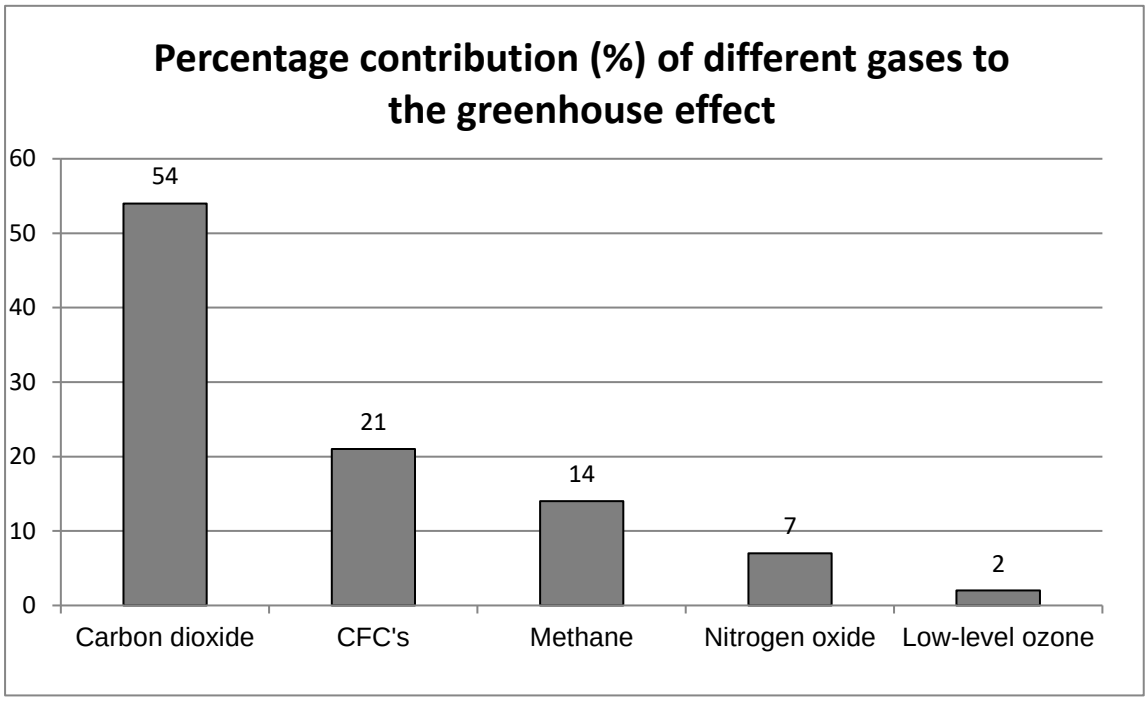


8.1. Provide suitable labels for 1 to 4 on the diagram. (4)

8.2 Write down the names of the three main rock types that are found in the Earth's lithosphere. (3)

8.3 Explain how sandstone is formed in nature. (2)

8.4 Study the graph and answer the questions that follow:



8.4.1 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)

8.4.2 Suggest a suitable label for the y-axis of the graph. (1)

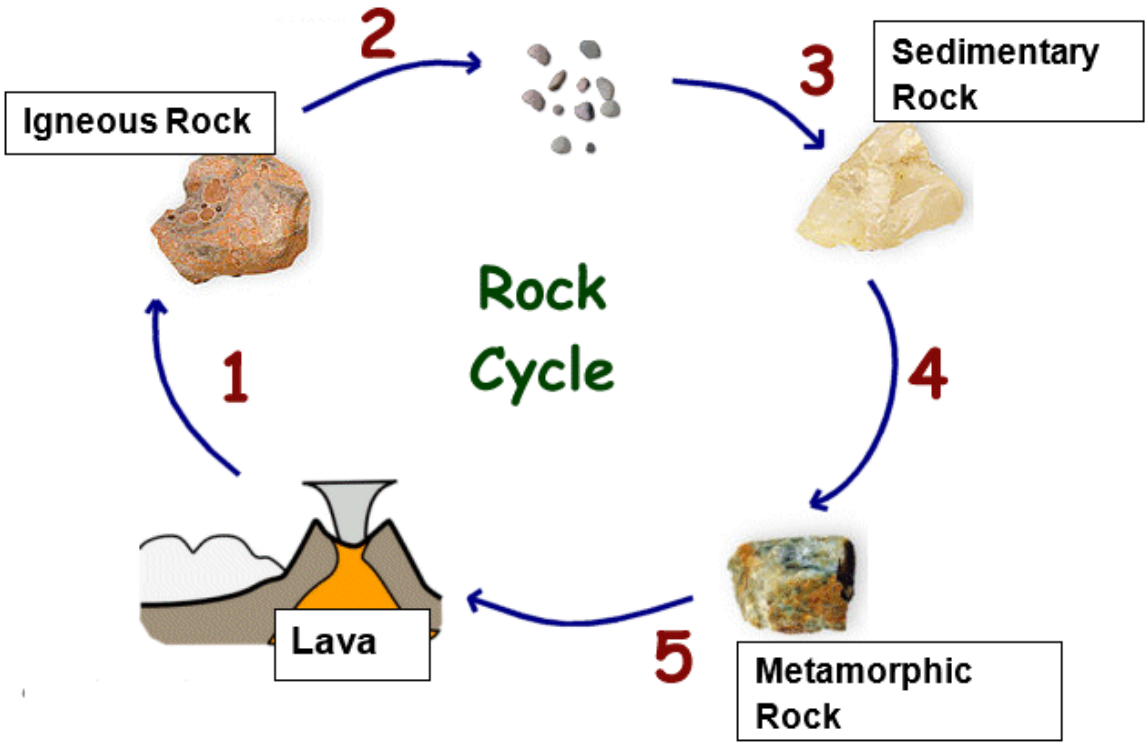
8.4.3 Identify one gas from the graph that is produced by natural processes. (1)

8.4.4 Identify one gas from the graph which is responsible for destroying the ozone layer. (1)

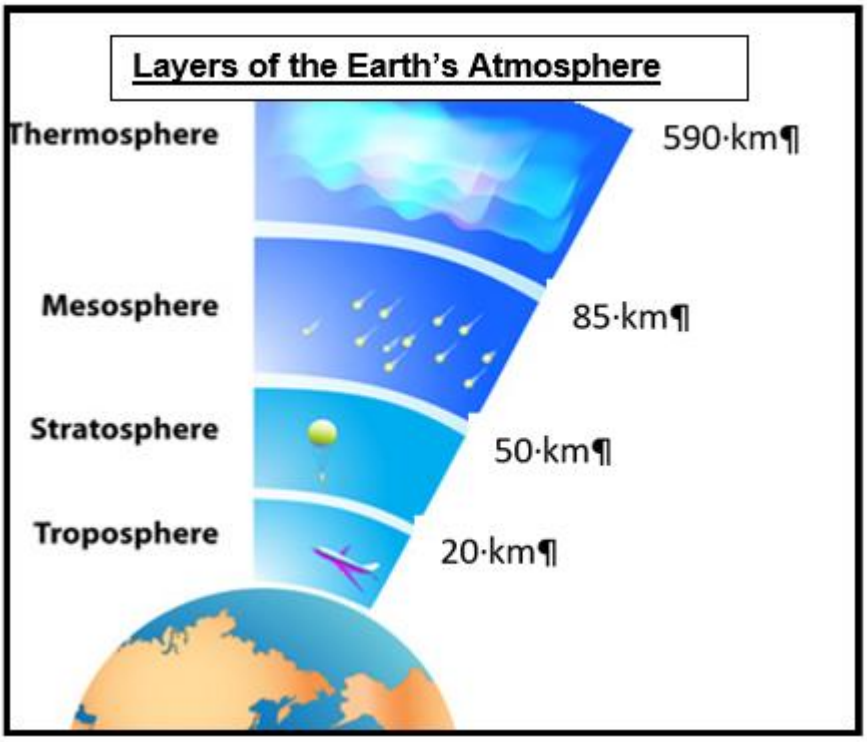
8.4.5 Which natural process produces the gas you named in question 8.4.3? (1)
[15]

QUESTION 9

9.1 Use the diagram below and provide labels for the different processes taking place in the rock cycle. Write down the number and the correct process for 1 to 5. (5)



9.2 Use the diagram below to answer the questions that follow:



Write down only the name for each of the spheres described in the statements below:

9.2.1 The coldest sphere. (1)

9.2.2 This sphere is in direct contact with the lithosphere. (1)

9.2.3 The sphere in which most meteors burn up after entering the Earth's atmosphere and before reaching Earth's surface. (1)

9.2.4 This sphere contains the ozone layer. (1)

9.2.5 This sphere extends to an altitude of between 50 km and 85 km above sea level. (1)

9.2.6 The sphere closest to the Earth's surface in which all weather occurs. (1)
[11]

TOTAL SECTION B: 80
GRAND TOTAL: 100