



**education**

Department of  
Education  
FREE STATE PROVINCE

**GRADE 9**

**NATURAL SCIENCES**

**NOVEMBER 2019**

**MARKS: 100**

**TIME: 2 HOURS**

**This paper consists of 16 pages, including an answer sheet.**

## **INSTRUCTIONS**

- 1 This question paper consists of TWO sections and NINE questions.  
  
SECTION A: 20 marks  
SECTION B: 80 marks
- 2 Number ALL your answers correctly according to the numbering system used in this question paper.
- 3 In case of calculations, show ALL steps.
- 4 Round off answers to TWO decimal places, where applicable.
- 5 Graph paper is attached for QUESTION 6.5.
- 6 Write neatly and legibly.

## SECTION A

### QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK.

1.1.1 A battery is a group of ... connected to each other.

- A     ammeters
  - B     voltmeters
  - C     resistors
  - D     cells
- (1)

1.1.2 A short circuit is caused when a conductor is connected directly to ...

- A     bulbs.
  - B     a rheostat.
  - C     resistors.
  - D     both terminals of a battery.
- (1)

1.1.3 A lightning strike is caused when... are discharged between a thunder cloud and the ground.

- A     electrons
  - B     protons
  - C     neutrons
  - D     photons
- (1)

1.1.4 ... force occurs when there is attraction between objects due to their masses.

- A     Electrostatic
  - B     Magnetic
  - C     Gravitational
  - D     Tension
- (1)

1.1.5 A safety component that conducts faulty electric current to the ground:

- A     Circuit breaker
  - B     Earth wire
  - C     Resistor
  - D     Neutral wire
- (1)

1.1.6 Connecting many appliances to a multi-plug is a typical parallel connection that can cause overheating. Eventually, the switch will trip due to ... in the circuit.

- A low resistance and high current
  - B high resistance and low current
  - C high resistance and high current
  - D no change in resistance or current
- (1)

1.1.7 Earth consists of four concentric layers called the ...

- A lithosphere, biosphere, hydrosphere and atmosphere.
  - B hydrosphere, lithosphere, mantle and crust.
  - C inner core, outer core, mantle and crust.
  - D biosphere, inner core, outer core and crust.
- (1)

1.1.8 Humans inhaling oxygen and exhaling carbon dioxide represents interaction between the ...

- A atmosphere and hydrosphere.
  - B hydrosphere and lithosphere.
  - C lithosphere and biosphere.
  - D biosphere and atmosphere.
- (1)

1.1.9 The three main types of rock are ...

- A igneous, basalt and granite.
  - B sedimentary, sandstone and limestone.
  - C metamorphic, slate and marble.
  - D igneous, sedimentary and metamorphic.
- (1)

1.1.10 The natural continuous process in which rocks form, break down and re-form over a long period of time, is known as...

- A the rock cycle.
  - B lithification.
  - C sedimentation.
  - D erosion.
- (1)

**[10]**

- 1.2 Choose a term in COLUMN B that matches a statement in COLUMN A. Write down the letter (A–J) next to the question number (1.2.1–1.2.5) in the ANSWER BOOK.

COLUMN A	COLUMN B
1.2.1 A layer of the lithosphere where animals and plants live	A Sandstone
1.2.2 An example of igneous rock resulting from the rapid cooling of magma	B Atmosphere
1.2.3 Fishes and sharks are inhabitants in this sphere	C Crust
1.2.4 The brown wire in a 3 pin-plug	D Electrical to chemical
1.2.5 The energy conversion where a battery supplies voltage in a circuit	E Generator
	F Chemical to electrical
	G Hydrosphere
	H Live
	I Pumice stone
	J Neutral

[5]

- 1.3 Give ONE word/term for each of the following descriptions. Write only the correct word/term next to the question number (1.3.1–1.3.5) in your ANSWER BOOK.

1.3.1 The measuring unit for force. (1)

1.3.2 A contact force that is created when a rubber band or spring is stretched out. (1)

1.3.3 An example of a contact force when objects rub against each other. (1)

1.3.4 The instrument that measures the potential difference. (1)

1.3.5 The earth's crust cracks, and hot liquid rock and smoke comes out. (1)

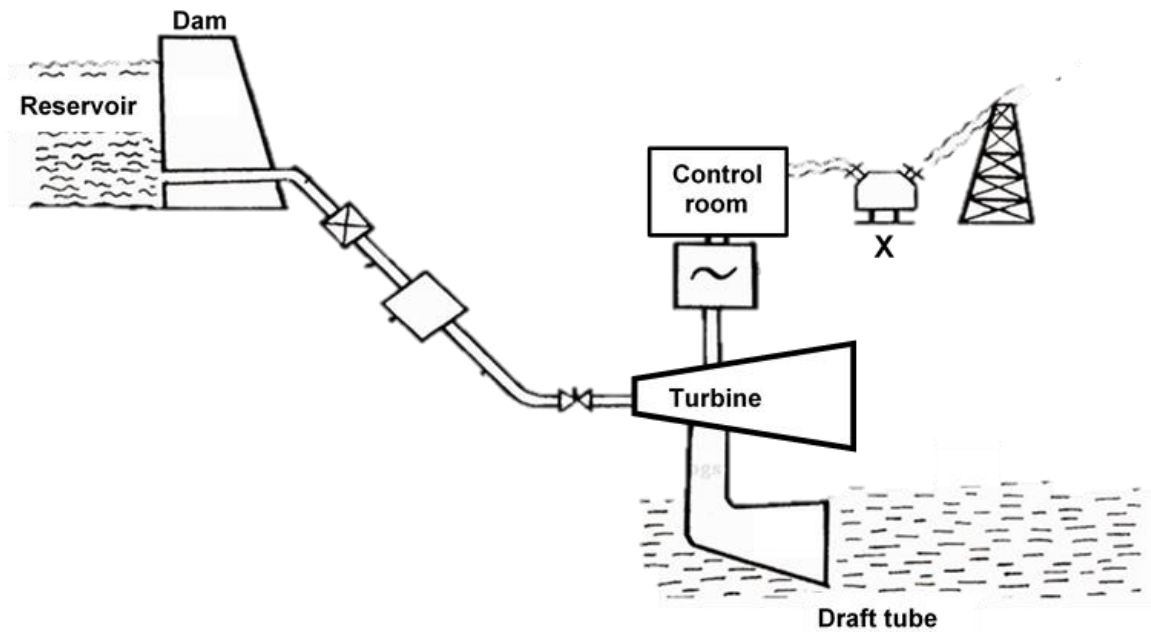
[5]

**TOTAL SECTION A: 20**

## SECTION B

### QUESTION 2

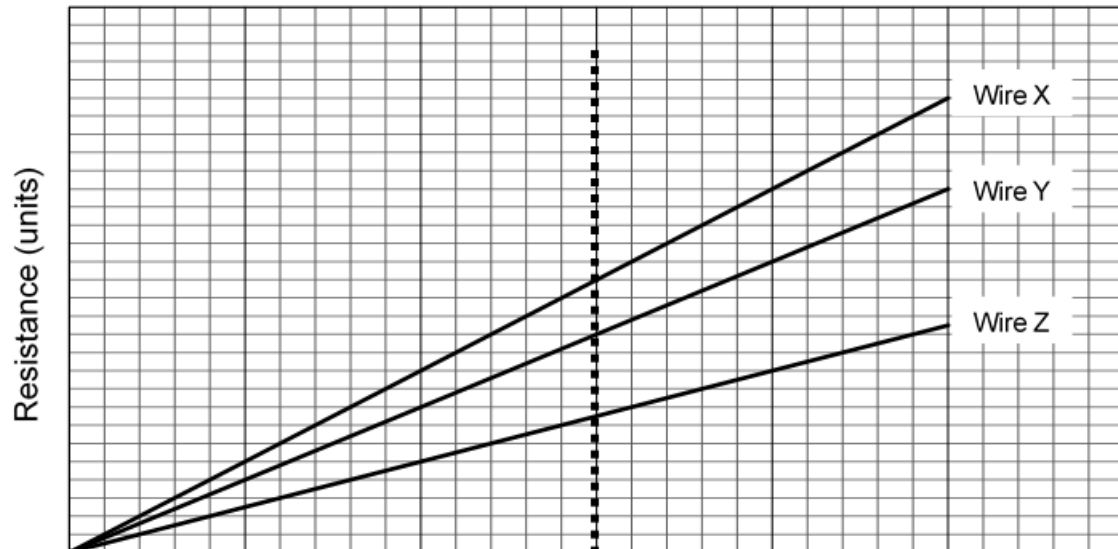
The diagram shows the process of generating electricity. Answer the questions.



- 2.1 What type of power station is shown in the diagram above? (1)
  - 2.2 Which substance is responsible for turning the turbine in this example? (1)
  - 2.3 Label part **X** and describe the role it plays. (2)
  - 2.4 Except for the example above, name TWO more RENEWABLE sources which can be used to generate electricity. (2)
- [6]**

### QUESTION 3

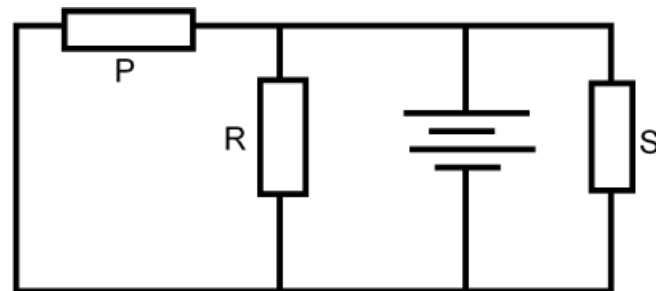
The graph below shows the effect of different types of wires of the same length on the resistance in a circuit.



- 3.1 Write down the investigative question. (2)
- 3.2 What is the independent variable? (1)
- 3.3 Select the wire which is the best conductor. Write only X, Y or Z. (1)
- 3.4 Motivate your choice in QUESTION 3.3. (2)
- 3.5 Write down any other factor that affects resistance. (1)
- [7]**

## QUESTION 4

4.1 Study the diagram and answer the questions that follow.



4.1.1 In which way are the components of the circuit connected? (1)

4.1.2 Give the name for component **S** in the circuit. (1)

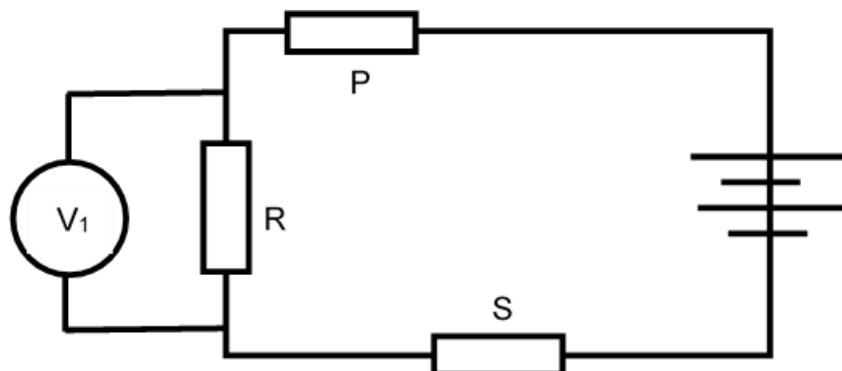
4.1.3 What is the function of component **S**? (1)

4.1.4 ONE cell has a potential difference of 1,5 V. What is the voltage across **P** and **R**? (2)

4.1.5 Redraw the circuit above in your answer book and show:

- (a) An ammeter measuring the main current
- (b) A voltmeter measuring the voltage of component **P** (2)

4.2 The components of the circuit above were REARRANGED and connected in the circuit below. Components P, R and S are identical and one cell still has a potential difference of 1,5 V.



4.2.1 Give the reading on  $V_1$ . (2)

4.2.2 What conclusion can be made about resistors connected in this way? (1)

4.2.3 What would happen to the reading on  $V_1$  if another component, identical to R is also added to the circuit?  
Only write INCREASE, DECREASE or STAY THE SAME. (1)

4.2.4 Motivate your answer in QUESTION 4.2.3. (2)

**[13]**



## QUESTION 5

A total of 45 computers, each with a power rating of 120W, were installed at school **X** for use in February 2020. The computers will be operating from Monday to Friday from 07:45 until 11:00. The unit rate at the school is R0,91/kWh.

### Calendar for February 2020 (South Africa)

Sun	Mon	Tue	February Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

Phases of the Moon: 2:10 9:00 16:00 23:00

5.1 What is the measuring unit for electrical power? (1)

5.2 Calculate the total number of hours the computers will be used in February 2020. (3)

5.3 Calculate the total power rating of the 45 computers. (3)

5.4 Calculate the cost of electricity for using the 45 computers during February 2020, using the formula:

Cost = power rating of appliance x number of hours x unit price of electricity

(2)

5.5 School **Y** will have the same computer centre set-up, but they plan to operate for 2,5 hours per day from Monday to Saturday in February 2020. Use calculations to prove that the **TOTAL** number of operating hours will be **60 hours**. (2)

5.6 Based on the number of operating hours, which school (**X** or **Y**) will have the **LOWEST** running cost for the computer centre? (1)

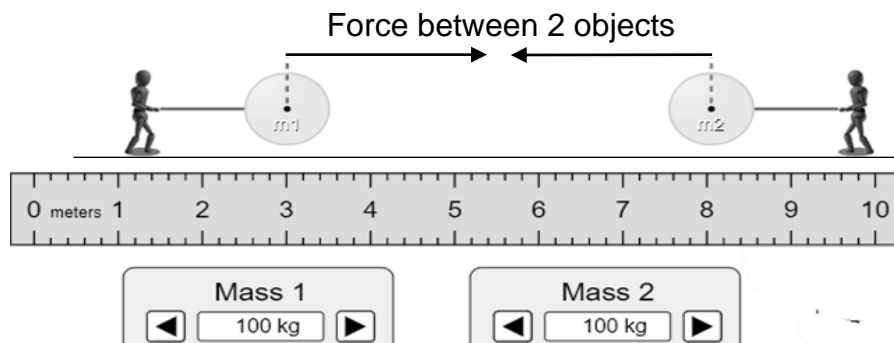
5.7 Use the cost formula given above to show that the operating cost of the computer centre at school **Y**, will be **R294,84**. (1)  
**[13]**

## QUESTION 6

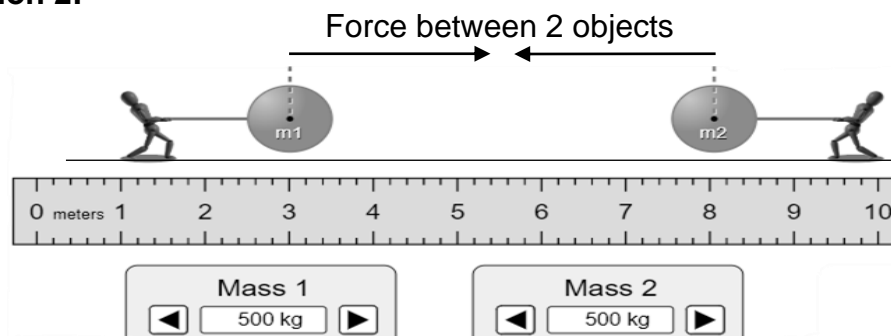
During an experiment, the force between two objects, mass 1 and mass 2, is investigated. The hypothesis that requires proof is:

The greater the masses of two objects, the smaller the force between the objects.

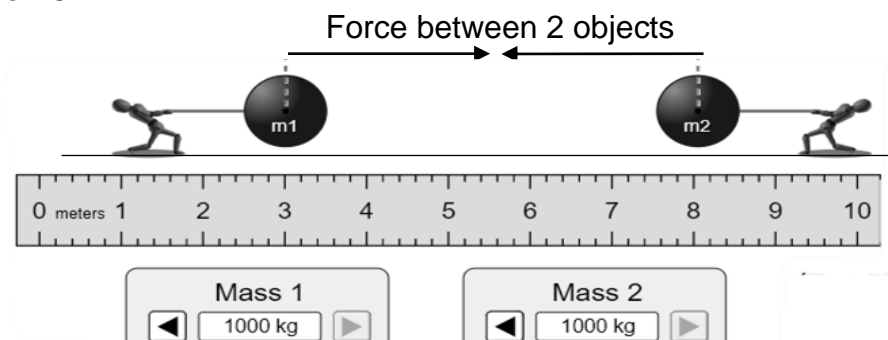
### Observation 1:



### Observation 2:



### Observation 3:



6.1 Which non-contact force is being investigated in this experiment? (1)

6.2 What is the controlled variable in this experiment? (1)

6.3 Which observation (**1**, **2** or **3**) shows the weakest force? (1)

6.4 Is the force in observation 3, **BIGGER**, **SMALLER** or **THE SAME** as the force in observation 1? (1)

6.5 On the graph paper provided, plot a **STRAIGHT-LINE GRAPH** to illustrate the effect of increasing mass on the force between objects.

Mass (kg)	Force (N)
0	0
100	10
500	50
1000	100

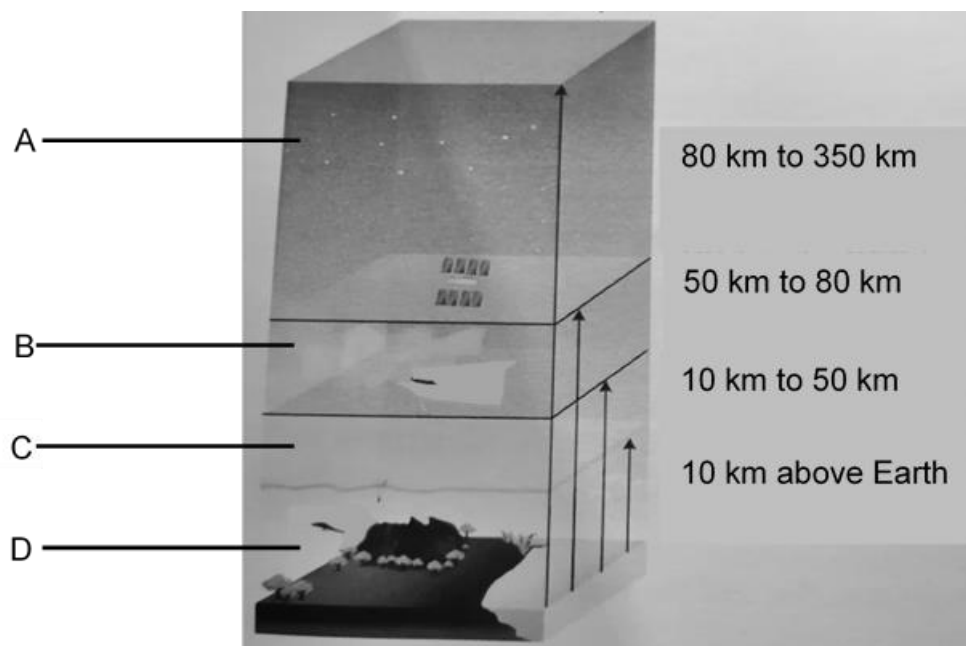
Provide the graph with labels. (4)

6.6 Based on the results in the table and the graph, the hypothesis is rejected. **REWRITE** the hypothesis to be **ACCEPTED**. (1)

**[9]**

## QUESTION 7

7.1 The diagram below shows the layers of the atmosphere. Answer the questions that follow.



7.1.1 Provide names for layers **A** and **C**. (2)

7.1.2 Give the **LETTER** of the layer where aeroplanes fly. (1)

7.1.3 What is the **NAME** of the layer where shooting stars occur? (1)

7.1.4 Compare layers **B** and **D** in terms of:

(a) Temperature (2)

(b) Air pressure (2)

7.2 Read the article below and answer questions that follow.

**DURBAN HOSTS KWAZULU-NATAL'S FIRST CLIMATE  
CHANGE SUMMIT**

*Article by Cheryl Kahla*

The two-day climate change summit kicked off on 14 August 2019. It follows a few months after devastating floods which claimed lives and destroyed infrastructure.

South Africa has been experiencing a serious drought since 2015, with associated crop losses leading to food price increases and animal starvation. Other impacts include water restrictions and poor quality of water.

Speaking at the summit, Premier Sihle Zikalala explained that climate change mitigation must become part of economic development plans and education to ensure that it becomes the new normal.

He added that studies show a rise in sea level, which indicates ice glaciers are being melted, posing a threat to polar bears and other species. The effects of climate change could clearly be seen on the sardine fish run, an annual occurrence dating back to the mid-1800s. There were no sardine fish runs in 2003 and again in 2006.

7.2.1 Name TWO of the most common natural greenhouse gases that contribute to climate change. (2)

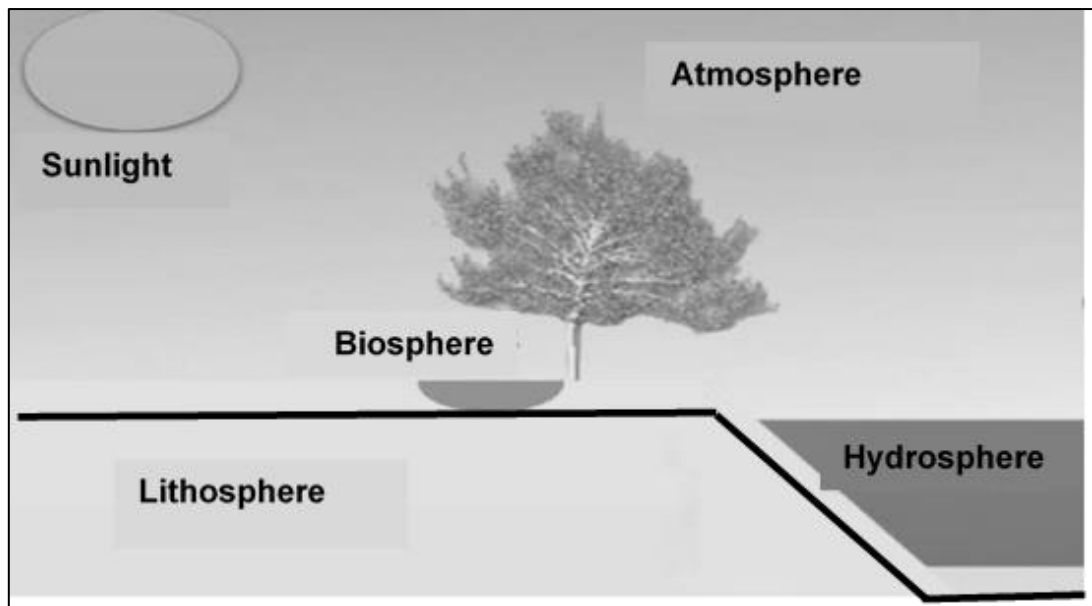
7.2.2 What effect of global warming is being referred to by the following words?

*"There were no sardine runs in 2003 and again in 2006."* (1)

7.2.3 Give THREE other effects of global warming that feature in this article. (3)  
**[14]**

## QUESTION 8

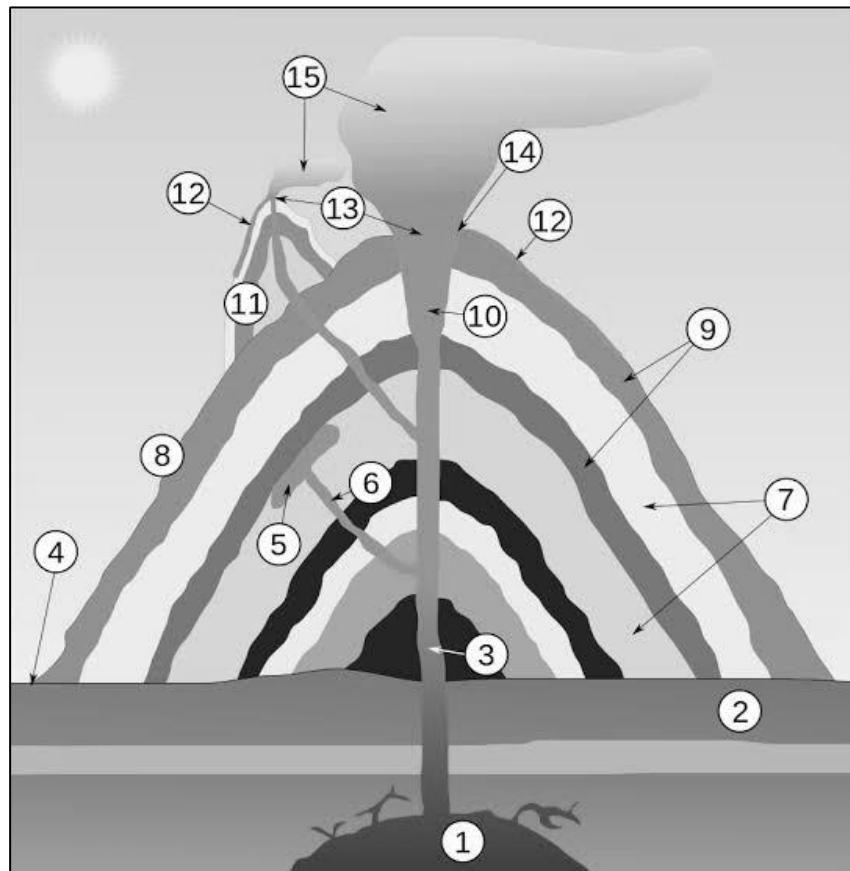
The diagram below shows the four spheres of the Earth.



- 8.1 Give a brief description of each sphere. (4)
- 8.2 A tree is an example of an organism that interacts with more than one of the spheres of the Earth. In what way does a tree interact with each of the following?
- 8.2.1 Soil (lithosphere) (1)
- 8.2.2 Air (atmosphere) (1)
- 8.2.3 Water (hydrosphere) (1)
- [7]**

## QUESTION 9

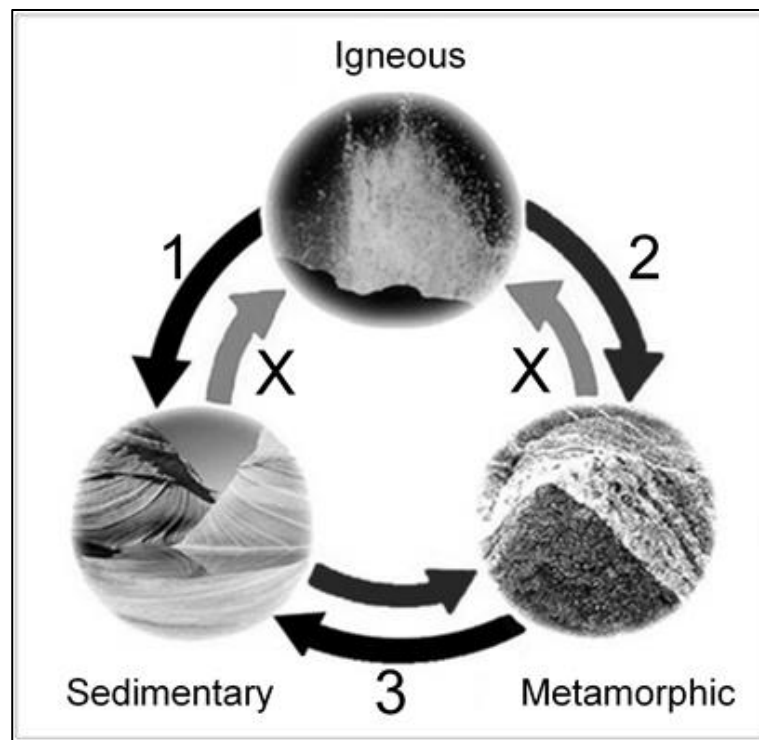
9.1 The diagram below shows an eruption of magma from deep within the Earth.



9.1.1 Differentiate between the rock that forms at number 5 (granite) and at number 12 (lava). (3)

9.1.2 Between lava and granite, which one cools down the fastest? Motivate your answer. (2)

- 9.2 This diagram shows changes from one form of rock to another, over a long period. Answer the questions that follow.



- 9.2.1 Which process is represented by arrow **X**?  
Write either MELTING or COOLING. (1)
- 9.2.2 At which TWO points are sediments found? (**1, 2** or **3.**) (2)
- 9.2.3 Which rock will form due to cooling and crystallisation of magma? (1)
- 9.2.4 Coal is formed by preservation or compression of dead plants.  
Which rock type is coal an example of? (1)
- 9.2.5 Which arrow represents the impact of HEAT AND PRESSURE  
changing rock from one form to another? (1)

[11]

**TOTAL SECTION B: 80**  
**GRAND TOTAL: 100**

## NAME OF LEARNER: \_\_\_\_\_ GRADE 9 \_\_\_\_\_

Mass (kg)	Force (N)
0	0
100	10
500	50
1000	100

## A full-page sheet of white graph paper with a light gray grid. The grid consists of small squares, with thicker lines forming a larger grid of approximately 10 columns and 10 rows. The entire page is covered by this grid pattern.