



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL ASSESSMENT GENERAL EDUCATION CERTIFICATE (GEC)

2023 GRADE 9 PILOT STUDY

Subject: Natural Sciences

Marks: 70

Duration: 120 Minutes
excluding 15 minutes reading time

This test consists of 29 pages excluding the cover page.

Instructions to the learner

1. You will receive 15 minutes reading time before you begin answering this test.
2. Read all the instructions and questions carefully.
3. Answer all questions.
4. Use the provided booklet to write all your answers.
5. You may use the non-programmable calculator.

The test starts on the next page.



Do not turn the page until you are told to do so.

SECTION A

1. What is a contact force?

- A It is force exerted at a distance between two bodies.
- B It is force exerted when two bodies are touching each other.
- C It is force exerted when two bodies repel each other.
- D It is force exerted between bodies that have the same mass only. (1)

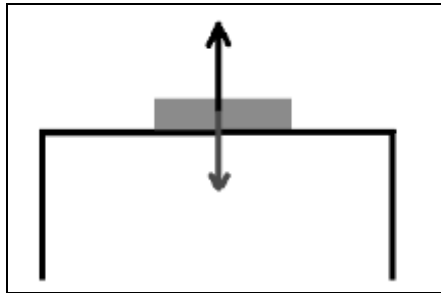
2. What are the similarities between magnetic and electrostatic force?

- A Objects repel and never attract each other.
- B Objects attract and repel each other.
- C Objects attract and never repel each other.
- D Objects are independent of distance from each other. (1)

3. Which **ONE** of the following is the unit of force?

- A watt
- B joule
- C gram
- D newton (1)

4. The diagram below shows an object resting on the table.

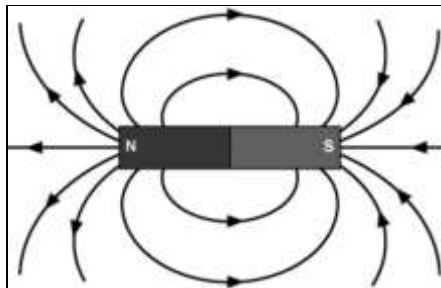


What is the force that a surface exerts on an object with which it is in contact and acts perpendicular to the surface of the object?

- A Weight
- B Friction
- C Normal
- D Tension

(1)

5. Study the diagram and answer the question that follows.

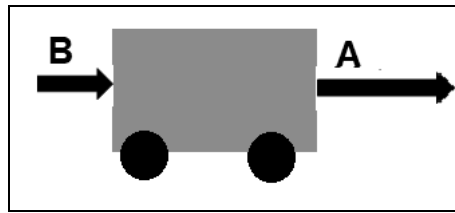


Where is the magnetic field the strongest? Where ...

- A the magnetic field lines are further apart.
- B the arrows are, on each magnetic field line.
- C the magnetic field lines are closer to each other.
- D there are no arrows on each magnetic field line.

(1)

6. Force A is exerted on the trolley. Force B, which is less than force A is now also exerted in the same direction as shown in the diagram.



What is the effect of the two forces on the trolley?

- A The trolley will experience a force that is less than that of force A in the same direction.
- B The trolley will experience a force that is more than that of force A in the same direction.
- C The trolley will experience a force that is less than that of force A in the opposite direction.
- D The trolley will experience a force that is more than that of force A in the opposite direction. (1)
7. A rock has a mass of 100 kg on Earth. It is now placed on Mercury, which is the smallest planet in our Solar System.

What will the mass of the rock be on Mercury?

- A The mass of the rock will be less than it was on Earth.
- B The mass of the rock will be more than it was on Earth.
- C The mass of the rock will be zero on Mercury.
- D The mass of the rock will be the same as on Earth. (1)

8. Which statement explains what happens when different objects are rubbed together?

- A One is charged positively and the other negatively.
- B Both objects will remain neutral.
- C Both objects become negatively charged.
- D Both objects become positively charged. (1)

9. A plastic ruler is rubbed with a piece of cloth. The piece of cloth becomes positively charged.

How does the piece of cloth acquire a positive charge?

- A It has gained protons.
- B It has gained electrons.
- C It has lost protons.
- D It has lost electrons. (1)

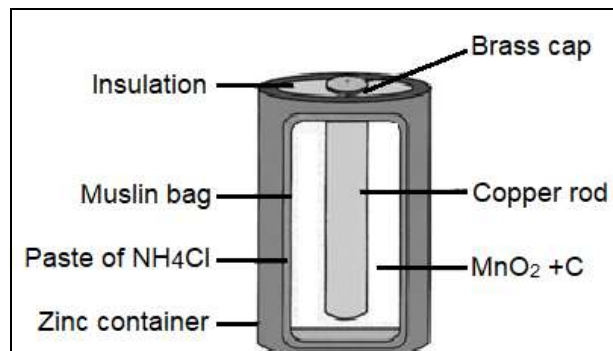
10. What are the major components necessary for an electric cell to operate?

- A anode and cathode
- B electrodes and electrolyte
- C cathode and electrolyte
- D anode and electrolyte (1)

11. Which of the following statements describes a battery? A battery is a/n ...

- A zinc–copper cell connected to a salt bridge in a circuit.
- B fruit cell connected to the wires to complete the circuit.
- C group of two or more cells connected together.
- D electrolyte with an anode and a cathode. (1)

12. For the dry cell to produce energy, there must be energy conversions that take place inside the cell. Study the dry cell and answer the question that follows.



Select the energy conversion that take places in the dry cell.

- A Chemical potential energy is converted to radiant energy.
- B Chemical potential energy is converted to electrical energy.
- C Electrical energy is converted to chemical potential energy.
- D Radiant energy is converted to chemical potential energy.

(1)

13. The table shows the results obtained when the lemon cell was constructed with different electrodes.

	Potential difference delivered by each pair of metal			
	Magnesium	Zinc	Iron	Copper
Copper	1,7	0,9	0,8	0
Iron	1,3	0,1	0	---
Zinc	0,8	0	---	---
Magnesium	0	---	---	---

Select a statement which explains why some metals cannot be used to construct a lemon cell.

- A Metals of the same type will work the same as any other different material.
- B Metals of the same type will slow the reaction and provide lowest reading.
- C Metals of the same type will speed up the reaction and provide the highest reading.
- D Metals of the same type will provide no potential difference between them. (1)
14. What is the SI unit of potential difference?
- A ampere
- B volt
- C ohm
- D joule (1)

15. One of the factors that affect resistance is the thickness of a conductor.

How does the thickness of the conductor affect its resistance?

- A the thicker the conductor, the less the resistance and the greater the current flow in it
- B the thicker the conductor, the more the resistance and the greater the current flow in it
- C the thicker the conductor, the less the resistance and the less the current flow in it
- D the thicker the conductor, the more the resistance and the current flow remains constant (1)

16. The picture shows various household appliances. They all have resistors.



What function do resistors perform in these appliances?

- A bypass the flow of electric current
- B stop the flow of electric current
- C provide useful energy transfers
- D provide wasteful energy transfers (1)

17. Electric kettle resistors heat up the water twice as fast as the stove top kettles and automatically shut off once the boiling point is reached. See the picture of the kettle from the inside

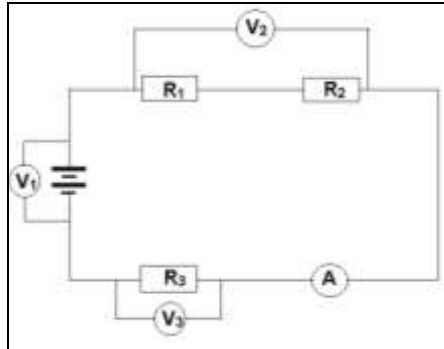


<http://www.mstworkbooks.co.za/natural-sciences/gr9/images/gr9ec03-gd-0007.jpg>

How does the resistor inside the kettle heat up water?

- A Energy released by moving electrons to overcome resistance is transferred to the water.
- B The resistor in the kettle increases current flow when current passes through them.
- C Energy absorbed by moving electrons to overcome resistance is transferred to the water.
- D The resistor in the kettle increases current flow and lower voltage levels within circuits. (1)

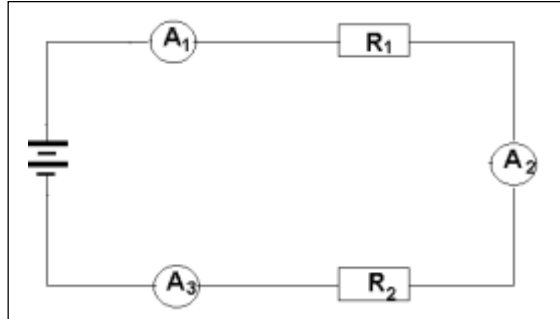
18. The battery of 7.5 V is connected to an ammeter, three identical resistors and three voltmeters as shown below. The potential difference across R_3 is 2.5 V.



What is the reading on V_2 ?

- A 2.5 V
B 5 V
C 7.5 V
D 3.75 V (1)
19. Which electrical connection is appropriate for home wiring? All the lights...
A and plugs are connected in series.
B are connected in parallel and the plugs in series.
C and plugs are connected in parallel.
D are connected in series and the plugs in parallel. (1)

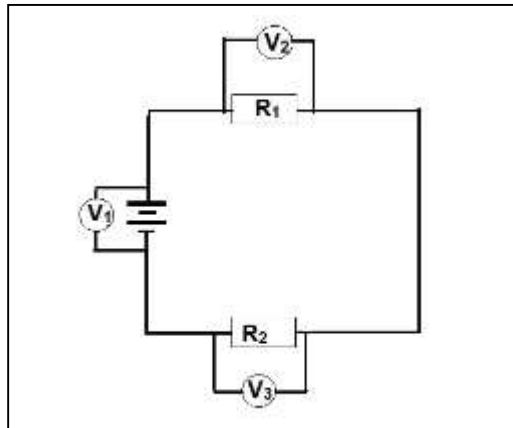
20. The circuit diagram shows two resistors, R_1 and R_2 connected to a battery and three ammeters, A_1 , A_2 and A_3 . Study the diagram and answer the question that follows.



How does the reading of A_2 compare to the reading of A_1 and A_3 ?

- A A_2 reading is less than reading of A_1 and A_3 .
 - B A_2 reading is greater than reading of A_1 and A_3 .
 - C A_1 reading is greater than that of A_2 and A_3 .
 - D A_1 , A_2 and A_3 readings are the same. (1)
21. What happens to current in the circuit when identical resistors are connected in parallel to each other?
- A Some resistors within the circuit will not receive any current.
 - B The current flowing in each resistor will not be the same.
 - C The current divides equally between the resistors.
 - D More current flows in the battery than in the resistors. (1)

22. The circuit diagram shows two resistors connected in series to a battery with the voltmeter readings across them; $V_3 = 7\text{ V}$ and $V_2 = 4\text{ V}$.



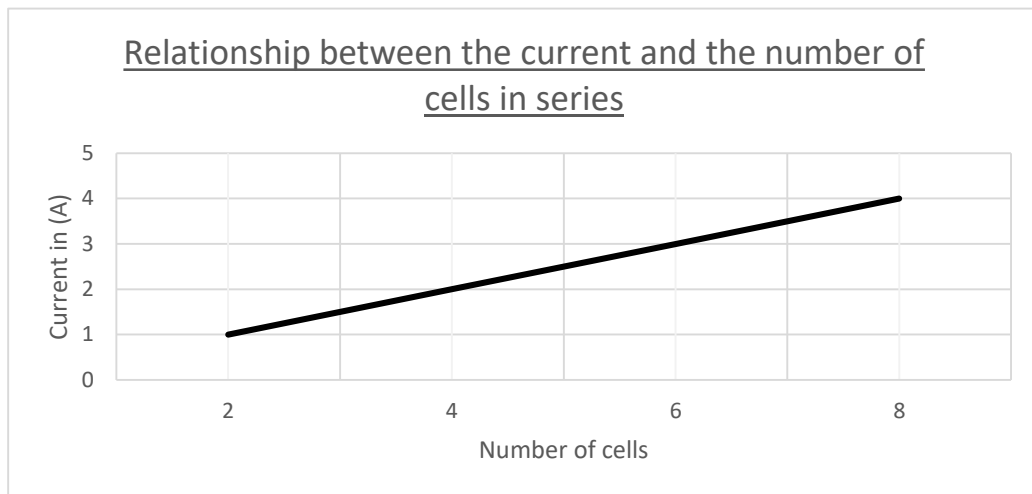
What is the reading on V_1 ?

- A 11 V
 - B 3 V
 - C 4 V
 - D 7 V
- (1)
23. In John's birthday party room, 25 lamps are connected in series. The room appears to be dim.

Which idea should be used to improve the brightness of the party room?

- A Increase the number of lamps to brighten the room.
 - B Decrease the number of lamps to brighten the room.
 - C Decrease the distances between the lamps to brighten the room.
 - D Increase the distances between the lamps to brighten the room.
- (1)

24. The Natural Sciences class investigates the relationship between current and the number of identical cells connected in series. The graph shows the results obtained from the investigation.



What happens to the current when the number of cells increases?

- A The current increases as the number of cells increases.
 - B The current decreases as the number of cells increases.
 - C Increasing the number of cells has no effect to the current.
 - D Increasing the number of cells, increases the resistance. (1)
25. Why circuit breakers should be used in our homes?
- A They do not trip and break when strong current flows.
 - B They trip and break the circuit when there is current overload.
 - C They absorb excess electrons and channel them to the ground.
 - D They are manually operated switches to protect electric damages. (1)

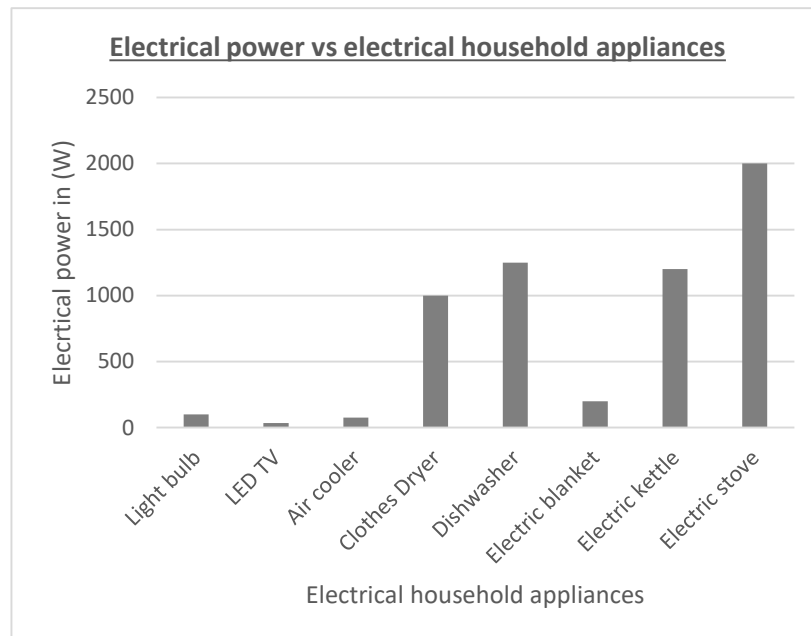
26. What is the energy supply grid? It is an ...
- A interconnected network for electricity delivery from transmission to consumers.
 - B interconnected network for electricity delivery from distribution to consumers.
 - C interconnected network for electricity delivery from producer to consumers.
 - D interconnected network for electricity delivery from producer to distribution. (1)
27. What is the disadvantage of South Africa's reliance on coal as the main source of energy in power stations?
- A Small dust particles and poisonous gases released into the atmosphere pollute the environment.
 - B A very large number of rafts is needed to generate a reasonable amount of electricity.
 - C The manufacturing and use of large batteries is not very environmentally friendly.
 - D About 1 000 turbines are needed to generate the same amount of energy as other sources (1)
28. Which component is used to change the voltages at different points in the national electricity grid?
- A turbines
 - B transmission lines
 - C transformers
 - D main switches (1)

29. The advantage of using sustainable sources of energy is that they are free, renewable, clean and have less or no waste products.

Which group of sources of energy are sustainable?

- A solar power, hydroelectric power, nuclear power
- B solar power, nuclear power, wind power
- C solar power, nuclear power, biomass
- D solar power, wind power, hydroelectric power (1)

30. The graph shows the use of electrical appliances in a household over a period of a month.



Which electric appliance uses the most energy?

- A LED TV
- B electric stove
- C clothes dryer
- D electric blanket (1)

31. How can you describe electrical power? It is ...

- A the amount of current flowing in a conductor.
- B the amount of time used to do work per minute.
- C current flowing in a system due to applied resistance.
- D the rate at which electrical energy is transferred in a circuit.

(1)

32. The picture shows some of the different types of light bulbs.



Which light bulb from the picture saves more electrical energy than others?

- A incandescent
- B CFL
- C LED
- D halogens

(1)

33. Four appliances are being used for a period of 5 hours. They are the incandescent light bulb (100 W), the television (100 W), electric fan (120 W), and geyser (170 W).

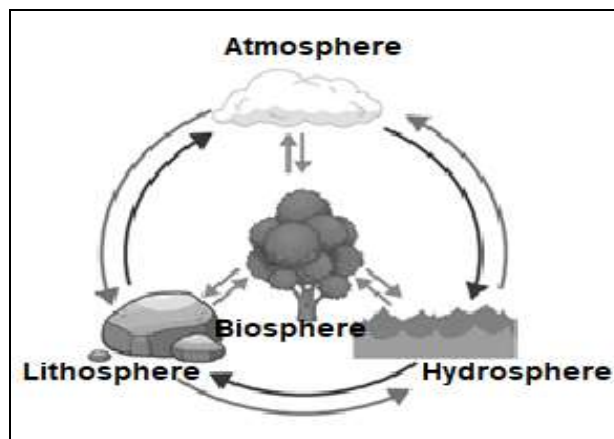
What is the total electric energy consumption?

- A 24.5 kWh
 - B 0.495 kWh
 - C 2.45 kWh
 - D 0.485 kWh
- (1)

34. Which sphere contains all living microorganisms, plants and animals?

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

35. The diagram shows the interactions amongst spheres of the Earth.



Which statement represents the correct interaction among all spheres?

- A Plants draw water from the soil and release oxygen into the air.
 - B Rain falls from clouds to form streams and rivers and evaporates back.
 - C Humans build homes to modify their natural habitat for their survival.
 - D Wind erosion can tear away small parts of rocks to create rock layers.
- (1)

36. Which statement represents the correct activity taking place in one of the layers of the atmosphere?

A Space shuttles orbit in the mesosphere.

B Aeroplanes fly in the exosphere.

C Meteors combust in the troposphere.

D Weather balloons fly in the stratosphere.

(1)

37. The lithosphere is the sphere of the Earth that is composed of the soil, the crust and the upper part of the mantle.

Which layer of the lithosphere is about 2 900 km thick?

A crust

B outer core

C inner core

D mantle

(1)

38. The lithosphere is made up of solid elements and inorganic compounds called minerals.

Mention **ONE** mineral which is an element that is found in the earth's crust.

A Magnesium

B Nitrogen

C Oxygen

D Limestone

(1)

39. Igneous rock is formed when magma cools down. Three factors play a role when igneous rock is formed. One of the factors is how quickly it cools.

Which statement best describes characteristics of an igneous rock formed when magma cools quickly?

- A Small crystal rocks are formed and the resulting rock has a fine-grained texture.
 - B Larger crystal rocks are formed and the resulting rock has a coarse-grained texture.
 - C Small crystal rocks are formed and the resulting rock has a coarse-grained texture.
 - D Larger crystal rocks are formed and the resulting rock has a fine-grained texture. (1)
40. Several processes can change one type of rock into another type of rock through rock cycle.

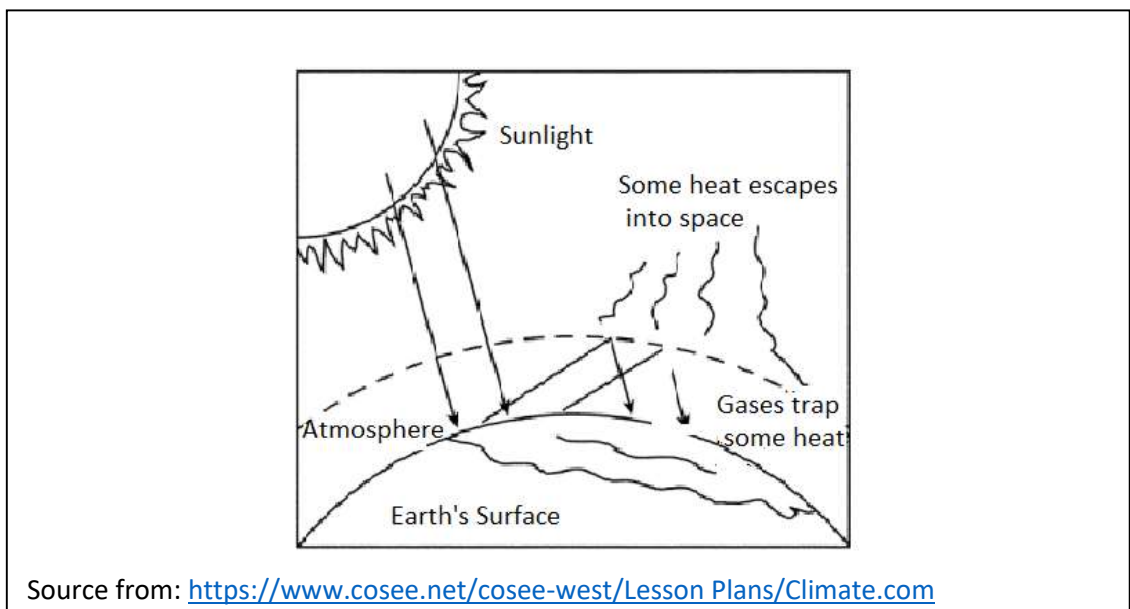
What is the correct sequence of the rock cycle?

- A crystallization, weathering and erosion, metamorphism, sedimentation
 - B crystallization, metamorphism, sedimentation, weathering and erosion
 - C crystallization, sedimentation, weathering and erosion, metamorphism
 - D crystallization, weathering and erosion, sedimentation, metamorphism (1)
41. Which definition explains mechanical weathering of rocks? A process whereby...
- A rocks crumble into smaller pieces without any change in their chemical composition.
 - B rocks crumble into smaller pieces due to chemical reactions.
 - C rocks crumble into smaller pieces due to reaction of minerals with other compounds.
 - D rocks crumble due to oxidation and acid rain which dissolves the rock to form soil. (1)

42. Which gas is found in abundance in the atmosphere?
- A Nitrogen
 - B Oxygen
 - C Carbon dioxide
 - D Water vapour
- (1)
43. Which of the following are the layers of the atmosphere?
- A stratosphere, troposphere, mesosphere and hydrosphere
 - B troposphere, stratosphere, mesosphere and thermosphere
 - C lithosphere, biosphere, hydrosphere and exosphere
 - D troposphere, hydrosphere, biosphere and stratosphere
- (1)
44. Which layer of the atmosphere has the ability to reflect radio signals back to Earth?
- A exosphere
 - B thermosphere
 - C stratosphere
 - D troposphere
- (1)
45. How does the stratosphere support life on Earth?
- A The temperature of the stratosphere falls with increasing altitude keeping the bottom cool.
 - B Clouds formation and weather patterns occur in this sphere.
 - C The International Space Station, where astronauts work in space orbits in this sphere.
 - D It has the ozone layer that absorbs harmful ultraviolet radiation from the sun.
- (1)

46. How does the thermosphere benefit Earth?
- A It destroys most of the meteors and asteroids before they reach the Earth's surface.
 - B It has ozone layer that absorbs the ultraviolet rays to protect life on Earth.
 - C It contains enough gas molecules to absorb a significant amount of dangerous solar radiation.
 - D All weather phenomena occur here which are the source for life on Earth. (1)

47. Study the illustration and answer the question that follows.



Which phenomenon is represented by the above illustration?

- A greenhouse effect
- B global warming
- C climate change
- D green house (1)

48. What type of processing involves crushing, heating or filtering the ore to extract the mineral?

A Smelting

B Physical

C Decanting

D Chemical

(1)

49. Lead ore is refined by heating lead oxide on a carbon block.

What are the products of this process?

A Lead and Carbon Dioxide

B Lead and Lead Oxide

C Carbon and Lead Oxide

D Lead and Carbon Monoxide.

(1)

50. Identify a compound mined in South Africa.

A Limestone

B Titanium

C Manganese

D Diamond

(1)

51. A blast furnace is a steel cylinder lined with refractory. The following three steps are used in the production of molten iron in the blast furnace
- (i) Ore is constantly dumped into the top of the furnace.
 - (ii) Limestone reacts with impurities inside the furnace.
 - (iii) A blast of hot air is blown into the bottom of the furnace.

Sequence the process of production of molten iron in the correct order of events.

- A (ii), (iii) and (i)
- B (iii), (i) and (ii)
- C (iii), (ii) and (i)
- D (i), (iii) and (ii) (1)

52. Mining produces large amounts of waste that is often dumped on the land. These mine dumps contain poisonous chemicals from mineral extraction processes, which contribute to air pollution and water pollution. The mining industry has in the past implemented methods like spraying mine dumps with water and planting grass.

What is the disadvantage of using this method to control air pollution?

- A The grass grown in these mine dumps cannot be able to trap dust to prevent air pollution.
- B The grass does not grow in areas where there are mine dumps and therefore not a solution.
- C The grass safely traps the dust for a longer period and the air pollution is avoided.
- D The grass withers during dry season and water is absorbed or evaporates quickly. (1)

53. Iron combines with carbon to form an alloy.

What is the name of the alloy formed?

- A Brass
- B Steel
- C Bronze
- D Nichrome

(1)

54. Stars spend most of their lives as main sequence stars, which is the most stable period in their lifetime. Nuclear fusion also takes place in this stage.

Which statement defines the nuclear fusion?

- A stars convert helium to hydrogen
- B stars hydrogen gas gets depleted
- C stars convert hydrogen to helium
- D stars helium gas gets depleted

(1)

55. The following occurrences are stages of the life of a star (birth, life and death).
- i. As the temperature increases, the colour changes to orange, yellow, white and light blue
 - ii. Planetary nebulae are lit up by their central white dwarf star and are beautiful objects.
 - iii. The dust and gas particles are pulled together by their own gravity and slowly contract

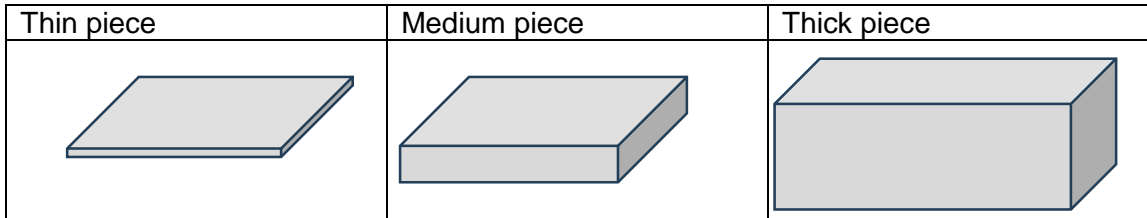
Which sequence represents the correct stages from birth to death of a star?

	Birth	Life	Death
A	ii	i	iii
B	iii	ii	i
C	iii	i	ii
D	i	iii	ii

(1)
[55]

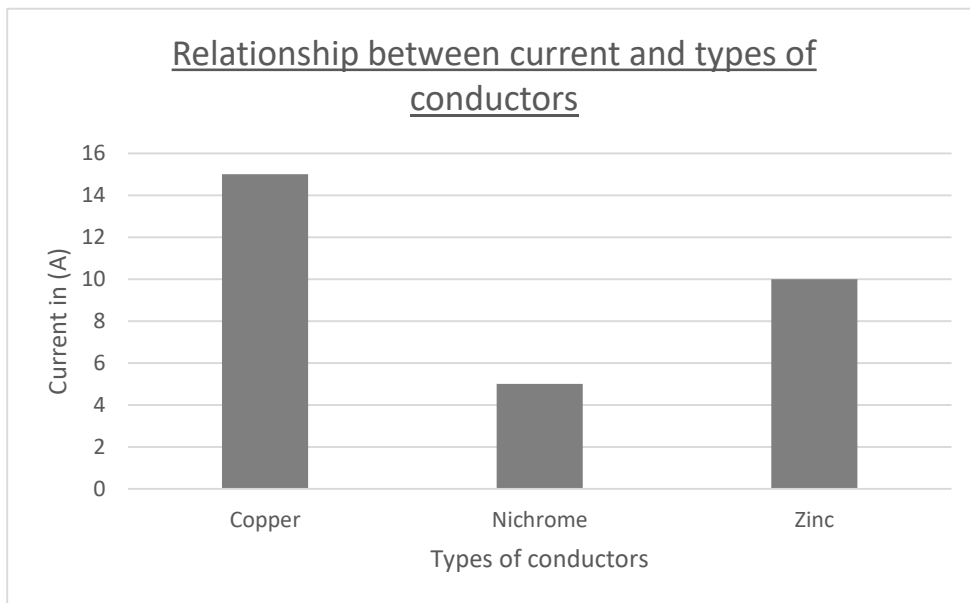
SECTION B

- Two Grade 9 learners investigate if a bar magnet can attract paper clips through pieces of wood with different thickness as shown in the diagram. After conducting the experiment, they observed that only the thick piece of wood prevented the magnet from picking up paper clips.



Write the conclusion of their experiment based on their observation. (2)

- The graph shows different conducting materials that offer resistance against electrical current. The resistance differs, depending on the type of material.



- Which one of the three conductors has the greatest current flow? (1)
- Which one of the three conductors has the highest resistance? (1)

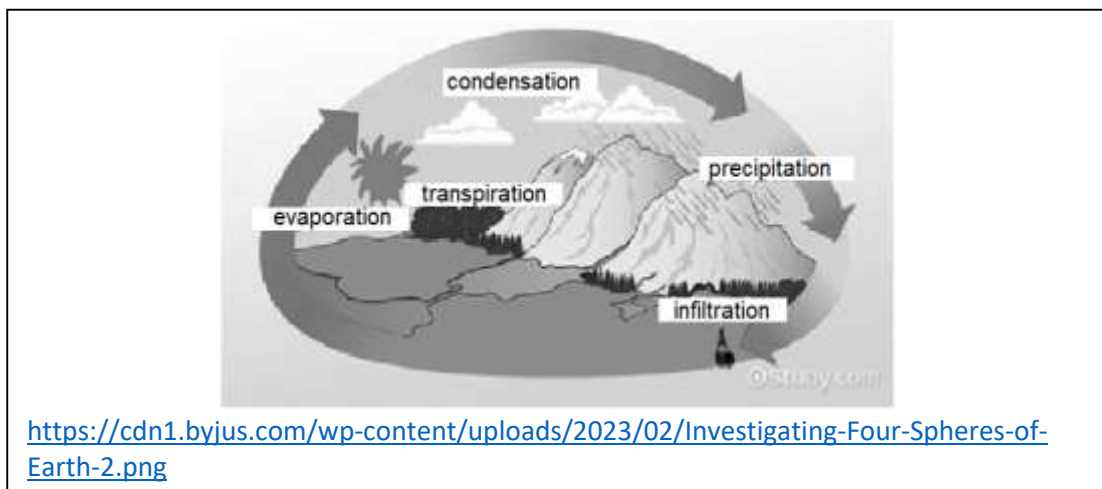
3. The table below shows the reading taken during the investigation of the relationship between current and the potential difference as the number of cells increases.

Number of cells connected	Ammeter reading (A)	Voltmeter reading (V)
1. One cell	0.15	1.5
2. Two cells	0.15	1.5
3. Three cells	0.15	1.5
4. Four cells	0.15	1.5

3.1	Identify the type of connection in these cells.	(1)
3.2	Give a reason for your answer.	(1)

4. Calculate the cost of using a 1 000 W stove for 2 hours at R2 per kWh. (3)

5.



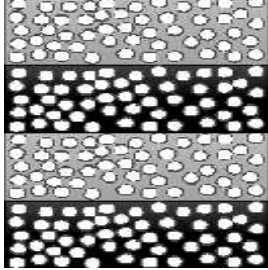
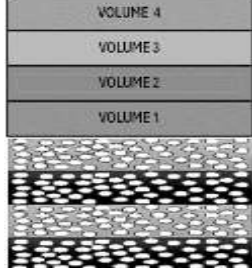
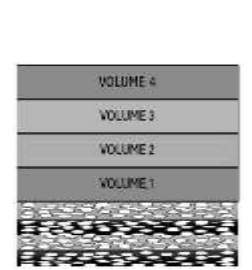
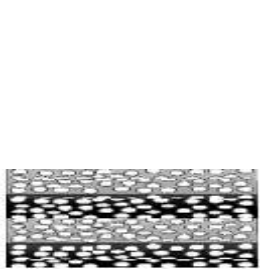
Refer to the picture above and discuss the interaction between the hydrosphere and the atmosphere. (2)

6. The table demonstrates the formation model of certain rocks.

Materials used: two layers of white sponge

two layers of black sponge

stack of books (Volume 1 - 4)

			
<p>Stacked alternating layers of white and black layers of sponge</p>	<p>A stack of books is placed on top of the sponge layers</p>	<p>More books are placed on the sponge layers</p>	<p>All the books are removed from the sponge layers</p>

6.1 What type of rock is represented by the above model of rock formation? (1)

6.2 What does each slice of sponge layer represent? (1)

7. The acid mine drainage remains the largest problem caused by coal mining around the world especially where it has been ignored for too long. This has negative impact on water quality where there are large coal mines.

Explain the negative impact of acid mine drainage on water quality. (2)

End of test