basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL ASSESSMENT
GENERAL EDUCATION CERTIFICATE (GEC)

2024 GRADE 9 PILOT STUDY

Subject: Natural Sciences

Marks: 70

Duration: 2 Hours

excluding15 minutes reading time

This test consists of 26 pages excluding the cover page.

Instructions to the learner

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Write your answers according to the instructions of each question.
4. ALL drawings must be done in pencil and labelled in blue or black ink.
5. Draw diagrams, flow charts or tables only when asked to do so.
6. The diagrams in this question paper are NOT necessarily drawn to scale.
7. Do NOT use graph paper.
8. You may use a non-programmable calculator where necessary.
9. Write neatly and legibly.

The test starts on the next page.

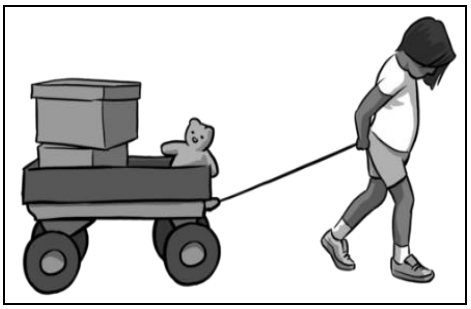
Do not turn the page until you are told to do so.

SECTION A

1. Which ONE of the following is an example of a field force?

   A Frictional force
   B Magnetic force
   C Compression force
   D Elastic force (1)

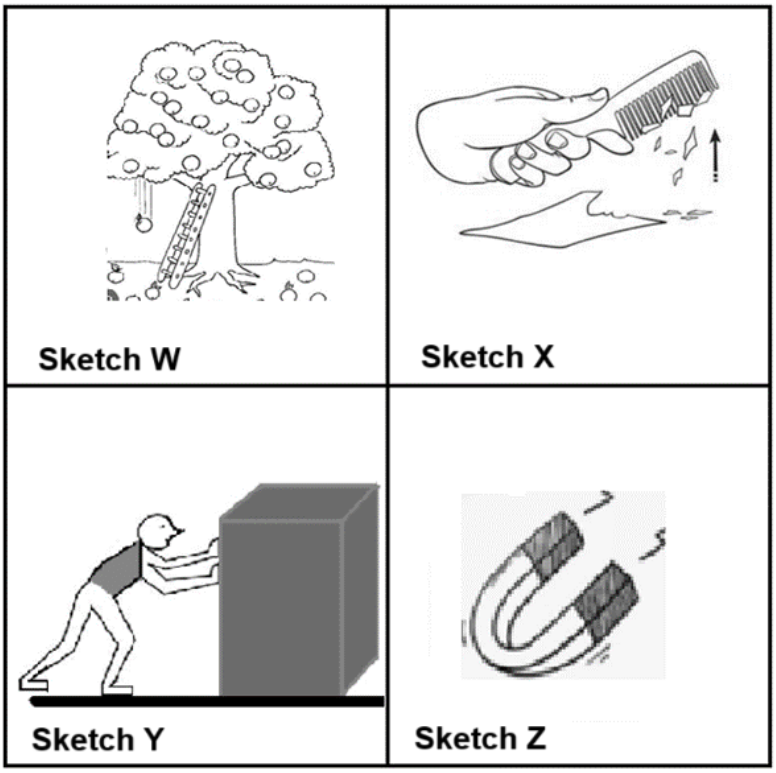
2. The picture shows a boy transporting his toys using a cart.



   Which ONE of the following is the effect of the force applied by the boy on the cart as shown in the diagram?

   A The cart stopped moving.
   B The shape of the cart changed.
   C The cart moved in the direction of the boy.
   D The cart moved in the opposite direction to the boy. (1)

3. The sketches show various types of forces**.**



Which sketch shows a contact force?

A Sketch Y
B Sketch Z
C Sketch W
D Sketch X (1)

4. A non-contact force is a force exerted ...

A between two bodies of different masses only.
B on objects in the outer space only.
C when two objects touch each other.
D by two objects at a distance from each other. (1)

5. Which statement best describes the relationship between gravitational force and distance between the objects?

A Gravitational force increases as the distance between objects increases.
B Gravitational force decreases as the distance between objects increases.
C Gravitational force decreases as the distance between objects decreases.
D The increased distance between objects has no effect on gravitational force. (1)

6. Which ONE of the following is correct about Thabo's weight on the Moon? It will be …

A the same as his weight on Earth.
B more than his weight on Earth.
C less than his weight on Earth.
D zero. (1)

7. Thandi used a bar magnet to test which materials (iron, nickel, lead, steel and copper) are magnetic. The table below represents the results of her investigation.

Choose the correct combination that best represents her results.

	Iron	**Nickel**	**Lead**	**Steel**	**Copper**
A	No	Yes	Yes	No	Yes
B	Yes	Yes	No	Yes	No
C	Yes	Yes	No	No	No
D	No	Yes	No	Yes	Yes

(1)

8. Andy rubs a balloon with a piece of cloth so that the balloon obtains a positive charge. She then holds the balloon close to her hair and feels her hair is rising towards the balloon.

Why is Andy's hair rising towards the balloon? The hair ...

A is negatively charged.
B is positively charged.
C has gained protons.
D has lost protons. (1)

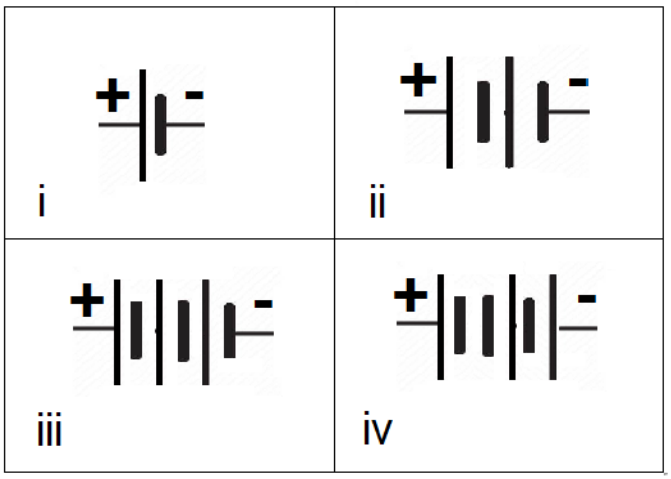
9. Which ONE of the following is **not** true about lightning?

A Lightning can strike the same place multiple times.
B Lightning can strike even if it is not raining in your area.
C Unplugging appliances can protect them from power surges.
D Lying flat on the ground will keep you safe during lightning. (1)

10. Which of the following is correct regarding a lemon battery? A lemon battery ...

A converts mechanical energy into electrical energy.
B converts light energy into electrical energy.
C is made using zinc and copper electrodes in a lemon.
D regulates heat from lemon juice. (1)

11. The diagram shows different connections of cell/cells.



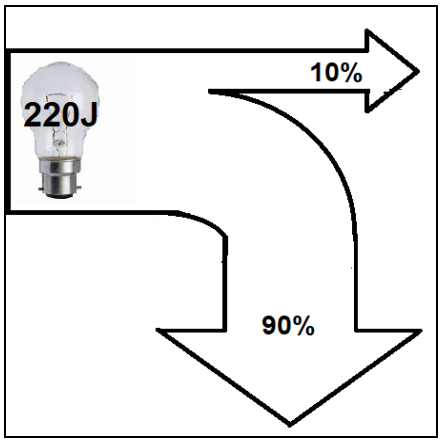
Which combinations in the diagram represent acceptable symbols for a battery?

A ii and iii
B i and iii
C ii and iv
D i and iv (1)

12. What type of energy conversion takes place in an electrochemical cell?

A Chemical energy to electrical energy
B Mechanical energy to electrical energy
C Thermal energy to electrical energy
D Electrical energy to chemical energy (1)

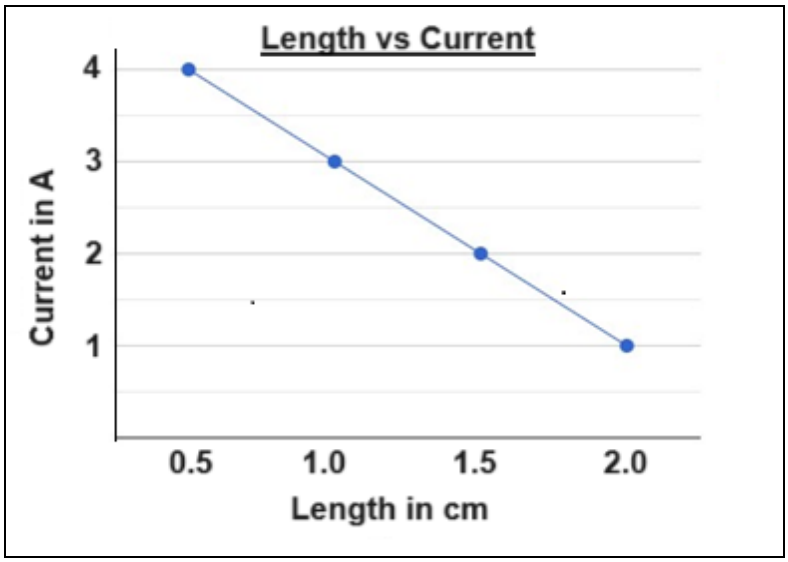
13. The diagram below shows the energy transfer taking place in a light bulb. Study the diagram and answer the question that follows.



How much energy is wasted by the light bulb above?

A 22 J
B 100 J
C 220 J
D 198 J (1)

14. The learner uses different lengths of conducting wires made from the same material to investigate how the length of a conductor affects the current flow. The graph below shows the results of the investigation.



How did the change in length of a conductor affect the current?

A When the length of the conductor increases, the current decreases because the resistance has increased.
B When the length of the conductor increases, the current decreases because the resistance has decreased.
C When the length of the conductor decreases, the current increases because the resistance has increased.
D When the length of the conductor decreases, the current decreases because the resistance has decreased. (1)

15. Which property of a material in a conductor affects resistance in a closed electric circuit?

A Colour
B Texture
C Temperature
D Strength (1)

QUESTIONS 16 AND 17 REFER TO THE TABLE BELOW WHICH SHOWS THE EFFECT OF DIFFERENT TYPES OF CONDUCTORS ON THE CURRENT IN AN ELECTRIC CIRCUIT.

TYPE OF CONDUCTOR	CURRENT (A)
Copper wire	3,0
Steel wire	1,5
Nichrome wire	0,5
Aluminium wire	2,2

16. Which conductor has the highest resistance?

A Copper wire
B Steel wire
C Nichrome wire
D Aluminium wire (1)

17. Which conductor in the table is the best conductor of electricity?

A Copper wire
B Steel wire
C Nichrome wire
D Aluminium wire (1)

18. Learners conducted an investigation to determine the relationship between the number of cells connected in series and the brightness of the bulb.

What are the correct variables for this investigation?

	Control	Independent	Dependent
A	Number of cells	Resistance of light bulb	Brightness of light bulb
B	Number of cells	Brightness of light bulb	Resistance of light bulb
C	Resistance of light bulb	Number of cells	Brightness of light bulb
D	Resistance of light bulb	Brightness of light bulb	Number of cells

(1)

19. What is the relationship between the potential difference across a battery and the potential difference across identical resistors connected in series? The potential difference across the battery is always …

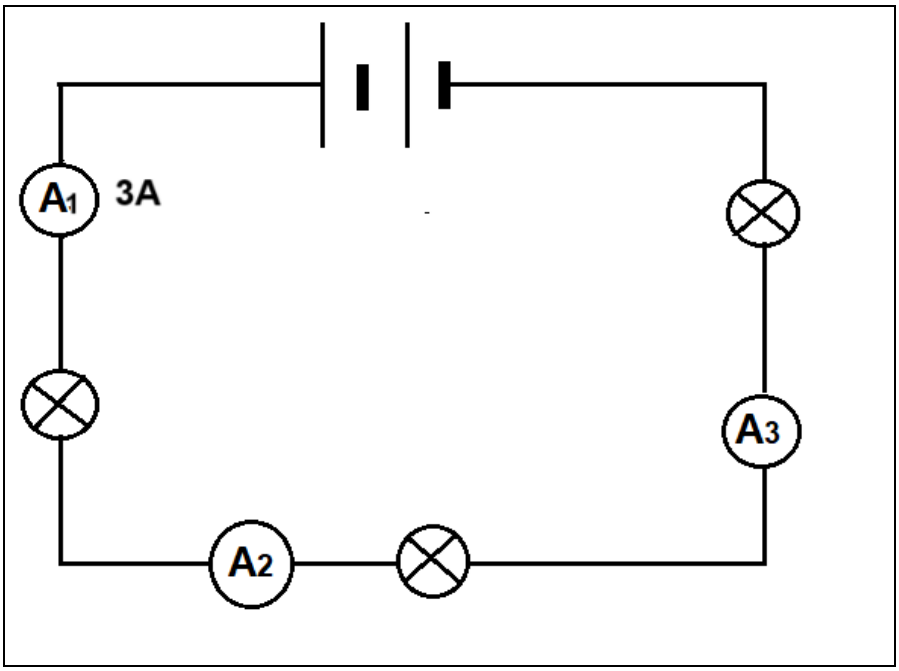
A greater than the potential difference across all resistors connected in series.

B less than the potential difference across all resistors connected in series.

C equal to the potential difference across each individual resistor connected in series.

D equal to the sum of the potential differences across resistors connected in series. (1)

20. The diagram shows a series circuit with a battery, 3 identical bulbs and 3 ammeters A_1, A_2 and A_3.



What are the readings of ammeters A_2 and A_3?

	A_2	A_3
A	3 A	3 A
B	1 A	2 A
C	1,5 A	1,5 A
D	2 A	1 A

(1)

21. What is the advantage of using parallel connections in our households?

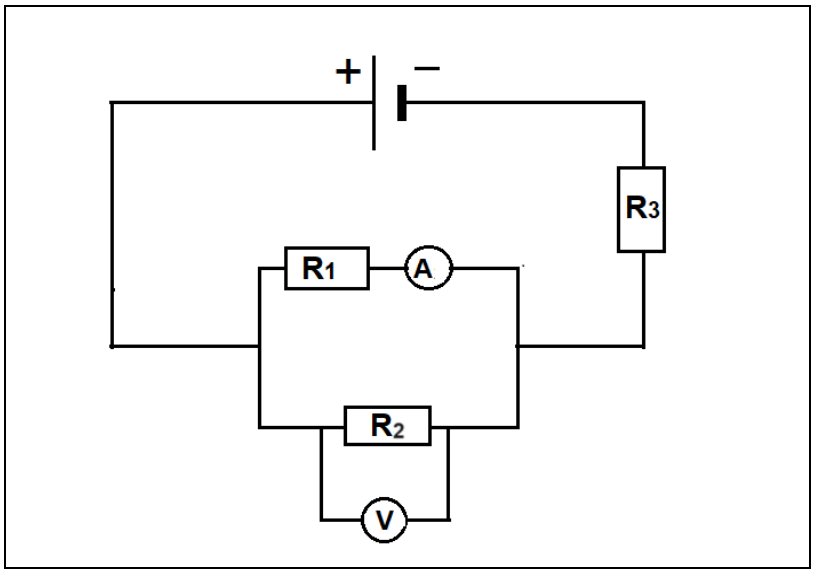
A The voltage in each component is different.

B To decrease total current drawn from the main power supply.

C It reduces overall power consumption of appliances.

D To switch multiple appliances on and off independently. (1)

22. The diagram below represents and electric circuit with different components.



Which combination represents a parallel connection between an instrument and a circuit component?

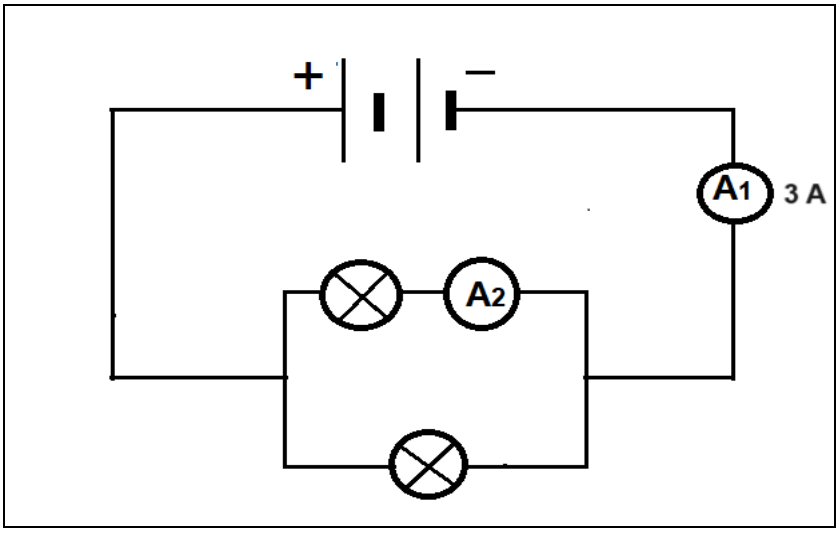
A R_2 and V

B R_1 and A

C A and R_3

D V and R_3 (1)

23. The diagram shows an electric circuit with a battery, ammeters (A_1 and A_2) and two identical light bulbs.



What is the reading on A_2?

A 3 A
B 1 A
C 2 A
D 1,5 A (1)

24. What is the purpose of a resistor in an electrical circuit? It …

A increases the voltage across the circuit.
B controls the flow of electric current.
C increases the flow of electric current.
D decreases the voltage across the circuit. (1)

25. Which wire is responsible for conducting electric current to the ground to prevent electric shock?

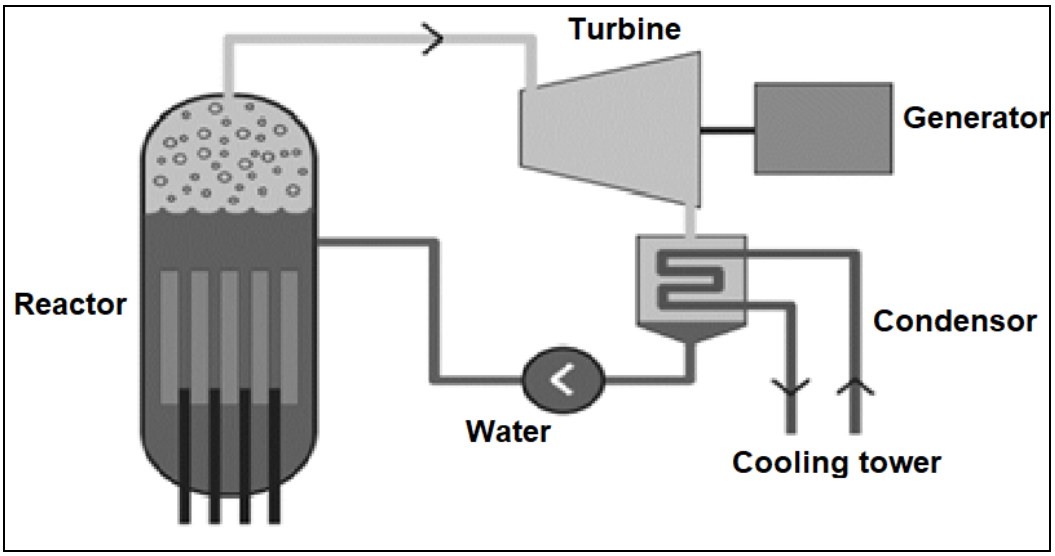
A Live wire
B Neutral wire
C Earth wire
D Fuse (1)

26. Electricity loadshedding has been introduced as a measure to prevent national power failures since 2008.

Which ONE of the following is the main contributing factor to South Africa's electricity loadshedding?

A The country has transitioned to renewable energy sources.
B Increased electricity exports to neighbouring countries.
C High consumption during major sporting events.
D Limited electricity supply versus high electricity demand. (1)

27 The diagram shows electricity generation at a nuclear power station.



Which ONE of the following components is responsible for generating steam by utilising the heat produced during nuclear fission?

A Turbine
B Reactor
C Condenser
D Generator (1)

28. What fuel is used in the generation of nuclear power?

A Hydrogen
B Uranium
C Natural gas
D Biomass (1)

29. What is the National electricity grid? It is a …

A single power station that supplies electricity to the entire country.
B government agency responsible for regulating electricity prices.
C network of interacting parts that forms a system for electricity transmission.
D centralised power generation system and radial distribution of electricity. (1)

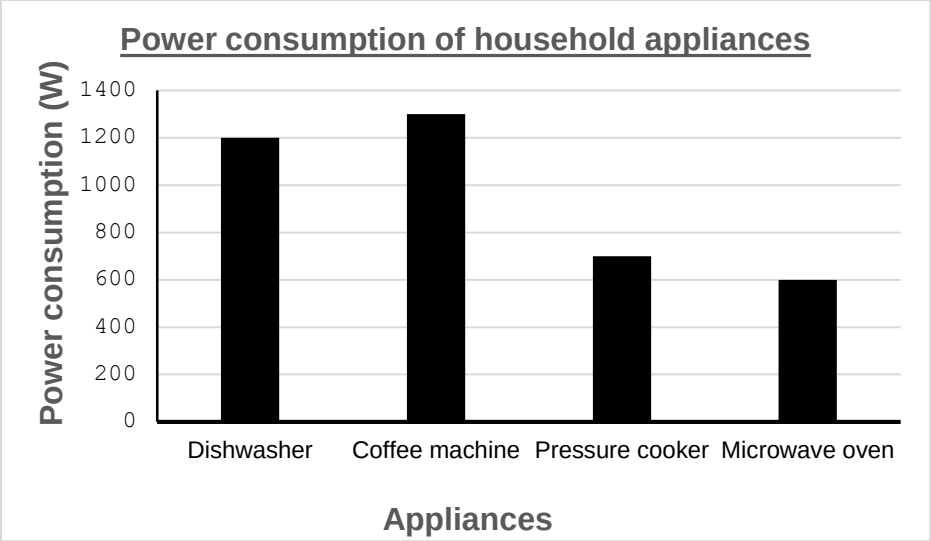
30. Which ONE of the following is the cost of electricity used for running the fridge with a power rating of 200W for 1 day if the unit price of electricity is R2,07?
Cost = power rating of the appliances x number of hours x unit price of electricity

A R4,14
B R41,40
C R9,94
D R0,41 (1)

31. What is the S.I. unit of electrical power?

A watt
B joule
C volt
D ampere (1)

32. The graph below shows power consumption of different household appliances.



What is the difference between the highest and the lowest power consumption in the given appliances?

A 600 W
B 100 W
C 700 W
D 500 W (1)

33. Which ONE of the following statements represents the relationship between electrical power and electrical energy?

A Electrical power is measured in joules, where 1 joule is equal to 1 watt per second.
B Electrical power is measured in watts, where 1 watt is equal to 1 joule per second.
C Electrical power is measured in volts, where 1 volt is equal to 1 watt per second.
D Electrical power is measured in amperes where 1 ampere is equal to 1 volt per second. (1)

34. Identify the correct combination of the spheres of the Earth.

A Lithosphere, atmosphere, troposphere and hydrosphere
B Atmosphere, lithosphere, biosphere and hydrosphere
C Biosphere, hydrosphere, stratosphere and mesosphere
D Hydrosphere, biosphere, thermosphere and lithosphere (1)

35. Which statement is correct concerning the spheres of the Earth?

A Each sphere of the Earth can function independently.
B Interaction between the Earth's spheres cannot predict outcomes of events.
C The spheres of the Earth are thermosphere, troposphere and exosphere.
D All spheres of the Earth interact with one another. (1)

36. Which ONE of the following statements refers to the composition of the hydrosphere?

A About 21% of the Earth's surface is covered with plants.
B About 10% of the Earth's surface is covered by land.
C About 70% of the Earth's surface is covered with water.
D About 80% of the Earth 's surface is covered with water. (1)

37. In which layer of the lithosphere is granite formed?

A Crust
B Mantle
C Inner core
D Outer core (1)

38. At what stage is pumice rock formed? When …

A some magma escapes to the surface as a volcano.
B molten rock from the mantle pushes up through the crust.
C pools of magma cool down slowly in the crust.
D magma cools down rapidly and trap gas bubbles. (1)

39. What is a rock cycle?

A A process through which the three main rock types transform from one type into another.
B It is the continuous circulation of water between rocks in the earth and atmosphere.
C It is the continuous movement of rocks within the earth and atmosphere.
D It is the parallel arrangement of certain mineral grains that gives the rock a striped appearance. (1)

40. How is shale rock formed? It forms …

A when water evaporates in mineral-rich marine soil environments.
B when water deposits clay particles to form thin layers.
C when calcite precipitate out of water containing dissolved calcium.
D by the rapid cooling of basaltic lava. (1)

41. Which ONE of the following sequences is the correct order of a rock cycle?

A Melting → crystallization → weathering and erosion → sedimentation → compaction and cementation → metamorphism

B Sedimentation → weathering and erosion → compaction and cementation → melting → crystallization → metamorphism

C Weathering and erosion → sedimentation → compaction and cementation → metamorphism → melting → crystallization

D Weathering and erosion → melting → sedimentation → compaction and cementation → metamorphism → crystallization (1)

42. Which ONE of the following explains the chemical weathering of rocks?

A A rock is formed from sediments.

B There is movement of rocks from one location to another.

C A rock breaks down when it combines with other minerals which changes its composition.

D Rocks are broken down by using physical means. (1)

43. The atmosphere is a layer above Earth's surface that consists of ...

A only carbon dioxide and nitrogen.

B only carbon dioxide and oxygen.

C a mixture of gases.

D helium and nitrogen. (1)

44. What is the percentage of each gas found in the earth's atmosphere?

	Nitrogen	Oxygen	Carbon dioxide	Other gases
A	77%	21%	<1%	1%
B	78%	21%	<1%	1%
C	78%	22%	<1%	1%
D	78%	21%	1%	>1%

(1)

45. Which layer of the atmosphere has the greatest density?

A Mesosphere
B Stratosphere
C Thermosphere
D Troposphere (1)

46. Which ONE of the following statements accurately describes the mesosphere?

A The air in the mesosphere is extremely thin and very cold.
B The mesosphere contains thick air and is very hot.
C The mesosphere has thin air and is very hot.
D The air in the mesosphere is thick and very cold. (1)

47. What would happen if the greenhouse gases were not present in the atmosphere?

A Earth would experience extreme heatwaves.
B Earth's climate would be stable and unchanged.
C Earth would have a wider range of temperature fluctuations.
D Earth would be an icy wasteland. (1)

48. In which layer of the lithosphere is mining done?

A Inner core
B Outer core
C Mantle
D Crust (1)

49. A mining company extract copper from ore by:

- crushing the ore into a fine powder
- a solution is then added to the powder to dissolve the copper minerals
- the solution is then filtered and heated to produce a pure copper compound

Which of the following are the processes the company used to extract copper from the ore?

A Smelting and refining
B Chemical leaching and filtration
C Flotation and magnetic separation
D Beneficiation and electrolysis (1)

50. During the chemical process of extracting lead from its ore, lead oxide reacts with …

A carbon dioxide to form lead and carbon.
B oxygen to form lead and carbon dioxide.
C carbon to form lead and carbon dioxide.
D carbon to form lead and carbon monoxide. (1)

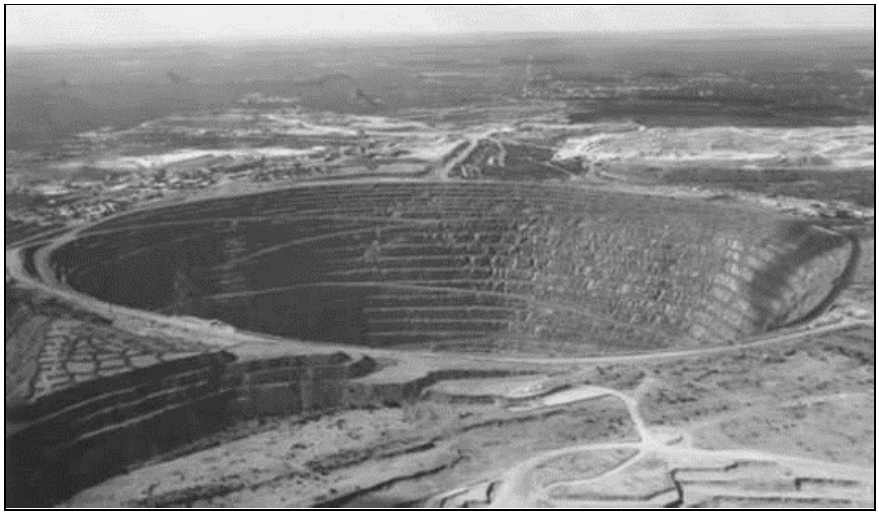
51. Which of the following is a modern method of producing steel from iron ore?

A Molten iron is blasted with coke to form steel.
B Molten iron is blasted with pure oxygen to form steel.
C Molten iron is blasted with nitrogen to form steel.
D Molten iron is blasted with chlorine to form steel. (1)

52. What responsibilities do large-scale mining companies have towards local communities and the environment?

A Balancing economic interest with social and environmental responsibilities
B Ensuring that the economic status of the community is improved
C Engaging with communities after the mining projects have been approved
D Prioritising environmental responsibilities for sustainability purposes (1)

53. The diagram shows one of the world's largest open man-made pit mines which is located in Phalaborwa.

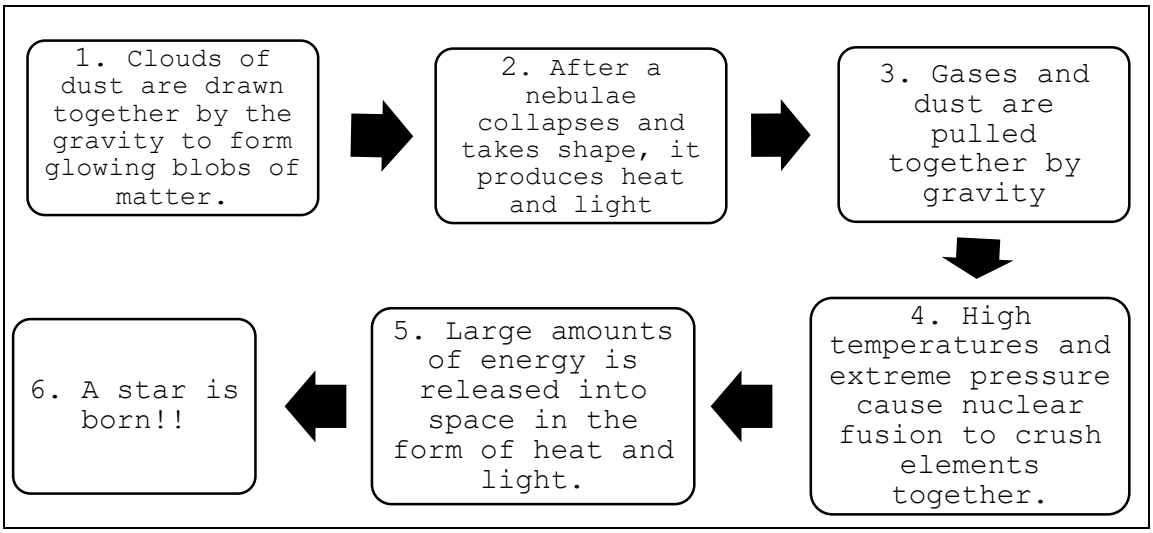


Source: mining-technology.com/projects/phalaborwa

Which ONE of the following is the potential long-term negative economic impact of open cast mining operations?

A Increased local economic growth and development
B Decreased property values and tax revenue
C Creation of sustainable jobs and infrastructure
D Depletion of natural resources and decreased exports (1)

54. The flow diagram below represents the birth of a star.



Which ONE of the above steps represents the formation of a protostar?

A 1

B 3

C 2

D 5 (1)

55. Which colour represents a younger star?

A Orange

B Yellow

C Red

D Blue (1)

[55]

SECTION B

1. Describe how lightning occurs during a thunderstorm. (2)

2. You made an electrical cell from a lemon and you observed that the light bulb is not glowing. How would you generate enough energy to make the light bulb glow? (2)

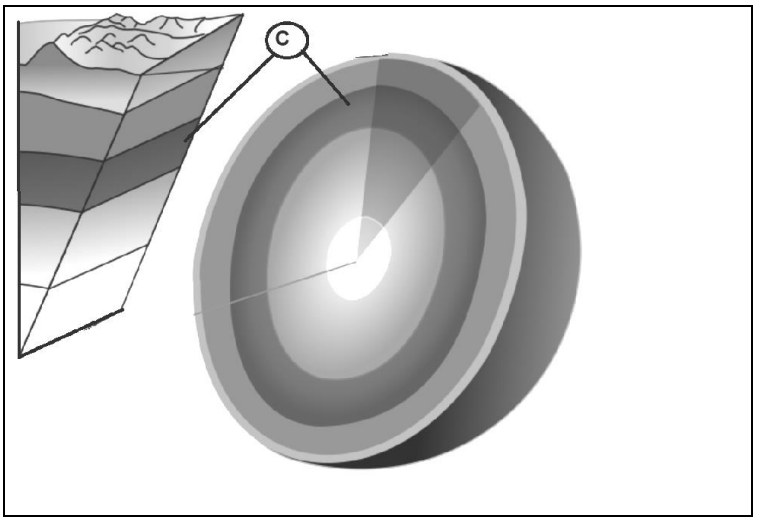
3. Draw an electric circuit diagram consisting of:

   - ONE cell
   - An OPEN switch
   - TWO light bulbs connected in parallel

   (3)

4. Mention TWO types of pollution that are caused by coal power stations. (2)

5. The diagram below shows the concentric layers of the earth. Study the diagram carefully and answer the question that follows.



Adapted from: https://happho.com/wp-content/uploads/2017/05/01-Layers-of-Earth.png

Which concentric layer is represented by the letter C? (1)

6. This type of rock forms when an original rock type is compressed under high pressure and high temperature. It usually has a harder and more grainy texture than the other two rock types.
The examples of this type of rock are shale, marble and slate.

Name the type of rock described above. (1)

7. Name one mining method used in South Africa. (1)

8. Explain how global warming can lead to rising sea levels. (2)

9. Which gas is formed during nuclear fusion? (1)

[15]

End of test