



education

Department of  
Education  
FREE STATE PROVINCE

**GRADE 8**

**NATURAL SCIENCES**

**NOVEMBER 2023**

**TIME: 2 HOURS**

Stanmorephysics.com

**MARKS: 100**

**INSTRUCTIONS AND INFORMATION:**

1. Write your name, grade, and class on the ANSWER BOOK.
2. The question paper consists of TWO SECTIONS divided into 11 questions.
3. Answer ALL questions in the ANSWER BOOK.
4. Number the answers correctly according to the numbering system used in this question paper.
5. **Skip one line between two sub-questions, for example QUESTION 4.1.1 and QUESTION 4.1.2.**
6. Write neatly and legibly.

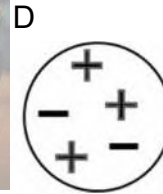
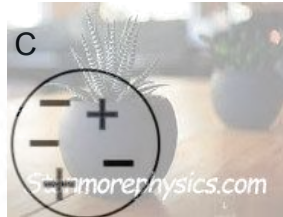
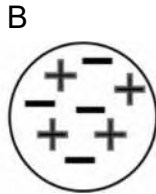
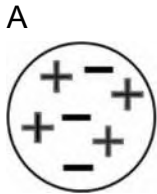
**This question paper consists of 14 pages.**

**SECTION A**

**QUESTION 1**

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Only write down the letter (A – D) next to the question number (1.1 – 1.10) in the ANSWER BOOK.

1.1 Which of the following objects is electrically neutral?



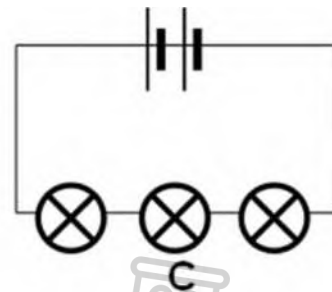
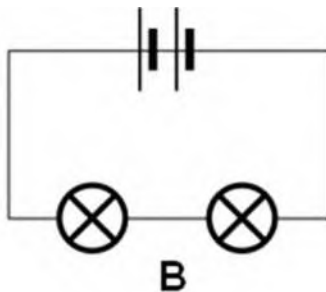
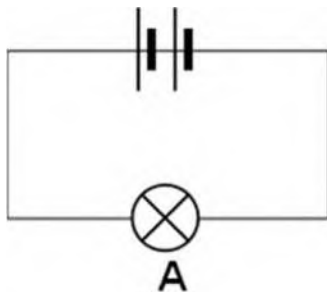
(1)

1.2 What will happen if you rub two identical plastic rulers with a woolen cloth and bring them closer together?

- A The rulers will attract each other.
- B The rulers will repel each other.
- C The rulers will neither attract nor repel.
- D The rulers will partially attract and partially repel.

(1)

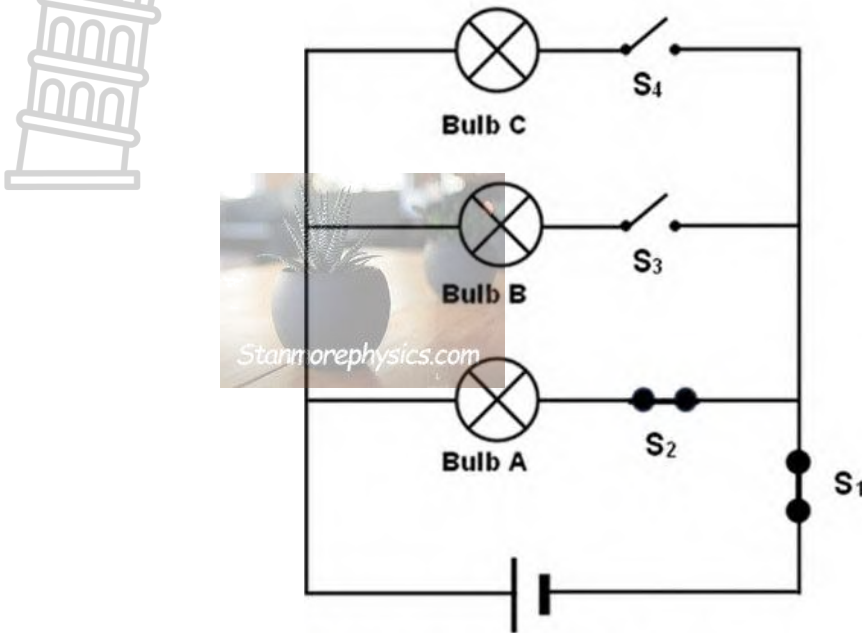
1.3 Which statement regarding the circuits below is TRUE?



- A The overall resistance in circuit C is less than in circuit A.
- B If more bulbs are connected in series, the brightness of the bulbs increase.
- C The bulb in circuit A is the brightest because the overall current is the largest.
- D All the bulbs glow with the same brightness.

(1)

1.4 In the circuit below, switch  $S_1$  and switch  $S_2$  are closed. What will happen if switch  $S_3$  is closed, and then  $S_4$ ?



- A The bulbs will glow dimmer and dimmer.
- B The overall resistance will decrease, and the overall current will increase.
- C The overall resistance will increase, and the overall current will decrease.
- D The overall resistance and current will remain the same. (1)

1.5 Which colour has the longest wavelength in the spectrum of visible light?

- A Red
- B Green
- C Blue
- D Violet (1)

1.6 When white light passes through a triangular glass prism, it separates into a spectrum of colors. This happens because the ...

- A prism absorbs some colours and reflects others.
- B prism refracts (bends) light of different colors by different amounts.
- C prism emits coloured light.
- D prism filters out certain colours. (1)

1.7 What is at the center of our solar system?

- A Moon
- B Earth
- C Sun
- D Mars (1)

1.8 Which planet is known to support life?

- A Jupiter
- B Uranus
- C Mercury
- D Earth

(1)

1.9 The distance between the Sun and Earth.

- A 4 light years.
- B 8 light minutes.
- C 28 million light years.
- D 1 light year.

(1)

1.10 A celestial body that comes from the Oort Cloud and has a white tail when it comes closer to the sun.

- A Comet
- B Meteor
- C Asteroid
- D Constellation

(1)

**[10]**

## QUESTION 2

Write down the CORRECT SCIENTIFIC WORD or PHRASE for each of the following statements. Write the answer next to the question number (2.1 – 2.5) in your answer book.

2.1 A tiny negatively charged particle found in atoms.

(1)

2.2 300 000 kilometres per second.

(1)

2.3 Substances through which most of the light can pass through.

(1)

2.4 The planet known as the Morning Star or Evening Star.

(1)

2.5 The Sun with its eight planets orbiting around it.

(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	It is a source of energy.	A	Series circuit
3.2	Resistors in parallel.	B	Electromagnet
3.3	Current decreases when resistors are added.	C	Resistor
3.4	It opposes the flow of electric current.	D	Current dividers
3.5	It breaks the circuit when it overheats.	E	Cell
		F	Potential dividers
		G	Fuse
		H	Parallel circuit
		I	Switch

[5]

**TOTAL SECTION A: 20**

**SECTION B**

**QUESTION 4**

Complete the paragraph on static electricity below by finding the missing words in the word box.

repel	rubbing	gains	friction
loses	opposite	attract	neutral
electrons	protons	the same	positive

Only write down the number and the missing word.

An object like a rod can be charged by 4.1. This is done by 4.2 the rod with a woolen cloth. Charging is due to the transfer of 4.3 from one material to another.

An object will become negatively charged when it 4.4 electrons and the object will become positively charged when it 4.5 electrons. If a negatively charged rod is brought near another freely suspended negatively charged rod, the two rods will 4.6 because their charges are 4.7. An object is uncharged or 4.8 when the number of positive charges equals the number of negative charges.

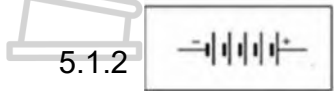
[8]

**QUESTION 5**

5.1 Label each of the following components of an electric circuit.



(1)



(1)



(1)

5.2 Draw the circuit diagram of a circuit that consists of:

- Two cells in series
- Two bulbs in parallel
- One resistor in series with the two bulbs in parallel
- A switch that can switch one of the bulbs in parallel, on and off

(4)

[7]

**QUESTION 6**

Shown below are the diagrams of an electric doorbell, the apparatus for covering a silver spoon with gold and an electric iron for ironing clothes.



**A: Electric doorbell**



**B: Covering a silver spoon with gold**



**C: Ironing clothes**

Which one of the above (choose between A, B or C) is an example of the:

6.1 heating effect of an electric current?

(1)

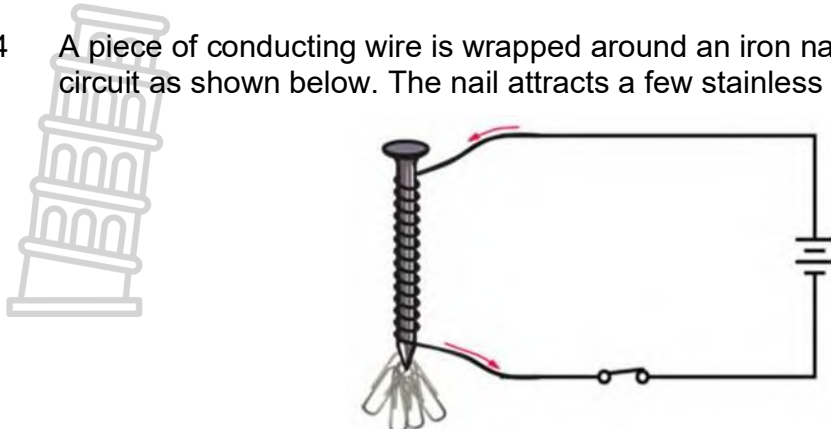
6.2 magnetic effect of an electric current?

(1)

6.3 chemical effect of an electric current?

(1)

6.4 A piece of conducting wire is wrapped around an iron nail and connected in a circuit as shown below. The nail attracts a few stainless steel paper clips.

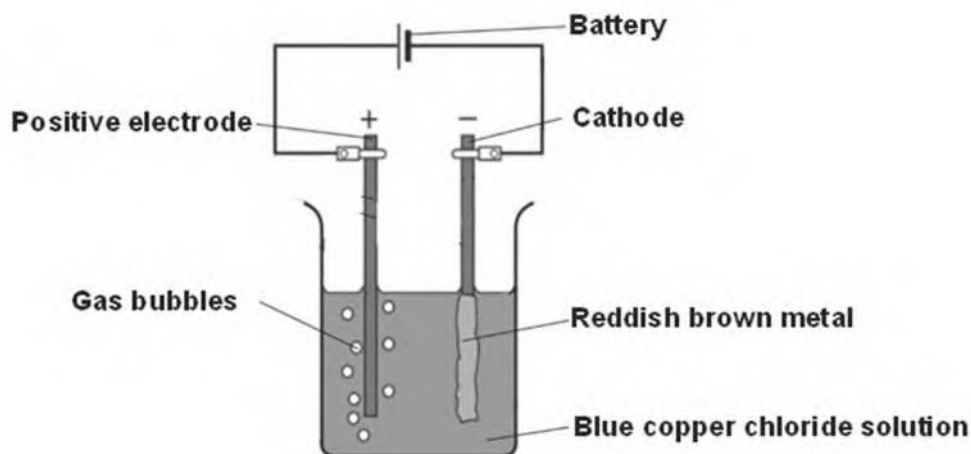


6.4.1 What is the apparatus in the diagram called? (1)

6.4.2 Give a reason why the iron nail is a TEMPORARY magnet. (1)

6.4.3 Suggest two practical changes that will enable the iron nail to pick up more paper clips. (2)

6.5 Study the diagram of an electrolytic cell containing a blue copper chloride solution.



6.5.1 Describe what happens to the copper chloride during electrolysis in the electrolytic cell above. (2)

6.5.2 Identify the electrolyte in the diagram above. (1)

6.5.3 Which observation proves that copper metal is one of the products that forms? (1)

6.5.4 Give the name of the gas that forms and smells like Jik. (1)

6.5.5 What is the name of the positive electrode? (1)

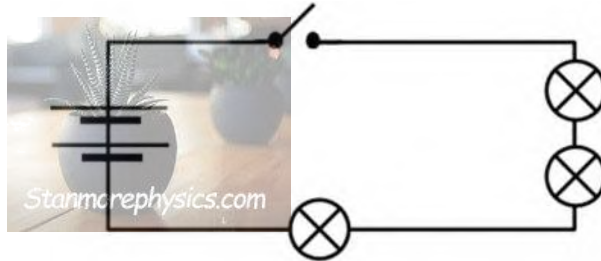
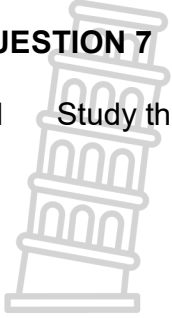
6.5.6 Write down the energy-conversion that takes place in the electrolytic cell. (2)

[15]



**QUESTION 7**

7.1 Study the series circuit below and answer the questions that follow.



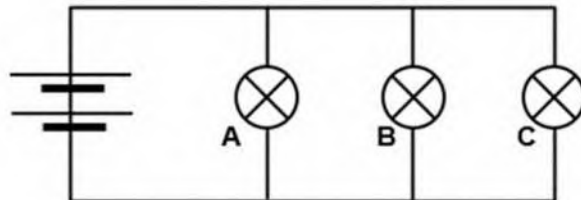
7.1.1 Why is this circuit called a series circuit? (1)

7.1.2 Currently, NONE of the bulbs in the circuit lights up. Give a reason why this is the case. (1)

7.1.3 The switch is now CLOSED, but still, none of the bulbs are lighting up. Provide TWO possible reasons that might have caused the bulbs not to light up. (2)

7.1.4 Name one DISADVANTAGE of connecting bulbs in series. (1)

7.2 Study the parallel circuit below and answer the questions that follow.

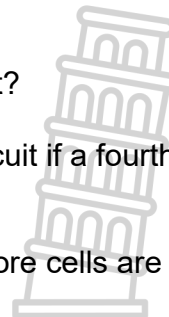


7.2.1 Why is this a parallel circuit? (1)

7.2.2 What will happen to bulbs B and C if bulb A dies out? (1)

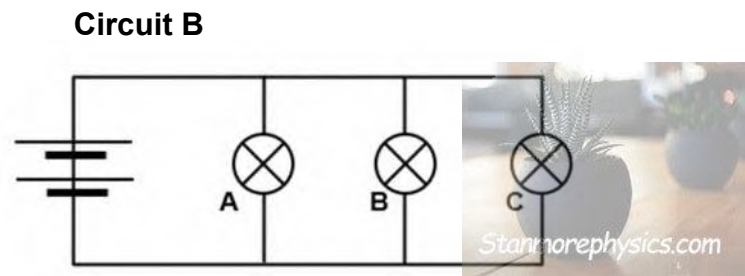
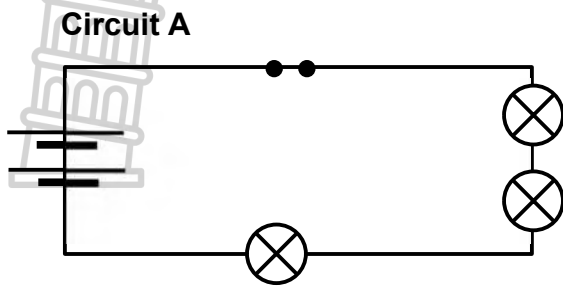
7.2.3 What will happen to the overall resistance in the circuit if a fourth bulb is connected in parallel to the circuit? (1)

7.2.4 What will happen to the brightness of the bulbs if more cells are connected in series? (1)





7.3 The two circuits are now compared. All the bulbs and cells are identical.



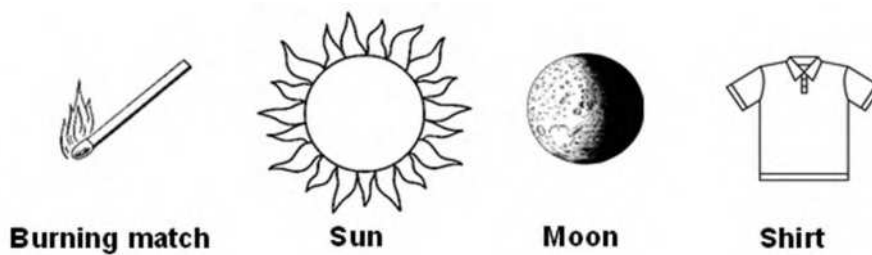
7.3.1 Explain why the overall resistance in circuit A is bigger than in circuit B. (2)

7.3.2 Give two reasons why the type of connection in circuit B is used for the electrical wiring of the lights in our homes. (2)

**[13]**

**QUESTION 8**

Some objects emit (send out) their own light, and other objects do not. Study the diagrams below and answer the following questions.

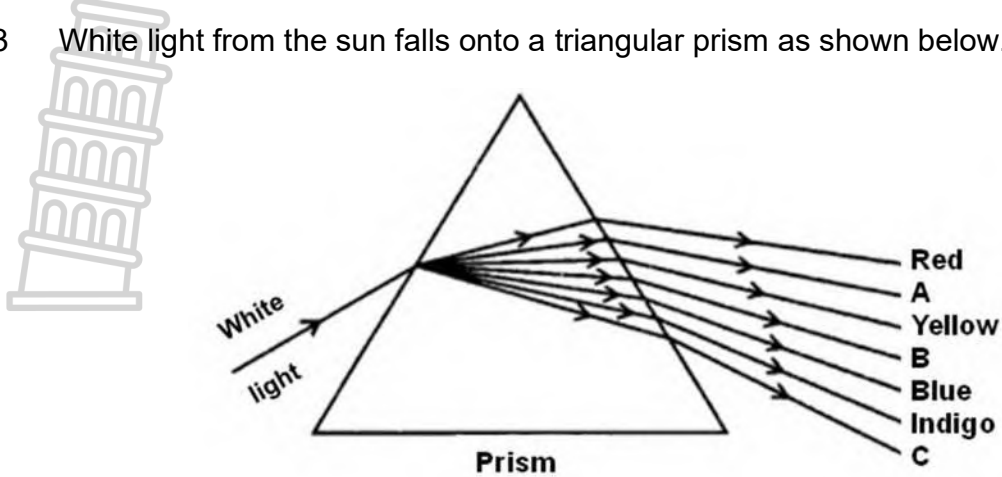


8.1 Identify one luminous object in the diagram above. (1)

8.2 Explain why the moon is a non-luminous object. (1)



8.3 White light from the sun falls onto a triangular prism as shown below.



8.3.1 Name the missing colours A, B and C. (3)

8.3.2 What is the complete range of seven colours of white light called? (1)

8.4 Opaque substances cast a shadow on the side facing away from the light source.

8.4.1 Which one of the two objects below will cast an obvious, dark shadow?  
The drinking glass or the book?



(1)

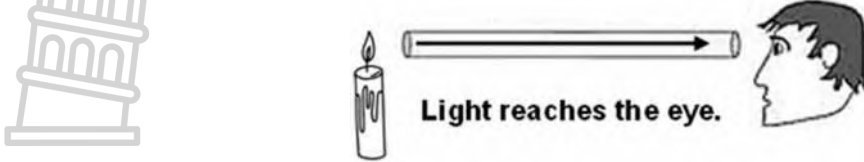
8.4.2 The outside cover of the book is **BLUE**. Refer to ABSORPTION and REFLECTION of light and explain why the book is seen as blue.

(2)  
[9]

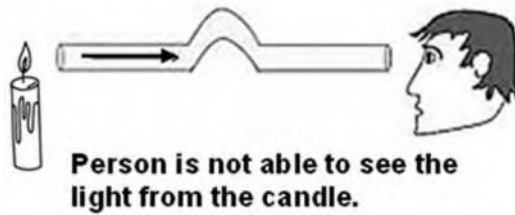


**QUESTION 9**

9.1 A person looks at a burning candle through a straight tube and can clearly see the light from the candle.



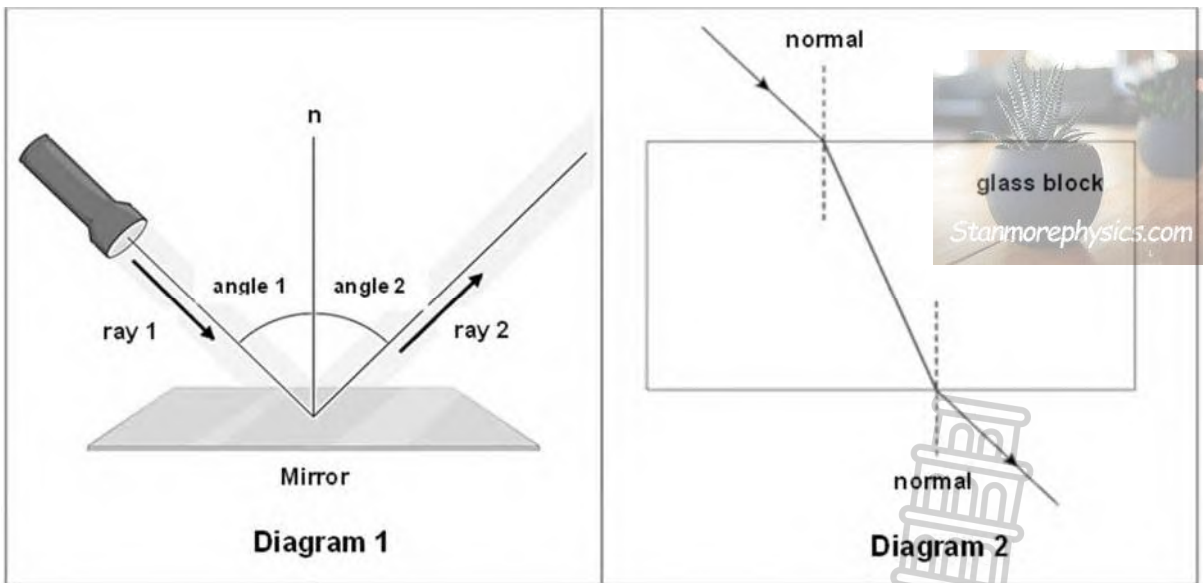
When the person looks at the lit candle through a bent tube, the light from the candle cannot be seen.



Give a reason why the person cannot see the light from the candle through the bent tube.

(1)

9.2 Study ray diagrams 1 and 2 below.



9.2.1 Which diagram represents the refraction of light?

(1)

9.2.2 If ray 1 is called the incident ray, what is the correct label for ray 2?

(1)

9.2.3 Compare the size of angle 1 with the size of angle 2.

(1)

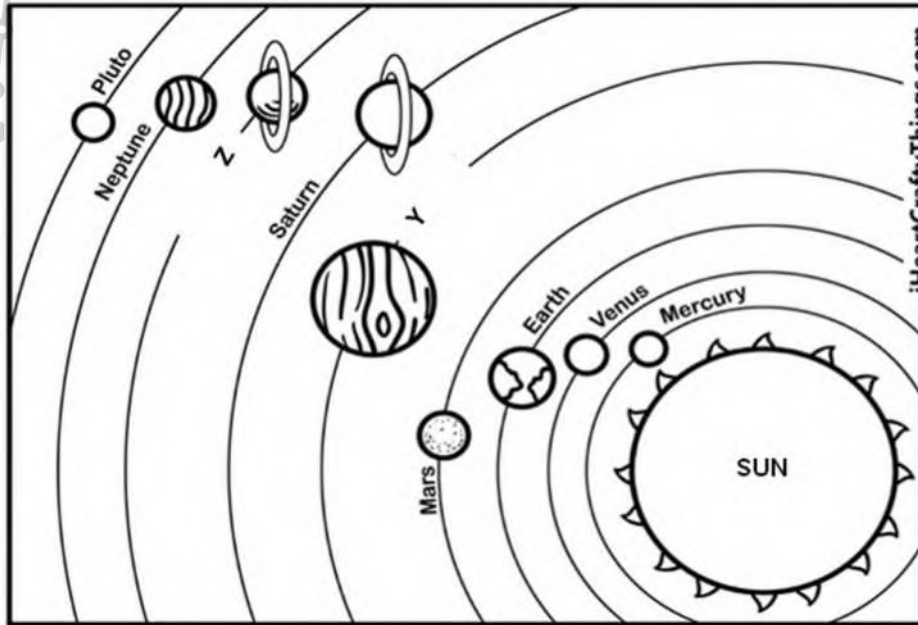
9.2.4 Which law is illustrated in diagram 1?

(1)

**[5]**

**QUESTION 10**

Study the diagram of the solar system below and answer the questions that follow.



- 10.1 Which one of the bodies in the diagram above is a star? (1)
- 10.2 Sunlight is produced through nuclear reactions where hydrogen atoms fuse together. What gas is created when hydrogen atoms undergo fusion? (1)
- 10.3 Which planet is known as the red planet? (1)
- 10.4 Why is the moon not regarded as a planet? (1)
- 10.5 How long does it take the earth to orbit the sun? (1)
- 10.6 Name Planet Y. (1)
- 10.7 Give the name of a dwarf planet in the diagram above. (1)
- 10.8 Which force keeps all the planets in their stable predictable orbits? (1)
- 10.9 Where in the solar system is the Asteroid Belt located? (1)
- 10.10 Discuss THREE conditions that support life on Earth. (3)

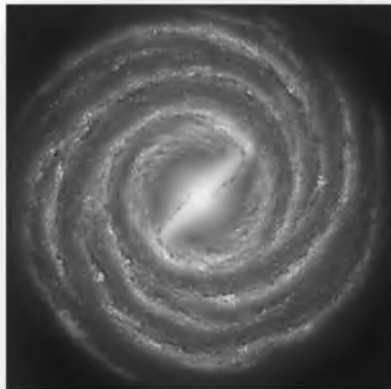
**[12]**

**QUESTION 11**

The photograph below shows the hazy path of light across the night sky near Sutherland where the SALT telescope is located.



- 11.1 The white band of stars spanning across the sky is part of the galaxy our solar system belongs to. What is the name of our galaxy? (1)
- 11.2 Where does the name for our galaxy come from? (1)
- 11.3 Explain what a galaxy is. (2)
- 11.4 Below is a diagram of what scientists think our galaxy looks like if seen from far away.



What is the shape of our galaxy?

(1)



11.5 The diagram below shows a famous constellation of four stars and its two pointers that can easily be seen in the southern hemisphere.



11.5.1 What is the name of this constellation of four stars? (1)

11.5.2 One of the two pointers is the nearest star to our Sun. What is the name of this star? (1)

11.5.3 How many light years away is the nearest star to our Sun? (1)

11.5.4 Explain what a light year is. (2)

11.5.5 Why do we measure distances in the universe in light years and not in kilometers? (1)

[11]

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



**NATURAL SCIENCE GRADE 8**

**MEMORANDUM**

**NOVEMBER 2023**



**SECTION A**

**QUESTION 1**

- |      |    |             |
|------|----|-------------|
| 1.1  | B✓ | (1)         |
| 1.2  | B✓ | (1)         |
| 1.3  | C✓ | (1)         |
| 1.4  | B✓ | (1)         |
| 1.5  | A✓ | (1)         |
| 1.6  | B✓ | (1)         |
| 1.7  | C✓ | (1)         |
| 1.8  | D✓ | (1)         |
| 1.9  | B✓ | (1)         |
| 1.10 | A✓ | (1)         |
|      |    | <b>[10]</b> |

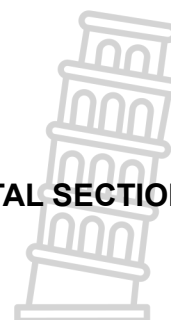
**QUESTION 2**

- |     |  |            |
|-----|--|------------|
| 2.1 | Electron✓                                    | (1)        |
| 2.2 | Speed of light✓ (in an empty space / vacuum) | (1)        |
| 2.3 | Transparent✓ substances                      | (1)        |
| 2.4 | Venus✓                                       | (1)        |
| 2.5 | Solar system✓                                | (1)        |
|     |  | <b>[5]</b> |

**QUESTION 3**

- |     |    |            |
|-----|----|------------|
| 3.1 | E✓ | (1)        |
| 3.2 | D✓ | (1)        |
| 3.3 | A✓ | (1)        |
| 3.4 | C✓ | (1)        |
| 3.5 | G✓ | (1)        |
|     |    | <b>[5]</b> |

**TOTAL SECTION A: 20**





MEMORANDUM

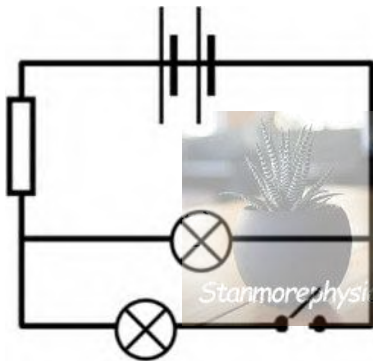
SECTION B

QUESTION 4

- 4.1 friction ✓ (1)
  - 4.2 rubbing ✓ (1)
  - 4.3 electrons ✓ (1)
  - 4.4 gains ✓ (1)
  - 4.5 loses ✓ (1)
  - 4.6 repel ✓ (1)
  - 4.7 the same ✓ (1)
  - 4.8 neutral ✓ (1)
- [8]**

QUESTION 5

- 5.1.1 (Open) switch ✓ (1)
- 5.1.2 Battery / 5 cells ✓ (1)
- 5.1.3 Resistor ✓ (1)
- 5.2



**Marking criteria:**

- ✓ Two cells in series
- ✓ Two bulbs in parallel
- ✓ One resistor in series with the two bulbs in parallel (on either side of the bulbs in parallel)
- ✓ An open/closed switch in series with one of the bulbs in either one of the parallel branches

(4)  
**[7]**

MEMORANDUM

**QUESTION 6**

6.1 C✓ (1)

6.2 A✓ (1)

6.3 B✓ (1)

6.4.1 Electromagnet✓ (1)

6.4.2 When the switch is opened, the circuit is broken, the current stops flowing, and the iron nail loses its magnetic properties. ✓

**OR**

The iron nail is only magnetic while the current flows. ✓ (1)

6.4.3 Increase the number of wire-turns (in the coil) around the nail. ✓

Use a stronger power source (with higher voltage) / more cells in series / stronger current. ✓

Use thicker wire✓ with lower electrical resistance in the coil.

Winding the wire tightly and uniformly✓ around the nail without gaps.

**(ANY TWO)** (2)

6.5.1 The copper chloride splits up / decomposes / breaks up✓ into copper (metal) and chlorine (gas). ✓ (2)

6.5.2 (Blue) copper chloride✓ solution (1)

6.5.3 The reddish brown metal / layer / deposit✓ that forms around the one electrode/cathode. (1)

6.5.4 Chlorine✓ (1)

6.5.5 Anode✓ (1)

6.5.6 Electrical energy✓ is converted into chemical energy.✓ (2)

**[15]**



MEMORANDUM

**QUESTION 7**

- 7.1.1 Only one pathway for electric current to flow. ✓  
**OR**  
All components/devices are connected one after another in a single pathway. ✓ (1)
- 7.1.2 The switch is open ✓ and the current cannot flow.  
**OR**  
The circuit is incomplete / broken. ✓ (1)
- 7.1.3 One or more bulbs are broken / fused. ✓  
The battery is flat. ✓  
There is break in the conducting wire **OR** A poor/faulty connection between two components. ✓ (ANY TWO) (2)
- 7.1.4 If any component or device in the circuit fails/fuses, all other components fail. ✓ (1)
- 7.2.1 There are two or more pathways for the electric current to flow through. ✓ (1)
- 7.2.2 B and C will continue to shine / glow. ✓ (1)
- 7.2.3 Overall resistance will decrease. ✓ (1)
- 7.2.4 Brightness will increase / bulbs will glow brighter. ✓ (1)
- 7.3.1 Circuit A: Bulbs in series ✓ have a higher overall resistance. ✓  
**OR**  
Circuit B: Bulbs in parallel ✓ have a lower overall resistance. ✓ (2)
- 7.3.2 More bulbs in parallel; less resistance; brightness remains the same. ✓  
Bulbs can be switched on and off independently from one another.  
**OR**  
If one bulb fuses, the other will still glow. ✓ (2)

[13]



MEMORANDUM

**QUESTION 8**

8.1 Burning match **OR** Sun ✓ (1)

8.2 The moon does not emit light of its own. ✓

**OR**

The moon only reflects light from the sun and does not give off its own light. ✓ (1)

8.3.1 A - Orange  
B - Green  
C - Violet (3)

8.3.2 Spectrum ✓ of white light (1)

8.4.1 Book ✓ (1)

8.4.2 When white light shines on the surface of the blue book, the book reflects only blue light ✓ (which reaches the eye) and absorbs all other colours ✓ of white light. (2)  
**[9]**

**QUESTION 9**

9.1 Light rays travel in straight lines ✓ from the source to the eye. (1)

9.2.1 Diagram 2 ✓ (1)

9.2.2 Reflected ray ✓ (1)

9.2.3 Angle 1 = Angle 2 / Angle 1 and angle 2 are the same size. ✓ (1)

9.2.4 The Law of Reflection ✓ (1)  
**[5]**

**QUESTION 10**

10.1 Sun ✓ (1)

10.2 Helium / He ✓ (1)

10.3 Mars ✓ (1)

10.4 The moon orbits the earth, and not the sun. ✓ (1)

10.5 365 days / 1 year / 365¼ days / 365,25 days ✓ (1)

10.6 Jupiter ✓ (1)

10.7 Pluto ✓ (1)



MEMORANDUM

- 10.8 Gravity / Gravitational force ✓ (1)
- 10.9 Between Mars and Jupiter ✓ (1)
- 10.10 -Earth's distance from the sun provides the ideal **temperature** range / Earth is not too hot or too cold. ✓
- Earth has just the right temperatures so that **water** can be in each of the three phases: solid, liquid and gas. ✓
- Earth gets the right amount of **sunlight** to provide energy for food chains or photosynthesis. ✓
- Earth has the right amount of **oxygen** needed for respiration / support life. ✓
- (ANY THREE)** (3)  
**[12]**

**QUESTION 11**

- 11.1 The Milky Way ✓ Galaxy (1)
- 11.2 The Greeks called it the Milky Way because it looks like spilled milk. ✓  
**OR**  
"Milky Way" comes from a faint band of light stretching across the night sky which looks milky or cloudy in texture, hence the name. ✓ (1)
- 11.3 A group of stars ✓ and their solar systems. ✓  
**OR**  
A huge collection of gas, dust, and billions of stars and their solar systems, ✓ all held together by gravity. ✓ (2)
- 11.4 Spiral ✓ shape. (1)
- 11.5.1 The Southern Cross ✓ (1)
- 11.5.2 Alpha Centauri ✓ (**Accept:** Proxima Centauri) (1)
- 11.5.3 (Approximately) 4,2 light years. ✓ (1)
- 11.5.4 A light year is distance ✓ that light travels in one year. ✓ (2)
- 11.5.5 The light year is used to measure distances in space because the distances are very large / incredibly vast, which makes the use of kilometers impractical. ✓ (1)  
**[11]**

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