education

Department of Education
FREE STATE PROVINCE

GRADE 8

NATURAL SCIENCES

NOVEMBER 2024

TIME: 2 HOURS

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 **9** 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, between QUESTION 7.1.2 and QUESTION 7.1.3.**
6. Write neatly and legibly.

This question paper consists of 12 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 When a balloon is rubbed against your hair and then held against a wall, what causes the balloon to stick to the wall?

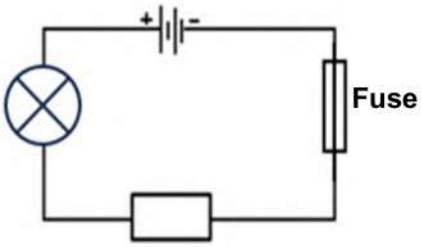
A Gravity
B Magnetism
C Static electricity
D Friction (1)

1.2 What component in a circuit, opposes the flow of electric current?

A Resistor
B Capacitor
C Battery
D Switch (1)

1.3. What will happen with the bulb in the circuit diagram below if the fuse burns out?

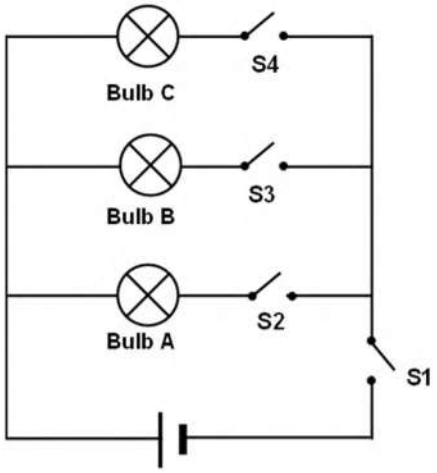
A The bulb will glow brighter.
B The bulb will glow dimmer.
C The bulb will not glow anymore.
D The bulb will flicker.



(1)

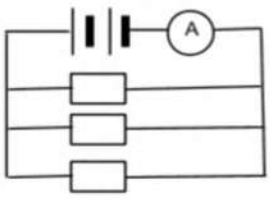
1.4 Which switch(es) must be closed in the following circuit to make ONLY bulb B light up?

A S_3
B S_1 and S_3
C S_1, S_2 and S_4
D S_1

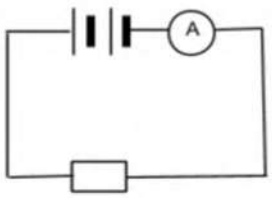


1.5 In the following circuit diagrams all the resistors are identical.
In which circuit will the ammeter have the highest reading?

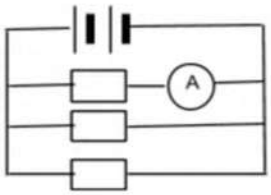
A



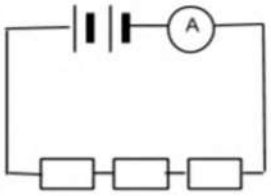
B



C



D



(1)

1.6 Which one of the following colours is NOT a part of the visible light spectrum?

A Red
B Yellow
C Orange
D Brown (1)

1.7. What colour does a RED OBJECT display when placed under a WHITE LIGHT?

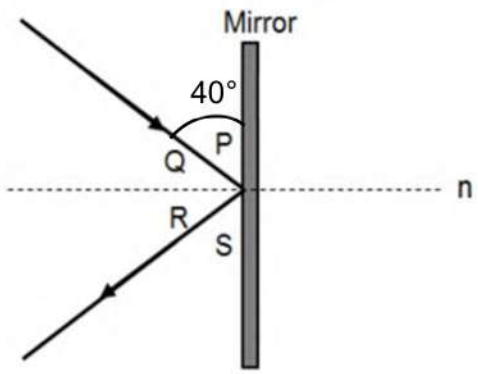
	Colour of object when placed under white light	**Explanation**
A	Red	All colours are absorbed; only red light is reflected by the object.
B	Red	All colours are reflected; only red light is absorbed.
C	White	White light is dominant.
D	Black	No colour is reflected and therefore the object displays black.

(1)

1.8. When white light passes through a prism, it is separates into seven colours.
This phenomenon is known as:

A Diffraction
B Refraction
C Dispersion
D Interference (1)

1.9 The diagram below shows a ray of light being reflected from a mirror. The angle between the incident ray and the mirror's surface is 40°.



The size of the angle of reflection is …

A 40°
B 90° - 40°
C 90° + 40°
D 90° (1)

1.10 When an asteroid enters Earth's atmosphere it is called a ...

A meteorite.
B meteor.
C comet.
D satellite. (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.

2.1 300 000 kilometers per second. (1)

2.2 The planet known as the Morning Star or Evening Star. (1)

2.3 The Sun with its eight planets orbiting around it. (1)

2.4. Time taken by the Earth to complete one rotation around its own axis. (1)

2.5 The constellation in the southern hemisphere that is used for navigation at night. (1)

[5]

QUESTION 3

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

COLUMN A		COLUMN B	
3.1	Occurs between two like charges.	A	Cell
3.2	Lightning	B	Current
3.3	A thin wire that easily melts when the current becomes too high.	C	Repulsion
3.4	Converts chemical energy to electrical energy.	D	Friction
3.5	The breaking up of copper chloride into copper and chlorine by an electric current.	E	Attraction
		F	Fuse
		G	Electrolysis
		H	Discharge

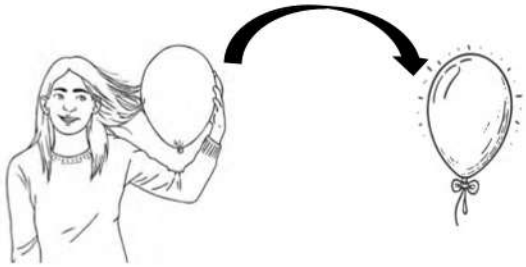
[5]

TOTAL SECTION A: 20

SECTION B

QUESTION 4

A balloon becomes NEGATIVELY charged when a girl rubs it against her hair.



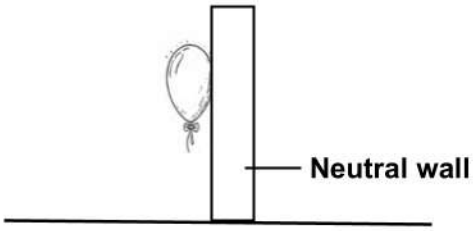
Negatively charged balloon

4.1 What causes the balloon to be charged when rubbed against the girl's hair? (1)

4.2 Refer to the movement of electrons and explain how the balloon becomes NEGATIVELY charged when rubbed against the girl's hair. (2)

4.3 Explain why the girl's hair continue to stand up even after she stopped rubbing the balloon against it. (2)

4.4 A negatively charged balloon sticks to an electrically neutral wall when it is slowly brought near the wall and allowed to touch the wall.



4.4.1 Explain what is meant by "electrically neutral wall" in the statement above. Choose between the following two answers. Write only the letter A **OR** B next to the question number (4.4.1) in your answer book.

A	The wall is electrically neutral, because it contains no charges.
B	The wall is electrically neutral, because it contains an equal number of positively charged protons (+) and negatively charged electrons (-).

(1)

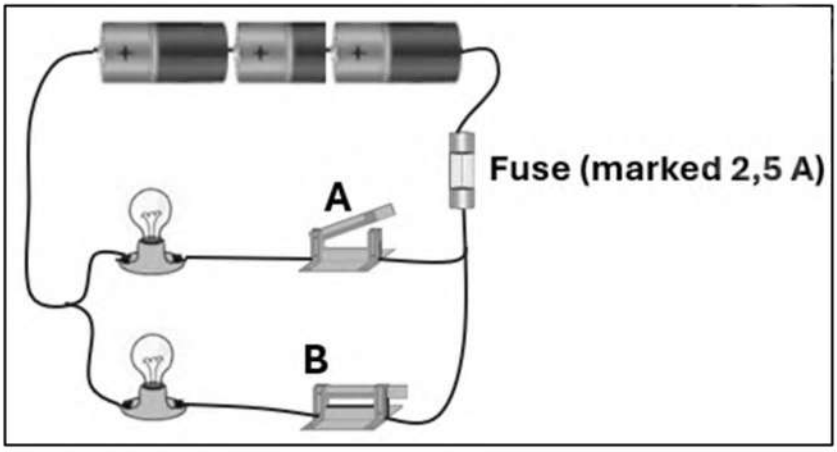
4.4.2 In your answer book, redraw the balloon sticking to the wall and clearly indicate the charges on both the balloon and the wall. (2)

[8]

QUESTION 5

5.1 Consider the drawing of an electrical circuit below.

This circuit consists of:
- Three cells connected in series
- Two similar bulbs connected in parallel
- An open switch (A)
- A closed switch (B)
- A fuse



5.1.1 Use the correct **SYMBOLS** and draw a circuit diagram that represents the circuit in the drawing above. (5)

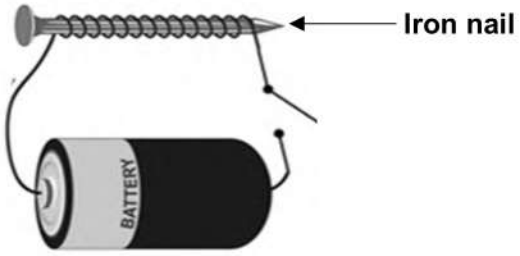
5.1.2 Is this circuit an example of a SERIES or PARALLEL circuit when switch A is open? (1)

5.1.3 What is the function of the fuse in this circuit? (1)

5.1.4 The current through the circuit is 2 A when switch A is open. Predict what will happen to the 2,5 A fuse when switch A is closed. (1)

5.1.5 Explain your answer in question 5.1.4. (2)

5.2 The iron nail in the diagram which forms part of an electromagnet CANNOT pick up any iron filings.

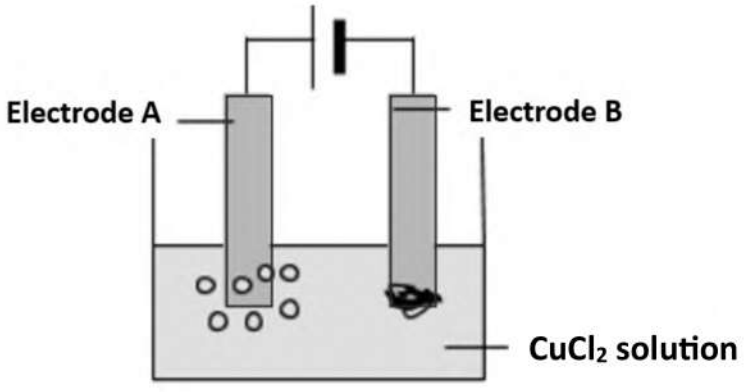


5.2.1 Explain why the electromagnet in the diagram is not able to pick up any iron filings. (2)

5.2.2 Name one device used in our daily lives which makes use of an electromagnet to function. (1)

5.2.3 Give two examples of practical changes that could be made to increase the strength of the electromagnet. (2)

5.3 Consider the diagram below that shows the apparatus used to investigate the effect of an electric current. Electrodes A and B are made of carbon.



5.3.1 Which effect of an electric current is investigated?
Choose between magnetic effect, heating effect or chemical effect. (1)

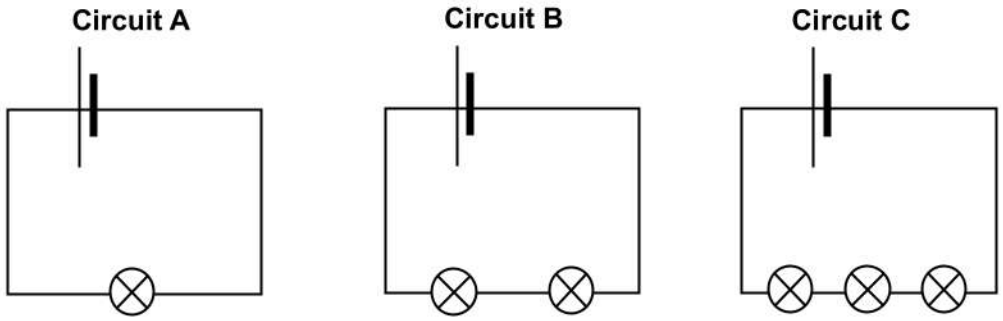
5.3.2 Identify the gas that forms at electrode A. (1)

5.3.3 What is the CHEMICAL NAME of the electrolyte used? (1)

5.3.4 Explain the purpose of the electric cell in the diagram above. (2)
[20]

QUESTION 6

6.1 Study circuits A, B and C below. **All the cells and the bulbs are identical.**



6.1.1 Explain why circuit C is considered a SERIES circuit. (1)

6.1.2 Study the table of results based on the three circuits above:

Circuit	Number of bulbs	Brightness of bulbs
A	1	Bright
B	2	Less bright / Dimmer
C	3	Least bright / Dimmest

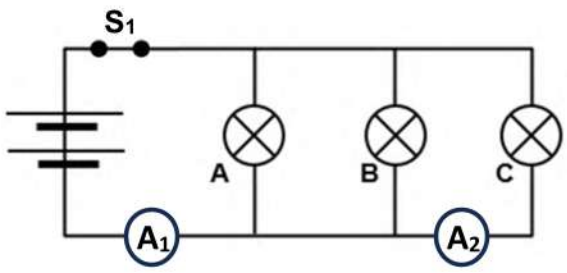
(a) Identify the independent variable for this investigation by analysing the data in the table. (1)

(b) Name two factors that were kept constant in this investigation. (2)

(c) Arrange circuits A, B and C from highest to lowest total resistance. (1)

(d) Formulate a conclusion for this investigation. (2)

6.2 Consider the circuit diagram below. All the bulbs and cells are identical.



6.2.1 Is this an example of a SERIES or PARALLEL circuit? (1)

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

6.2.3 An ammeter is an instrument that measures electrical current. What is electrical current? (1)

6.2.4 What will happen to the total current as measured by ammeter A_1 if bulb C fuses? (Choose between INCREASE or DECREASE.) (1)

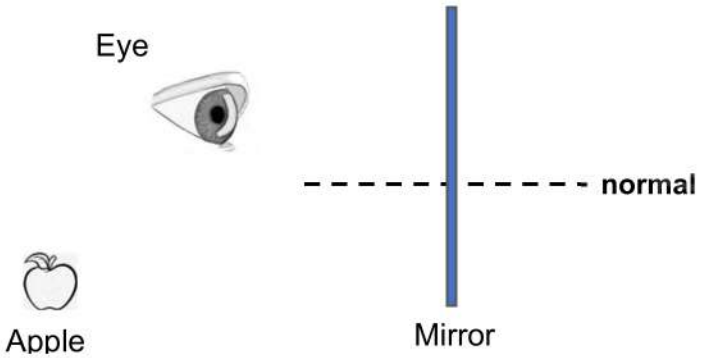
6.2.5 What will happen to the current as measured by ammeter A_2 if bulb C fuses? (1)

6.2.6 Explain why NONE of the bulbs will glow when switch S_1 is opened. (1)

[14]

QUESTION 7

7.1 The picture below shows the eye of a boy who is able to observe an apple in a mirror. The apple is situated behind the boy.



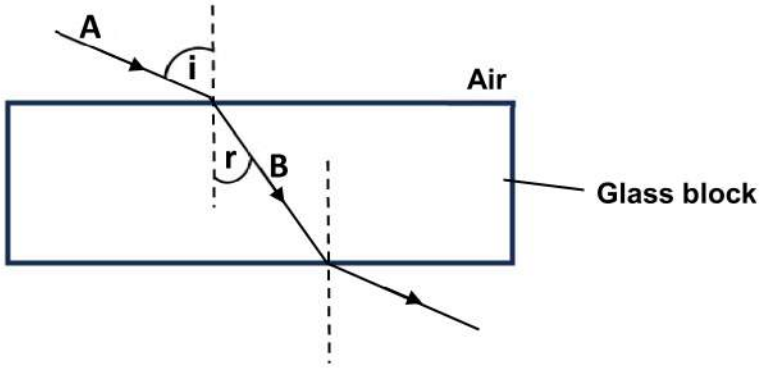
7.1.1 Is the apple an example of a luminous or non-luminous object? (1)

7.1.2. Is a mirror an example of a transparent or opaque object? Explain your answer. (2)

7.1.3 Redraw the picture in your answer book and complete a ray diagram to illustrate how the boy can see the apple behind him.
Use arrowheads to indicate the direction in which the light travels. (2)

7.1.4 What is the relationship between the angle of incidence and the angle of reflection? This relationship is known as the Law of Reflection. (1)

7.2 A ray of light strikes the surface of a rectangular glass block and changes direction upon entering the glass. Use the diagram below and answer the questions that follow.



7.2.1 What optical phenomenon is observed when the ray of light changes direction as it enters the glass block? (1)

7.2.2 Give the correct label for light ray **A**. (1)

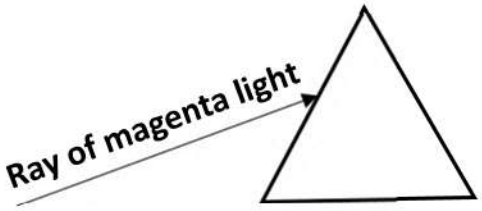
7.2.3 If angle **i** is called the angle of incidence, what is the correct label for angle **r**? (1)

7.2.4 Use your observations from the diagram to explain why the optical density of glass is higher than the optical density of air. (2)

7.3 Magenta light is a secondary color formed by combining red and blue light.

7.3.1 Which colour of light, red or blue, has the highest frequency? (1)

7.3.2 Copy the following diagram into your answer book and complete the path of a ray of magenta light as it passes through the glass prism.



Label the beams of light that can be observed on the other side of the prism. (2)
[14]

QUESTION 8

8.1 Identify the celestial bodies described in questions 8.1.1 to 8.1.4.
Write only the name of the celestial body next to the corresponding question number.

8.1.1 Name the planet in our solar system that is known for its prominent rings. (1)

8.1.2 What is the name of the star that is found in our solar system? (1)

8.1.3 The planet in our solar system known as the red planet. (1)

8.1.4 Which planet in our solar system is closest to the Sun? (1)

8.2 Discuss THREE conditions that support life on Earth. (3)

8.3 Information on the features of a few planets in our solar system is given below. The unit in which the data is measured is indicated in brackets below the heading of each column. Study the table and answer the questions that follow.

Planet	Distance for Sun (million km)	Radius of planet (km)	Time to orbit the Sun (earth days)	Time to orbit its own axis (earth hours)	Average surface temperature of planet (°C)
Mars	228	3 390	687	24,7	-63
Jupiter	779	69 911	4 330	9,8	-145
Earth	150	6 371	365	24	15

8.3.1 Write down the names of the three planets mentioned in the table in order of INCREASING size. (3)

8.3.2 Write down the names of FOUR planets that are not mentioned in the table but are also found in our solar system (4)

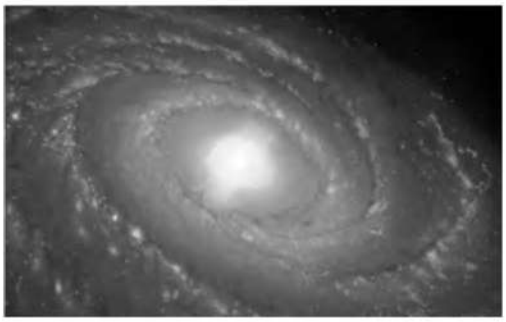
8.3.3 Which one of the three planets mentioned in the table has the longest year? (1)

8.3.4 Which data in the table confirms your answer in question 8.3.3? (1)

8.3.5 Use the data in the table and explain why Jupiter has the shortest day. (1)
[17]

QUESTION 9

Below is a diagram of what scientists think our galaxy looks like when seen from far away.



9.1	What is the shape of our galaxy?	(1)
9.2	Why is our galaxy called the Milky Way?	(1)
9.3	Name the force that holds all the solar systems and stars together in the Milky Way Galaxy.	(1)
9.4	Give the definition of a light year.	(2)
9.5	Why do we use light years to measure distances in space instead of kilometers?	(1)
9.6	How far, in light years, is Alpha Centauri from our solar system?	(1)
		[7]

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

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NATURAL SCIENCE GRADE 8 **NOVEMBER 2024**

MEMORANDUM

SECTION A

QUESTION 1

1.1	C✓	(1)
1.2	A✓	(1)
1.3	C✓	(1)
1.4	B✓	(1)
1.5	A✓	(1)
1.6	D✓	(1)
1.7	A✓	(1)
1.8	C✓	(1)
1.9	B✓	(1)
1.10	B✓	(1)
		[10]

QUESTION 2

2.1	Speed of light✓ (in an empty space / vacuum)	(1)
2.2	Venus ✓	(1)
2.3	Solar system✓	(1)
2.4	24 hours✓ **OR** One day✓	(1)
2.5	Southern Cross✓ **OR** Crux✓	(1)
		[5]

QUESTION 3

3.1	C✓	(1)
3.2	H✓	(1)
3.3	F✓	(1)
3.4	A✓	(1)
3.5	G✓	(1)
		[5]

TOTAL SECTION A: 20

SECTION B

QUESTION 4

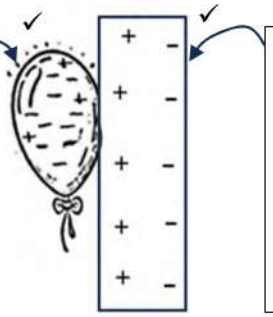
4.1 Friction✓ (1)

4.2 Electrons are transferred✓ from the girl's hair to the balloon.✓ (2)

4.3 The girl's hair became positively charged✓ due to a loss of electrons.
As a result, the like-charged hairs✓ repel each other. (2)

4.4.1 B✓ (1)

4.4.2



Marking criteria:

Negatively charged balloon has MORE electrons (-) than protons (+).

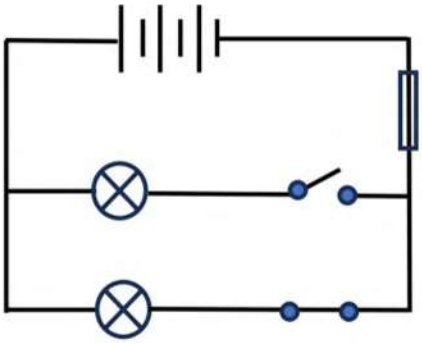
Marking criteria:

Neutral wall has an equal number of electrons and protons, but the charges are separated, with most of the electrons located on the right side of the wall, away from the balloon.

(2)
[8]

QUESTION 5

5.1.1



Marking criteria:

✓ Three cells in series.
✓Two bulbs in parallel.
✓One fuse in series with the two bulbs in parallel.
✓An open switch in one of the parallel branches.
✓A closed switch in the other parallel branch.

(5)

5.1.2 Series✓ (1)

5.1.3 A fuse protects an electrical circuit / circuit components from excessive current.✓ (1)

5.1.4 The fuse will burn off / melt.✓ (1)

Do NOT mark with error.
Apply negative marking from 5.1.4 to 5.1.5.
If the answer in 5.1.4 is incorrect, the learner forfeits the marks for 5.1.5.

5.1.5 Closing switch A decreases the overall resistance of the circuit (two light bulbs in parallel compared to one light bulb in series).
The current increases (doubles)✓ and causes the fuse wire to burn off / melt due to the current exceeding the fuse's 2,5 A rating. ✓ (2)

5.2.1 The switch is open,✓ therefore no current will move through the conducting wire.
No magnetic field✓ will be generated. (2)

5.2.2 Electromagnetic door lock✓
Electric motors✓
Electromagnets used in scrap yards to lift metal objects✓
Speakers✓
Consider alternative answers. **(Any ONE)** (1)

5.2.3 Increase the current flowing through the wire / add cells in series. ✓
Increase the number of turns of wire. ✓
Use soft iron as the core material around which the wire is wound.✓ **(Any TWO)** (2)

5.3.1 Chemical effect✓ (1)

5.3.2 Chlorine gas **OR** Cl_2-gas ✓ (1)

5.3.3 Copper chloride✓ (**ONLY** accept the name) (1)

5.3.4 Supply the energy✓ for the chemical reaction to take place.✓ (2)
[20]

QUESTION 6

6.1.1 The current in a series circuit is the same in all positions.✓
OR
The current in a series circuit is NOT divided.✓
OR
There is only one pathway for the current to flow through.✓ (1)

6.1.2 (a) Number of bulbs✓ connected in series. (1)

(b) The cells are identical. ✓
The number of cells in all three circuits are the same. ✓
The bulbs are identical.✓ **(Any TWO)** (2)

(c) C, B, A✓ (1)

(d) As the number of bulbs in series increases, ✓ the brightness of the bulbs decreases.✓
OR
The total resistance of the circuit increases✓ as more bulbs are connected in series.✓
OR
The current strength in a circuit decreases✓ as more bulbs are connected in series.✓ (2)

6.2.1 Parallel✓ (1)

6.2.2 More bulbs in parallel; less resistance; brightness of bulbs remains the same. ✓
Bulbs can be switched on and off independently from one another.
OR
If one bulb fuses, the others will still glow. ✓ (2)

6.2.3 Electric current is the flow of electric charge.✓ (1)

6.2.4 Decrease✓ (1)

6.2.5 Zero / 0 A✓ (1)

6.2.6 If S_1 is opened, the main / total current is interrupted / circuit is broken.✓ (1)
[14]

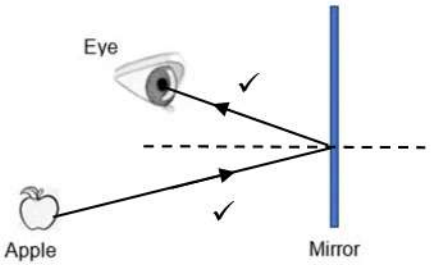
QUESTION 7

7.1.1 non-luminous ✓ (1)

7.1.2 A mirror is an opaque object.✓
Explanation:
A mirror reflects light from its surface / does not allow light to pass through.✓

NOTE: Apply negative marking; if the learner writes transparent, then the explanation should NOT be considered; 0/2. (2)

7.1.3



Marking criteria:
✓ Ray of light from apple to mirror and from mirror to eye (showing the reflection of light).
✓Direction of light is away from the apple towards the eye.

(2)

7.1.4 The angle of incidence is equal to the angle of reflection.✓ (1)

7.2.1 Refraction✓ (1)

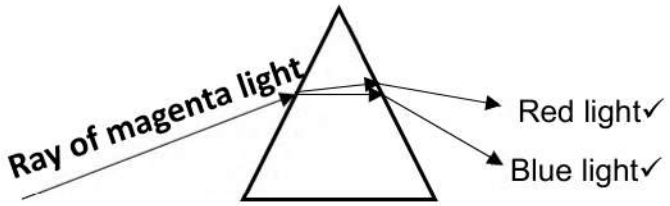
7.2.2 Incident ray✓ (1)

7.2.3 Angle of refraction✓ (1)

7.2.4 The ray of light is refracted towards the normal✓ as it enters the glass block✓ from air.
OR
The ray of light is refracted away from the normal✓ as it exits the glass block✓ into the air.
OR
The angle of refraction (**r**) is smaller than the angle of incidence (**i**)✓ when the ray of light enters the glass block from air.✓ (2)

7.3.1 Blue✓ light (1)

7.3.2



Marking criteria	Marks
Red light above and blue light below	2
Blue light above and red below	1
Complete spectrum of light, with red light above and blue light below	1
Complete spectrum of light, with blue light above and red light below	0

(2)
[14]

QUESTION 8

8.1.1 Saturn✓ (1)

8.1.2 Sun✓ (1)

8.1.3 Mars✓ (1)

8.1.4 Mercury✓ (1)

8.2 -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 exist 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)

8.3.1 Mars,✓ Earth,✓ Jupiter✓ (In this order) (3)

8.3.2 Saturn✓ Venus✓ Uranus✓ Mercury✓ Neptune✓ (**Any FOUR**) (4)

8.3.3 Jupiter✓ (1)

8.2.4 The time (for a planet) to orbit the Sun✓ determines the length of its year. (1)

8.3.5 The time taken for Jupiter to rotate around its own axis is the shortest of all the planets mentioned in the table.✓ (1)

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QUESTION 9

9.1 Spiral✓ shaped (1)

9.2 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)

9.3 Gravity / Gravitational force✓ (1)

9.4 A light year is the distance✓ that light travels in one year. ✓ (2)

9.5 The light year is used to measure distances in space because the distances are incredibly vast (very large), which makes the use of kilometers impractical. ✓ (1)

9.6 4,2✓ light years (1)

[7]

TOTAL SECTION B: 80
GRAND TOTAL: 100