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Department of
Education
FREE STATE PROVINCE

GRADE 9

NATURAL SCIENCES

REVISION BOOKLET #2 (2020)

QUESTION PAPER A – Page 2

QUESTION PAPER B – Page 11

QUESTION PAPER C – Page 18

QUESTION PAPER D – Page 24

MEMORANDUM A – Page 30

MEMORANDUM B – Page 33

MEMORANDUM C – Page 35

MEMORANDUM D – Page 38

CONTENT

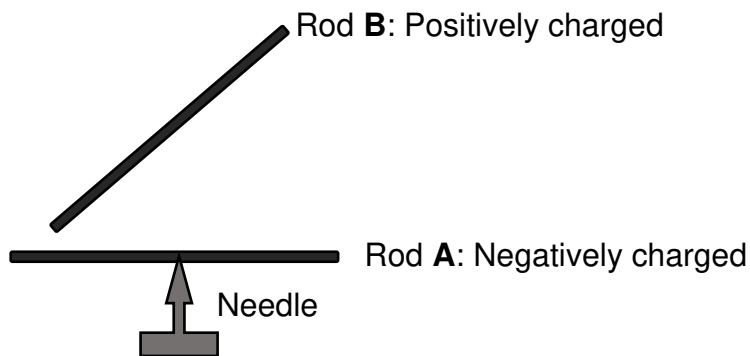
ENERGY AND CHANGE (TERM 3)

Total number of pages: 40

REVISION QUESTION PAPER A**SECTION A****QUESTION 1**

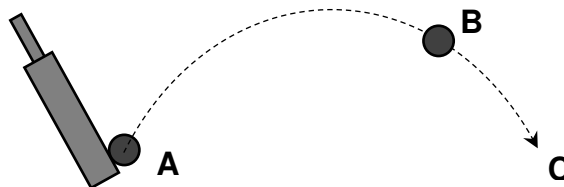
Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A – D) next to the question number (1.1 – 1.10) in the ANSWERBOOK.

- 1.1 A negatively charged rod, rod A, is balanced on a needle. Rod A is free to rotate. A positively charged rod, rod B, is brought closer to rod A as shown in the drawing below.



What will be observed when rod B is brought closer to rod A?

- A Rod A remains stationary.
 B Rod A is pushed away and rotates away from rod B.
 C Rod A is attracted by rod B and rotates away from rod B.
 D Rod A is attracted by rod B and rotates towards rod B. (1)
- 1.2 Study the diagram below. A cricket player hits a cricket ball with a bat at point A. The ball passes point B while moving through the air and lands on the ground at point C.

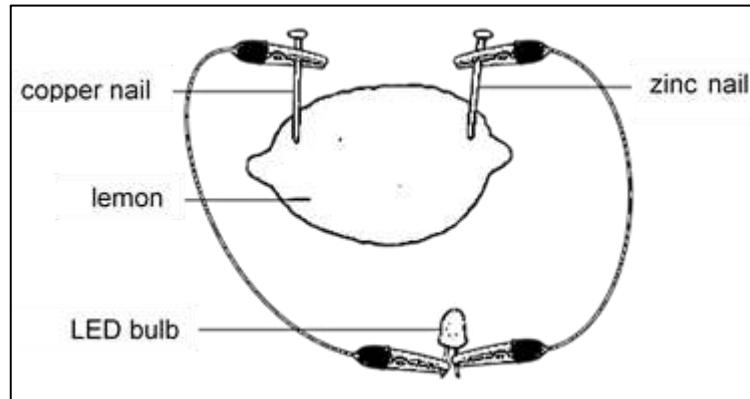


Which option best describes the forces acting at point A and at point B?

	Force at A	Force at B
A	Field force between the bat and the ball.	Gravitational force
B	Field force between the bat and the ball.	Magnetic force
C	Contact force between the bat and the ball.	Gravitational force
D	Contact force between the bat and the ball.	Magnetic force

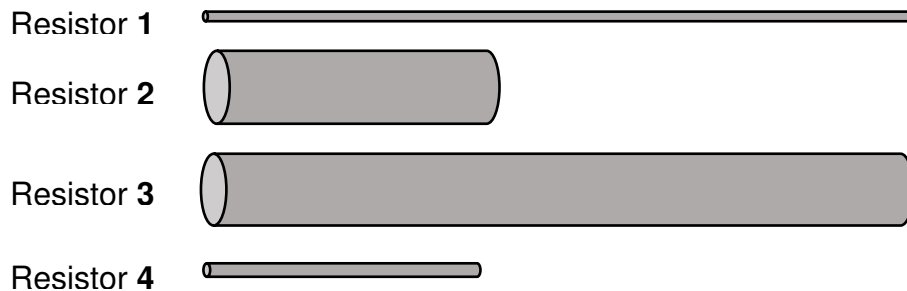
(1)

- 1.3 A zinc nail and a copper nail are inserted into a lemon. The nails are connected to the contact wires of a LED bulb and the LED lights up. The reason for the LED to light up is because the lemon acts as a ...



- A cell.
 B resistor.
 C conductor.
 D source of heat energy. (1)

- 1.4 A current of 2 A passes through each of the four copper resistors below, which are all at the same temperature. Which resistor's temperature will increase the most within 2 minutes?

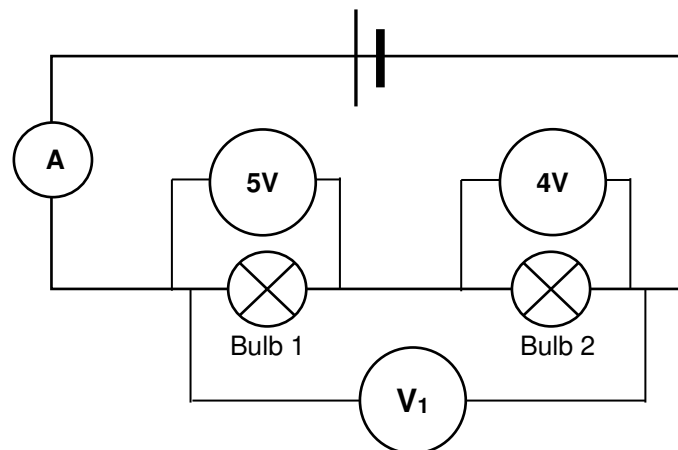


- A Resistor 1
 B Resistor 2
 C Resistor 3
 D Resistor 4 (1)

- 1.5 A battery consists of four 2 V cells connected in parallel. The voltage across the battery is:

- A 2 V
 B 4 V
 C 6 V
 D 8 V (1)

Study the circuit diagram below and answer BOTH questions 1.6 and 1.7.



1.6 What is the reading on V_1 ?

- A 4 V
- B 5 V
- C 9 V
- D 14 V

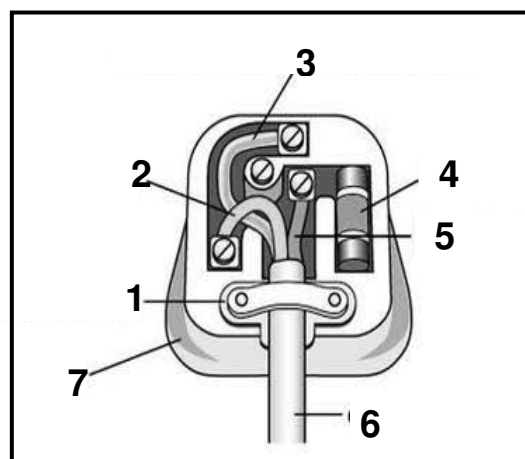
(1)

1.7 A third bulb is connected in series with bulbs 1 and 2. Which statement is correct?

- A The brightness of bulbs 1 and 2 will increase, because the total resistance in the circuit decreases.
- B The brightness of bulbs 1 and 2 will increase, because the total resistance in the circuit increases.
- C The brightness of bulbs 1 and 2 will decrease, because the total resistance in the circuit decreases.
- D The brightness of bulbs 1 and 2 will decrease, because the total resistance in the circuit increases.

(1)

1.8 Study the diagram of the three-pin plug below.

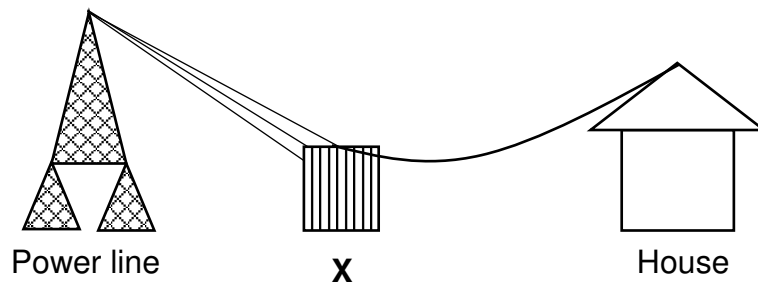


The correct colours for wires 2, 3 and 5 are:

	Wire 2	Wire 3	Wire 5
A	Yellow green	Blue	Brown
B	Brown	Yellow green	Blue
C	Blue	Yellow green	Brown
D	Yellow green	Brown	Blue

(1)

- 1.9 Component X in the drawing below is a very important part of the national electricity grid.



Component X is a ...

- A turbine.
- B transformer.
- C generator.
- D power station.

(1)

- 1.10 One unit of electricity is the same as one ...

- A joule.
- B kilojoule.
- C kilowatt.
- D kilowatt hour.

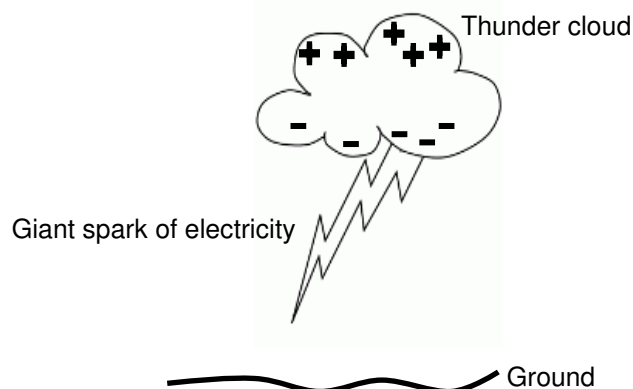
(1)

[10]

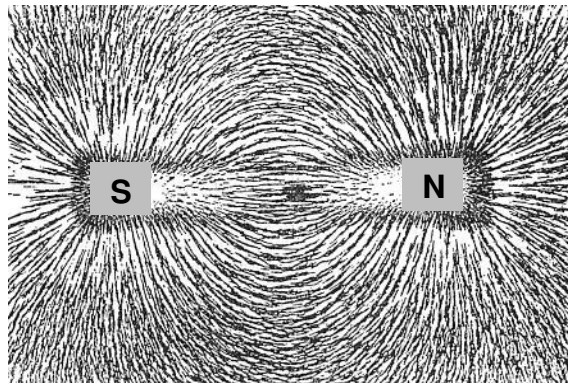
SECTION B

QUESTION 2

- 2.1 Clouds are made up of water molecules. The movement of the particles in the cloud creates friction. This causes the cloud to become positively charged at the top and negatively charged towards the bottom as indicated in the drawing below.



- 2.1.1 What is the charge on the ground? (1)
- 2.1.2 What type of force exists between charged objects? (1)
- 2.1.3 Name the subatomic particles which move from the cloud to the ground to create the giant spark of electricity. (1)
- 2.1.4 Give one word for the “giant spark of electricity”. (1)
- 2.1.5 Name one safety precaution that can be taken when trapped in a thunderstorm. (1)
- 2.2 A teacher demonstrates the magnetic field around a bar magnet. He places a sheet of paper over a bar magnet and sprinkles iron filings on the sheet of paper. After lightly tapping the sheet of paper, the following pattern is observed.



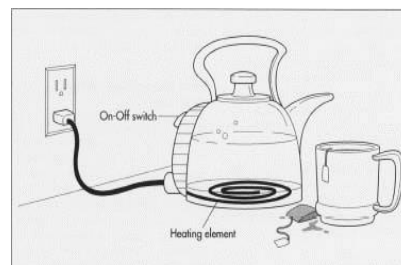
- 2.2.1 Draw a bar magnet in your answer book. Make a clear line drawing of the magnetic field observed around the bar magnet. Indicate the poles of the magnet as well as the direction of the magnetic field lines. (2)
- 2.2.2 Which TWO of the metals below will NOT be attracted by a magnet?

Steel, Aluminium, Iron, Zinc, Cobalt, Nickel

(2)
[9]

QUESTION 3

- 3.1 Most heating elements are made of the alloy nichrome which is a mixture of 80% nickel and 20% chromium. Nichrome has a relatively high resistance and heats up effectively.

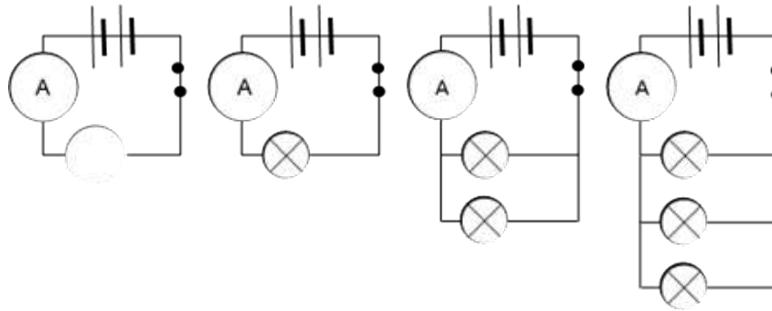


- 3.1.1 Explain what is meant by “resistance”. (2)
- 3.1.2 Name TWO factors that affect the resistance of a resistor. (2)

3.2 Read the HYPOTHESIS below:

If more bulbs are connected in parallel, then the current in the circuit will decrease.

A group of learners wanted to test this hypothesis. They conducted a practical investigation by connecting the circuits below. They used identical cells and bulbs throughout the experiment and in each case the switch was closed for only 3 seconds to take the reading on the ammeter.



Readings were taken for each circuit and the results were recorded in the table below.

Number of bulbs in parallel	Current strength (A)
0	0
1	1,8
2	3,6
3	5,4
4	7,2

3.2.1 Identify the independent variable for this investigation. (1)

3.2.2 Identify the dependent variable for this investigation. (1)

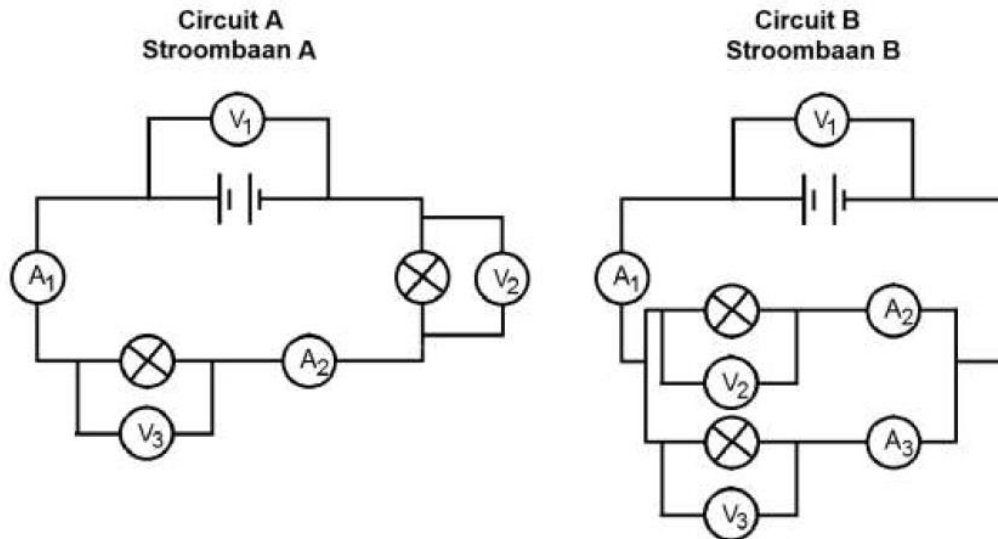
3.2.3 Identify one controlled variable for this investigation. (1)

3.2.4 Use the graph paper provided at the end of the question paper and draw a line graph to represent the results in the table above. (6)

3.2.5 Do the results CONFIRM or REJECT the hypothesis?
Explain your answer. (2)
[15]

QUESTION 4

Study the circuit diagrams below. **The voltage of each cell is 2 V.** The cells in both circuits are identical. All bulbs are NOT necessarily identical. Answer the questions that follow.

**4.1 For circuit A:**

- 4.1.1 What is the reading on V_1 ? (1)
 4.1.2 The reading on V_3 is 1 V. Calculate the reading on V_2 . (2)
 4.1.3 The reading on A_1 is 0,8 A. What is the reading on A_2 ? (1)

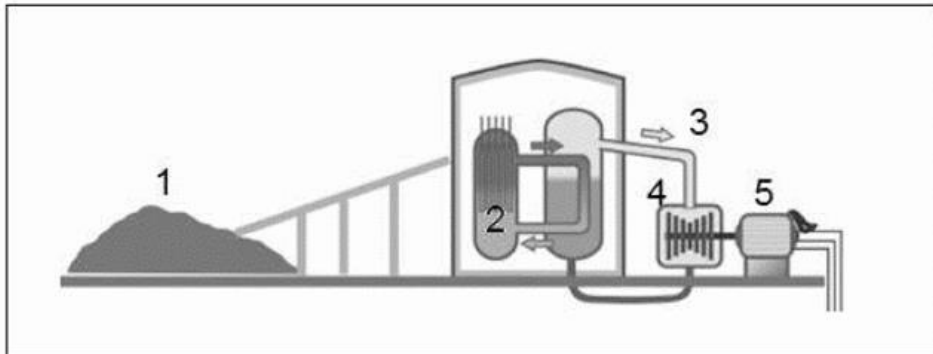
4.2 For circuit B:

- 4.2.1 What is the reading on V_3 ? Explain your answer. (2)
 4.2.2 The reading on A_2 is 0,7 A and the reading on A_3 is 0,5 A. Calculate the reading on A_1 . (2)

[8]

QUESTION 5

- 5.1 Study the diagram below and read the passage before answering the questions.

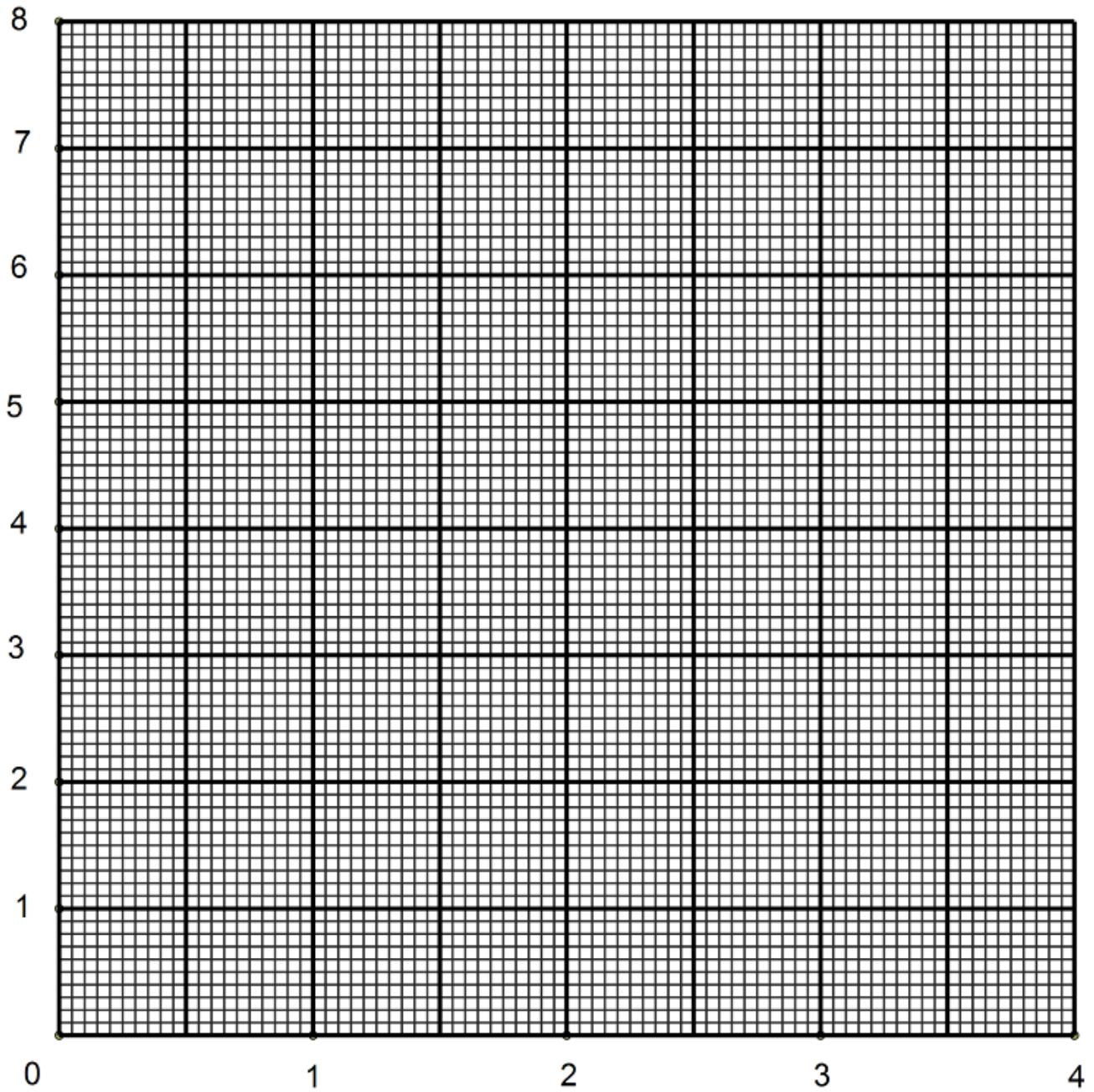


This diagram shows a typical coal-fired power station producing electricity. Coal (1) is burnt to generate heat which boils water under high pressure in a boiler (2). This produces high pressure steam which is taken through pipes (3) to the turbine (4) where it is used to turn the turbine at high speeds. From the turbine, the steam enters the condenser where it is cooled back into liquid water. The water is then returned to the boiler.

The turbine shaft is used to rotate the large magnets within coils of wire which form the main parts of the generator (5). The energy needed to spin the magnet in the coils of wire comes from the heat produced by burning the coal. A giant power station can burn about 350 tons of coal per hour.

- 5.1.1 What causes the turbine to rotate? (1)
- 5.1.2 List two disadvantages of coal-fired power stations. (2)
- 5.1.3 Suggest one alternative source of energy that can be used for the generation of electricity, other than coal. (1)
- 5.2 A refrigerator has a power rating of 200 W.
- 5.2.1 Convert 200 W to kilowatt. (1)
- 5.2.2 For how many hours can the refrigerator be used if R 300 of prepaid electricity is bought at a cost of R 1,80 per kWh? Show all steps. (3)
- [8]**

TOTAL SECTION A: 10
TOTAL SECTION B: 40
GRAND TOTAL: 50

ANSWER SHEET FOR QUESTION 3.2.4**NAME:** _____ **GRADE:** _____

REVISION QUESTION PAPER B**SECTION A****QUESTION 1**

Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A – D) next to the question number (1.1 – 1.10).

1.1 A/An ... force acts when coarse surfaces slide across or rub against each other.

- A frictional
- B gravitational
- C elastic
- D electrostatic

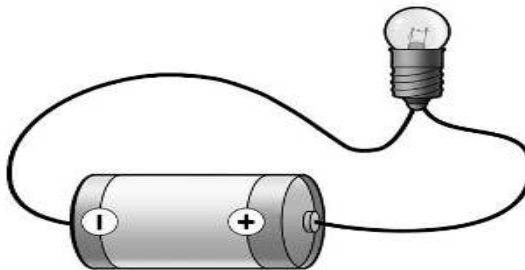
1.2 Which ONE of the following is a contact force?

- A Gravitational force
- B Electrostatic force
- C Magnetic force
- D Frictional force

1.3 To oppose the flow of electric current in a circuit, a ... is used.

- A resistor
- B ammeter
- C battery
- D fuse

1.4 The brightness of the bulb in the electrical circuit below will increase if ...



- A the wire is made longer.
- B the wire is made thicker.
- C the wire becomes hotter.
- D another bulb is added in series.

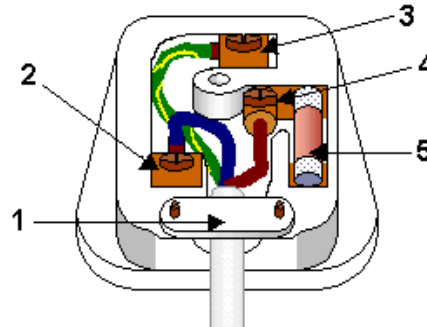
1.5 Adding a light bulb to a series circuit will ...

- A increase the total current strength in the circuit.
- B not change the total current strength through the circuit.
- C decrease the total resistance.
- D increase the total resistance.

1.6 Which is true about current in a parallel circuit?

- A It is produced by resistance.
- B It divides among the branches.
- C It decreases if another resistor is added in parallel.
- D It is the same at every point in the circuit.

1.7 The following diagram represents the wiring of a three-pin plug.



Labels 3, 4 and 5 are ...

- A live wire, wire clamp and fuse.
- B fuse, neutral wire and earth wire.
- C earth wire, live wire and fuse.
- D earth wire, neutral wire and fuse.

1.8 Which ONE of the following DOES NOT form part of the electricity grid?

- A Step-up transformer
- B Coal mine
- C Transmission lines
- D Power station

1.9 How many kilowatts are in 6500 W?

- A 0,65 kW
- B 6,5 kW
- C 65 kW
- D 6 5000 000 kW

1.10 What is the power rating of a heater that uses 1,2 kWh in 45 minutes?

- A 0,026 kW
- B 54 kW
- C 0,9 kW
- D 1,6 kW

TOTAL SECTION A: 10

SECTION B**QUESTION 2**

2.1 Read the following statements below.

If the statement is true, write TRUE next to the question number.

If the statement is false, write FALSE and REWRITE the statement to make it true.

2.1.1 A force can make a moving object change direction. (1)

2.1.2 Lightning is caused by a magnetic force. (1)

2.1.3 Force is measured in Newton. (1)

2.1.4 Weight is a force of attraction between an object and the earth. (1)

2.1.5 The north pole of a magnet will repel a south pole. (1)

2.2 Study the pictures below and use terms from the word-box provided to identify the type of force acting in each case (2.2.1 to 2.2.4).

Elastic	Gravitational	Electrostatic	Frictional
Electrical	Chemical	Magnetic	



2.2.1



2.2.2



2.2.3

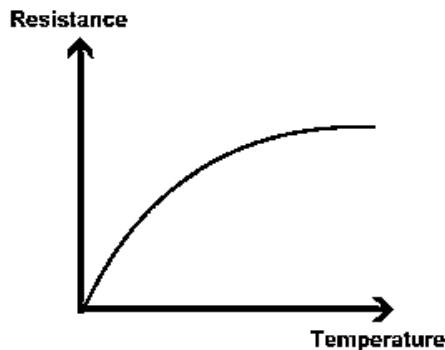


2.2.4

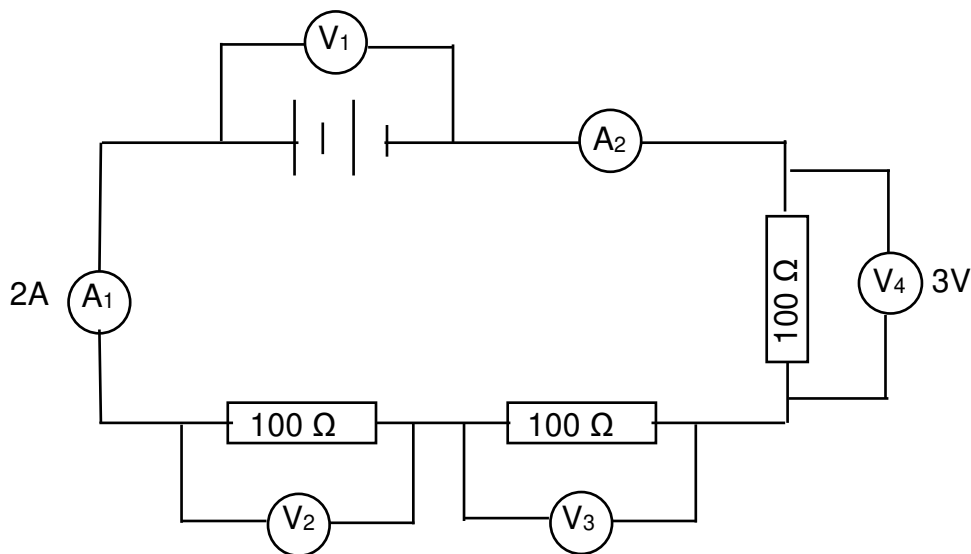
(4)
[9]

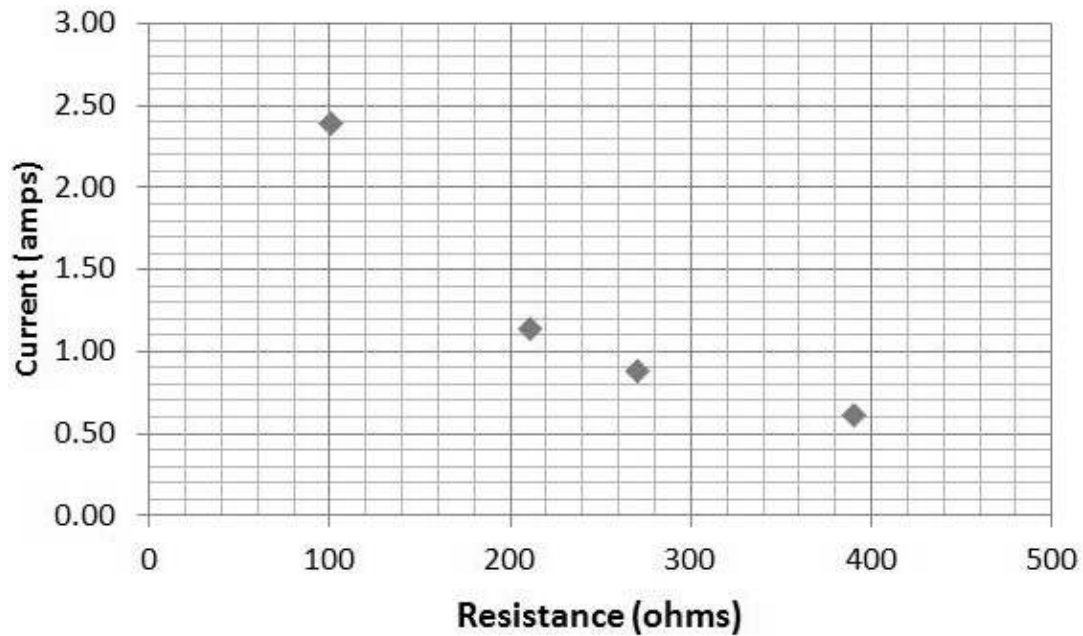
QUESTION 3

- 3.1 Learners investigated how the resistance of a conductor changes with temperature. They measured the resistance of a conductor at different temperatures. The following graph was obtained from the results.



- 3.1.1 Write a hypothesis for this investigation. (1)
- 3.1.2 Identify the dependent variable in this investigation. (1)
- 3.1.3 Identify the independent variable in this investigation. (1)
- 3.1.4 What is the relationship between temperature and the resistance of a conductor? (1)
- 3.1.5 Name ONE **other** factor that may affect resistance. (1)
- 3.2 The following circuit diagram and the accompanying graph represent an investigation into the effect of resistance on the flow of current in a circuit. Current strength was measured for 1 resistor in the circuit, then 2 resistors and lastly 3 resistors.



Graph of current strength versus resistance

Use the above circuit diagram to answer the questions:

- 3.2.1 How are the resistors connected in the circuit diagram? (1)
 3.2.2 What is the reading on V_1 ? (1)
 3.2.3 What is the reading on A_2 ? Give a reason for your answer. (2)

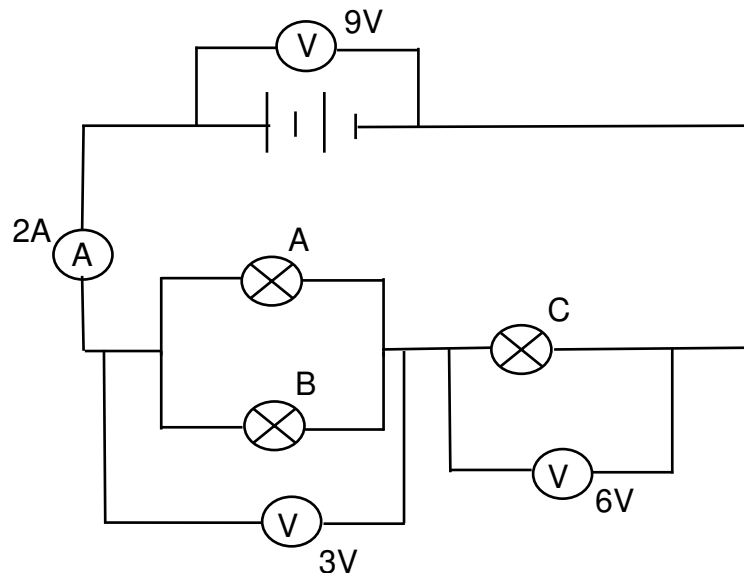
Refer to the graph to answer the following questions:

- 3.2.4 What was the current when the resistance was the highest? (1)
 3.2.5 What was the current when resistance was the lowest? (1)
 3.2.6 What deduction can you make about the relationship between resistance and current in the electrical circuit above? (1)
[12]

QUESTION 4

4.1 A learner connects **three identical bulbs** as shown in the circuit below.

The voltmeter across the battery shows a reading of 9V, the voltmeter reading across bulb C is 6 V and across bulbs A and B, 3V. The ammeter reading in the external circuit is 2A.

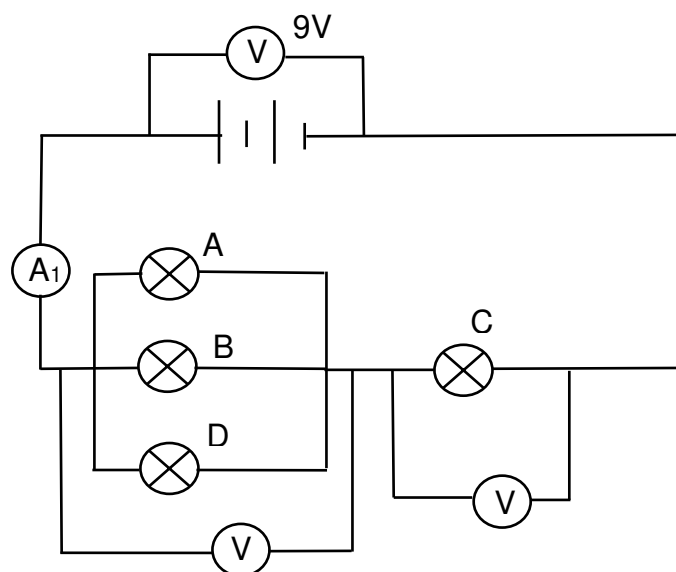


4.1.1 Which of the three bulbs are connected in parallel? (1)

4.1.2 What happens to the brightness of C when B fuses (burn out)? (1)

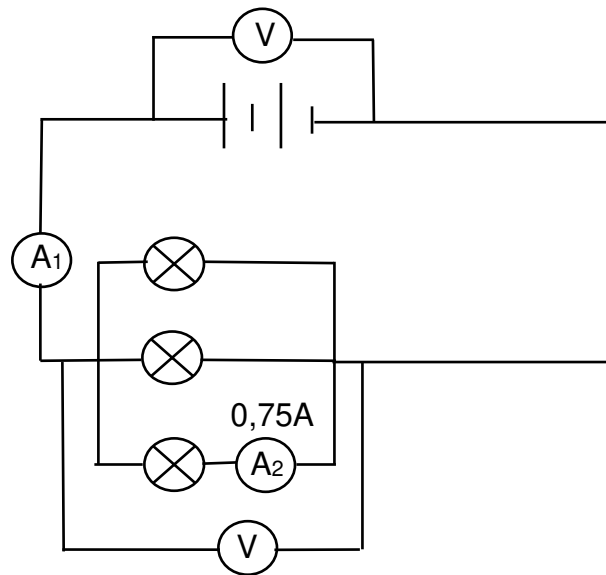
4.1.3 Will the reading of the ammeter INCREASE, DECREASE or REMAIN THE SAME? Explain your answer (2)

The learner replaces bulb B with a new one and decides to add another identical bulb D across bulb B as shown below.



- 4.1.4 Will the voltage across **bulb C** INCREASE, DECREASE or REMAIN THE SAME? Explain your answer. (2)

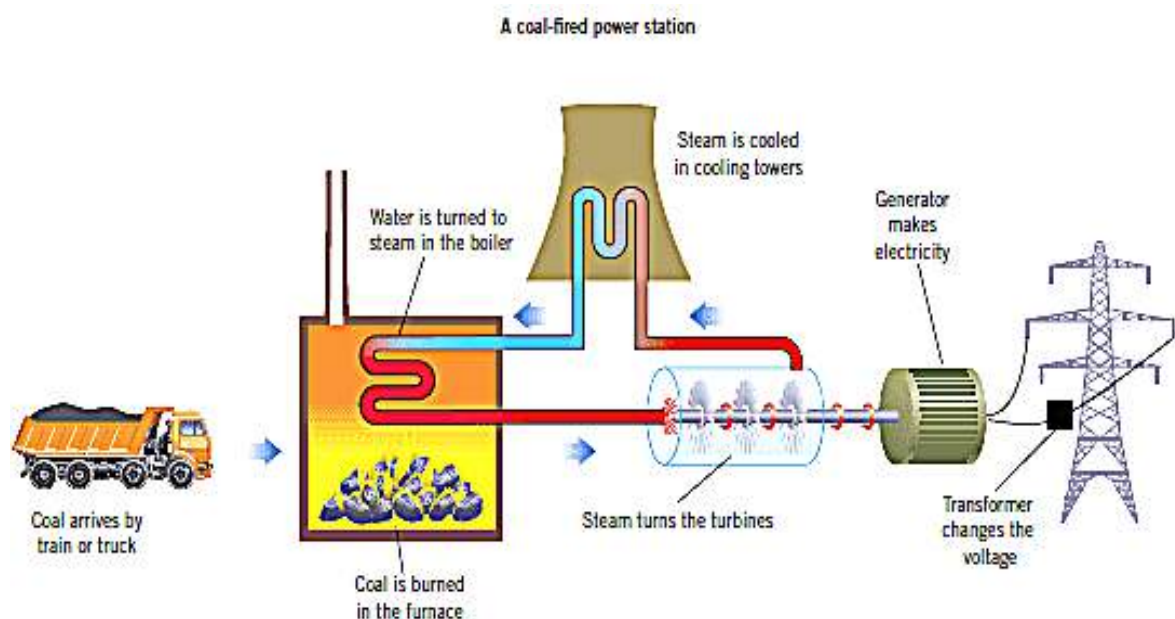
After a while the learner removes bulb C from the circuit and reconnects the conducting wires as shown in the circuit below. The learner observes that ammeter A_2 reads 0,75A.



- 4.1.5 What will the reading on ammeter A_1 be? Show by calculation how you arrived at your answer. (3)
[9]

QUESTION 5

- 5.1 The diagram below represents a coal station where electrical power is generated for distribution to the factories and residential areas.



- 5.1.1 Name ONE disadvantage of using coal at a power station. (1)

5.1.2 Name ONE other energy source that may be used to generate electricity. (1)

5.1.3 Use the power station diagram above and the word-box below to describe the process of generating electricity.

Transformer	Turbine	Cooling-tower
Furnace	Water	Generator
Steam	Boiler	Truck
Transmission lines	Voltage	

(3)

5.2 A washing machine has a power rating of 480 W. It takes the machine 1,5 hours to completely wash a 6 kg load of heavily soiled laundry. Eskom charges energy usage at R1,65 per kWh.

5.2.1 What does kWh represent? (Which physical quantity?) (1)

5.2.2 Convert 480W to kilowatt. (1)

5.2.3 Calculate the cost if the washing machine works for 1,5 hours. (3)
[10]

TOTAL SECTION A: 10
TOTAL SECTION B: 40
GRAND TOTAL: 50

REVISION QUESTION PAPER C

SECTION A

QUESTION 1

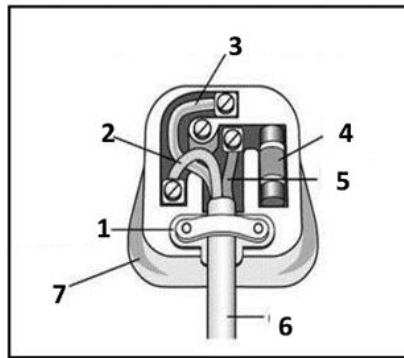
1.1 Various options (A to D) are provided as possible answers for questions 1.1.1 to 1.1.5. Choose the correct answer from the options given and write down the number and the letter of your choice, for example, 1.1.9 D.

1.1.1 The primary energy source used in Eskom power plants is ...

- A natural gas.
- B uranium.
- C coal.
- D oil.

(1)

- 1.1.2 In the diagram below, which number represents the cable that discharges the fault current to the ground?



- A 2
B 3
C 4
D 5

(1)

- 1.1.3 Which one of the following groups of sources of energy is sustainable and has a very small negative impact on the environment?

- A Sun-heated steam, waves in the sea and wind.
B Coal, nuclear fuel and wind.
C Earth oil, hydroelectric power and wave power.
D Solar energy, coal and falling water.

(1)

- 1.1.4 ... may cause burns, cancer and gene mutation if the skin is exposed to it due to its radioactive nature.

- A Coal
B Falling water
C Steam
D Nuclear waste

(1)

- 1.1.5 Two resistors are connected in parallel. The resistance of resistor 1 is R and the resistance of resistor 2 is $4R$. If the main current is 9 A , what is the current through resistor 1?

- A $\frac{9}{5}\text{ A}$
B $\frac{36}{5}\text{ A}$
C $\frac{5}{9}\text{ A}$
D $\frac{5}{36}\text{ A}$

(1)

[5]

- 1.2 Choose a word from **COLUMN B** that matches the statement in **COLUMN A**. In your answer book, only write the LETTER (A - J) next to the question number (1.2.1 – 1.2.5), for example, 1.2.7 M.

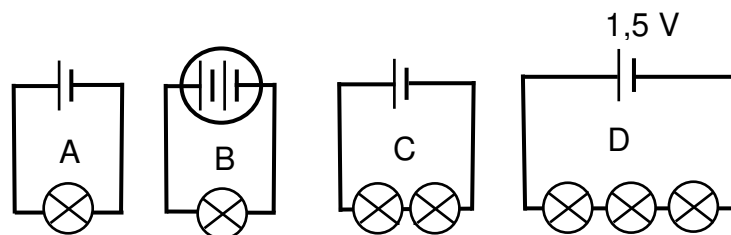
COLUMN A	COLUMN B
1.2.1 A facility that generates electricity through different processes.	A. Voltmeter
1.2.2 An instrument used to measure potential difference.	B. Power Station
1.2.3 Equipment used to step up or step down the voltage.	C. Fuse
1.2.4 The rate of electrical energy supply.	D. Electrical power
1.2.5 A safety device that trips due to a current overload in a circuit.	E. Generator
	F. Ammeter
	G. Power surge
	H. Rheostat
	I. Transformer
	J. Circuit breaker

(5)
TOTAL SECTION A: [10]

SECTION B

QUESTION 2

- 2.1 Study circuits A, B, C and D and answer questions 2.1.1 to 2.1.5. All bulbs and cells are identical.

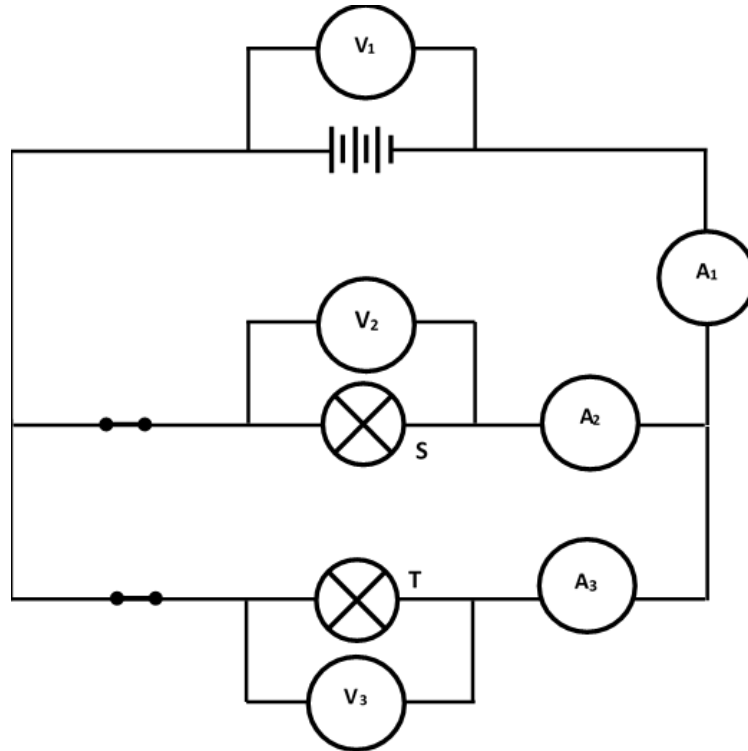


- 2.1.1 Which circuit has the highest resistance? (1)
 2.1.2 In circuit B, what is the component that is circled? (1)
 2.1.3 What is the purpose of the component circled? (1)
 2.1.4 What is the voltage of each bulb in circuit D? (2)
 2.1.5 In which circuit will the bulb/bulbs be the brightest? (1)
- 2.2 Mention TWO factors that can influence the resistance of a resistor. (2)

- 2.3 For ONE of the factors you chose in question 2.2, describe HOW it would affect the resistance of the resistor. (1)
[9]

QUESTION 3

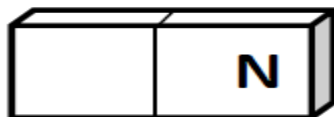
Study the circuit diagram below and answer the questions that follow. Each cell has a potential difference of 1,5 V. The resistance of bulb S is R and the resistance of bulb T is $4R$.



- 3.1 In which way are bulbs **S** and **T** connected? (1)
3.2 What is the reading on voltmeter V_1 ? (2)
3.3 What is the reading on voltmeter V_3 ? (1)
3.4 Which bulb will glow the brightest? S or T? (1)
3.5 What will happen to the reading on ammeter A_1 if bulb T is switched off? (1)
3.6 Explain your answer in question 3.5. (2)
[8]

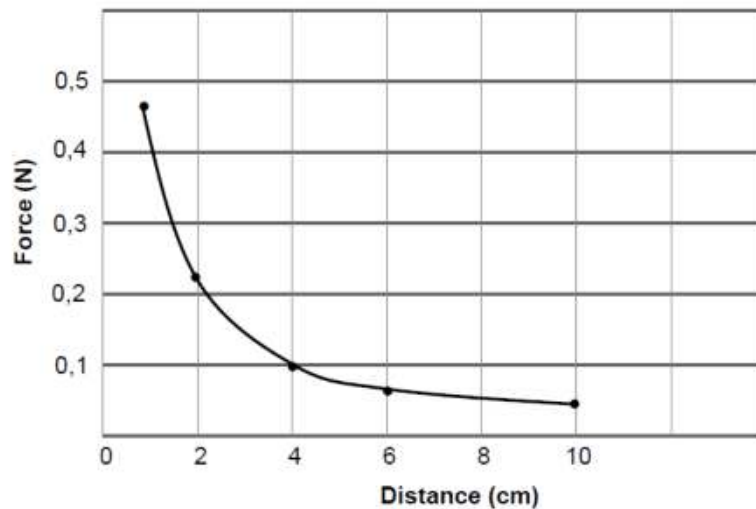
QUESTION 4

- 4.1 Two magnets are placed such that their north poles are facing each other.

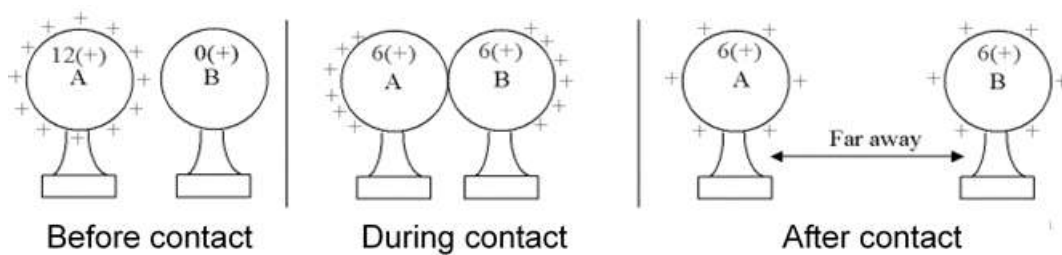


- 4.1.1 Is the force two magnets exert on each other, a FIELD FORCE or a CONTACT FORCE? (1)
4.1.2 Draw in your answer book the magnetic field line pattern that can be observed between the two north poles of these magnets. (2)

- 4.2 The graph below shows how the magnetic force changes with the distance between two magnets.



- 4.2.1 What is the magnitude of the magnetic force exerted by one magnet on another when the distance between the magnets is 4 cm? (1)
- 4.2.2 How far apart should the magnets be to experience a force of 0,15 N? (1)
- 4.2.3 What conclusion can be made based on the results in the graph? (2)
- 4.3 Two charged objects are shown below, before contact, during contact and after contact.

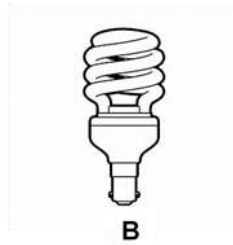


- 4.3.1 What is the name of the force that exists between the charged objects? (1)
- 4.3.2 Which particles will be transferred from one sphere to another sphere when they make contact?
Write either PROTONS, NEUTRONS or ELECTRONS. (1)
- 4.3.3 Sphere B was neutral before contact. Did it have charged particles?
Write YES or NO. (1)
- 4.3.4 Notice how the position of the spheres changed after contact. Suggest a reason why the distance between the spheres is so much bigger than before. (2)

[12]

QUESTION 5

- 5.1 Room 1 uses bulb A, which has a power rating of 0,06kW and which is switched on for 5 hours on any given day.
 Room 2 uses bulb B, an 11 W LED bulb, which is switched on for 7 hours MORE than bulb A.
 The unit price for electricity is R1,13 per kilowatt-hour.



- 5.1.1 Calculate the cost to use EACH of the bulbs.

Use the formula:

Cost = power rating of appliance x number of hours used x unit price of electricity (5)

- 5.1.2 If the owner used bulb B in room 1, the cost would have been R0,06 or 6 cents. Calculate the amount that will be saved if bulb B is used in room 1. (2)
- 5.2 A flat iron is used for 30 minutes per day for 20 days in one month. Calculate the total number of **hours** the flat iron is used for during this time. (2)
- 5.3 Eskom usually shows the power alert advertisement below.



- 5.3.1 What seems to be the problem in the national electricity grid when this alert is shown? (1)
- 5.3.2 If the users are not following the alert, what will Eskom do? (1)
- [11]**

TOTAL SECTION A: 10
TOTAL SECTION B: 40
GRAND TOTAL: 50

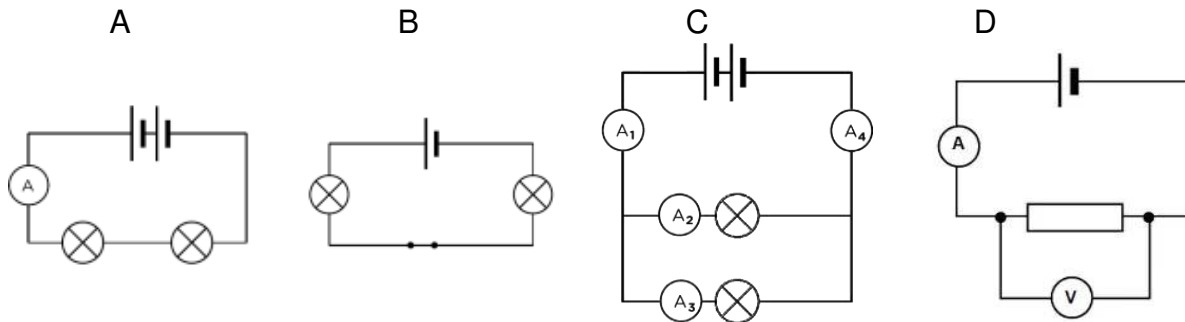
REVISION QUESTION PAPER D

SECTION A

QUESTION 1

1.1 Four options are provided as possible answers to the following questions. Write only the letter of the correct answer (A – D) next to the question number (1.1.1 – 1.1.5) in your ANSWER BOOK, for example, 1.1.6 D.

1.1.1 Which one of the following circuit diagrams represents a parallel circuit?



1.1.2 Which one of the following statements is **TRUE** for resistors connected in electric circuits?

- A As more resistors are added in series, the total current increases.
- B As more resistors are added in parallel, the total current decreases.
- C As more resistors are added in series, the total resistance increases.
- D As more resistors are added in parallel, the total resistance increases.

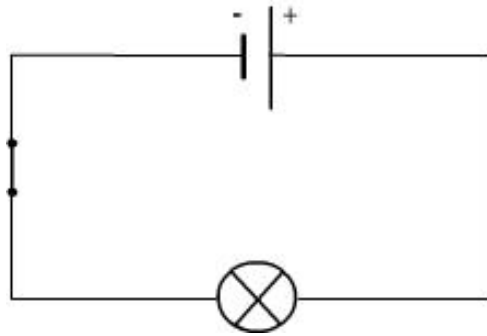
1.1.3 The unit that force is measured in is represented by ...

- A kg
- B N
- C J
- D N.m

1.1.4 The energy conversion that takes place in a cell when it is connected in a closed electric circuit is from ...

- A potential energy to chemical energy.
- B chemical potential energy to electrical energy.
- C electrical energy to light energy.
- D chemical potential energy to light energy.

1.1.5 Consider the following electric circuit diagram:



Which one of the following combinations represents all the components of this electric circuit?

- A Battery, closed switch and an ammeter.
- B Cell, closed switch and an ammeter.
- C Battery, resistor and a bulb.
- D Cell, closed switch and a bulb.

[5]

1.2 Choose a word from COLUMN B that matches a description in COLUMN A. Write only the letter (A – I) next to the question number (1.2.1 – 1.2.5) in your answer book, for example, 1.2.6 L.

COLUMN A	COLUMN B
1.2.1 The unit for electrical power.	A Potential dividers
1.2.2 A non-renewable energy source.	B Electrons
1.2.3 A device inside the knob of a stove that is used to set the stove plate on higher or lower temperatures.	C Sun
1.2.4 Charges which are able to move from one object to another.	D kW
1.2.5 Resistors connected in series.	E Current dividers
	F Protons
	G Coal
	H kWh
	I Rheostat

[5]

TOTAL SECTION A: [10]

SECTION B**QUESTION 2**

2.1 Use the terms provided in the list below to identify the TYPE OF FORCES illustrated in the diagrams. Give the question number and type of force in each case.

List of Terms:

Friction

Gravity

Electrostatic

Elastic

Magnetic

2.1.1



2.1.2



2.1.3



(3)

2.2 Identify TWO forces mentioned in QUESTION 2.1 that are examples of **NON-CONTACT** forces.

(2)

[5]**QUESTION 3**

An investigation was performed to determine the unknown charge on four objects. A **negatively** charged object **X** and a **neutral** object **P** were used to determine the charge on each of the objects, **Q**, **R**, **S** and **T**.



The following observations about the forces which exist between the different objects were noted while performing the investigation:

- T attracts X
- S attracts R, but repels T
- Q attracts P
- R repels Q

3.1 Indicate the charge on each of the following objects by writing down the question number and matching charge.

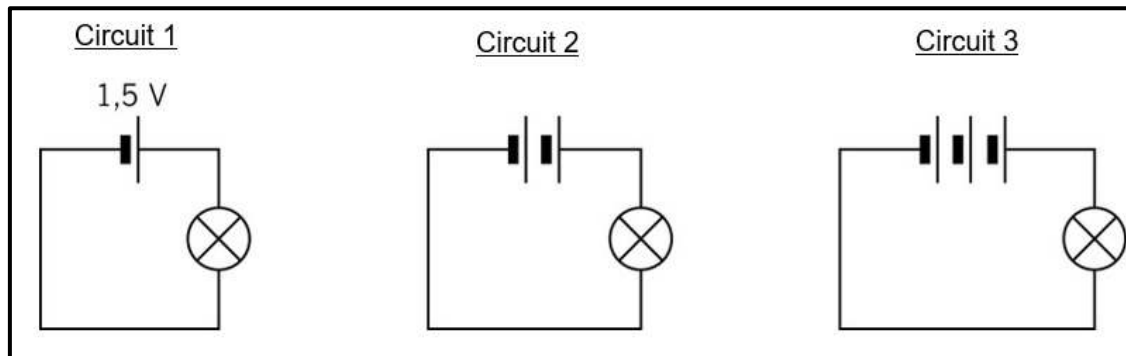
OBJECT	CHARGE ON OBJECT (POSITIVE, NEGATIVE OR NEUTRAL)
T	3.1.1
S	3.1.2
R	3.1.3
Q	3.1.4

(4)

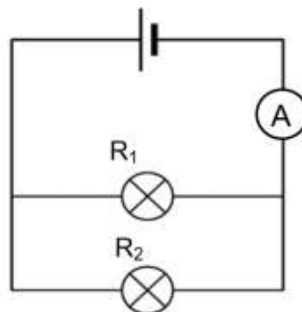
- 3.2 Explain why S attracts R, but repels T. (2)
- 3.3 What is the dependent variable in this investigation? (1)
- [7]**

QUESTION 4

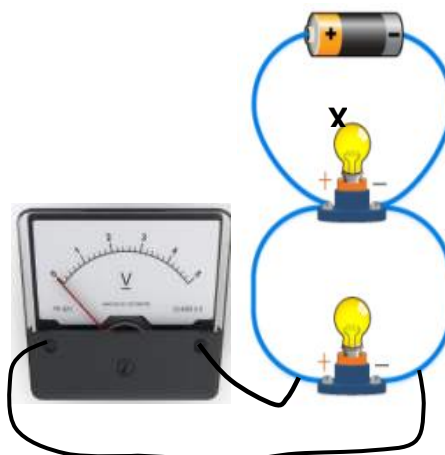
- 4.1 Study the three circuit diagrams below and answer the questions that follow.
All the cells and all the bulbs that are used in the different circuits are identical. Each cell has a potential difference of 1,5 V.



- 4.1.1 In which one of the circuits will the bulb glow the brightest? (1)
- 4.1.2 Determine the total potential difference which the battery can supply in circuit 3. (1)
- 4.2 Consider the circuit below and answer the question that follows.
You can assume that the two light bulbs are identical.



- 4.2.1 What will happen to the ammeter reading if bulb R_1 fuses? Explain your answer. (2)
- 4.3 Consider the following picture of an electric circuit.



- 4.3.1 Use the information in the picture and draw the corresponding CIRCUIT DIAGRAM. (4)
- 4.3.2 What will happen to the voltmeter reading if the bulb marked **X** fuses? Only write down, **INCREASE**, **DECREASE** or **REMAINS THE SAME**. (1)
- 4.4 One of the factors that influences the resistance of a conductor is the temperature of a conductor. If the temperature of a conductor increases, its resistance also increases.

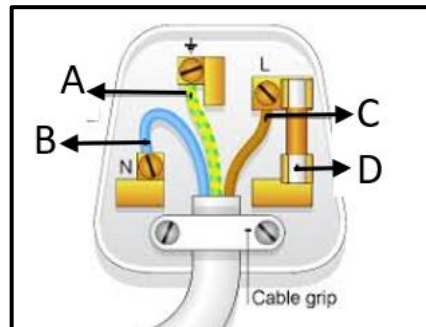
Copy the table below in your answer book and complete the relevant columns by stating two additional factors (excluding temperature) that can affect resistance of a conductor. Also indicate HOW each of these two factors influence the resistance of a conductor.

	FACTOR AFFECTING RESISTANCE OF A CONDUCTOR	HOW THE FACTOR INFLUENCES RESISTANCE OF A CONDUCTOR
4.4.1		
4.4.2		

(4)
[13]

QUESTION 5

Refer to the diagram of a three-pin plug and answer the questions that follow.



- 5.1 Label part **D** in the diagram. (1)
- 5.2 Suggest ONE safety precaution you would need to take when working with electrical appliances? (1)
- 5.3 Koeberg Power station is South Africa's only nuclear power station.
- 5.3.1 What is nuclear power? (1)
- 5.3.2 Give ONE advantage and ONE disadvantage of using nuclear power to generate electricity. (2)
- 5.4 Consider the picture below of an overloaded electrical plug and answer the question that follows.



- 5.4.1 Give TWO reasons why overloading a plug is a safety hazard. (2)
[7]

QUESTION 6

Find below an electricity voucher, which was bought at a supermarket. The voucher shows the number of electricity units bought and how much money was spent to buy these units of electricity.

Electricity Credit	
6777 0749 9086 2063 4573	
Amount:	R26.09
Tax :	R3.91
Total :	R30.00
Receipt Ref: 59190819185830789	
Free Units :	0.00 kWh
Credit Units:	11.90 kWh
Total Units :	11.90 kWh

- 6.1 How many units were bought with R30,00? (1)
- 6.2 Use the information on the voucher and determine the cost per unit electricity. (2)
- 6.3 Use your answer in question 6.2 to determine how much it will cost to keep a 60 W bulb on for 24 hours. (3)
- 6.4 Name one way in which consumers can reduce their electricity bill. (1)
- 6.5 Give one reason for the continuous rise in the cost of electricity. (1)
[8]

TOTAL SECTION A: 10
TOTAL SECTION B: 40
GRAND TOTAL: 50

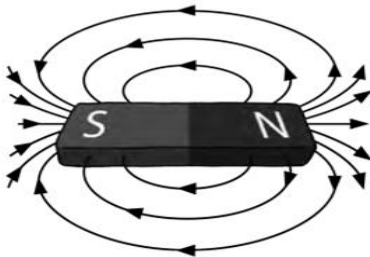
MEMORANDUM REVISION QUESTION PAPER A**SECTION A****QUESTION 1**

- 1.1 D✓
 1.2 C✓
 1.3 A✓
 1.4 A✓
 1.5 A✓
 1.6 C✓
 1.7 D✓
 1.8 C✓
 1.9 B✓
 1.10 D✓

[10]**SECTION B****QUESTION 2**

- 2.1.1 Positive (+)✓ (1)
 2.1.2 Electrostatic✓ force (1)
 2.1.3 Electrons✓ (1)
 2.1.4 Lightning✓ (1)
 2.1.5 Stay indoors / inside a car. ✓
 Stay away from windows and metal objects. ✓
 Avoid standing next to tall / metal objects. ✓ (ANY ONE) (1)

2.2.1



Criteria	Marks
Shape of magnetic field	✓
Direction of magnetic field lines (N → S)	✓

(2)

2.2.2 Aluminium✓; zinc✓

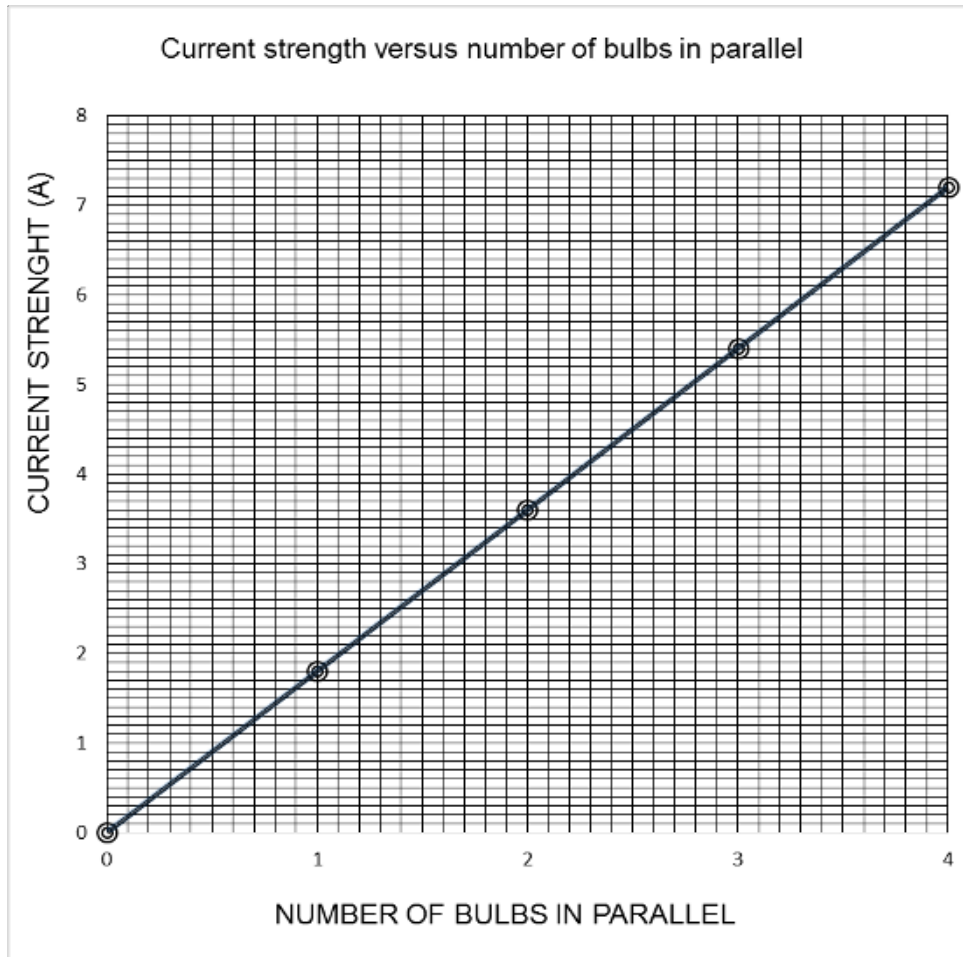
(2)

[9]**QUESTION 3**

- 3.1.1 Resistance is the characteristic of a conductor to oppose✓ the flow of current.✓ (2)
 3.1.2 Type of material / conductor. ✓
 Length of the conductor. ✓
 Thickness of the conductor. ✓
 Temperature of the conductor. ✓ (ANY TWO) (2)

- 3.2.1 Number of bulbs in parallel ✓ (1)
- 3.2.2 Current strength ✓ (1)
- 3.2.3 Amount of time / number of seconds the switch was closed. ✓
OR
 Number of cells used.
OR
 Type of cells and bulbs used. (1)

3.2.4



Marking criteria for graph	Marks
Heading	1
Label on x-axis	1
Label on y-axis (unit must be indicated)	1
First 3 points plotted correctly	1
Last 2 points plotted correctly	1
Best-fit line through the points	1

(6)

- 3.2.5 Reject. ✓
 The results indicate that if the number of bulbs in parallel increases, the current strength (ammeter reading) increases. ✓
OR
 When more bulbs are connected in parallel, the current strength / ammeter reading becomes bigger. ✓

(2)

[15]

QUESTION 4

$$4.1.1 \quad V_1 = 2 + 2 = 4 \text{ V} \checkmark \quad (1)$$

$$4.1.2 \quad V_2 = 4 - 1 \checkmark = 3 \text{ V} \checkmark \quad (2)$$

$$4.1.3 \quad 0,8 \text{ A} \checkmark \quad (1)$$

$$4.2.1 \quad 4 \text{ V} \checkmark$$

The total voltage across the battery is 4V. Because the bulbs are connected in parallel, the voltmeter reading across each bulb is also 4V. ✓ (2)

$$4.2.2 \quad A_1 = 0,7 + 0,5 \checkmark = 1,2 \text{ A} \checkmark \quad (2)$$

[8]

QUESTION 5

5.1.1 Steam/High pressure steam ✓ (1)

5.1.2 Coal / a non-renewable energy source, is exhausted. ✓
 Burning of coal causes air pollution / production of greenhouse gases /
 causes global warming. ✓
 Uses a lot of water. ✓
 Causes water pollution. ✓
 Destroys the environment / habitats. ✓ (ANY TWO) (2)

5.1.3 Wind ✓
 Falling water ✓
 Waves ✓
 Solar energy/Sun ✓
 Nuclear energy ✓ (ANY ONE) (1)

$$5.2.1 \quad 200 \div 1\,000 = 0,2 \text{ kW} \checkmark \quad (1)$$

$$5.2.2 \quad \text{Cost of electricity} = \text{Power rating} \times \text{Number of hours used} \times \text{Unit price of electricity}$$

$$300 \checkmark = 0,2 \times \text{Number of hours used} \times 1,80 \checkmark$$

$$\text{Number of hours} = 833,33 \text{ hours} \checkmark \quad (3)$$

[8]

TOTAL SECTION A: 10
TOTAL SECTION B: 40
GRAND TOTAL: 50

MEMORANDUM REVISION QUESTION PAPER B**SECTION A****QUESTION 1**

- | | | | |
|-----|----|------|----|
| 1.1 | A✓ | 1.2 | D✓ |
| 1.3 | A✓ | 1.4 | B✓ |
| 1.5 | D✓ | 1.6 | B✓ |
| 1.7 | C✓ | 1.8 | B✓ |
| 1.9 | B✓ | 1.10 | D✓ |

TOTAL SECTION A:10**SECTION B****QUESTION 2**

- | | | |
|-------|--|------------|
| 2.1.1 | True✓ | (1) |
| 2.1.2 | False. Lightning is caused by an electrostatic force.✓ | (1) |
| 2.1.3 | True✓ | (1) |
| 2.1.4 | True✓ | (1) |
| 2.1.5 | False. North pole will attract a south pole.✓ | (1) |
| | | |
| 2.2.1 | Magnetic✓ | (1) |
| 2.2.2 | Electrostatic✓ | (1) |
| 2.2.3 | Elastic✓ | (1) |
| 2.2.4 | Gravitational✓ | (1) |
| | | [9] |

QUESTION 3

- 3.1.1 Increasing the temperature of a conductor will lead to an increase in resistance. ✓
OR
 Increasing the temperature of a conductor will lead to a decrease in resistance. ✓
 (1)
- 3.1.2 Resistance✓ (1)
- 3.1.3 Temperature✓ (1)
- 3.1.4 Resistance increases as temperature increases✓ (1)
- 3.1.5 Length of a conductor✓
 Type of a conductor✓
 Thickness of a conductor✓
- (ANY ONE) (1)**
- 3.2.1 Series✓ (1)
- 3.2.2 9 V✓ (3V x 3 = 9V; three identical resistors) (1)
- 3.2.3 2 A✓ Current is the same at every point in a series circuit✓ (2)
- 3.2.4 0,6 A✓ (1)
- 3.2.5 2,4 A✓ (1)

3.2.4 If resistance increases (in a series circuit), current decreases.✓

OR

If resistance decreases (in a series circuit), current increases.✓

(1)
[12]

QUESTION 4

4.1.1 A and B✓

(1)

4.1.2 Brightness decreases **OR** Bulb becomes dimmer✓

(1)

4.1.3 Decrease,✓ because total resistance increases.✓

(2)

4.1.4 Increase✓

More resistors in parallel, parallel resistance decreases, voltage across parallel section decreases and voltage across C increases.✓

(2)

4.1.5 $0,75 + 0,75 + 0,75 \checkmark \checkmark = 2,25 \text{ A} \checkmark$ **OR** $3 \times 0,75 \checkmark \checkmark = 2,25 \text{ A} \checkmark$

(3)
[9]

QUESTION 5

5.1.1 Causes air pollution / Causes water pollution / Causes global warming✓
Fossils fuel gets depleted/exhausted / It is non-renewable✓
Uses a lot of water✓

(ANY ONE) (1)

5.1.2 Wind✓

Nuclear energy✓

Waves✓

Falling water✓

Solar energy (Sun) ✓

(ANY ONE) (1)

5.1.3 Coal is transported from mines to the power station by truck✓

Coal is burnt in a furnace to produce heat✓

Heat is used to turn water to steam in the boiler✓

Steam pushes against the blades of the turbine, which starts to rotate.✓

Cooling tower converts steam back into water✓

Turbines turn the generator to make/produce electricity✓

Electricity travels in transmission lines through transformers to where it is needed✓

(ANY THREE) (3)

5.2.1 Amount of **energy** used in 1 hour✓

(1)

5.2.2 0,48 kW✓

(1)

5.2.3 Cost = Power rating x Number of hours used x Unit price of electricity
= $0,48 \checkmark \times 1,5 \times 1,65 \checkmark$
= R1,19✓

(3)
[10]

TOTAL SECTION A: 10
TOTAL SECTION B: 40
GRAND TOTAL: 50

MEMORANDUM REVISION QUESTION PAPER C**SECTION A****QUESTION 1**

- 1.1.1 C ✓
 1.1.2 B ✓
 1.1.3 A ✓
 1.1.4 D ✓
 1.1.5 B ✓

- 1.2.1 B ✓
 1.2.2 A ✓
 1.2.3 I ✓
 1.2.4 D ✓
 1.2.5 J ✓

[10]**SECTION B****QUESTION 2**

- 2.1.1 D ✓ (1)
 2.1.2 Battery ✓ (1)
 2.1.3 It is a source of (electrical) energy. ✓ (1)
 2.1.4 $1,5 \div 3 = 0,5 \text{ V}$ ✓ (**Award 2 marks if a learner wrote 0,5 V only.**) (2)
 2.1.5 B ✓ (1)

- 2.2 Temperature ✓ of the resistor.
 Type ✓ of a resistor.
 Thickness ✓ of the resistor.
 Length ✓ of the resistor. **(ANY TWO)** (2)

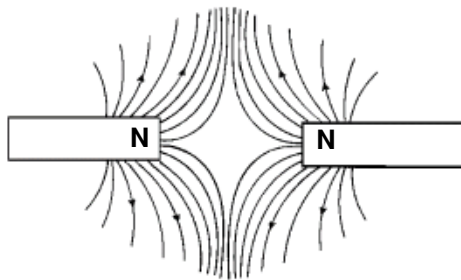
- 2.3 **Temperature of the conductor:** The hotter the conductor, the higher the resistance. ✓
Type of material: Different conducting materials have different resistances to an electric current. ✓
Thickness of the conductor: Thinner wires have more resistance than thicker wires. ✓
Length of the conductor: Longer wires have more resistance than shorter wires. ✓
(FOR ANY ONE OF THE FACTORS MENTIONED IN Q2.2) (1)
[9]

QUESTION 3

- 3.1 Parallel ✓ (1)
- 3.2 $V_1 = 3 \times 1,5$ ✓
 $= 4,5 \text{ V}$ ✓ (2)
- 3.3 4,5 V ✓ (1)
- 3.4 S ✓ (1)
- 3.5 Reading on A_1 will decrease. ✓ (1)
- 3.6 If T is switched off, there are less resistors in parallel, therefor the total resistance in the circuit will increase, ✓ and the total current will decrease. ✓ (2)
- [8]**

QUESTION 4

- 4.1.1 Field force ✓ (1)
- 4.1.2



- ✓ Shape of the magnetic field.
- ✓ Direction of the magnetic field.
 (Away from north **OR** north to south.)

- (2)
- 4.2.1 0,1 N ✓ (**Value AND unit for 1 mark.**) (1)
- 4.2.2 3 cm ✓ (**Accept 2,9 cm to 3,1 cm**) (1)
- 4.2.3 Force decreases as distance between magnets increases.
OR
 As the distance between the magnets increases, the magnetic force between the magnets decreases.
OR
 As the distance between the magnets decreases, the magnetic force between the magnets increases.

Marking criteria:

- Both variables mentioned. (Distance and Force) ✓
 Relationship between variables. ✓ (2)

- 4.3.1 Electrostatic✓(force) (1)
- 4.3.2 Electrons✓ (1)
- 4.3.3 Yes✓ (1)
- 4.3.4 The spheres carry the same charge / spheres have like charges,✓
they repel one another / push each other way.✓ (2)
- [12]**

QUESTION 5

5.1.1 **Cost = power rating x number of hours x unit price of electricity**

Bulb A

$$\text{Cost} = 0,06 \times 5 \times 1,13 \checkmark$$

$$= R0,34 \text{ or } 34 \text{ c} \checkmark$$

Bulb B

$$\text{Cost} = \frac{11}{1000} \checkmark \times (5+7) \checkmark \times 1,13$$

$$= R0,15 \text{ or } 15 \text{ c} \checkmark \quad (5)$$

5.1.2 Saving = Cost for bulb A - Cost for bulb B

$$= R0,34 - R0,06 \checkmark$$

$$= R0,28 \text{ or } 28 \text{ cents} \checkmark \quad (2)$$

5.2 Number of hours flat iron is used = $\frac{30}{60} \times 20 \checkmark$

$$= 10 \text{ h} \checkmark \quad (2)$$

5.3.1 Overload / demand for electricity is too high.✓

OR

Electricity usage is too high. (1)

5.3.2 Load shedding / electricity supply will be interrupted or cut.✓ (1)

[11]

TOTAL SECTION A: 10
TOTAL SECTION B: 40
GRAND TOTAL: 50

MEMORANDUM REVISION QUESTION PAPER D**SECTION A****QUESTION 1**

- | | | | |
|---------|---|---------|---|
| 1.1.1 C | ✓ | 1.2.1 D | ✓ |
| 1.1.2 C | ✓ | 1.2.2 G | ✓ |
| 1.1.3 B | ✓ | 1.2.3 I | ✓ |
| 1.1.4 B | ✓ | 1.2.4 B | ✓ |
| 1.1.5 D | ✓ | 1.2.5 A | ✓ |

[10]**QUESTION 2**

- 2.1.1 Magnetic ✓ (1)
- 2.1.2 Gravity ✓ (1)
- 2.1.3 Friction ✓ (1)
- 2.2 Gravity, Electrostatic or Magnetic force. (Any two for two marks) ✓✓ (2)

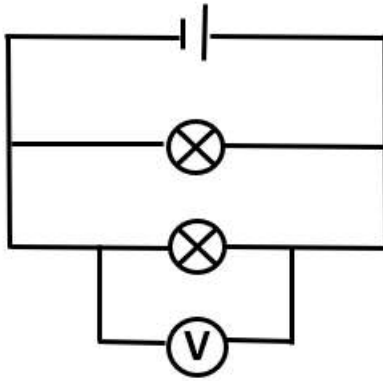
[5]**QUESTION 3**

- 3.1.1 Positive ✓ (1)
- 3.1.2 Positive ✓ (1)
- 3.1.3 Negative ✓ (1)
- 3.1.4 Negative ✓ (1)
- 3.2 S and R, are oppositely charged; oppositely charged objects attract ✓
each other.
S and T have like charges; like charged object repel each other ✓ (2)
- 3.3 Type of charge ✓ (1)

[7]**QUESTION 4**

- 4.1.1 Circuit 3 ✓ (1)
- 4.1.2 $V_t = 3(1,5)$
 $= 4,5 \text{ V}$ ✓ (1)
- 4.2.1 The ammeter reading will decrease ✓, because the total resistance will INCREASE ✓ when a bulb in parallel fuses. (2)

4.3.1



One cell ✓
 2 x Bulbs ✓
 Connected in parallel ✓
 Voltmeter in parallel ✓

(4)

4.3.2 Remains the same. ✓

(1)

4.4

FACTOR AFFECTING RESISTANCE	HOW THE FACTOR CAN INFLUENCE RESISTANCE OF A CONDUCTOR
Length ✓	The longer the resistor the higher the resistance. OR The shorter the resistor, the lower the resistance ✓
Thickness OR diameter ✓	Thinner resistors have a higher resistance. OR Thicker resistors have a lower resistance ✓

(4)

[13]**QUESTION 5**

5.1 Fuse ✓

(1)

5.2 Do not handle appliances with wet hands or near open water.
 Do not repair appliance while they are plugged into a wall socket.
(OR any other relevant, correct answer) ✓

(1)

5.3.1 **Radioactive nuclear fuel** is used in a nuclear power station to generate electricity ✓

(1)

5.3.2 **Advantage: (Any 1 advantage for 1 mark)**

Very little effect on the environment – e.g. Almost no air pollution.
 The amount of fuel needed to power nuclear power plants are much less than the fuel needed in coal power plants. ✓

Disadvantage: (Any 1 disadvantage for 1 mark)

Initial cost of constructing nuclear power plants are very high (expensive).
 Nuclear waste can be harmful if not properly disposed of.
 Safe disposal of nuclear waste is expensive. ✓

(2)

