KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GENERAL EDUCATION AND TRAINING

GRADE 9

NATURAL SCIENCES
PLC CONTROLLED TEST
2025 TERM 3

Time: 80 Minutes
Marks: 60

Instructions and Information

1. You must **answer all the questions**.
2. Read the instructions carefully, and answer questions as instructed.
3. Number your answers exactly as the questions are numbered.
4. Write neatly and legibly.

NB. This question paper consists of **6 pages excluding cover page** and contains **7 questions**.

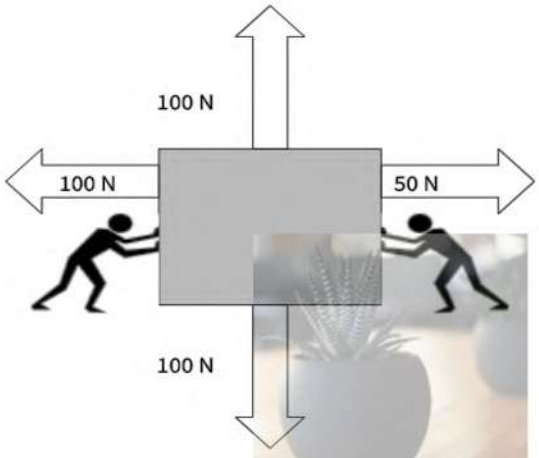
SECTION A

QUESTION 1

1.1 A force is defined as a…

A push or pull
B pull, not a push
C push, not a pull
D neither a push nor a pull (1)

1.2 Which is the best description of the forces acting on the box below?



A The contact forces are balanced and the box wil move to the right.
B The field forces are balanced and the box won't move.
C The contact forces unbalanced and the box will move to the right.
D The field forces are unbalanced and the box won't move. (1)

1.3 Which of the following lists of forces are considered field forces?

A Tension, gravitational, electrostatic.
B Gravitational, electrostatic, magnetic.
C Magnetic, tension, electrostatic.
D Friction, tension, compression. (1)

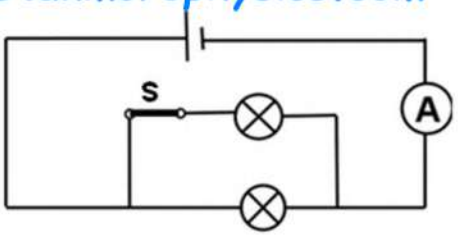
1.4 Which electrical component is needed to change the rotational speed of a ceiling fan?

A Resistor
B Rheostat
C LDR
D Semi-conductor (1)

1.5 This safety device works by melting and breaking causing current flow to stop.

A Fuse
B Earth leakage
C Circuit breaker
D Short circuit (1)

1.6 Two identical light bulbs are connected in parallel in the circuit below.



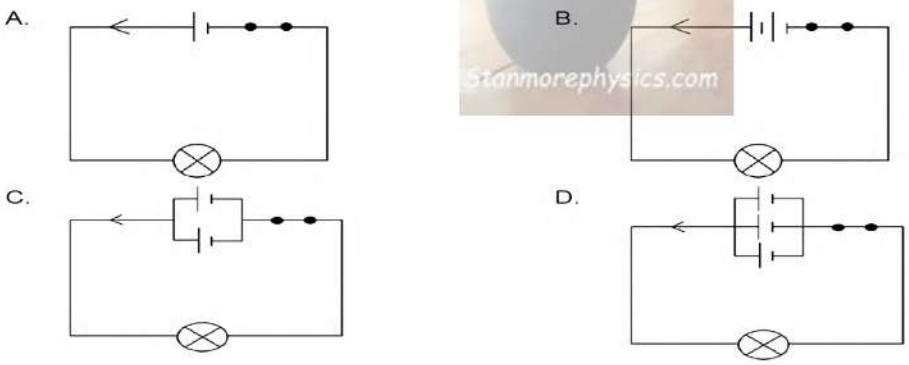
What will happen to the current reading when the switch S is opened?

A The current reading will stay the same
B The current reading will increase
C The current reading will decrease
D The current will stop flowing, so the reading will be zero (1)

1.7 Which is the correct colour-function combination of a three-pin plug?

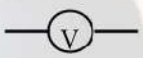
A Blue → Live; Yellow & green → Earth; Brown → Neutral
B Blue → Neutral; Yellow & green → Earth; Brown → Live
C Blue → Earth ; Yellow & green → Live; Brown → Neutral
D Blue → Neutral; Yellow & green → Live; Brown → Earth (1)

1.8 Identical light bulbs and cells are used in the following circuits. In which circuit will the light bulb glow the brightest?



(1)

1.9 Which one of the following circuit components measures potential difference?

A 
B 
C 
D 

(1)

1.10 The rate at which electrical energy is converted to an appliance.

A Charge
B Watts
C Voltage
D Current (1)

[10]

SECTION B

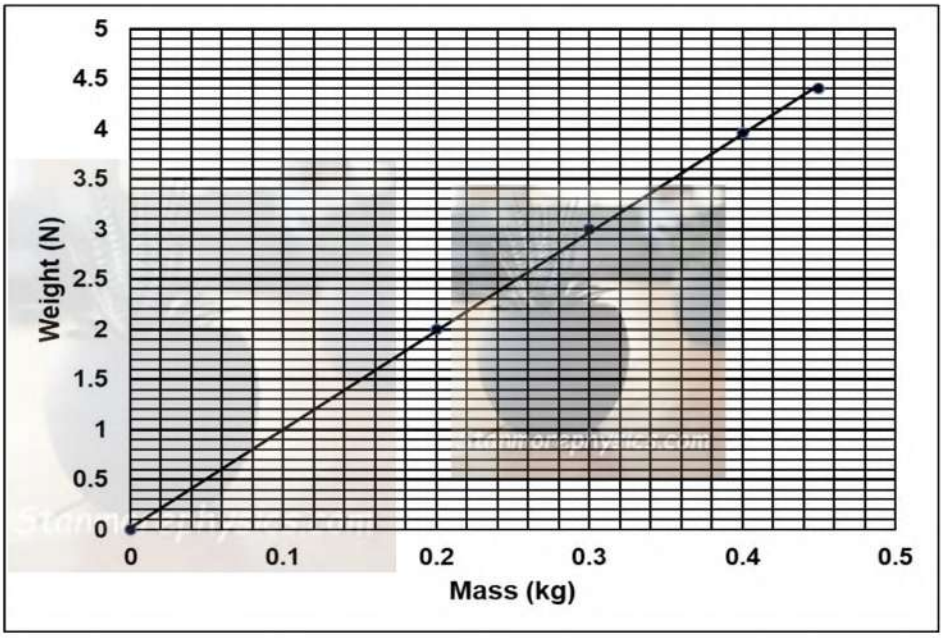
QUESTION 2

A group of grade 9 learners conducted an investigation to determine the relationship between the mass of an object and the gravitational force exerted on it by the Earth.

2.1 List the two factors that affects the magnitude (size) of gravitational force between the two bodies. (2)

2.2 Explain the differences between ***mass*** and ***weight***. (2)

2.3 The results of the investigation conducted are represented in the graph below.



2.3.1 What is the weight of the object if its mass is 0,3kg? (1)

2.3.2 Write a suitable hypothesis for this investigation. (1)

2.3.3 Write down the independent variable. (1)

2.3.4 Write down the dependent variable. (1)

2.3.5 What conclusion did the learners reach in this investigation? (1)

2.4 An apple with a mass of 300g is taken to the Moon, which has a gravitational accceleration of 1,625 $m.s^{-2}$.

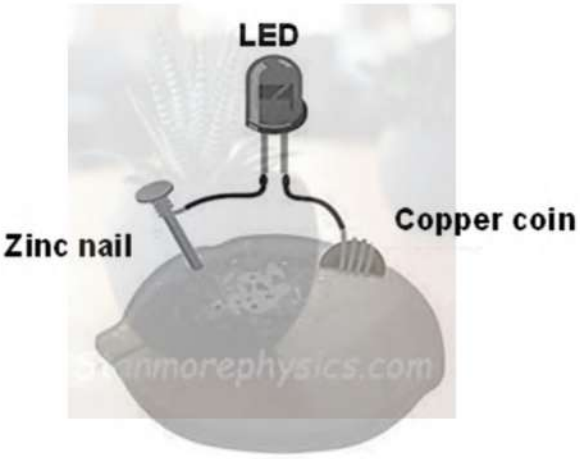
2.4.1 Using the formula $W=m.g$, calculate the weight of the apple on the Moon. (2)

2.4.2 Will the apple weigh more or less on the Earth? Explain your answer. (2)

[13]

QUESTION 3

3.1 Uminami, a grade 9 learner, connects an LED to a zinc nail and a copper coin using nichrome wires which he inserts into a lemon as shown below.



3.1.1 What does the lemon function as? (1)

3.1.2 What does 'LED' stand for? (1)

3.1.3 The LED does not light up. Suggest TWO possible reasons for this. (2)

3.2 The circuit is finally altered (changed) to allow the LED to light up. However, it does not shine very brightly. Upon touching the connecting wires, Uminami notices that they are warm.

3.2.1 What happens inside the wires that causes them to be warm when touched? (2)

3.2.2 State what will happen to the **brightness** of the LED after the girl makes the following changes to the conducting wires:

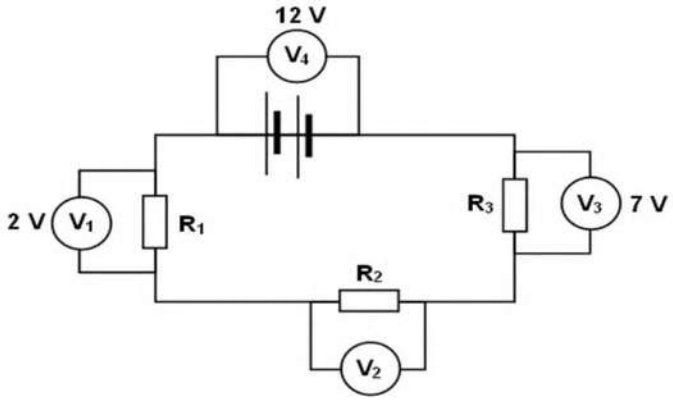
A – Longer nichrome wires are used. (1)

B – The nichrome wires are replaced with copper wires. (1)

[8]

QUESTION 4

Study the circuit diagram below and answer the questions that follow.



4.1 Calculate the voltmeter reading on V_2. Show all calculations. (2)

4.2 Which resistor (R_1, R_2 or R_3) provides the lowest resistance? (1)

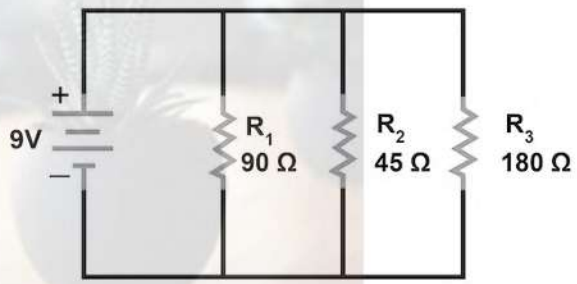
4.3 If the current moving through R_3 is 6A, what is the current moving through R_2? Give a reason for your answer. (2)

4.4 What will the voltage supplied to the circuit be if one cell is removed? (1)

[6]

QUESTION 5

Study the circuit diagram below and answer the questions that follow.



5.1 What is the voltage supplied to the resistor R_2? (1)

5.2 Which resistor will receive the most current? Give a reason for your answer. (3)

5.3 The resistor R_3 is now removed. State what will happen to the: (Only write INCREASE, DECREASE or STAY THE SAME).

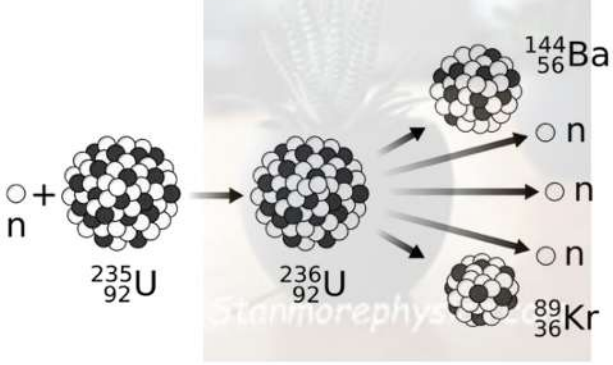
5.3.1 Resistance (1)

5.3.2 Current (1)

[6]

QUESTION 6

The diagram below shows the first step in generating electricity using nuclear energy.



6.1 Which atom is used in the process described? (1)

6.2 What is the term used to describe the atom splitting as above? (1)

6.3 Is this electricity generation method considered renewable or non-renewable? (1)

6.4 List one ADVANTAGE and one DISADVANTAGE of using this method to generate electricity. (2)

South Africa mainly uses coal to generate electricity.

6.5 List TWO harmful effects that coal-fired power stations have on the environment. (2)

6.6 Households and businesses are encouraged to use photovoltaic cells to generate electricity.

6.6.1 What is the common term for 'photovoltaic cells?' (1)

6.6.2 Give TWO reasons why photovoltaic cells preferred by *households* over wind turbines? (2)

[10]

QUESTION 7

7.1 Using the formula: ***Cost = power rating x time x unit price***, calculate the cost of powering a fridge with a power rating of 800W for 10 hours if the unit price for electricity is R3,00. (3)

7.2 What is another *term* to describe an electrical ***unit***? (1)

7.3 Your aunt complains that whenever she buys electricity for the second time later in the same month, she pays a higher price per unit compared to the first time she bought units in that same month. She argues that if she buys a larger amount once off at the beginning of a month, she will pay a lower price per unit. Briefly explain why your aunt will still pay the same amount per month for electricity, regardless of when she buys units during a monthly period. (2)

[6]

Total Marks : 60

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GENERAL EDUCATION AND TRAINING

GRADE 9

NATURAL SCIENCES
PLC CONTROLLED TEST AMENDED MARKING GUIDELINES
2025 TERM 3

Time: 80 minutes

Marks: 60

This marking guidelines consists of **3 pages** excluding cover page.

SECTION A

QUESTION 1

1.1 A✓ (1)

1.2 Any option (1)

1.3 B✓ (1)

1.4 B✓ (1)

1.5 A✓ (1)

1.6 C✓ (1)

1.7 B✓ (1)

1.8 B✓ (1)

1.9 D✓ (1)

1.10 B✓ (1)

[10]

SECTION B

QUESTION 2

2.1 Mass ✓
Distance ✓ (2)

2.2 Mass is the number of particles an object consists of. ✓
Weight is the gravitational force that a celestial body / Earth exerts on an object with mass. ✓ (2)

2.3.1 3N ✓ (1)

2.3.2 An increase in mass results in an increase in weight. ✓ (1)

2.3.3 Mass ✓ (1)

2.3.4 Weight ✓ (1)

2.3.5 An increase in mass does indeed result in an increase in weight /

Mass is directly proportional to weight. ✓ (1)

2.4.1 W = mg (no mark for the formula)

= (0,3)(1,625) ✓

= 0,487N / 0,49 N ✓ (2)

2.4.2 More ✓

because Earth has a significantly stronger gravitational pull than the Moon. ✓ (2)

[13]

QUESTION 3

3.1.1 Cell ✓ / electrolyte / energy source (battery) (1)

3.1.2 Light Emitting Diode ✓ (1)

3.1.3 Accept <u>any TWO</u> relevant reasons, e.g.:

- Not enough cells / lemons ✓
- LED is connected the wrong way around ✓
- Nichrome wires provide too much resistance
- LED defective (2)

3.2.1 The electrons moving through the wire collide ✓with the atoms inside the wire, increasing the temperature. ✓ (2)

3.2.2 A – Dimmer ✓
B – Brighter ✓ (2)
[8]

QUESTION 4

4.1 $V_2 = V_4 – V_1 – V_3$

$V_2 = 12 – 2 – 7$ ✓

$V_2 = 3V$ ✓ (2)

4.2 R_1 ✓ (1)

4.3 6A ✓

Current stays constant in series circuits. ✓ (2)

4.4 6V ✓ (1)
[6]

QUESTION 5

5.1 9V ✓ (1)

5.2 R_2 ✓
Current takes the path of least resistance. ✓✓(lowest) (3)

5.3.1 INCREASE ✓ (1)

5.3.2 DECREASE ✓ (1)
[6]

QUESTION 6

6.1 Uranium / U ✓ (1)

6.2 Nuclear fission ✓ (1)

6.3 Non-renewable ✓ (1)

6.4 Accept any relevant answer, e.g.:

ADVANTAGE	DISADVANTAGE
Very little material required to generate vast amounts of electricity ✓	A very expensive generation technique✓
Does not release toxic gases into the atmosphere	Toxic waste needs to be discarded appropriately

(2)

6.5 Accept any TWO relevant effects, e.g.:

- Coal-mining destroys natural habitat ✓
- Release harmful gases into the atmosphere ✓
- Acid rain
- Global warming (2)

6.6.1 Solar panels ✓ (1)

6.6.2 Accept any TWO relevant answers, e.g.:

- Wind turbines are large and obtrusive / Solar panels are small and unobtrusive. ✓
- Wind is an unreliable source of energy / The sun is a more reliable source of energy. ✓
- Wind turbines are noisy / Solar panels do not produce any noise.
- Wind turbines are dangerous for birds / Solar panels are safe for wildlife.
- Solar panels are less expensive than wind turbines for households. (2)

[10]

QUESTION 7

7.1 Cost = power rating x time x unit price
= 0,8 ✓ x 10 x 3 ✓
= R24 ✓ (3)

7.2 Kilowatt hour ✓ (1)

7.3 Eskom's electricity pricing structure is based on a stepped tariff (block) system, ✓ The more units you buy, the more expensive they become. ✓
OR
ESKOM uses an inclining block tariff system ✓, meaning that the more electricity the household consumes, the higher the rate they will pay per unit. ✓ (2)

[6]

Total Marks: 60

BALANCED WEIGHTING GRID FOR NS GRADE 9 PLC CONTROLLED TEST SEPTEMBER 2025

QUESTION NO.	LOW ORDER	MIDDLE ORDER	HIGH ORDER	TOTAL
SECTION A - QUESTION 1				
1.1	1			1
1.2			1	1
1.3	1			1
1.4		1		1
1.5	1			1
1.6		1		1
1.7	1			1
1.8		1		1
1.9	1			1
1.10	1			1
				(10)
SECTION B - QUESTION 2				
2.1	2			2
2.2	2			2
2.3.1	1			1
2.3.2		1		1
2.3.3		1		1
2.3.4		1		1
2.3.5		1		1
2.4.1		2		2
2.4.2		2		2
				(13)
QUESTION 3				
3.1.1	1			1
3.1.2	1			1
3.1.3			2	2
3.2.1			2	2
3.2.2 - A		1		1
3.2.2 - B		1		1
				(8)
QUESTION 4				
4.1		2		2
4.2		1		1
4.3		2		2
4.4	1			1
				(6)
QUESTION 5				
5.1	1			1
5.2		3		3
5.3.1		1		1
5.3.2		1		1
				(6)
QUESTION 6				

6.1	1			1
6.2	1			1
6.3	1			1
6.4	2			2
6.5	2			2
6.6.1	1			1
6.6.2			2	2
				(10)
QUESTION 7				
7.1		3		3
7.2	1			1
7.3			2	2
				(6)
% IN EXAMS	40%	45%	15%	
TOTAL MARKS	**24**	**27**	**9**	**60**