KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL STANDARDISED ASSESSMENT

GRADE 11

PHYSICAL SCIENCES P1 (PHYSICS)

JUNE 2026



MARKS: 100

DURATION: 2 hours

This question paper consists of 12 pages and 2 data sheets.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SEVEN questions. Answer ALL the questions in the ANSWER BOOK.
2. Start EACH question on a NEW page in the ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Leave ONE line between two sub-questions, for example between QUESTION 2.1 and QUESTION 2.2.
5. You may use a non-programmable calculator.
6. You may use appropriate mathematical instruments.
7. You are advised to use the attached DATA SHEET.
8. Show ALL formulae and substitutions in ALL calculations.
9. Round off your final numerical answers to a minimum of TWO decimal places.
10. Give brief motivations, discussions et cetera where required.
11. Write neatly and legibly.



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QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write only the letter (A–D) next to the question number (1.1–1.7) in the ANSWER BOOK, for example 1.8 E.

1.1 Two forces, F_1 and F_2, act simultaneously at a point. The resultant force is 17 N when they act in the same direction, and 5 N when they act in opposite directions.

The magnitude of the two forces are…

A 14 N and 3 N

B 11 N and 6 N

C 5 N and 12 N

D 10 N and 7 N

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(2)

1.2 A person stands on a bathroom scale that is calibrated in newton, in a stationary elevator. The reading on the bathroom scale is W.

The elevator now moves downward with a constant acceleration of $\frac{1}{4}$ g, where g is the gravitational acceleration on Earth.

What will the reading on the bathroom scale now be?

A $\frac{1}{4}$W

B $\frac{3}{4}$W

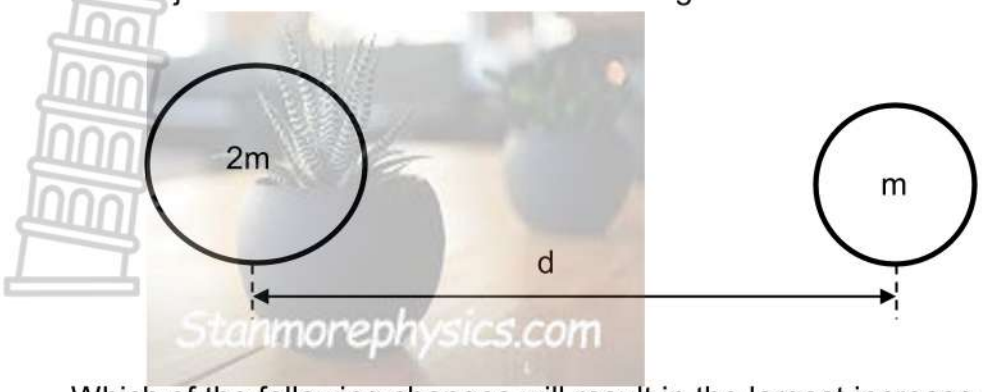
C W

D $\frac{5}{4}$W

(2)

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1.3 Two objects of masses 2m and m are arranged as shown in the diagram below.



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Which of the following changes will result in the largest increase in gravitational force the two objects exert on each other?

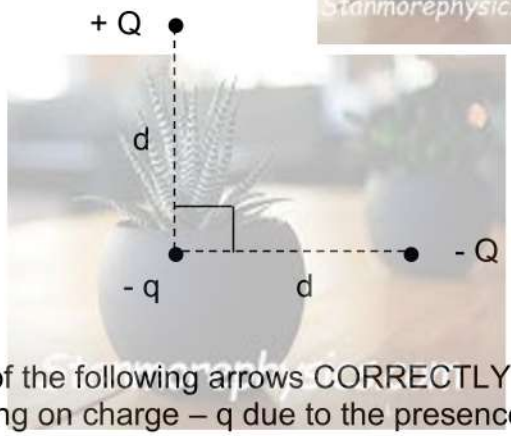
A Double the mass of each object

B Double the larger mass and double the distance between their centres

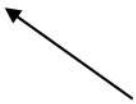
C Double the larger mass and half the distance between their centres

D Triple the smaller mass and the half the distance between their centres (2)

1.4 Two charges, + Q and – Q, are each placed a distance d from a negative charge – q. The charges, + Q and – Q, are located along lines that are perpendicular to each other as shown in the diagram below.



Which ONE of the following arrows CORRECTLY shows the direction of the net force acting on charge – q due to the presence of charges + Q and – Q?

A 

B 

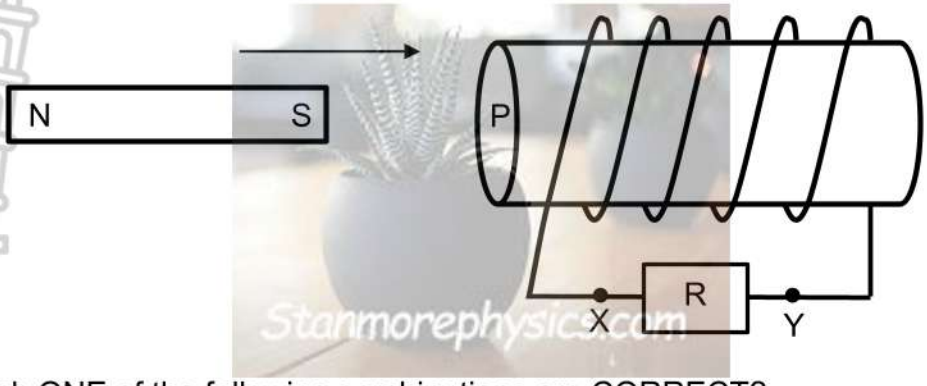
C 

D 

(2)

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1.5 The diagram below shows a magnet that is moved towards a solenoid.

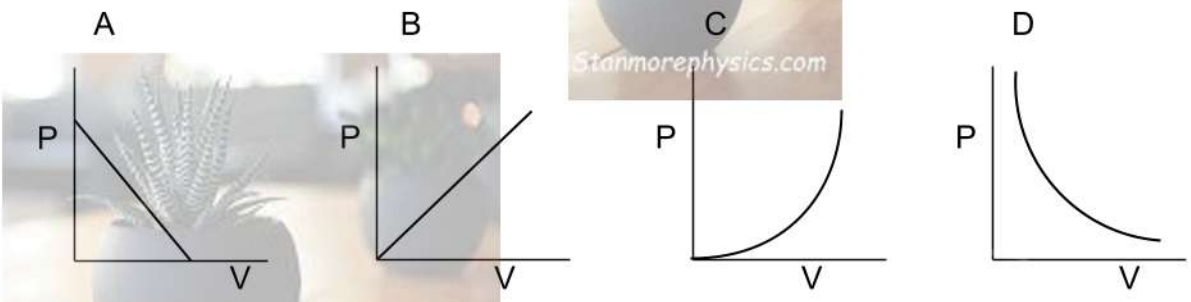


Which ONE of the following combinations are CORRECT? (2)

	Polarity at P	Direction of current through the resistor
A	North	X to Y
B	North	Y to X
C	South	X to Y
D	South	Y to X

(2)

1.6 Which ONE of the following graphs best represents the relationship between the electrical power (P) dissipated by a resistor and the potential difference (V) across the resistor if the resistance of the resistor remains constant?



(2)

1.7 Which ONE of the following is the unit of measurement for the rate of flow of charge?

A Coulomb

B Ampere

C Volts

D Watts (2)

[2 X 7 = 14]

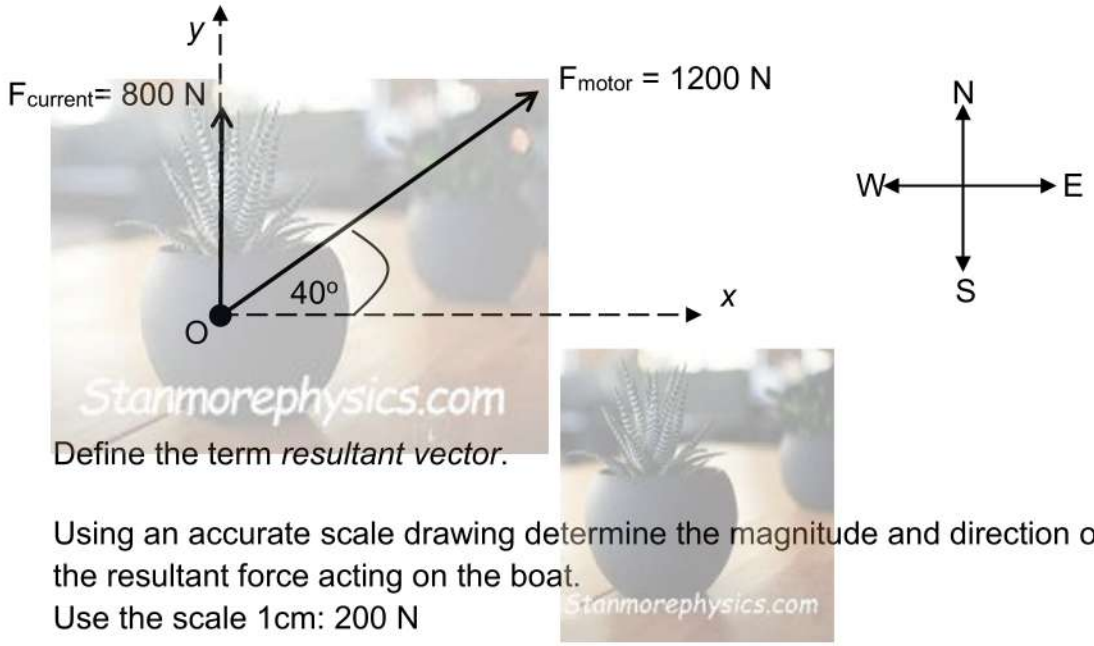
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QUESTION 2 (Start on a new page.)

Two forces act simultaneously on a small boat in a flat part of a river:

- The motor exerts a force of 1200 N at an angle of 40° north of east.
- The river current exerts a force of 800 N in a northerly direction.

The forces, not drawn to scale, are shown in the diagram below. The boat is at point O.



2.1 Define the term *resultant vector*. (2)

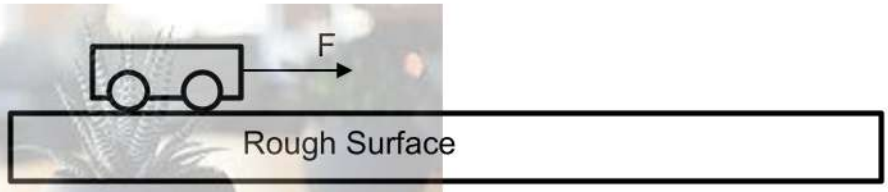
2.2 Using an accurate scale drawing determine the magnitude and direction of the resultant force acting on the boat.
Use the scale 1cm: 200 N (5)

[7]

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QUESTION 3 (Start on a new page.)

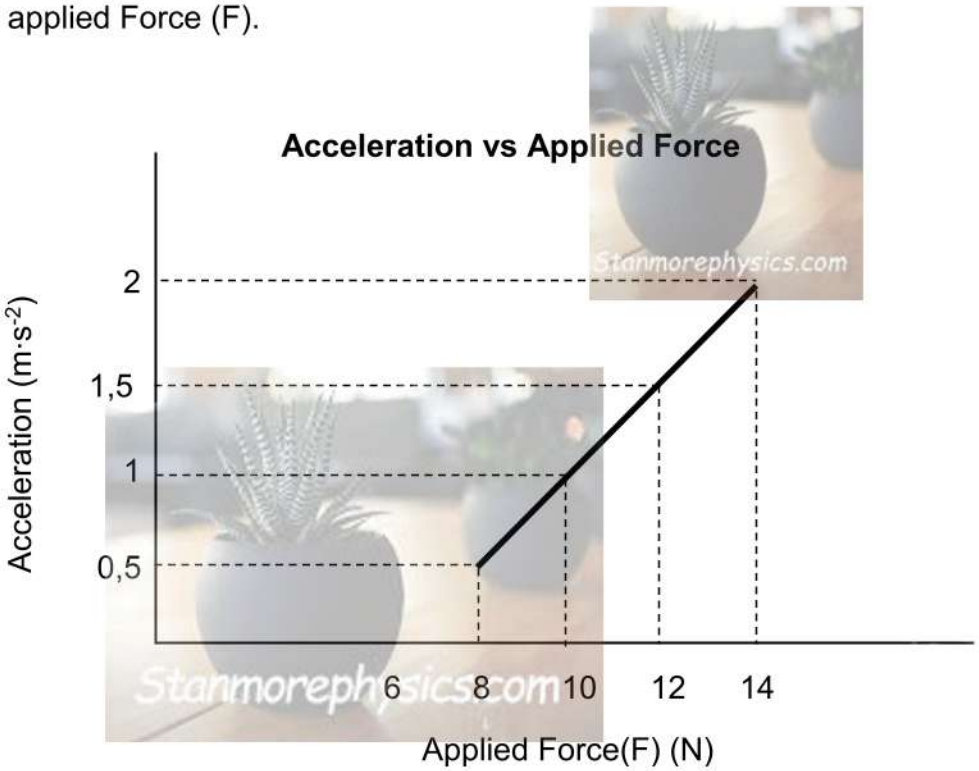
A trolley of UNKNOWN MASS rests on a rough horizontal surface. A horizontal force is applied to the trolley towards the right as shown in the diagram below.



The trolley initially remains at rest. The magnitude of F is gradually increased, until the trolley begins to move. The maximum static frictional force (f_s^{max}) between the trolley and the surface is 7N.

The acceleration of the trolley is measured for different values of F.

The graph below shows the relationship between the acceleration of the trolley (a) and the applied Force (F).



3.1 Define the term *static friction* in words. (2)

3.2 Write down the magnitude of the static frictional force when the applied force acting on the trolley is 6N to the right. (1)

3.3 Draw a labelled free-body diagram showing all HORIZONTAL forces acting on the trolley when the trolley is in motion. (2)

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3.4 Show that the relationship between the applied force and acceleration can be written as:

$$a = \frac{F}{m} - \frac{f_k}{m}$$ (2)

3.5 Use the graph to calculate the mass of the trolley. (3)

3.6 Hence calculate the coefficient of static friction between the surface and the trolley. (4)

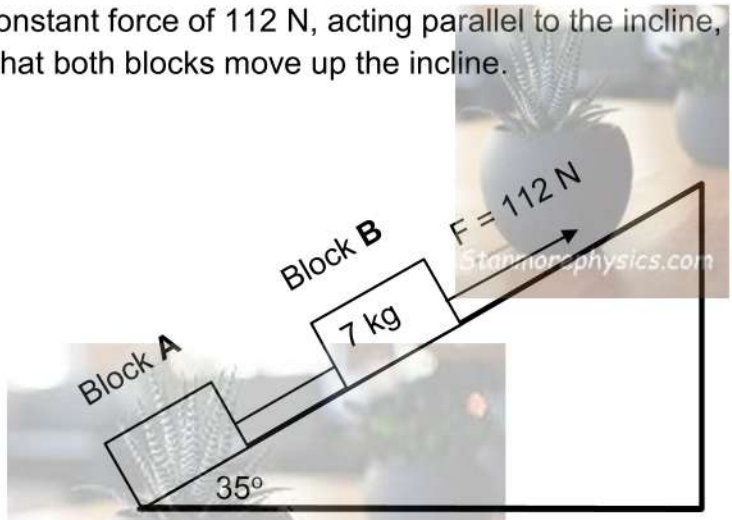
3.7 Determine the magnitude of the kinetic frictional force acting on the trolley (2)

[16]

QUESTION 4 (Start on a new page.)

4.1 Block **A** of unknown mass and block **B** of mass 7 kg are placed on a rough incline that makes an angle of 35° with the horizontal. The blocks, initially at rest, are connected by a light, inextensible string.

A constant force of 112 N, acting parallel to the incline, is applied to block B so that both blocks move up the incline.



Each block travels 0,7 m up the incline in 0,536 seconds. The kinetic frictional force acting on blocks **A** and **B** are 3 N and 5 N respectively.

4.1.1 Show by means of a calculation that the magnitude of the acceleration of the blocks was 4,87 $m \cdot s^{-2}$ while moving up the incline. (3)

4.1.2 Draw a labelled free-body diagram for block **B** while it was moving up the slope. (5)

4.1.3 Determine the mass of block **A**. (5)

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After moving 0,70 m up the incline, the string connecting blocks **A** and **B** breaks.

4.1.4 Will the maximum distance covered by block **A** along the incline be GREATER THAN, LESS THAN or EQUAL TO 0,7 m?
Explain the answer. (2)

4.2 A space agency is designing landing equipment for a mission to the Moon. Engineers need accurate information on the Moon's gravitational acceleration.

Earth exerts a gravitational force of $2,34 \times 10^{20}$ N on the moon. The shortest distance between the surfaces of Earth and the moon is $3,46 \times 10^{8}$ m as indicated in the diagram below. The moon has a mass of $7,35 \times 10^{22}$ kg.



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4.2.1 State *Newton's law of universal gravitation* in words. (2)

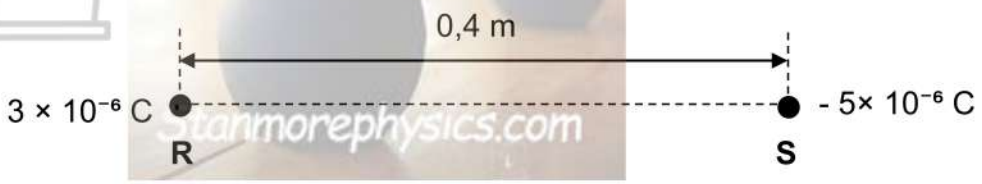
4.2.2 Determine the gravitational acceleration on the surface of the moon. (6)
[23]

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QUESTION 5 (Start on a new page)

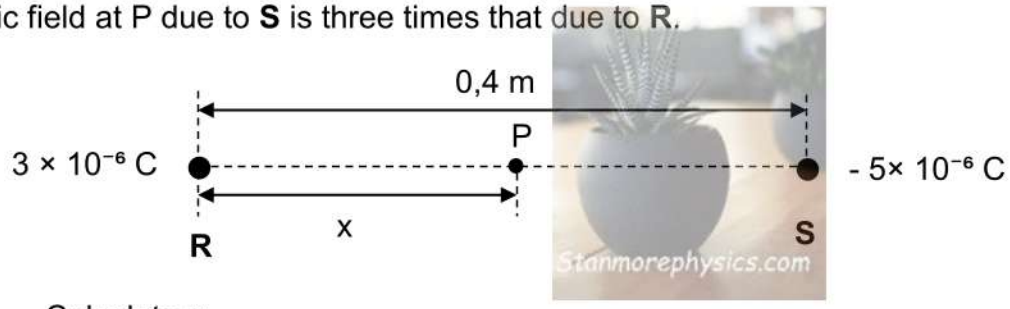
Two identical charged particles, **R** and **S**, are positioned 0,4 m apart along a straight line in a vacuum. Particle **R** has a charge of 3×10^{-6} C, while particle **S** has a charge of -5×10^{-6} C, as illustrated in the diagram below.



5.1 State *Coulomb's law* in words. (2)

5.2 Calculate the magnitude of the electrostatic force that particle **S** exerts on particle **R.** (3)

Point P is x metres to the right of **R**, with R, P and S lying on a straight line. The electric field at P due to **S** is three times that due to **R**.



5.3 Calculate **x**. (6)

The net electric field at point P due to both particles **R** and **S** is 2,07 x 10^6 N·C^{-1} to the right.

5.4 Determine the electrostatic force exerted on an electron placed at point P. (4)

[15]

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QUESTION 6 (Start on a new page)

A circular coil with 150 turns is placed in a uniform magnetic field of strength 0,5 T. The plane of the coil initially makes an angle of 40° with the magnetic field, as shown in Diagram 1 below:

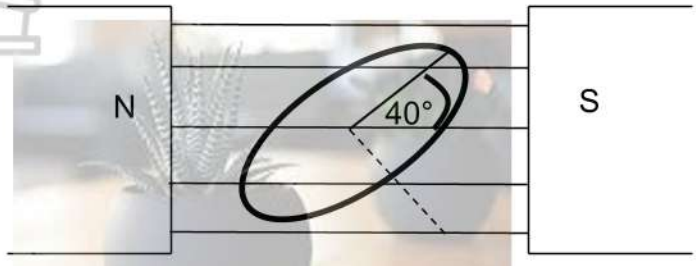


Diagram 1: Plane of coil at 40° to the magnetic field.

The coil is uniformly rotated in 0,2 seconds so that its plane is parallel to the magnetic field, as shown in Diagram 2 below:

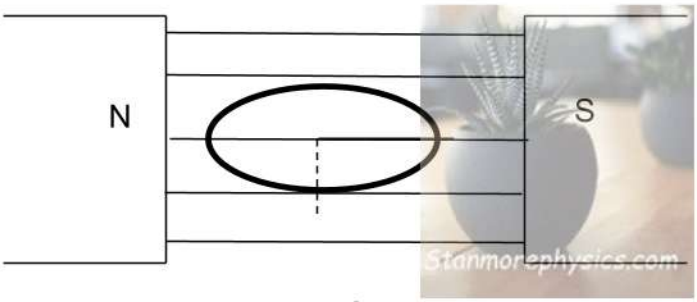


Diagram 2: Plane of coil is parallel to the magnetic field.

During this rotation, the induced emf in the coil is 0,43 V.

6.1 State *Faraday's law of electromagnetic induction* in words. (2)

6.2 Calculate the change in magnetic flux during the rotation of the coil. (3)

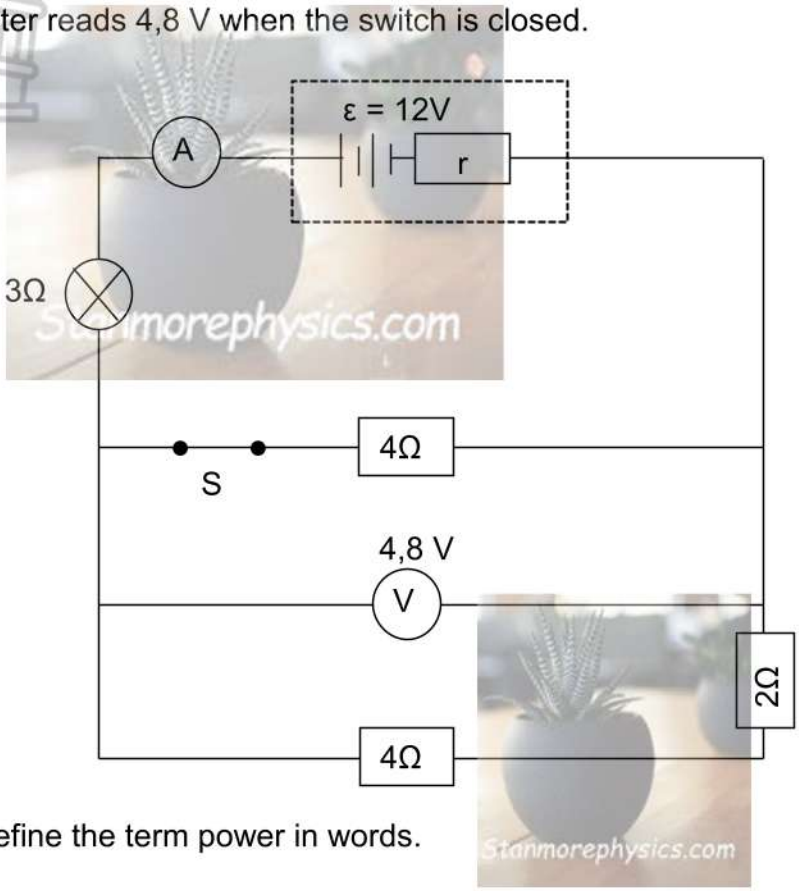
6.3 Determine the area of one turn of the circular coil. (3)

[8]

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QUESTION 7 (Start on a new page)

Three resistors and a light bulb are connected to a battery with an emf (ε) of 12 V and an unknown internal resistance(r) as shown in the diagram below. The ammeter and connecting wires have negligible resistance.
The voltmeter reads 4,8 V when the switch is closed.



7.1 Define the term power in words. (2)

7.2 Calculate the:

7.2.1 Effective resistance of the parallel combination (2)

7.2.2 Reading on the ammeter (3)

7.2.3 Internal resistance of the battery (4)

7.2.4 Power dissipated by the light bulb (3)

The switch is now opened.

7.3 Will the brightness of the bulb INCREASE, DECREASE or REMAIN THE SAME? Explain the answer. (3)

[17]

TOTAL: 100

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DATA FOR PHYSICAL SCIENCES GRADE 11
PAPER 1 (PHYSICS)

TABLE 1: PHYSICAL CONSTANTS

NAME	SYMBOL	VALUE
Acceleration due to gravity	g	9,8 $m.s^{-2}$
Universal gravitation constant	G	6,67 x 10^{-11} $N{\cdot}m^2{\cdot}kg^{-2}$
Radius of the Earth	R_E	6,4 x 10^6 m
Mass of the Earth	M_E	5,98 x 10^{24} kg
Coulombs constant	k	9 x 10^9 $N{\cdot}m^2{\cdot}C^{-2}$
Charge on electron	q_e	-1,6 x 10^{-19} C
Electron mass	m_e	9,11 x 10^{-31} kg

TABLE 2: FORMULAE

MOTION

$v_f = v_i + a\Delta t$	$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$v_f^2 = v_i^2 + 2a\Delta x$	$\Delta x = \left(\frac{v_f + v_i}{2}\right)\Delta t$

FORCE

$F_{net} = ma$	$w = mg$
$f_s^{max} = \mu_s N$	$f_k = \mu_k N$
$F = \frac{Gm_1m_2}{r^2}$	$g = G\frac{M}{r^2}$

ELECTROSTATICS

$F = \frac{kQ_1Q_2}{r^2}$	$E = \frac{kQ}{r^2}$
$V = \frac{W}{q}$	$E = \frac{F}{q}$
$n = \frac{Q}{e}$ or $n = \frac{Q}{q_e}$	

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ELECTRIC CIRCUITS

$R = \frac{V}{I}$	emf (ε) = I(R + r)
$R_s = R_1 + R_2 + \ldots$ $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$	$q = I\,\Delta t$
$W = V\,q$ $W = VI\,\Delta t$ $W = I^2R\,\Delta t$ $W = \frac{V^2\Delta t}{R}$	$P = \frac{W}{\Delta t}$ $P = VI$ $P = I^2R$ $P = \frac{V^2}{R}$

ELECTROMAGNETISM

$\varepsilon = -N\frac{\Delta\Phi}{\Delta t}$	$\Phi = BA\cos\Theta$



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