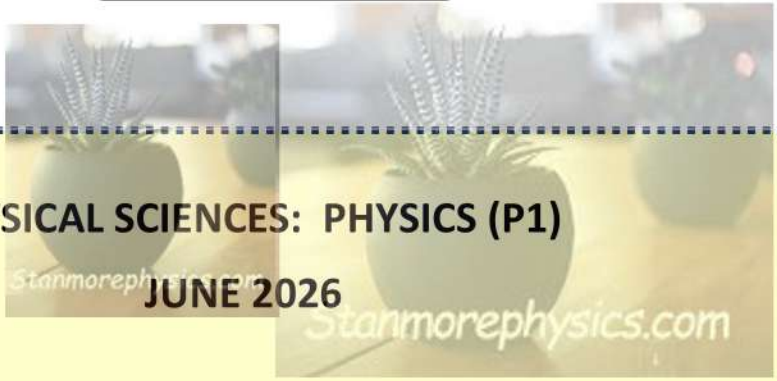
LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11



PHYSICAL SCIENCES: PHYSICS (P1)

JUNE 2026

MARKS : 100

TIME : 2 HOURS

This question paper consists of 13 pages including data sheets.

INSTRUCTIONS AND INFORMATION

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



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QUESTION 1

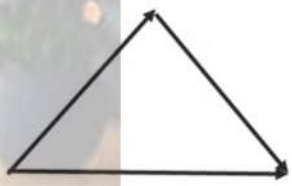
Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write down only the letter A, B, C or D next to the question number (1.1–1.5) in your ANSWER BOOK.

1.1 In which of the following vector diagrams is the resultant of the three vectors zero?

A



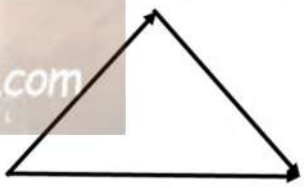
B



C



D



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(2)

1.2 Newton's second law of motion can be expressed as $F_{net} = ma$. This equation consists of …

A one vector quantity and two scalar quantities.

B two vector quantities and one scalar quantity.

C three vector quantities.

D three scalar quantities. (2)

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1.3 The magnitude of the electrostatic force exerted by charge Q_1 on charge Q_2 is F. When the distance between the two charges is tripled, the magnitude of the electrostatic force in terms of F, will now be

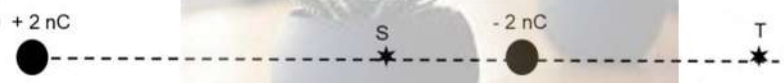
A $\frac{1}{9}F$

B $\frac{1}{3}F$

C 3F

D 9F (2)

1.4 Two charges of +2 nC and -2 nC are located on a straight line. S and T are two points that lie on the same straight line as shown in the diagram below.

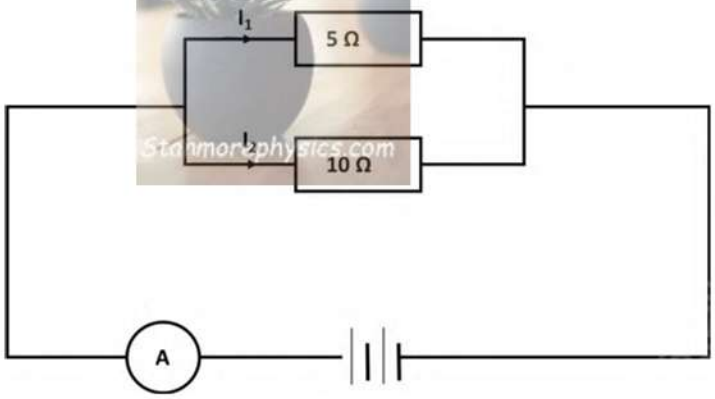


Which ONE of the following correctly represents the directions of the RESULTANT electric fields at S and T?

	Direction of the resultant electric field at point S	Direction of the resultant electric field at point T
A	Left	Left
B	Right	Left
C	Left	Right
D	Right	Right

(2)

1.5 5 Ω and 10 Ω resistors are connected in parallel as shown in the diagram.



The relationship between current I_1 and current I_2 can be expressed as:

A $I I_2 = I_1$

B $I_2 = \frac{1}{3} I_1$

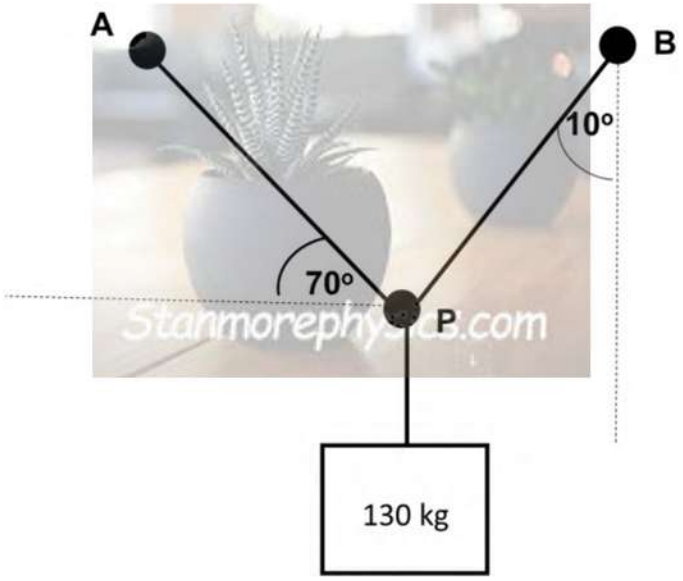
C $I_2 = \frac{3}{2} I_1$

D $I_2 = \frac{1}{2} I_1$

(2)
[10]

QUESTION 2

A heavy object of mass 130 kg is suspended in a stationary position by two ropes, **A** and **B**. Rope **A** makes an angle of 70° with the horizontal and rope **B** makes an angle of 10° with the vertical.



2.1 State the condition for a system to be in equilibrium. (2)

2.2 Draw a free-body diagram representing all the forces acting on point **P**. (3)

2.3 Calculate the tensions in ropes **A** and **B**. (5)

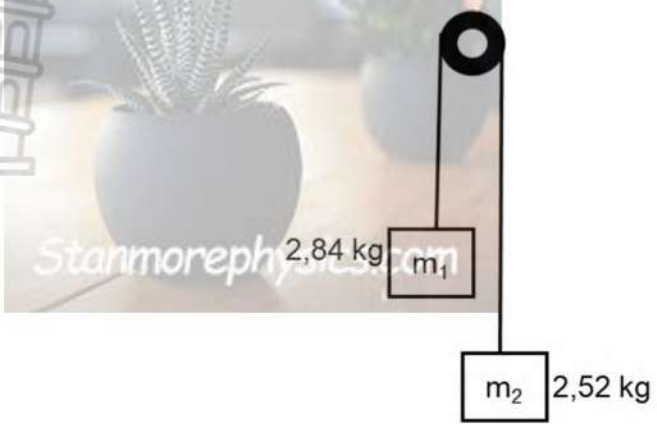
2.4 The mass of the object is doubled without changing the ropes.

Explain what will happen to the system or object. (2)

[12]

QUESTION 3

Consider a two-body problem in which two known masses are held over a low-friction pulley by a very tight string as shown in the diagram.



3.1 State *Newton's Second Law of motion*. (2)

3.2 When the masses are released, in what direction will

3.2.1 $\mathbf{m_1}$ travel? (1)

3.2.2 $\mathbf{m_2}$ travel? (1)

3.3 How will the acceleration of $\mathbf{m_1}$ compare to the acceleration of $\mathbf{m_2}$? Explain. (2)

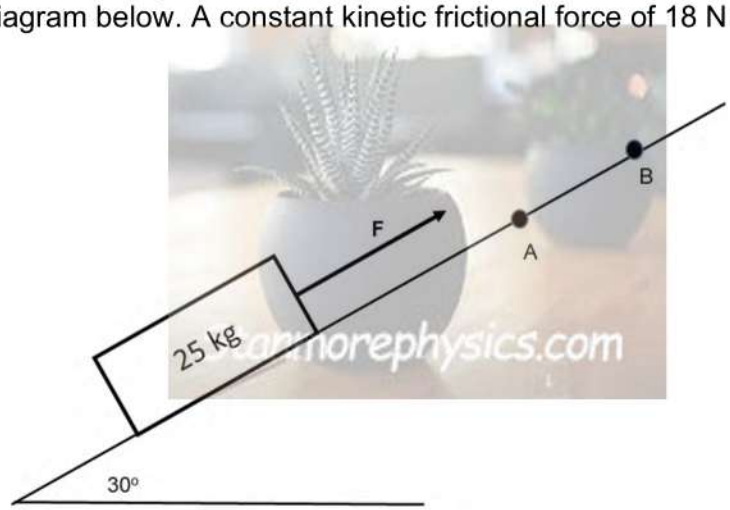
3.4 How does the net force on $\mathbf{m_1}$ compare to the net force on $\mathbf{m_2}$? Explain. (2)

3.5 Why are 'very-light string' and 'low friction pulley' important elements of this problem? (2)

[10]

QUESTION 4

A block of mass 25 kg is placed on a rough surface inclined at 30° to the horizontal. A constant force **F**, acting parallel to the surface, is applied on the block so that the block moves up the incline at a CONSTANT VELOCITY of 2 $m \cdot s^{-1}$. Refer to the diagram below. A constant kinetic frictional force of 18 N acts on the block.



4.1 State *Newton's First Law of motion*. (2)

4.2 Draw a free-body diagram for the block. (4)

4.3 Calculate the magnitude of force **F**. (3)

Force **F** is removed when the block reaches point **A** on the surface. The block continues to move up the surface and comes to rest momentarily at point **B**. Assume that the kinetic frictional force acting on the block remains at 18 N as it moves from point **A** to point **B**.

4.4 Write down the net force acting on the block as it moves from point **A** to point **B**. (2)

[11]

QUESTION 5

A satellite of mass 600 kg orbits the Earth at a height of 2 000 km above the Earth's surface.



5.1 5.1.1 State *Newton's Law of Universal Gravitation* in words. (2)

5.1.2. Why is the distance **r** in the formula measured from the centres of the two objects rather than their surfaces? (2)

5.1.3. Calculate the gravitational force exerted by the Earth on the satellite. (4)

5.1.4. If the distance between the satellite and the centre of the Earth were **doubled**, by what factor would the gravitational force change? (Use the Inverse Square Law to justify). (2)

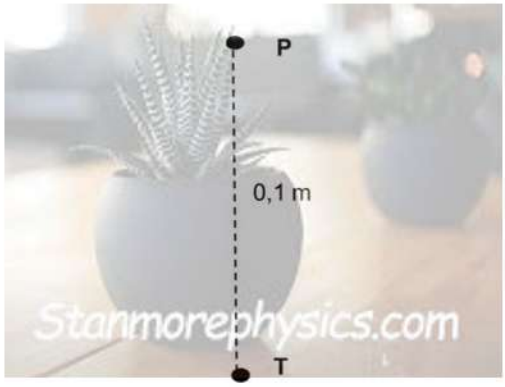
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5.2 A parachutist feels no contact forces while falling in the atmosphere. Name the term used to explain the phenomenon. (1)

[11]

QUESTION 6

Two identical spheres , **P** and **T**, carrying charges of +5 x 10^{-6} C and -3 x 10^{-6} C respectively, are placed a distance of 0,1 m apart.



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

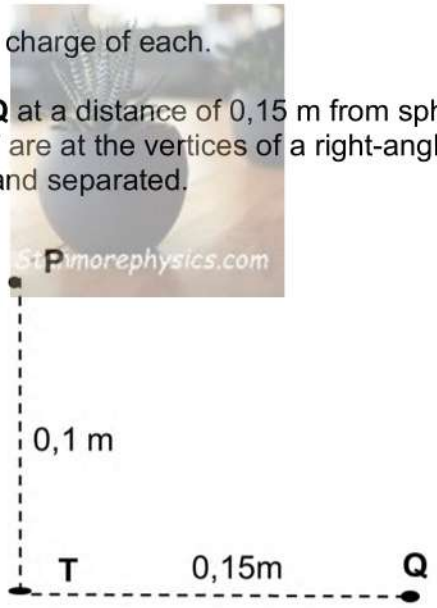
6.2 Calculate the electrostatic force between the spheres (4)

6.3 Draw the resultant electric field pattern due to the charges on **P** and **T**. (3)

The two spheres touch and separate, and return to the original positions.

6.4 Calculate the new charge of each. (3)

6.5 Consider a point **Q** at a distance of 0,15 m from sphere **T** such that the three points, **P, Q** and **T** are at the vertices of a right-angled triangle after the two spheres touched and separated.



6.5.1 Define the *electric field at a point*. (2)

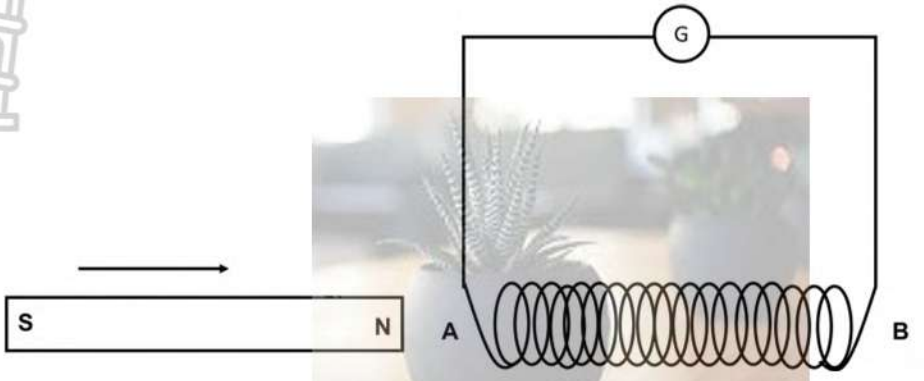
6.5.2 Calculate the magnitude of the electric field on **Q** due to **P**. (4)

6.5.3 Calculate the magnitude of the electric field on **Q** due to **T**. (2)

[20]

QUESTION 7

The following diagram shows a solenoid **AB** connected to a galvanometer (able to record very small currents). The magnet is now moved as indicated.



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

7.2 State what will happen to the reading on the galvanometer when:

7.2.1 The magnet is pushed into the solenoid (1)

7.2.2 The magnet is held still inside the solenoid (1)

7.3 The magnet is moved into the solenoid.

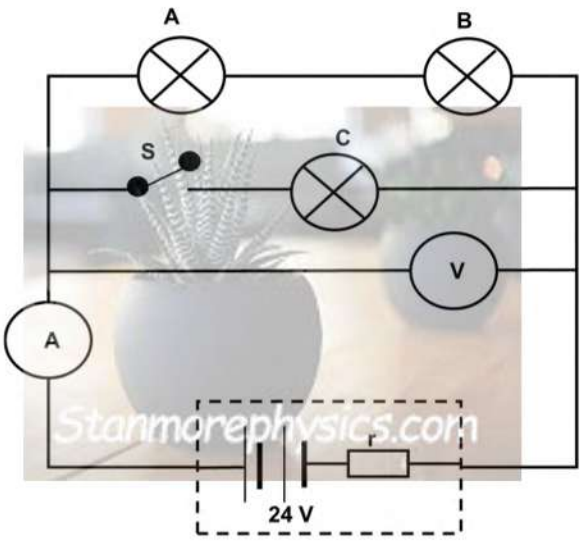
7.3.1 Identify the polarity of point **A** on the solenoid. (1)

7.3.2 Indicate the direction a current will flow in the solenoid: **A** to **B** or **B** to **A**. (2)

7.3.3 Explain the rule and how you used it to get the answer to QUESTION 7.3.2. (2)
[9]

QUESTION 8

Three IDENTICAL light-bulbs **A**, **B** and **C** each with a resistance of 4,5 Ω are connected to a battery with emf 24 V and unknown internal resistance, as shown in circuit diagram below. The resistance of the connecting wires and the ammeter may be ignored.



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Switch **S** is open. The ammeter reading is 2 A.

8.1 Define the term *electrical power* in words. (2)

8.2 Calculate the:

8.2.1 Reading on the voltmeter. (4)

8.2.2 Internal resistance of the battery. (3)

Switch **S** is now closed.

8.3 Compare the brightness of the light-bulbs **A**, **B** and **C**. Justify the answer. (4)

8.4 How would the voltmeter reading change? Choose from INCREASES, DECREASES or REMAINS THE SAME. Explain the answer. (4)

[17]

TOTAL: 100

PHYSICAL SCIENCES GRADE 11 DATA SHEET

TABLE 1: PHYSICAL CONSTANTS/*TABEL 1: FISIESE KONSTANTES*

NAME/*NAAM*	SYMBOL/*SIMBOOL*	VALUE/*WAARDE*
Acceleration due to gravity *Swaartekragversnelling*	g	$9,8\ m{\cdot}s^{-2}$
Gravitational constant *Swaartekragkonstante*	G	$6,67 \times 10^{-11}\ N{\cdot}m^2{\cdot}kg^{-2}$
Radius of Earth *Straal van Aarde*	R_E	$6,38 \times 10^6\ m$
Coulomb's constant *Coulomb se konstante*	k	$9,0 \times 10^9\ N{\cdot}m^2{\cdot}C^{-2}$
Speed of light in a vacuum *Spoed van lig in 'n vakuum*	c	$3,0 \times 10^8\ m{\cdot}s^{-1}$
Charge on electron *Lading op elektron*	e	$-1,6 \times 10^{-19}\ C$
Electron mass *Elektronmassa*	m_e	$9,11 \times 10^{-31}\ kg$
Mass of the Earth *Massa van die Aarde*	M	$5,98 \times 10^{24}\ kg$

TABLE 2: FORMULAE/*TABEL 2: FORMULES*

MOTION/*BEWEGING*

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

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FORCE/*KRAG*

$F_{net} = ma$	$w = mg$
$F = \frac{Gm_1m_2}{r^2}$	$\mu_s = \frac{f_{s(max)}}{N}$
$\mu_k = \frac{f_k}{N}$	

WAVES, SOUND AND LIGHT/*GOLWE, KLANK EN LIG*

$v = f\lambda$	$T = \frac{1}{f}$
$n_i \sin\theta_i = n_r \sin\theta_r$	$n = \frac{c}{v}$

ELECTROSTATICS/*ELEKTROSTATIKA*

$F = \frac{kQ_1Q_2}{r^2}$ $(k = 9{,}0 \times 10^9\ N{\cdot}m^2{\cdot}C^{-2})$	$E = \frac{F}{Q}$
$E = \frac{kQ}{r^2}$ $(k = 9{,}0 \times 10^9\ N{\cdot}m^2{\cdot}C^{-2})$	$V = \frac{W}{Q}$

ELECTROMAGNETISM/*ELEKTROMAGNETISME*

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

CURRENT ELECTRICITY/*STROOMELEKTRISITEIT*

$I = \frac{Q}{\Delta t}$	$R = \frac{V}{I}$
$\frac{1}{R} = \frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3} + \ldots$	$R = r_1 + r_2 + r_3 + \ldots$
$W = Vq$ $W = VI\Delta t$ $W = I^2R\Delta t$ $W = \frac{V^2\Delta t}{R}$	$P = \frac{W}{\Delta t}$ $P = VI$ $P = I^2R$ $P = \frac{V^2}{R}$

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