KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL STANDARDISED ASSESSMENT

GRADE 11

PHYSICAL SCIENCES

COMMON TEST

MARCH 2026

Stanmorephysics.com

MARKS: 100

DURATION: 2 hours

This question paper consists of 13 pages and 1 data sheet.

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. Stanmorephysics,com
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.

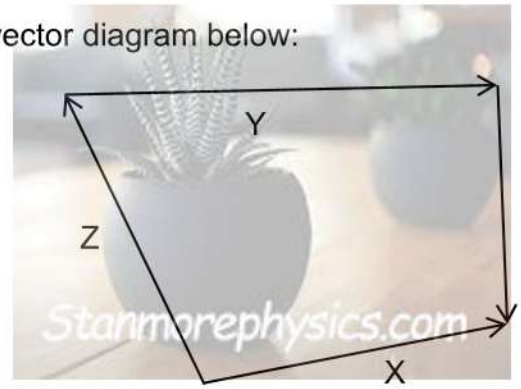
Stanmorephysics.com

Copyright reserved

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 Consider the vector diagram below:



Which ONE of the following represents the resultant vector of the other three?

A W

B X

C Y

D Z (2)

1.2 The forces acting on an object are in equilibrium.
Consider the following statements:

(i) The object could be stationary
(ii) The object could be moving at a constant velocity
(iii) The acceleration of the object is zero

Which of the above statements is/are true?

A (i) only

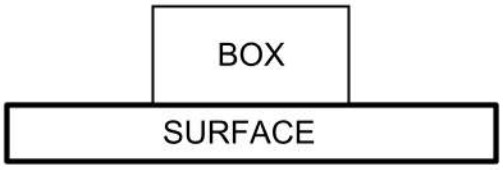
B (ii) only

C (i) and (iii) only

D (i), (ii) and (iii) (2)

Copyright reserved

1.3 A box is at rest on a horizontal surface.



Which of the following forces is the reaction force to the WEIGHT of the box?

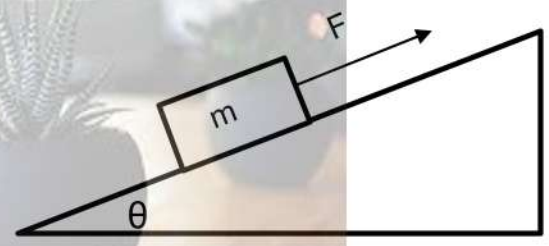
A Normal force acting on the box

B Force that Earth exerts on the box

C Force that the box exerts on Earth

D Force that the box exerts on the surface (2)

1.4 A block of mass **m** is pulled up an incline by a force **F**, as shown in the diagram below. The incline makes an angle θ with the horizontal



Stanmorephysics.com

The NORMAL force acting on the block is given by …

A mg sinθ

B mg cosθ

C mg sinθ – Fcosθ

D mg cosθ - Fsinθ (2)

Copyright reserved

1.5 The acceleration due to gravity on the surface of Earth is **g**.

Which ONE of the following is the gravitational acceleration on another planet which has HALF the mass of Earth and ONE-QUARTER of Earth's radius?

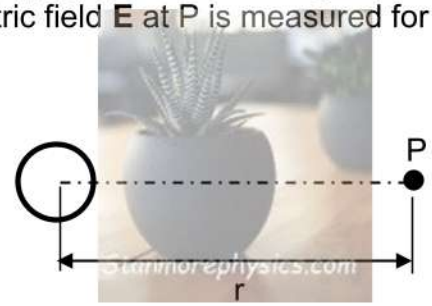
A 2g

B 4g

C 8g

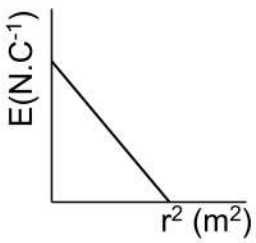
D 16g (2)

1.6 A small sphere, carrying a constant charge is placed **r** metres from a fixed point, **P**. The electric field **E** at P is measured for different values of **r**.

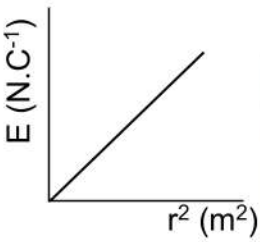


Which of the following graphs correctly shows the relationship between the electric field **E** at P and $\mathbf{r^2}$?

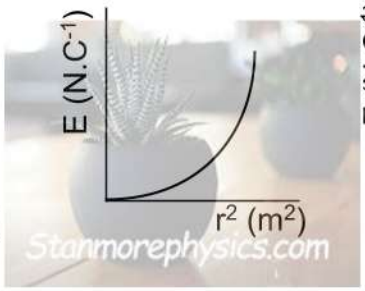
A



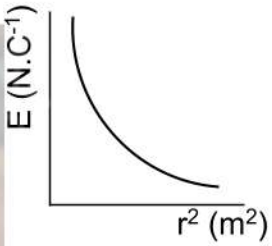
B



C



D



(2)

Copyright reserved

1.7 Two identical conducting spheres carrying charges Q and -2Q are placed r metres apart. The electrostatic force acting on each sphere is **F**. The spheres are brought into contact and are then separated so that the distance between them remains r metres.
Which ONE of the following is the magnitude of the electrostatic force that the spheres exert on each other after they are separated?

A $\frac{\mathbf{F}}{2}$

B $\frac{\mathbf{F}}{4}$

C $\frac{\mathbf{F}}{8}$

D 2**F**

(2)

[2 X 7 = 14]



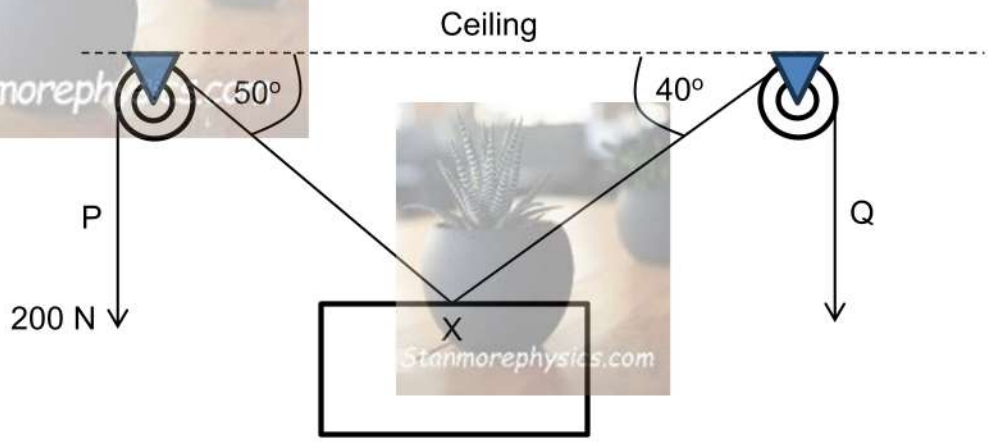
Copyright reserved

QUESTION 2 (Start on a new page.)

A box is lifted vertically upwards at CONSTANT VELOCITY using two light, inextensible strings, **P** and **Q**. The strings pass over frictionless pulleys attached to a horizontal ceiling and are attached to the box at point X, as shown in the diagram below. Stanmorephysics,com

- The tension in string **P**, which makes an angle of 50° with the ceiling, is 200 N.
- String **Q** makes an angle of 40° with the ceiling.

Ignore the effects of air resistance and assume that the box does not rotate while being lifted.



2.1 What is meant by a *closed vector diagram*? (2)

2.2 Draw a fully labelled closed vector diagram representing all forces acting on the box. Indicate any TWO angles. (3)

2.3 Calculate:

2.3.1 The magnitude of the tension in string Q (3)

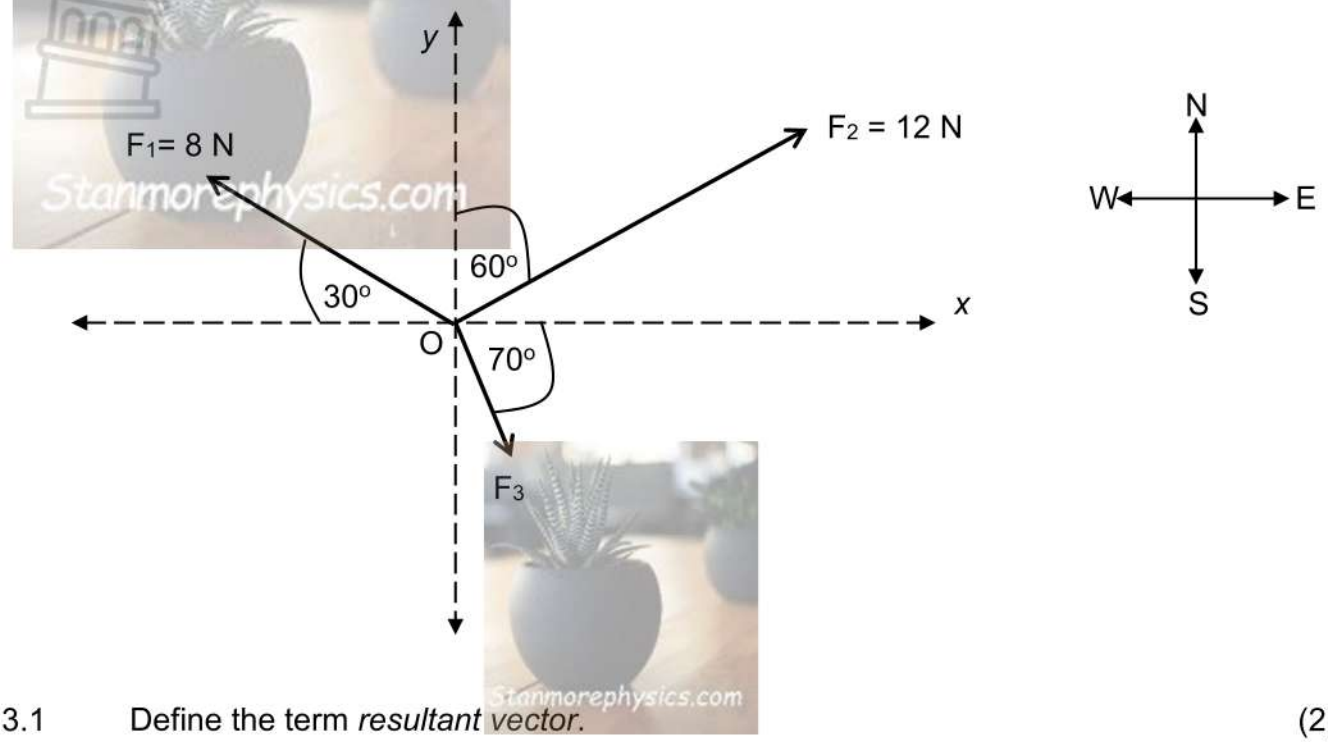
2.3.2 The mass of the box (3)

[11]

Copyright reserved

QUESTION 3 (Start on a new page.)

When three forces, F_1, F_2 and F_3 act on an object at point O as shown in the diagram below, the object moves from rest in a straight line at a bearing of 25°.
The forces are not drawn to scale.



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

3.2 Calculate the magnitude of the RESULTANT of:

3.2.1 The horizontal components of F_1 and F_2 ONLY (2)

3.2.2 The vertical components of F_1 and F_2 ONLY (2)

3.3 Determine the magnitude of F_3. (6)

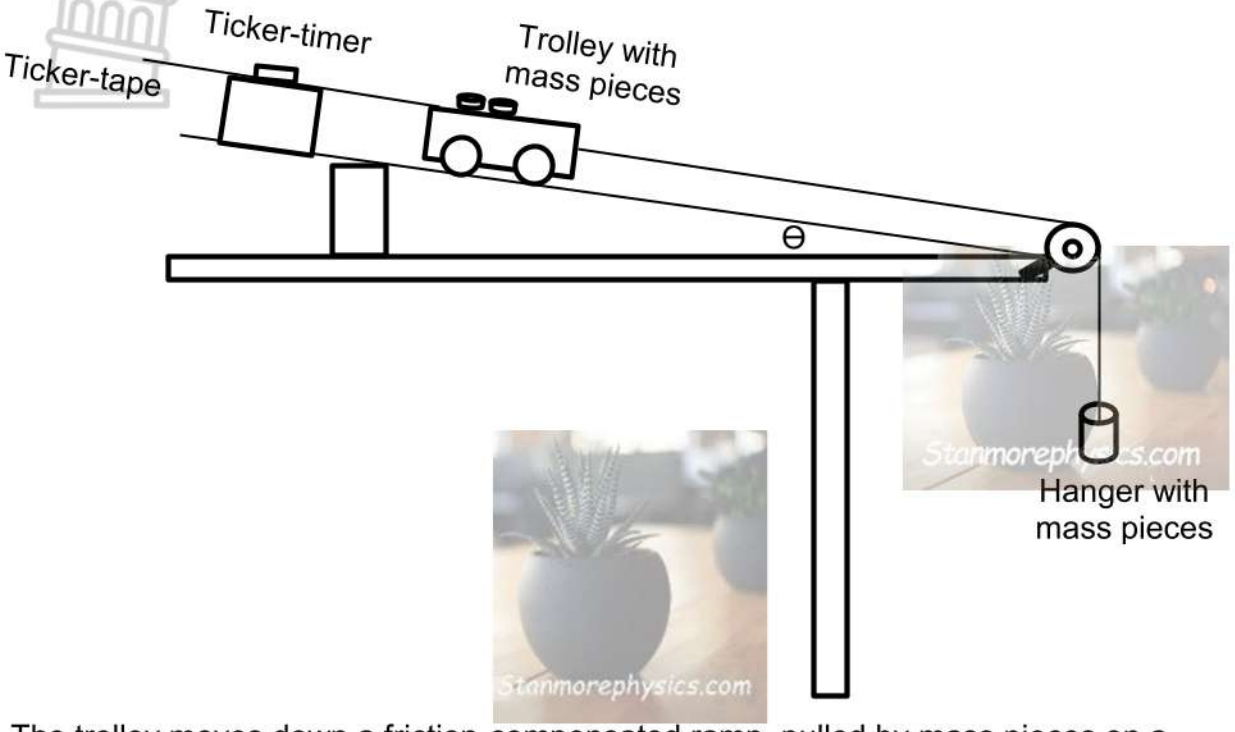
3.4 A fourth force F_4 now also acts at point O along the vertical axis, so that the object moves due EAST, along the positive x-axis.

Determine the magnitude and bearing of F_4. (3)
[15]

Copyright reserved

QUESTION 4 (Start on a new page.)

An investigation is conducted to determine the relationship between the net force acting on an object and its acceleration. The apparatus used in the experiment is shown below.



The trolley moves down a friction-compensated ramp, pulled by mass pieces on a mass hanger. The hanger is attached to the trolley by a light, inextensible string that passes over a frictionless pulley. The net force is increased by moving mass pieces from the trolley to the hanger.

4.1 Explain how a ticker-timer and ticker-tape is used to adjust the ramp in order to compensated for friction. Stanmorephysics,com (3)

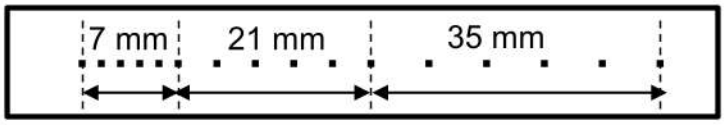
4.2 Identify:

4.2.1 The dependent variable (1)

4.2.2 A controlled variable (1)

4.3 Write down an investigative question for this experiment. (2)

The ticker timer has a frequency of 50 Hz, and the ticker tape shown below (not drawn to scale) is divided into intervals of five dots.

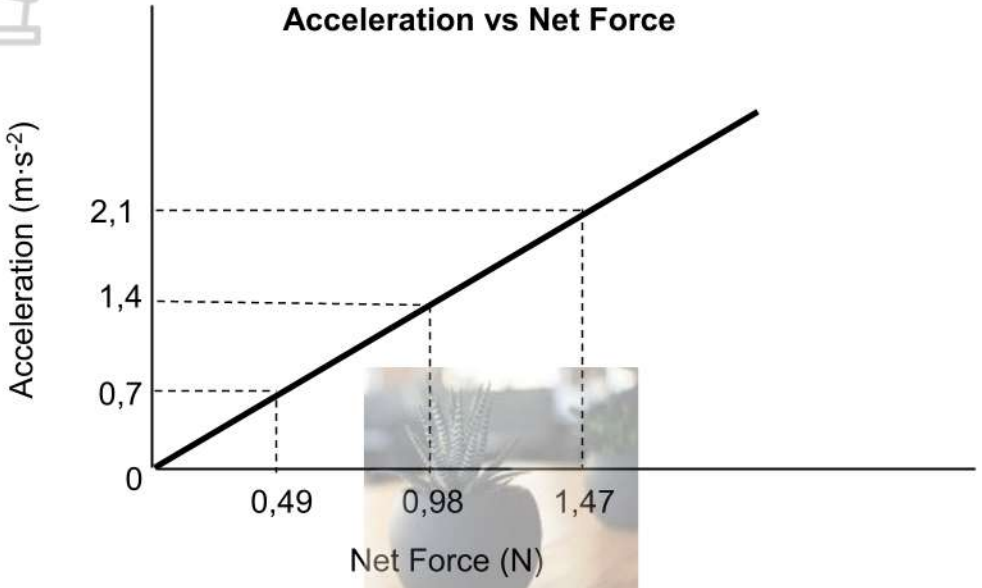


Copyright reserved

4.4 Determine the time elapsed for every 5-dot section of the tape. (3)

4.5 Using the data on the ticker-tape above, calculate the magnitude of the trolley's acceleration. (4)

The results obtained is shown on the graph below:



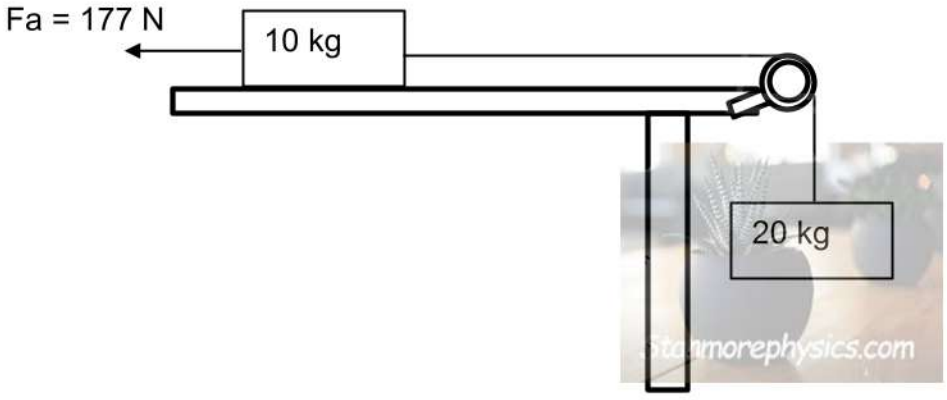
4.6 Write down the mathematical relationship between the net force exerted on the trolley and the acceleration produced. (1)

4.7 Give a reason why the mass pieces added to the hanger were initially placed on the trolley. (2)

[17]

QUESTION 5 (Start on a new page)

A 10 kg block resting on a rough horizontal surface is connected to a 20 kg block, by a light, inextensible string passing over a frictionless pulley. The 20 kg block hangs vertically, as shown in the diagram below.



Copyright reserved

A force of 177 N is applied to the left of the 10 kg block, to control the LOWERING of the 20 kg block to the ground. The kinetic frictional force between the 10 kg block and the surface is 11,5 N.

5.1 State *Newton's second law of motion* in words. (2)

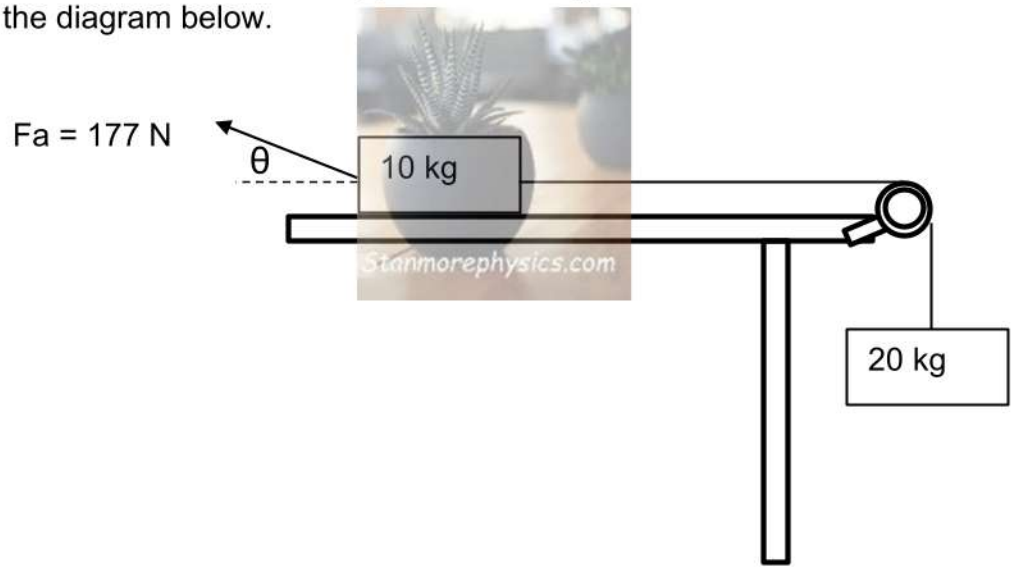
5.2 Draw a labelled free-body diagram showing all forces acting on the 20 kg block. (2)

5.3 Calculate the magnitude of the:

5.3.1 Acceleration of the 20 kg block (5)

5.3.2 Tension in the string connecting the blocks (2)

5.4 The 177 N force is now applied at an angle θ to the horizontal as shown in the diagram below.



Will the kinetic frictional force on the 10 kg block INCREASE, DECREASE or REMAIN THE SAME? Explain the answer. (3)

[14]

Copyright reserved

QUESTION 6 (Start on a new page)

A rocket, with its fuel, has a mass of 20 000 kg on the surface of Earth. The rocket is launched vertically upwards and its mass decreases uniformly as the fuel burns. At a height of 6,4 x 10^6 m above the surface of Earth, the rocket's mass DECREASES by 5000 kg.

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

6.2 Calculate the weight of the rocket on the surface of Earth. (2)

6.3 Determine the percentage reduction in the rocket's weight when it is 6,4 x 10^6 m above the surface of Earth. (5)

The rocket's mass decreased by 25% as it ascends from the ground to 6,4 x 10^6 m above the surface of Earth

6.4 Explain why the percentage reduction in the rocket's weight is considerably larger than the percentage reduction in the rocket's mass. (2)

[11]

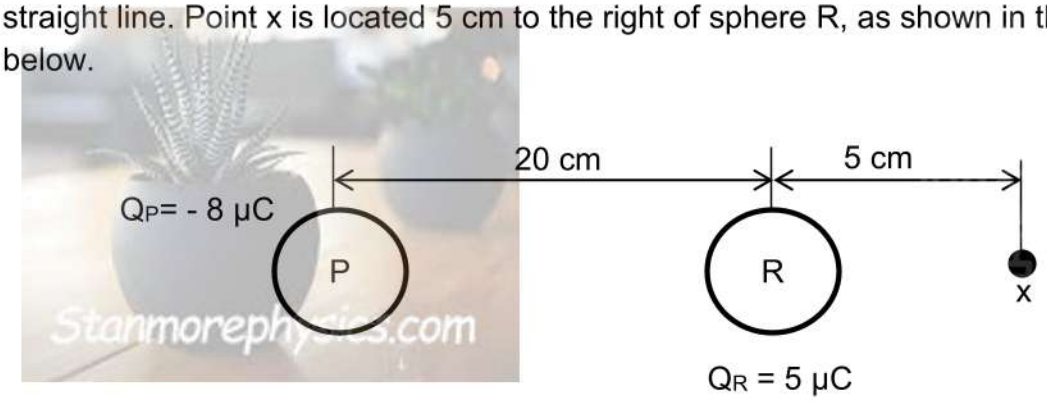
Stanmorephysics.com

QUESTION 7 (Start on a new page)

A metal sphere P, which was initially neutral, is given a charge of – 8 μC.

7.1 Determine the number of electrons added to P to obtain a charge of – 8 μC. (3)

Sphere R, carrying a charge of 5 μC, is placed 20 cm to the right of sphere P along a straight line. Point x is located 5 cm to the right of sphere R, as shown in the diagram below.



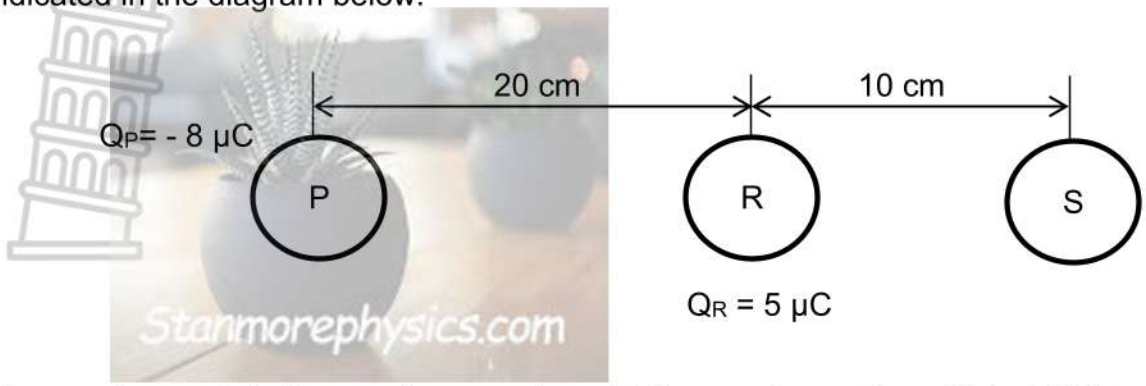
Stanmorephysics.com

7.2 Define the term *electric field at a point* in words. (2)

7.3 Calculate the net electric field at point x. (5)

Copyright reserved

A third sphere S, of unknown charge, is placed 10 cm to the right of sphere R, as indicated in the diagram below.



Stanmorephysics.com

The net electrostatic force acting on **sphere P** due to spheres R and S is 6,6 N to the right.

7.4 Determine the:

7.4.1 Electrostatic force that sphere S exerts on sphere P (5)

7.4.2 Charge on sphere S (3)

[18]

TOTAL: 100

Stanmorephysics.com

Copyright reserved

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

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

Stanmorephysics.com

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 $n = \frac{Q}{q_e}$	

Copyright reserved