LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

Stanmorephysics.com

PHYSICAL SCIENCES
CONTROL TEST 1
TERM 1
17 MARCH 2025

Stanmorephysics.com

MARKS: 100

TIME: 2 hours

This question paper consists of **11** pages and **2** data sheets

INSTRUCTIONS AND INFORMATION

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

Stanmorephysics.com

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Various 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 numbers (**1.1 – 1.10**) in the ANSWER BOOK, e.g. 1.11 E.

1.1 Vector P and vector –P are acting on a common point O. The angle between the two vectors is ...

A 0^0

B 90^0

C 180^0

D 270^0 (2)

1.2 Which ONE of the following pairs of physical quantities is vector quantities?

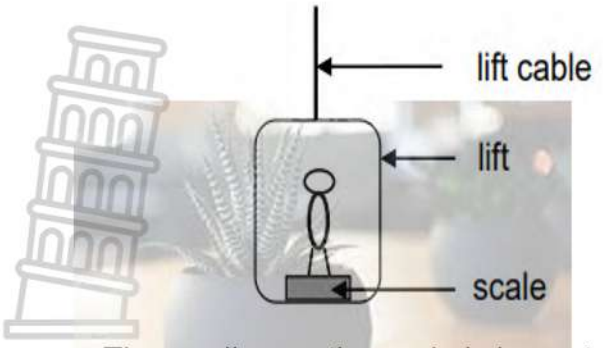
A Force and distance

B Velocity and speed

C Charge and electric field

D Electric field and force (2)

1.3 A person stands on a bathroom scale that is fixed to the floor of a lift, as shown in the diagram below.



The reading on the scale is largest when the lift moves …

A upwards at a constant speed.

B downwards at a constant speed.

C upwards at an increasing speed

D downwards at an increasing speed. (2)

1.4 Which ONE of the following is an example of a CONTACT force?

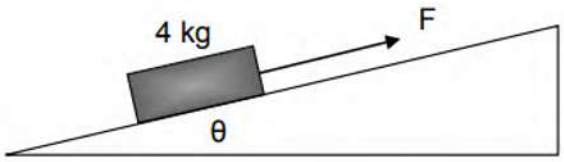
A Magnetic force

B Frictional force

C Electrostatic force

D Gravitational force (2)

1.5 A block with a mass of 4 kg is pulled upwards along a frictionless slope, inclined at an angle θ, with a force F, as shown in the sketch below.



Which ONE of the following equations can be used to calculate the magnitude of the normal force (N)?

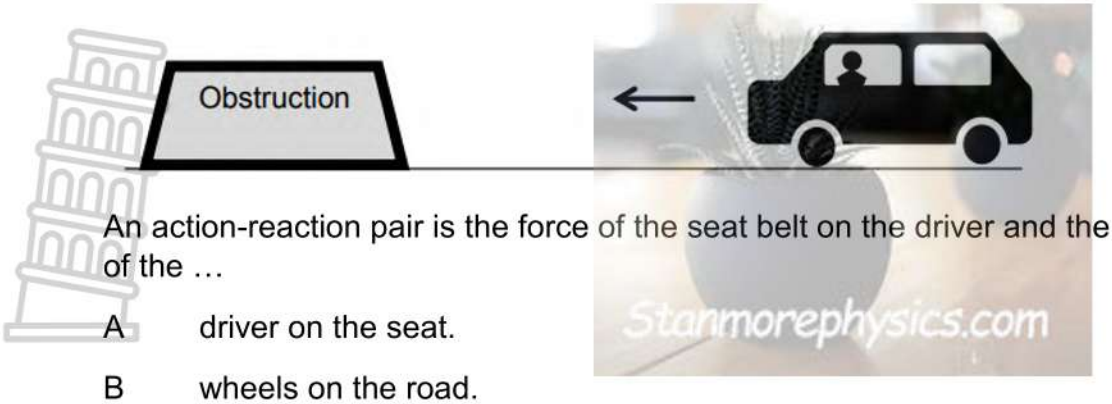
A $N = (4)(9,8)\sin\theta$

B $N = F - (4)(9,8)\cos\theta$

C $N = F + (4)(9,8)\cos\theta$

D $N = (4)(9,8)\cos\theta$ (2)

1.6 A car is travelling along a road. The driver has his seat belt on. The driver sees an obstruction in the road ahead and suddenly applies the brakes.



An action-reaction pair is the force of the seat belt on the driver and the force of the …

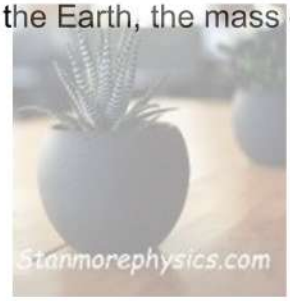
A driver on the seat.

B wheels on the road.

C driver on the seat belt.

D seat belt on the seat. (2)

1.7 The mass of an astronaut on EARTH is M. At a height above the Earth equal to twice the radius of the Earth, the mass of the astronaut will be…



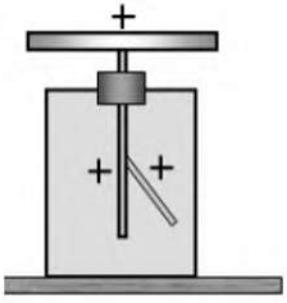
A M

B ¼ M

C 2 M

D 1/9 M (2)

1.8 The leaves of the electroscope in the diagram below are positively charged



When an object is brought close to the plate, the leaves diverge more. We can therefore conclude that the object …

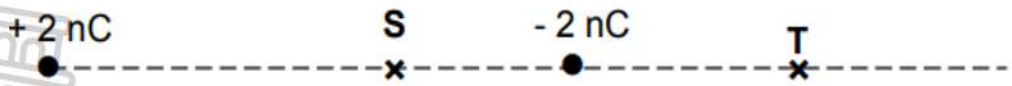
A is positively charged.

B is negatively charged.

C is not charged at all.

D releases positive charges. (2)

1.9 Two charges of + 2 n C and - 2 n C 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.

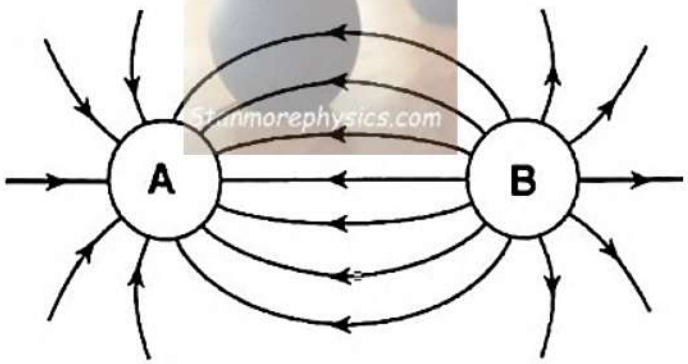


Which ONE of the following correctly represents the directions of the RESULTANT electric fields at **S** and at **T**?

	DIRECTION OF THE RESULTANT ELECTRIC FIELD AT POINT S	DIRECTION OF THE RESULTANT ELECTRIC FIELD AT POINT T
A	Right	Left
B	Left	Left
C	Right	Right
D	Left	Right

(2)

1.10 The electric field pattern between two charged spheres, **A** and **B**, is shown below.



Which ONE of the following statements regarding the charge on spheres **A** and **B** is CORRECT?

A Sphere A is negatively charged, and sphere B is positively charged.

B Sphere A is positively charged, and sphere B is negatively charged.

C Sphere A and B are both negatively charged.

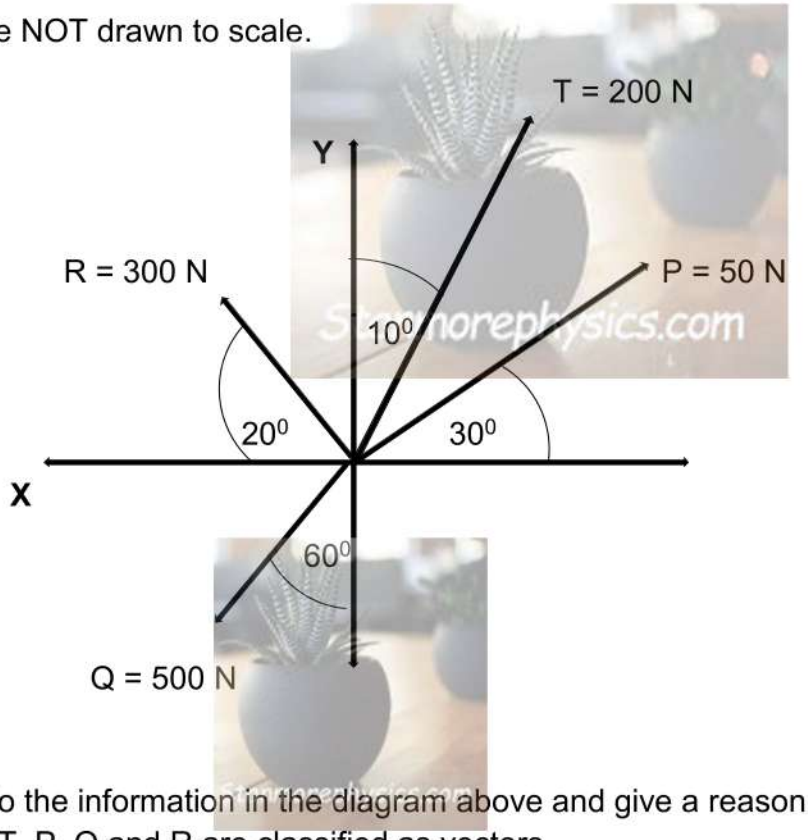
D Sphere A and B are both positively charged. (2)

[20]

QUESTION 2 (Start on a new page)

Four forces, **T**, **P**, **Q** and **R**, of magnitudes 200 N, 50 N, 500 N and 300 N respectively, act on a point O in the directions shown in the diagram below.

The forces are NOT drawn to scale.



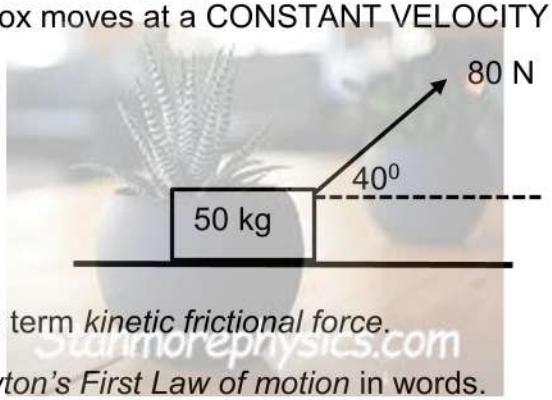
2.1 Refer to the information in the diagram above and give a reason why forces T, P, Q and R are classified as vectors. (2)

2.2 Determine the magnitude and direction of the resultant force, either by CALCULATION **or** by ACCURATE CONSTRUCTION AND MEASUREMENT. (Use scale 10 mm = 50 N.) (8)

[10]

QUESTION 3 (Start on a new page)

A box, with a mass of 50 kg, is pulled with a force of 80 N at an angle of 40º to the horizontal. The box moves at a CONSTANT VELOCITY



3.1 Define the term *kinetic frictional force*. (2)

3.2 State *Newton's First Law of motion* in words. (2)

3.3 Calculate the magnitude of the horizontal component of the applied force. (2)

3.4 Calculate the magnitude of the normal force. (4)

3.5 Calculate the coefficient of kinetic friction. (4)

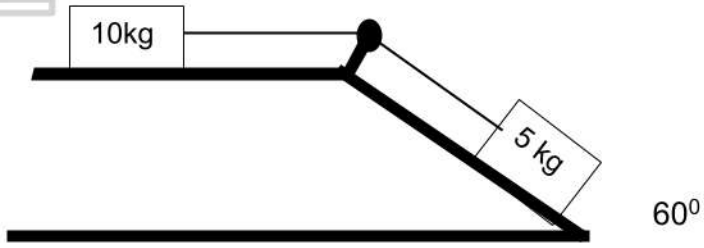
3.6 Will the coefficient of kinetic friction change if the angle of the applied force is decreased? Write only **YES** or **NO** and give a reason. (2)

[16]

QUESTION 4 (Start on a new page)

Two blocks of mass 10 kg and 5 kg respectively, are joined with an inelastic string

of negligible mass. The string runs over a frictionless pulley. The 10 kg block is on a horizontal surface while 5kg block is on an inclined plane of 60^0 with the horizontal. The coefficient of kinetic friction for both blocks is 0,3. The 5 kg block accelerates down the slope.



4.1 State *Newton's Second law of Motion* in words. (2)

4.2 Draw a labelled free-body diagram of ALL the forces acting on the 5 kg block. (4)

4.3 Calculate the frictional force between the surface and the 5 kg block (4)

4.4 Calculate the magnitude of the acceleration of the system. (6)

4.5 How will the acceleration compare if the positions of the 10 kg block and 5 kg are switched? Choose from GREATER THAN, LESS THAN or THE SAME. Explain your answer. (4)

[20]

Stanmorephysics.com

QUESTION 5 (Start on a new page)

An object of mass 250 kg is orbiting the earth at a distance **d** from the earth's surface. The weight of the object at that position is 10% less than its weight on the earth's surface.

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

5.2 Calculate the distance **d** from the earth's surface at which the satellite is orbiting. (7)

5.3 The object is moved to a new position where the distance from the centre of the earth is twice the radius of the earth.

5.3.1 Write down the mathematical relationship between the weight of the object and the distance at which it is placed from the centre of the earth. (2)

5.3.2 Determine the weight of the object at the new position. (3)

[14]

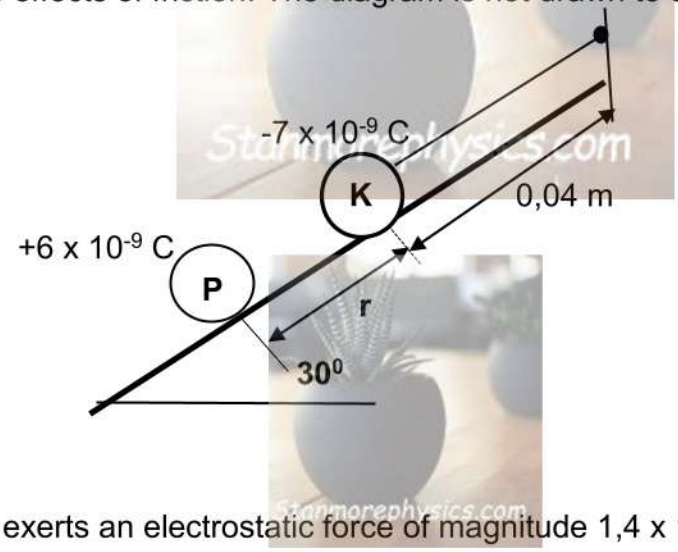


QUESTION 6 (Start on a new page)

Two charged spheres, **P** and **K**, are both stationary on a smooth, insulated surface inclined at an angle of 30^0 to the horizontal. Sphere **K,** of mass 0,02 kg and carrying a charge of -7×10^{-9} C, is connected to a 0,04m long, light inextensible string attached to point **R** at the top of the incline.

Sphere **P**, carrying a charge of $+6 \times 10^{-9}$ C, is held such that the distance between the centres of the spheres is **r**, as shown in the diagram below.

Ignore the effects of friction. The diagram is not drawn to scale.



Sphere **P** exerts an electrostatic force of magnitude $1,4 \times 10^{-3}$ N on sphere **K**.

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

6.2 Calculate the distance **r** between the spheres. (3)

6.3 Draw a labelled free- body diagram for sphere **K**. (4)

6.4 Calculate the:

6.4.1 tension in the string (5)

6.4.2 net electric field at point P (6)

[20]

TOTAL: 100

DATA FOR PHYSICAL SCIENCES GRADE 11

PAPER 1 (PHYSICS)

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	$5,98 \times 10^{24}\ kg$

Stanmorephysics.com

TABLE 2: FORMULAE/*TABEL 2: FORMULES*

MOTION/*BEWEGING*

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

FORCE/*KRAG*

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

Copyright reserved

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*

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

ELECTRIC CIRCUITS/*ELEKTRIESE STROOMBANE*

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

Stanmorephysics.com