KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 11

PHYSICAL SCIENCES

PROVINCIAL STANDARDISED ASSESSMENT

MARKING MEMORANDUM

MARCH 2026

Stanmorephysics.com

MARKS: 100

DURATION: 2 hours



Copyright reserved

QUESTION 1:

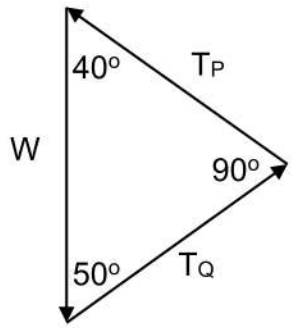
1.1	B ✓✓	(2)
1.2	D ✓✓	(2)
1.3	C ✓✓	(2)
1.4	B ✓✓	(2)
1.5	C ✓✓	(2)
1.6	D ✓✓	(2)
1.7	C ✓✓	(2)
		[14]

QUESTION 2

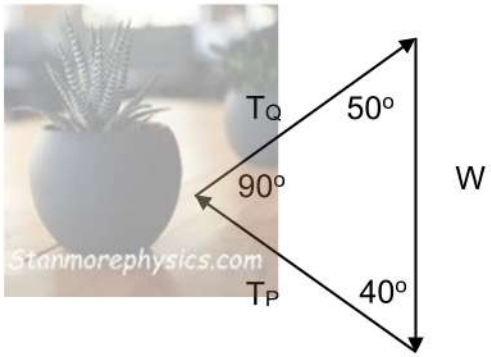
2.1 A closed vector diagram is a representation of several vectors and the resultant is zero✓ so that the last vector ends where the first vector starts. ✓ (2)

2.2

OPTION 1



OPTION 2



Marking Criteria:

- Three forces correctly drawn and labelled in a right-angled triangle. ✓
- Direction of forces correctly shown. ✓
- Any two angles correctly shown on triangle. ✓ (3)

2.3.1

OPTION 1	**OPTION 2**	**OPTION 3**
$\tan 50^\circ = \frac{T_P}{T_Q}$	$\tan 40^\circ = \frac{T_Q}{T_P}$	$\frac{\sin 50^\circ}{T_P} = \frac{\sin 40^\circ}{T_Q}$
$\tan 50^\circ$ ✓$= \frac{200}{T_Q}$ ✓	$\tan 40^\circ$ ✓$= \frac{T_Q}{200}$ ✓	$\frac{\sin 50^\circ}{200}$ ✓$= \frac{\sin 40^\circ}{T_Q}$ ✓
T_Q = 167,82 N ✓	T_Q = 167,82 N ✓	T_Q = 167,82 N ✓

(3)

Stanmorephysics.com

Copyright reserved

OPTION 1	OPTION 2	OPTION 3
$\sin 50^o = \frac{T_P}{W}$	$\cos 40^o = \frac{T_P}{W}$	$W = \sqrt{T_P^2 + T_Q^2}$
$\sin 50^o = \frac{200}{W}$ ✓	$\cos 40^o = \frac{200}{W}$ ✓	$W = \sqrt{200^2 + 167{,}82^2}$ ✓
W = 261,08 N	W = 261,08 N	W = 261,08 N
W = mg	W = mg	W = mg
261,08 = m(9,8) ✓	261,08 = m(9,8) ✓	261,08 = m(9,8) ✓
m = 26,64 kg✓	m = 26,64 kg✓	m = 26,64 kg✓

(3)

[11]

QUESTION 3

3.1 A single vector that has the same effect as two or more vectors added together. ✓✓ (2)

3.2.1 $F_x = 12\cos(30^o) - 8\cos(30^o)$ ✓ {Note: sin(60°) could replace cos(30°) in either substitution}

$= 3{,}46$ N ✓ (East) (2)

3.2.2 $F_y = 12\sin(30^o) + 8\sin(30^o)$ ✓ {Note: cos(60°) could replace sin(30°) in either substitution}

$= 10$ N ✓ (North) (2)

3.3 **POSITIVE MARKING FROM Q3.2.1 AND Q3.2.2**

$F_{3x} = F_3\cos(70^o)$ OR $F_{3x} = F_3\sin(20^o)$ ✓

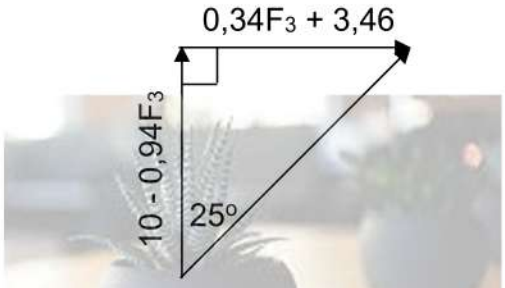
$= 0{,}34F_3$ East

$F_{3y} = F_3\sin(70^o)$ OR $F_{3x} = F_3\cos(20^o)$ ✓

$= 0{,}94F_3$ South

$F_X = 0{,}34F_3 + 3{,}46$ ✓ East

$F_Y = 10 - 0{,}94F_3$ ✓ North



$\tan(25^o) = \frac{0{,}34F_3 + 3{,}46}{10 - 0{,}94F_3}$ ✓ OR $\tan(65^o) = \frac{10 - 0{,}94F_3}{0{,}34F_3 + 3{,}46}$ ✓

$F_3 = 1{,}55$ N ✓ (6)

Copyright reserved

3.4 **POSITIVE MARKING FROM QUESTION 3.3**

$F_4 = 10 - 0{,}94F_3$

$= 10 - 0{,}94(1{,}55)$ ✓

$= 8{,}54$ N ✓ at a bearing of 180° ✓ (3)

[15]

QUESTION 4

4.1 Ticker tape is attached to the trolley, and threaded through the ticker timer. ✓
The trolley is gently pushed down the ramp without any mass pieces attached.✓
The angle of the incline is adjusted until the dots on the ticker-tape are equally spaced. ✓ (3)

4.2.1 Acceleration✓ (1)

4.2.2 Mass (of the system) / angle of the incline (any one) ✓ (1)

4.3 What is relationship between the resultant force acting on the trolley and the acceleration it produces?✓ ✓ (2)

4.4 $T = \frac{1}{f}$

$= \frac{1}{50}$ ✓

$= 0{,}02$ s

Time for 5 dot interval $= 0{,}02 \times 5$ ✓

$= 0{,}1$ s ✓ (3)

Stanmorephysics.com

4.5

OPTION 1	**OPTION 2**	**OPTION 3**
$v = \frac{\Delta x}{\Delta t}$	$v = \frac{\Delta x}{\Delta t}$	$v = \frac{\Delta x}{\Delta t}$
$v_i = \frac{0{,}007}{0{,}1}$ ✓	$v_i = \frac{0{,}007}{0{,}1}$ ✓	$v_i = \frac{0{,}021}{0{,}1}$ ✓
$= 0{,}07$ m·s^{-1}	$= 0{,}07$ m·s^{-1}	$= 0{,}21$ m·s^{-1}
$v_f = \frac{0{,}035}{0{,}1}$ ✓	$v_f = \frac{0{,}021}{0{,}1}$ ✓	$v_f = \frac{0{,}035}{0{,}1}$ ✓
$= 0{,}35$ m·s^{-1}	$= 0{,}21$ m·s^{-1}	$= 0{,}35$ m·s^{-1}
$a = \frac{\Delta v}{\Delta t}$	$a = \frac{\Delta v}{\Delta t}$	$a = \frac{\Delta v}{\Delta t}$
$a = \frac{0{,}35 - 0{,}07}{0{,}2}$ ✓	$a = \frac{0{,}21 - 0{,}07}{0{,}1}$ ✓	$a = \frac{0{,}35 - 0{,}21}{0{,}1}$ ✓
$= 1{,}4$ m·s^{-2} ✓	$= 1{,}4$ m·s^{-2} ✓	$= 1{,}4$ m·s^{-2} ✓

(4)

Stanmorephysics.com

4.6 Acceleration is directly proportional ✓to the net force (OR a α Fnet) (1)

4.7 It ensures that the mass of the system remains constant ✓✓ (2)

[17]

Copyright reserved

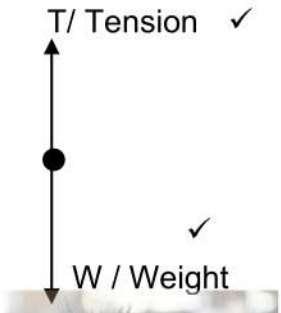
QUESTION 5

5.1 When a resultant/net force acts on an object, the object will accelerate in the direction of the force. This acceleration is directly proportional to the (net) force✓ and inversely proportional to the mass of the object. ✓ (2)

NOTE:

If the first sentence is not stated (for correct context), maximum $\frac{1}{2}$.

5.2 (2)



Note: subtract 1 mark for additional forces

5.3.1

10 kg block		**20 kg block**
$F_{net} = ma$	✓ Any one	Fnet = ma
$T + (-F_a) + (-f_k) = ma$		$W + (-T) = ma$
$T - 177 - 11,5$ ✓ $= 10a$ ✓		$(20 \times 9,8) - T = 20a$ ✓
$T - 188,5 = 10a$ _____ (eqn 1)		$196 - T = 20a$ _____ (eqn 2)

(eqn 1) + (eqn 2): $196 - 188,5 = 30a$

$7,5 = 30a$

$a = 0,25\ m \cdot s^{-2}$ ✓ (5)

5.3.2 **POSITIVE MARKING FROM QUESTION 5.3.1**

Substitute in eqn (1) or eqn(2)

OPTION 1	**OPTION 2**
$T - 188,5 = 10a$	$196 - T = 20a$
$T - 188,5 = 10(0,25)$ ✓	$196 - T = 20(0,25)$ ✓
$T = 191$ N ✓	$T = 191$ N ✓

(2)

5.4 Decrease. ✓

The vertical component of the applied force will cause the normal force to decrease. ✓

The kinetic frictional force is directly proportional to the normal force
The kinetic frictional force decreases as the normal force decreases
✓ Any one

(when μ_k is constant) (3)

[14]

Copyright reserved

QUESTION 6

6.1 Every body in the universe attracts every other body with a gravitational force that is directly proportional to the product of their masses✓ and inversely proportional to the square of the distance between their centres. ✓ (2)

6.2 $W = mg$
$= 20000 \times 9,8$ ✓
$= 196\ 000$ N ✓ (2)

6.3 **POSITIVE MARKING FROM QUESTION 6.2**

OPTION 1	OPTION 2	OPTION 3
$F = \frac{Gm_1m_2}{r^2}$ ✓ $\frac{6,67\times10^{-11}\times5,98\times10^{24}\times15000}{(6,4\times10^6+6,4\times10^6)^2}$ ✓✓ = 36 517,27 N	$g = \frac{GM}{r^2}$ ✓ $\frac{6,67\times10^{-11}\times5,98\times10^{24}}{(6,4\times10^6+6,4\times10^6)^2}$ ✓ $= 2,4345\ m\cdot s^{-2}$ $W = mg$ $= 15000 \times 2,4345$ ✓ $= 36\ 517,5$ N	$g_{new} = \frac{1}{4}\times9,8$ ✓✓ $= 2,45\ m\cdot s^{-2}$ $W = mg$ $=15000 \times 2,45$ ✓ $= 36\ 750$ N

$$\%\ \text{Loss in weight} = \frac{196\ 000 - 36517,27}{196\ 000} \times 100 \checkmark$$
$$= 81,34\% \checkmark$$ (5)

6.4
- The rocket is further away from the centre of the Earth OR above the surface of the earth, therefore gravitational acceleration decreases. ✓
- Since BOTH the gravitational acceleration and mass decrease✓, there is a greater percentage reduction in weight.

OR

- The gravitational force is directly proportional to the product of the masses and inversely proportional to the square of the distance between the centres. ✓
- Since BOTH the mass of the rocket decreases and the distance between the rocket and centre of the earth increases, ✓there is a greater percentage reduction in weight.

(2)

[11]

Copyright reserved

QUESTION 7

7.1 $n = \frac{Q}{q_e}$ ✓

$= \frac{8 \times 10^{-6}}{1,6 \times 10^{-19}}$ ✓ ACCEPT : $= \frac{-8 \times 10^{-6}}{-1,6 \times 10^{-19}}$ ✓

$= 5 \times 10^{13}$ electrons ✓ (3)

7.2 The electrostatic force experienced per unit positive charge placed at the point. ✓✓ (2)

7.3 $E_p = \frac{kQ}{r^2}$ ✓

$= \frac{9 \times 10^9 \times 8 \times 10^{-6}}{0,25^2}$ ✓

$= 1,152 \times 10^6$ N·C^{-1} left

$E_R = \frac{kQ}{r^2}$

$= \frac{9 \times 10^9 \times 5 \times 10^{-6}}{0,05^2}$ ✓

$= 1,8 \times 10^7$ N·C^{-1} right

$E_{net} = E_R - E_P$ (Right +) OR $E_{net} = E_P - E_R$ (Left +)

$= 1,8 \times 10^7 - 1,152 \times 10^6$ ✓ $= 1,152 \times 10^6 - 1,8 \times 10^7$ ✓

$= 1,6\,85 \times 10^7$ N·C^{-1} right ✓ $= -1,6\,85 \times 10^7$ N·C^{-1}

$= 1,6\,85 \times 10^7$ N·C^{-1} right ✓ (5)

7.4.1 $F_{RP} = \frac{kQ_RQ_P}{r^2}$ ✓

$= \frac{9 \times 10^9 \times 5 \times 10^{-6} \times 8 \times 10^{-6}}{0,2^2}$ ✓ ✓

$= 9$ N right

$F_{net} = F_{RP} + F_{SP}$

$6,6 = 9 + F_{SP}$ ✓

$F_{SP} = -2,4$ N

$= 2,4$ N left ✓ (5)

7.4.2 **POSITIVE MARKING FROM 7.4.1**

$F_{SP} = \frac{kQ_SQ_P}{r^2}$

$2,4$ ✓ $= \frac{9 \times 10^9 \times Q_S \times 8 \times 10^{-6}}{0,3^2}$ ✓

Magnitude of $Q_S = 3 \times 10^{-6}$ C. ∴ $Q_S = -3 \times 10^{-6}$ C ✓ (3)

[18]

TOTAL: 100

Copyright reserved