Province of the
EASTERN CAPE
EDUCATION

OR TAMBO INLAND DISTRICT

GRADE 11



PHYSICAL SCIENCES

Controlled Test

MARCH 2024

MEMORANDUM

MARKS: 100

THIS MEMORANDUM CONSISTS OF FIVE PAGES

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QUESTION 1

1.1 D✓✓ (2)

1.2 B✓✓ (2)

1.3 A✓✓ (2)

1.4 D✓✓ (2)

1.5 C✓✓ (2)

1.6 D✓✓ (2)

1.7 B✓✓ (2)

1.8 A✓✓ (2)

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QUESTION 2

2.1.1 Single vector having the same effect as two or more vectors together.✓✓ (2)

OR

Resultant is the vector sum of two or more vectors.

2.1.2

Option 1	**Option 2**	**Option 3**
$F_y = 30 \sin 60°$ ✓ $F_y = 25.98\ N$ ✓	$F_y = 30 \cos 30°$ ✓ $F_y = 25.98\ N$ ✓	$F_y = 30 \sin 120°$ ✓ $F_y = 25.98\ N$ ✓

(2)

2.1.3 $R_y = 25.98\ N$, downwards

$F_x = 30 \cos 60°$ $F_x = 15\ N$✓, $left$	$F_x = 30 \sin 30°$ $F_x = 15\ N$✓, $left$

$R_x = 25\ N - 15\ N - 26\ N$

$R_x = -16\ N$

$R_x = 16\ N$✓, $left$

$R^2 = {R_x}^2 + {R_y}^2$

$R^2 = (16)^2 + (25.98)^2$ ✓

$R = 30.51\ N$ ✓

$\tan\theta = \frac{16}{25.98}$ ✓

$\theta = 31.63°$ ✓ (6)

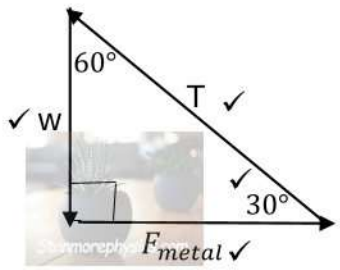
2.2.1 $w = mg$ ✓

$w = (2.5)(9.8)$ ✓

$w = 24.50\ N$ ✓ (3)

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2.2.2



(4)

2.2.3 A closed vector diagram is set of vectors drawn on the Cartesian using tail to head method✓ and that has a resultant with a magnitude of zero✓. (2)

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QUESTION 3

3.1 A body will remain in its state of rest or motion at constant velocity unless a non-zero resultant/net force acts on it.✓✓ (2)

3.2 $F_{net} = 0$ (N)✓✓ (2)

3.3
$N = mg$ ✓
$N = (4)(9.8)$ ✓
$N = 39.2\ N$ ✓ (3)

3.4
$F_{net} = 0$
$F + (-f) = 0$ ✓
$15 - f = 0$ ✓
$f = 15\ N$
$f_k = \mu_k N$ ✓
$15 = \mu_k(39.2)$ ✓
$\mu = 0.38$ ✓ (5)

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QUESTION 4

4.1 What is the relationship between the acceleration and net force when the mass of the trolley is kept constant? ✓✓ (2)

OR

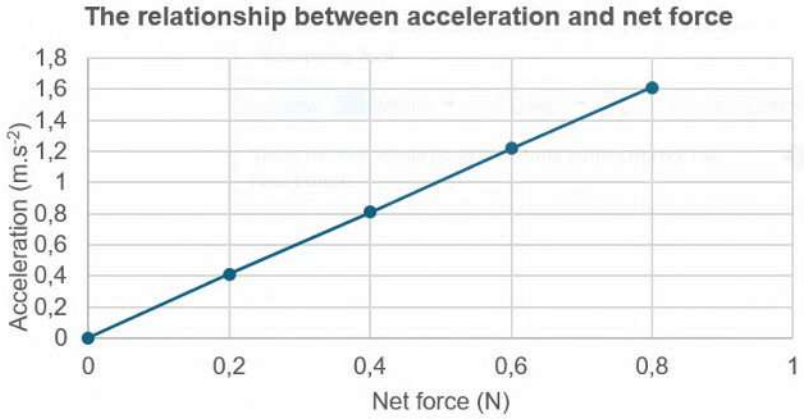
How will the net force affects the acceleration (of the trolley) when the mass of the trolley is kept constant?

4.2.1 Net force✓ (1)

4.2.2 Acceleration✓ (1)

4.3 Newton's Second Law✓ (1)

4.4



Marking criteria for the graph	
Axes with correct/ appropriate scale	✓
3 or more coordinates correctly plotted	✓✓
Drawing a line of best fit	✓

(4)

4.5

Option 1	Option 2
$Gradient = \frac{1.64-0}{0.8-0}$ ✓✓ $Gradient = 2.05$ $mass = \frac{1}{2.05}$ ✓✓ $= 0.49\ kg$ ✓	$Gradient = \frac{1.64-0.41}{0.8-0.2}$ $Gradient = 2.05$ $mass = \frac{1}{2.05} = 0.49\ kg$

(5)

4.6 The acceleration is directly proportional to net force if the mass of the trolley is kept constant.✓✓ (2)

4.7 Presence of friction force.✓ (1)

4.8 To compensate the friction, increase the angle until the velocity is constant.✓ (1)

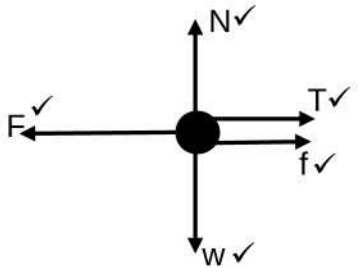
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QUESTION 5

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

5.2 $f_k = \mu_k N$ ✓
$f_k = (0.2)(4 \times 9.8)$ ✓
$f_k = 7.84\ N$ ✓ (3)

5.3



(5)

5.4.1 $F_{net} = ma$ ✓
$F - f - T = ma$
$40 - 7.84 - T$ ✓$= 4 \times 2$ ✓
$T = 24.16\ N$ ✓ (4)

5.4.2 $F_{net} = ma$
$T - w = ma$
$24.16 - m(9.8)$ ✓$= m(2)$ ✓
$m = 2.05\ kg$ ✓ (3)

5.5 DECREASES✓ (1)

5.6 As the angle increases, the normal decreases✓ and the friction will also decrease✓. (2)

Frictional force is directly proportional to the normal force✓,
OR $f_k \propto N$.

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QUESTION 6

6.1 Each particle in the universe attracts every other particle 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 $F = \frac{Gm_1m_2}{r^2}$ ✓
$F = \frac{(6.67 \times 10^{-11})(4600)(5.98 \times 10^{24})}{(32000 \times 1000 + 6.38 \times 10^6)^2}$ ✓✓
$F = 1245.59\ N$ ✓ (4)

6.3 EQUAL TO✓ (1)

6.4 When object A exerts a force on object B, object B simultaneously exerts an oppositely directed force of equal magnitude on object A.✓✓ (2)

6.5 *weight is the gravitational force exerted by the Earth on an object*✓, whilst *mass is the amount of matter in a body.*✓ (2)

6.6 $F = \frac{Gm_1m_2}{r^2}$
622.795✓ $= \frac{(6.67 \times 10^{-11})(5.98 \times 10^{24})m_Y}{(32000 \times 1000 + 6.38 \times 10^6)^2}$ ✓✓
$m_Y = 2300\ kg$ ✓ (4)

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TOTAL: 100

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