LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

MOGALAKWENA DISTRICT

PHYSICAL SCIENCES

NATIONAL SENIOR CERTIFICATE

TERM 1 CONTROL TEST
07 MARCH 2023
GRADE 11

MEMORANDUM

MARKS : 100 **DURATION: 2 hours**

STARTING TIME: 08H00

This question paper consists of 8 pages including this one

QUESTION 1

1.1 D✓✓
1.2 D✓✓
1.3 A✓✓
1.4 A✓✓
1.5 B✓✓
1.6 B✓✓
1.7 D✓✓
1.8 D✓✓
1.9 D✓✓
1.10 B✓✓

[20]

QUESTION 2

2.1 Resultant (net) vector ✓ (1)

2.2

2.2.1 $F_y = F\sin\theta$ (2)

$= 50\sin 30° \checkmark$ OR $50\cos 60°$

$= 25\ N \checkmark$

2.2.2 $F_x = F\cos\theta$ (3)

$= 50\cos 30°$ OR $50\sin 60°$

$= 43.30\ N$ to the left ✓

Substitution marks awarded within the question even if calculations for F_x and F_y are wrong

Horizontal resultant

$F_{Rx} = (-43.30) + (80)$ ✓

$= 36.70\ N$ to the right ✓

2.2.3 **Positive marking from Questions 2.2.1 and 2.2.2** (2)

Vertical resultant

F_{Ry}= 25 N upwards

Resultant Force

$F_R^2 = F_{Rx}^2 + F_{Ry}^2$

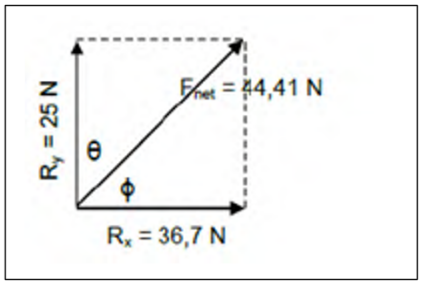
$F_R^2 = (36.70)^2 + (25)^2$ ✓

F_R=44.41 N ✓

2.2.4 **Positive marking from Question 2.2.1 and 2.2.2** (2)

$\tan\theta = \frac{36.7}{25}$ ✓

θ=55.74° ✓



OR

$\sin\theta = \frac{36.7}{44.41}$

θ=55.74°

OR

$\cos\theta = \frac{25}{44.41}$

θ=55.74°

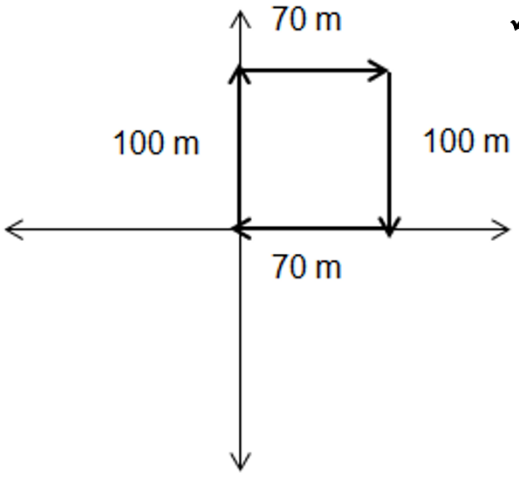
Also accept direction as:

$\emptyset = 90 - 55.74°$

$\emptyset = 34.26°$

2.3

2.3.1 (2)



✓✓Correct diagram

2.3.2 The first vector starts at the origin and the last vector ends at the origin. (The resultant would have a magnitude of zero since it is drawn from the tail of the first vector to the head of the final vector) ✓ (1)

[13]

QUESTION 3

3.1 (2)

Marking criteria
- The dependent and independent variables are stated correctly.
- State the relationship between dependent and independent variable

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

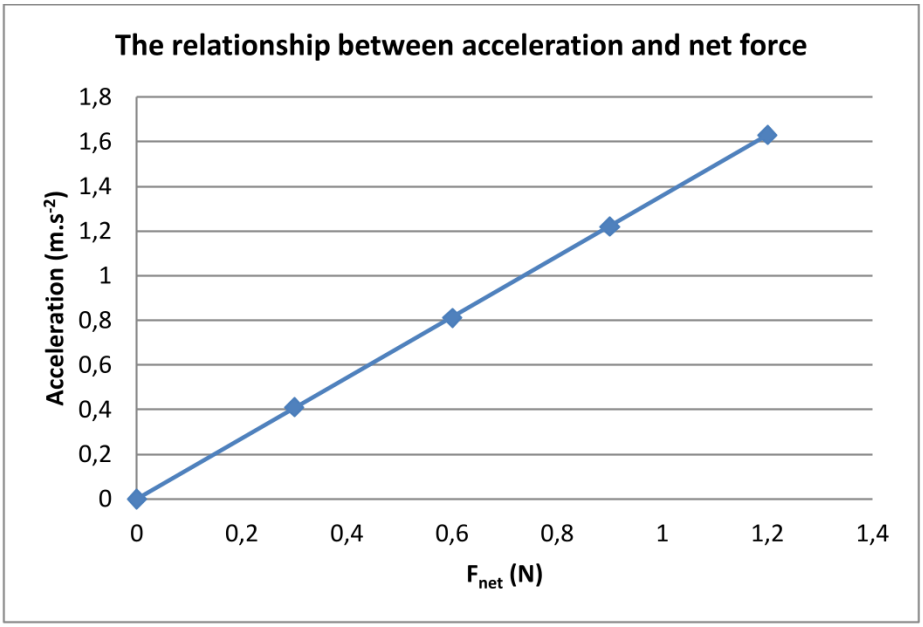
3.2

3.2.1 Net force ✓ (1)

3.2.2 Acceleration ✓ (1)

3.2.3 Newton's second law of motion ✓ (1)

3.3



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

(4)

3.4 $\text{Gradient} = \frac{1,63 - 0 \checkmark}{1,2 - 0 \checkmark} = 1,36 \checkmark$ (3)

OR

$$\text{Gradient} = \frac{1,63 - 1,22}{1,2 - 0.9} = 1,36$$

OR

$$\text{Gradient} = \frac{1,22 - 0,81}{0,9 - 0,6} = 1,36$$

3.5 **POSITIVE MARKING FROM QUESTION 3.4.** (2)

$$\text{Gradient} = \frac{a}{F_{Net}} = \frac{1}{m}$$

$$1,36 = \frac{1}{m} \checkmark$$

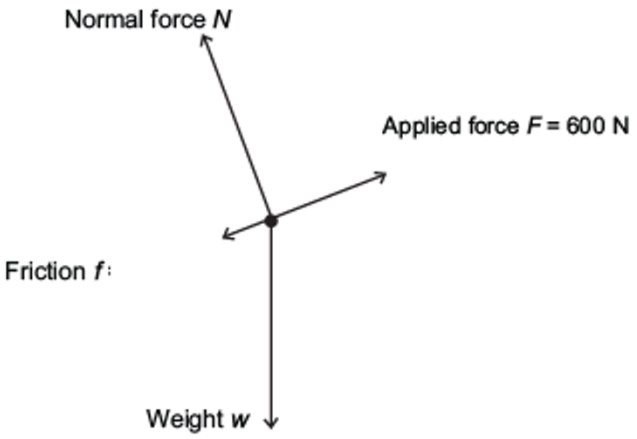
m = 0.74 kg ✓

3.6 For a constant applied force, an increase in mass decreases the negative acceleration. This cause the stopping time to increase and therefore the vehicle has a greater stopping distance. ✓✓ (2)

[16]

QUESTION 4

4.1 (4)



	Accept the following symbols
N✓	F_N/ Normal force
Ff✓	Kinetic friction force/ f_K/ F_f/ F_r
Fg✓	W / mg
F✓	Fa/Force Applied/600N

NB: Do not penalise for the length of the arrows

4.2 $f_k = \mu N$ (3)

$= \mu mg\cos\theta$ ✓

$= 0{,}145\ (150)(9{,}8)\cos 20°$ ✓

$= 200{,}30$ N ✓

4.3 $W_{||} = mg\sin\theta$ (6)

$= (150)(9{,}8)\ \sin 20°$

$= 502{,}77$ N down the slope ✓

$F_{net} = ma$

$(F_{app}) + (-W_{||}) + (-f) = ma$ ✓

$(600) + (-502{,}77) + (-200{,}30)$ ✓ $= 150a$ ✓

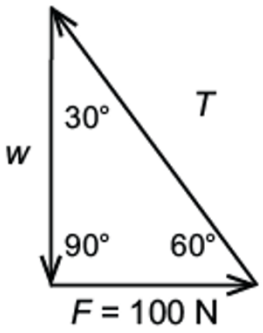
$-103.07 = 150a$

$a = -0{,}69\ m.s^{-2}$ ✓

$a = 0{,}69\ m.s^{-2}$ down the slope ✓

4.4 It means that the sled will slow down. ✓ (1)

4.5 (3)



$\sin 30° = \frac{100}{T}$ ✓

$T = \frac{100}{\sin 30°}$ ✓

T = 200 N ✓

[17]

QUESTION 5

5.1 Every object in the universe attracts every other object in the universe with a force that is directly proportional to the product of their masses ✓and inversely proportional to the square of distance✓ between their centres. ✓ (3)

5.2 The mass of an object is the amount of matter found in an object. ✓
The weight of an object is the force with which the centre of a planet attracts an object. ✓ (2)

5.3 $F= \frac{Gm_1m_2}{r^2}$ ✓ (5)

$4,6\times10^{15}$✓$= \frac{(6,67\times10^{-11})(6,4\times10^{23})(9,6\times10^{15})✓}{r^2}$

$r=9,44\times10^{6}$m ✓

5.4 $F= \frac{Gm_1m_2}{r^2}$ ✓ (3)

$= \frac{(6,67\times10^{-11})(9,6\times10^{15})(72)✓}{(7,4\times10^{6})^2}$

$=8,42\times10^{-7}$N ✓

[13]

QUESTION 6

6.1 The force between two charges is directly proportional to the product of the charges and inversely proportional to the distance between the charges squared✓✓ (2)

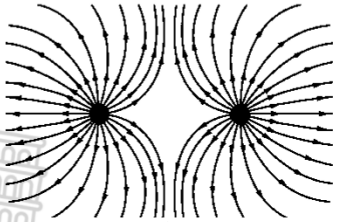
6.2 $F=k\frac{Q_1Q_2}{r^2}$ ✓ (4)

$=9\times10^{9}\frac{\left(8\times10^{-9}\right)\left(5\times10^{-9}\right)✓}{(40\times10^{-3})^2}$ ✓

$=2,25\times10^{-4}$N ✓

6.3 A region in space in which an electric charge ✓ will experience a force ✓ (2)

6.4 (2)



✓ direction ✓ shape

6.5 (8)

$E_{8nC} = k\frac{Q}{r^2}$ $E_{5nC} = k\frac{Q}{r^2}$

$= \frac{(9\times10^{9})(8\times10^{-9}\checkmark)}{(10\times10^{-3}\checkmark)^2}$ $= \frac{(9\times10^{9})(5\times10^{-9})\checkmark}{(30\times10^{-3})^2}\checkmark$

$= 720\ 000\ N.C^{-1}$ ✓ $= 50\ 000\ N.C^{-1}$ ✓

E_{net} = 720 000 – 50 000 ✓ (towards the right – positive direction)

$= 670\ 000\ NC^{-1}$ ✓

6.6 F = qE $= (1,6\times10^{-19}) \times (670\ 000)$ ✓ (3)

$= 1,07 \times 10^{-13}$ N ✓ towards the +8nC charge ✓

[21]

GRAND TOTAL: 100 MARKS