LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

CAPRICORN DISTRICT

NATIONAL
SENIOR CERTIFICATE

GRADE 11

PHYSICAL SCIENCES
CONTROLLED TEST NO.1
MEMORANDUM

NAME OF SCHOOL______________________________________

MARKS: 100

This MEMORANDUM consists of 7 pages including the cover page

SECTION A

QUESTION 1

1.1.	B√√	(2)
1.2.	B√√	(2)
1.3.	C√√	(2)
1.4.	B√√	(2)
1.5.	D√√	(2)
1.6.	A√√	(2)
1.7.	B√√	(2)
1.8.	D√√	(2)
1.9.	A√√	(2)
1.10.	B√√	(2)

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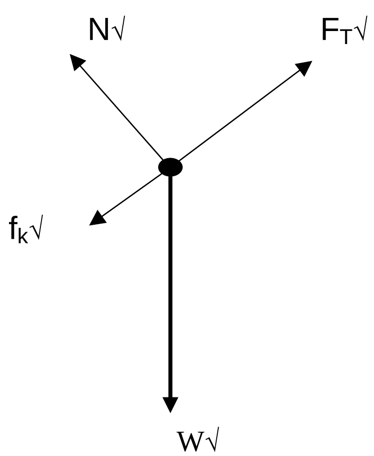
SECTION B
QUESTION 2

2.1. Newton's Second law of Motion states that when a resultant /net force acts on an object will accelerate in the direction of the force. √ This acceleration is directly proportional to the force and inversely proportion to the mass of the object. √ (2)

2.2. (4)



Accepted labels	
W	F_g / F_w / weight/mg /gravitational force
f_k	$F_{friction}$/ F_f / friction
N	F_N /F_{normal} / normal force
F_T	F_t/ T/ tension

2.3. Calculate the:

2.3.1. Up the incline as positive (5)

$F_{net} = ma$

$F_T + f_k + W_{//} = ma$

$F_T + \mu_k N + mgsin30° = ma$

$F_T + \mu_k mgcos30° + mgsin30° = ma\surd$

$F_T - (0.3)(6)(9.8)\surd - (6)(9.8)sin30°\surd = (6)(4)\surd$

$F_T = 63.58\ N\surd$

2.3.2. REMAINS THE SAME. (1)

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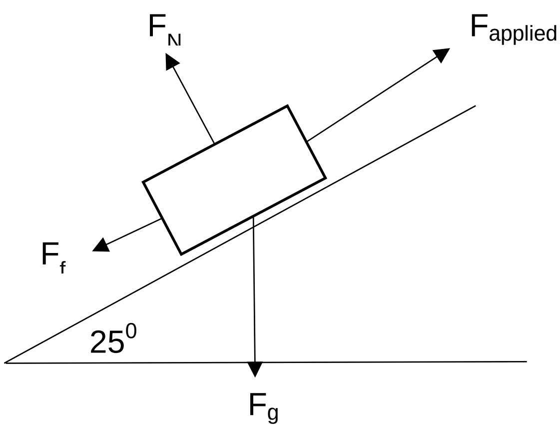
QUESTION 3

3.1. (2)



Acceptable labelling	
F_g	W / F_w / weight/mg /gravitational force
F_f	$F_{friction}$/ / f_k/ friction
F_N	N /F_{normal} / normal force

3.2. $F_{net} = ma\surd$ (5)

$7400 = 1400 \times a\surd$

$\therefore a = 5.29\ m \cdot s^{-1}\surd$

3.3. $F_f = \mu k\ F_N\surd$ (3)

$= \mu k\ mg \cos\theta$

$= 0.23 \times 1400 \times 9.8 \cos 25°\surd$

$= 2.86 \times 10^3\ \text{N}\surd$

3.4 $F_{net} = F_a + F_f \cos 180° + mgsin\theta \cos 180°\ \surd$

. $7400\surd = F_a - 2.86 \times 10^3 - 1400 \times 9.8 \sin 25°\surd$ (4)

$= 16058.32\ N\ \surd\ or\ 1.61 \times 10^4\ N$

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QUESTION 4

4.1. Any two objects in the universe attract each other √ with a force directly proportional to the product of their masses√ and inversely proportional to the square of the distance between their centres√ (2)

4.2. $F = \frac{Gm_1 m_2}{R^2}$√ where R is the distance between the centres of the two (5)

$5000√= \frac{(6.67 \times 10^{-11})(5.98 \times 10^{24})(615)√}{R^2}$

$R = 7.0 \times 10^6\ m$

$height = R - r$ where r is the radius of the earth

$= 7.0 \times 10^6 - 6.38 \times 10^6$√

$= 6.2432 \times 10^5\ m$

$= 6.24\ km$√

4.3. (3)

$$F = \frac{Gm_1 m_2}{r^2}$$

$$= \frac{Gm_1 2m_2}{(2r)^2}√$$

$$= {}^1/_2 \frac{Gm_1 m_2}{r^2}$$

$$= {}^1/_2 (5000)√$$

$$= 2500\ N√$$

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QUESTION 5

5.1 $\mu_s = \frac{F_{s,max}}{F_N}$√√ (2)

5.2.1 Use the checklist to mark this question. (2)

The investigative question has the:	1	0
Dependant variable		
Independent variable		

Example of an investigative question:
Is the coefficient of static friction for the shoe on the tile bigger than, smaller than or equal to 0,5? **OR**
What is the coefficient of static friction for the shoe on the tile? *OR ANY AS LONG AS BOTH VARIABLES ARE SHOWN*

5.2.2 **Apparatus for method 1:** (2)
Protractor√
Ruler√
Apparatus for method 2
Spring balance
Scale

5.2.3 **Method 1** (3)
Place the shoe on the tile. Lift the one end of the tile gradually until the

shoe JUST STARTS TO SLIDE down the tile. √

IF PROTRACOR USED

Measure the angle between the tile and the horizontal surface. √

IF RULER USED:

Measure any two of the following: perpendicular height of the tile, length of the tile or the length from the foot of the tile to the perpendicular height and then use trigonometry to determine the angle √

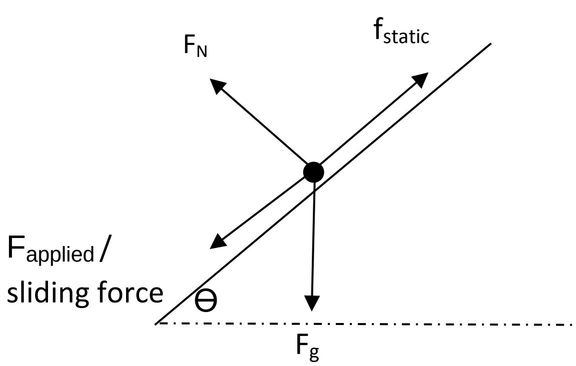
The following free body diagram illustrates the different forces acting on the shoe.

Use the checklist to mark this question.

The free body diagram:	**1**	**0**
Normal force and force of friction on the shoe correctly indicated.		
Relationship between the angle that the inclined plane forms with the horizontal and the static force of friction correctly.		

(2)

{5}



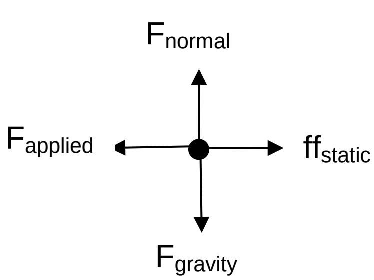
OR

Method 2

Place a heavy object in the shoe and determine the mass of the shoe and the object. √

Pull the shoe with the heavy object inside with a spring balance. √

Take the reading on the spring balance (F) when the shoe just starts to move √



The free body diagram:	1	0
Normal force on the shoe correctly indicated.		
Force of friction on the shoe correctly indicated.		

5.2.4 **Method 1** (2)

Size of the angle between tile and floor when shoe just starts to slide. √√

Method 2

Mass of shoe and heavy object.√ Reading on spring balance when shoe just starts to move. √

5.2.5 (2)

Method 1

The normal force, $F_N = F_g \cos\theta$ and

$$F_s = \mu_s . F_g \cos\theta$$

$$\mu_s = \frac{F_s}{F_g \cos\theta} = \tan\theta$$

If μ_s is bigger or equal to 0,5, the grocer is not guilty.
If μ_s is smaller than 0,5, the grocer is guilty.

The conclusion:	1	0
Correct mathematical expression to determine coefficient of friction.		
Indicates how it will be determined whether grocer is guilty or not		

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QUESTION 6

6.1. Bond energy is the amount of energy required to break one mole of a particular covalent bond in the gaseous state.√√ (2)

6.2. H-F is the strongest.√ (2)
largest amount of energy is required to break one mole particles with the bond√

6..3.
6.3.1 N_2√ +$3H_2 \rightarrow NH_3$ √ balancing√ (3)
6.3.2. N_2: triple non-polar covalent√ (2)
NH_3: single polar covalent√
6.3.3. Draw a Lewis diagram of the NH_3 molecule (2)

6.3.4 Trigonal pyramidal √ (2)

6.3.5. Polar√- has polar bonds (Δ EN=0.9) and asymmetrical shape that results in a permanent dipole√ (2)

6.4 What type of forces-interatomic or intermolecular- are involved in the following? (2)

6.4.1. Intermolecular√√ (2)

6.4.2. Intermolecular √√ (2)

6.4.3. Intermolecular√√ (2)

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QUESTION 7

7.1 Higher heat capacity√√ . (2)

7.2. Water has strong hydrogen bonding between it particles√. This means, it takes more heat to raise the temperature of water√ one degree than any other liquid (except ammonia). (4)
This is because a lot of heat added to water is used to break strong hydrogen bonds√ and not to increase the motion of the water molecules√, causing temperature change; this keeps the temperature near the ocean relatively constant.

7.3. It would look like mars. There would be large changes in temperature√ and life would not exist√. (2)

[8]

TOTAL: 100