



Education and Sport Development

Department of Education and Sport Development

Departement van Onderwys en Sport Ontwikkeling

Lefapha la Thuto le Tihabololo ya Metshameko

NORTH WEST PROVINCE

NATIONAL SENIOR CERTIFICATE

GRADE 11

**TECHNICAL SCIENCES
2018 JUNE EXAMINATION MEMORANDUM**

MARKS: 150

TIME: 3 HOURS

This memorandum consists of 10 pages



NW/JUNE/TEC-SCNE/ EMIS/6*****

QUESTION 1

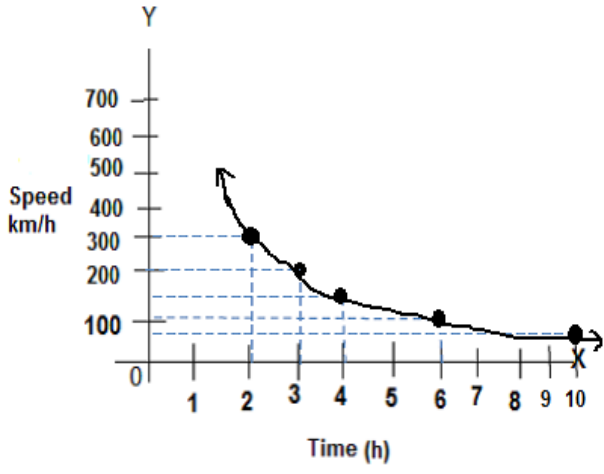
- 1.1. D ✓✓
1.2. C ✓✓
1.3. D ✓✓
1.4. B ✓✓
1.5. B ✓✓
1.6. D ✓✓
1.7. B ✓✓
1.8. B ✓✓

[16]**QUESTION 2**

- 2.1 E ✓✓
2.2 H ✓✓
2.3 F ✓✓
2.4 A ✓✓
2.5 B ✓✓
2.6 G ✓✓
2.7 D ✓✓
2.8 C ✓✓

[16]

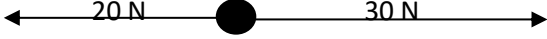
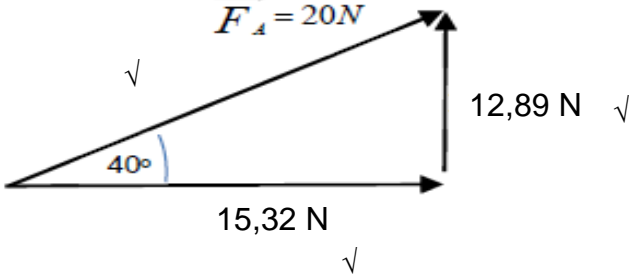
QUESTION 3

3.1	<p style="text-align: center;">Speed vs. Travel Time</p>  <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="2" style="text-align: center;">Marking Criteria</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Heading</td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="text-align: center;">Labelling of the x-axis with the correct units</td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="text-align: center;">Labelling of the y-axis with the correct units</td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="text-align: center;">Plotting of the points on the graph</td> <td style="text-align: center;">✓✓</td> </tr> <tr> <td style="text-align: center;">Form of the graph</td> <td style="text-align: center;">✓</td> </tr> </tbody> </table>	Marking Criteria		Heading	✓	Labelling of the x-axis with the correct units	✓	Labelling of the y-axis with the correct units	✓	Plotting of the points on the graph	✓✓	Form of the graph	✓
Marking Criteria													
Heading	✓												
Labelling of the x-axis with the correct units	✓												
Labelling of the y-axis with the correct units	✓												
Plotting of the points on the graph	✓✓												
Form of the graph	✓												
3.2	<p>Speed is Inversely proportional to time ✓</p> <p>As the (Speed) decreases, (Time) increases or vice versa ✓✓</p>												

[9]



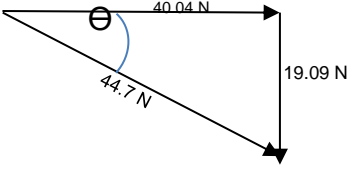
QUESTION 4

4.1	A single vector that has the same effect as all the other vectors acting on an object ✓✓ (2)
4.2.1	 ✓✓ ✓✓ (4)
4.2.2	$\vec{F}_R = \vec{F}_1 + \vec{F}_2 \quad \checkmark$ $\vec{F}_R = 30 + (-20) \quad \checkmark\checkmark$ $\vec{F}_R = 10N$ <p>(3)</p>
4.3.1	$\vec{F}_R^2 = \vec{F}_1^2 + \vec{F}_2^2 \quad \checkmark$ $\vec{F}_R^2 = 2^2 + 5^2 \quad \checkmark$ $\vec{F}_R = 5,39 N \quad \checkmark$ <p>(3)</p>
4.4.1	$\vec{f}_x = \vec{F} \cos \theta \quad \checkmark$ $\vec{f}_x = 20 \cos 40^\circ \quad \checkmark$ $\vec{f}_x = 15,32N \quad \checkmark$ <p>(3)</p>
4.4.2	$\vec{f}_y = \vec{F} \sin \theta \quad \checkmark$ $\vec{f}_y = 20 \sin 40^\circ \quad \checkmark$ $\vec{f}_y = 12,86N \quad \checkmark$ <p>(3)</p>
4.4.3	 <p>(3)</p>

[21]



QUESTION 5

5.1	FOR F_1	FOR F_2
	$\vec{f}_{1x} = \vec{F}_1 \cos \theta$ $\vec{f}_{1x} = 20 \cos 37^\circ$ $\vec{f}_{1x} = 15.97N \text{ To the Right } \checkmark$	$\vec{f}_{2x} = \vec{F}_2 \cos \theta$ $\vec{f}_{2x} = 40 \cos 53^\circ$ $\vec{f}_{2x} = 24.07N \text{ To the Right } \checkmark$
	$\vec{f}_{1y} = \vec{F}_1 \sin \theta$ $\vec{f}_{1y} = 20 \sin 37^\circ$ $\vec{f}_{1y} = 12.04N \text{ Upward } \checkmark$	$\vec{f}_{2y} = \vec{F}_2 \sin \theta$ $\vec{f}_{2y} = 40 \sin 53^\circ$ $\vec{f}_{2y} = 31.95N \text{ Downward } \checkmark$
	RESULTANT	
	$\vec{F}_{x(RES)}$ $\vec{f}_{x(RES)} = \vec{F}_{1x} + \vec{F}_{2x}$ $\vec{f}_{x(RES)} = 15.97 + 24.07$ $\vec{f}_{x(RES)} = 40.04N \text{ RIGHT } \checkmark$	$\vec{F}_{y(RES)}$ $\vec{f}_{y(RES)} = \vec{F}_{1y} + \vec{F}_{2y}$ $\vec{f}_{y(RES)} = 12.04 + (-31.95)$ $\vec{f}_{y(RES)} = -19.91N$ $\vec{f}_{y(RES)} = 19.91N$ $\text{Downward } \checkmark$
$\vec{F}_{Res}^2 = \vec{F}_{x(Res)}^2 + \vec{F}_{y(Res)}^2$ $\vec{F}_{Res} = \sqrt{(40.04)^2 + (19.91)^2}$ $\vec{F}_{Res} = 44.7N \checkmark \checkmark$		

(8)

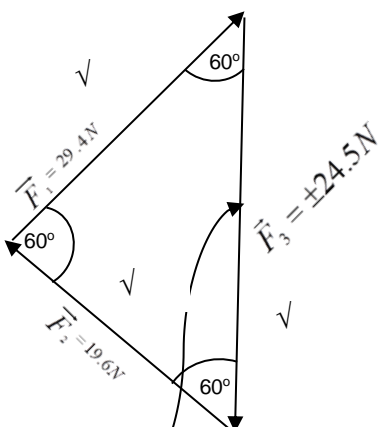
5.2	$\tan \theta = \frac{\vec{F}_{y(Res)}}{\vec{F}_{x(Res)}} = \frac{19.91}{40.04} \checkmark \checkmark$ $\theta = \tan^{-1}(0.497) \checkmark$ $\theta = 0.46^\circ \checkmark$ <p>∴ Using the bearing method:</p> $\theta = 90^\circ + 0.45^\circ = 90.45^\circ$ <p>Bearing of $90.45^\circ \checkmark$</p>
-----	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

(5)

[13]



QUESTION 6

6.1.1	$\vec{F}_1 = mg \checkmark$ $= 3 \times 9.8 \checkmark$ $\vec{F}_1 = 29.4N \checkmark$ <p style="text-align: right;">(3)</p>
6.1.2	$\vec{F}_2 = mg$ $= 2 \times 9.8 \checkmark$ $\vec{F}_2 = 19.6N \checkmark$ <p style="text-align: right;">(2)</p>
6.2	<p>Construction</p> <p>1cm:3N \checkmark</p> <p>$\vec{F}_1 = 29.4N = 9.8cm$</p> <p>$\vec{F}_2 = 19.6N = 6.5cm$</p>  <p>$\vec{F}_3 = \pm 8.2cm$</p> <p>$\therefore \vec{F}_3 = \pm 24.5N \checkmark$</p> <p>$\vec{F}_3 = \vec{W} = mg = 24.5$</p> <p>$\therefore 24.5 = m(9.8)$</p> <p>$m = \frac{24.5}{9.8}$</p> <p>$m = 2.5 \text{ kg} \checkmark$</p> <p style="text-align: right;">(6)</p>

[11]

QUESTION 7



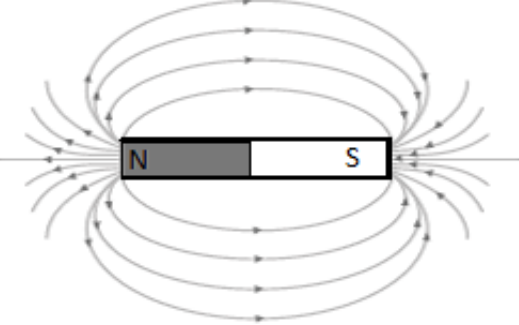
7.1.1.	<p>The force that opposes the tendency of motion of a stationary object relative to a surface.</p> <p style="text-align: center;">Or</p> <p>Force that acts between two surfaces when the object is stationary.</p> <p style="text-align: right;">(2)</p>
7.1.2.	<p>The perpendicular force exerted by a surface on an object that lies on that surface</p> <p style="text-align: center;">Or</p> <p>A perpendicular force exerted by a surface on an object resting on it.</p> <p style="text-align: right;">(2)</p>
7.2.1	<div style="text-align: center;"> </div> <p style="text-align: right;">(4)</p>
7.2.2	$\vec{N} = \vec{W} = mg \checkmark$ $= (5)(9.8) \checkmark$ $\vec{N} = 49N \checkmark$ <p style="text-align: right;">(3)</p>
7.2.3	$\vec{F}_s = \mu_s N \checkmark$ $= (0.21)(49) \checkmark$ $= 10.29N \checkmark$ <p style="text-align: right;">(3)</p>

[14]

QUESTION 8

8.1	<p>A material that can attract other materials and has two poles called north and south $\checkmark\checkmark$</p> <p style="text-align: center;">Or</p> <p>An object that has a pair of opposite poles called north and south.</p> <p style="text-align: right;">(2)</p>
8.2	<p>The magnetic field lines can be shown by using iron fillings and a blank page.</p> <p>Put the magnet on a flat surface \checkmark</p> <p>Put a blank page over the magnet \checkmark</p> <p>Slowly spread iron fillings on top of the page as you are pouring them \checkmark</p> <p style="text-align: right;">(3)</p>
8.3	<p>Dropping \checkmark</p>



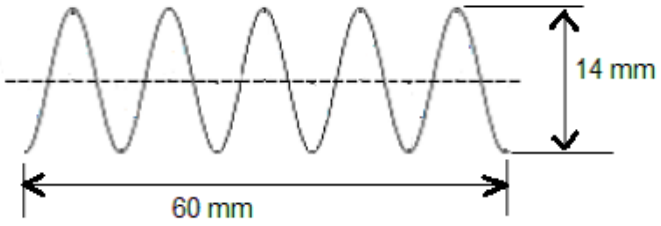
	Hitting ✓ Heating ✓	(3)
8.4	They should never touch one another ✓ They must be evenly spaced ✓ The must point from north to south ✓	(3)
8.5	 <p><u>CRITERIA</u></p> <ul style="list-style-type: none"> • Evenly spaced ✓ • Point from north to south ✓ • Never touch each other ✓ 	(3)
8.6	Magnetosphere ✓ The function of the magnetic field around the earth is to protect the earth from ions from the outer space ✓✓	(3)

[17]

QUESTION 9

9.1.1	Distance between any two successive points that are in phase on a wave. ✓✓	(2)
9.1.2	The highest point of a wave. ✓✓ Or The upper most point on a transverse wave.	(2)
9.1.3	The maximum displacement of a particle in a wave or pulse from its position of rest. ✓✓	(2)
9.1.4	The time taken to complete one full vibration or wave. ✓✓ (2)	



9.2.1	When two waves meet at the same point simultaneously, the net amplitude is the algebraic sum of the amplitudes of the two individual wave displacements. $\checkmark\checkmark$ (2)
9.2.2	<p>A.</p> $A_{(Net)} = A_a + A_b \quad \checkmark$ $= 10cm + 10cm \quad \checkmark$ $A_{(Net)} = 20cm \quad \checkmark$ <p>(2)</p> <p>B.</p> $A_{(Net)} = A_a + (-A_b) \quad \checkmark$ $= 10 + (-10) \quad \checkmark$ $A_{(Net)} = 0cm \quad \checkmark$ <p>(2)</p>
9.3.1	 <p>CRITERIA</p> <ul style="list-style-type: none"> • Wave shape \checkmark • Wave length \checkmark • Wave amplitude \checkmark <p>(3)</p>
9.3.2	$Amplitude = \frac{14mm}{2} \quad \checkmark$ $= 7mm \quad \checkmark$ <p>(2)</p>
9.3.3	$Length = \frac{60mm}{6} \quad \checkmark$ $= 10mm \text{ (equals to the length of one full wave)} \quad \checkmark$ $\therefore \lambda = 10mm \quad \checkmark$ <p>(3)</p>
9.3.4	$T = \frac{1}{f} \quad \checkmark$ $T = \frac{1}{60} \quad \checkmark$



	$T = 0.017 \text{ s} \quad \checkmark$ <div style="text-align: right;">(3)</div>
9.3.5	$\bar{v} = f\lambda \quad \checkmark$ $= (60)(10 \times 10^{-3}) \quad \checkmark$ $\bar{v} = 0.6 \text{ m} \cdot \text{s}^{-1} \quad \checkmark$ Or $\bar{v} = \frac{\lambda}{T} \quad \checkmark$ $= \frac{10 \times 10^{-3}}{0.017} \quad \checkmark$ $\bar{v} = 0.6 \text{ m} \cdot \text{s}^{-1} \quad \checkmark$ <div style="text-align: right;">(3)</div>
9.4	$\bar{v} = \frac{\Delta x}{\Delta t} \quad \checkmark$ $343 = \frac{\Delta x}{3.2} \quad \checkmark$ $= 343 \times 3.2$ $\Delta x = 1097.6 \text{ m} \quad \checkmark$ $\therefore \text{Distance between learner and building} = \frac{\Delta x}{2}$ $\therefore \Delta x = \frac{1097.6}{2} \text{ (Dividing by answer by 2)} \quad \checkmark$ <p>NB: learners may divide the total time taken by 2 before using it to the calculations. Please award full marks for such approach.</p> $\Delta x = 548.8 \text{ m} \quad \checkmark$ <div style="text-align: right;">(5)</div>

[33]

[TOTAL: 150]

