

**NATIONAL
SENIOR CERTIFICATE**

GRADE 10

NOVEMBER 2019

**MATHEMATICS P2
MARKING GUIDELINE (EXEMPLAR)**

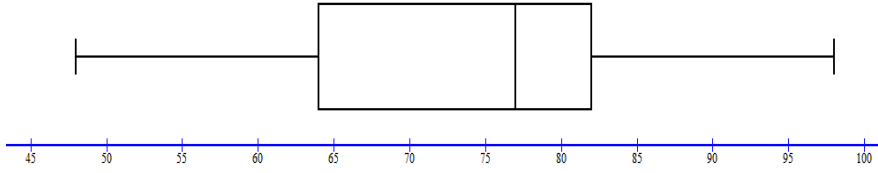
MARKS: 100

This marking guideline consists of 8 pages.

Consistent accuracy (CA) marking, applies in ALL aspects of the marking guideline.

QUESTION 1

48	50	52	59	60	68	73	76	76	76
78	79	80	81	82	82	84	91	92	98

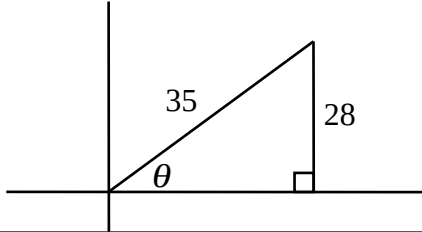
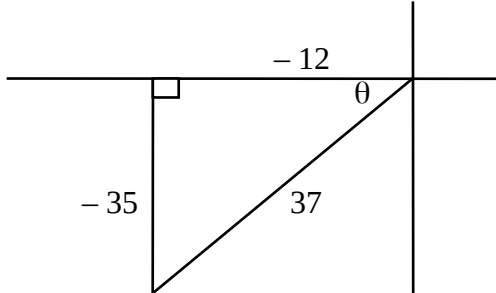
1.1.1	Median = $\frac{76 + 78}{2} = 77$	✓ answer (1)
1.1.2	Lower quartile = $\frac{60 + 68}{2} = 64$ Upper quartile = 82	✓ lower quartile ✓ upper quartile (2)
1.1.3	Interquartile range (IQR) = $Q_3 - Q_1$ $= 82 - 64 = 18$	✓ substitution ✓ answer (2)
1.1.4	Min = 48 and max = 98	✓ min and max (1)
1.1.5		✓ min and max ✓ Q_1 and Q_3 ✓ Q_2 (3)
1.1.6	Skewed to the left or negatively skewed	✓ answer (1)

1.2	Duration (min)	No of calls (f_1)	Midpoint (x_1)	$(f_1) \times (x_1)$	
	$2 \leq t < 5$	47	3,5	164,5	
	$5 \leq t < 8$	139	6,5	903,5	
	$8 \leq t < 11$	211	9,5	2004,5	
	$11 \leq t < 14$	102	12,5	1275	
	$14 \leq t < 17$	58	15,5	899	
	$17 \leq t < 20$	19	A	B	
		576		5598	
1.2.1	A = 18,5 and B = 351,5				✓ answer of A ✓ answer of B (2)
1.2.2	approximate mean = $\frac{\text{sum of } f_1 \times x_1}{\text{sum of } f_1}$ $= \frac{5598}{576}$ $= 9,7$ minutes				✓ sum of all $(f_1) \times (x_1)$ ✓ sum of all (f_1) ✓ answer (3)
1.2.3	$\frac{75}{100} \times 576 = 432$ 75 th percentile lie = 100 In the interval $11 \leq t < 14$				✓ 432 ✓ interval (2)
[17]					

QUESTION 2

2.1	<p>$A(-2; 6)$, $B(6; 8)$ and $C(4; 0)$</p> $d_{AB} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(6 - (-2))^2 + (8 - 6)^2}$ $= 2\sqrt{17}$ $d_{BC} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(4 - 6)^2 + (0 - 8)^2}$ $= 2\sqrt{17}$ <p>$\therefore AB = BC.$</p>	<p>✓ formula</p> <p>✓ substitution</p> <p>✓ distance AB</p> <p>✓ substitution</p> <p>✓ distance of BC</p> <p>(5)</p>
2.2	<p>ABCD is a kite adjacent sides are equal</p>	<p>✓ kite</p> <p>✓ motivation</p> <p>(2)</p>
2.3	<p>$A(-2; 6)$, $B(6; 8)$ and $C(4; 0)$</p> $\text{Midpoint of BC} = \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)$ $= \left(\frac{-2 + 6}{2}, \frac{8 + 6}{2} \right) = G(2; 7)$ $\text{Midpoint of AB} = \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)$ $= \left(\frac{4 + 6}{2}, \frac{0 + 8}{2} \right) = H(5; 4)$	<p>✓ formula</p> <p>✓ substitution</p> <p>✓ coordinates of G, mdpt of BC</p> <p>✓ substitution</p> <p>✓ coordinates of H, mdpt of AB</p> <p>(5)</p>
2.4	<p>$\hat{B}AD = \hat{B}CD$ (opposite \angle's of a kite are =)</p> <p>$\hat{A}EH = \hat{E}DB$ (corresponding \angle's, $EG \parallel DB$)</p> <p>but $\hat{E}DB = \hat{B}DC$ (diagonals of a kite)</p> <p>$\therefore \hat{A}EG = \hat{B}DC$</p> <p>$\therefore \Delta AEG \parallel \Delta CDB.$ (A A A)</p>	<p>✓ S ✓ R</p> <p>✓ SR</p> <p>✓ 3rd angle or reason</p> <p>(4)</p>
		[16]

QUESTION 3

<p>3.1.1</p>	$x^2 = 35^2 - 28^2$ $x = 21$ $\therefore \cos \theta = \frac{21}{35}$ 	<p>✓ sub in Pythagoras ✓ $x = 21$ $\frac{21}{35}$ ✓</p> <p>(3)</p>
<p>3.1.2</p>	$\sin^2 \theta + \cos^2 \theta = \left(\frac{28}{35}\right)^2 + \left(\frac{21}{35}\right)^2$ $= 1$ $= \text{RHS}$	<p>✓ $\left(\frac{28}{35}\right)^2$ ✓ $\left(\frac{21}{35}\right)^2$ ✓ 1</p> <p>(3)</p>
<p>3.2</p>	<p>If $37 \sin \theta + 35 = 0$</p> $\therefore \sin \theta = -\frac{35}{37}$ $x^2 = 37^2 - 35^2$ $x = 12$  $24 \sec \theta - 70 \cot \theta$ $= 24\left(\frac{37}{-12}\right) - 70\left(\frac{-12}{-35}\right)$ $= -74 - 24$ $= -98$	<p>✓ $\sin \theta = \frac{-35}{37}$ ✓ 3rd quadrant ✓ x value = -12 ✓✓ substitution ✓ answer</p> <p>(6)</p>
<p>3.3.1</p>	$8 \cos(x + 10^\circ) = 5$ $\cos(x + 10^\circ) = \frac{5}{8}$ $x + 10^\circ = 51,32^\circ$ $x = 41,32^\circ$	<p>✓ $\cos(x + 10^\circ)$ ✓ $x + 10^\circ$ ✓ answer</p> <p>(3)</p>

3.3.2	$\operatorname{cosec} 2x = 2$ $\sin 2x = \frac{1}{2}$ $2x = 30^\circ$ $x = 15^\circ$	$\checkmark \sin 2x = \frac{1}{2}$ $\checkmark 2x = 30^\circ$ $\checkmark \text{answer}$ <p style="text-align: right;">(3)</p>
3.4	$\frac{\sin 30^\circ \times \tan 60^\circ}{\tan 30^\circ \times \cos 60^\circ} = \frac{\frac{1}{2} \times \frac{\sqrt{3}}{1}}{\frac{1}{\sqrt{3}} \times \frac{1}{2}}$ $= 3$ $= \text{RHS}$	$\checkmark \frac{1}{2}$ $\checkmark \sqrt{3}$ $\checkmark \frac{1}{\sqrt{3}}$ $\checkmark \frac{1}{2}$ $\checkmark \text{answer}$ <p style="text-align: right;">(5)</p>
3.5.1	$\sin 55^\circ = \frac{x}{15}$ $x = 15 \times \sin 55^\circ$ $= 12,29^\circ$ <p style="text-align: center;">OR</p> $\cos 35^\circ = \frac{x}{15}$ $x = 12,29^\circ$	$\checkmark \text{using } \sin 55^\circ$ $\checkmark \text{answer}$ <p style="text-align: right;">(2)</p> $\checkmark \text{using } \cos 35^\circ$ $\checkmark \text{answer}$ <p style="text-align: right;">(2)</p>
3.5.2	$\tan 21^\circ = \frac{4,4}{y}$ $y = \frac{4,4}{\tan 21^\circ}$ $= 11,46$ <p style="text-align: center;">OR</p> $\tan 69^\circ = \frac{y}{4,4}$ $y = 11,46$ <p style="text-align: center;">OR</p> $y^2 = 12,29^2 - 4,4^2$ $y = 11,48$	$\checkmark \text{using } \tan 21^\circ$ $\checkmark \text{answer}$ <p style="text-align: right;">(2)</p> $\checkmark \text{Pythagoras}$ $\checkmark \text{answer}$ <p style="text-align: right;">(2)</p>
		[27]

QUESTION 4

<p>4.1</p>		<ul style="list-style-type: none"> ✓ intercepts ✓ turning pts ✓ shape <p style="text-align: right;">(3)</p>
<p>4.2</p>	<p>period of $g = 360^\circ$</p>	<p>✓ answer</p> <p style="text-align: right;">(1)</p>
<p>4.3</p>	<p>range of $m(x)$ if $m(x) = -3f(x) + 1$ range of $-3f(x)$: $-3 \leq y \leq 3$ range of $m(x)$: $-2 \leq y \leq 4$</p>	<ul style="list-style-type: none"> ✓ notation ✓✓ endpoints <p style="text-align: right;">(3)</p>
<p>4.4</p>	<p>g decreasing: $90^\circ < x < 270^\circ$</p>	<ul style="list-style-type: none"> ✓ notation ✓ endpoints <p style="text-align: right;">(2)</p>
<p>4.5</p>	<p>$f(x) \times g(x) < 0$ $90^\circ < x < 180^\circ$ or $270^\circ < x < 360^\circ$</p>	<ul style="list-style-type: none"> ✓ notation ✓ endpoints ✓ endpoints <p style="text-align: right;">(3)</p>
		<p>[12]</p>

QUESTION 5

5.1	$\hat{A}\hat{D}\hat{C} = 53^\circ$ (\angle s on a straight line) $\hat{D}\hat{C}\hat{B} = 116^\circ$ (supplementary adj \angle s) $\hat{C}\hat{B}\hat{A} = 101^\circ$ (\angle s on a straight line) $\hat{B}\hat{A}\hat{D} = 360^\circ - 53^\circ - 116^\circ - 101^\circ$ $= 90^\circ$ (\angle s of a quad = 360°)	✓ SR ✓ SR ✓ SR ✓ answer	(4)
Answer only: full marks, provided one reason is given			
5.2	Let $\hat{D}\hat{E}\hat{B} = y$ and $\hat{F}\hat{E}\hat{C} = k$ $\therefore \hat{B} = 180^\circ - 2y$ and $\hat{C} = 180^\circ - 2k$ (\angle s of a $\Delta = 180^\circ$) In ΔABC : $x + 180^\circ - 2y + 180^\circ - 2k = 1800$ $2y + 2k = x + 180^\circ + 180^\circ - 180^\circ$ $y + k = \frac{1}{2}x + 90^\circ$ $\hat{D}\hat{E}\hat{F} = 90^\circ - \frac{1}{2}x$ (\angle s on a straight line)	✓ SR ✓ SR ✓ S ✓ SR	(4)
			[8]

QUESTION 6

6.1.1	$AP = DE$ and $AQ = DF$ (given) $\hat{A} = \hat{D}$ (given) $\Delta APQ \equiv \Delta DEF$ (SAS)	✓ given ✓ Δ 's similar ✓ reason	(3)
6.1.2	$\hat{A}\hat{P}\hat{Q} = \hat{E}$ ($\Delta APQ \equiv \Delta DEF$) But $\hat{B} = \hat{E}$ (given) $\therefore \hat{A}\hat{P}\hat{Q} = \hat{B}$ $\therefore PQ \parallel BC$ (a pair of corresponding \angle s are =)	✓ Statement ✓ Statement ✓ Reason	(3)
6.1.3	$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$ ($\Delta ABC \parallel \Delta DEF$) $\frac{7,5}{3,5} = \frac{8}{DF}$ $DF = \frac{8 \times 3,5}{7,5}$ $= 3,7$	✓ SR ✓ substitution ✓ simplification ✓ answer	(4)
6.2.1	Converse of midpoint theorem	✓ answer	(1)

6.2.2	$BD = \sqrt{32} \therefore AD = \sqrt{32}$ $\therefore EF = \sqrt{32}$ (opp sides of a parallelogram) $\therefore CG = 2\sqrt{32}$ (midpt theorem) $= 8\sqrt{2}$	✓ $BD = AD$ ✓ S✓R ✓ SR ✓ answer (5)
		[16]

QUESTION 7

TSA of cone = TSA of hemisphere $\pi r^2 + \pi r s = 3\pi r^2$ $\pi r s = 2\pi r^2$ $s = 2x \quad (r = x)$ but $s^2 = h^2 + x^2$ $\therefore h^2 + x^2 = 4x^2$ $\therefore h = \sqrt{4x^2 - x^2}$ $= \sqrt{3}x$	✓ equating the TSA ✓ use of Pythagoras ✓ substituting $s = 2x$ ✓ h subject of formula (4)	
		[4]
TOTAL:		100