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KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL STANDARDISED ASSESSMENT

GRADE 12

MATHEMATICS P2

JUNE 2026

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 15 pages.



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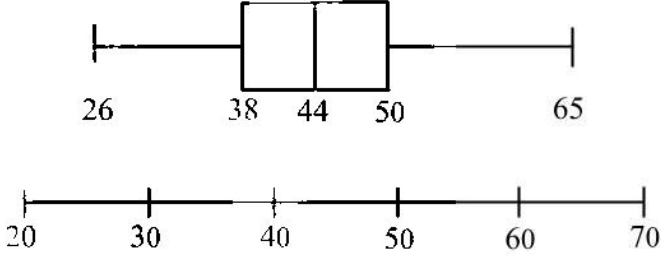
QUESTION 1

1.1	$\frac{7d-2}{5} = 15$ $7d-2 = 75$ $7d = 77$ $d = 11$	✓A $7d-2$ ✓A equation ✓A simplification	(3)	
1.2	22 ; 12 ; 13 ; 8 ; 20 $\sigma = 5,22$	Answer only: Full marks	✓A data values ✓CA answer	(2)
1.3.1	The mean will increase	✓A increase	(1)	
1.3.2	The standard deviation will remain the same	✓A remain the same	(1)	
			[7]	

QUESTION 2

2.1	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>AGE</th> <th>FREQUENCY</th> <th>CUM. FREQ</th> </tr> </thead> <tbody> <tr> <td>$25 < x \leq 30$</td> <td>6</td> <td>6</td> </tr> <tr> <td>$30 < x \leq 35$</td> <td>11</td> <td>17</td> </tr> <tr> <td>$35 < x \leq 40$</td> <td>17</td> <td>34</td> </tr> <tr> <td>$40 < x \leq 45$</td> <td>25</td> <td>59</td> </tr> <tr> <td>$45 < x \leq 50$</td> <td>24</td> <td>83</td> </tr> <tr> <td>$50 < x \leq 55$</td> <td>10</td> <td>93</td> </tr> <tr> <td>$55 < x \leq 60$</td> <td>7</td> <td>100</td> </tr> <tr> <td>$60 < x \leq 65$</td> <td>8</td> <td>108</td> </tr> </tbody> </table>	AGE	FREQUENCY	CUM. FREQ	$25 < x \leq 30$	6	6	$30 < x \leq 35$	11	17	$35 < x \leq 40$	17	34	$40 < x \leq 45$	25	59	$45 < x \leq 50$	24	83	$50 < x \leq 55$	10	93	$55 < x \leq 60$	7	100	$60 < x \leq 65$	8	108	✓A 34 ✓CA 108	(2)
AGE	FREQUENCY	CUM. FREQ																												
$25 < x \leq 30$	6	6																												
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$55 < x \leq 60$	7	100																												
$60 < x \leq 65$	8	108																												
2.2	<p style="text-align: center;">Ages of Workers at a Textile factory in KZN</p>	✓A grounding ogive ✓CA plotting at upper limits ✓CA accurate points ✓CA smooth curve	(4)																											



2.3		Plotted on box and whisker diagram: ✓ A 26 and 65 ✓ CA 38 (accept 37 – 39) ✓ CA 44 (accept 43 – 45) ✓ CA 50 (accept 49 – 51) (4)
2.4.1	$108 \cdot 96 = 12 \text{ workers}$ $\frac{12}{108} \times 100 = 11\%$	✓ A 12 (accept 11 – 13) ✓ CA 11% (2)
2.4.2	more skewed to the right	✓ A answer (1)
[13]		





QUESTION 3

3.1	Angle of inclination of PS = $116,5^\circ$ $m_{PS} = \tan 116,5^\circ = -2$	✓ A angle of inclination ✓ CA answer (2)
3.2	$y = -2x + 4$	✓ CA answer (1)
3.3	Substitute S(4;k) in: $y = -2x + 4$ $k = -2(4) + 4$ $= -4$	✓ CA substitution (1)
3.4	At Q: $0 = -2x + 4$ $x = 2$ $\therefore Q(2; 0)$ and OQ = 2 units since OQ : QR = 1 : 4 $R(8; 0)$ and OR = 8 units $\therefore QR = 6$ units	✓ CA $0 = -2x + 4$ ✓ CA $x = 2$ ✓ CA OR = 8 ✓ CA QR = 6 (4)
3.5	$M\left(\frac{0+8}{2}; \frac{4+0}{2}\right)$ $M(4; 2)$	✓ CA x-coordinate ✓ CA y-coordinate (2)
3.6	$m_{QM} = \frac{2-0}{4-2} = 1$ $m_{PR} = \frac{0-4}{8-0} = -\frac{1}{2}$ M is the midpoint of PR, but, $m_{QM} \times m_{PR} = 1 \times -\frac{1}{2} = -\frac{1}{2}$ $-\frac{1}{2} \neq -1$ \therefore BM cannot be the perpendicular bisector	✓ CA m_{QM} ✓ CA m_{PR} ✓ CA calculating $m_{QM} \times m_{PR}$ ✓ CA $-\frac{1}{2} \neq -1$ (4)
3.7	$MS = 2 - (-4) = 6$ units Area of $\Delta MQS = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 6 \times 2 = 6 \text{ units}^2$ Area of $\Delta MTS = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 6 \times 6 = 18 \text{ units}^2$ Area of quadrilateral QSTM $= \text{Area of } \Delta MQS + \text{Area of } \Delta MTS$ $= 6 + 18 = 24 \text{ units}^2$	✓ CA length of MS ✓ CA Area of ΔMQS ✓ CA Area of ΔMTS ✓ CA answer (4)

[18]





QUESTION 4

4.1	$(x+3)^2 + (y-2)^2 = 12+9+4$ $(x+3)^2 + (y-2)^2 = 25$ $L(-3; 2)$ $r = 5$	✓A LHS of equation ✓A RHS of equation ✓CA $L(-3; 2)$ ✓CA $r = 5$	(4)
4.2	$(-3-0)^2 + (2-y)^2 = 25$ $29+4-4y+y^2 = 25$ $y^2 - 4y - 12 = 0$ $(y-6)(y+2) = 0$ $y = 6 \text{ or } y = -2$ $\therefore S(0; 6)$	✓CA substitution ✓CA standard form ✓CA factors ✓CA coordinates of S	(4)
4.3	$m_{LS} = \frac{6-2}{0-(-3)}$ $m_{LS} = \frac{4}{3}$ $m_{SG} = -\frac{3}{4}$ $y = -\frac{3}{4}x + 6$ <p>At G: $0 = -\frac{3}{4}x + 6$ OR $m_{SG} = \frac{6-0}{0-x} = -\frac{3}{4}$</p> $\frac{3}{4}x = 6$ $x = 8$ $\therefore G(8; 0)$	✓CA m_{LS} ✓CA $m_{SG} = -\frac{3}{4}$ ✓CA substitute in equation of SG OR substitute in gradient of SG ✓CA coordinates of G	(4)
4.4	$\tan \hat{S}GH = -\frac{3}{4}$ $\hat{S}GH = 143,13^\circ$ $O\hat{S}G + 90^\circ = 143,13^\circ \text{ [ext } \angle \text{ of } \Delta OSG]$ $O\hat{S}G = 53,13^\circ$ $\therefore \theta = 126,87^\circ$	✓CA $\tan \hat{S}GH = -\frac{3}{4}$ ✓CA $\hat{S}GH = 143,13^\circ$ ✓CA $O\hat{S}G = 53,13^\circ$ ✓CA answer	(4)



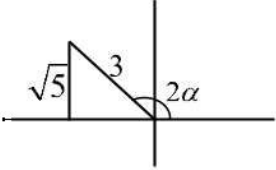


4.5	$\hat{L}\hat{S}\hat{G} = \hat{M}\hat{G}\hat{S} = 90^\circ$ $\therefore LS \parallel MG$ $LS = MG$ $\therefore LMGS$ is a parallelogram Also: $LMGS$ is a rectangle	$[\tan \perp \text{rad}]$ $[\text{co-int. } \angle\text{s suppl.}]$ $[\text{equal radii}]$ $[\text{one pair opp. sides = and } \parallel]$ $[\text{a parm. with an angle of } 90^\circ]$	\checkmark A showing $LMGS$ is a parm. \checkmark A showing $LMGS$ is a rectangle (2)
4.6	Using translation: Coordinates of M: $(5; -4)$ Equation of circle with centre M: $(x-5)^2 + (y+4)^2 = 25$ OR Midpoint of LG = $\left(\frac{-3+8}{2}; \frac{2+0}{2}\right) = \left(\frac{5}{2}; 1\right)$ The diagonals of $LMGS$ bisect since $LMGS$ is a rectangle. Let M be the point $(a; b)$. $\frac{a+0}{2} = \frac{5}{2}$ and $\frac{b+6}{2} = 1$ $\therefore a = 5$ and $b = -4$ $M(5; -4)$ $(x-5)^2 + (y+4)^2 = 25$		\checkmark CA x -coordinate of M \checkmark CA y -coordinate of M \checkmark CA answer OR \checkmark CA x -coordinate of M \checkmark CA y -coordinate of M \checkmark CA answer (3)
			[21]





QUESTION 5

5.1.1	$\sin 2\alpha = \frac{\sqrt{5}}{3}$ $x^2 = 3^2 - (\sqrt{5})^2 \quad [\text{Pythagoras}]$ $x = -2$ $\tan 2\alpha = -\frac{\sqrt{5}}{2}$ 	✓A substitution ✓A value of x ✓CA answer (3)
5.1.2	$\cos 2\alpha = -\frac{2}{3}$ $1 - 2\sin^2 \alpha = -\frac{2}{3}$ $2\sin^2 \alpha = \frac{5}{3}$ $\sin^2 \alpha = \frac{5}{6}$ $\sin \alpha = \sqrt{\frac{5}{6}}$	✓CA value of $\cos 2\alpha$ ✓CA double \angle expansion (CA is on $-\frac{2}{3}$) ✓CA simplification ✓CA answer (4)
5.2	$\tan^2(180^\circ - \theta) \cdot \sin^2(90^\circ + \theta) - \cos(\theta - 180^\circ) \cdot \cos \theta$ $= (-\tan \theta)^2 \cdot (\cos \theta)^2 - (-\cos \theta) \cdot \cos \theta$ $= \tan^2 \theta \cdot \cos^2 \theta + \cos^2 \theta$ $= \frac{\sin^2 \theta}{\cos^2 \theta} \cdot \cos^2 \theta + \cos^2 \theta$ $= \sin^2 \theta + \cos^2 \theta$ $= 1$	✓A $-\tan \theta$ ✓A $\cos \theta$ ✓A $-\cos \theta$ ✓CA quotient identity ✓CA answer (5)





5.3.1	LHS $= \frac{\cos 5x \cos 3x + \sin 3x \sin 5x}{\cos x - \sin x}$ $= \frac{\cos 5x \cos 3x + \sin 5x \sin 3x}{\cos x - \sin x}$ $= \frac{\cos(5x - 3x)}{\cos x - \sin x}$ $= \frac{\cos 2x}{\cos x - \sin x}$ $= \frac{\cos^2 x - \sin^2 x}{\cos x - \sin x}$ $= \frac{(\cos x + \sin x)(\cos x - \sin x)}{\cos x - \sin x}$ $= \cos x + \sin x$ $= \text{RHS}$	✓A using compound \angle expansion ✓A double \angle expansion ✓A factorisation (3)
5.3.2	Undefined when: $\cos x - \sin x = 0$ $\cos x = \sin x$ $\tan x = 1$ $x = 45^\circ + k \cdot 180^\circ, k \in \mathbb{Z}$ For $x \in [-180^\circ; 180^\circ]$: $x = -135^\circ$ or $x = 45^\circ$	✓A $\cos x - \sin x = 0$ ✓A $\tan x = 1$ ✓CA answer ✓CA answer (4)
[19]		



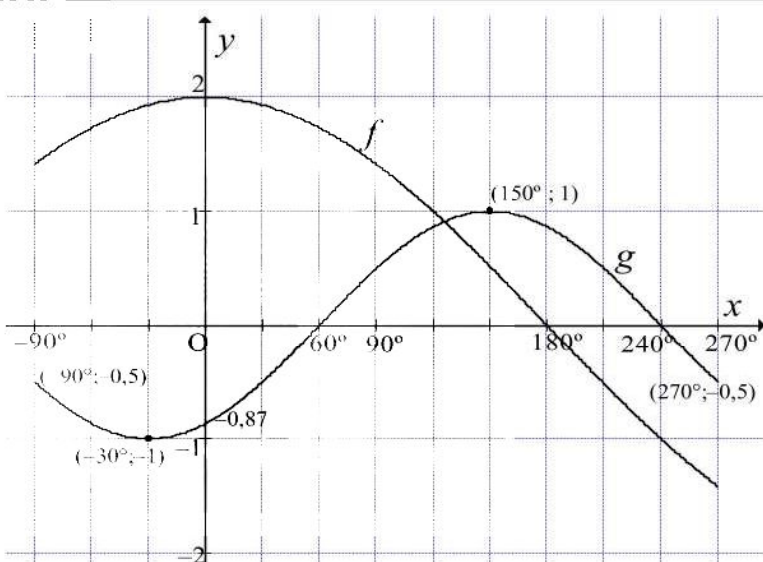


QUESTION 6

6.1	$2 \cos 2x - \sin x + 1 = 0$ $2(1 - 2 \sin^2 x) - \sin x + 1 = 0$ $2 - 4 \sin^2 x - \sin x + 1 = 0$ $-4 \sin^2 x - \sin x + 3 = 0$ $4 \sin^2 x + \sin x - 3 = 0$ $(4 \sin x - 3)(\sin x + 1) = 0$ $\sin x = \frac{3}{4} \quad \text{or} \quad \sin x = -1$ $x = 48,59^\circ + k \cdot 360^\circ, \quad k \in \mathbb{Z}$ $\text{or } x = 131,41^\circ + k \cdot 360^\circ, \quad k \in \mathbb{Z}$ $\text{or } x = 270^\circ + k \cdot 360^\circ, \quad k \in \mathbb{Z}$	\checkmark A double \angle identity \checkmark CA standard form \checkmark CA factorisation \checkmark CA both equations \checkmark CA $x = 48,59^\circ + k \cdot 360^\circ$ \checkmark CA $x = 131,41^\circ + k \cdot 360^\circ$ \checkmark CA or $x = 270^\circ + k \cdot 360^\circ$
6.2	$\sqrt{3} \cos \beta + \sin \beta$ $= 2 \left(\frac{\sqrt{3}}{2} \cos \beta + \frac{1}{2} \sin \beta \right)$ $= 2(\sin 60^\circ \cos \beta + \cos 60^\circ \sin \beta)$ $= 2 \sin(60^\circ + \beta)$ $\therefore k = 2 \quad \text{and} \quad m = 60$	\checkmark A $2 \left(\frac{\sqrt{3}}{2} \cos \beta + \frac{1}{2} \sin \beta \right)$ \checkmark A $\sin 60^\circ$ and $\cos 60^\circ$ \checkmark A $k = 2$ \checkmark A $m = 60$
[11]		



QUESTION 7

7.1	period = 720°	✓A answer (1)
7.2		✓A shape ✓A turning points ✓A intercepts with axes ✓A end points (4)
7.3	translation of 30° to the right OR translation of 390° to the right OR translation of 330° to the left	✓A number of degree translated ✓A direction of translation (2)
7.4.1	$-90^\circ \leq x \leq 180^\circ$ OR $x \in [-90^\circ ; 180^\circ]$	✓A ✓A answer OR ✓A ✓A answer (2)
7.4.2	$60^\circ < x < 180^\circ$ or $240^\circ < x \leq 270^\circ$ OR $x \in (60^\circ ; 180^\circ)$ or $(240^\circ ; 270^\circ]$	✓CA answer ✓CA ✓CA answer OR ✓CA answer ✓CA ✓CA answer (3)
		[12]





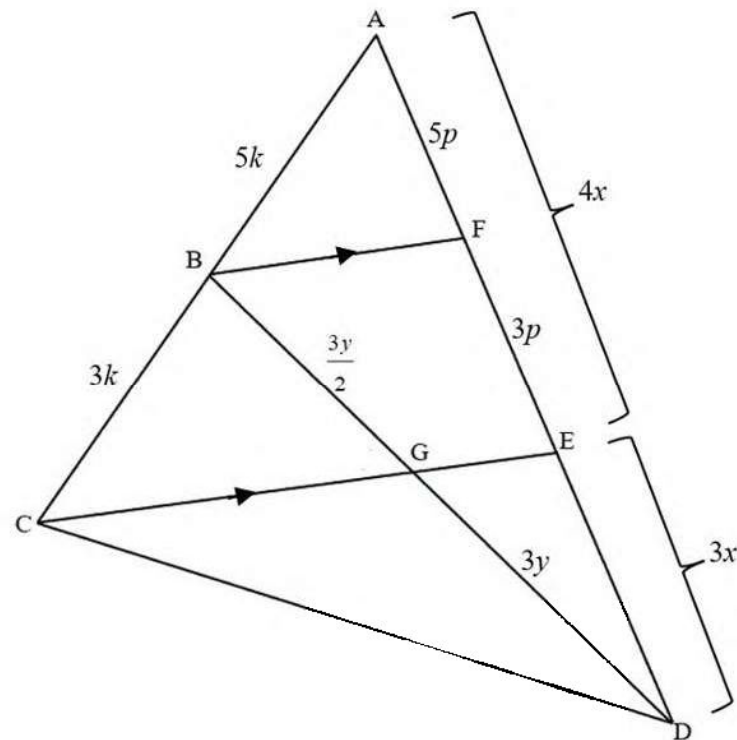
QUESTION 8

8.1	$\frac{CB}{\sin 2x} = \frac{k}{\sin(90^\circ - x)}$ $CB = \frac{k \cdot \sin 2x}{\sin(90^\circ - x)}$ $CB = \frac{k \cdot 2 \sin x \cos x}{\cos x}$ $CB = 2k \sin x$	✓A application of sine rule ✓A double \angle expansion ✓A co-ratio (3)
8.2	$\cos x = \frac{CB}{HC}$ $\cos x = \frac{2k \sin x}{HC}$ $HC = \frac{2k \sin x}{\cos x}$ $HC = 2k \tan x$	✓A trig ratio ✓A $HC = \frac{2k \sin x}{\cos x}$ (2)
8.3	$HC = 2(40) \tan 23^\circ$ $CD^2 = HC^2 + HD^2 - 2(HC)(HD) \cos \theta$ $40^2 = (2(40) \tan 23^\circ)^2 + 30^2 - 2(2(40) \tan 23^\circ)(30) \cos \theta$ $\cos \theta = \frac{[2(40) \tan 23^\circ]^2 + 30^2 - 40^2}{2[2(40) \tan 23^\circ](30)}$ $\cos \theta = 0,2224046183\dots$ $\theta = 77,15^\circ$	✓A applying cosine rule ✓A substitution ✓CA value of $\cos \theta$ ✓CA answer (4)
		[9]





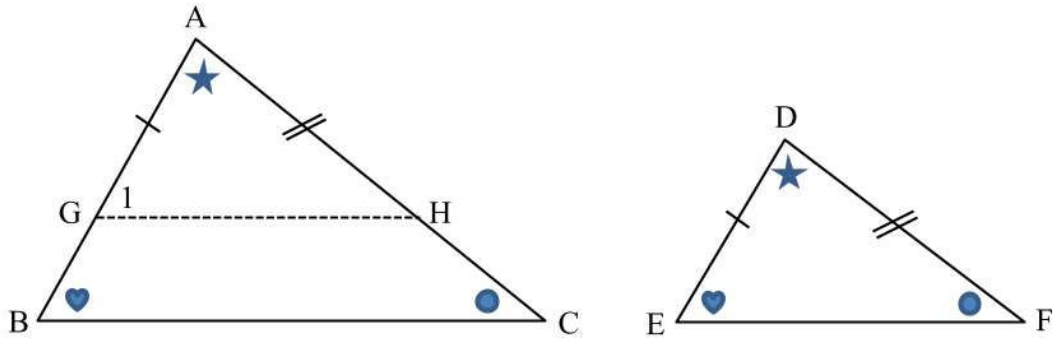
QUESTION 10



10.1	$\frac{AF}{FE} = \frac{5}{3}$	[prop. theorem, $BF \parallel CE$]	✓S ✓R	(2)
10.2	From sketch: $8p = 4x$ $\therefore p = \frac{x}{2}$ And: $FE = \frac{3x}{2} = 1,5x$ $ED:FE = 3x:1,5x$ $= 2:1$ $\therefore DG:GB = 2:1$	[prop theorem, $BF \parallel CE$]	✓S ✓S ✓S/R	(3)
10.3	$\frac{\text{Area of } \triangle BCG}{\text{Area of } \triangle DGC} = \frac{\frac{1}{2}(\text{GB}) \cdot \text{height}}{\frac{1}{2}(\text{GD}) \cdot \text{height}}$ $= \frac{\text{GB}}{\text{GD}}$ $= \frac{1}{2}$	[same height]	✓ substitution ✓CA answer	(2)
				[7]



QUESTION 11

11.1	
	<p>Mark off G and H on AB and AC respectively, such that $AG = DE$ and $AH = DF$.</p> <p>In $\triangle AGH$ and $\triangle DEF$:</p> <ol style="list-style-type: none"> $\hat{A} = \hat{D}$ [given] $AG = DE$ [construction] $AH = DF$ [construction] <p>$\therefore \triangle AGH \equiv \triangle DEF$ [s ; \angle ; s]</p> <p>$\therefore \hat{G}_1 = \hat{E}$ [$\equiv \Delta$s]</p> <p>$GH \parallel EF$ [corresponding \angles are =]</p> <p>In $\triangle ABC$: $\frac{AG}{AB} = \frac{AH}{AC}$ [prop. theorem; $GH \parallel EF$]</p> <p>Also: $\frac{DE}{AB} = \frac{DF}{AC}$ [$AG = DE$; $AH = DF$]</p> <p style="text-align: right;">(6)</p>





11.2.1	In $\triangle PSV$ and $\triangle PRS$: 1. $\hat{P}_1 = \hat{P}_1$ [common] 2. $\hat{S}_1 = \hat{R}_1$ [given; both = x] 3. $\hat{V}_1 = \hat{P}_2$ [sum of \angle s of \triangle] $\therefore \triangle PSV \parallel \triangle PRS$ [\angle ; \angle ; \angle]	✓S ✓S ✓R	(3)
11.2.2	$\hat{R}_2 = 90^\circ$ [\angle in semi-circle] $\therefore \hat{S}RQ = 90^\circ + x$ $\hat{S}PT = 90^\circ - x$ [opp. \angle s of a cyclic quad.] $\hat{T}_1 = 90^\circ$ [sum of \angle s of \triangle] $= \hat{R}_2$ $\therefore VTQR$ is a cyclic quadrilateral [converse: ext. \angle of cyclic quad]	✓S/R ✓S/R ✓S ✓R	(4)
11.2.3	In $\triangle PRQ$ and $\triangle PTV$: 1. $\hat{P}_2 = \hat{P}_2$ [common] 2. $\hat{R}_2 = \hat{T}_1$ [proved; both = 90°] 3. $\hat{Q} = \hat{V}_4$ [sum of \angle s of \triangle] $\therefore \triangle PRQ \parallel \triangle PTV$ [\angle ; \angle ; \angle]	✓S ✓S ✓R	(3)
11.2.4	From 11.2.1: $\frac{PS}{PR} = \frac{PV}{PS}$ [\triangle s] $\therefore PS^2 = PR \cdot PV$ From 11.2.3: $\frac{PR}{PT} = \frac{PQ}{PV}$ [\triangle s] $\therefore PT \cdot PQ = PR \cdot PV$ $\therefore PT \cdot PQ = PS^2$ [both = $PR \cdot PV$] But: $ST^2 = PS^2 - PT^2$ [Pythagoras] $ST^2 = PT \cdot PQ - PT^2$ $ST^2 = PT(PQ - PT)$	✓S ✓S ✓S ✓S	(5)
			[21]

TOTAL: 150 MARKS