Province of the
EASTERN CAPE
EDUCATION

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REPUBLIC OF SOUTH AFRICA

CHIEF DIRECTORATE – CURRICULUM MANAGEMENT

GRADE 12 LEARNER SUPPORT PROGRAMME

REVISION AND REMEDIAL TEACHING INSTRUMENT: ANSWERS

SUBJECT: MATHEMATICS – SECOND PAPER

June 2009

This document consists of 11 pages.

Strictly not for test/examination purposes

QUESTION 1

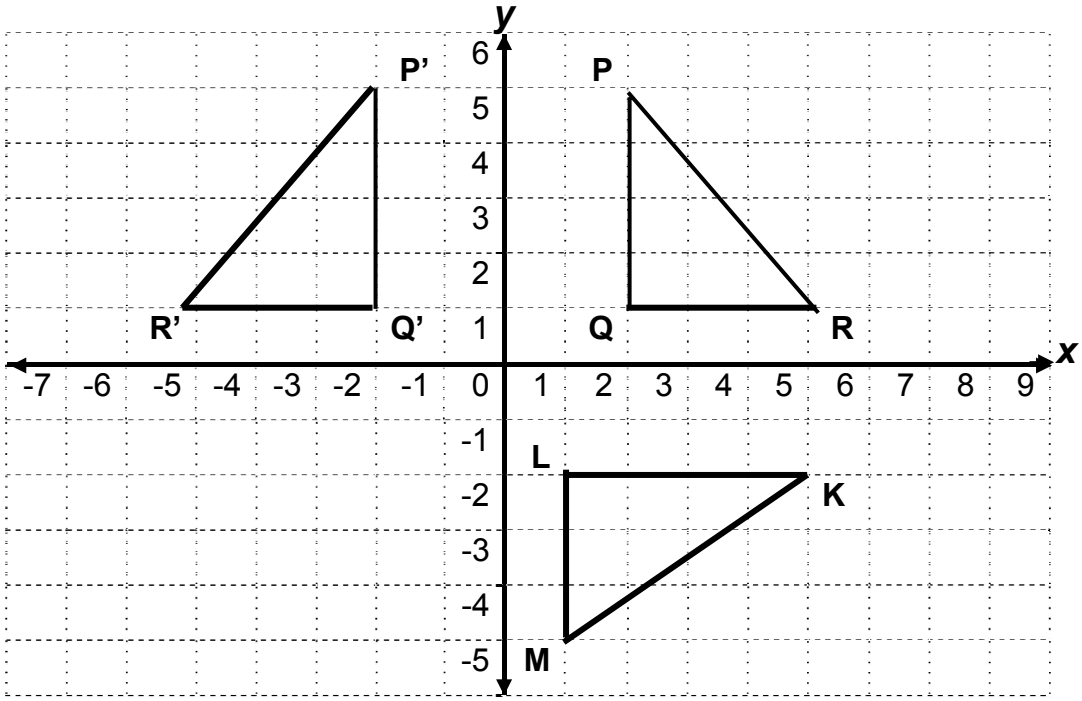
1.1	$P\left(\frac{-5+5}{2};\frac{-2+4}{2}\right)$ = P(0; 1) $\therefore$ P lies on the y-axis because x = 0	✓ corr. subst. midpt. formula ✓ coordinates of P ✓ conclusion	(3)
1.2	$M_{LM} = \frac{-2-(-6)}{-5-(-1)} = \frac{-2+6}{-5+1} = \frac{4}{-4} = -1$	✓ corr. subst. midpt. formula ✓ answer	(2)
1.3	$y = mx + c$ $\therefore y = -1x + 1$	✓ form. straight line ✓ equal gradients ✓ y-intercept	(3)
1.4	Substitute N(2; -1) into y = -x + 1 LHS = -1 RHS = -(2) + 1 = -1 $\therefore$ LHS = RHS $\therefore$ N(2; -1) lies on y = -x + 1	✓ substitution in equation ✓ result ✓ conclusion	(3)
1.5	$LM = \sqrt{(-5+1)^2+(-2+6)^2}$ $= \sqrt{(-4)^2+(4)^2}$ $= \sqrt{16+16}$ $= \sqrt{32}$ $= 4\sqrt{2}$	✓ dist. formula ✓ substitution ✓ answer	(3)
1.6	$2PN = 2\sqrt{(2-0)^2+(1+1)^2}$ $= 2\sqrt{4+4}$ $= 2\sqrt{8}$ $= 2.2\sqrt{2}$ $= 4\sqrt{2}$ $\therefore$ LM = 2PN	✓ substitution ✓ simplification ✓ answer ✓ simplest surd form	(4) **[18]**

QUESTION 2

2.1	y-intercept $3x + 2y - 12 = 0$ $\therefore y = -\frac{3}{2}x + 6$ $\therefore y = 6$ $\therefore K(0; 6)$ $RK^2 = KO^2 + OR^2$ (pyth)\ $= 6^2 + 4^2$ $RK^2 = 52$ $\therefore RK = \sqrt{52}$ $= 2\sqrt{13}$	✓ stand. form of equation ✓ value of y ✓ Pythagoras ✓ answer	(4)
2.2	$y = -\frac{3}{2}x + 6$ $\therefore M_{KR} = -\frac{3}{2}$ $M_{KR}.M_{NR} = -1$ (radius $\perp$ tangent) $\therefore M_{NR} = \frac{2}{3}$ $\therefore y = \frac{2}{3}x + c$ $(4; 0) : 0 = \frac{2}{3}(4) + c$ or $y - 0 = \frac{2}{3}(x - 4)$ $\therefore c = -\frac{8}{3} = -2\frac{2}{3}$ $\therefore y = \frac{2}{3}x - \frac{8}{3}$ $\therefore y = \frac{2}{3}x - 2\frac{2}{3}$ $\therefore 3y = 2x - 8$	✓prod. gradients -1 ✓ gradient NR ✓ equation with perp. Gradient ✓ subst. of point R ✓ equation in any form	(5)
2.3	$NR = NP$ (radii) $NR^2 = NP^2$ $(x - 4)^2 + (y - 0)^2 = (x - 3)^2 + (y + 5)^2$ $x^2 - 8x + 16 + y^2 = x^2 - 6x + 9 + y^2 + 10y + 25$ $-10y = 2x + 18$ (1) Eq NR : $3y = 2x - 8$ (2) (1) - (2) $-13y = 26$ [÷(-13)] $y = -2$ (3) (3) in (1) $-10(-2) = 2x + 18$ $\therefore 2x = 20 - 18$ $2x = 2$ $\therefore x = 1$ $\therefore N(1; -2)$	✓ equal radii ✓ substitution both sides ✓✓simplification – both sides ✓ equation (1) ✓value of y ✓value of x	(8)
2.4	$(x - x_N)^2 + (y - y_N)^2 = (x_N - x_P)^2 + (y_N - y_P)^2$ $(x - 1)^2 + (y + 2)^2 = (1 - 4)^2 + (-2 - 0)^2$ $x^2 - 2x + 1 + y^2 + 4y + 4 = 9 + 4$ $x^2 + y^2 - 2x + 4y - 8 = 0$	✓ equate distances ✓✓ substitution ✓ simplification ✓ answer	(5) **[22]**

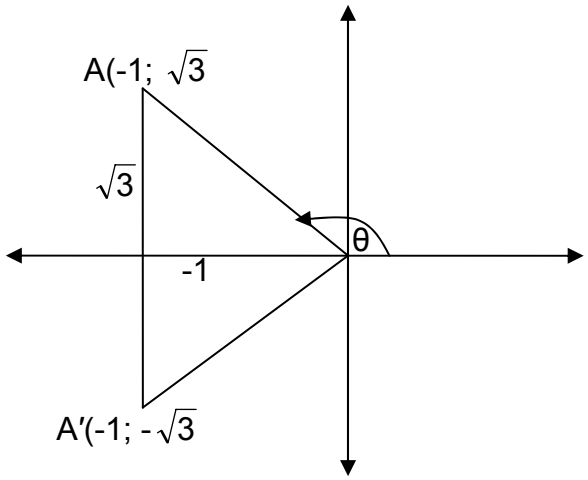
QUESTION 3

3.1.1	Scale factor of enlargement is 2	✓✓ answer	(2)
3.1.2	Area of ABCD = 6 units^2 Area of A'B'C'D' = 24 units^2	✓✓ answer ✓✓ answer	(4)
3.1.3	Four times	✓ answer	(1)
3.1.4	The shapes are similar as the shape is preserved. The shapes are not congruent, as the size is not preserved in an enlargement.	✓statement & reason ✓statement & reason	(2)
3.2.1	(See diagram)	✓ ✓✓plotting of points	(3)
3.2.2	(See diagram) P'(-2 ; 5), Q'(-2 ; 1), R'(-5 ; 1)	✓✓✓correct coordinates for ∆P'Q'R'	(3)
3.2.3	(See diagram) K(5 ; -2), L(1 ; -2) , M(1; -5)	✓✓✓ correct coordinates of ∆KLM	(3)



3.2.4	P"(-1 ; 2), Q"(-1 ; -2), R"(- 4 ; -2)	✓✓✓coordinates	(3)
			[21]

QUESTION 4

4.1	 $AO = (-1)^2 + \sqrt{3})^2$ $= 1 + 3 \Rightarrow AO^2 = 4$ $\therefore AO = 2$ $\therefore \cos\theta = -\frac{1}{2}$	✓ use of Pythagoras or distance formula ✓ value of AO ✓value of cos θ (3)
4.2	$A'(-1;-\sqrt{3})$ $\therefore A\hat{O}X = 180° + 60°$ $= 240°$	✓ both coordinates ✓180° + 60° ✓ answer (3) **[6]**

QUESTION 5

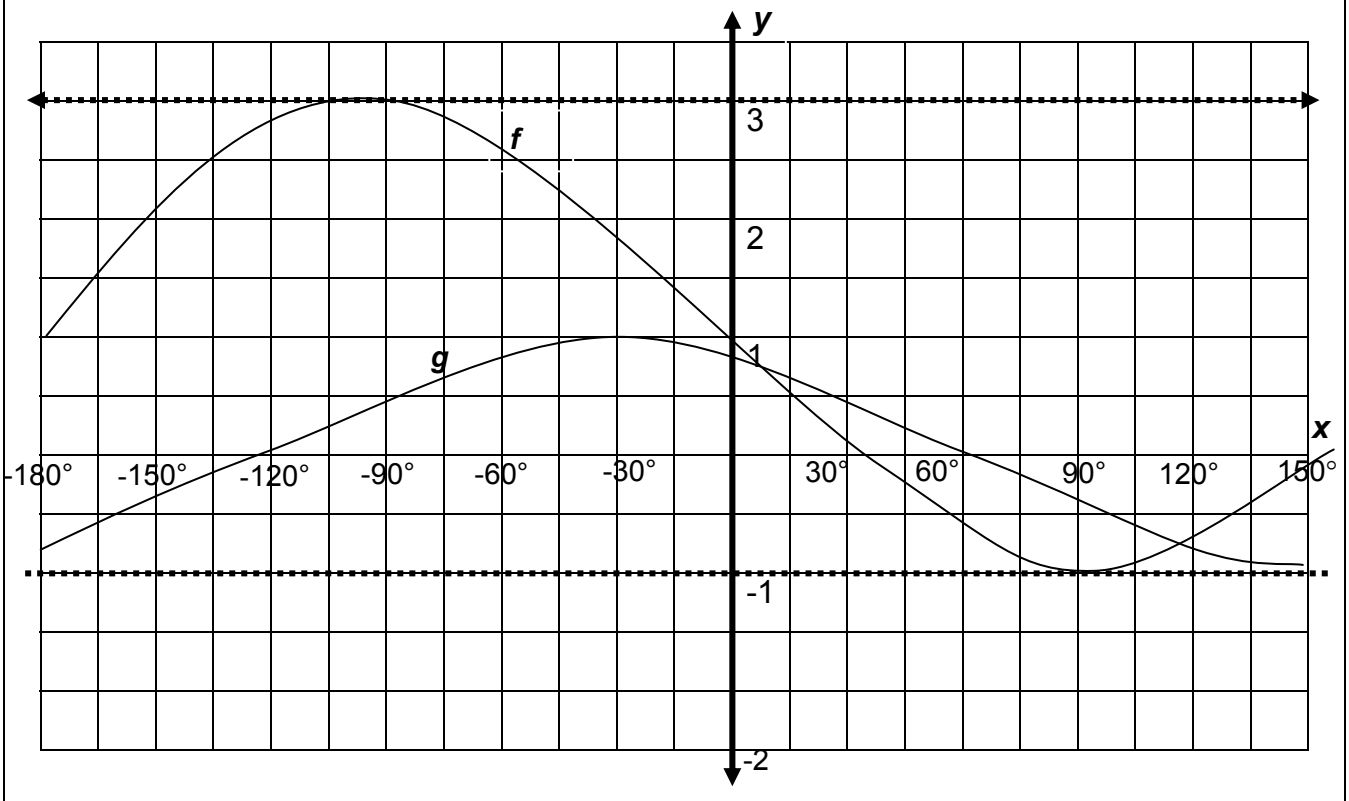
5.1	$-\frac{1}{2}\tan(-225°).\cos^2 585$		
	$= -\frac{1}{2}\tan 45°.\cos^2 45°$	✓✓ special angles	
	$= \frac{1}{2}.1.\left(\frac{1}{\sqrt{2}}\right)^2$	✓✓ 2 ratios	
	$= \frac{1}{2}.\frac{1}{2}$		
	$= \frac{1}{4}$	✓ answer	(5)
5.2	$\frac{\sin\theta-\cos\theta}{\tan\theta-1}-\cos\theta$		
	$= \frac{\sin\theta-\cos\theta}{\frac{\sin\theta}{\cos\theta}-1}-\cos\theta$	✓ identity	
	$= \frac{\sin\theta-\cos\theta}{\frac{\sin\theta}{\cos\theta}-\frac{\cos\theta}{\cos\theta}}-\cos\theta$	✓ simplification of fraction	
	$= \frac{\sin\theta-\cos\theta}{\frac{\sin\theta-\cos\theta}{\cos\theta}}-\cos\theta$	✓ simplification of fraction	
	$= \frac{\sin\theta-\cos\theta}{\sin\theta-\cos\theta}.\cos\theta-\cos\theta$		
	$= \cos\theta - \cos\theta$		
	$= 0$	✓answer	(4) **[9]**

QUESTION 6

6.1	$\cos(x + 12{,}4°) = -0{,}334$ $x + 12{,}4° = 180° + 70{,}49°$ $\therefore x = 238{,}09°$	✓ reference angle ✓quadrant ✓ answer (3)
6.2	$2.\sqrt{3}.\sin x.\tan x - \sqrt{3}.\tan x - 2\sin x + 1 = 0$ $\sqrt{3}\tan x(2\sin x - 1) - 1(2\sin x - 1) = 0$ $\therefore \tan = \frac{1}{\sqrt{3}}$ or $\sin x = \frac{1}{2}$ $\therefore x = 30° + 180.k$ *or* $x = 30° + 360°, k \in Z$ $x = 150° + 360°.k,\ k \in Z$	✓ common factor ✓ common factor ✓✓ values of tan x and sin x ✓✓✓ values for x, (8) ✓ k specified **[11]**

QUESTION 7

7.



7.1	***f***		***g***	
	✓	shape	✓	
	✓	y-intercept	✓	
	✓	x-intercept	✓	
	✓	turning points	✓	(8)

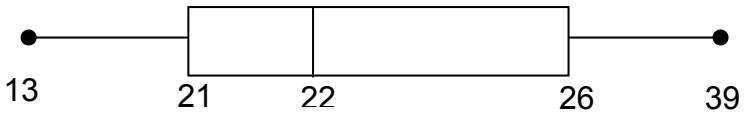
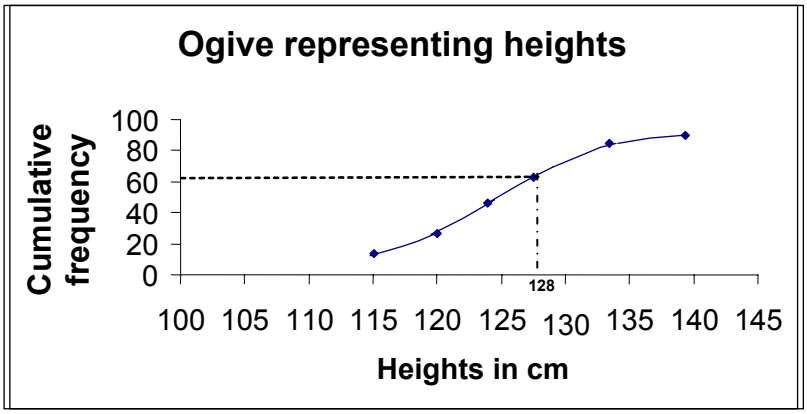
7.2	7.2.1	2✓	(1)
	7.2.2	360°✓	(1)
7.3	$\sin x - \frac{1}{2} + \frac{1}{2}\cos(x + 30°) = \frac{1}{2} \rightarrow -2\sin x + 1 - \cos(x + 30°) = 1$✓ x = 150°✓		(2)
7.4	$g{:}x \rightarrow \cos x + 1$	✓ cos *x* ✓ + 1	(2) **[14]**

QUESTION 8

8.1.1	In ΔACB: $A\hat{C}B = 180° - (x + y)$ angles of triangle $\frac{AB}{\sin C} = \frac{BC}{\sin x}$ $\therefore AB = \frac{BC.\sin[180° - (x + y)]}{\sin x}$ $= \frac{BC.\sin(x + y)}{\sin x}$	✓ $A\hat{C}B$ ✓ sine rule ✓substitution	(3)
8.1.2	MN = AB , AMNB is a rectangle $\therefore \frac{h}{BC} = \tan z$ $\therefore BC = \frac{h}{\tan z}$ $MN = \frac{BC.\sin(x + y)}{\sin x}$ MN = AB $= \frac{h}{\tan z} x \frac{\sin(x + y)}{\sin x}$ $= \frac{h.\sin(x + y)}{\tan z.\sin x}$	✓ properties of rect. ✓ tan ratio ✓ value of BC ✓ subst of BC	(4)

8.2	$MN = \frac{h\sin(x+y)}{\tan z.\sin x}$ $70 = \frac{h\sin(52{,}3° + 27{,}3°)}{\tan 42°.\sin 52{,}3°}$ $h = \frac{70.\tan 42°.\sin 52{,}3°}{\sin 79{,}6°}$ $\therefore h = 50{,}7\text{ m}$	✓ substitution ✓subject of formula ✓ answer	(3)
8.3	In ΔABC: $AC^2 = AB^2 + BC^2 - 2AB.BC\cos A\hat{B}C$ $= (70)^2 + (48{,}3)^2 - 2(70)(48{,}3)\cos 27{,}3°$ $= 1224{,}06$ m $\therefore AC = 34{,}99$ m $\therefore$ Perimeter of ΔABC = 70 m + 48,3 m + 34,99 m = 153,29 m	✓cos formula ✓substitution ✓AC ✓✓ answer	(5)
8.4	Area : $\Delta ABC = \frac{1}{2}AB.BC\sin A\hat{B}C$ $= \frac{1}{2}.70.48{,}3.\sin 27{,}3°$ $= 775{,}3\text{ m}^2$ $\therefore$ number of mice = $\frac{775{,}3}{10} = 77$ mice (accept 78)	✓ area rule ✓ substitution ✓ area ✓✓ answer	(5) **[20]**

QUESTION 9

<table>
<tr><td>9.1.1</td><td>Lower quartile Q_1= 21
Upper quartile Q_3 = 26
Inter-quartile range = $Q_3 - Q_1$ = 26 – 21 = 5</td><td>✓21
✓26
✓ 5</td><td>(3)</td></tr>
<tr><td>9.1.2</td><td> 
</td><td>✓ box & whiskers
✓ 13 and 39
✓ 21 and 26
✓ 22</td><td>(4)</td></tr>
<tr><td>9.1.3</td><td>The dispersion of the data is skewed to the right</td><td>✓✓ answer</td><td>(2)</td></tr>
<tr><td>9.2.1</td><td><table>
<tr><th>Height in cm</th><th>Frequency</th><th>Cumulative Frequency</th></tr>
<tr><td>110 ≤ h<115</td><td>10</td><td>10</td></tr>
<tr><td>115 ≤ h<120</td><td>14</td><td>24</td></tr>
<tr><td>120 ≤ h<125</td><td>22</td><td>46</td></tr>
<tr><td>125 ≤ h<130</td><td>23</td><td>69</td></tr>
<tr><td>130 ≤ h<135</td><td>16</td><td>85</td></tr>
<tr><td>135 ≤ h<140</td><td>5</td><td>90</td></tr>
</table></td><td>✓✓cum. frequency</td><td>(2)</td></tr>
<tr><td>9.2.2</td><td> 
</td><td>✓ y-co-ords of points
✓ x-co-ords of points
✓ curve (upper limits of intervals)</td><td>(3)</td></tr>
<tr><td>9.2.3</td><td>60 girls are shorter than 128 cm (accept 55-65)</td><td>✓✓answer</td><td>(2)</td></tr>
</table>

<table>
<tr><td>9.3.1</td><td>Mean mass: $\overline{x} = \frac{304}{8} = 38$</td><td>✓ formula for mean
✓ answer</td><td>(2)</td></tr>
<tr><td></td><td>❖ answer only via calculator: full marks</td><td></td><td></td></tr>
<tr><td>9.3.2</td><td>
<table>
<tr><th>Mass in kg</th><th>$x-\overline{x}$</th><th>$(x-\overline{x})^2$</th></tr>
<tr><td>26</td><td>-12</td><td>144</td></tr>
<tr><td>28</td><td>-10</td><td>100</td></tr>
<tr><td>32</td><td>-6</td><td>36</td></tr>
<tr><td>35</td><td>-3</td><td>9</td></tr>
<tr><td>38</td><td>0</td><td>0</td></tr>
<tr><td>43</td><td>5</td><td>25</td></tr>
<tr><td>47</td><td>9</td><td>81</td></tr>
<tr><td>55</td><td>17</td><td>289</td></tr>
<tr><td>$\sum = 304$</td><td></td><td>$\sum = 684$</td></tr>
<tr><td colspan="2">$\overline{x} = \frac{304}{8} = 38$</td><td></td></tr>
</table>
</td><td>✓ ✓ $x-\overline{x}$
✓✓ $(x-\overline{x})^2$
✓ 684</td><td>(5)</td></tr>
<tr><td>9.3.3</td><td>Variance $\partial^2 = \frac{\sum_{i=1}^{n}(x_i-\overline{x})^2}{n}$ = $\frac{684}{8} = 85,5$
$\therefore S.D. = \sqrt{85,5} = 9.25$
❖ answer only via calculator: full marks</td><td>✓formula of variance
✓ variance
✓ form. st. dev.
✓ st. deviation</td><td>(4)</td></tr>
<tr><td>9.3.4</td><td>interval (28,75;47,25)
∴ 5 people</td><td>✓✓ answer</td><td>(2)
[29]</td></tr>
<tr><td></td><td></td><td>TOTAL:</td><td>150</td></tr>
</table>