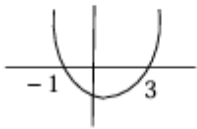


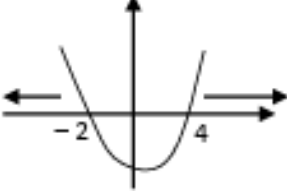
**Gr 12 MARCH MOCK PAPER REVISION QUESTIONS 2026 MARKING GUIDELINE**

**QUESTION 1/VRAAG 1**

1.1.1	$x(x-3) = 0$ $x = 0$ or $x = 3$	✓ $x = 0$ ✓ $x = 3$ (2)
1.1.2	$2x^2 - 4x + 1 = 0$ $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(1)}}{2(2)}$ $x = 1,71$ or $x = 0,29$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 20px;">Answer only: <math>\frac{4}{4}</math></div>	✓ standard form ✓ correct substitution in correct formula ✓ answer ✓ answer (4)
1.1.3	$x^2 - 2x - 3 > 0$ $(x-3)(x+1) > 0$ CV: $x = 3$ or $x = -1$  <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 20px;">Answer only: <math>\frac{3}{4}</math></div>	✓ factors ✓ critical values ✓✓ answer (4)
1.1.4	$2^{2x} - 2^{x+2} - 32 = 0$ $2^{2x} - 2^2 \cdot 2^x - 32 = 0$ $(2^x - 8)(2^x + 4) = 0$ $2^x = 8$ or $2^x = -4$ $2^x = 2^3$ no solution $x = 3$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 20px;">Answer only: <math>\frac{1}{5}</math></div>	✓ use of exponential law ✓ factors ✓ $2^x = 8$ ✓ $2^x \neq -4$ ✓ answer (5)
1.1.5	$\sqrt{-2x+4} - x = 2$ $\sqrt{-2x+4} = 2 + x$ $(\sqrt{-2x+4})^2 = (2+x)^2$ $-2x+4 = 4 + 4x + x^2$ $x^2 + 6x = 0$ $x(x+6) = 0$ $x = 0$ or $x = -6$	✓ isolating the root ✓ squaring both sides ✓ standard form ✓ answers with selection (4)

<p>1.2</p>	$y = 3 - 2x \quad \dots (1)$ $y^2 + xy = 2 \quad \dots (2)$ <p>Subs (1) into (2):</p> $(3 - 2x)^2 + (3 - 2x)x = 2$ $4x^2 - 12x + 9 - 2x^2 + 3x - 2 = 0$ $2x^2 - 9x + 7 = 0$ $(2x - 7)(x - 1) = 0$ $x = \frac{7}{2} \quad \text{or} \quad x = 1$ $y = -4 \quad y = 1$ <p><b>OR/OF</b></p> $x = \frac{3 - y}{2} \quad \dots (1)$ $y^2 + xy = 2 \quad \dots (2)$ <p>Subs (1) into (2):</p> $y^2 + \left(\frac{3 - y}{2}\right)y = 2$ $2y^2 + 3y - y^2 - 4 = 0$ $y^2 + 3y - 4 = 0$ $(y + 4)(y - 1) = 0$ $y = -4 \quad \text{or} \quad y = 1$ $x = \frac{7}{2} \quad \text{or} \quad x = 1$	<p>✓ eq 1</p> <p>✓ substitution</p> <p>✓ standard form</p> <p>✓ both <math>x</math>-values</p> <p>✓ both <math>y</math>-values (5)</p> <p><b>OR/OF</b></p> <p>✓ eq 1</p> <p>✓ substitution</p> <p>✓ standard form</p> <p>✓ both <math>y</math>-values</p> <p>✓ both <math>x</math>-values (5)</p>
<p>1.3</p>	$\text{Product} = \frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \dots \times \frac{n}{n-1} \times \frac{n+1}{n} = \frac{n+1}{2}$ <p>The product will be an integer value when <math>n + 1</math> is divisible by 2 i.e. <math>n \in \{3; 5; 7; \dots\}</math></p> <p>Therefore, <math>n</math> must be an odd number, greater than 2.</p> <p><b>OR/OF</b></p> <p>For <math>n = 2</math> the product is <math>\frac{3}{2}</math></p> <p>For <math>n = 3</math> the product is <math>\left(\frac{3}{2}\right)\left(\frac{4}{3}\right) = 2</math></p> <p>For <math>n = 4</math> the product is <math>\left(\frac{3}{2}\right)\left(\frac{4}{3}\right)\left(\frac{5}{4}\right) = \frac{5}{2}</math></p> <p>For <math>n = 5</math> the product is <math>\left(\frac{3}{2}\right)\left(\frac{4}{3}\right)\left(\frac{5}{4}\right)\left(\frac{6}{5}\right) = 3</math></p> <p><math>n \in \{3; 5; 7; \dots\}</math></p> <p>Therefore, <math>n</math> must be an odd number, greater than 2.</p>	$\checkmark \frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \dots \times \frac{n+1}{n}$ <p>✓ statement <math>\left(\frac{n+1}{2}\right)</math></p> <p>✓ <math>n</math> is odd for <math>n &gt; 2</math> (3)</p> <p><b>OR/OF</b></p> <p>✓ generation of the four products</p> <p>✓ identifying the pattern when <math>n</math> is odd</p> <p>✓ <math>n</math> is odd for <math>n &gt; 2</math> (3)</p>
	<p>[27]</p>	

QUESTION 1/VRAAG 1

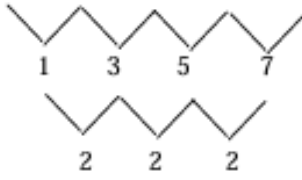
1.1.1	$3x^2 + 5x = 0$ $x(3x+5) = 0$ $x = 0$ or $x = -\frac{5}{3}$	$\checkmark x = 0$ $\checkmark x = -\frac{5}{3}$ (2)
1.1.2	$4x^2 + 3x - 5 = 0$ $x = \frac{-(3) \pm \sqrt{(3)^2 - 4(4)(-5)}}{2(4)}$ $x = 0,80$ or $x = -1,55$	$\checkmark$ correct substitution into correct formula $\checkmark$ answer $\checkmark$ answer (3)
1.1.3	$(x-1)^2 - 9 \geq 0$ $x^2 - 2x - 8 \geq 0$ $(x-4)(x+2) \geq 0$ $x = 4$ or $x = -2$ $x \leq -2$ or $x \geq 4$	 $\checkmark$ standard form $\checkmark$ critical values $\checkmark\checkmark x \leq -2$ or $x \geq 4$ (4)
1.1.4	$5^{2x} - 5^x = 0$ $5^x(5^x - 1) = 0$ $5^x \neq 0$ or $5^x = 1$ $x = 0$ <b>OR/OF</b> $5^{2x} = 5^x$ $2x = x$ $2x - x = 0$ $x = 0$	$\checkmark$ common factor $\checkmark 5^x \neq 0$ $\checkmark 5^x = 1$ $\checkmark x = 0$ (4) <b>OR/OF</b> $\checkmark 5^{2x} = 5^x$ $\checkmark 2x = x$ $\checkmark 2x - x = 0$ $\checkmark x = 0$ (4)

1.1.5	$\frac{x}{\sqrt{20-x}} = 1$ $x = \sqrt{20-x}$ $x^2 = 20-x$ $x^2 + x - 20 = 0$ $(x+5)(x-4) = 0$ $x = 4 \text{ or } x = -5$	<ul style="list-style-type: none"> <li>✓ isolating the surd</li> <li>✓ squaring both sides</li> <li>✓ standard form</li> <li>✓ answers</li> <li>✓ selection</li> </ul> <p style="text-align: right;">(5)</p>
1.2	$2x^2 - y^2 = 7 \quad \dots (1)$ $x + y = 9 \quad \dots (2)$ $y = 9 - x$ $2x^2 - (9-x)^2 = 7$ $2x^2 - 81 + 18x - x^2 = 7$ $x^2 + 18x - 88 = 0$ $(x+22)(x-4) = 0$ $x = -22 \text{ or } x = 4$ $y = 31 \text{ or } y = 5$ <p><b>OR/OF</b></p> $2x^2 - y^2 = 7 \quad \dots (1)$ $x + y = 9 \quad \dots (2)$ $x = 9 - y$ $2(9-y)^2 - y^2 = 7$ $2(81 - 18y + y^2) - y^2 - 7 = 0$ $162 - 36y + 2y^2 - y^2 - 7 = 0$ $y^2 - 36y + 155 = 0$ $(y-31)(y-5) = 0$ $y = 31 \text{ or } y = 5$ $x = -22 \text{ or } x = 4$	<ul style="list-style-type: none"> <li>✓ <math>y = 9 - x</math></li> <li>✓ substitution</li> <li>✓ standard form</li> <li>✓ <math>x</math>-values</li> <li>✓ <math>y</math>-values</li> </ul> <p><b>OR/OF</b></p> <ul style="list-style-type: none"> <li>✓ <math>x = 9 - y</math></li> <li>✓ substitution</li> <li>✓ standard form</li> <li>✓ <math>y</math>-values</li> <li>✓ <math>x</math>-values</li> </ul> <p style="text-align: right;">(5)</p>
1.3	$P \times T = (1-a)(1+a)(1+a^2)(1+a^4) \dots (1+a^{512})$ $P \times T = (1-a^2)(1+a^2)(1+a^4) \dots (1+a^{512})$ $P \times T = (1-a^4)(1+a^4) \dots (1+a^{512})$ $P \times T = (1-a^8) \dots (1+a^{512})$ $P \times T = (1-a^{512})(1+a^{512})$ $= 1 - a^{1024}$	<ul style="list-style-type: none"> <li>✓ <math>(1-a^4)</math></li> <li>✓ <math>(1-a^{512})</math></li> <li>✓ <math>1 - a^{1024}</math></li> </ul> <p style="text-align: right;">(3)</p>
<b>[26]</b>		

NATURE OF ROOTS

1.3	$x = \frac{4 \pm \sqrt{16 - 4m(-m+5)}}{2m}$ <p>For non-real roots/Vir nie-reële wortels: <math>16 - 4m(-m+5) &lt; 0</math></p> $16 + 4m^2 - 20m < 0$ $m^2 - 5m + 4 < 0$ $(m-4)(m-1) < 0$ $1 < m < 4$	$\checkmark 16 - 4m(-m+5) < 0$ $\checkmark$ factors or using formula/ <i>faktore of gebruik formule</i> $\checkmark \checkmark 1 < m < 4$ <p style="text-align: right;">(4)</p>
1.4	$-x^2 + 4x + 12$ $= -1(x^2 - 4x - 12)$ $= -1(x^2 - 4x + 4 - 4 - 12)$ $= -1(x-2)^2 + 16$ <p>The maximum value of/Die maksimum waarde van <math>-x^2 + 4x + 12</math> is 16</p> <p><math>\therefore</math> max value of <math>\sqrt{-x^2 + 4x + 12}</math> is 4</p> <p><b>OR/OF</b></p> $\sqrt{-x^2 + 4x + 12}$ <p>max when <math>x = \frac{-b}{2a}</math></p> $= \frac{-4}{2(-1)}$ $= 2$ <p>max value <math>y = -(2)^2 + 4(2) + 12</math></p> $= 16$ <p>The maximum value of/Die maksimum waarde van <math>-x^2 + 4x + 12</math> is 16</p> <p><math>\therefore</math> max value of <math>\sqrt{-x^2 + 4x + 12}</math> is 4</p>	$\checkmark -1(x^2 - 4x - 12)$ $\checkmark -1(x^2 - 4x + 4 - 4 - 12)$ $\checkmark -1(x-2)^2 + 16$ $\checkmark \sqrt{16} = 4$ <p style="text-align: right;">(4)</p> <p><b>OR/OF</b></p> $\checkmark$ subst/verv. $\checkmark$ x-value/waarde $\checkmark$ y-value/waarde $\checkmark \sqrt{16} = 4$ <p style="text-align: right;">(4)</p>

QUESTION/VRAAG 2

2.1.1	$S_n = \frac{n}{2}[2a + (n-1)d]$ $S_{20} = \frac{20}{2}[2(7) + (20-1)(5)]$ $S_{20} = 1\ 090$	✓ substitution ✓ answer (2)
2.1.2	$T_n = 7 + (n-1)(5)$ $T_n = 5n + 2$ $S_{75} - S_{20} = 14\ 400 - 1\ 090 = 13\ 310$ $\sum_{n=1}^{75} (5n+2) - \sum_{n=1}^{20} (5n+2) = 13\ 310$ $\therefore \sum_{n=21}^{75} (5n+2) = 13\ 310$ <p><b>OR/OF</b></p> $T_{21} + T_{22} + T_{23} + \dots + T_{75} = 14\ 400 - 1\ 090$ $107 + 112 + 117 + \dots = 13\ 310$ $T_n = 102 + 5n$ $\therefore \sum_1^{55} (5n+102) = 13\ 310$	✓ general term ✓ $S_{75} - S_{20}$ ✓ $\sum_{n=21}^{75} \checkmark = 13\ 310$ (4) <b>OR/OF</b> ✓ $S_{75} - S_{20}$ ✓ general term ✓ $\sum_{n=1}^{55} \checkmark = 13\ 310$ (4)
2.2.1	$T_n = 2n - 1$ $98^{\text{th}} \text{ first difference} = 2(98) - 1 = 195$ <p>Quadratic: <math>T_{98} = 9\ 632 - 195 = 9\ 437</math></p>	✓ answer ✓ method ✓ answer (3)
2.2.2	$28 ; 29 ; 32$  $2a = 2 \quad 3a + b = 1 \quad 9a + 3b + c = 32$ $a = 1 \quad b = -2 \quad T_3 = 1(3)^2 - 2(3) + c = 32$ $c = 29$ <p><b>OR/OF</b></p> $1 - 2 + c = 28$ $c = 29$ $\therefore T_n = n^2 - 2n + 29$	✓ second difference ✓ $a = 1$ ✓ $b = -2$ ✓ method to calculate $c$ ✓ $c = 29$ (5)
<b>[14]</b>		

QUESTION 2/VRAAG 2

2.1.1	$r = \frac{1}{2}$ <p>Yes, because <math>-1 &lt; \frac{1}{2} &lt; 1</math></p>	<p>✓ <math>r = \frac{1}{2}</math></p> <p>✓ answer with reason</p> <p>(2)</p>
2.1.2	$S_{\infty} = \frac{a}{1-r}$ $S_{\infty} = \frac{4}{1-\frac{1}{2}}$ $\therefore S_{\infty} = 8$	<p>✓ substitution</p> <p>✓ answer</p> <p>(2)</p>
2.2	$\sum_{j=k}^{10} 3^{j-1} = 3^{k-1} + 3^{k+1-1} + 3^{k+2-1} + \dots + 3^9$ $= 3^{k-1} + 3^k + 3^{k+1} + \dots + 3^9$ $S_n = \frac{a(r^n - 1)}{r - 1}$ $29\,520 = \frac{3^{k-1}(3^{11-k} - 1)}{3 - 1}$ $3^{10} - 3^{k-1} = 59\,040$ $3^{k-1} = 9$ $k - 1 = 2$ $\therefore k = 3$	<p>✓ <math>a = 3^{k-1}</math></p> <p>✓ <math>r = 3</math></p> <p>✓ <math>n = 11 - k</math></p> <p>✓ substitution</p> <p>✓ answer</p> <p>(5)</p>
		<b>[9]</b>

QUESTION 3/VRAAG 3

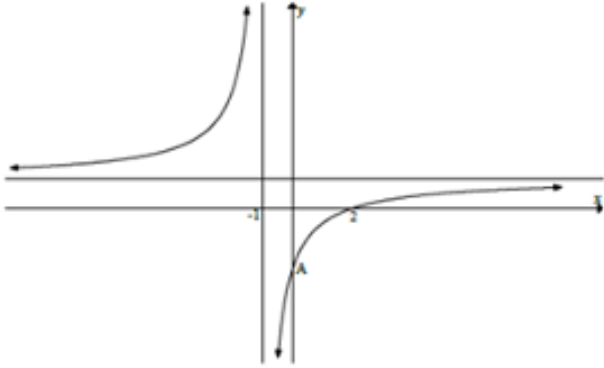
<p>3.1.1</p>	$3; 7; 12; 18$ $\quad \vee \quad \vee \quad \vee$ <p>First diff: <math>4; 5; 6</math></p> $\quad \vee \quad \vee$ <p>Second diff: <math>1; 1</math></p> $2a=1$ $a = \frac{1}{2}$ $3a+b=4$ $3\left(\frac{1}{2}\right)+b=4$ $b = \frac{5}{2}$ $a+b+c=3$ $\frac{1}{2} + \frac{5}{2} + c = 3$ $c=0$ $T_n = \frac{1}{2}n^2 + \frac{5}{2}n$	$\checkmark 2a=1$  $\checkmark 3\left(\frac{1}{2}\right)+b=4$  $\checkmark \frac{1}{2} + \frac{5}{2} + c = 3$  <p style="text-align: right;">(3)</p>
<p>3.1.2</p>	$13\,527 = \frac{1}{2}n^2 + \frac{5}{2}n$ $n^2 + 5n - 27\,054 = 0$ $(n-162)(n+167) = 0$ $n=162 \text{ or } n=-167$ $T_{161} = 13\,363$ $\therefore T_{161} + 164 = 13\,527$ <p>164 must be added.</p> <p><b>OR/OF</b></p> $T_n = 3 + \text{sum of } 1^{\text{st}} \text{ differences}$ $13\,527 = 3 + 4 + 5 + \dots + n$ $\frac{n-3+1}{2}[3+n] = 13\,527$ $n^2 + n - 27\,060 = 0$ $(n+165)(n-167) = 0$ $n = 164$	$\checkmark 13\,527 = \frac{1}{2}n^2 + \frac{5}{2}n$ $\checkmark \text{ standard form}$  $\checkmark \text{ answers for } n$  $\checkmark 164$  <p style="text-align: right;">(4)</p> <p><b>OR/OF</b></p> $\checkmark 13\,527 = 3 + 4 + 5 + \dots + n$ $\checkmark n^2 + n - 27\,060 = 0$  $\checkmark \text{ answers for } n$ $\checkmark 164$  <p style="text-align: right;">(4)</p>

3.2.1	$T_n = 8 + (n-1)(3)$ $T_n = 3n + 5$ $41 = 3n + 5$ $36 = 3n$ $n = 12$	$\checkmark T_n = 3n + 5$ $\checkmark T_n = 41$ $\checkmark$ answer (3)
3.2.2a	$P_{4i} = 12$	$\checkmark$ answer (1)
3.2.2b	$P_8 = a + 7d = 1$ $P_{11} = a + 10d = 2$ $3d = 1$ $d = \frac{1}{3}$ $a + 7\left(\frac{1}{3}\right) = 1$ $a = -\frac{4}{3}$	$\checkmark a + 7d = 1$ $\checkmark a + 10d = 2$ $\checkmark$ value of $d$ $\checkmark$ value of $a$ (4)
		<b>[15]</b>

QUESTION 6

	$f(x) = \frac{a}{x-5} + 1$ $0 = \frac{a}{(2)-5} + 1$ $-1 = \frac{a}{-3}$ $a = 3$ $f(x) = \frac{3}{x-5} + 1$ <p><b>OR</b></p> $(x-5)(y-1) = k$ $(2-5)(0-1) = k$ $k = 3$ $(x-5)(y-1) = 3$ $y = \frac{3}{x-5} + 1$	<p>✓ <math>x-5</math>                  ✓ <math>+1</math>                  ✓ substitution of <math>(2; 0)</math>                  ✓ <math>a = 3</math></p> <p>(4)</p> <p>✓ <math>(x-5)</math>                  ✓ <math>(y-1)</math>                  ✓ substitution of <math>(2; 0)</math>                  ✓ <math>k = 3</math></p> <p>(4)</p> <p>[4]</p>
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QUESTION/VRAAG 6

<p>Given: <math>f(x) = \frac{x-d}{x-p}</math></p>		
<p>6.1.1</p>	$0 = \frac{2-d}{2-p}$ $d = 2$ $-1 - p = 0$ $p = -1$	<p><b>NOTE:</b>                  If candidate leaves answer as <math>f(x) = \frac{x-2}{x+1}</math> : 2/2 marks</p> <p>✓ <math>d</math> value                  ✓ <math>p</math> value</p> <p>(2)</p>

6.1.2	$y = \frac{x-2}{x+1}$ $= \frac{(x+1)-3}{x+1}$ $= \frac{x+1}{x+1} - \frac{3}{x+1}$ $= \frac{-3}{x+1} + 1$ <p>OR</p> $\frac{-3}{x+1} + 1$ $= \frac{-3+x+1}{x+1}$ $= \frac{x-2}{x+1}$	<p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>If the candidate starts with <math>y = \frac{a}{x+1} + 1</math> and substitutes (2 ; 0) and proves <math>a = -3</math>: 0/2 marks</li> <li>If the candidate starts with <math>y = \frac{-3}{x+1} + 1</math> and calculates (2 ; 0) as x-intercept: 0/2 marks</li> </ul>	$\checkmark \frac{x-2}{x+1} = \frac{x+1-3}{x+1}$ $\checkmark \frac{x+1}{x+1} - \frac{3}{x+1}$ <p>(2)</p>
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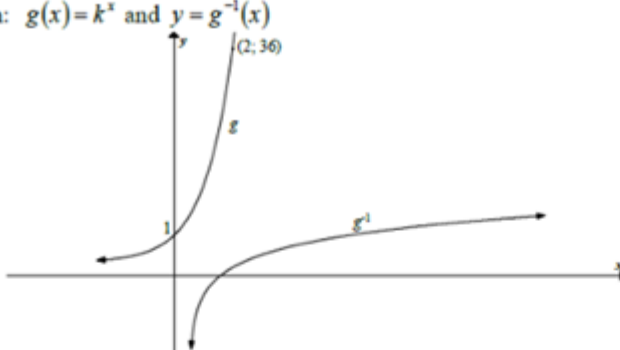
	<p>OR</p> $x+1 \overline{)x-2}$ $\underline{-x-1}$ $-3$ <p>Remainder = -3  <math>\therefore x-2 = 1(x+1) - 3</math></p> $\frac{x-2}{x+1} = 1 - \frac{3}{x+1}$ $f(x) = \frac{-3}{x+1} + 1$	$\checkmark \frac{-3+x+1}{x+1}$ <p><math>\checkmark</math> simplification (2)</p> <p><math>\checkmark</math> long division</p> <p><math>\checkmark</math> remainder = -3 (2)</p>
6.1.3	P(-1 ; 1)	$\checkmark$ x-coordinate $\checkmark$ y-coordinate (2)

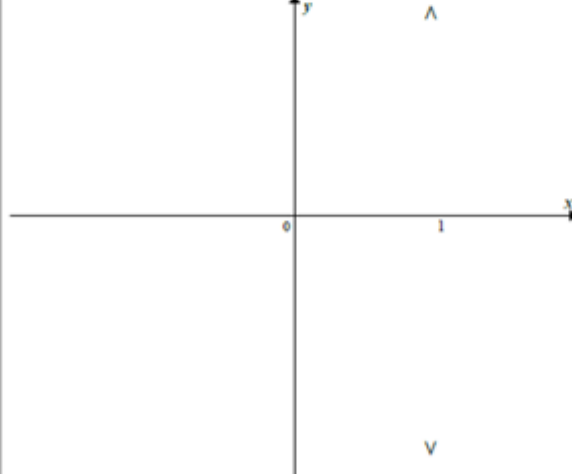
**QUESTION 8**

8.1	$x > 0$  <b>OR</b> $x \in (0; \infty)$	✓ answer  (1)
8.2	$y = 2^{-x}$  <b>OR</b> $y = \left(\frac{1}{2}\right)^x$	✓ answer  (1)
8.3	$y = 0$	✓ answer  (1)
8.4.1	Reflect the graph of $f$ over the $x$ -axis  <b>OR</b> For each point the $y$ -coordinate changes sign.	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> <b>NOTE:</b>                      Reflect only : 0 / 1                 </div>  ✓ answer  (1)
8.4.2	Reflect the graph of $f$ over the line $y = x$ . Then shift the graph down 5 units	✓✓ answer ✓ answer  (3)

8.4.2 contd	<b>OR</b> Sketch the graph of the inverse of $f$ . Shift the graph of the inverse of $f$ down by 5 units.  <b>OR</b> Shift the graph 5 units LEFT. Reflect the graph over the line $y = x$ .	
8.5	$\log_2 x < 3$ $-\log_2 x > -3$ For $-\log_2 x = -3$ $2^3 = x$ $x = 8$ $f(x) > -3$ $0 < x < 8$ or $x \in (0; 8)$	<div style="border: 1px solid black; padding: 5px;"> <b>NOTE:</b>                      Notation incorrect:                       Answer <math>x &lt; 8</math>: 2 / 3                       Answer only correct: 3 / 3                 </div> ✓ multiplication by - 1  ✓ Notation ✓ critical values  (3) <b>[10]</b>

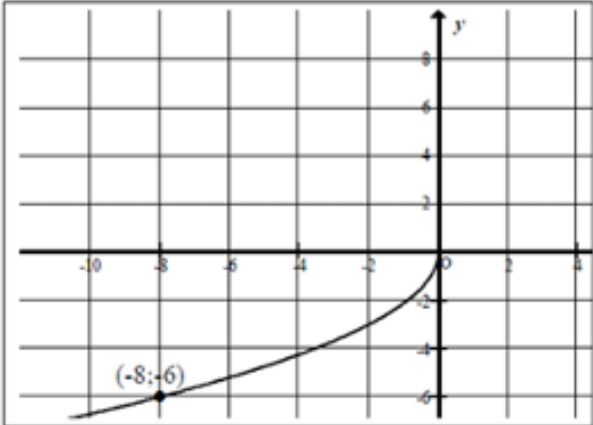
QUESTION/VRAAG 5

Given: $g(x) = k^x$ and $y = g^{-1}(x)$ 		
5.1.1	$k^2 = 36$ $k = 6$	$\checkmark k^2 = 36$ $\checkmark$ answer (2)
5.1.2	$g: y = 6^x$ $g^{-1}: x = 6^y$ $y = \log_6 x$ or $y = \frac{\log x}{\log 6}$	<div style="border: 1px solid black; padding: 5px; display: inline-block; margin: 10px;">                     NOTE:                      Answer only : 2/2 marks                 </div> $\checkmark x = 6^y$ $\checkmark y = \log_6 x$ or $y = \frac{\log x}{\log 6}$ (2)
5.1.3	$0 < x \leq 1$ OR $(0; 1]$	$\checkmark 0 < x$ $\checkmark x \leq 1$ (2)
5.1.4	$x > 3$ OR $(3; \infty)$	$\checkmark$ answer (1)

5.2.1		$\checkmark$ vertical line $\checkmark$ vertical line has x-intercept $(1; 0)$ (2)
		<div style="border: 1px solid black; padding: 5px; display: inline-block; margin: 10px;">                     NOTE:                      Any other graph cutting                      at <math>(1; 0)</math>: 0 / 2 marks                 </div>

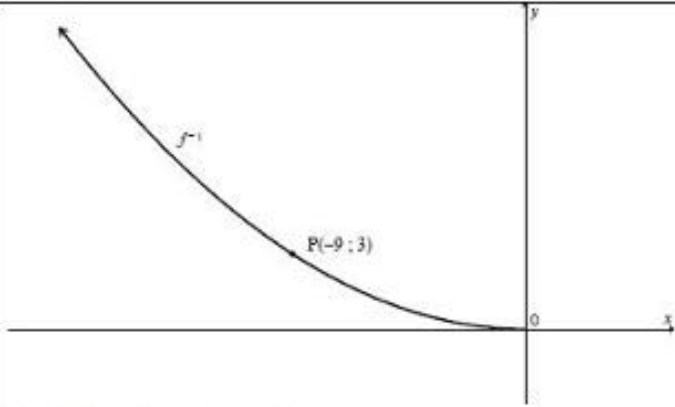
5.2.2	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p><b>NOTE:</b> If <math>x = 1</math> is not drawn in 5.2.1: 0/2 marks</p> </div> <p>No, the inverse of <math>f</math> is not a function because the vertical line test fails in the graph of <math>x = 1</math>. <i>Nee, die inverse van <math>f</math> is nie 'n funksie nie omdat die vertikale lyn-toets vir die grafiek <math>x = 1</math> faal.</i></p> <p><b>OR</b></p> <p>No, the inverse of <math>f</math> is not a function because the horizontal line test fails in the graph of <math>y = 1</math>. <i>Nee, die inverse van <math>f</math> is nie 'n funksie nie omdat die horisontale lyn-toets vir die grafiek <math>y = 1</math> faal.</i></p> <p><b>OR</b></p> <p>Since <math>f</math> as defined is a many-to-one function it does not have an inverse function. <i><math>f</math> is gedefinieerd as 'n meer-tot-een-funksie en het dus nie 'n inverse funksie nie.</i></p> <p><b>OR</b></p> <p>The inverse of <math>f</math> is a one-to-many relation. <i>Die inverse funksie van <math>f</math> is 'n een-tot-meer relasie.</i></p>	<p>✓ not a function ✓ valid reason (2)</p> <p>✓ not a function ✓ valid reason (2)</p> <p>✓ not a function ✓ valid reason (2)</p> <p>✓ not a function ✓ explanation (2)</p>
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**QUESTION 6**

6.1	$f(x) = ax^2$ $-8 = a(-6)^2$ $-8 = 36a$ $a = -\frac{8}{36}$ <p><b>OR</b></p> $a = -\frac{2}{9}$	<p>✓ substitution</p> <p>✓ answer (2)</p>
6.2	$f(x): y = -\frac{2}{9}x^2$ $x = -\frac{2}{9}y^2$ $9x = -2y^2$ $-\frac{9x}{2} = y^2$ $y = \pm\sqrt{\frac{-9x}{2}}, \text{ since } y \leq 0$ $y = -\sqrt{\frac{-9x}{2}} \text{ OR } y = -3\sqrt{\frac{-x}{2}}$ <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p><b>Note:</b> If candidate does not substitute the value of <math>a</math> the answer is <math>y = -\sqrt{\frac{x}{a}}</math> then 2 / 3 marks</p> </div>	<p>✓ swop x and y</p> <p>✓ <math>y^2 = -\frac{9x}{2}</math> or <math>y = \pm\sqrt{\frac{-9x}{2}}</math></p> <p>✓ <math>y = -\sqrt{\frac{-9x}{2}}</math> (3)</p>
6.3	$y \leq 0$ <p><b>OR</b></p> $y \in (-\infty ; 0]$	<p>✓ answer (1)</p>
6.4		<p>✓ shape (third quadrant) (concave upward)</p> <p>✓ Any point other than (0 ; 0) that lies on the graph</p> <p>Point corresponding from original graph will be (- 8 ; - 6) (2)</p>

6.5	$y = -f^{-1}(x)$ $= \sqrt{\frac{-9x}{2}}$ <p style="text-align: center;"><b>OR</b></p> $y = -f^{-1}(x)$ $= 3\sqrt{\frac{-x}{2}}$ <p><b>OR</b></p> $y = -\frac{2}{9}x^2$ <p>Reflection in <math>y = x</math>: <math>x = -\frac{2}{9}y^2</math></p> $-\frac{9}{2}x = y^2$ $y = -\sqrt{-\frac{9x}{2}}$ <p>Reflection about <math>y</math>-axis: <math>y = \sqrt{-\frac{9x}{2}}</math></p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p><b>Note:</b> If candidate has <math>(x : y) \rightarrow (y : -x)</math> then 2 / 3 marks</p> </div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p><b>Note:</b> If candidate does not substitute the value of <math>a</math> the answer is <math>y = \sqrt{\frac{x}{a}}</math> then full marks</p> </div>	$\checkmark\checkmark -f^{-1}(x)$ $\checkmark$ answer (3)  $\checkmark x = -\frac{2}{9}y^2$  $\checkmark y = -\sqrt{-\frac{9x}{2}}$ $\checkmark y = \sqrt{-\frac{9x}{2}}$ (3) <b>[11]</b>
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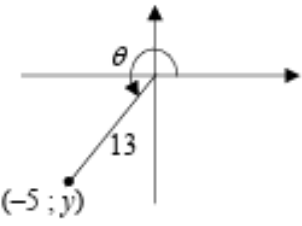
### QUESTION 5

5.1	$0 \leq x \leq 3$ OR $[0; 3]$	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <p><b>Note:</b> if the candidate gives <math>0 &lt; x &lt; 3</math>, award 1/2 marks</p> </div>	$\checkmark 0 \leq x$ $\checkmark x \leq 3$ (2)
5.2	$f^{-1}: x = -\sqrt{27y}$ $x^2 = 27y$ $y = \frac{x^2}{27}$ $x \leq 0$ OR $(-\infty; 0]$	$\checkmark$ interchange $x$ - and $y$ - values $\checkmark y = \frac{x^2}{27}$ $\checkmark x \leq 0$ or $(-\infty; 0]$ (3)	
5.3		$\checkmark$ shape $\checkmark$ end at origin $\checkmark$ any other point on the graph (3)	
5.4	Reflection about the $x$ -axis	$\checkmark$ answer	

QUESTION/VRAG 6

6.1	$f: y = \frac{1}{4}x^2$ $f^{-1}: x = \frac{1}{4}y^2$ $y^2 = 4x$ $y = \pm\sqrt{4x}$ $f^{-1}(x) = -\sqrt{4x} \quad \text{OR/OF} \quad f^{-1}(x) = -2\sqrt{x}$	✓ interchanging x and y ✓ $y^2 = 4x$ ✓ answer (3)
6.2		✓ both graphs pass through (0 ; 0) ✓ shape for both ✓ one additional point on both graphs (3)
6.3	Yes. No value of $x$ in the domain of $f^{-1}$ maps onto more than one $y$ -value. <i>Ja. Geen waarde van <math>x</math> in die definisieversameling van <math>f^{-1}</math> assosieer met meer as een <math>y</math>-waarde nie.</i>  <b>OR/OF</b>  Yes. One to one function./Ja. Een-tot-een-funksie.	✓ yes ✓ reason (2)  ✓ yes ✓ reason

QUESTION/VRAAG 5

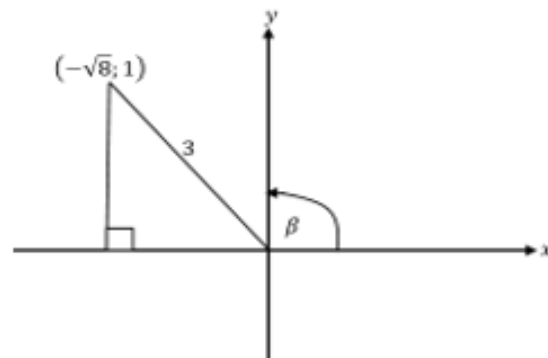
<p>5.1.1</p>	<p><math>y^2 = \sqrt{13^2 - (-5)^2}</math> [Pythagoras]  <math>y = -12</math></p> <p><math>\sin^2 \theta</math>  <math>= \left(-\frac{12}{13}\right)^2</math>  <math>= \frac{144}{169}</math></p> <p><b>OR/OF</b></p> <p><math>\sin^2 \theta = 1 - \cos^2 \theta</math>  <math>\sin^2 \theta = 1 - \left(-\frac{5}{13}\right)^2</math>  <math>\sin^2 \theta = \frac{144}{169}</math></p> 	<p>✓ <math>y = -12</math></p> <p>✓ substitution</p> <p>✓ answer (3)</p> <p>✓ square identity</p> <p>✓ substitution</p> <p>✓ answer (3)</p>
<p>5.1.2</p>	<p><math>\tan(360^\circ - \theta)</math>  <math>= -\tan \theta</math>  <math>= -\left(\frac{-12}{-5}\right)</math>  <math>= -\frac{12}{5}</math></p>	<p>✓ <math>-\tan \theta</math></p> <p>✓ answer (2)</p>
<p>5.1.3</p>	<p><math>\cos(\theta - 135^\circ)</math>  <math>= \cos \theta \cos 135^\circ + \sin \theta \sin 135^\circ</math>  <math>= \cos \theta (-\cos 45^\circ) + \sin \theta (\sin 45^\circ)</math>  <math>= \left(-\frac{5}{13}\right)\left(-\frac{\sqrt{2}}{2}\right) + \left(-\frac{12}{13}\right)\left(\frac{\sqrt{2}}{2}\right)</math> OR <math>\left(-\frac{5}{13}\right)\left(-\frac{1}{\sqrt{2}}\right) + \left(-\frac{12}{13}\right)\left(\frac{1}{\sqrt{2}}\right)</math>  <math>= -\frac{7\sqrt{2}}{26}</math> <span style="margin-left: 150px;"><math>= -\frac{7}{13\sqrt{2}}</math></span></p>	<p>✓ cpd. <math>\angle</math> expansion</p> <p>✓ reduction</p> <p>✓ substitution</p> <p>✓ answer (4)</p>

5.2	$\frac{2 \cos(180^\circ - x) \sin(-x)}{1 - 2 \cos^2(90^\circ - x)}$ $= \frac{2(-\cos x)(-\sin x)}{1 - 2 \sin^2 x}$ $= \frac{2 \sin x \cos x}{\cos 2x}$ $= \frac{\sin 2x}{\cos 2x}$ $= \tan 2x$	<ul style="list-style-type: none"> <li>✓ <math>\cos(180^\circ - x) = -\cos x</math></li> <li>✓ <math>\sin(-x) = -\sin x</math></li> <li>✓ <math>\cos^2(90^\circ - x) = \sin^2 x</math></li> <li>✓ <math>1 - 2 \sin^2 x = \cos 2x</math></li> <li>✓ <math>2 \sin x \cos x = \sin 2x</math></li> <li>✓ answer</li> </ul> <p style="text-align: right;">(6)</p>
5.3	$(\tan 92^\circ)(\tan 94^\circ)(\tan 96^\circ) \dots (\tan 176^\circ)(\tan 178^\circ)$ $= \left(\frac{\sin 92^\circ}{\cos 92^\circ}\right) \left(\frac{\sin 94^\circ}{\cos 94^\circ}\right) \left(\frac{\sin 96^\circ}{\cos 96^\circ}\right) \dots \left(\frac{\sin 176^\circ}{\cos 176^\circ}\right) \left(\frac{\sin 178^\circ}{\cos 178^\circ}\right)$ $= \left(\frac{\cos 2^\circ}{-\sin 2^\circ}\right) \left(\frac{\cos 4^\circ}{-\sin 4^\circ}\right) \left(\frac{\cos 6^\circ}{-\sin 6^\circ}\right) \dots \left(\frac{\sin 4^\circ}{-\cos 4^\circ}\right) \left(\frac{\sin 2^\circ}{-\cos 2^\circ}\right)$ $= 1$ <p><b>OR</b></p> $(\tan 92^\circ)(\tan 94^\circ)(\tan 96^\circ) \dots (\tan 176^\circ)(\tan 178^\circ)$ $= (\tan 92^\circ)(\tan 94^\circ)(\tan 96^\circ) \dots (-\tan 4^\circ)(-\tan 2^\circ)$ $= \left(\frac{\sin 92^\circ}{\cos 92^\circ}\right) \left(\frac{\sin 94^\circ}{\cos 94^\circ}\right) \left(\frac{\sin 96^\circ}{\cos 96^\circ}\right) \dots \left(-\frac{\sin 4^\circ}{\cos 4^\circ}\right) \left(-\frac{\sin 2^\circ}{\cos 2^\circ}\right)$ $= \left(\frac{\cos 2^\circ}{-\sin 2^\circ}\right) \left(\frac{\cos 4^\circ}{-\sin 4^\circ}\right) \left(\frac{\cos 6^\circ}{-\sin 6^\circ}\right) \dots \left(-\frac{\sin 4^\circ}{\cos 4^\circ}\right) \left(-\frac{\sin 2^\circ}{\cos 2^\circ}\right)$ $= 1$	<ul style="list-style-type: none"> <li>✓ quotient identity</li> <li>✓ co-ratios</li> <li>✓ reduction</li> <li>✓ answer</li> </ul> <p style="text-align: right;">(4)</p> <ul style="list-style-type: none"> <li>✓ reduction</li> <li>✓ quotient identity</li> <li>✓ co-ratios</li> <li>✓ answer</li> </ul> <p style="text-align: right;">(4)</p>
		[19]

**QUESTION/VRAAG 6**

6.1	$\begin{aligned} \text{LHS} &= 2 \cos^2(45^\circ + x) \\ &= 2 \cos^2(45^\circ + x) + 1 - 1 \\ &= \cos[2(45^\circ + x)] + 1 \\ &= \cos(90^\circ + 2x) + 1 \\ &= (-\sin 2x) + 1 \\ &= 1 - \sin 2x \\ &= \text{RHS} \end{aligned}$ <p><b>OR/OF</b></p> $\begin{aligned} \text{LHS} &= 2 \cos^2(45^\circ + x) \\ &= 2(\cos(45^\circ + x))^2 \\ &= 2(\cos 45^\circ \cos x - \sin 45^\circ \sin x)^2 \\ &= 2\left(\frac{\sqrt{2}}{2} \cos x - \frac{\sqrt{2}}{2} \sin x\right)^2 \\ &= 2\left(\frac{1}{2} \cos^2 x - \sin x \cos x + \frac{1}{2} \sin^2 x\right) \\ &= \cos^2 x - 2 \sin x \cos x + \sin^2 x \\ &= 1 - \sin 2x \\ &= \text{RHS} \end{aligned}$	<ul style="list-style-type: none"> <li>✓ + 1 - 1</li> <li>✓ double angle</li> <li>✓ simplification</li> <li>✓ reduction</li> </ul> <p style="text-align: right;">(4)</p> <ul style="list-style-type: none"> <li>✓ compound <math>\angle</math> expansion</li> <li>✓ subst. special <math>\angle</math> values</li> <li>✓ simplification</li> <li>✓ <math>\sin^2 x + \cos^2 x = 1</math></li> </ul> <p style="text-align: right;">(4)</p>
6.2.1	$\begin{aligned} \text{LHS} &= \sin(A - B) - \sin(A + B) \\ &= \sin A \cos B - \cos A \sin B - (\sin A \cos B + \cos A \sin B) \\ &= \sin A \cos B - \cos A \sin B - \sin A \cos B - \cos A \sin B \\ &= -2 \cos A \sin B \\ &= \text{RHS} \end{aligned}$	<ul style="list-style-type: none"> <li>✓ <math>\sin A \cos B - \cos A \sin B</math></li> <li>✓ <math>-\sin A \cos B - \cos A \sin B</math></li> </ul> <p style="text-align: right;">(2)</p>
6.2.2	$\begin{aligned} \sin 4x - \sin 10x &= \sin(7x - 3x) - \sin(7x + 3x) \\ &= -2 \cos 7x \sin 3x \end{aligned}$	<ul style="list-style-type: none"> <li>✓ <math>4x = 7x - 3x</math> &amp; <math>10x = 7x + 3x</math></li> <li>✓ answer</li> </ul> <p style="text-align: right;">(2)</p>
6.2.3	$\begin{aligned} \sin 4x - \sin 10x &= \sin 3x \\ -2 \cos 7x \sin 3x &= \sin 3x \\ 2 \cos 7x \sin 3x + \sin 3x &= 0 \\ \sin 3x(2 \cos 7x + 1) &= 0 \end{aligned}$ $\begin{array}{ll} \sin 3x = 0 & \text{or} \quad \cos 7x = -\frac{1}{2} \\ 3x = 0^\circ & 7x = 120^\circ \quad \text{or} \quad 7x = 240^\circ \\ x = 0^\circ & x = 17,14^\circ \quad x = 34,29^\circ \\ & \text{N/A} \end{array}$	<ul style="list-style-type: none"> <li>✓ substitution</li> <li>✓ factorisation</li> <li>✓ both equations</li> <li>✓ answer</li> <li>✓ answer</li> </ul> <p style="text-align: right;">(5)</p>

QUESTION/VRAAG 3



3.1.1	$r^2 = x^2 + y^2$ pyth $3^2 = x^2 + 1^2$ $x = -\sqrt{8}$ $\tan\beta = -\frac{1}{\sqrt{8}}$	✓ Method ✓ $x = -\sqrt{8}$ ✓ answer (3)
3.1.2	$\cos 2\beta = 1 - 2\sin^2 \beta$ $= 1 - 2\left(\frac{1}{3}\right)^2$ $= \frac{7}{9}$	✓ double angle identity ✓ answer (2)
3.1.3	$\cos(-\beta - 450^\circ) = \cos(-\beta - 90^\circ)$ $= \cos(90^\circ + \beta)$ $= -\sin \beta = -\frac{1}{3}$	✓ $\cos(90^\circ + \beta)$ ✓ Answer (2)
3.2	$\frac{-4 \cos x \sin x}{\sin(30 - x + x)}$ $= \frac{-4 \cos x \sin x}{\sin 30^\circ}$ $= \frac{-4 \cos x \sin x}{\frac{1}{2}}$ $= -8 \sin x \cos x$ $= -4 \sin 2x$	✓ $4 \cos x$ ✓ $-\sin x$ ✓ $\sin 30^\circ$ ✓ $\frac{1}{2}$ ✓ $-8 \sin x \cos x$ ✓ $-4 \sin 2x$ (6)

3.3.1	$\tan 203^\circ$ $\tan 23^\circ = \frac{\sqrt{1-a^2}}{a}$	✓ $\tan 23^\circ$ ✓ $\sqrt{1-a^2}$ ✓ Answer (3)
3.3.2	$\sin 46^\circ$ $= \sin 2(23^\circ)$ $= 2\sin 23^\circ \cos 23^\circ$ $= 2a\sqrt{1-a^2}$	✓ double angle ✓ Expansion ✓ Answer (3)
3.4.1	$\sin(60^\circ + 45^\circ)$ $= \sin 60^\circ \cdot \cos 45^\circ + \cos 60^\circ \cdot \sin 45^\circ$ $= \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{2}}\right) + \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right)$ $= \frac{\sqrt{3}+1}{2\sqrt{2}} \text{ OR } \frac{\sqrt{6}+\sqrt{2}}{4}$  OR  $= \sin(180^\circ - 75^\circ)$ $= \sin 75^\circ$ $= \sin 30^\circ \cdot \cos 45^\circ + \cos 30^\circ \cdot \sin 45^\circ$ $= \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{2}}\right)$ $= \frac{\sqrt{3}+1}{2\sqrt{2}} \text{ OR } \frac{\sqrt{6}+\sqrt{2}}{4}$	✓ compound angles ✓ expansion ✓ substitution ✓ answer (4)  OR  ✓ $\sin 75^\circ$ ✓ expansion ✓ substitution ✓ answer (4)
3.4.2	$\cos 69^\circ \cdot \cos 9^\circ + \cos 81^\circ \cdot \cos 21^\circ$ $= \cos 69^\circ \cdot \cos 9^\circ + \sin 9^\circ \cdot \sin 69^\circ$ $= \cos 60^\circ$ $= \frac{1}{2}$	co-function : ✓ $\cos 81^\circ \cdot \cos 21^\circ = \sin 9^\circ \cdot \sin 69^\circ$ ✓ $\cos 60^\circ$ ✓ answer  OR

	<p>OR</p> $\sin 21^\circ \cdot \cos 9^\circ + \cos 21^\circ \cdot \sin 9^\circ$ $= \sin 30^\circ$ $= \frac{1}{2}$	<p>co-function</p> $\checkmark \cos 69^\circ \cdot \cos 9^\circ = \sin 21^\circ \cdot \cos 9^\circ$ $\checkmark \sin 30^\circ$ $\checkmark \text{answer} \quad (3)$
3.5	$LHS = \frac{2\sin x \cdot \cos x - \cos x}{1 - (1 - 2\sin^2 x) - \sin x}$ $= \frac{2\sin x \cdot \cos x - \cos x}{2\sin^2 x - \sin x}$ $= \frac{\cos x(2\sin x - 1)}{\sin x(2\sin x - 1)}$ $= \frac{\cos x}{\sin x}$ $= \frac{1}{\frac{\sin x}{\cos x}}$ $\frac{1}{\tan x} = RHS$	$\checkmark 2\sin x \cdot \cos x$ $\checkmark 1 - 2\sin^2 x$ $\checkmark \text{factorization}$ $\checkmark \text{simplification}$ $\checkmark \text{identity for } \tan x \quad (5)$
3.6	$\cos 2x = \cos x + 2$ $2\cos^2 x - 1 - \cos x - 2 = 0$ $2\cos^2 x - \cos x - 3 = 0$ $(2\cos x - 3)(\cos x + 1) = 0$ $\cos x \neq \frac{3}{2} \quad \text{or} \quad \cos x = -1$ $x = 180^\circ$	$\checkmark \text{double angle identity}$ $\checkmark \text{standard form}$ $\checkmark \text{factors}$ $\checkmark \cos x = \frac{3}{2} \quad \checkmark \cos x = -1$ $\checkmark \text{rejection}$ $\checkmark x = 180^\circ \quad (7)$
		<b>[38]</b>