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**GRADE/GRAAD 12**

**SEPTEMBER 2015**

**MATHEMATICS P1/WISKUNDE V1  
MEMORANDUM**

**MARKS/PUNTE: 150**

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This memorandum consists of 15 pages./  
Hierdie memorandum bestaan uit 15 bladsye.

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**NOTE/LET OP:**

- If a candidate answered a question TWICE, mark the FIRST attempt ONLY.  
*Indien 'n kandidaat 'n vraag TWEE keer beantwoord het, merk SLEGS die EERSTE poging.*
- Consistent accuracy applies in ALL aspects of the memorandum.  
*Volgehoue akkuraatheid geld deurgaans in ALLE aspekte van die memorandum.*
- If a candidate crossed out an attempt of a question and did not redo the question, mark the crossed-out attempt.  
*Indien 'n kandidaat 'n poging vir 'n vraag deurgetrek het en nie die vraag weer beantwoord het nie, merk die poging wat deurgetrek is.*
- The mark for substitution is awarded for substitution into the correct formula.  
*Die punt vir substitusie word toegeken vir substitusie in die korrekte formule.*

**QUESTION 1/VRAAG 1**

1.1.1	$(x + 3)(3x - 1) = m$ $(x + 3)(3x - 1) = 0$ $x = -3$ or/of $x = \frac{1}{3}$	<p>✓✓ <math>x</math>-values/waardes</p> <p>If a candidate removes brackets and factorised incorrectly, maximum 1 mark if both <math>x</math>-values are correct./ As kandidaat hakies verwyder en verkeerd faktoriseer, maksimum 1 punt indien beide <math>x</math>-waardes korrek is.</p>	(2)	
1.1.2	$(x + 3)(3x - 1) = m$ $(x + 3)(3x - 1) = 6$ $3x^2 - x + 9x - 3 = 6$ $3x^2 + 8x - 9 = 0$ $x = \frac{-8 \pm \sqrt{(8)^2 - 4(3)(-9)}}{2(3)}$ $x = \frac{-8 \pm \sqrt{172}}{6}$ $x = 0,85$ or/of $x = -3,52$	<p>Penalise 1 mark for incorrect rounding off./ Penaliseer 1 punt vir verkeerde afronding.</p> <p>If stopped at <math>\frac{-8 \pm \sqrt{172}}{6}</math> : max 3 marks As stop by <math>\frac{-8 \pm \sqrt{172}}{6}</math> : maks 3 punte</p>	<p>✓ simplification/vereenvoudiging ✓ standard form/standaardvorm ✓ substitution/substitusie</p> <p>✓✓ <math>x</math>-values/waardes</p>	(5)
1.1.3 (a)	The graph should be shifted $8\frac{1}{3}$ units upwards / Die grafiek moet $8\frac{1}{3}$ eenhede opwaarts geskuif word.	<p>✓ <math>8\frac{1}{3}</math> ✓ upwards/opwaarts</p>	(2)	
(b)	$k > 8\frac{1}{3}$	✓ answer/antwoord	(1)	

<p>1.2</p>	$x - 2y = 3$ $x = 2y + 3$ $4x^2 - 5xy = 3 - 6y$ $4(2y + 3)^2 - 5y(2y + 3) = 3 - 6y$ $4(4y^2 + 12y + 9) - 10y^2 - 15y = 3 - 6y$ $16y^2 + 48y + 36 - 10y^2 - 15y = 3 - 6y$ $6y^2 + 39y + 33 = 0$ $2y^2 + 13y + 11 = 0$ $(2y + 11)(y + 1) = 0$ $y = \frac{-11}{2} \text{ or/of } y = -1$ $x = -8 \text{ or/of } x = 1$ <p><b>OR/OF</b></p> $x - 2y = 3$ $-2y = 3 - x$ $2y = x - 3$ $y = \frac{x-3}{2}$ $4x^2 - 5x\left(\frac{x-3}{2}\right) = 3 - 6\left(\frac{x-3}{2}\right)$ $8x^2 - 5x(x-3) = 6 - 6(x-3)$ $8x^2 - 5x^2 + 15x = 6 - 6x + 18$ $3x^2 + 21x - 24 = 0$ $x^2 + 7x - 8 = 0$ $(x + 8)(x - 1) = 0$ $x = -8 \text{ or/of } x = 1$ $y = \frac{-11}{2} \text{ or/of } y = -1$	<p>✓ <math>x = 2y + 3</math></p> <p>✓ substitution/substitusie</p> <p>✓ standard form/standaardvorm</p> <p>✓ factors/faktore</p> <p>✓ y-values/waardes</p> <p>✓ x-values/waardes</p> <p>✓ <math>y = \frac{x-3}{2}</math></p> <p>✓ substitution/substitusie</p> <p>✓ standard form/standaardvorm</p> <p>✓ factors/faktore</p> <p>✓ x-values/waardes</p> <p>✓ y-values/waardes</p> <p>(6)</p>
<p>1.3</p>	$(3^x - 1)(3^x - 12) = 0$ $3^x - 1 = 0 \text{ or/of } 3^x - 12 = 0$ $3^x = 1 \text{ or/of } 3^x = 12$ $x = 0 \text{ or/of } \log 3^x = \log 12 \text{ OR/OF } x = \log_3 12$ $x \log 3 = \log 12 \quad x = 2,26$ $x = \frac{\log 12}{\log 3}$ $x = 2,26$	<p>✓ <math>3^x = 1 \text{ or/of } 3^x = 12</math></p> <p>✓ <math>x = 0</math></p> <p>✓ use of logs/gebruik van logs</p> <p>✓ <math>x = 2,26</math></p> <p>(4)</p>

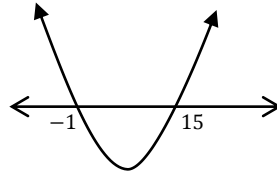
1.4

$$-n^2 + 14n + 15 \geq 0$$

$$n^2 - 14n - 15 \leq 0$$

$$(n - 15)(n + 1) \leq 0$$

$$-1 \leq n \leq 15$$



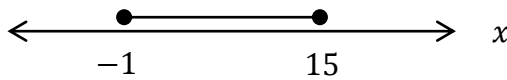
✓ factors/faktore

✓ critical values/kritieke waardes

✓✓ solution/oplossing

**OR/OF**

$$n \in [-1; 15]$$

**OR/OF**

Note/Let op:

If/As  $n \leq 15$  and/en  $n \geq -1$  Full marks/volpunteIf/As  $-1 < n < 15$  max/maks 2 punte.If/As  $n \leq 15$  or/of  $n \geq -1$  max/maks 2 marks/punte.If/As  $n \leq 15$  or/of  $n \leq -1$  max/maks 2 marks/punte.

If correct graphical solution but concludes incorrectly, max 3 marks. As korrekte grafiese oplossing, maar maak verkeerde gevolgtrekking, maks 3 punte.

(4)

[24]

QUESTION 2/VRAAG 2

<p>2.1.1</p>	<p>14 ; 9 ; 4 ; ...</p> $T_n = a + (n - 1)d$ $= 14 + (49)(-5)$ $= -231$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;">                 Answer ONLY: 3 marks                  SLEGS antwoord: 3 punte             </div>	<ul style="list-style-type: none"> <li>✓ <math>d = -5</math></li> <li>✓ substitution/substitusie</li> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(3)</p>
<p>2.1.2</p>	$S_{50} = \frac{50}{2} [2(14) + (49)(-5)]$ $= -5425$ <p><b>OR/OF</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;">                 If a candidate expands series but gives incorrect answer: 0 marks/                  Indien 'n kandidaat reeks uitbrei, maar gee verkeerde antwoord: 0 punte             </div> $S_{50} = \frac{50}{2} [14 - 231]$ $= -5425$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;">                 Answer ONLY: 2 marks                  SLEGS antwoord: 2 punte             </div>	<ul style="list-style-type: none"> <li>✓ substitution/substitusie</li> <li>✓ answer/antwoord</li> </ul> <ul style="list-style-type: none"> <li>✓ substitution/substitusie</li> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(2)</p>
<p>2.2</p>	$T_2 - T_1 = T_3 - T_2$ $p - (-24) = p^2 - p$ $p^2 - 2p - 24 = 0$ $(p - 6)(p + 4) = 0$ $p = 6 \text{ or/of } p = -4$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;">                 BOTH answers ONLY:                  4 marks                  SLEGS ALBEI antwoorde:                  4 punte             </div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto; margin-top: 10px;">                 ONE answer ONLY: 1 mark                  SLEGS EEN antwoord: 1 punt             </div>	<ul style="list-style-type: none"> <li>✓ <math>T_2 - T_1 = T_3 - T_2</math></li> <li>✓ standard form/standaardvorm</li> <li>✓ factors/faktore</li> <li>✓ answers/antwoorde</li> </ul> <p style="text-align: right;">(4)</p>
<p>2.3.1</p>	$r = \frac{m}{3}$ $-1 < r < 1$ $-1 < \frac{m}{3} < 1$ $-3 < m < 3$	<ul style="list-style-type: none"> <li>✓ <math>r</math></li> <li>✓ <math>-1 &lt; r &lt; 1</math></li> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(3)</p>
<p>2.3.2</p>	$S_{\infty} = \frac{a}{1-r}$ $\frac{3}{1-\frac{m}{3}} = \frac{27}{7}$ $27 - 9m = 21$ $-9m = -6$ $m = \frac{6}{9} \text{ or/of } \frac{2}{3} \text{ or/of } 0,67$ <p><b>OR/OF</b></p> $\frac{3}{1-\frac{m}{3}} = \frac{27}{7}$ $\frac{9}{3-m} = \frac{27}{7}$ $27(3 - m) = 63$ $81 - 27m = 63$ $-27m = -18$ $m = \frac{18}{27} \text{ or/of } \frac{2}{3} \text{ or/of } 0,67$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto; margin-top: 10px;">                 Wrong formula/verkeerde formule                  0 marks/punte             </div>	<ul style="list-style-type: none"> <li>✓ substitution/substitusie</li> <li>✓ simplification/vereenvoudiging</li> <li>✓ answer/antwoord</li> </ul> <ul style="list-style-type: none"> <li>✓ substitution/substitusie</li> </ul> <ul style="list-style-type: none"> <li>✓ simplification/vereenvoudiging</li> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(3)</p>

2.4	$S_3 = 31\frac{1}{2} \quad T_4 + T_5 + T_6 = 3\frac{15}{16}$ $a + ar + ar^2 = 31\frac{1}{2}$ $ar^3 + ar^4 + ar^5 = 3\frac{15}{16}$ $r^3(a + ar + ar^2) = 3\frac{15}{16}$ $r^3\left(31\frac{1}{2}\right) = 3\frac{15}{16}$ $r^3 = \frac{1}{8}$ $r = \frac{1}{2}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">           Answer ONLY: 1 mark            SLEGS antwoord: 1 punt         </div>	<ul style="list-style-type: none"> <li>✓ <math>a + ar + ar^2 = 31\frac{1}{2}</math></li> <li>✓ <math>ar^3 + ar^4 + ar^5 = 3\frac{15}{16}</math></li> <li>✓ common factor/gemene factor</li> <li>✓ substitution/substitusie</li>   <li>✓ answer/antwoord</li> </ul>
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(5)  
[20]

## QUESTION 3/VRAAG 3

3.1	<p>9; 15; 24; 36 ...</p> $2a = 3$ $\therefore a = \frac{3}{2}$ $3a + b = 6$ $3\left(\frac{3}{2}\right) + b = 6$ $\therefore b = \frac{3}{2}$ $a + b + c = 9$ $\frac{3}{2} + \frac{3}{2} + c = 9$ $\therefore c = 6$ $T_n = \frac{3}{2}n^2 + \frac{3}{2}n + 6$ <p><b>OR/OF</b></p> $T_n = an^2 + bn + c$ $9a + 3b + c = 24 \quad \dots \quad (1)$ $4a + 2b + c = 15 \quad \dots \quad (2)$ $a + b + c = 9 \quad \dots \quad (3)$ $(1) - (2) \quad \dots \quad 5a + b = 9$ $(2) - (3) \quad \dots \quad 3a + b = 6$ $2a = 3$ $\therefore a = \frac{3}{2}$ $3\left(\frac{3}{2}\right) + b = 6$ $\therefore b = \frac{3}{2}$ $\frac{3}{2} + \frac{3}{2} + c = 9$ $\therefore c = 6$ $T_n = \frac{3}{2}n^2 + \frac{3}{2}n + 6$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">           Answer ONLY: 4 marks            SLEGS antwoord: 4 punte         </div>	<ul style="list-style-type: none"> <li>✓ common 2<sup>nd</sup> difference/gemene tweede verskil</li> <li>✓ a-value/waarde</li>   <li>✓ b-value/waarde</li>   <li>✓ c-value/waarde</li>   <li>✓ method/metode</li>   <li>✓ a-value/waarde</li>   <li>✓ b-value/waarde</li>   <li>✓ c-value/waarde</li> </ul>
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(4)

3.2	$T_{20} = \frac{3}{2}(19)^2 + \frac{3}{2}(19) + 6$ $= 576$ <p>Fifth term in Row 20/Vyfde term in Ry 20:  <math>576 + 9 = 585</math></p> <p><b>OR/OF</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;">       If <math>n = 20</math>, answer = 645: 1 mark        As <math>n = 20</math>, antwoord = 645: 1 punt     </div>	<p>✓ <math>n = 19; T_n = \frac{3}{2}n^2 + \frac{3}{2}n + 6</math></p> <p>✓ method/metode</p> <p>✓ answer/antwoord</p>
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Ry 1	3						
Ry 2	6	9					
Ry 3	12	15	18				
Ry 4	21	24	27	30			
Ry 5	33	36	39	42	45		
Ry 6	48	51	54	57	60	63	
Ry 7	66	69	72	75	78	81	84

	<p>Terms in 5<sup>th</sup> column/terme in 5<sup>de</sup> kolom        45; 60; 78; ...</p> $T_n = \frac{3}{2}n^2 + 10\frac{1}{2}n + 33$ $T_{16} = \frac{3}{2}(16)^2 + 10\frac{1}{2}(16) + 33$ $= 585$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;">       If <math>n = 20</math>, answer = 843: 1 mark        As <math>n = 20</math>, antwoord = 843: 1 punt     </div>	<p>✓ method/metode</p> <p>✓ <math>n = 16; T_n = \frac{3}{2}n^2 + 10\frac{1}{2}n + 33</math></p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(3) [7]</p>
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## QUESTION 4/VRAAG 4

4.1.1	$F = 2000 \left(1 + \frac{0,08}{12}\right)^{24} + \frac{1200 \left[ \left(1 + \frac{0,08}{12}\right)^{24} - 1 \right]}{\frac{0,08}{12}}$ $= R33\,465,60$ <div style="border: 1px solid black; padding: 5px; margin: 10px 0;">           If used present value formula: max 2 marks            As huidige waarde formule gebruik: maks 2 punte         </div> <p><b>OR/OF</b></p> $F = 800 \left(1 + \frac{0,08}{12}\right)^{24} + \frac{1200 \left[ \left(1 + \frac{0,08}{12}\right)^{25} - 1 \right]}{\frac{0,08}{12}}$ $= R33\,465,60$ <div style="border: 1px solid black; padding: 5px; margin: 10px 0;">           If ONLY compound formula or ONLY future value formula used: max 3 marks            Indien SLEGS saamgestelde formule of SLEGS toekomstige waarde formule gebruik: maks 3 punte         </div>	$\checkmark i = \frac{0,08}{12}$ $\checkmark 2000 \left(1 + \frac{0,08}{12}\right)^{24}$ $\checkmark n = 24$ in $F$ $\checkmark \frac{1200 \left[ \left(1 + \frac{0,08}{12}\right)^{24} - 1 \right]}{\frac{0,08}{12}}$ $\checkmark$ answer/antwoord  $\checkmark i = \frac{0,08}{12}$ $\checkmark 800 \left(1 + \frac{0,08}{12}\right)^{24}$ $\checkmark n = 25$ in $F$ $\checkmark \frac{1200 \left[ \left(1 + \frac{0,08}{12}\right)^{25} - 1 \right]}{\frac{0,08}{12}}$ $\checkmark$ answer/antwoord
4.1.2	$A = 33\,465,60 \left(1 + \frac{0,08}{12}\right)^5$ <div style="border: 1px solid black; padding: 5px; margin: 10px 0;">           Wrong formula/            Verkeerde formule            0 marks/punte         </div> $= R34\,596,10 \text{ or/of } R34\,596,09$	$\checkmark 33\,465,60$ $\checkmark$ substitution/substitusie  $\checkmark$ answer/antwoord
4.2.1	$150\,000 \left(1 + \frac{0,15}{12}\right)^2 = \frac{x \left[ 1 - \left(1 + \frac{0,15}{12}\right)^{-94} \right]}{\frac{0,15}{12}}$ $x = R2\,790,10$ <div style="border: 1px solid black; padding: 5px; margin: 10px 0;">           If/Indien:  <math display="block">150\,000 = \frac{x \left[ 1 - \left(1 + \frac{0,15}{12}\right)^{-94} \right]}{\frac{0,15}{12}}</math> <math>x = R2\,721,64</math>            4 marks/punte         </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;">           If used present value formula:            max 2 marks            As huidige waarde formule gebruik: maks 2 punte         </div>	$\checkmark i = \frac{0,15}{12}$ $\checkmark 150\,000 \left(1 + \frac{0,15}{12}\right)^2$ $\checkmark n = -94$ $\checkmark \frac{x \left[ 1 - \left(1 + \frac{0,15}{12}\right)^{-94} \right]}{\frac{0,15}{12}}$ $\checkmark$ answer/antwoord
4.2.2	$1 + i = \left(1 + \frac{0,15}{12}\right)^{12}$ $i = 16,08\%$ <div style="border: 1px solid black; padding: 5px; margin: 10px 0;">           Wrong formula: 0 marks            Verkeerde formule: 0 punte         </div> <p><b>OR/OF</b></p> $A = 100 \left(1 + \frac{0,15}{12}\right)^{12}$ $A = 116,08$ $i = 16,08\%$	$\checkmark$ substitution/substitusie $\checkmark$ answer/antwoord  $\checkmark$ substitution/substitusie $\checkmark$ answer/antwoord

(2)  
[15]

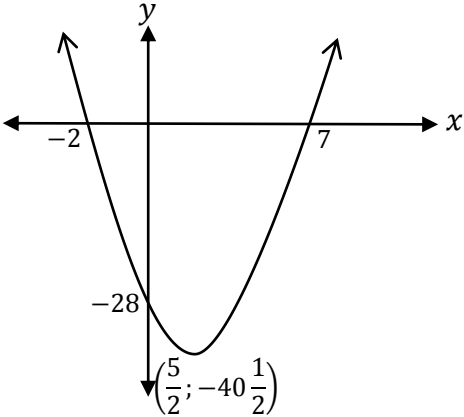
QUESTION 5/VRAAG 5

<p>5.1</p>	$f(x) = \left(\frac{1}{2}\right)^x$ $x = \left(\frac{1}{2}\right)^y$ $y = \log_{\frac{1}{2}}x \text{ or/of } y = -\log_2x \text{ or/of}$ $y = \frac{-\log_2 x}{\log_2 2} \text{ or/of } y = \frac{\log x}{\log \frac{1}{2}}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">                 Answer ONLY: 2 marks                  SLEGS antwoord: 2 punte             </div>	<p>✓ swop <math>x</math> and <math>y</math>/ruil <math>x</math> en <math>y</math> om                  ✓ answer/antwoord</p> <p style="text-align: right;">(2)</p>
<p>5.2</p>	$x > 0$	<p>✓ answer/antwoord</p> <p style="text-align: right;">(1)</p>
<p>5.3</p>	$4 \times f(x + 1) = \sqrt{2}$ $4 \times \left(\frac{1}{2}\right)^{x+1} = \sqrt{2}$ $4 \times (2^{-1})^{x+1} = 2^{\frac{1}{2}}$ $2^2 \times 2^{-x-1} = 2^{\frac{1}{2}}$ $2 - x - 1 = \frac{1}{2}$ $-x = -2 + 1 + \frac{1}{2}$ $x = \frac{1}{2}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">                 Answer ONLY: 1 mark                  SLEGS antwoord: 1 punt             </div> <p>OR/OF</p> $4 \cdot f(x + 1) = \sqrt{2}$ $4 \cdot \left(\frac{1}{2}\right)^{x+1} = \sqrt{2}$ $\left(\frac{1}{2}\right)^{x+1} = \frac{\sqrt{2}}{4}$ $= 2^{\frac{1}{2}-2}$ $2^{-x-1} = 2^{\frac{-3}{2}}$ $\therefore -x - 1 = \frac{-3}{2}$ $-x = \frac{-1}{2}$ $x = \frac{1}{2}$	<p>✓ <math>4 \cdot \left(\frac{1}{2}\right)^{x+1} = \sqrt{2}</math></p> <p>✓ <math>2^2 \cdot 2^{-x-1} = 2^{\frac{1}{2}}</math></p> <p>✓ answer/antwoord</p> <p>✓ <math>4 \cdot \left(\frac{1}{2}\right)^{x+1} = \sqrt{2}</math></p> <p>✓ <math>2^{-x-1} = 2^{\frac{-3}{2}}</math></p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(3)</p>
<p>5.4</p>	$y = \left(\frac{1}{2}\right)^0$ $y = 1$ $\therefore A(0; 1)$ $\therefore \text{range/terrein } y \in \mathbf{R}, y \neq 1$	<p>✓ <math>y = 1</math></p> <p>✓ <math>y \in \mathbf{R}, y \neq 1</math></p> <p style="text-align: right;">(2)</p>
<p>5.5</p>	$y = x + 3$ $1 = x + 3$ $x = -2$ $B(-2; 1)$	<p>✓ <math>y = 1</math>                  ✓ <math>x = -2</math></p> <p style="text-align: right;">(2)</p>

5.6	$g(x) = \frac{a}{x+2} + 1$ $(0; 0)$ $0 = \frac{a}{0+2} + 1$ $0 = a + 2$ $a = -2$ $g(x) = \frac{-2}{x+2} + 1$	$\checkmark p = 2 \quad \checkmark q = 1$ $\checkmark$ substitute/vervang (0; 0) $\checkmark a = -2$	(4)
5.7	$x \in \mathbf{R}, x \neq -2$	$\checkmark$ answer/antwoord	(1) [15]

## QUESTION 6/VRAAG 6

6.1	$(0; -28)$	$\checkmark$ answer/antwoord	(1)
6.2	$f(x) = 2x^2 - 10x - 28$ $2x^2 - 10x - 28 = 0$ $x^2 - 5x - 14 = 0$ $(x - 7)(x + 2) = 0$ $x = 7 \text{ or/of } x = -2$	$\checkmark f(x) = 0$ $\checkmark$ factors/faktore $\checkmark$ x-values/waardes	(3)
6.3	$x = \frac{-b}{2a} = \frac{-(-10)}{2(2)} = \frac{5}{2}$ <p><b>OR/OF</b></p> $x = \frac{7+(-2)}{2} = \frac{5}{2}$ <p><b>OR/OF</b></p> $f'(x) = 4x - 10 = 0$ $x = \frac{5}{2}$ $y = f\left(\frac{5}{2}\right) = 2\left(\frac{5}{2}\right)^2 - 10\left(\frac{5}{2}\right) - 28 = -40\frac{1}{2}$ $\left(\frac{5}{2}; -40\frac{1}{2}\right)$	$\checkmark x = \frac{5}{2}$ $\checkmark y = -40\frac{1}{2}$	(2)

<p>6.4</p>		<p>✓ intercepts/asse</p> <p>✓ turning point/draaipunt</p> <p style="text-align: right;">(2)</p>
<p>6.5</p>	$f'(x) = 4x - 10$ $4x - 10 = 6$ $4x = 16$ $x = 4$ $f(4) = 2(4)^2 - 10(4) - 28$ $= -36$ <p style="text-align: center;"><math>P(4; -36)</math></p>	<p>✓ <math>f'(x)</math></p> <p>✓ <math>f'(x) = 6</math></p> <p>✓ <math>x = 4</math></p> <p>✓ <math>y = -36</math></p> <p style="text-align: right;">(4)</p>
<p>6.6</p>	<p><math>B(-2; 0)</math> and/en <math>E(4; -36)</math></p> $m_{BE} = \frac{-36-0}{4-(-2)} = \frac{-36}{6} = -6$ $y = -6x + c$ $(-2; 0)$ or/of $(4; -36)$ $0 = -6(-2) + c$ $-36 = -6(4) + c$ $c = -12$ $c = -12$ $y = -6x - 12$ <p><b>OR/OF</b></p> $y - y_1 = m(x - x_1)$ $(-2; 0)$ or/of $(4; -36)$ $y - 0 = -6(x - (-2))$ $y - (-36) = -6(x - 4)$ $y = -6(x + 2)$ $y + 36 = -6x + 24$ $y = -6x - 12$	<p>✓ <math>m = -6</math></p> <p>✓ substitution/substitusie <math>(-2; 0)</math> or/of <math>(4; -36)</math></p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(3)</p>
<p>6.7</p>	<p><math>f</math> translates 2 units left and 3 down/  <math>f</math> transleer 2 eenhede links en 3 af</p> $h(x) = 2\left(x - \frac{1}{2}\right)^2 - 43\frac{1}{2}$	<p>✓ <math>-\frac{1}{2}</math></p> <p>✓ <math>-43\frac{1}{2} / -\frac{87}{2}</math></p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(3)</p>
<p><b>[18]</b></p>		

## QUESTION 7/VRAAG 7

7.1	$f(x) = -5x^2$ $f(x+h) = -5(x+h)^2$ $= -5(x^2 + 2xh + h^2)$ $= -5x^2 - 10xh - 5h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-5x^2 - 10xh - 5h^2 - (-5x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{-5x^2 - 10xh - 5h^2 + 5x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-10xh - 5h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-10x - 5h)}{h}$ $= \lim_{h \rightarrow 0} (-10x - 5h)$ $= -10x$	<p>✓ substitute/vervang <math>(x+h)</math></p> <p>✓ formula/formule</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;">           Penalise 1 mark for incorrect use of formula. Must show <math>f'(x)</math>.            Penaliseer 1 punt vir verkeerde gebruik van formule. Moet <math>f'(x)</math> toon.         </div> <p>✓ simplification/vereenvoudiging</p> <p>✓ common factor/gemene faktor</p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(5)</p>
7.2.1	$y = 8x^3$ $\frac{dy}{dx} = 24x^2$	<div style="border: 1px solid black; padding: 5px; margin: 5px 0;">           Penalise 1 mark for incorrect notation in 7.2.            Penaliseer 1 punt vir verkeerde notasie in 7.2.         </div> <p>✓ answer/antwoord</p> <p style="text-align: right;">(1)</p>
7.2.2	$\sqrt{a} = y^{\frac{2}{3}}$ $a = y^{\frac{4}{3}}$ $\frac{da}{dy} = \frac{4}{3} y^{\frac{1}{3}}$	<p>✓ <math>a = y^{\frac{4}{3}}</math></p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(2)</p>
7.2.3	$a = y^{\frac{4}{3}} = (8x^3)^{\frac{4}{3}} = (2^3 x^3)^{\frac{4}{3}} = 16x^4$ $\frac{da}{dx} = 64x^3$	<p>✓ substitute/vervang <math>y = 8x^3</math></p> <p>✓ <math>a = 16x^4</math></p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(3)</p>
7.3	$g(x) = -8x + 3$ $f(5) = g(5) = -8(5) + 3 = -37$ $f'(5) = -8$ $f(5) - f'(5) = -37 - (-8) = -29$	<p>✓ <math>f(5) = -37</math></p> <p>✓ <math>f'(5) = -8</math></p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(3)</p> <p style="text-align: right;"><b>[14]</b></p>

## QUESTION 8/VRAAG 8

8.1	$f(x) = -x^3 + 10x^2 - 17x + d$ $d = (-1)(4)(7) = -28$	✓ answer/antwoord (1)
8.2	$f'(x) = -3x^2 + 20x - 17 = 0$ $3x^2 - 20x + 17 = 0$ $(3x - 17)(x - 1) = 0$ $x = \frac{17}{3} \left(5\frac{2}{3}\right)$ or/of $x = 1$  $f\left(\frac{17}{3}\right) = -\left(\frac{17}{3}\right)^3 + 10\left(\frac{17}{3}\right)^2 - 17\left(\frac{17}{3}\right) - 28$ $= 14\frac{22}{27} \left(\frac{400}{27}\right)$  $f(1) = -(1)^3 + 10(1)^2 - 17(1) - 28$ $= -36$  $A(1; -36)$ and/en $B\left(\frac{17}{3}; 14\frac{22}{27}\right)$	✓ $f'(x)$ ✓ $f'(x) = 0$ ✓ factors/faktore        ✓ $A(1; -36)$ ✓ $B\left(\frac{17}{3}; 14\frac{22}{27}\right)$ (5)
8.3	$f''(x) = -6x + 20 = 0$ $-6x = -20$ $x = \frac{10}{3}$ or/of $3\frac{1}{3}$ or/of 3,33	✓ $f''(x) = 0$  ✓ answer/antwoord (2)
8.4	Maximum where/maksimum waar $f''(x) = 0$ $\therefore$ at/by $x = \frac{10}{3}$ $f\left(\frac{10}{3}\right) = -\left(\frac{10}{3}\right)^3 + 10\left(\frac{10}{3}\right)^2 - 17\left(\frac{10}{3}\right) - 28$ $= -6\frac{16}{27}$ or/of $-10,59$  $\left(\frac{10}{3}; -6\frac{16}{27}\right)$ or/of $\left(\frac{10}{3}; -10,59\right)$	✓ $x = \frac{10}{3}$   ✓ $y = -10\frac{16}{27}$ or/of $-10,59$   (2)
8.5	$-1 \leq x \leq 1$ or/of $4 \leq x \leq \frac{17}{3}$ or/of $x \geq 7$	✓ $-1 \leq x \leq 1$ ✓ $4 \leq x \leq \frac{17}{3}$ ✓ $x \geq 7$   (3) <b>[13]</b>

**QUESTION 9/VRAAG 9**

9.1	$P(q; -2q^2)$	✓ answer/antwoord (1)
9.2	$A = 2q^2(6 - q)$ $= 12q^2 - 2q^3$	✓ $l = 2q^2$ ✓ $b = 6 - q$ and method/en metode (2)
9.3	$\frac{dA}{dq} = 24q - 8q^2 = 0$ $6q(4 - q) = 0$ $q = 0$ or/of $q = 4$  $A = 12(4)^2 - 2(4)^3$ $= 64$ square units/vierkante eenhede	✓ $\frac{dA}{dq} = 0$ ✓ factors/faktore  ✓ $q$ -values/waardes  ✓ area/oppervlakte (4) <b>[7]</b>

**QUESTION 10/VRAAG 10**

10.1.1	$P(A) = 1 - P(\text{not/nie } A)$ $P(A) = 1 - 0,45$ $P(A) = 0,55$	✓ answer/antwoord (1)
10.1.2	Mutually exclusive events/onderling uitsluitende gebeurtenisse: $P(A \text{ or/of } B) = P(A) + P(B)$ $= 0,55 + 0,35$ $= 0,9$	✓ rule/reël ✓ answer/antwoord (2)
10.1.3	Independent events/onafhanklike gebeurtenisse: $P(A \text{ and/en } B) = P(A) \times P(B)$ $= 0,55 \times 0,35$ $= 0,1925$ or/of $0,19$	✓ rule/reël ✓ answer/antwoord (2)

<p>10.2.1</p>		<ul style="list-style-type: none"> <li>✓ first branch/eerste vertakking</li> <li>✓ second branch from <i>B</i>/tweede vertakking uit <i>B</i></li> <li>✓ second branch from <i>G</i>/tweede vertakking uit <i>G</i></li> <li>✓ outcomes/uitkomst</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>If probabilities not listed, maximum 1 mark Indien waarskynlikhede nie gelys is nie, maksimum 1 punt</p> </div> <p style="text-align: right;">(4)</p>
<p>10.2.2</p>	$  \begin{aligned}  P(R) &= P(BR) + P(GR) \\  &= \left(\frac{1}{2}\right)\left(\frac{3}{8}\right) + \left(\frac{1}{2}\right)\left(\frac{7}{9}\right) \\  &= \frac{3}{16} + \frac{7}{18} \\  &= \frac{83}{144}  \end{aligned}  $	<ul style="list-style-type: none"> <li>✓ <math>\left(\frac{1}{2}\right)\left(\frac{3}{8}\right)</math></li> <li>✓ <math>\left(\frac{1}{2}\right)\left(\frac{7}{9}\right)</math></li> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(3) <b>[12]</b></p>

**QUESTION 11/VRAAG 11**

<p>11.1</p>	$  \begin{aligned}  n(\text{codes/kodes}) &= 20^4 \times 9^4 \\  &= 1\,049\,760\,000  \end{aligned}  $	<ul style="list-style-type: none"> <li>✓ <math>20^4</math> ✓ <math>9^4</math></li> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(3)</p>
<p>11.2</p>	<p><math>n(\text{syfers ongelyke ewe getalle/digits unequal even numbers}) = 20^4 \times 4! = 3\,840\,000</math></p> <p><math>P(\text{syfers ongelyke ewe getalle/digits unequal even numbers}) = \frac{3\,840\,000}{1\,049\,760\,000}</math> or/of <math>\frac{8}{2\,187}</math></p> <p><b>OR/OF</b></p> <p><math>P(\text{syfers ongelyke ewe getalle/ digits unequal even numbers}) = \frac{4!}{9^4} = \frac{24}{6561}</math> or/of <math>\frac{8}{2\,187}</math></p>	<ul style="list-style-type: none"> <li>✓ 3 840 000</li> <li>✓ answer/antwoord</li> <li>✓ 24</li> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(2) <b>[5]</b></p>
<p><b>TOTAL/TOTAAL:</b></p>		<p><b>150</b></p>