



**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**SEPTEMBER 2025**

**MATHEMATICS P1**

**MARKS: 150**

**TIME: 3 hours**



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This question paper consists of 12 pages including an information sheet and an answer book of 23 pages.

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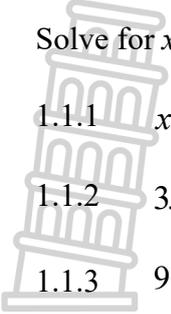
**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions.

1. This question paper consists of ELEVEN questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your answer.
4. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
5. Answers only will not necessarily be awarded full marks.
6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Number the answers correctly according to the numbering system used in this question paper.
9. An information sheet with formulae is included at the end of the question paper.
10. Write neatly and legibly.



**QUESTION 1**1.1 Solve for  $x$ :


$$1.1.1 \quad x^2 = 3 - 2x \quad (3)$$

$$1.1.2 \quad 3x^2 - 9x + 2 = 0 \quad (\text{correct to TWO decimal places}) \quad (3)$$

$$1.1.3 \quad 9 > -x(x - 6) \quad (4)$$

$$1.1.4 \quad \sqrt{x+5} - \sqrt{x} = 1 \quad (4)$$

1.2 Solve for  $x$  and  $y$  simultaneously:

$$2x = 1 - y \quad \text{and} \quad y^2 - 2y - 3x + 1 = 3xy - 2x^2 \quad (6)$$

1.3 Given:  $k = \frac{1}{x^2 + 7x + 5}$  and  $p = \frac{1}{x^2 + 7x + 7}$

Determine the value of  $p$  if  $\sqrt[3]{k} = 4^{\frac{1}{6}}$  (5)**[25]**

## QUESTION 2

- 2.1 Two learners, Amanda and Leroy were given a task to come up with any common ratio ( $r$ ) that would be suitable to calculate the sum to infinity if it given that the first term,  $a = 2$ . Below are the calculations:

**Amanda's calculation:**  $a = 2$  and  $r = 3$

$$\begin{aligned}S_{\infty} &= \frac{2}{1-3} \\ &= -1\end{aligned}$$

**Leroy's calculation:**  $a = 2$  and  $r = \frac{1}{2}$

$$\begin{aligned}S_{\infty} &= \frac{2}{1-\frac{1}{2}} \\ &= 4\end{aligned}$$

- 2.1.1 Which learner's response is incorrect? (1)
- 2.1.2 Hence, explain why the learner's response is incorrect. (2)
- 2.2 Evaluate:  $\sum_{k=1}^{10} \frac{3}{2}(2)^k$  (4)
- 2.3 Which term of the sequence  $8 ; 6 ; \frac{9}{2} ; \dots$  will be the first to be less than  $\frac{1}{100}$ ? (4)

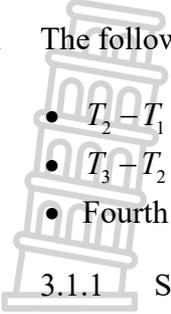
[11]



**QUESTION 3**

3.1 The following information about a quadratic number pattern is given:

- $T_2 - T_1 = -4$
- $T_3 - T_2 = -3$
- Fourth term is equal to 1



3.1.1 Show that the general term of the quadratic number pattern is

$$T_n = \frac{1}{2}n^2 - \frac{11}{2}n + 15 \tag{4}$$

3.1.2 Determine the value of  $T_{16}$  (1)

3.1.3 Which TWO terms in the quadratic number pattern will have a difference of 45? (3)

3.2 Given:  $S_n = 2n^2 - 6n$

3.2.1 Calculate the sum of the first thirty terms. (2)

3.2.2 Determine the value of  $n$  if  $T_n = 300$  (3)

**[13]**



**QUESTION 4**

Given the function:  $f(x) = 3x - 5$ , for  $x \in [-4; 5]$

4.1 Determine the equation of  $f^{-1}$  (2)

4.2 Calculate the value of  $f(5)$  (1)

4.3 Sketch the graphs of  $f$  and  $f^{-1}$  on the same set of axes and show the line of symmetry and the coordinates of the endpoints. (4)

4.4 Calculate the coordinates of the point of intersection of  $f$  and  $f^{-1}$  (4)

4.5 Given the following information:

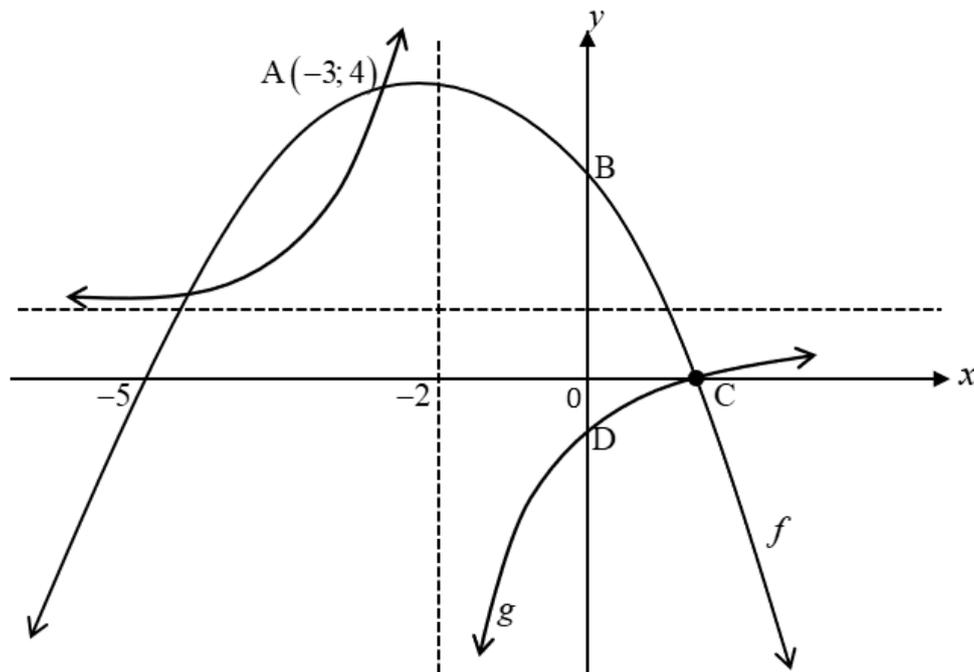
- $f(x) = g'(x)$
- $g(x)$  is a parabola, with  $y$ -intercept at  $\frac{25}{6}$

Determine the minimum value of  $h(x)$  if  $h(x) = 2^{g(x)}$  (5)  
**[16]**



**QUESTION 5**

The graphs of  $f(x) = -\frac{1}{2}(x+2)^2 + 4\frac{1}{2}$  and  $g(x) = \frac{a}{x+p} + q$  are drawn below. The graphs of  $f$  and  $g$  cuts the  $y$ -axis at  $2\frac{1}{2}$  and  $-\frac{1}{2}$  respectively. One of the points of intersection of the graphs is  $A(-3;4)$ . Point  $C$  is the point of intersection and  $x$ -intercept of  $f$  and  $g$ . The vertical asymptote of  $g$  is  $x = -2$



- 5.1 Write down the coordinates of B. (1)
- 5.2 Calculate values of  $a, p$  and  $q$  (6)
- 5.3 Determine the range of  $f$  (2)
- 5.4 Determine an equation for the axis of symmetry of  $g$  that has gradient equal to  $-1$ . (2)
- 5.5 Determine the average gradient of  $f$  between B and C (3)
- 5.6 For which values of  $x$  is:
  - 5.6.1  $f(x) \geq 0$ ? (2)
  - 5.6.2  $g(x) \cdot g'(x) > 0$ ? (2)
- 5.7 If  $h(x) = x$ , determine the value(s) of  $k$  for which  $f(x) = h(x) + k$  has two roots that have different signs. (2)

**[20]**

**QUESTION 6**

6.1 Lester invests R8 000 at 13% per annum, compounded quarterly. At the end of the investment period he receives R22 350.

For how long did he invest the money? (4)

6.2 Brian deposits R700 at the end of each month into a saving account for 15 years. Exactly 5 years after the first payment, R5 200 was paid in the account as an additional payment. The interest rate on the savings account is 12% per annum, compounded monthly.

Determine the accumulated amount at the end of the investment period. (5)

6.3 Mr Faku was granted a loan of R900 000, over a period of 20 years. The loan is repaid in equal monthly instalments at the end of each month. The interest rate is 11,5% per annum compounded monthly. The first instalment is paid 4 months after the loan was granted.

6.3.1 Determine Mr Faku's monthly payments. (4)

6.3.2 The balance immediately after 16 years is R379 811,29. Determine how much interest he paid till the end of 16 years. (3)

[16]

**QUESTION 7**

7.1 Determine  $f'(x)$  from first principles if  $f(x) = x^2 + 2$  (4)

7.2 Determine:

7.2.1  $f'(x)$  if  $f(x) = (5x - 7)(5x + 7)$  (2)

7.2.2 Given that  $p'(x) = 2x^3$ , determine  $D_x \left[ p(x) - \sqrt[3]{x} + \frac{5}{x^4} \right]$  (4)

[10]



**QUESTION 8**

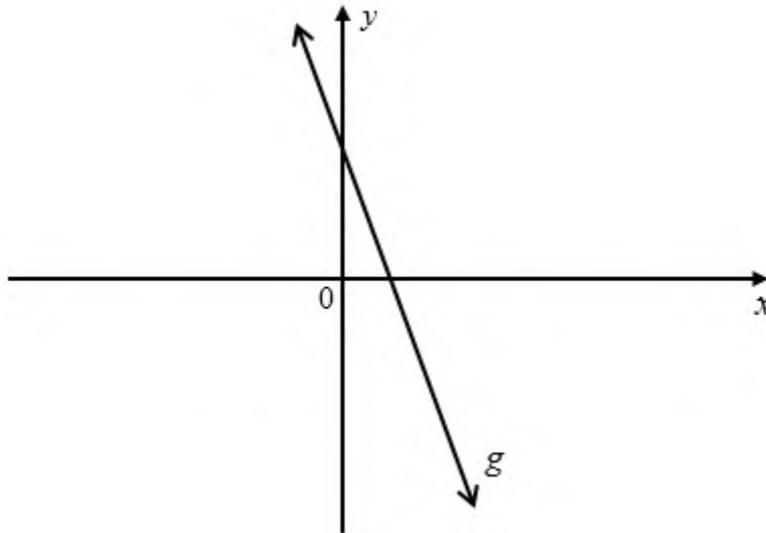
8.1 Given the function:  $f(x) = -x^3 + 5x^2 + 8x - 12$

8.1.1 Determine the  $x$ - and  $y$ -intercepts of the graph of  $f$  (4)

8.1.2 Determine the coordinates of the turning points of  $f$  (4)

8.1.3 Sketch the graph of  $f$ . Show clearly all the turning points as well as the intercepts on the axes. (3)

8.2 Given:  $f(x) = kx^3 + px^2 + 4x - 3$  and  $g(x) = -6x + 10$ , where  $g(x) = f''(x)$   
Below is the sketch of  $g$



8.2.1 Calculate the values of  $k$  and  $p$  (3)

8.2.2 For which values of  $x$  will  $f(x)$  be concave up? (2)

[16]

**QUESTION 9**

The sum of two numbers is 25. Determine the two numbers such that the square of the one number plus three times the square of the other number is a minimum.

[7]

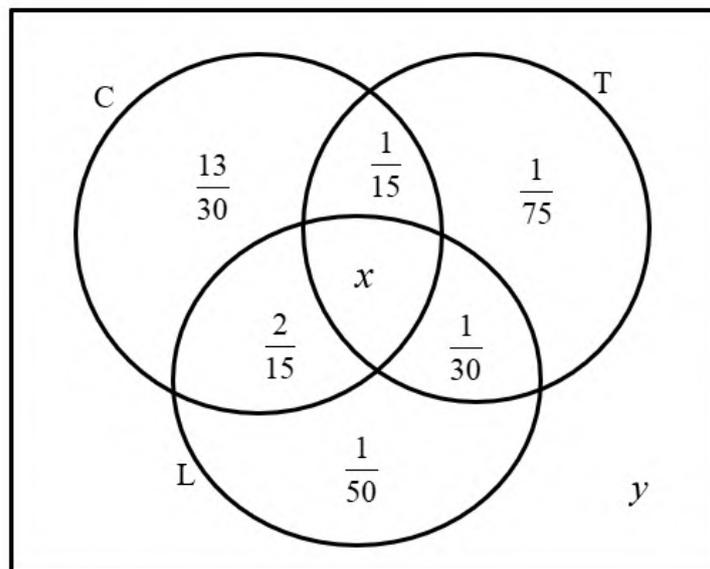
**QUESTION 10**

10.1 Two mutually exclusive events, A and B are such that  $P(A) = 0,5$  and  $P(\text{not } B) = 0,7$

10.1.1 Determine  $P(B)$  (2)

10.1.2 Determine  $P[\text{not}(A \text{ or } B)]$  (3)

10.2 A survey was conducted on the digital devices that learners own. A certain number of learners were surveyed, and the results were recorded. The survey revealed that there were learners owning cellphones (C), tablets (T) and laptops (L). Below are the results (as probabilities) on the Venn diagram.



10.2.1 Determine the values of  $x$  and  $y$  if the probability of owning at least one of the three devices is  $\frac{9}{10}$  (3)

10.2.2 Calculate the probability that a learner owns a cellphone and tablet. (1)

10.2.3 If the total number of participants in the survey is 150, calculate the number of learners who own laptops only. (2)

**[11]**

**QUESTION 11**

Codes of 3 symbols are formed using the twenty-six letters of the alphabet (A–Z) and the ten digits (0–9). Repetition is allowed.

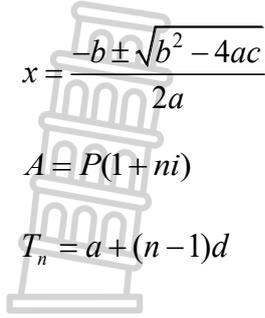
- 11.1 How many codes (letters and digits) can be formed using at least one letter? (4)
- 11.2 What is the probability that a code in QUESTION 11.1 will start with a vowel and the second and third symbols form an even number? (1)

[5]

**TOTAL: 150**



INFORMATION SHEET



$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$T_n = a + (n - 1)d$$

$$T_n = ar^{n-1}$$

$$F = \frac{x[(1+i)^n - 1]}{i}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$y = mx + c$$

$$(x - a)^2 + (y - b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\bar{x} = \frac{\sum x}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$\hat{y} = a + bx$$

$$A = P(1 - ni)$$

$$S_n = \frac{n}{2}(2a + (n - 1)d)$$

$$S_n = \frac{a(r^n - 1)}{r - 1}; \quad r \neq 1$$

$$P = \frac{x[1 - (1+i)^{-n}]}{i}$$

$$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$S_\infty = \frac{a}{1 - r}; \quad -1 < r < 1$$

$$m = \tan \theta$$

$$a^2 = b^2 + c^2 - 2bc \cos A \quad \text{area } \triangle ABC = \frac{1}{2} ab \sin C$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$





<b>LEARNER'S NAME AND SURNAME</b> <i>LEERDER SE NAAM EN VAN</i>	
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<b>GRADE/GRAAD 12</b>	
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CERTIFICATE/SERTIFIKAAT**

**GRADE/GRAAD 12**

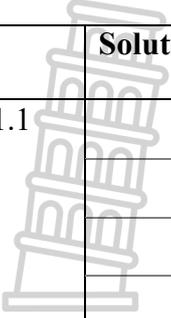
**SEPTEMBER 2025**

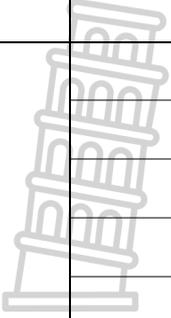
**MATHEMATICS P1/WISKUNDE V1  
SPECIAL ANSWER BOOK/SPEZIALE ANTWOORDEBOEK**

Marker/Merker			Moderator's Initials/Moderator se paraaf							
Question <i>Vraag</i>	Mark <i>Punt</i>	Initial <i>Parafeer</i>	Marks <i>Punte</i>	S M	Marks <i>Punte</i>	D M	Marks <i>Punte</i>	P M	Marks <i>Punte</i>	N M
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
<b>TOTAL TOTAAL</b>										

This special answer book consists of 23 pages.  
*Hierdie spesiale antwoordeboek bestaan uit 23 bladsye.*

**QUESTION/VRAAG 1**

	<b>Solution/Oplissing</b>	<b>Marks/ Punte</b>
1.1.1		(3)
1.1.2		(3)
1.1.3		(4)
1.1.4		(4)

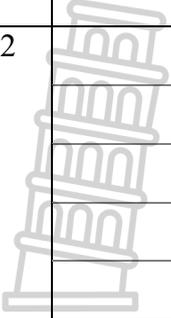
	<b>Solution/Oplissing</b>	<b>Marks/ Punte</b>
1.2		
1.3		(6)
		(5)
		<b>[25]</b>

**QUESTION/VRAAG 2**

	<b>Solution/Oplissing</b>	<b>Marks/ Punte</b>
2.1.1		(1)
2.1.2		(2)
2.2		(4)
2.3		(4)
		<b>[11]</b>

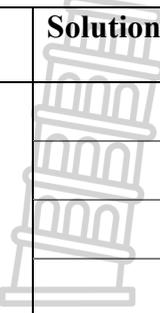
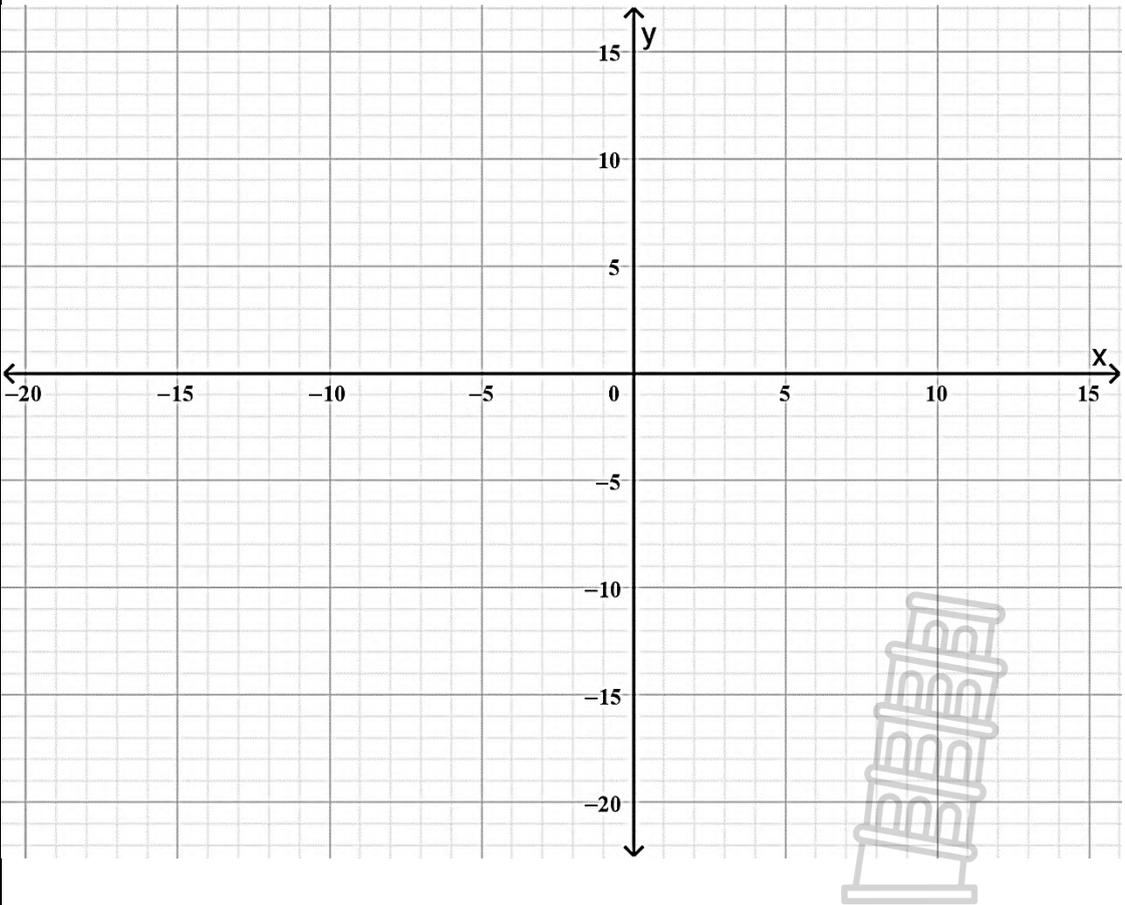
**QUESTION/VRAAG 3**

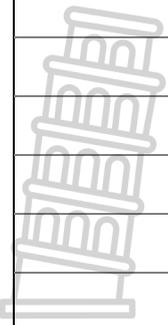
	<b>Solution/Oplissing</b>	<b>Marks/ Punte</b>
3.1.1		(4)
3.1.2		(1)
3.1.3		(3)
3.2.1		(2)

	<b>Solution/Oplissing</b>	<b>Marks/ Punte</b>
3.2.2		
		(3)
		<b>[13]</b>



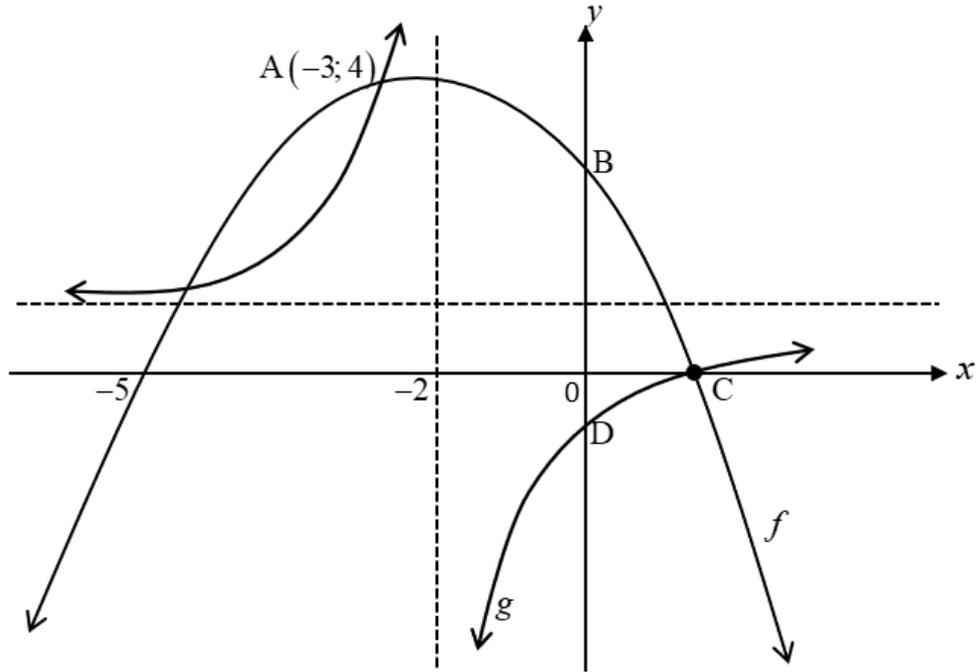
QUESTION/VRAAG 4

	<b>Solution/Oplissing</b>	<b>Marks/ Punte</b>
4.1		(2)
4.2		(1)
4.3		(4)

4.4		
4.5		(4)
		(5)
		<b>[16]</b>



QUESTION/VRAAG 5



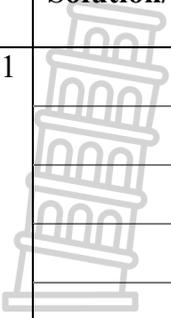
	<b>Solution/Oplissing</b>	<b>Marks/ Punte</b>
5.1		(1)
5.2		(6)



	<b>Solution/Oplissing</b>	<b>Marks/ Punte</b>
5.3		(2)
5.4		(2)
5.5		(3)
5.6.1		(2)
5.6.2		(2)
5.7		(2)
		<b>[20]</b>

**QUESTION/VRAAG 6**

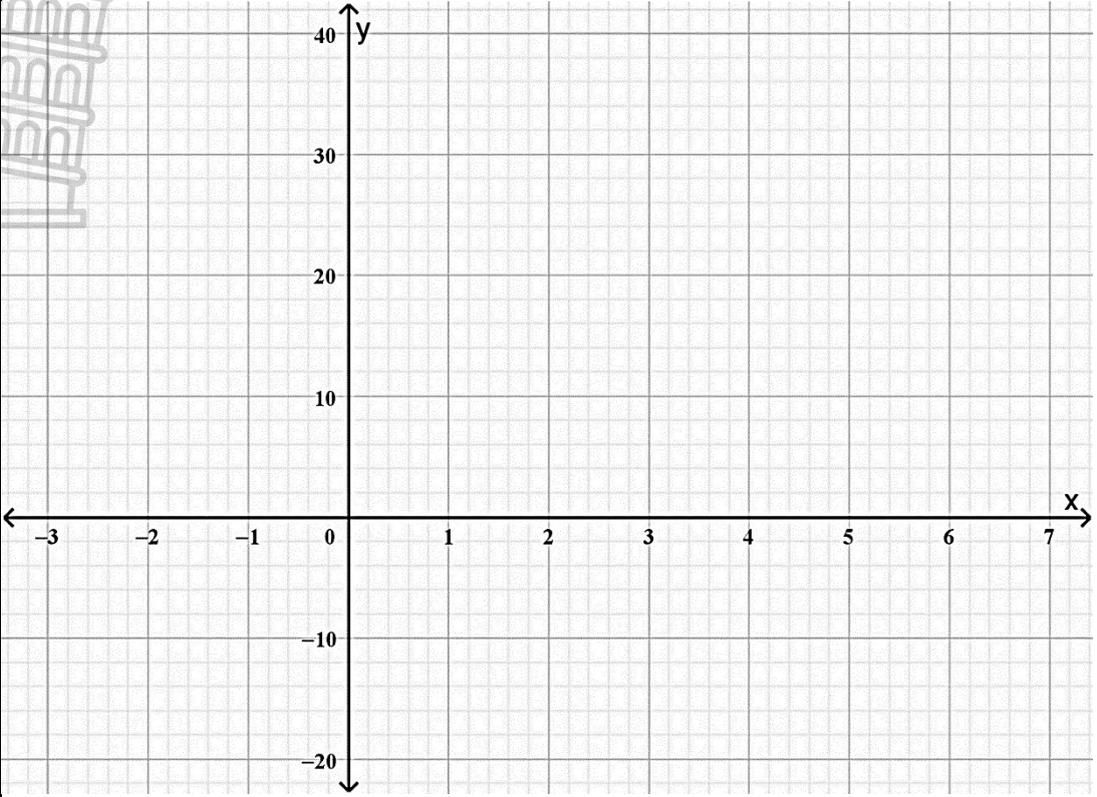
	<b>Solution/Oplissing</b>	<b>Marks/ Punte</b>
6.1		(4)
6.2		(5)

	<b>Solution/Oplissing</b>	<b>Marks/ Punte</b>
6.3.1		
6.3.2		(4)
		(3)
		<b>[16]</b>

QUESTION/VRAAG 7

	<b>Solution/Oplissing</b>	<b>Marks/ Punte</b>
7.1		
		(4)
7.2.1		
		(2)
7.2.2		
		(4)
	<b>[10]</b>	

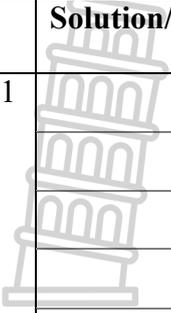


	Solution/Oplissing	Marks/ Punte
8.1.3		(3)





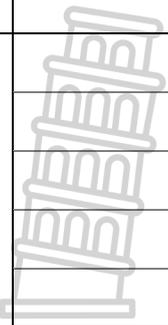
**QUESTION/VRAAG 10**

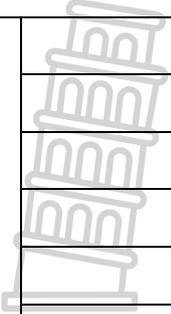
	<b>Solution/Oplossing</b>	<b>Marks/ Punte</b>
10.1.1		(2)
10.1.2		(3)
10.2.1		(3)
10.2.2		(1)
10.2.3		(2)
		<b>[11]</b>

QUESTION/VRAAG 11

	<b>Solution/Oplossing</b>	<b>Marks/ Punte</b>
11.1		(4)
11.2		(1)
		<b>[5]</b>



	<b>Additional space/</b> <i>Addisionele ruimte</i>	<b>Marks/</b> <i>Punte</i>
		

<b>Additional Space/Addisionele Ruimte</b>	<b>Marks/ Punte</b>
	

<b>Additional Space/Addisionele Ruimte</b>	<b>Marks/ Punte</b>

Additional Space/ <i>Addisionele Ruimte</i>	Marks/ <i>Punte</i>

**TOTAL/TOTAAL: 150**



**NATIONAL  
SENIOR CERTIFICATE  
NASIONALE  
SENIOR SERTIFIKAAT**

**GRADE/GRAAD 12**

**SEPTEMBER 2025**

**MATHEMATICS P1 MARKING GUIDELINE  
WISKUNDE V1 NASIENRIGLYN**

**MARKS/PUNTE: 150**



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This marking guideline consists of 19 pages./  
*Hierdie nasienriglyn bestaan uit 19 bladsye.*

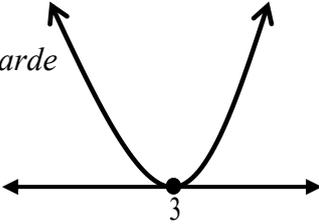
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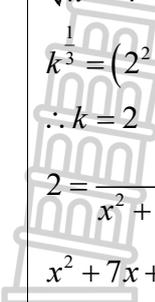
**NOTE/LET OP:**

- 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(CA) applies in ALL aspects of the marking guideline.  
*Volgehoue akkuraatheid geld deurgaans in ALLE aspekte van die nasienriglyn.*
- 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/VRAAG 1**

1.1	1.1.1	$x^2 = 3 - 2x$ $x^2 + 2x - 3 = 0$ $(x + 3)(x - 1) = 0$ $x + 3 = 0 \text{ or/of } x - 1 = 0$ $x = -3 \text{ or/of } x = 1$ <p style="text-align: center;"><b>OR/OF</b></p> $x^2 + 2x - 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-3)}}{2(1)}$ $x = 1 \text{ or/of } x = -3$	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;">                 Answers only – Full Marks                  Slegs antwoorde - Volpunte             </div>	<ul style="list-style-type: none"> <li>✓ standard form/<i>standaardvorm</i></li> <li>✓ factors/<i>faktore</i></li> <li>✓ both answers/<i>beide antwoorde</i> (3)</li> </ul> <p style="text-align: center;"><b>OR/OF</b></p> <ul style="list-style-type: none"> <li>✓ standard form/<i>standaardvorm</i></li> <li>✓ correct substitution into correct formula/<i>korrekte vervanging in korrekte formule</i></li> <li>✓ both answers/<i>beide antwoorde</i> (3)</li> </ul>
	1.1.2	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(3)(2)}}{2(3)}$ $x = \frac{9 \pm \sqrt{57}}{6}$ $\therefore x = 2,76 \text{ or/of } x = 0,24$	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;">                 Penalise 1 mark for incorrect rounding off./                  Penaliseer 1 punt vir verkeerde afronding.             </div>	 <ul style="list-style-type: none"> <li>✓ substitution/<i>vervanging</i></li> <li>✓✓ x-values/<i>x-waardes</i> (3)</li> </ul>

	<p>1.1.3 <math>9 &gt; -x(x-6)</math>  <math>x^2 - 6x + 9 &gt; 0</math>  <math>(x-3)^2 &gt; 0</math>                      critical value/kritieke waarde  <math>x = 3</math></p>  <p><math>x \in \mathbf{R}, x \neq 3</math></p> <p style="text-align: center;"><b>OR/OF</b></p> <p><math>x \in (-\infty; -\infty), x \neq 3</math></p>	<p>✓ standard form/standaardvorm</p> <p>✓ critical value/kritieke waarde</p> <p>✓✓ <math>x \in \mathbf{R}, x \neq 3</math>                      (accuracy/akkuraatheid)</p> <p style="text-align: center;"><b>OR/OF</b></p> <p>✓✓ <math>x \in (-\infty; -\infty), x \neq 3</math></p> <p style="text-align: right;">(4)</p>
	<p>1.1.4 <math>(\sqrt{x+5}) = 1 + \sqrt{x}</math>  <math>(\sqrt{x+5})^2 = (1 + \sqrt{x})^2</math>  <math>x + 5 = 1 + 2\sqrt{x} + x</math>  <math>4 = 2\sqrt{x}</math>  <math>2 = \sqrt{x}</math>  <math>\therefore x = 4</math></p>	<p>✓ isolating surd/iseleer wortelvorm</p> <p>✓ square both sides/kwadreer beide kante</p> <p>✓ simplification/vereenvoudiging</p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(4)</p>
<p>1.2</p>	<p><math>2x = 1 - y</math> ..... (1)  <math>y^2 - 2y - 3x + 1 = 3xy - 2x^2</math> ..... (2)                      From / Vanaf (1): <math>y = 1 - 2x</math> ..... (3)                      (3) into/in (2):  <math>(1 - 2x)^2 - 2(1 - 2x) - 3x + 1 = 3x(1 - 2x) - 2x^2</math>  <math>1 - 4x + 4x^2 - 2 + 4x - 3x + 1 = 3x - 6x^2 - 2x^2</math>  <math>12x^2 - 6x = 0</math>  <math>6x(2x - 1) = 0</math>  <math>x = 0</math> or/of <math>x = \frac{1}{2}</math>  <math>y = 1</math> or/of <math>y = 0</math></p> <p><b>Note: the last mark is an independent mark and can always be awarded as a CA mark</b>  <b>Nota: die laaste punt is onafhanklik en kan altyd as 'n CA punt toegeken word.</b></p>	<p>✓ <math>y = 1 - 2x</math></p> <p>✓ substitution/vervanging</p> <p>✓ standard form/standaardvorm</p> <p>✓ factors/faktore</p> <p>✓ x-values/waardes</p> <p>✓ y-values/waardes</p> <p style="text-align: right;">(6)</p>

1.3	 $\sqrt[3]{k} = 4^{\frac{1}{6}}$ $k^{\frac{1}{3}} = (2^2)^{\frac{1}{6}} = 2^{\frac{1}{3}}$ $\therefore k = 2$ $2 = \frac{1}{x^2 + 7x + 5}$ $x^2 + 7x + 5 = \frac{1}{2} \quad \left( \frac{a}{b} = \frac{c}{d} \Rightarrow \frac{d}{b} = \frac{c}{a} \right)$ $x^2 + 7x + 5 + 2 = \frac{1}{2} + 2 \quad (\text{add 2 both sides/tel 2 beide kante by})$ $x^2 + 7x + 7 = \frac{5}{2}$ $\frac{1}{x^2 + 7x + 7} = \frac{2}{5} \quad (\text{invert fractions/keer breuke om})$ $p = \frac{2}{5}$	<p>✓ surd form to exp. form/ wortelvorm na eks. vorm</p> <p>✓ <math>k = 2</math></p> <p>✓ <math>x^2 + 7x + 5 = \frac{1}{2}</math></p> <p>✓ <math>x^2 + 7x + 7 = \frac{5}{2}</math></p> <p>✓ <math>p = \frac{2}{5}</math></p> <p style="text-align: right;">(5)</p> <p style="text-align: right;"><b>[25]</b></p>
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QUESTION/VRAAG 2		
2.1	2.1.1 Amanda	✓ answer/antwoord (1)
	2.1.2 For a series to converge the ratio ( $r$ ), $-1 < r < 1$ . / <i>Vir 'n reeks om te konvergeer moet verhouding,</i> $-1 < r < 1$ Amanda's $r$ is out of the interval $-1 < r < 1$ . / <i>Amanda se <math>r</math> is buite die interval <math>-1 &lt; r &lt; 1</math></i> Formula $S_{\infty}$ cannot be used in such a case. / <i>Formule <math>S_{\infty}</math> geld nie in so geval nie.</i>	✓ $r$ is out of the interval $r \in (-1; 1)$ / <i><math>r</math> is buite die interval</i> $r \in (-1; 1)$ ✓ $S_{\infty}$ cannot be used in such a case / <i><math>S_{\infty}</math> kan dus nie gebruik word nie</i> (2)
2.2	$\frac{3}{2}(2)^1 + \frac{3}{2}(2)^2 + \frac{3}{2}(2)^3 + \dots + \frac{3}{2}(2)^m$ $3 \quad + 6 \quad + 12 \quad + \dots$ $a = 3 \text{ and/en } r = 2$ $S_n = \frac{a(r^n - 1)}{r - 1}$ $= \frac{3(2^{10} - 1)}{2 - 1}$ $= 3069$	✓ $a = 3$ ✓ $r = 2$  ✓ substitution/vervanging ✓ answer/antwoord (4)
2.3	$T_n = ar^{n-1}$ $\therefore 8\left(\frac{3}{4}\right)^{n-1} < \frac{1}{100}$ $\therefore \left(\frac{3}{4}\right)^{n-1} < \frac{1}{800}$ $\therefore (n-1)\log\left(\frac{3}{4}\right) < \log\left(\frac{1}{800}\right)$ $\therefore n-1 > \frac{\log\left(\frac{1}{800}\right)}{\log\left(\frac{3}{4}\right)}$ ; since/omdat $\log\left(\frac{3}{4}\right) < 0$ $n-1 > 23,236\dots$ $n > 24,236$ $\therefore 25^{\text{th}}$ term will thus be the first term to be less than $\frac{1}{100}$ . / $25^{\text{ste}}$ term sal dus die eerste term kleiner as $\frac{1}{100}$ wees.	✓ general term/algemene term  $\checkmark 8\left(\frac{3}{4}\right)^{n-1} < \frac{1}{100}$  $\checkmark n-1 > 23,236\dots$  ✓ answer/antwoord (4)
		[11]

QUESTION/VRAAG 3		
3.1	3.1.1 $2a = 1$ $3a + b = -4$ $\therefore a = \frac{1}{2}$ $3\left(\frac{1}{2}\right) + b = -4$ $b = -\frac{11}{2}$ $T_n = an^2 + bn + c$ $= \frac{1}{2}n^2 - \frac{11}{2}n + c$ $T_4 = 1$ $1 = \frac{1}{2}(4)^2 - \frac{11}{2}(4) + c$ $c = 15$ $T_n = \frac{1}{2}n^2 - \frac{11}{2}n + 15$	✓ $2^{\text{nd}}$ difference/ $2^{\text{de}}$ verskil = 1 ✓ $a = \frac{1}{2}$ ✓ $b = -\frac{11}{2}$ ✓ $c = 15$ (4)
	3.1.2 $T_{16} = \frac{1}{2}(16)^2 - \frac{11}{2}(16) + 15 = 55$	✓ answer/antwoord (1)
	3.1.3 $-4; -3; -2; \dots$ $a = -4$ $d = 1$ $T_n = a + d(n-1)$ $= -4 + (n-1)$ $= -4 - 1 + n$ $45 = -5 + n$ $n = 50$ $\therefore$ between/tussen $T_{50}$ and/en $T_{51}$	✓ sequence of $1^{\text{st}}$ difference/ ry van $1^{\text{ste}}$ verskille ✓ equating/gelykstel ✓ answer/antwoord (3)
3.2	3.2.1 $S_{30} = 2(30)^2 - 6(30)$ $= 1620$	✓ substitution/vervanging ✓ answer/antwoord (2)



	<p>3.2.2 <math>T_1 = S_1 = 2(1)^2 - 6(1) = -4</math>  <math>T_2 = S_2 - S_1 = -4 + 4 = 0</math>  <math>T_3 = S_3 - S_2 = 0 + 4 = 4</math>  <math>\therefore d = 4</math>  <math>\Rightarrow T_n = 4n - 8</math>  <math>4n - 8 = 300</math>  <math>4n = 308</math>  <math>n = 77</math></p> <p style="text-align: center;"><b>OR/OF</b></p> <p><math>T_n = S_n - S_{n-1}</math>  <math>300 = 2n^2 - 6n - 2(n-1)^2 + 6(n-1)</math>  <math>300 = 2n^2 - 6n - 2n^2 + 4n - 2 + 6n - 6</math>  <math>300 = 4n - 8</math>  <math>308 = 4n</math>  <math>n = 77</math></p>	<p>✓ first 3 terms/<i>eerste 3 terme</i>  ✓ general term in terms of <i>n</i>/  <i>algemene term i.t.v. n</i>  ✓ value of <i>n</i>/<i>waarde van n</i></p> <p style="text-align: right;">(3)</p> <p style="text-align: center;"><b>OR/OF</b></p> <p>✓ substitution/<i>vervanging</i>  ✓ general term in terms of <i>n</i>/  <i>algemene term i.t.v. n</i>  ✓ value of <i>n</i>/<i>waarde van n</i></p> <p style="text-align: right;">(3)</p> <p style="text-align: right;"><b>[13]</b></p>
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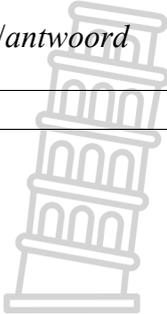
QUESTION/VRAAG 4			
4.1	$y = 3x - 5$ $x = 3y - 5$ $y = \frac{1}{3}x + \frac{5}{3}, x \in [-17; 10]$	✓ swapping $x$ and $y$ / <i>omruil van <math>x</math> en <math>y</math></i>  ✓ answer/antwoord (accuracy/akkuraatheid) (2)	
4.2	$f(5) = 3(5) - 5$ $= 10$	✓ answer / antwoord (1)	
4.3		✓ shape of $f$ / <i>vorm van <math>f</math></i>  ✓ shape of $f^{-1}$ / <i>vorm van <math>f^{-1}</math></i>  ✓ endpoints of $f$ / <i>eindpunte van <math>f</math></i>  ✓ endpoints of $f^{-1}$ / <i>eindpunte van <math>f^{-1}</math></i>  (4)	
4.4	$f(x) = f^{-1}(x)$ $3x - 5 = \frac{1}{3}x + \frac{5}{3}$ $\frac{8}{3}x = \frac{20}{3}$ $x = \frac{5}{2}$ $\therefore \left(\frac{5}{2}; \frac{5}{2}\right)$	<b>OR / OF</b> $9x - 15 = x + 5$ $8x = 20$ $x = \frac{20}{8}$ $x = \frac{5}{2}$ $y = \frac{5}{2}$	✓ equating $f$ to $f^{-1}$ <i>gelyk stel <math>f</math> aan <math>f^{-1}</math></i>  ✓ $\frac{8}{3}x = \frac{20}{3}$ <b>OR/OF</b> $8x = 20$  ✓ solving of $x$ / <i>oplos vir <math>x</math></i> ✓ answer/antwoord (4)

4.5	$f(x) = 3x - 5$ $g'(x) = 2ax + b$ $\therefore 2a = 3 \Rightarrow a = \frac{3}{2}$ and/en $b = -5$ $g(x) = \frac{3}{2}x^2 - 5x + \frac{25}{6}$ $x = \frac{-(-5)}{2\left(\frac{3}{2}\right)} = \frac{5}{3}$  min. value of $g$ / min waarde van $g : g\left(\frac{5}{3}\right) = 0$ Min. value of $h$ / Min. waarde van $h : h(x) = 2^0 = 1$	✓ value of $a$ /waarde van $a$ ✓ value of $b$ /waarde van $b$  ✓ $x = \frac{5}{3}$  ✓ min. of $g(x)$ /min. van $g(x)$ ✓ answer/antwoord (5)
		<b>[16]</b>

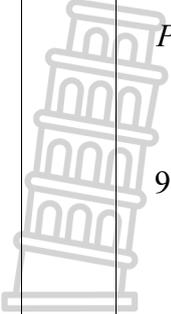


QUESTION/VRAAG 5		
5.1	$B\left(0; 2\frac{1}{2}\right)$	✓ answer/antwoord (1)
5.2	$y = \frac{a}{x+p} + q$ if vertical asymptote of $g$ is $x = -2$ / as die vertikale asimptoot van $g$ ; $x = -2$ , is $\therefore p = 2$ $y = \frac{a}{x+2} + q$ substitute/vervang: $(-3; 4)$ $4 = \frac{a}{-3+2} + q$ $4 = -a + q$ $a = q - 4 \dots \dots \dots (1)$ substitute/vervang: $\left(0; -\frac{1}{2}\right)$ $-\frac{1}{2} = \frac{a}{2} + q$ $-1 = a + 2q$ $a = -1 - 2q \dots \dots \dots (2)$ $(1) = (2)$ $q - 4 = -2q - 1$ $-3q = -3$ $q = 1$ For $q = 1$ : $a = -3$	✓ value of $p$ / waarde van $p$  ✓ substitution of $(-3; 4)$ / vervanging van $(-3; 4)$  ✓ formulating the first equation/ formulering van eerste vergelyking  ✓ formulating the second equation/ formulering van tweede vergelyking  ✓ equating/gelykstelling  ✓ values of $a$ and $q$ / waardes van $a$ en $q$ (6)
5.3	$\left\{y \mid y \leq 4\frac{1}{2}; y \in \mathbf{R}\right\}$ <p style="text-align: center;"><b>OR/OF</b></p> $y \in \left[-\infty; 4\frac{1}{2}\right]; y \in \mathbf{R}$	✓✓ answer/antwoord (2)  <p style="text-align: center;"><b>OR/OF</b></p> ✓✓ answer/antwoord (2)

5.4	$y = -(x+2)+1$ $= -x-1$ <b>OR/OF</b> $y = -x+c$ subst./vervang: $(-2;1)$ $1 = -(-2)+c$ $c = -1$ $y = -x-1$	✓ substitution/ <i>vervanging</i> ✓ answer/ <i>antwoord</i> <b>OR/OF</b> (2) ✓ substitution/ <i>vervanging</i> ✓ answer/ <i>antwoord</i> (2)
5.5	$B\left(0; \frac{5}{2}\right) C(x; 0)$ $x_c = 1$ (by using symmetry / <i>deur simmetrie te gebruik</i> ) <b>OR / OF</b> $-1 = -\frac{3}{x+2}$ $-x-2 = -3$ $x = 3-2$ $x = 1$ $C(1; 0)$ $m = \frac{\frac{5}{2}-0}{0-1}$ $= -\frac{5}{2}$	✓ coordinates of C/ <i>koördinate van C</i> ✓ substitution/ <i>vervanging</i> ✓ answer/ <i>antwoord</i> (3)
5.6	5.6.1 $-5 \leq x \leq 1$	✓✓ answer/ <i>antwoord</i> (2)
	5.6.2 $x < -2$ or / <i>of</i> $x > 1$	✓✓ answer/ <i>antwoord</i> (2)
5.7	$k < \frac{5}{2}$	✓✓ answer/ <i>antwoord</i> (2)
		<b>[20]</b>



QUESTION/VRAAG 6		
6.1	$A = P(1+i)^n$ $22350 = 8000 \left(1 + \frac{13\%}{4}\right)^{4n}$ $\frac{447}{160} = \left(\frac{413}{400}\right)^n$ $4n = \log_{\left(\frac{413}{400}\right)} \frac{447}{160}$ $4n = 32,12279\dots$ $n = 8,03 \text{ years/jaar}$	<ul style="list-style-type: none"> <li>✓ substitution/vervanging</li> <li>✓ simplification/vereenvoudiging</li> <li>✓ correct use of log/korrekte gebruik van 'n log</li> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(4)</p>
6.2	$F_V = \frac{x \left[ (1+i)^n - 1 \right]}{i} + P(1+i)^n$ $= \frac{700 \left[ \left(1 + \frac{12\%}{12}\right)^{180} - 1 \right]}{\frac{12\%}{12}} + 5200 \left(1 + \frac{12\%}{12}\right)^{120}$ $= R366\ 868,15$ <p style="text-align: center;"><b>OR/OF</b></p> $F_V = \left[ \frac{700 \left[ \left(1 + \frac{12\%}{12}\right)^{60} - 1 \right]}{\frac{12\%}{12}} + 5200 \right] \left(1 + \frac{12\%}{12}\right)^{120} + \frac{700 \left[ \left(1 + \frac{12\%}{12}\right)^{120} - 1 \right]}{\frac{12\%}{12}}$ $= 205841,0675 + 161027,0826$ $= R366\ 868,15$	<ul style="list-style-type: none"> <li>✓ <math>i</math> and/en <math>n = 180</math></li> <li>✓ <math>n = 120</math></li> <li>✓ correct substitution into <math>F_V</math> / korrekte vervanging in <math>F_V</math></li> <li>✓ correct substitution into A / korrekte vevanging in A</li> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(5)</p> <p style="text-align: center;"><b>OR/OF</b></p> <ul style="list-style-type: none"> <li>✓ <math>i</math> and/en 60 in <math>F_V</math></li> <li>✓ adding/optel 5200 and/en <math>\left(1 + \frac{12\%}{12}\right)^{120}</math></li> <li>✓ second/tweede <math>F_V</math></li> <li>✓ <math>205841,0675 + 161027,0826</math></li> <li>✓ answer/Antwoord</li> </ul> <p style="text-align: right;">(5)</p>

6.3	6.3.1	 $P_v = \frac{[1 - (1+i)^{-n}]}{i}$ $900000 \left(1 + \frac{11,5\%}{12}\right)^3 = \frac{x \left[1 - \left(1 + \frac{11,5}{12}\right)^{-237}\right]}{\frac{11,5\%}{12}}$ $x = \frac{900000 \left(1 + \frac{11,5\%}{12}\right)^3 \times \frac{11,5\%}{12}}{\left[1 - \left(1 + \frac{11,5}{12}\right)^{-237}\right]}$ $x = R9908,90$	<p>✓ <math>n = -237</math></p> <p>✓ <math>900000 \left(1 + \frac{11,5\%}{12}\right)^3</math></p> <p>✓ correct substitution/ korrekte vervanging</p> <p>✓ answer/antwoord (4)</p>
	6.3.2	<p>Total paid in the 16 years/<i>Totaal betaal in die 16 jaar</i>  <math>= R9908,90 \times 189 = R1\ 872\ 782,10</math></p> <p>Interest paid/<i>Rente betaal</i>  <math>= R1872\ 782,10 - (R900\ 000 - R379\ 811,29)</math>  <math>= R1352\ 593,39</math></p>	<p>✓ R1 872 782,10</p> <p>✓ subtracting (.....)/ aftrekking van (.....)</p> <p>✓ answer/antwoord (3)</p>
		<b>[16]</b>	



QUESTION/VRAAG 7		
7.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h)^2 + 2 - (x^2 + 2)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 + 2 - x^2 - 2}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x + h)}{h}$ $= 2x$	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">                     Penalise 1 mark for incorrect notation in this question                      Penaliseer 1 punt vir verkeerde notasie in hierdie vraag                 </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">                     Answer ONLY: 0 marks                      SLEGS antwoord: 0 punte                 </div> <ul style="list-style-type: none"> <li>✓ substitution/vervanging</li> <li>✓ simplification/vereenvoudiging</li> <li>✓ factorisation/faktorisering (dividing by h/deel deur h)</li> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(4)</p>
7.2	7.2.1 $f(x) = (5x - 7)(5x + 7)$ $= 25x^2 - 49$ $f'(x) = 50x$	<ul style="list-style-type: none"> <li>✓ <math>25x^2 - 49</math></li> <li>✓ <math>50x</math></li> </ul> <p style="text-align: right;">(2)</p>
	7.2.2 $p'(x) = 2x^3$  $D_x \left[ p(x) - \sqrt[3]{x} + \frac{5}{x^4} \right]$ $= D_x \left[ p(x) - x^{\frac{1}{3}} + 5x^{-4} \right]$ $= p'(x) - \frac{1}{3}x^{-\frac{2}{3}} - 20x^{-5}$ $= 2x^3 - \frac{1}{3}x^{-\frac{2}{3}} - 20x^{-5}$	<ul style="list-style-type: none"> <li>✓ <math>x^{\frac{1}{3}} + 5x^{-4}</math></li> <li>✓ <math>2x^3</math></li> <li>✓ <math>\frac{1}{3}x^{-\frac{2}{3}}</math></li> <li>✓ <math>-20x^{-5}</math></li> </ul> <p style="text-align: right;">(4)</p>
		<b>[10]</b>

QUESTION/VRAAG 8		
8.1	8.1.1 $f(x) = -x^3 + 5x + 8x - 12$ $y$ - int. / afsnit : $y = -12$ $x$ - int s. / $x$ - afsnitte : $y = 0$ : $(x + 2)(x - 1)(x - 6) = 0$ $x = -2$ or / of $x = 1$ or / of $x = 6$ $(-2; 0) ; (1; 0) ; (6; 0)$	<ul style="list-style-type: none"> <li>✓ <math>y</math>-intercept/<math>y</math>-afsnit</li> <li>✓ first factor/<i>eerste faktor</i></li> <li>✓ other two factors/<i>ander twee faktore</i></li> <li>✓ <math>x</math>-intercepts/<math>x</math>-afsnitte</li> </ul> <p style="text-align: right;">(4)</p>
	8.1.2 $f(x) = -x^3 + 5x + 8x - 12$ $f'(x) = -3x^2 + 10x + 8$ $f'(x) = 0$ $-3x^2 + 10x + 8 = 0$ $(x - 4)(3x + 2) = 0$ $x = 4$ or/of $x = -\frac{2}{3}$ $f(4) = 36$ $f\left(-\frac{2}{3}\right) = -\frac{400}{27} \approx -14,81$ $(4; 36) \left(-\frac{2}{3}; -\frac{400}{27}\right)$ <p style="text-align: center;"><b>OR / OF</b></p> $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-10) \pm \sqrt{(10)^2 - 4(-3)(8)}}{2(-3)}$ $x = -\frac{2}{3}$ or/of $x = 4$ $f(4) = 36$ $f\left(-\frac{2}{3}\right) = -\frac{400}{27} \approx -14,81$ $(4; 36) \left(-\frac{2}{3}; -\frac{400}{27}\right)$	<ul style="list-style-type: none"> <li>✓ <math>f'(x)</math></li> <li>✓ <math>f'(x) = 0</math></li> <li>✓ <math>x</math> - values /<math>x</math>-waardes</li> <li>✓ <math>y</math> - values /<math>y</math>-waardes</li> </ul> <p style="text-align: right;">(4)</p> <p style="text-align: center;"><b>OR / OF</b></p> <ul style="list-style-type: none"> <li>✓ <math>f'(x)</math></li> <li>✓ <math>f'(x) = 0</math></li> <li>✓ <math>x</math> - values /<math>x</math>-waardes</li> <li>✓ <math>y</math> - values /<math>y</math>-waardes</li> </ul> <p style="text-align: right;">(4)</p>

8.13		<ul style="list-style-type: none"> <li>✓ x-intercepts/x-afsnitte</li> <li>✓ y-intercept/y-afsnit</li> <li>✓ turning points/draaipunte</li> <li>✓ shape/vorm</li> </ul> <p style="text-align: right;">(3)</p>
8.2	<p>8.2.1</p> $f'(x) = 3kx^2 + 2px + 4$ $f''(x) = 6kx + 2p$ $g(x) = -6x + 10$ <p><math>\therefore 6k = -6</math> and/en <math>2p = 10</math></p> <p><math>k = -1</math> and/en <math>p = 5</math></p>	<ul style="list-style-type: none"> <li>✓ <math>f''(x) = 6kx + 2p</math></li> <li>✓ <math>p = 5</math></li> <li>✓ <math>k = -1</math></li> </ul> <p style="text-align: right;">(3)</p>
8.2.2	<p>x – coordinate of inflection point: x – koördinaat van buigpunt :</p> $-6x + 10 = 0$ $x = \frac{5}{3} \text{ and/en } a < 0$ <p><math>\therefore f</math> is concave up when: / <math>f</math> is konkaaf op vir: <math>x &lt; \frac{5}{3}</math></p> <p style="text-align: center;"><b>OR/OR</b></p> <p><math>f</math> is concave up when: / <math>f</math> is konkaaf op wanneer: <math>f''(x) &gt; 0</math></p> $-6x + 10 > 0$ $-6x > -10$ $x < \frac{5}{3}$	<ul style="list-style-type: none"> <li>✓ <math>f''(x) = 0</math></li> <li>✓ answer /antwoord</li> </ul> <p style="text-align: center;"><b>OR/OF</b></p> <ul style="list-style-type: none"> <li>✓ <math>f''(x) &gt; 0</math></li> <li>✓ answer /antwoord</li> </ul> <p style="text-align: right;">(2)</p>
		<b>[16]</b>

QUESTION/VRAAG 9		
9	<p><math>x + y = 25</math></p> <p>let the expression to be minimised be A:</p> <p><i>laat A die uitdrukking wees wat ge - minimeer moet word</i></p> <p><math>\therefore A = x^2 + 3y^2</math></p> <p>but/maar: <math>y = 25 - x</math></p> <p><math>A = x^2 + 3(25 - x)^2</math></p> <p><math>= x^2 + 3(625 - 50x + x^2)</math></p> <p><math>= x^2 + 1875 - 150x + 3x^2</math></p> <p><math>= 4x^2 - 150x + 1875</math></p> <p><math>A'(x) = 8x^2 - 150</math></p> <p><math>A'(x) = 0</math></p> <p><math>150 = 8x^2</math></p> <p><math>x = \frac{75}{4}</math></p> <p><math>y = \frac{25}{4}</math></p>	<p><math>\checkmark x^2 + 3y^2</math></p> <p><math>\checkmark y = 25 - x</math></p> <p><math>\checkmark x^2 + 3(25 - x)^2</math></p> <p><math>\checkmark A'(x)</math></p> <p><math>\checkmark A'(x) = 0</math></p> <p><math>\checkmark x = \frac{75}{4}</math></p> <p><math>\checkmark y = \frac{25}{4}</math></p>
		(7)
		[7]



QUESTION/VRAAG 10			
10.1	10.1.1	$P(B) = 1 - P(\text{not/nie } B)$ $= 1 - 0,7$ $= 0,3$	✓ substitution/ <i>vervanging</i> ✓ answer/ <i>antwoord</i> (2)
	10.1.2	$P(A \text{ and/en } B) = 0$ $P(A \text{ or/of } B) = P(A) + P(B)$ $P(A \text{ or/of } B) = 0,5 + 0,3$ $= 0,8$ $\therefore P[\text{not/nie}(A \text{ or/of } B)] = 0,2$	✓ $P(A \text{ and/en } B) = 0$ ✓ substitution into the correct rule/ <i>vervanging in korrekte reël</i> ✓ answer/ <i>antwoord</i> (3)
10.2	10.2.1	$y = 1 - \frac{9}{10}$ $= 0,1$ $= \frac{1}{10}$ $x = \frac{9}{10} - \left( \frac{13}{30} + \frac{1}{15} + \frac{1}{75} + \frac{2}{15} + \frac{1}{30} + \frac{1}{50} \right)$ $= \frac{1}{5}$	✓ value of $y$ / <i>waarde van y</i> ✓ sum of at least 3/ <i>som van ten minste 3</i> $= \frac{9}{10}$ ✓ value of $x$ / <i>waarde van x</i> (3)
	10.2.2	$P(\text{cellphone and tablet}) = \frac{4}{15}$ $P(\text{selfoon en tablet}) = \frac{4}{15}$	✓ answer/ <i>antwoord</i> (1)
	10.2.3	$P(E) = \frac{n(E)}{n(S)}$ $\frac{1}{50} = \frac{n(E)}{150}$ $n(E) = 3$ <p>∴ only 3 learners owning laptops/ <i>slegs 3 leerders besit skootrekenaars</i></p>	✓ $n(E) = \frac{1}{50} \times 150$ ✓ answer/ <i>antwoord</i> (2)
			<b>[11]</b>

QUESTION/VRAAG 11		
11.1	<p><b>Case 1 (1 letter) :</b> <math>26 \times 10 \times 10 = 2\,600</math> But the letter can be in any of three positions <math>\therefore 3 \times 2\,600 = 7\,800</math> codes</p> <p><b>Case 2 (2 letter codes) :</b> <math>26 \times 26 \times 10 = 6\,760</math> But the digit can be in any of three different positions <math>\therefore 3 \times 6\,760 = 20\,280</math> codes</p> <p><b>Case 3 (3 letter codes) :</b> <math>26 \times 26 \times 26 = 17\,576</math> codes</p> <p><math>\Rightarrow</math> Total number of codes = <b>45 656 codes</b></p>	<p><b>Accuracy/Akkuraatheid</b></p> <p>✓ 7 800 answer/<i>antwoord</i></p> <p>✓ 20 280 answer/<i>antwoord</i></p> <p>✓ 17 576 answer/<i>antwoord</i></p> <p>✓ answer/<i>antwoord</i> (4)</p>
	<p><b>Opsie 1 (1 letter) :</b> <math>26 \times 10 \times 10 = 2\,600</math> <i>Maar die letter kan in enige van drie posisies wees</i> <math>\therefore 3 \times 2\,600 = 7\,800</math> kodes</p> <p><b>Opsie 2 (2 letter kodes) :</b> <math>26 \times 26 \times 10 = 6\,760</math> <i>Maar die syfer kan in enige van drie posisies wees</i> <math>\therefore 3 \times 6\,760 = 20\,280</math> kodes</p> <p><b>Opsie 3 (3 letter kodes) :</b> <math>26 \times 26 \times 26 = 17\,576</math> kodes</p> <p><math>\Rightarrow</math> <i>Totale aantal kodes = 45 656 kodes</i></p>	
11.2	$P(\text{Letter, Even Code}) / P(\text{Letter, Ewe kode}) = \frac{250}{45\,656}$	<p>✓ answer / <i>antwoord</i> (1)</p>
		[5]
		<b>TOTAL/TOTAAL: 150</b>

