



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

SEPTEMBER 2021



**MATHEMATICS P1/WISKUNDE VI
MARKING GUIDELINE/NASIENRIGLYN**

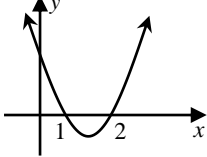
MARKS/PUNTE: 150

This marking guideline consists of 22 pages./
Hierdie nasienriglyn bestaan uit 22 bladsye.

NOTE/LET WEL:

- If a candidate answers a question TWICE, mark the FIRST attempt ONLY.
Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk SLEGS die EERSTE poging.
- Consistent accuracy 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 1/VRAAG 1

1.1.1	$x^2 + 2x - 15 = 0$ $(x - 3)(x + 5) = 0$ $\therefore x = 3 \quad \text{or / of} \quad x = -5$ <p style="text-align: center;">OR/OF</p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-2 \pm \sqrt{2^2 - 4(1)(-15)}}{2(1)}$ $= \frac{-2 \pm \sqrt{64}}{2}$ $= 3 \quad \text{or / of} \quad -5$	<p>✓ factors / faktore ✓ $x = 3$ ✓ $x = -5$</p> <p style="text-align: right;">(3)</p> <p style="text-align: center;">OR/OF</p> <p>✓ substitution / vervanging</p> <p>✓ $x = 3$ ✓ $x = -5$</p> <p style="text-align: right;">(3)</p>
1.1.2	$3x^2 + x - 1 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-1 \pm \sqrt{1^2 - 4(3)(-1)}}{2(3)}$ $= \frac{-1 \pm \sqrt{13}}{6}$ $= 0,43 \quad \text{or / of} \quad -0,77$ <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Penalise 1 mark for incorrect rounding Penaliseer 1 punt vir verkeerde afronding </div>	<p>✓ substitution / vervanging</p> <p>✓ $x = 0,43$ ✓ $x = -0,77$</p> <p style="text-align: right;">(3)</p>
1.1.3	$x(x - 3) \geq -2$ $x^2 - 3x + 2 \geq 0$ $(x - 1)(x - 2) \geq 0$ $\therefore x \leq 1 \quad \text{or / of} \quad x \geq 2$	<div style="text-align: center;">  </div> <p>✓ standard form standaardvorm</p> <p>✓ factorisation faktorisering</p> <p>✓ $x \leq 1$ or/of ✓ $x \geq 2$</p> <p style="text-align: right;">(4)</p>

1.1.4	$\sqrt{43-x} - x + 1 = 0$ $\sqrt{43-x} = x - 1$ $(\sqrt{43-x})^2 = (x-1)^2$ $43 - x = x^2 - 2x + 1$ $x^2 - x - 42 = 0$ $(x-7)(x+6) = 0$ $\therefore x = 7 \quad \text{or / of} \quad x \neq -6$	<ul style="list-style-type: none"> ✓ isolating the surd <i>isolering van die wortelvorm</i> ✓ squaring both sides <i>kwadreer beide kante</i> ✓ standard form / <i>standaardvorm</i> ✓ factorisation / <i>faktorisering</i> ✓ selection / <i>korrekte keuse</i>
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(5)



<p>1.2</p> $2y - x = 3 \quad (1)$ $y^2 + 3x = 2xy \quad (2)$ $x = 2y - 3 \quad (3)$ <p>Substitute (3) into (2) / <i>Vervang (3) in (2)</i></p> $y^2 + 3(2y - 3) = 2y(2y - 3)$ $y^2 + 6y - 9 - 4y^2 + 6y = 0$ $-3y^2 + 12y - 9 = 0$ $y^2 - 4y + 3 = 0$ $(y - 3)(y - 1) = 0$ <p>$\therefore y = 3$ or / of $y = 1$</p> $x = 2(3) - 3 \quad \text{or / of} \quad x = 2(1) - 3$ $= 3 \quad \quad \quad = -1$ <p style="text-align: center;">OR/OF</p> $2y - x = 3 \quad (1)$ $y^2 + 3x = 2xy \quad (2)$ $y = \frac{x}{2} + \frac{3}{2} \quad (3)$ <p>Substitute (3) into (2) / <i>Vervang (3) in (2)</i></p> $\left(\frac{x}{2} + \frac{3}{2}\right)^2 + 3x = 2x\left(\frac{x}{2} + \frac{3}{2}\right)$ $\frac{x^2}{4} + \frac{6x}{4} + \frac{9}{4} + 3x = x^2 + 3x$ $-\frac{3x^2}{4} + \frac{6x}{4} + \frac{9}{4} = 0$ $-3x^2 + 6x + 9 = 0$ $x^2 - 2x - 3 = 0$ $(x - 3)(x + 1) = 0$ <p>$\therefore x = 3$ or / of $x = -1$</p> $y = \left(\frac{3}{2} + \frac{3}{2}\right) \quad \text{or / of} \quad y = \left(-\frac{1}{2} + \frac{3}{2}\right)$ $= 3 \quad \quad \quad = 1$	<p>$\checkmark x = 2y - 3$</p> <p>\checkmark substitution / <i>vervanging</i></p> <p>\checkmark standard form / <i>standaardvorm</i></p> <p>\checkmark factorisation / <i>faktorisering</i></p> <p>\checkmark y-values / <i>y-waardes</i></p> <p style="text-align: center;">OR/OF</p> <p>$\checkmark y = \frac{x}{2} + \frac{3}{2}$</p> <p>$\checkmark$ substitution / <i>vervanging</i></p>	
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		<ul style="list-style-type: none"> ✓ standard form / <i>standaardvorm</i> ✓ factorisation / <i>faktorisering</i> ✓ x-values / <i>x-waardes</i> ✓ y-values / <i>y-waardes</i> (5)
<p>1.3</p>	$x = \frac{5 \pm \sqrt{p(6-p)-9}}{2}$ <p>For non-real roots: / <i>Vir nie - reële wortels :</i></p> <p>$\Delta < 0$</p> <p>$p(6-p)-9 < 0$</p> <p>$-p^2 + 6p - 9 < 0$</p> <p>$p^2 - 6p + 9 > 0$</p> <p>$(p-3)^2 > 0$</p> <p>$\therefore p \in \square$ but/maar $p \neq 3$</p> <p style="text-align: center;">OR/OF</p> $x = \frac{5 \pm \sqrt{p(6-p)-9}}{2}$ <p>For non-real roots: / <i>Vir nie - reële wortels:</i></p> <p>$\Delta < 0$</p> <p>$p(6-p)-9 < 0$</p> <p>$-p^2 + 6p - 9 < 0$</p> <p>$(3-p)(p-3) < 0$</p> <p>$\therefore p \in \square$ but / maar $p \neq 3$</p>	<ul style="list-style-type: none"> ✓ $\Delta < 0$ ✓ standard form / <i>standaardvorm</i> ✓ factorisation / <i>faktorisering</i> ✓ answer / <i>antwoord</i> <p style="text-align: center;">OR/OF</p> <ul style="list-style-type: none"> ✓ $\Delta < 0$ ✓ standard form / <i>standaardvorm</i> ✓ factorisation / <i>faktorisering</i> ✓ answer / <i>antwoord</i> <p style="text-align: right;">(4)</p>
		<p>[24]</p>

QUESTION 2/VRAAG 2


2.1.1	$ \begin{array}{cccc} -16 & ; & -16 & ; & -12 & ; & -4 \\ & \diagdown & / & \diagdown & / & \diagdown & / \\ & & 0 & & 4 & & 8 \\ & \diagdown & / & \diagdown & / & \diagdown & / \\ & & 4 & & 4 & & \\ 8 & & & & & & \end{array} $	$\checkmark 8$ (1)
2.1.2	$ \begin{aligned} 2a &= 4 \\ \therefore a &= 2 \\ \\ 3a + b &= 4 \\ 3(2) + b &= 4 \\ \therefore b &= -6 \\ \\ a + b + c &= -16 \\ 2 - 6 + c &= -16 \\ \therefore c &= -12 \\ \\ T_n &= 2n^2 - 6n - 12 \end{aligned} $ 	$\checkmark a = 2$ $\checkmark b = -6$ $\checkmark c = -12$ $\checkmark T_n = 2n^2 - 6n - 12$ (4)
2.1.3	$ \begin{aligned} T_{38} &= 2(38)^2 - 6(38) - 12 \\ &= 2648 \end{aligned} $	\checkmark substitution / <i>vervanging</i> \checkmark answer / <i>antwoord</i> (2)

2.1.4	<p>General term for first differences: <i>Algemene term vir eerste verskille</i> $T_n = 4n - 4$ $400 = 4n - 4$ $\therefore n = 101$ $T_{n(\text{linear/liniêr})} = (T_{n+1} - T_n)_{(\text{quadratic/kwadraties})}$ $\therefore n = 101$ and / en $n + 1 = 102$ The terms are / <i>Die terme is</i>: 101 and / en 102</p> <p style="text-align: center;">OR/OF</p> $2(n+1)^2 - 6(n+1) - 12 - (2n^2 - 6n - 12) = 400$ $2n^2 + 4n + 2 - 6n - 6 - 12 - 2n^2 + 6n + 12 = 400$ $4n - 4 = 400$ $4n = 404$ $\therefore n = 101$ $\therefore \text{Between/Tussen } T_{101} \text{ and / en } T_{102}$ <p style="text-align: center;">OR/OF</p> Trial and error / <i>Proefneming</i> $T_{102} = 2(102)^2 - 6(102) - 12 = 20184$ $T_{101} = 2(101)^2 - 6(101) - 12 = 19784$ Difference/ <i>Verskil</i> : 400 $\therefore \text{Between/Tussen } T_{101} \text{ and / en } T_{102}$	<p>✓ $T_n = 4n - 4$ ✓ $T_n = 400$</p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: center;">OR/OF</p> <p>✓ $4n - 4 = 400$ ✓</p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: center;">OR/OF</p> <p>✓ subst. for T_{101} and T_{102} <i>verv. vir T_{101} en T_{102}</i></p> <p>✓ 400 ✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(3)</p>
2.2.1	$T_n = a + (n - 1)d$ $89 = 2 + (n - 1)(3)$ $3n - 1 = 89$ $3n = 90$ $n = 30$	<p>✓ substitution / <i>vervanging</i></p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(2)</p>


2.2.2	<p><i>k is the sum to 30 terms / is die som tot 30 terme.</i></p> $S_n = \frac{n}{2}[a + l]$ $= \frac{30}{2}[2 + 89]$ $= 1365$ <p>OR / OF</p> $S_n = \frac{n}{2}[2a + (n-1)d]$ $= \frac{30}{2}[2(2) + (30-1)(3)]$ $= 1365$	<p>✓ Sum formula / <i>Som formule</i></p> <p>✓ substitution / <i>vervanging</i></p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: center;">OR / OF</p> <p>✓ Sum formula / <i>Som formule</i></p> <p>✓ substitution / <i>vervanging</i></p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(3)</p>
		[15]



QUESTION 3/VRAAG 3

3.1	$T_9 = ar^8 = 768$ $T_{13} = ar^{12} = 12\,288$ $\frac{ar^{12}}{ar^8} = \frac{12\,288}{768}$ $\therefore r^4 = 16$ $r = \pm 2$ $a = \frac{768}{(\pm 2)^8}$ $= 3$	$\checkmark \frac{ar^{12}}{ar^8} = \frac{12\,288}{768}$ $\checkmark r = \pm 2$ $\checkmark \text{value of } a / \text{waarde van } a$ <p style="text-align: right;">(3)</p>
3.2.1	$S_2 = \frac{54}{19} - \frac{24}{19}$ $= \frac{30}{19}$	$\checkmark \text{answer} / \text{antwoord}$ <p style="text-align: right;">(1)</p>
3.2.2	$T_1 + T_2 = \frac{30}{19}$ $a + ar = \frac{30}{19}$ $a(1+r) = \frac{30}{19}$ $a = \frac{30}{19(1+r)}$	<div style="text-align: center;">  </div> $\checkmark a + ar = \frac{30}{19}$ <p style="text-align: right;">(1)</p>
3.2.3	$S_\infty = \frac{a}{1-r} = \frac{54}{19}$ $\therefore a = \frac{54(1-r)}{19}$ $a = \frac{30}{19(1+r)} \dots\dots\dots \text{from} / \text{vanaf} (3.2.2)$ $\therefore \frac{30}{19(1+r)} = \frac{54(1-r)}{19}$ $(1-r)(1+r) = \frac{30}{54}$ $1-r^2 = \frac{5}{9}$ $r^2 = \frac{4}{9}$ $\therefore r = \frac{2}{3}$	$\checkmark a = \frac{54(1-r)}{19}$ $\checkmark \text{equating} / \text{gelykstel}$ $\checkmark r^2 = \frac{4}{9}$ $\checkmark \text{answer} / \text{antwoord}$ <p style="text-align: right;">(4)</p>
		[9]

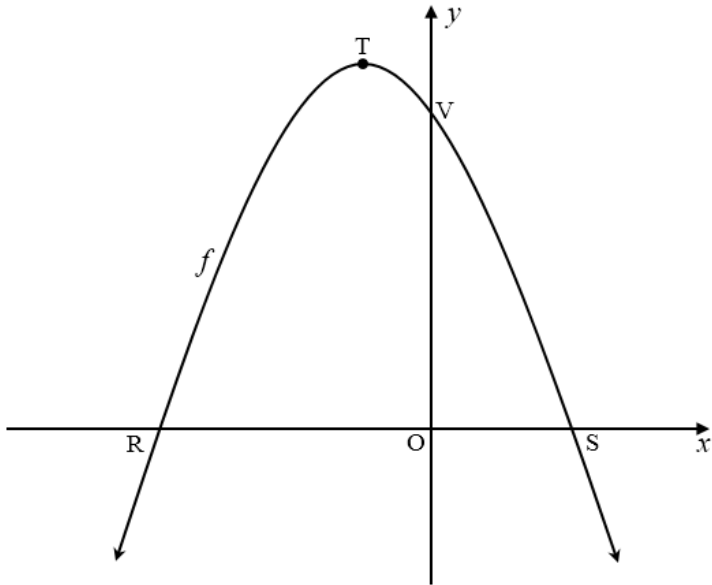

QUESTION 4/VRAAG 4

4.1	D(0 ; 1)	✓ (0 ; 1) (1)
4.2	$x = -2$; $y = -1$	✓ $x = -2$ ✓ $y = -1$ (2)
4.3	$x \in \mathbb{R}$ but/maar $x \neq -2$	✓ $x \in \mathbb{R}$ ✓ $x \neq -2$ (2)
4.4	$g(x) = b^x$ $8 = b^{-3}$ $8 = \frac{1}{b^3}$ $b^3 = \frac{1}{8}$ $\therefore b = \frac{1}{2}$	 ✓ substitution / <i>vervanging</i> ✓ answer / <i>antwoord</i> (2)
4.5	$y = \frac{-3}{x+2} - 1$ $0 = \frac{-3}{x+2} - 1$ $1 = \frac{-3}{x+2}$ $x+2 = -3$ $x = -5$ $\therefore A(-5; 0)$ $y = \frac{-3}{0+2} - 1$ $= -\frac{5}{2}$ $\therefore C(0; -\frac{5}{2})$	✓ substitution $y = 0$ / <i>vervanging</i> $y = 0$ ✓ $x = -5$ ✓ $y = -\frac{5}{2}$ (3)

4.6	$x = \left(\frac{1}{2}\right)^y$ $\therefore y = \log_{\frac{1}{2}} x$ <p style="text-align: center;">OR/OF</p> $y = 2^{-x}$ $\therefore x = 2^{-y}$ $y = -\log_2 x$	$\checkmark x = \left(\frac{1}{2}\right)^y$ $\checkmark y = \log_{\frac{1}{2}} x$ <p style="text-align: center;">OR/OF</p> $\checkmark x = 2^{-y}$ $\checkmark y = -\log_2 x$ <p style="text-align: right;">(2)</p> <p style="text-align: right;">(2)</p>	
4.7			
4.7.1	$-5 < x < -2$	OR/OF $x \in (-5 ; -2)$	$\checkmark\checkmark$ answer / <i>antwoord</i> (A) (2)
4.7.2	$0 < x \leq \frac{1}{8}$	OR/OF $x \in (0 ; \frac{1}{8}]$	$\checkmark\checkmark$ answer / <i>antwoord</i> (A) (2)
			[16]



QUESTION 5/VRAAG 5

		
5.1	$-x^2 - 2x + 8 = 0$ $x^2 + 2x - 8 = 0$ $(x + 4)(x - 2) = 0$ $\therefore x = -4 \text{ or / of } x = 2$ $\therefore R(-4; 0) \text{ and / en } S(2; 0)$ $\therefore RS = 6 \text{ units / eenhede}$ 	<ul style="list-style-type: none"> ✓ $f(x) = 0$ ✓ factorisation / faktorisering ✓ values of x / waardes van x ✓ answer / antwoord <p style="text-align: right;">(4)</p>

<p>5.2</p> $x = \frac{-4+2}{2}$ $= -1$ $y = -(-1)^2 - 2(-1) + 8$ $= 9$ $\therefore T(-1;9)$ <p style="text-align: center;">OR/OF</p> $f(x) = -x^2 - 2x + 8$ $x = -\frac{b}{2a}$ $= -\left(\frac{-2}{2(-1)}\right)$ $= -1$ $y = -(-1)^2 - 2(-1) + 8$ $= 9$ $\therefore T(-1;9)$ <p style="text-align: center;">OR/OF</p> $f'(x) = -2x - 2 = 0$ $-2x = 2$ $x = -1$ $y = -(-1)^2 - 2(-1) + 8$ $= 9$ $\therefore T(-1;9)$	$\checkmark \text{ method / metode}$ $\checkmark x = -1$ $\checkmark y = 9$ <p style="text-align: center;">OR/OF</p> $\checkmark -\frac{b}{2a}$ $\checkmark x = -1$ $\checkmark y = 9$ <p style="text-align: center;">OR/OF</p> $\checkmark -2x - 2 = 0$ $\checkmark x = -1 \quad \checkmark y = 9$	<p style="text-align: right;">(3)</p>
<p>5.3.1</p> $f(x) = -x^2 - 2x + 8$ $f'(x) = -2x - 2$ $\therefore -2x - 2 = 2$ $\therefore x = -2$ $\therefore y = -(-2)^2 - 2(-2) + 8$ $= 8$ $\therefore W(-2;8)$	$\checkmark f'(x)$ $\checkmark f'(x) = 2$ $\checkmark x = -2$ $\checkmark y = 8$	<p style="text-align: right;">(4)</p>
<p>5.3.2</p> $g(x) = mx + c$ $m = -\frac{1}{2} \quad (\perp \text{ lines / lyne})$ $c = 8$ $\therefore y = -\frac{1}{2}x + 8$	$\checkmark \text{ gradient / gradiënt}$ $\checkmark \text{ equation / vergelyking}$	<p style="text-align: right;">(2)</p>



5.4	$f(x) = -x^2 - 2x + 8$ $h(x) = -f(x-1)$ $= -[-(x-1)^2 - 2(x-1) + 8]$ $= -[-(x^2 - 2x + 1) - 2x + 2 + 8]$ $= -[-x^2 + 2x - 1 - 2x + 2 + 8]$ $= x^2 - 9$ <p style="text-align: center;">OR/OF</p> $h(x) = (x+3)(x-3)$ $= x^2 - 9$ <p style="text-align: center;">OR/OF</p> <p>New turning point / Nuwe draaipunt = (0 ; -9) $y = x^2 - 9$</p>	$\checkmark -f(x-1)$ \checkmark substitution / <i>vervanging</i> \checkmark simplifying / <i>vereenvoudiging</i> \checkmark equation / <i>vergeliking</i> <p style="text-align: center;">OR/OF</p> $\checkmark\checkmark$ roots/wortels 3 and/en -3 $\checkmark + (x+3)(x-3)$ \checkmark equation / <i>vergeliking</i> <p style="text-align: center;">OR/OF</p> $\checkmark (0 ; \checkmark\checkmark -9)$ \checkmark equation / <i>vergeliking</i>
		(4)
		[17]


QUESTION 6/VRAAG 6

6.1	$A = P(1-i)^n$ $5510 = 9670(1-i)^4$ $\therefore i = 1 - \sqrt[4]{\frac{5510}{9670}}$ $= 0,131177$ $\therefore r = 13,12\%$	\checkmark subst. into correct formula <i>vervanging in korrekte formule</i> \checkmark simplification <i>vereenvoudiging</i> \checkmark answer / <i>antwoord</i>
		(3)

6.2	<p>End of December / <i>Einde van Desember</i></p> $F = \frac{x[(1+i)^n - 1]}{i}$ $\therefore F = \frac{600 \left[\left(1 + \frac{0,087}{12}\right)^{144} - 1 \right]}{0,087}$ $= R151438,20$ <p>End of January / <i>Einde van Januarie</i></p> $A = P(1+i)^n$ $= 151438,20 \left(1 + \frac{0,087}{12}\right)$ $= R152536,13$ <p style="text-align: center;">OR/OF</p> $F = \frac{x[(1+i)^n - 1](1+i)}{i}$ $\therefore F = \frac{600 \left[\left(1 + \frac{0,087}{12}\right)^{144} - 1 \right] \left(1 + \frac{0,087}{12}\right)}{0,087}$ $= R152536,13$	<p>✓ $n = 144$ ✓ subst. into correct formula <i>vervanging in korrekte formule</i></p> <p>✓ adding final month's interest <i>voeg finale maand se rente by</i> ✓ answer / <i>antwoord</i></p> <p style="text-align: center;">OR/OF</p> <p>✓ $n = 144$ ✓ subst. into correct formula <i>vervanging in korrekte formule</i> ✓ adding final month's interest <i>voeg finale maand se rente by</i> ✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(4)</p>
6.3.1	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $350000 = \frac{x \left[1 - \left(1 + \frac{0,093}{12}\right)^{-72} \right]}{\frac{0,093}{12}}$ $\therefore x = \frac{350000 \times \frac{0,093}{12}}{\left[1 - \left(1 + \frac{0,093}{12}\right)^{-72} \right]}$ $\therefore x \approx R6361,18$	<p>✓ $i = \frac{0,093}{12}$ and $n = 72$ ✓ substitution into correct formula <i>vervanging in korrekte formule</i></p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(3)</p>

6.3.2	<p>Outstanding balance = / <i>Uitstaande balans</i> =</p> $P = \frac{x \left[1 - (1+i)^{-n} \right]}{i}$ $\therefore P = \frac{6361,18 \left[1 - \left(1 + \frac{0,093}{12} \right)^{-32} \right]}{\frac{0,093}{12}}$ $= R179\,667,32$ <p style="text-align: center;">OR/OF</p> <p>Outstanding balance / <i>Uitstaande balans</i> = $A - F$</p> $= 350\,000 \left(1 + \frac{0,093}{12} \right)^{40} - \frac{6361,18 \left[\left(1 + \frac{0,093}{12} \right)^{40} - 1 \right]}{\frac{0,093}{12}}$ $= R476\,628,84 - R296\,961,79$ $= R179\,667,05$	<p>✓ $i = \frac{0,093}{12}$ and/en $n = 32$ ✓ subst. into correct formula <i>vervanging in korrekte formule</i></p> <p>✓ $P = 179\,667,32$</p> <p style="text-align: center;">OR/OF</p> <p>✓ $i = \frac{0,093}{12}$ and/en $n = 40$ ✓ subst. Into correct formula <i>vervanging in korrekte formule</i></p> <p>✓ $P = 179\,667,32$</p> <p style="text-align: right;">(3)</p>
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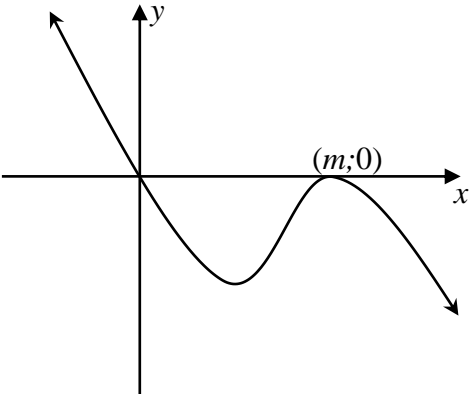


6.3.3	$\therefore 179\,667,32 = \frac{7\,000 \left[1 - \left(1 + \frac{0,093}{12} \right)^{-n} \right]}{\frac{0,093}{12}}$ $\frac{179\,667,32 \times \frac{0,093}{12}}{7\,000} - 1 = - \left(1 + \frac{0,093}{12} \right)^{-n}$ $-0,80108\dots = - \left(\frac{4\,031}{4\,000} \right)^{-n}$ $\therefore 0,80108\dots = \frac{4\,031^{-n}}{4\,000}$ $\therefore -n = \frac{\log 0,80108\dots}{\log \frac{4\,031}{4\,000}}$ $-n \approx -28,73$ $\therefore n \approx 28,73$ <p>\therefore The number of months is 29. Die aantal maande is 29.</p> <p style="text-align: center;">OR/OF</p>  $179\,667,32 = \frac{7\,000 \left[1 - \left(1 + \frac{0,093}{12} \right)^{-n} \right]}{\frac{0,093}{12}}$ $\frac{179\,667,32 \times \frac{0,093}{12}}{7\,000} - 1 = - \left(1 + \frac{0,093}{12} \right)^{-n}$ $-0,80108\dots = - \left(\frac{4\,031}{4\,000} \right)^{-n}$ $\therefore 0,80108\dots = \frac{4\,031^{-n}}{4\,000}$ $\therefore -n = \frac{\log 0,80108\dots}{\log \frac{4\,031}{4\,000}}$ $-n \approx -28,73$ $\therefore n \approx 28,73$ <p>\therefore The number of months is 29. Die aantal maande is 29</p>	<p>✓ subst. into correct formula <i>vervanging in korrekte formule</i></p> <p>✓ correct use of logs <i>korrekte gebruik van logs</i></p> <p>✓ = 28,73</p> <p>✓ $n = 29$ months / <i>maande</i></p> <p style="text-align: center;">OR/OF</p> <p>✓ subst. into correct formula <i>vervanging in korrekte formule</i></p> <p>✓ correct use of logs <i>korrekte gebruik van logs</i></p> <p>✓ = 28,73</p> <p>✓ $n = 29$ months / <i>maande</i></p> <p style="text-align: right;">(4)</p>
		[17]

QUESTION 7/VRAAG 7

7.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{5 - 2(x+h)^2 - (5 - 2x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{5 - 2x^2 - 4xh - 2h^2 - 5 + 2x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-4xh - 2h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-4x - 2h)}{h}$ $= \lim_{h \rightarrow 0} (-4x - 2h)$ $= -4x$	<p>✓ substitution / <i>vervanging</i></p> <p>✓ expansion / <i>uitbreiding</i></p> <p>✓ simplification / <i>vereenvoudiging</i></p> <p>✓ notation and $\lim_{h \rightarrow 0} (-4x - 2h)$</p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(5)</p>
7.2.1	$y = 7x^4 + \frac{2x^2}{\sqrt{x}}$ $= 7x^4 + 2x^{\frac{3}{2}}$ $\therefore \frac{dy}{dx} = 28x^3 + 3x^{\frac{1}{2}}$	<p>✓ $2x^{\frac{3}{2}}$</p> <p>✓ $28x^3$ ✓ $3x^{\frac{1}{2}}$</p> <p style="text-align: right;">(3)</p>
7.2.2	$= D_x \left[\frac{3x^2 - 7x - 6}{x} \right]$ $= D_x [3x - 7 - 6x^{-1}]$ $= 3 + 6x^{-2}$	<p>✓ $3x - 7$ ✓ $-6x^{-1}$</p> <p>✓ 3 and differentiating constant <i>3 en afgeleide van konstante</i></p> <p>✓ $+6x^{-2}$</p> <p style="text-align: right;">(4)</p>
		[12]

QUESTION 8/VRAAG 8

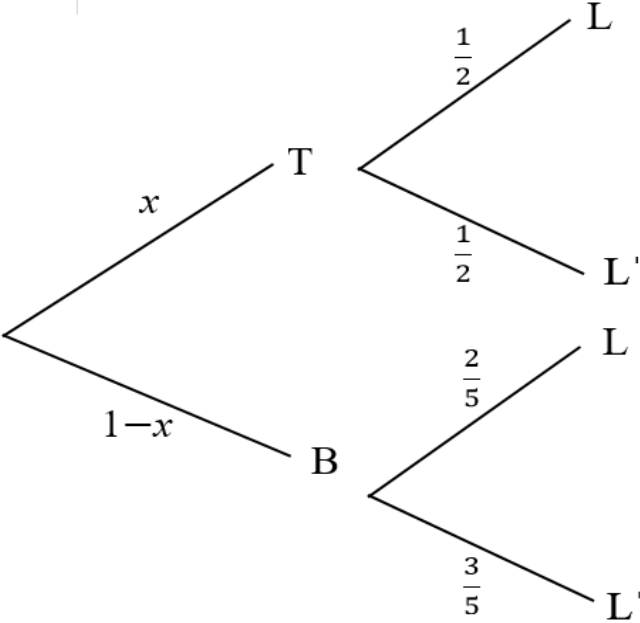
<p>8.1.1</p>	$f(x) = 2(x - x_1)(x - x_2)(x - x_3)$ $= 2(x+1)\left(x - \frac{1}{2}\right)(x-3)$ $= (x+1)(2x-1)(x-3)$ $= (x+1)(2x^2 - 7x + 3)$ $= 2x^3 - 7x^2 + 3x + 2x^2 - 7x + 3$ $= 2x^3 - 5x^2 - 4x + 3$ $f(x) = 2x^3 + bx^2 + cx + d$ $\therefore b = -5, c = -4, d = 3$	$\checkmark\checkmark f(x) = 2(x+1)\left(x - \frac{1}{2}\right)(x-3)$ <p style="text-align: center;">OR/OF</p> $\checkmark\checkmark f(x) = (x+1)(2x-1)(x-3)$ $\checkmark \text{ expansion / uitbreiding}$ $\checkmark \text{ simplifying / vereenvoudiging}$ <p style="text-align: right;">(4)</p>
<p>8.1.2</p>	$f'(x) = 6x^2 - 10x - 4$ $0 = 6x^2 - 10x - 4$ $\therefore 3x^2 - 5x - 2 = 0$ $(3x+1)(x-2) = 0$ $\therefore x = -\frac{1}{3} \text{ or / of } x = 2$ $\therefore N \text{ is at } f(2)$ $f(2) = 2(2)^3 - 5(2)^2 - 4(2) + 3$ $= -9$ $\therefore N(2; -9)$	$\checkmark f'(x) = 6x^2 - 10x - 4 = 0$ $\checkmark \text{ factorisation / faktorisering}$ $\checkmark \text{ choosing/kies : } x = 2$ $\checkmark y = -9$ <p style="text-align: right;">(4)</p>
<p>8.1.3 (a)</p>	$-\frac{1}{3} < x < 2$	$\checkmark\checkmark \text{ answer / antwoord}$ <p style="text-align: right;">(2)</p>
<p>8.1.3 (b)</p>	$f''(x) = 12x - 10$ $12x - 10 < 0$ $12x < 10$ $\therefore x < \frac{5}{6}$ <p style="text-align: center;">OR/OF</p> $x = \frac{-\frac{1}{3} + 2}{2} = \frac{5}{6}$ $\therefore x < \frac{5}{6}$	$\checkmark f''(x) = 12x - 10$ $\checkmark f''(x) < 0$ $\checkmark \text{ answer / antwoord}$ <p style="text-align: center;">OR/OF</p> $\checkmark x = \frac{5}{6}$ $\checkmark\checkmark x < \frac{5}{6} \text{ OR/OF } x \in \left(-\infty; \frac{5}{6}\right)$ <p style="text-align: right;">(3)</p>
<p>8.2</p>		$\checkmark f(0) = 0$ $\checkmark (m; 0)$ $\checkmark \text{ shape / vorm}$ <p style="text-align: right;">(3)</p>
<p style="text-align: right;">[16]</p>		

QUESTION 9/VRAAG 9

9.1	$A = \left(\frac{1}{2} \times 15x \times 8x \times 2\right) + (15xy) + (8xy) + (17xy)$ $5760 = 120x^2 + 40xy$ $\therefore y = \frac{5760 - 120x^2}{40x}$	✓ total surface area / <i>totale buite-oppervlakte</i> ✓ $5760 = 120x^2 + 40xy$ (2)
9.2	$V = \left(\frac{1}{2}bh\right) \times H$ $V = \frac{1}{2} \times 15x \times 8x \times y$ $= \frac{1}{2} \times 15x \times 8x \times \frac{5760 - 120x^2}{40x}$ $= 60x(144 - 3x^2)$ $= 8640x - 180x^3$	✓ substitution into V <i>vervanging in V</i> ✓ substituting for y <i>vervanging van y</i> (2)
9.3	$V'(x) = 8640 - 540x^2$ $V'(x) = 0$ $\therefore 8640 - 540x^2 = 0$ $8640 = 540x^2$ $x^2 = 16$ $\therefore x = 4$	✓ $V'(x) = 8640 - 540x^2$ ✓ $V'(x) = 0$ ✓ simplification / <i>vereenvoudiging</i> ✓ answer / <i>antwoord</i> (4)
		[8]



QUESTION 10/VRAAG 10

10.1.1	$P(B) = 1 - P(\text{not/nie } B)$ $= 1 - 0,45$ $= 0,55$	✓ 0,55 (1)
10.1.2	$P(A \text{ and/en } B) = P(A) \times P(B)$ $= 0,2 \times 0,55$ $= 0,11$ $P(A \text{ or/of } B) = P(A) + P(B) - P(A \text{ and/en } B)$ $= 0,2 + 0,55 - 0,11$ $= 0,64 \quad \text{or / of} \quad \frac{16}{25}$	✓ $P(A) \times P(B)$ ✓ substitution / <i>vervanging</i> ✓ answer / <i>antwoord</i> (3)
10.2	 $P(\text{late/laat}) = \frac{1}{2}x + \frac{3}{5}(1-x)$ $\frac{1}{2}x + \frac{3}{5}(1-x) = \frac{8}{15}$ $15x + 18(1-x) = 16$ $15x + 18 - 18x = 16$ $-3x = -2$ $x = \frac{2}{3}$	✓ $\frac{1}{2}x + \frac{3}{5}(1-x)$ ✓ equating / <i>gelyk stel</i> ✓ substitution / <i>vervanging</i> ✓ answer / <i>antwoord</i> (4)
		[8]

QUESTION 11/VRAAG 11

11.1	<p>@ @ @ # # #</p> $\boxed{20} \times \boxed{22} \times \boxed{21} \times \boxed{10} \times \boxed{10} \times \boxed{10}$ $= 9\,240\,000$	<p>✓ $\boxed{20} \times \boxed{22} \times \boxed{21}$ ✓ $\boxed{10} \times \boxed{10} \times \boxed{10}$ ✓ answer / antwoord</p> <p style="text-align: right;">(3)</p>
11.2	$\frac{\boxed{20} \times \boxed{19} \times \boxed{3} \times \boxed{10} \times \boxed{10} \times \boxed{5} + \boxed{20} \times \boxed{3} \times \boxed{19} \times \boxed{10} \times \boxed{10} \times \boxed{5}}{9\,240\,000}$ $= \frac{1140\,000}{9\,240\,000}$ $= \frac{19}{154} \quad \text{or / of} \quad 0,12 \quad \text{or / of} \quad 12,34\%$	<p>✓ $\boxed{20} \times \boxed{19} \times \boxed{3} \times \boxed{10} \times \boxed{10} \times \boxed{5}$ ✓ $\boxed{20} \times \boxed{3} \times \boxed{19} \times \boxed{10} \times \boxed{10} \times \boxed{5}$ ✓ adding / optel ✓ 9 240 000 ✓ answer / antwoord</p> <p style="text-align: right;">(5)</p>
		[8]

TOTAL/TOTAAL: 150

