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**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIORSERTIFIKAAT**

GRADE/GRAAD 12

SEPTEMBER 2024

**MATHEMATICS P1/WISKUNDE V1
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/PUNTE: 150

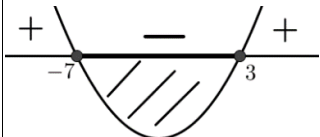
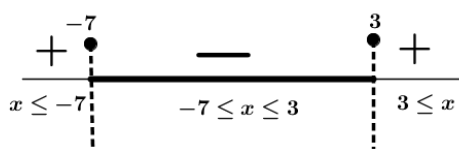
This marking guideline consists of 22 pages./
Hierdie nasienriglyn bestaan uit 22 bladsye.



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	$(2x-4)(x-1)=0$ $x=2$ or/of $x=1$	$\checkmark x=2$ $\checkmark x=1$ (2)
1.1.2	$2x^2-3(x+2)=4$ $2x^2-3x-6-4=0$ $2x^2-3x-10=0$ $x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-10)}}{2(2)}$ $x=3,11$ OR/OF $x=-1,61$	\checkmark standard form / <i>standaardvorm</i> \checkmark substitution / <i>vervanging</i> $\checkmark x=3,11$ or/of $\checkmark x=-1,61$ (4)
1.1.3	$x^2+4x-21 \leq 0$ $(x+7)(x-3) \leq 0$ <i>c.v's</i> : $x \in \{-7; 3\}$  OR / OF  $\therefore -7 \leq x \leq 3$	\checkmark factors / <i>faktore</i> $\checkmark \checkmark$ answer / <i>antwoord</i> <i>(Accuracy / Akkuraatheid)</i> (3)



1.1.4	$-\sqrt{x-1} = 3 - 2x$ $2x - 3 = \sqrt{x-1}$ $(2x - 3)^2 = x - 1$ $4x^2 - 12x + 9 = x - 1$ $4x^2 - 13x + 10 = 0$ $(4x - 5)(x - 2) = 0$ $x \neq \frac{5}{4} \text{ or/of } x = 2$ $\therefore x = 2$	<ul style="list-style-type: none"> ✓ squaring both sides/ <i>kwadreer beide kante</i> ✓ standard form / <i>standaardvorm</i> ✓ factors / formula <i>faktore / formule</i> ✓ answers with selection <i>antwoorde met keuse</i> <p style="text-align: right;">(4)</p>
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<p>1.2</p> <p>$2x = 1 - y$.....(1)</p> <p>$xy - x^2 + y^2 = 5$.....(2)</p> <p>$y = 1 - 2x$.....(3)</p> <p>Subst/Vervang (3) into/in (2)</p> <p>$x(1 - 2x) - x^2 + (1 - 2x)^2 = 5$</p> <p>$x - 2x^2 - x^2 + 1 - 4x + 4x^2 - 5 = 0$</p> <p>$x^2 - 3x - 4 = 0$</p> <p>$(x - 4)(x + 1) = 0$</p> <p>$x = 4$ or/of $x = -1$</p> <p>For/Vir $x = 4$:</p> <p>$y = 1 - 2(4)$</p> <p>$y = -7$</p> <p>For/Vir $x = -1$:</p> <p>$y = 1 - 2(-1)$</p> <p>$y = 3$</p> <p style="text-align: center;">OR / OF</p> <p>$y = 1 - 2x$.....(1)</p> <p>$xy - x^2 + y^2 = 5$.....(2)</p> <p>$x = \frac{1}{2} - \frac{y}{2}$.....(3)</p> <p>Subst/Vervang (3) into/in (2)</p> <p>$y\left(\frac{1}{2} - \frac{y}{2}\right) - \left(\frac{1}{2} - \frac{y}{2}\right)^2 + y^2 = 5$</p> <p>$\frac{y}{2} - \frac{y^2}{2} - \left(\frac{1}{4} - \frac{y}{2} + \frac{y^2}{4}\right) + y^2 = 5$</p> <p>$\frac{y}{2} - \frac{y^2}{2} - \frac{1}{4} + \frac{y}{2} - \frac{y^2}{4} + y^2 = 5$</p> <p>$\frac{y^2}{4} + y - \frac{21}{4} = 0$</p> <p>$y^2 + 4x - 21 = 0$</p> <p>$(y + 7)(y - 3) = 0$</p> <p>$y = -7$ or/of $y = 3$</p> <p>For/Vir $y = -7$:</p> <p>$x = 4$</p> <p>For/Vir $y = 3$:</p> <p>$x = -1$</p>	<p>$\checkmark y = 1 - 2x$</p> <p>\checkmark substitution / <i>vervanging</i></p> <p>\checkmark standard form / <i>standaardvorm</i></p> <p>\checkmark factors / <i>faktore</i></p> <p>\checkmark x-values / <i>x-waardes</i></p> <p>\checkmark y-values / <i>y-waardes</i></p> <p style="text-align: center;">OR/OF</p> <p>$\checkmark x = \frac{1}{2} - \frac{y}{2}$</p> <p>$\checkmark$ substitution / <i>vervanging</i></p> <p>\checkmark standard form / <i>standaardvorm</i></p> <p>\checkmark factors / <i>faktore</i></p> <p>\checkmark y-values / <i>y-waardes</i></p> <p>\checkmark x-values / <i>x-waardes</i></p>
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(6)

1.3	$f(x) = x^2 + 3x$ $\therefore f(-x) = x^2 - 3x$ $2x = [t(x)]^{\frac{1}{2}}$ $t(x) = 4x^2$ $\therefore t(2k) = 4(2k)^2$ $f(-x) + \frac{t(2k)}{4} = 0$ $x^2 - 3x + \frac{4(2k)^2}{4} = 0$ $x^2 - 3x + 4k^2 = 0$ <p>For equal roots / <i>Vir gelyke wortels</i>, $\Delta = 0$</p> $b^2 - 4ac = 0$ $(-3)^2 - 4(1)(4k^2) = 0$ $9 - 16k^2 = 0$ $(3 - 4k)(3 + 4k) = 0$ $k = \frac{3}{4} \quad \text{or/of} \quad k = -\frac{3}{4}$	<p>✓ $f(-x)$ & $t(2k)$</p> <p>✓ simplification / <i>vereenvoudiging</i></p> <p>✓ subst. in / <i>vervang in</i>: $\Delta = 0$</p> <p>✓ method of solving for k <i>metode vir oplos van k</i></p> <p>✓ k-values / <i>k-waardes</i></p> <p style="text-align: right;">(5)</p>
		[24]



QUESTION 2/VRAAG 2

2.1		
2.1.1	$2a = 2$ $\therefore a = 1$ $3a + b = 1$ $b = 1 - 3(1)$ $\therefore b = -2$ $\therefore T_n = n^2 - 2n - 4$	$a + b + c = -5$ $c = -5 - 1 + 2$ $\therefore c = -4$ $\checkmark a = 1$ $\checkmark b = -2$ $\checkmark c = -4$ $\checkmark T_n = n^2 - 2n - 4 \quad (4)$
2.1.2	$T_n = n^2 - 2n - 4$ $T_{35} = (35)^2 - 2(35) - 4$ $= 1\,151$	$\checkmark \text{answer / antwoord} \quad (1)$
2.1.3	$T_n = 1 + (n-1)(2)$ $T_n = 2n - 1$ $T_{n+1} = 2(n+1) - 1$ $T_{n+1} = 2n + 1$ $T_n \times T_{n+1} = 1155$ $(2n-1)(2n+1) = 1155$ $4n^2 - 1 = 1155$ $4n^2 = 1156$ $n^2 = 289$ $n = \pm 17$ $\therefore n = 17, n \in \mathbb{N}$ $\therefore T_{17} \text{ and/en } T_{18} \text{ will give a product of 1155}$ <p style="text-align: center;"><i>sal 'n produk van 1 155 gee</i></p> <p style="text-align: center;">OR/OF</p> $T_n = 2n - 1$ $T_{n-1} = 2n - 3$ $(2n-1)(2n-3) = 1155$ $4n^2 - 8n - 1152 = 0$ $n^2 - 2n - 288 = 0$ $(n-18)(n+16) = 0$ $n = 18 \text{ or/of } n \neq -16, n \in \mathbb{N}$ $n = 18 \text{ and/en } n-1 = 17$ $\therefore T_{17} \text{ and/en } T_{18} \text{ will give a product of 1155}$ <p style="text-align: center;"><i>sal 'n produk van 1 155 gee</i></p>	$\checkmark T_n = 2n - 1$ $\checkmark (2n-1)(2n+1) = 1155$ $\checkmark \text{standard form / standaardvorm}$ $\checkmark n = 17 \text{ and/en } n+1 = 18$ <p style="text-align: right;">(4)</p> <p style="text-align: center;">OR/OF</p> $\checkmark T_n = 2n - 1$ $\checkmark (2n-1)(2n-3) = 1155$ $\checkmark \text{standard form / standaardvorm}$ $\checkmark n = 18 \text{ and/en } n-1 = 17$ <p style="text-align: right;">(4)</p>



2.2	$T_p = 430$ $d = 5$ $T_p = a + (p-1)d$ $430 = 60 + (p-1)(5)$ $430 = 60 + 5p - 5$ $5p = 375$ $p = 75$ $\therefore T_{75} = 430$	✓ equating / <i>gelyk stel</i> ✓ simplification / <i>vereenvoudiging</i> ✓ answer / <i>antwoord</i>	(3)
2.3	$a + (a + d) + (a + 2d) = 30$ $3a + 3d = 30$ $a + d = 10$ $\therefore a = 10 - d \dots \dots \dots (1)$ $a(a + d)(a + 2d) = 510 \dots \dots (2)$ Subst./Vervang (1) into/in (2) $(10 - d)(10 - d + d)(10 - d + 2d) = 510$ $10(10 - d)(10 + d) = 510$ $(10 - d)(10 + d) = 51$ $100 - d^2 - 51 = 0$ $49 - d^2 = 0$ $d^2 = 49$ $d = \pm 7$ $\therefore d = 7$ $\therefore a = 10 - 7 = 3$	✓ eq(1) and / <i>en eq (2)</i> ✓ substitution / <i>vervang</i> ✓ simplification / <i>vereenvoudiging</i> ✓ value of d / <i>waarde van d</i> ✓ value of a / <i>waarde van a</i>	(5)
			[17]

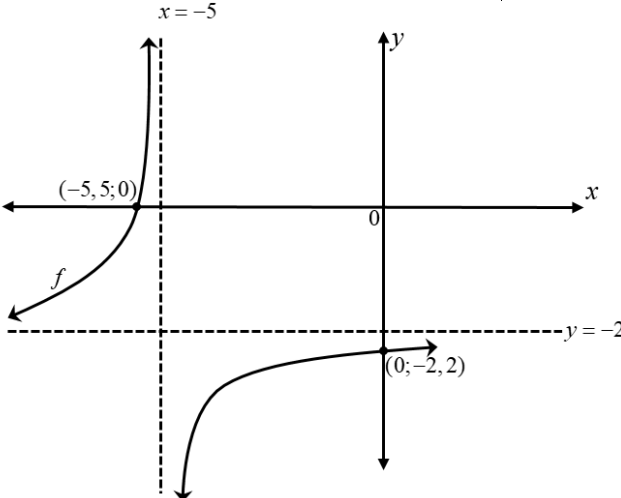


QUESTION 3/VRAAG 3

3.1.1	$\frac{2}{3} ; \frac{2}{9}$	✓ answer / <i>antwoord</i> (1)
3.1.2	$S_{\infty} = \frac{a}{1-r}$ $= \frac{2}{1-\frac{1}{3}}$ $= 3$	✓ substitution / <i>vervanging</i> ✓ answer / <i>antwoord</i> (2)
3.2	$\sum_{k=3}^m 8(2)^{k-1} = 131\,040$ $32 + 64 + 128 + \dots$ $r = 2$ $s_n = \frac{a(1-r^n)}{1-r}$ $131\,040 = \frac{32(2^n - 1)}{2 - 1}$ $\therefore 2^n - 1 = 4\,095$ $2^n = 4\,096$ $2^n = 2^{12} \quad \text{OR/OF } n = \log_2(4\,096)$ $\Rightarrow n = 12$ $n = m - 3 + 1$ $12 = m - 2$ $m = 14$	✓ value of a / <i>waarde van a</i> ✓ substitution / <i>vervanging</i> ✓ simplification / <i>vereenvoudiging</i> ✓ value of n / <i>waarde van n</i> ✓ answer / <i>antwoord</i> (5)
		[8]

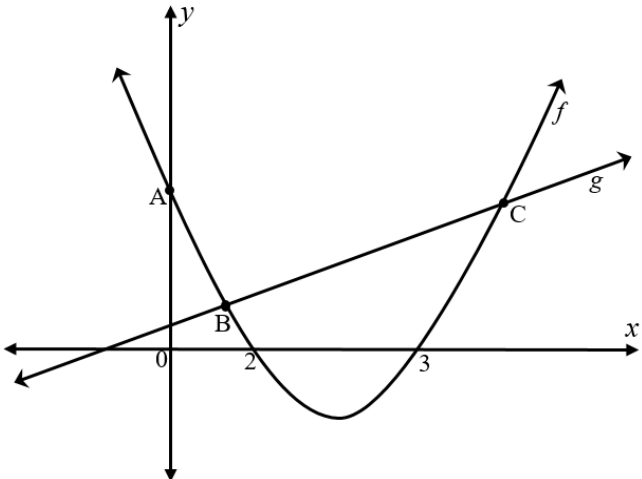


QUESTION 4/VRAAG 4

4.1	$x = -5$ $y = -2$	✓ equation of V.A / <i>vergelyking van V.A</i> ✓ equation of H.A / <i>vergelyking van H.A</i> (2)
4.2	$0 = \frac{-1}{x+5} - 2$ $2 = \frac{-1}{x+5}$ $2(x+5) = -1$ $2x = -11$ $x = \frac{-11}{2} = -5,5$ $\therefore \left(-\frac{11}{2}; 0\right)$	✓ $y = 0$ ✓ answer / <i>antwoord</i> (2)
4.3	$y = \frac{-1}{x+5} - 2$ $y = \frac{-1}{0+5} - 2$ $y = -\frac{11}{5} = -2,2$ $\therefore \left(0; -\frac{11}{5}\right)$	✓ $x = 0$ ✓ answer / <i>antwoord</i> (2)
4.4		✓ both asymptotes / <i>beide asimptote</i> ✓ x-intercept / <i>x-afsnit</i> and/of y-intercept / <i>y-afsnit</i> ✓ shape / <i>vorm</i> (3)
4.5	$y = -(x+5) - 2$ $y = -x - 7$ <p style="text-align: center;">OR/OF</p> $y = -x + c$ Subst./Vervang $(-5; -2)$ $-2 = -(-5) + c$ $-7 = c$ $\therefore y = -x - 7$	✓ method / <i>metode</i> ✓ answer / <i>antwoord</i> Note: <i>Neem kennis</i> ✓✓ Answer only – Full marks <i>Slegs antwoord - Volpunte</i> (2)
		[11]



QUESTION 5/VRAAG 5

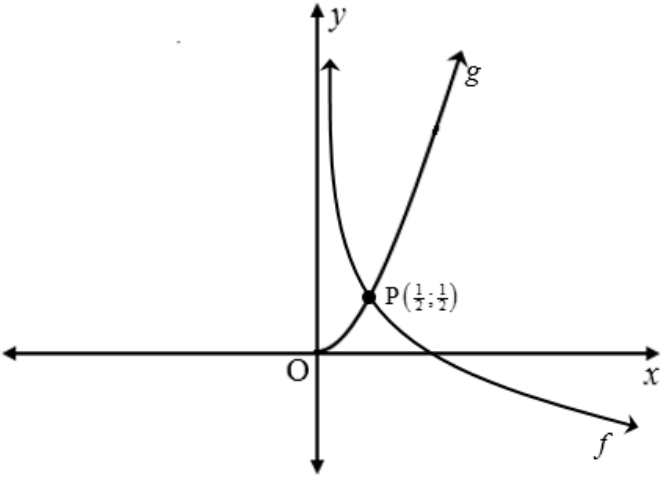
		
5.1	$x = \frac{-b}{2a}$ $x = \frac{-(-5)}{2(1)}$ $x = \frac{5}{2} = 2,5$ <p style="text-align: center;">OR / OF</p> $f(x) = x^2 - 5x + 6$ $f'(x) = 2x - 5$ $2x - 5 = 0$ $2x = 5$ $\therefore x = \frac{5}{2} = 2,5$	<p>✓ substitution / <i>vervanging</i></p> <p>✓ equation / <i>vergelyking</i></p> <p style="text-align: center;">OR / OF</p> <p>✓ $f'(x) = 0$</p> <p>✓ equation / <i>vergelyking</i></p> <p style="text-align: right;">(2)</p>
5.2	$f(x) = g(x)$ $x^2 - 5x + 6 = x + 1$ $x^2 - 6x + 5 = 0$ $(x - 5)(x - 1) = 0$ $x = 5 \text{ or/ of } x = 1$ $g(5) = 5 + 1 = 6$ $g(1) = 1 + 1 = 2$ <p style="text-align: center;">B(1;2) and/en C(5;6)</p>	<p>✓ $f(x) = g(x)$</p> <p>✓ standard form / <i>standaardvorm</i></p> <p>✓ x-values / <i>x-waardes</i></p> <p>✓ y-values / <i>y-waardes</i></p> <p style="text-align: right;">(4)</p>



5.3	$h = x + 1 - (x^2 - 5x + 6)$ $h(x) = x + 1 - x^2 + 5x - 6$ $= -x^2 + 6x - 5$ $x = \frac{-6}{2(-1)}$ $= 3$ <p style="text-align: center;">OR/OF</p> $h'(x) = -2x + 6$ $0 = -2x + 6$ $\therefore x = 3$ $h(3) = -(3)^2 + 6(3) - 5 = 4$ <p>\therefore Max. height is 4 units. <i>Maks hoogte is 4 eenhede.</i></p>	<p>✓ $g(x) - f(x)$</p> <p>✓ $h(x)$</p> <p>✓ $x = 3$</p> <p>✓ Max. height / <i>Maks. hoogte</i></p> <p style="text-align: right;">(4)</p>
5.4	<p>Min. of $f : f\left(\frac{5}{2}\right) = \left(\frac{5}{2}\right)^2 - 5\left(\frac{5}{2}\right) + 6 = -\frac{1}{4}$</p> <p>Min. of/van $t(x) = -\frac{1}{4} - 2 = -\frac{9}{4}$</p> <p>$\therefore y \in \left[-\frac{9}{4}; \infty\right); y \in \mathbf{R}$</p> <p style="text-align: center;">OR / OF</p> <p>$\therefore y \geq -\frac{9}{4}; y \in \mathbf{R}$</p>	<p>✓✓ Range of $t(x)$ / <i>Terrein van $t(x)$</i></p> <p style="text-align: right;">(2)</p>
5.5	$2 < x < 3$	<p>✓✓ $2 < x < 3$ (accuracy / <i>akkuraatheid</i>)</p> <p style="text-align: right;">(2)</p>
[14]		



QUESTION 6/VRAAG 6

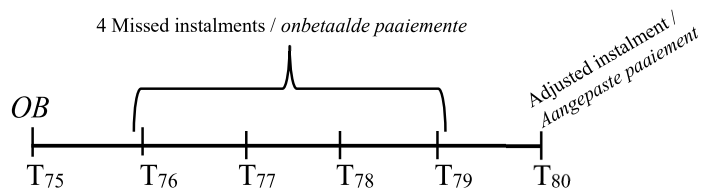
		
<p>6.1</p>	$f(x) = -\log_c x$ $\frac{1}{2} = -\log_c \left(\frac{1}{2}\right)$ $\sqrt{c} = 2$ $c = 4$ $g(x) = d x^2$ $\frac{1}{2} = d \left(\frac{1}{2}\right)^2$ $d = 2$	<p>✓ subst. of / <i>vervanging van</i> $\left(\frac{1}{2}; \frac{1}{2}\right)$</p> <p>✓ value of c / <i>waarde van c</i></p> <p>✓ value of d / <i>waarde van d</i></p> <p style="text-align: right;">(3)</p>
<p>6.2.1</p>	$g : y = 2x^2$ $g^{-1} : x = 2y^2$ $g^{-1} : y^2 = \frac{1}{2}x$ $g^{-1} : y = \pm \sqrt{\frac{1}{2}x}$ $\therefore y = \sqrt{\frac{1}{2}x}$	<p>✓ swopping x and y <i>omruil van x en y</i></p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(2)</p>
<p>6.2.2</p>	$f(x) = -\log_4 x$ $h(x) = \log_4 x$ $h^{-1}(x) : y = 4^x$	<p>✓ $h(x) = \log_4 x$</p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(2)</p>
<p>6.2.3</p>	$x \in \square$	<p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(1)</p>
		<p>[8]</p>

QUESTION 7/VRAAG 7

7.1	$A = P(1-i)^n$ $= 180000(1-0,13)^6$ $= R78052,72$	✓ $n = 6$ ✓ substitution / <i>vervangings</i> ✓ answer / <i>antwoord</i> (3)
7.2	$F_v = \frac{x[(1+i)^n - 1]}{i}$ $= \frac{900 \left[\left(1 + \frac{0,08}{12}\right)^{120} - 1 \right]}{\frac{0,08}{12}} + \frac{1300 \left[\left(1 + \frac{0,08}{12}\right)^{60} - 1 \right]}{\frac{0,08}{12}}$ $= 164651,4317 + 95519,91312$ $= R260171,34$	✓ $n = 120$ and/en $i = \frac{8\%}{12}$ or / of $\frac{8}{1200}$ ✓ $n = 60$ in F ✓ substitution into F_v / <i>vervangings in F_v</i> ✓ answer / <i>antwoord</i> (5)
7.3.1	$OB = P(1+i)^n - \frac{x[(1+i)^n - 1]}{i}$ $OB = 850000 \left(1 + \frac{0,13}{12}\right)^{75} - \frac{9958,39 \left[\left(1 + \frac{0,13}{12}\right)^{75} - 1 \right]}{\frac{0,13}{12}}$ $= R763\,890,54$ <p style="text-align: center;">OR/OF</p> $OB = \frac{x[1 - (1+i)^{-n}]}{i}$ $OB = \frac{9958,39 \left[1 - \left(1 + \frac{0,13}{12}\right)^{-165} \right]}{\frac{0,13}{12}}$ $= R763\,889,86$	✓ correct substitution into A formula / <i>korrekte vervangings in A formule</i> ✓ correct substitution into F_v formula / <i>korrekte vervangings in F_v formule</i> ✓ answer / <i>antwoord</i> <p style="text-align: center;">OR/OF</p> ✓ $n = 165$ ✓ substitution into the correct formula / <i>vervangings in korrekte formule</i> ✓ answer / <i>antwoord</i> (3)



7.3.2

**For Outstanding Balance / Vir Uitstaande Balans**

$$= R 763 890,54 :$$

$$A = P(1+i)^n$$

$$A = 763890,54 \left(1 + \frac{0,13}{12}\right)^4$$

$$A = R 797 534,2651$$

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

$$797534,2651 = \frac{x \left[1 - \left(1 + \frac{0,13}{12}\right)^{-161}\right]}{\frac{0,13}{12}}$$

$$x = \frac{797534,2651 \times \frac{0,13}{12}}{\left[1 - \left(1 + \frac{0,13}{12}\right)^{-161}\right]}$$

$$x = R 10 490,96$$

\therefore Adjusted instalment is R10 490,96

OR / OF**For Outstanding Balance / Vir Uitstaande Balans**

$$= R 763 889,86 :$$

$$A = P(1+i)^n$$

$$A = 763889,86 \left(1 + \frac{0,13}{12}\right)^4$$

$$= R 797 533,5551$$

$$797533,56 = \frac{x \left[1 - \left(1 + \frac{0,13}{12}\right)^{-161}\right]}{\frac{0,13}{12}}$$

$$x = \frac{797533,56 \times \frac{0,13}{12}}{\left[1 - \left(1 + \frac{0,13}{12}\right)^{-161}\right]}$$

$$x = R 10 490,95$$

✓ substitution into the correct **A** formula / vervanging in korrekte **A** formule

✓ accumulated amount / opgeboude bedrag

✓ substitution into the correct formula / vervanging in korrekte formule

✓ $n = -161$

✓ answer / antwoord

(5)

OR / OF

✓ substitution into the correct **A** formula / vervanging in korrekte **A** formule

✓ accumulated amount/opgeboude bedrag

✓ substitution into the correct formula / vervanging in korrekte formule

✓ $n = -161$

✓ answer / antwoord

(5)

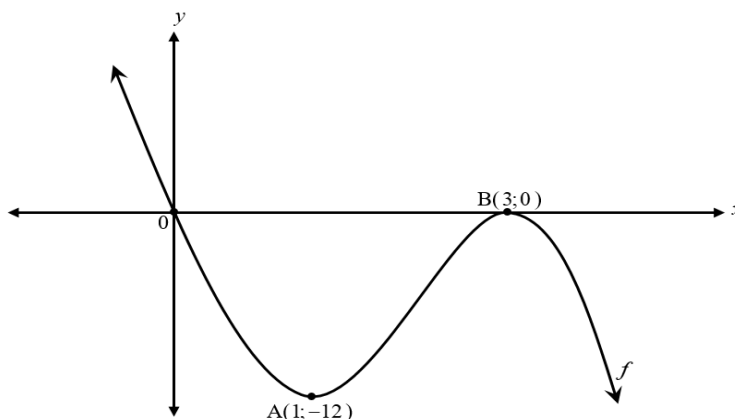
[16]

QUESTION 8/VRAAG 8

8.1	$f(x) = x^2 - 3$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h)^2 - 3 - (x^2 - 3)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh - h^2 - 3 - (x^2 - 3)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh - h^2 - 3 - x^2 + 3}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh - h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x - h)}{h}$ $= \lim_{h \rightarrow 0} 2x - h$ $f'(x) = 2x$	<p>✓ substitution into the formula <i>vervang in die formule</i></p> <p>✓ simplification / <i>vereenvoudiging</i></p> <p>✓ factorisation / <i>faktorisering</i></p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(4)</p>
8.2.1	$\frac{dy}{dx} = -6x + 7$	<p>✓ $-6x$</p> <p>✓ 7</p> <p style="text-align: right;">(2)</p>
8.2.2	$D_x \left[\frac{x^3 - 5x^2}{x^3} - \sqrt{x} \right]$ $= D_x \left[\frac{x^3}{x^3} - \frac{5x^2}{x^3} - x^{\frac{1}{2}} \right]$ $= D_x \left[1 - 5x^{-1} - x^{\frac{1}{2}} \right]$ $= 0 + 5x^{-2} - \frac{1}{2}x^{-\frac{1}{2}}$ $= \frac{5}{x^2} - \frac{1}{2\sqrt{x}}$	<p>✓ $x^{\frac{1}{2}}$</p> <p>✓ $1 - 5x^{-1}$</p> <p>✓ 0 & $5x^{-2}$ (zero does not have to be seen) (<i>hoef nie nul te sien nie</i>)</p> <p>✓ $-\frac{1}{2}x^{-\frac{1}{2}}$</p> <p style="text-align: right;">(4)</p>




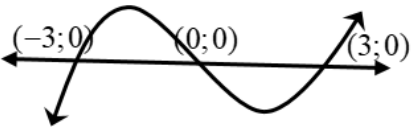
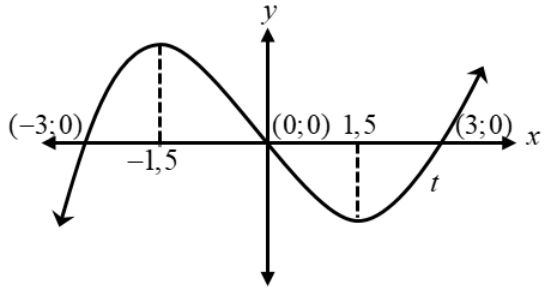
QUESTION 9/VRAAG 9



<p>9.1.1</p>	$f(x) = -3x^3 + mx^2 + nx$ $f'(x) = -9x^2 + 2mx + n$ $0 = -9(1)^2 + 2m(1) + n$ $0 = -9 + 2m + n$ $n = 9 - 2m \dots \dots \dots (1)$ $f'(x) = -9x^2 + 2mx + n$ $0 = -9(3)^2 + 2m(3) + n$ $81 = 6m + n$ $81 - 6m = n \dots \dots \dots (2)$ $81 - 6m = 9 - 2m$ $81 - 9 = 6m - 2m$ $72 = 4m$ $\therefore m = 18$ $n = 9 - 2(18)$ $\therefore n = -27$ $\therefore f(x) = -3x^3 + 18x^2 - 27x$	<p>✓ equation 1 / vergelyking 1</p> <p>✓ equation 2 / vergelyking 2</p> <p>✓ equating (method) / gelykstel (metode)</p> <p>✓ solve for m / oplos vir m</p> <p>✓ substituting value of m / vervanging van waarde van m</p> <p>(5)</p>
<p>9.1.2</p>	<p>$f(a)$ – corresponding y-value when $x = a$, while $f'(a)$ – gradient/derivative/rate of change of f when $x = a$</p> <p>$f(a)$ – is die ooreenstemmende y-waarde wanneer $x = a$, terwyl</p> <p>$f'(a)$ – stel voor die gradiënt/afgeleide/veranderingskoers van f wanneer $x = a$</p>	<p>explanation of/verduideliking van</p> <p>✓ $f(a)$</p> <p>✓ $f'(a)$</p> <p>(2)</p>

9.1.3	<p>Point of inflection/<i>Buigpunt/infleksiepunt</i></p> $x = \frac{x_A + x_B}{2}$ $x = \frac{1+3}{2} = 2$ <p style="text-align: center;">OR / OF</p> $f'(x) = -9x^2 + 36x - 27$ $f''(x) = -18x + 36$ $f''(x) = 0$ $-18x + 36 = 0$ $18x = 36$ $\therefore x = 2$ $\therefore f(2) = -3(2)^3 + 18(2)^2 - 27(2) = -6$ $\therefore (2; -6)$ <p>Gradient of / <i>Gradiënt van</i> $g(x)$: $f'(2) = -9(2)^2 + 36(2) - 27 = 9$</p> <p>Gradient of / <i>Gradiënt van</i> $h(x)$: $m_g \times m_h = -1$</p> $\therefore m_h = -\frac{1}{9}$ $\therefore h(x) = -\frac{1}{9}x$	<p>✓ method / <i>metode</i></p> <p>✓ $x = 2$</p> <p>✓ $f(2)$</p> <p>✓ $f'(2)$</p> <p>✓ $h(x) = -\frac{1}{9}x$</p> <p style="text-align: right;">(5)</p>
9.1.4	<p>$f''(x) > 0$ when $f(x)$ is concave up x - value for point of inflection is 2 $\therefore x < 2$</p> <p>$f''(x) > 0$ wanneer $f(x)$ konkaaf op is x-waarde vir buigpunt/infleksiepunt is 2 $\therefore x < 2$</p>	<p>✓✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(2)</p>



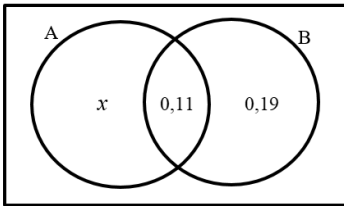
<p>9.2</p>	<ul style="list-style-type: none"> • $a = 2 > 0$  <ul style="list-style-type: none"> • $(-3; 0)$ $(0; 0)$ $(3; 0)$ (x-intercepts) <i>(x-afsnitte)</i>  <ul style="list-style-type: none"> • x-values of stationary points: <i>x-waardes van stasionêre punte</i> 	<ul style="list-style-type: none"> ✓ shape / <i>vorm</i> ✓ intercepts on the graph/ <i>afsnitte op die grafiek</i> ✓ x- values for stationary points <i>x-waardes vir stasionêre punte</i> <p style="text-align: right;">(3)</p>
		[17]

QUESTION 10/VRAAG 10

10.1	$S(t) = -3t^2 + 30t$ $S(3) = -3(3)^2 + 30(3)$ $= 63$ scripts / skrifte	✓ substitution / <i>vervanging</i> ✓ answer / <i>antwoord</i> (2)																				
10.2	$S'(t) = -6t + 30$ For maximum number of scripts, $S'(t) = 0$ / <i>Vir maksimum aantal skrifte, $S'(t) = 0$</i> $-6t + 30 = 0$ $6t = 30$ $t = 5$ (Day 5 / <i>Dag 5</i>)	✓ $S'(t)$ ✓ $S'(t) = 0$ ✓ $t = 5$ (3)																				
10.3	No / <i>Nee</i> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>D1</th><th>D2</th><th>D3</th><th>D4</th><th>D5</th><th>D6</th><th>D7</th><th>D8</th><th>D9</th><th>D10</th></tr> </thead> <tbody> <tr> <td>27</td><td>48</td><td>63</td><td>72</td><td>75</td><td>72</td><td>63</td><td>48</td><td>27</td><td>0</td></tr> </tbody> </table> Sum/Som = 495 scripts/skrifte	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	27	48	63	72	75	72	63	48	27	0	✓ No / <i>Nee</i> ✓ explanation / <i>verduideliking</i> (2)
D1	D2	D3	D4	D5	D6	D7	D8	D9	D10													
27	48	63	72	75	72	63	48	27	0													
		[7]																				



QUESTION 11/VRAAG 11

		
11.1.1	$x = 1 - (0,11 + 0,19 + 0,41)$ $x = 0,29$ $\therefore P(A) = 0,29 + 0,11 = 0,4$	✓ value of x / waarde van x ✓ answer / antwoord (2)
11.1.2	$P(A \text{ or/of not/nie } B) = 0,29 + 0,11 + 0,41 = 0,81$	✓✓ answer / antwoord (2)
11.2.1	$a = 4$	✓ answer / antwoord (1)
11.2.2	$\frac{14}{30} = \frac{7}{15}$	✓ answer / antwoord (1)
11.2.3	$P(\text{winning a game}) = \frac{7}{30}$ $P(\text{playing at home}) = \frac{15}{30} = \frac{1}{2}$ $P(\text{winning a game}) \times P(\text{playing at home})$ $= \frac{7}{30} \times \frac{1}{2}$ $= \frac{7}{60} = 0,12$ $P(\text{winning a game and playing at home}) = \frac{3}{30} = 0,10$ \therefore events are not independent, since $P(\text{winning a game and playing at home}) \neq$ $P(\text{winning a game}) \times P(\text{playing at home})$	✓ $P(\text{winning a game}) \times P(\text{playing at home})$ ✓ $P(\text{winning a game and playing at home})$ ✓ conclusion
	$P(\text{wen 'n wedstryd}) = \frac{7}{30}$ $P(\text{speel tuiswedstryd}) = \frac{15}{30} = \frac{1}{2}$ $P(\text{wen wedstryd}) \times P(\text{speel tuiswedstryd})$ $= \frac{7}{30} \times \frac{1}{2}$ $= \frac{7}{60} = 0,12$ $P(\text{wen wedstryd en tuis wedstryd}) = \frac{3}{30} = 0,10$ \therefore gebeurtenisse is nie onafhanklik nie, omdat $P(\text{wen wedstryd en speel tuiswedstryd}) \neq$ $P(\text{wen wedstryd}) \times P(\text{speel tuiswedstryd})$	✓ $P(\text{wen wedstryd}) \times P(\text{speel tuiswedstryd})$ ✓ $P(\text{wen wedstryd en speel tuiswedstryd})$ ✓ Gevolgtrekking (3)
		[9]



QUESTION 12/VRAAG 12

12.1	$21 \times 20 \times 10 \times 9 \times 19 \times 18$ $= 12\,927\,600$ codes/kodes	✓✓ answer / antwoord (2)																									
12.2	<p>DIGITS / SYFERS:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><u>4</u></td> <td style="text-align: center;"><u>2</u></td> <td style="text-align: center;">or/of</td> <td style="text-align: center;"><u>3</u></td> <td style="text-align: center;"><u>1</u></td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">1</td> <td></td> <td style="text-align: center;">4</td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">2</td> <td></td> <td style="text-align: center;">6</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">8</td> <td style="text-align: center;">4</td> <td></td> <td style="text-align: center;">8</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">9</td> <td></td> <td></td> <td style="text-align: center;">9</td> <td></td> </tr> </table> <p>LETTERS BEFORE G / LETTERS VOOR G:</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> A; B; C; D; E and/en F </div> <p>Out of 6 letters remove A and E (vowels) = 4 letters <i>Van die 6 letters verwyder A en E (klinkers) = 4 letters</i></p> <p>COMBINED / KOMBINASIE :</p> $n(A) = (4 \times 20 \times 4 \times 2 \times 19 \times 18) + (4 \times 20 \times 3 \times 1 \times 19 \times 18)$ $= 218\,880 + 82\,080$ $= 300\,960$ $P(A) = \frac{n(A)}{n(S)}$ $= \frac{300960}{12927600}$ $= \frac{22}{945}$ $\approx 0,02$	<u>4</u>	<u>2</u>	or/of	<u>3</u>	<u>1</u>	4	1		4	1	6	2		6	2	8	4		8	4	9			9		✓ 4 in $n(A)$ ✓ 4×2 and/en 3×1 in $n(A)$ ✓ dividing by / deel deur 12927600 ✓ answer / antwoord (4) [6]
<u>4</u>	<u>2</u>	or/of	<u>3</u>	<u>1</u>																							
4	1		4	1																							
6	2		6	2																							
8	4		8	4																							
9			9																								

TOTAL/TOTAAL: 150