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**NATIONAL
SENIOR CERTIFICATE/
*NASIONALE SENIORSERTIFIKAAT***

GRADE/*GRAAD* 12

SEPTEMBER 2023

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

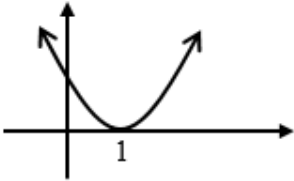
MARKS/*PUNTE*: 150

This marking guideline consists of 17 pages./
Hierdie nasienriglyn bestaan uit 17 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	$x^2 + x - 30 = 0$ $(x - 5)(x + 6) = 0$ $\therefore x = 5 \quad \text{or / of} \quad x = -6$ OR/OF $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-1 \pm \sqrt{(1)^2 - 4(1)(-30)}}{2(1)}$ $= \frac{-1 \pm \sqrt{121}}{2}$ $= 5 \text{ or / of } -6$	$\checkmark$ factors / faktore $\checkmark x = 5 \quad \checkmark x = -6$ OR/OF $\checkmark$ substitution / vervanging $\checkmark x = 5 \quad \checkmark x = -6$
1.1.2	$x(2x - 6) = -3$ $2x^2 - 6x + 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-6) \pm \sqrt{(-6)^2 - 4(2)(3)}}{2(2)}$ $= \frac{6 \pm \sqrt{12}}{4} \quad \text{OR / OF} \quad \frac{3 \pm \sqrt{3}}{2}$ $= 2,37 \text{ or / of } 0,63$	$\checkmark$ standard form / standaardvorm $\checkmark$ substitution / vervanging $\checkmark x = 2,37 \text{ or / of } 0,63$
1.1.3	$x^2 - 2x + 1 > 0$ $(x - 1)(x - 1) > 0$ $c/v: x = 1$ $\therefore x \in \mathbb{R}, x \neq 1$ 	$\checkmark$ factors / faktore $\checkmark \checkmark x \in \mathbb{R}, x \neq 1$ (Accuracy/Akkuraatheid)

1.1.4	$2x - 1 = \sqrt{4 - 5x}$ $(2x - 1)^2 = (\sqrt{4 - 5x})^2$ $(2x - 1)^2 = 4 - 5x$ $4x^2 - 4x + 1 + 5x - 4 = 0$ $4x^2 + x - 3 = 0$ $(4x - 3)(x + 1) = 0$ or / of $x = \frac{-1 \pm \sqrt{(1)^2 - 4(4)(-3)}}{2(4)}$ $\therefore x = \frac{3}{4}$ or / of $x \neq -1$	✓ squaring both sides <i>kwadreer beide kante</i> ✓ standard form / <i>standaardvorm</i> ✓ factors / <i>formula</i> <i>faktore / formule</i> ✓ answers with selection <i>antwoorde met seleksie/keuse</i> (4)
1.2	$y - 2x = -1$(1) $y^2 + 2xy = 3x^2$(2) $y = 2x - 1$(3) Substitute / <i>Vervang</i> (3) into/in (2): $(2x - 1)^2 + 2x(2x - 1) - 3x^2 = 0$ $4x^2 - 4x + 1 + 4x^2 - 2x - 3x^2 = 0$ $5x^2 - 6x + 1 = 0$ $(5x - 1)(x - 1) = 0$ $\therefore x = \frac{1}{5}$ or / of $x = 1$ $\therefore y = -\frac{3}{5}$ or / of $y = 1$ OR/OF $y - 2x = -1$(1) $y^2 + 2xy = 3x^2$(2) $x = \frac{y+1}{2}$(3) Substitute / <i>Vervang</i> (3) into/in (2) $y^2 + 2y\left(\frac{y+1}{2}\right) - 3\left(\frac{y+1}{2}\right)^2 = 0$ $y^2 + y^2 + y - 3\left(\frac{y^2 + 2y + 1}{4}\right) = 0$ $8y^2 + 4y - 3y^2 - 6y - 3 = 0$ $5y^2 - 2y - 3 = 0$ $(5y + 3)(y - 1) = 0$ $\therefore y = -\frac{3}{5}$ or / of $y = 1$ $\therefore x = \frac{1}{5}$ or / of $x = 1$	✓ $y = 2x - 1$ ✓ substitution / <i>vervanging</i> ✓ standard form / <i>standaardvorm</i> ✓ factors / <i>faktore</i> ✓ x-values / <i>x-waardes</i> ✓ y-values / <i>y-waardes</i> (6) OR/OF ✓ $x = \frac{y+1}{2}$ ✓ substitution / <i>vervanging</i> ✓ standard form / <i>standaardvorm</i> ✓ factors / <i>faktore</i> ✓ y-values / <i>y-waardes</i> ✓ x-values / <i>x-waardes</i> (6)

1.3	$2x^2 - px + 1 = 0$ For real unequal roots: <i>Vir ongelykereële wortels:</i> $b^2 - 4ac > 0$ $(-p)^2 - 4(2)(1) > 0$ $p^2 - 8 > 0$ $\therefore p < -\sqrt{8} \text{ or / of } p > \sqrt{8}$	$\checkmark b^2 - 4ac > 0$ $\checkmark$ substitution / <i>vervanging</i> $\checkmark$ standard form / <i>standaardvorm</i> $\checkmark \checkmark$ answer / <i>antwoord</i> (5)
		[25]

QUESTION 2/VRAAG 2

2.1.1	$a + 9d = 21$ $a + 16d = 49$ $\therefore -7d = -28$ $d = 4$	$\checkmark a + 9d = 21$ $\checkmark a + 16d = 49$ $\checkmark$ value of d / <i>waarde van d</i> (3)
2.1.2	$a + 9(4) = 21$ $a = -15$ $T_{18} = T_{17} + 4$ $= 49 + 4$ $= 53$ $\therefore T_1 + T_{18}$ $= -15 + 53$ $= 38$	$\checkmark a = -15$ $\checkmark T_{18} = 53$ $\checkmark$ answer / <i>antwoord</i> (3)
2.2.1	$T_1 = 4(1) - 19 = -15$ $T_2 = 4(2) - 19 = -11$ $T_3 = 4(3) - 19 = -7$	$\checkmark$ all three terms / <i>al drie terme</i> (1)
2.2.2	$S_n = \frac{n}{2}[2a + (n-1)d]$ $S_m = \frac{m}{2}[2(-15) + 4(m-1)]$ $1189 = \frac{m}{2}(-30 + 4m - 4)$ $0 = 2m^2 - 17m - 1189$ $(2m + 41)(m - 29) = 0$ or / of $m = \frac{-(-17) \pm \sqrt{(-17)^2 - 4(2)(-1189)}}{2(2)}$ $\therefore m = 29$ or / of $m \neq -\frac{41}{2}$	$\checkmark$ substitution / <i>vervanging</i> and/en = 1 189 $\checkmark$ standard form / <i>standaardvorm</i> $\checkmark$ method / <i>metode</i> $\checkmark$ answer / <i>antwoord</i> (4)

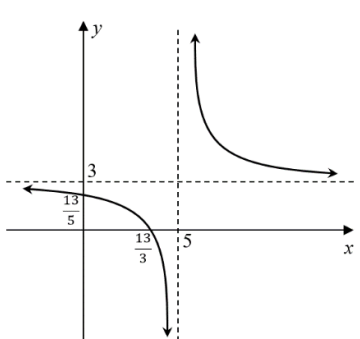
2.3.1	$ \begin{array}{ccccccc} -78 & & -76 & & -72 & & -66 \\ & \swarrow & \searrow & & \swarrow & \searrow & \\ & 2 & & 4 & & 6 & \\ & & \swarrow & \searrow & & \swarrow & \searrow \\ & & 2 & & 2 & & \end{array} $ $-58 ; -48$	✓ both answers / beide antwoorde (1)
2.3.2	$T_n = an^2 + bn + c$ $2a = 2 \quad 3a + b = 2 \quad a + b + c = -78$ $a = 1 \quad 3(1) + b = 2 \quad 1 - 1 + c = -78$ $b = -1 \quad c = -78$ $\therefore T_n = n^2 - n - 78$	✓ $a = 1$ ✓ $b = -1$ ✓ $c = -78$ ✓ answer / antwoord (4)
2.3.3	$k > 78$ (Accept/Aanvaar $k \geq 78$)	✓✓ answer / antwoord (2)
		[18]

QUESTION 3/VRAAG 3

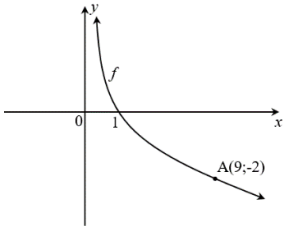
3.1	$a = 81 \dots\dots\dots(1)$ $a + ar^2 = 117 \dots\dots\dots(2)$ $a(1+r^2) = 117$ $81(1+r^2) = 117$ $1+r^2 = \frac{117}{81}$ $r^2 = \frac{36}{81}$ $r = \pm \frac{2}{3}$	✓ ✓ $a + ar^2 = 117$ ✓ substitution / vervanging ✓ simplification / vereenvoudiging ✓ answer / antwoord (4)
3.2.1	$r = \frac{9^x}{3^x}$ $= \frac{3^{2x}}{3^x}$ $= 3^x$	✓ answer / antwoord (3)

3.2.2	$S_{\infty} = \frac{a}{1-r}$ $\frac{1}{2} = \frac{3^x}{1-3^x}$ $2 \cdot 3^x = 1 - 3^x$ $3 \cdot 3^x = 1$ $3^x = \frac{1}{3}$ $3^x = 3^{-1}$ $\therefore x = -1$	✓ $a = 3^x$ & $r = 3^x$ ✓ substitution / <i>vervang</i> ✓ answer / <i>antwoord</i>
		(3)
		[8]

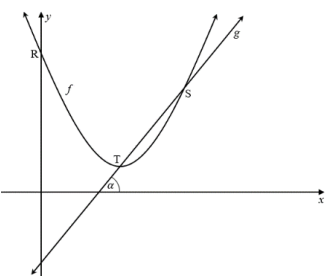
QUESTION 4/VRAAG 4

4.1	$f(x) = \frac{2}{x-5} + 3$ $x = 5$ $y = 3$	$\checkmark x = 5$ $\checkmark y = 3$ (2)
4.2	$y \in \mathbb{R}$ but/maar $y \neq 3$	$\checkmark y \neq 3$ (1)
4.3	$f(x) = \frac{2}{x-5} + 3$ x – intercept / x – afsnit: $\frac{2}{x-5} + 3 = 0$ $\frac{2}{x-5} = -3$ $-3x + 15 = 2$ $x = \frac{13}{3}$ y – intercept / y – afsnit: $y = \frac{2}{0-5} + 3$ $= \frac{13}{5}$ $\therefore$ Intercepts/Afsnitte: $(\frac{13}{3}; 0)$ and / en $(0; \frac{13}{5})$	$\checkmark$ substitution / vervanging $\checkmark x = \frac{13}{3}$ $\checkmark y = \frac{13}{5}$ (3)
4.4		$\checkmark$ asymptotes / asimptote $\checkmark$ y -intercept / y -afsnit $\checkmark$ x -intercept / x -afsnit $\checkmark$ shape and quadrants vorm en kwadrante (4)
4.5	f is reflected in the x -axis and shifted 2 units downwards. f is gereflekteer in die x -as en 2 eenhede afwaarts geskuif. OR/OF f is shifted 2 units upwards and then reflected in the x -axis. f is 2 eenhede opwaarts geskuif en daarna gereflekteer in die x -as.	$\checkmark f(x)$ reflected / gereflekteer $\checkmark$ in the x -axis / in die x -as $\checkmark$ shift 2 units / skuif 2 eenhede downwards/upwards afwaarts/opwaarts (3)
	–	[13]

QUESTION 5/VRAAG 5

		
5.1	$f(x) = \log_b x$ $x = b^y$ $9 = b^{-2}$ $b^2 = \frac{1}{9}$ $b = \frac{1}{3}$	✓ substitution / <i>vervanging</i> ✓ answer / <i>antwoord</i> (2)
5.2	$y = \log_{\frac{1}{3}} x$ $x = \log_{\frac{1}{3}} y$ $y = \left(\frac{1}{3}\right)^x$ OR/OF $y = 3^{-x}$	✓ swopping x and y <i>omruil van x en y</i> ✓ answer / <i>antwoord</i> (2)
5.3	$0 < x \leq 1$	✓ ✓ answer (Accuracy) <i>antwoord (Akkuraatheid)</i> (2)
5.4	$y = 0$	✓ ✓ answer (Accuracy) <i>antwoord (Akkuraatheid)</i> (2)
		[8]

QUESTION 6/VRAAG 6

		
6.1	$f(x) = x^2 - 6x + 11$ $= x^2 - 6x + 9 - 9 + 11$ $= (x - 3)^2 + 2$ $\therefore$ At TP : $x = 3$ and / en $y = 2$ OR/OF $f(x) = x^2 - 6x + 11$ $x = -\frac{b}{2a} = -\frac{(-6)}{2(1)}$ $= 3$ $\therefore y = 3^2 - 6(3) + 11$ $= 2$ $\therefore$ At TP : $x = 3$ and / en $y = 2$	✓ completing the square vierkantsvoltooiing ✓ $(x - 3)^2 + 2$ ✓✓ values for x and y waardes van x en y ✓ substitution / vervanging ✓ value of x / waarde van x ✓ substitution / vervanging ✓ value of y / waarde van y (4)
6.2	$m_g = \tan 63,44^\circ$ $= 2$ $y - 2 = 2(x - 3)$ $y = 2x - 4$	✓ $m_g = 2$ ✓ substitution / vervanging ✓ equation of g / vergeliking van g (3)
6.3	$f(x) = g(x)$ $x^2 - 6x + 11 = 2x - 4$ $x^2 - 8x + 15 = 0$ $(x - 3)(x - 5) = 0$ $x = 3 \text{ or / of } x = 5$ $\therefore y = 2(5) - 4$ $= 6$ $\therefore S(5 ; 6)$ CA only if g is linear VA slegs as g lineêr is	✓ equating / gelyk stel ✓ standard form / standaardvorm ✓ x values / x-waardes ✓ S coordinates / S- koördinate (4)



6.4.1	$1 \leq x \leq 5$	✓✓ answer / <i>antwoord</i> (2)
6.4.2	$k \leq -2$ Accept / <i>Aanvaar</i> $k < -2$ for 1 mark / <i>vir 1 punt</i>	✓✓ answer / <i>antwoord</i> (2)
		[15]

QUESTION 7/VRAAG 7

7.1	$A = P(1+i)^n$ $166\,433 = 97\,000 \left(1 + \frac{0,091}{4}\right)^{4n}$ $\frac{166\,433}{97\,000} = \left(\frac{4\,091}{4\,000}\right)^n$ $\therefore 4n = \log_{\frac{4\,091}{4\,000}} \frac{166\,433}{97\,000}$ $= 24$ $\therefore n = 6 \text{ years / jaar}$	✓ $\frac{0,091}{4}$ ✓ substitution into correct formula <i>vervanging in korrekte formule</i> ✓ correct use of logs <i>korrekte gebruik van logs</i> ✓ answer / <i>antwoord</i> (4)
7.2.1	$A = P(1-i)^n$ $= 482\,000(1-0,147)^5$ $= R217\,666,80$	✓ substitution into correct formula <i>vervanging in korrekte formule</i> ✓ answer / <i>antwoord</i> (2)
7.2.2	$A = P(1+i)^n$ $= 482\,000(1+0,081)^5$ $= R711\,500,99$	✓ substitution into correct formula <i>vervanging in korrekte formule</i> ✓ answer / <i>antwoord</i> (2)

7.2.3	Required amount / <i>Bedrag benodig</i>: = R 711 501 – R 217 666,80 = R 493 834,20 $F = \frac{x[(1+i)^n - 1]}{i}$ $493834,20 = \frac{x \left[\left(1 + \frac{0,073}{12} \right)^{60} - 1 \right]}{\frac{0,073}{12}} \left(1 + \frac{0,073}{12} \right)$ $\therefore x = \frac{493834,20 \times \frac{0,073}{12}}{\left[\left(1 + \frac{0,073}{12} \right)^{60} - 1 \right] \left(1 + \frac{0,073}{12} \right)}$ = R 6803,01	✓ amount / <i>bedrag</i> ✓ correct formula / <i>korrekte formule</i> ✓ $n = 60$ and / <i>en</i> $i = \frac{0,073}{12}$ ✓ $x \left[\left(1 + \frac{0,073}{12} \right)^{60} - 1 \right]$ ✓ $\times \left(1 + \frac{0,073}{12} \right)$ ✓ answer / <i>antwoord</i> (6)
		[14]

QUESTION 8/VRAAG 8

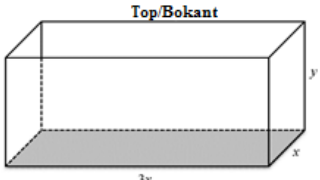
8.1	$f(x) = 1 - x^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{1 - (x+h)^2 - (1 - x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{1 - x^2 - 2xh - h^2 - 1 + x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-2xh - h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-2x - h)}{h}$ $= \lim_{h \rightarrow 0} (-2x - h)$ $= -2x$ OR/OF $f(x) = 1 - x^2$ $f(x+h) - f(x) = 1 - (x+h)^2 - (1 - x^2)$ $= 1 - x^2 - 2xh - h^2 - 1 + x^2$ $= -2xh - h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-2xh - h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-2x - h)}{h}$ $= \lim_{h \rightarrow 0} (-2x - h)$ $= -2x$	✓ substitution / vervanging ✓ expansion / uitbreiding ✓ simplification / vereenvoudiging ✓ factorisation / faktorisering ✓ answer / antwoord (5) OR/OF ✓ substitution / vervanging ✓ expansion / uitbreiding ✓ simplification / vereenvoudiging ✓ factorisation / faktorisering ✓ answer / antwoord (5)
8.2.1	$D_x \left[\left(x - \frac{1}{x} \right)^2 \right] = D_x \left(x^2 + \frac{1}{x^2} - 2 \right)$ $= D_x (x^2 + x^{-2} - 2)$ $= 2x - 2x^{-3}$	✓ $D_x (x^2 + x^{-2} - 2)$ ✓ $2x$ and / en constant/konstante is 0 ✓ $-2x^{-3}$ (3)
8.2.2	$y = \frac{x^5}{10} - \frac{2}{\sqrt{x}}$ $= \frac{1}{10} x^5 - 2x^{-\frac{1}{2}}$ $\therefore \frac{dy}{dx} = \frac{1}{2} x^4 + x^{-\frac{3}{2}}$	✓ $2x^{-\frac{1}{2}}$ ✓ $\frac{1}{2} x^4$ ✓ $x^{-\frac{3}{2}}$ (3)
		[11]

QUESTION 9/VRAAG 9

9.1	$f(x) = -2x^3 + ax^2 + bx + c.$ $9 = -2(2)^3 + a(2)^2 + b(2) - 3$ $9 = -16 + 4a + 2b - 3$ $4a + 2b = 28 \dots\dots\dots(1)$ At TP / By DP: $-6x^2 + 2ax + b = 0$ $-6(2)^2 + 2a(2) + b = 0$ $4a + b = 24 \dots\dots(2)$ $4a + 2b = 28$ $4a + b = 24$ $(1) - (2) \quad b = 4$ $4a + 4 = 24$ $4a = 20$ $a = 5$	$\checkmark$ equation 1 / vergelyking 1 $\checkmark f'(x) = -6x^2 + 2ax + b$ $\checkmark$ equation 2 / vergelyking 2 $\checkmark$ value of b / waarde van b $\checkmark$ value of a / waarde van a (5)
9.2	$f(x) = -2x^3 + 5x^2 + 4x - 3$ $f'(x) = -6x^2 + 10x + 4$ At/By E: $-6x^2 + 10x + 4 = 0$ $3x^2 - 5x - 2 = 0$ $(3x+1)(x-2) = 0$ $\therefore x = -\frac{1}{3} \text{ or / of } x = 2$ $y = -2(-\frac{1}{3})^3 + 5(-\frac{1}{3})^2 + 4(-\frac{1}{3}) - 3$ $= -\frac{100}{27}$ $\therefore E(-\frac{1}{3}; -\frac{100}{27})$	$\checkmark f'(x) = 0$ $\checkmark$ values of x / waarde van x $\checkmark$ both coordinates / beide koördinate (3)
9.3.1	$x < -\frac{1}{3} \text{ or / of } x > 2$	$\checkmark x < -\frac{1}{3}$ $\checkmark x > 2$ (2)

9.3.2	$f''(x) = -12x + 10$ $-12x + 10 = 0$ $x = \frac{5}{6}$ $\therefore x > \frac{5}{6}$ OR/OF $x = -\frac{b}{3a}$ $= -\frac{5}{3(-2)}$ $= \frac{5}{6}$ $\therefore x > \frac{5}{6}$	$\checkmark f''(x) = -12x + 10$ $\checkmark$ value of x / <i>waarde van x</i> $\checkmark$ answer / <i>antwoord</i> (3) OR/OF $\checkmark$ substitution / <i>vervanging</i> $\checkmark$ value of x / <i>waarde van x</i> $\checkmark$ answer / <i>antwoord</i> (3)
9.4	$f'(x) = -6x^2 + 10x + 4$ $m = f'(-1) = -6(-1)^2 + 10(-1) + 4$ $= -12$ $\therefore y = -12x + c$ $0 = -12(-1) + c$ $c = -12$ $y = -12x - 12$	$\checkmark f'(x) = -6x^2 + 10x + 4$ $\checkmark m$ $\checkmark$ substitution / <i>vervanging</i> $\checkmark$ answer / <i>antwoord</i> (4)
		[17]

QUESTION 10/VRAAG 10

10.1	 $3x^2 + 2xy + 6xy = 147$ $3x^2 + 8xy = 147$ $\therefore y = \frac{147 - 3x^2}{8x}$	$\checkmark 3x^2 + 2xy + 6xy = 147$ $\checkmark$ simplifying / vereenvoudiging (2)
10.2	$V = lbh$ $= 3x \cdot x \cdot y$ $= 3x^2 \left(\frac{147 - 3x^2}{8x} \right)$ $= \frac{441x}{8} - \frac{9x^3}{8}$ $V'(x) = \frac{441}{8} - \frac{27x^2}{8}$ $\therefore \frac{441}{8} - \frac{27x^2}{8} = 0$ $27x^2 = 441$ $x^2 = \frac{441}{27}$ $x = \frac{21}{3\sqrt{3}} \quad (= 4,04)$	$\checkmark 3x \cdot x \cdot y$ $\checkmark$ substitution / vervangings $\checkmark V'(x) = 0$ $\checkmark$ simplification / vereenvoudiging $\checkmark$ answer / antwoord (5)
		[7]

QUESTION 11/VRAAG 11

		WATCH SOCCER/ KYK SOKKER	WATCH RUGBY/ KYK RUGBY	TOTAL/ TOTAAL
	Female / Vroulik	72	a	120
	Male / Manlik	54	36	90
	Total / Totaal	b	84	210
11.1.1	$a = 48$ $b = 126$	$\checkmark a = 48$ $\checkmark b = 126$		
11.1.2	$P(F \text{ and/en } WS) = \frac{72}{210}$	$\checkmark\checkmark$ answer / antwoord		
11.1.3	(For independent events) / (Vir onafhanklike gebeurtenisse) $P(M) \times P(R) = P(M \text{ and / en } R)$ $P(M) \times P(R) = \frac{90}{210} \times \frac{84}{210}$ $= \frac{6}{35}$ $\square 0,17$ $P(M \text{ and / en } R) = \frac{36}{210}$ $= \frac{6}{35}$ $\therefore$ The events are independent Die gebeurtenisse is onafhanklik	$\checkmark \frac{90}{210} \times \frac{84}{210}$ $\checkmark$ answer / antwoord $\checkmark \frac{36}{210}$ $\checkmark$ conclusion / gevolgtrekking		
11.2.1	26 25 24 10 9 8 $26 \times 25 \times 24 \times 10 \times 9 \times 8$ $= 11\,232\,000$	$\checkmark$ method / metode $\checkmark$ answer / antwoord		

11.2.2	$5 \times 25 \times 24 \times 9 \times 8 \times 3$ $= 648\,000$ $P(\text{Vowel} / \text{Factor of } 9) / P(\text{Vokaal} / \text{Faktor van } 9)$ $= \frac{648\,000}{11\,232\,000}$ $= \frac{3}{52}$	$\checkmark 5 \times 25 \times 24$ $\checkmark 9 \times 8 \times 3$ $\checkmark 11\,232\,000$ as denominator / <i>as noemer</i> $\checkmark$ answer / <i>antwoord</i> (4)
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TOTAL/TOTAAL: 150