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**MATHEMATICS P1/
WISKUNDE V1**

MARKING GUIDELINES/NASIENRIGLYNE

2019

**MARKS: 150
PUNTE: 150**

**These marking guidelines consist of 15 pages.
*Hierdie nasienriglyne bestaan uit 15 bladsye.***

NOTE:

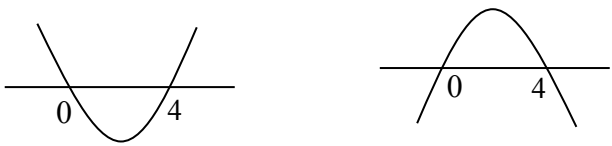
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent Accuracy applies in all aspects of the marking memorandum.

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging.
- Volgehoue akkuraatheid is DEURGAANS op ALLE aspekte van die memorandum van toepassing.

QUESTION/VRAAG 1

1.1.1	$x^2 - 5x - 6 = 0$ $(x - 6)(x + 1) = 0$ $x = 6$ or $x = -1$ OR/OF $x^2 - 5x - 6 = 0$ $x = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(-6)}}{2(1)}$ $x = \frac{5 \pm \sqrt{49}}{2}$ $x = 6$ or $x = -1$	✓ factors ✓ both answers OR/OF ✓ correct subst into correct formula ✓ both answers (2)
1.1.2	$(3x - 1)(x - 4) = 16$ $3x^2 - 13x - 12 = 0$ $x = \frac{13 \pm \sqrt{(-13)^2 - 4(3)(-12)}}{2(3)}$ $x = \frac{13 \pm \sqrt{313}}{6}$ $x = 5,12$ or $x = -0,78$ OR/OF $3x^2 - 13x - 12 = 0$ $x^2 - \frac{13}{3}x = 4$ $x^2 - \frac{13}{3}x + \left(-\frac{13}{6}\right)^2 = 4 + \left(-\frac{13}{6}\right)^2$ $\left(x - \frac{13}{6}\right)^2 = \frac{313}{36}$ $x = \frac{13 \pm \sqrt{313}}{6}$ $x = 5,12$ or $x = -0,78$	✓ standard form ✓ correct subst into correct formula ✓ ✓ answers OR/OF ✓ standard form ✓ adding $\left(-\frac{13}{6}\right)^2$ both sides ✓ ✓ answers (4)

1.1.3	$x(4-x) \geq 0$ $-x(x-4) \geq 0$ or $-x(x-4) \geq 0$ $x(x-4) \leq 0$  $0 \leq x \leq 4$ or $x \in [0 ; 4]$	✓ factorisation ✓✓ $0 \leq x \leq 4$
1.1.4	$\frac{5^{2x} - 1}{5^x + 1} = 4$ $\frac{(5^x + 1)(5^x - 1)}{5^x + 1} = 4$ $5^x - 1 = 4$ $5^x = 5$ $x = 1$ OR/OF $\frac{5^{2x} - 1}{5^x + 1} = 4$ $5^{2x} - 1 = 4 \cdot 5^x + 4$ $5^{2x} - 4 \cdot 5^x - 5 = 0$ $(5^x - 5)(5^x + 1) = 0$ $5^x = 5$ or $5^x \neq -1$ $x = 1$	✓ factors in numerator ✓ $5^x - 1 = 4$ ✓ answer OR/OF ✓ standard form ✓ factors ✓ answer
1.2	$x = 2 - 3y$(1) $x^2 + 4xy - 5 = 0$(2) Substitute (1) in (2): $(2 - 3y)^2 + 4y(2 - 3y) - 5 = 0$ $4 - 12y + 9y^2 + 8y - 12y^2 - 5 = 0$ $-3y^2 - 4y - 1 = 0$ $3y^2 + 4y + 1 = 0$ $(3y + 1)(y + 1) = 0$ $y = -\frac{1}{3}$ or $y = -1$ $x = 3$ or $x = 5$ OR/OF	✓ $x = 2 - 3y$ ✓ correct subst into correct formula ✓ either standard form ✓ y – values ✓ x – values

	$y = \frac{2}{3} - \frac{x}{3} \dots\dots\dots(1)$ $x^2 + 4xy - 5 = 0 \dots\dots\dots(2)$ Substitute (1) in (2): $x^2 + 4x\left(\frac{2}{3} - \frac{x}{3}\right) - 5 = 0$ $3x^2 + 8x - 4x^2 - 15 = 0$ $-x^2 + 8x - 15 = 0$ $x^2 - 8x + 15 = 0$ $(x - 5)(x - 3) = 0$ $x = 3 \text{ or } x = 5$ $y = -\frac{1}{3} \text{ or } y = -1$	$\checkmark y = \frac{2}{3} - \frac{x}{3}$ $\checkmark \text{ correct subst into correct formula}$ $\checkmark \text{ either standard form}$ $\checkmark x - \text{values}$ $\checkmark y - \text{values} \quad (5)$
1.3	$ab = 2\sqrt{10}$ $bc = 3\sqrt{2}$ $ac = 6\sqrt{5}$ $ab.bc.ac = 2\sqrt{10}.6\sqrt{5}.3\sqrt{2}$ $(abc)^2 = 36\sqrt{100}$ $abc = \sqrt{360} = 6\sqrt{10}$ OR/OF $ac = 6\sqrt{5} \quad \therefore a = \frac{6\sqrt{5}}{c}$ $bc = 3\sqrt{2} \quad \therefore b = \frac{3\sqrt{2}}{c}$ $ab = 2\sqrt{10}$ $\left(\frac{6\sqrt{5}}{c}\right)\left(\frac{3\sqrt{2}}{c}\right) = 2\sqrt{10}$ $18\sqrt{10} = 2\sqrt{10}.c^2$ $c^2 = 9$ $c = 3$ $\text{Volume} = abc = 2\sqrt{10}.3 = \sqrt{360} = 6\sqrt{10}$	$\checkmark \text{ volume} = abc$ $\checkmark \checkmark ab.bc.ac = 2\sqrt{10}.6\sqrt{5}.3\sqrt{2}$ $\checkmark (abc)^2 = 36\sqrt{100}$ $\checkmark \text{ answer} \quad (5)$ OR/OF $\checkmark a = \frac{6\sqrt{5}}{c}$ $\checkmark b = \frac{3\sqrt{2}}{c}$ $\checkmark \text{ value of } c$ $\checkmark \text{ Volume} = abc$ $\checkmark \text{ answer} \quad (5)$ [22]

QUESTION/VRAAG 2

2.1.1	59	✓ answer (1)
2.1.2	$ \begin{array}{ccccccc} 15 & & 29 & & 41 & & 51 \\ & \backslash & / & \backslash & / & \backslash & / \\ & 14 & & 12 & & 10 & \\ & & \backslash & / & \backslash & / & \\ & & -2 & & -2 & & \end{array} $ $ \begin{aligned} 2a &= -2 \\ a &= -1 \\ 3(-1) + b &= 14 \\ b &= 17 \\ (-1) + (17) + c &= 15 \\ c &= -1 \\ T_n &= -n^2 + 17n - 1 \end{aligned} $	✓ second difference of -2 ✓ a ✓ b ✓ c (4)
2.1.3	$ \begin{aligned} T_{27} &= -(27)^2 + 17(27) - 1 \\ &= -271 \end{aligned} $	✓ substitution ✓ answer (2)
2.2.1	$r = \frac{-18}{36} = -\frac{1}{2}$	✓ answer (1)
2.2.2	$ \begin{aligned} T_n &= 36\left(-\frac{1}{2}\right)^{n-1} \\ \frac{9}{4096} &= 36\left(-\frac{1}{2}\right)^{n-1} \\ \frac{1}{16384} &= \left(-\frac{1}{2}\right)^{n-1} \\ \left(-\frac{1}{2}\right)^{14} &= \left(-\frac{1}{2}\right)^{n-1} \\ 14 &= n - 1 \\ n &= 15 \\ \textbf{OR/OF} \\ 36; -18; 9; \frac{-9}{2}; \frac{9}{4}; \frac{-9}{8}; \dots; \frac{9}{4096} \\ \text{If you look only at the denominator: } 2; 4; 8; \dots; 4096 \\ 2^k &= 4096 \\ 2^k &= 2^{12} \\ k &= 12 \\ \therefore n &= 15 \text{ terms} \end{aligned} $	$ \begin{aligned} &\checkmark T_n = 36\left(-\frac{1}{2}\right)^{n-1} \\ &\checkmark \frac{1}{16384} = \left(-\frac{1}{2}\right)^{n-1} \\ &\checkmark \text{ answer} \\ &\textbf{OR/OF} \\ &\checkmark 2^k = 4096 \\ &\checkmark k = 12 \\ &\checkmark \text{ answer} \end{aligned} $ (3)

2.2.3	$S_{\infty} = \frac{a}{1-r}$ $= \frac{36}{1 - \left(-\frac{1}{2}\right)}$ $= 24$	✓ correct subst into correct formula with $-1 < r < 1$ ✓ answer if $-1 < r < 1$ (2)
2.2.4	$S_{250 \text{ even}} = \frac{-18 \left(\left(\frac{1}{4} \right)^{250} - 1 \right)}{\frac{1}{4} - 1}$ $= -24$ $S_{250 \text{ odd}} = \frac{36 \left(\left(\frac{1}{4} \right)^{250} - 1 \right)}{\frac{1}{4} - 1}$ $= 48$ $\frac{S_{\text{odd}}}{S_{\text{even}}} = \frac{48}{-24}$ $= -2$ OR/OF $\frac{T_1 + T_3 + T_5 + T_7 + \dots + T_{499}}{T_2 + T_4 + T_6 + T_8 + \dots + T_{500}}$ $= \frac{a + ar^2 + ar^4 + \dots + ar^{498}}{ar + ar^3 + ar^5 + \dots + ar^{499}}$ $= \frac{a + ar^2 + ar^4 + \dots + ar^{498}}{r(a + ar^2 + ar^4 + \dots + ar^{498})}$ $= \frac{1}{r}$ $= -2$	✓ $r = \frac{1}{4}$ and $n = 250$ ✓ $S_{250 \text{ even}} = -24$ ✓ $S_{250 \text{ odd}} = 48$ ✓ answer (4) OR/OF ✓ $a + ar^2 + ar^4 + \dots + ar^{498}$ ✓ $ar + ar^3 + ar^5 + \dots + ar^{499}$ ✓ $r(a + ar^2 + ar^4 + \dots + ar^{498})$ ✓ answer (4) [17]

QUESTION/VRAAG 3

3.1.1	$p + 6 - (2p + 3) = p - 2 - (p + 6)$ $-p + 3 = -8$ $p = 11$	✓ equating i.t.o p ✓ simplifying (2)
3.1.2	$T_n = 25 + (n - 1)(-8) = 33 - 8n$ $33 - 8n < -55$ $-8n < -88$ $n > 11$ ∴ Term 12 will be the first term smaller than -55 ∴ Term 12 sal die eerste term kleiner as -55 wees.	✓ subst into T_n formula ✓ $n > 11$ ✓ $n = 12$ (3)
3.2	$S_6 = \frac{n}{2}[a + l] = \frac{6}{2}[(x - 3) + (x - 18)]$ $= 6x - 63$ $S_9 = \frac{n}{2}[a + l] = \frac{9}{2}[(x - 3) + (x - 27)]$ $= 9x - 135$ $6x - 63 = 9x - 135$ $3x = 72$ $x = 24$ $\therefore S_{15} = \frac{n}{2}[a + l] = \frac{15}{2}[(x - 3) + (x - 45)]$ $= \frac{15}{2}[2x - 48]$ $= \frac{15}{2}[2(24) - 48] = 0 = \text{RHS}$ OR/OF $\sum_{k=7}^9 (x - 3k) = 0$ $(x - 21) + (x - 24) + (x - 27) = 0$ $\therefore 3x - 72 = 0$ $3x = 72$ $x = 24$ $\sum_{k=1}^{15} (24 - 3k)$ $= 21 + 18 + 15 + \dots + -21.$ $S_n = \frac{n}{2}[a + l]$ $= \frac{15}{2}[21 - 21]$ $= 0 = \text{RHS}$ OR/OF	✓ $6x - 63$ ✓ $9x - 135$ ✓ 24 ✓ $\frac{15}{2}[(x - 3) + (x - 45)]$ ✓ substitution of x (5) OR/OF ✓ expansion ✓ $3x - 72 = 0$ ✓ 24 ✓ substitution of x ✓ sum of 15 terms (5) OR/OF

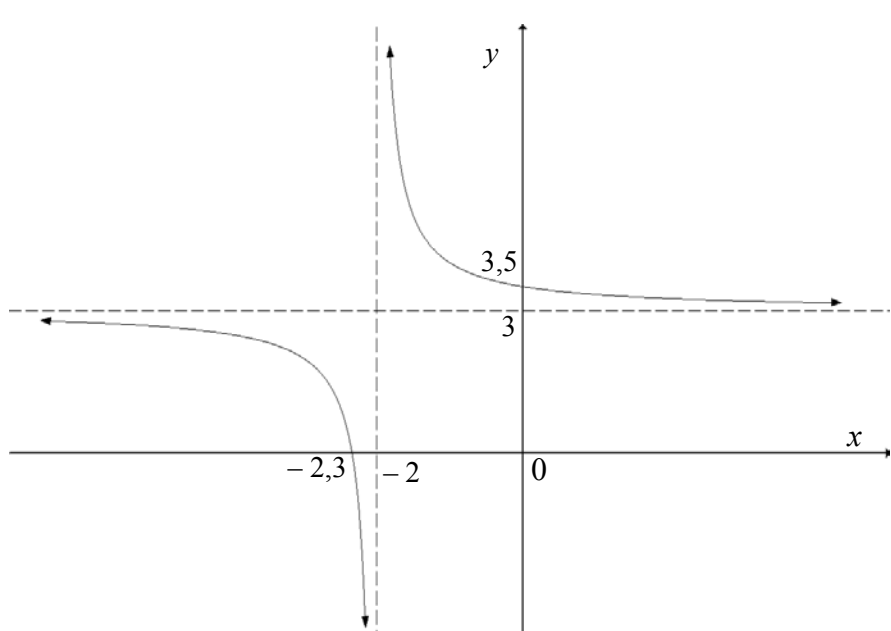
$(x-3) + (x-6) + (x-9) + (x-12) + (x-15) + (x-18)$ $= (x-3) + (x-6) + (x-9) + (x-12) + (x-15) + (x-18)$ $+ (x-21) + (x-24) + (x-27)$ $\therefore 3x - 72 = 0$ $3x = 72$ $x = 24$ $\sum_{k=1}^{15} (24 - 3k)$ $= 21 + 18 + 15 + \dots + -21.$ $S_n = \frac{n}{2}[a + l]$ $= \frac{15}{2}[21 - 21]$ $= 0 = \text{RHS}$	✓ expansion ✓ $3x - 72 = 0$ ✓ 24 ✓ substitution of x ✓ sum of 15 terms (5) [10]
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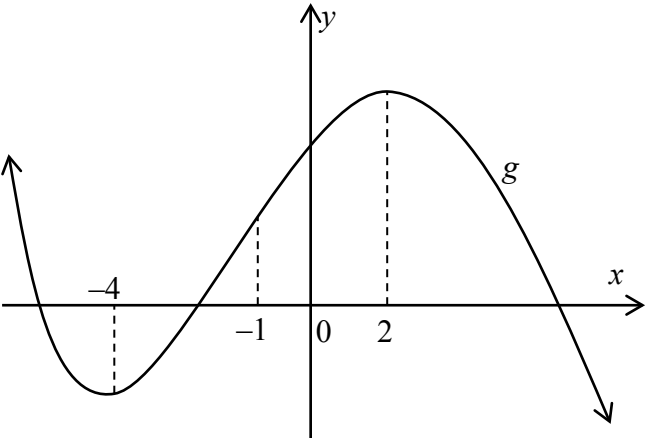
QUESTION/VRAAG 4

4.1	$y > 0$ OR/OF $y \in (0 ; \infty)$	✓ answer (1) OR/OF ✓ answer (1)
4.2	$g: y = \left(\frac{1}{2}\right)^x$ $g^{-1}: x = \left(\frac{1}{2}\right)^y$ $y = \log_{\frac{1}{2}} x$ or $y = -\log_2 x$ or $y = \log_2 \frac{1}{x}$	✓ $x = \left(\frac{1}{2}\right)^y$ ✓ equation (2)
4.3	Yes. The vertical line test cuts g^{-1} once <i>Ja. Die vertikale lyn toets sny g^{-1} slegs eenkeer.</i> OR/OF Yes. For every x -value there is a unique y -value <i>Ja. Vir elke x-waarde is daar 'n unieke y-waarde</i> OR/OF Yes. g is a one-to-one function / <i>Ja. g is 'n een-tot-een funksie</i> OR/OF Yes. The horizontal line cuts g only once <i>Ja. Die horisontale lyn sny g slegs een keer</i>	✓ yes ✓ valid reason (2) OR/OF ✓ yes ✓ valid reason (2) OR/OF ✓ yes ✓ valid reason (2) OR/OF ✓ yes ✓ valid reason (2)

4.4.1	$y = -\log_2 x$ $2 = -\log_2 a$ $a = 2^{-2} = \frac{1}{4}$ or $a = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$	✓ correct subst into correct formula ($a ; 2$) ✓ answer (2)
4.4.2	$M'\left(2; \frac{1}{4}\right)$ or $M'(2; a)$	✓ answer (1)
4.5	$M''\left(-1; \frac{9}{4}\right)$	✓ -1 ✓ ✓ $\frac{9}{4}$ (3)
		[11]

QUESTION/VRAAG 5

5.1.1	$x = -2$ $y = 3$	✓ answer ✓ answer (2)
5.1.2	$\left(0; \frac{7}{2}\right)$	✓ answer (1)
5.1.3	$\frac{1}{x+2} + 3 = 0$ $1 + 3(x+2) = 0$ $3x = -7$ $x = -\frac{7}{3}$ x-intercept $\left(-\frac{7}{3}; 0\right)$	✓ $y = 0$ ✓ answer (2)
5.1.4		✓ asymptotes at $y = 3$ and $x = -2$ ✓ intercepts at $y = 3,5$ and $x = -2,3$ ✓ shape (reasonable representation in correct quadrants) (3)

5.2.1	$-2x + 4 = 0$ $2x = 4$ $x = 2$ $\therefore S(2 ; 0)$	$\checkmark y = 0$ $\checkmark x = 2$ (2)
5.2.2	Equation of k : $y = a(x+1)^2 + 18$ $0 = a(2+1)^2 + 18$ or $0 = a(-4+1)^2 + 18$ $9a = -18$ $a = -2$ $y = -2(x+1)^2 + 18$	$\checkmark y = a(x+1)^2 + 18$ $\checkmark$ substitute $(2 ; 0)$ or $(-4 ; 0)$ $\checkmark a$ (3)
5.2.3	$-2x^2 - 4x + 16 = -2x + 4$ $-2x^2 - 2x + 12 = 0$ $x^2 + x - 6 = 0$ $(x+3)(x-2) = 0$ $x = -3$ or $x = 2$ $y = -2(-3) + 4 = 10$ $T(-3 ; 10)$	$\checkmark$ equating $\checkmark$ standard form $\checkmark$ factors $\checkmark$ choosing $x = -3$ $\checkmark$ answer (5)
5.2.4	$x < -3$ or $x > 2$ OR/OF $(-\infty ; -3) \cup (2 ; \infty)$	$\checkmark\checkmark$ answer (2) OR/OF $\checkmark\checkmark$ answer (2)
5.2.5(a)	$x < -1$ OR/OF $(-\infty ; -1)$	$\checkmark\checkmark$ answer (2) OR/OF $\checkmark\checkmark$ answer (2)
5.2.5(b)		$\checkmark$ shape of cubic with local min tp moving to local max tp $\checkmark$ turning points at $x = 2$ and $x = -4$ $\checkmark$ point of inflection at $x = -1$ (3) [25]

QUESTION/VRAAG 6

6.1.1	$A = P(1 - i)^n$ $79866,96 = 180\,000(1 - 0,15)^n$ $(1 - 0,15)^n = \frac{79866,96}{180\,000}$ $n = \frac{\log\left(\frac{79866,96}{180\,000}\right)}{\log(1 - 0,15)}$ $n = 4,999 \dots \text{ years}$ $n \approx 5 \text{ years}$	✓ substitution ✓ use of logs ✓ answer (3)
6.1.2	$A = P(1 + i)^n$ $= 49\,000\left(1 + \frac{0,1}{4}\right)^{20}$ $= R80\,292,21$ The money will be enough to buy the car. Die geld sal genoeg wees om die motor te koop.	✓ values of i and n ✓ substitution ✓ conclusion (consistent with answer) (3)
6.2.1	$P = \frac{x[1 - (1 + i)^{-n}]}{i}$ $P = \frac{7853,15\left[1 - \left(1 + \frac{0,1025}{12}\right)^{-234}\right]}{\frac{0,1025}{12}}$ $P = R793\,749,25$ OR/OF Balance Outstanding / <i>Uitstaande balans</i> $= 800\,000\left(1 + \frac{0,1025}{12}\right)^6 - \frac{7853,15\left[\left(1 + \frac{0,1025}{12}\right)^6 - 1\right]}{\frac{0,1025}{12}}$ $= 841\,885,56 - 48\,136,62$ $= R793\,748,94$	✓ $n = 234$ ✓ $i = \frac{0,1025}{12}$ ✓ substitution in present value formula ✓ answer OR/OF ✓ $n = 6$ in both ✓ $i = \frac{0,1025}{12}$ ✓ A – F ✓ R793 748,94 (4)

6.2.2	$A = P(1+i)^n$ $= 793749,25 \left(1 + \frac{0,1025}{12}\right)^3$ $= R814\,263,3052$ New instalment/Nuwe paalement: $P = \frac{x[1 - (1+i)^{-n}]}{i}$ $814\,263,3052 = \frac{x \left[1 - \left(1 + \frac{0,1025}{12}\right)^{-231}\right]}{\frac{0,1025}{12}}$ $x = R8\,089,20$	$\checkmark 793749,25 \left(1 + \frac{0,1025}{12}\right)^3$ $\checkmark n = 231$ $\checkmark \text{substitution of new P}$ $\checkmark \text{substitution of } n \text{ and } i \text{ into formula}$ $\checkmark \text{answer} \quad (5)$ [15]
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QUESTION/VRAAG 7

7.1	$f(x) = x^2 + 2$ $f(x+h) = (x+h)^2 + 2$ $= x^2 + 2xh + h^2 + 2$ $f(x+h) - f(x) = x^2 + 2xh + h^2 + 2 - (x^2 + 2)$ $= 2xh + h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $= \lim_{h \rightarrow 0} (2x+h)$ $= 2x$ OR/OF $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 + 2 - (x^2 + 2)}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $= \lim_{h \rightarrow 0} (2x+h)$ $= 2x$	$\checkmark x^2 + 2xh + h^2 + 2$ $\checkmark \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $\checkmark \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $\checkmark \text{answer} \quad (4)$ OR/OF $\checkmark x^2 + 2xh + h^2 + 2$ $\checkmark \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $\checkmark \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $\checkmark \text{answer} \quad (4)$
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7.2.1	$y = 4x^3 + 2x^{-1}$ $\frac{dy}{dx} = 12x^2 - 2x^{-2}$	$\checkmark + 2x^{-1}$ $\checkmark 12x^2$ $\checkmark - 2x^{-2}$ (3)
7.2.2	$y = 4\sqrt[3]{x} + (3x^3)^2$ $= 4x^{\frac{1}{3}} + 9x^6$ $\frac{dy}{dx} = \frac{4}{3}x^{-\frac{2}{3}} + 54x^5$	$\checkmark 4x^{\frac{1}{3}}$ $\checkmark 9x^6$ $\checkmark \frac{4}{3}x^{-\frac{2}{3}}$ $\checkmark 54x^5$ (4)
7.3	Point of contact: (1 ; 5) $m = 2$ $y - y_1 = m(x - x_1)$ or $y = 2x + c$ $y - 5 = 2(x - 1)$ $5 = 2 + c$ $c = 3$ $y = 2x + 3$ $y = 2x + 3$	$\checkmark m = 2$ $\checkmark$ substitution of (1 ; 5) $\checkmark$ answer (3) [14]

QUESTION/VRAAG 8

8.1	$h(x) = -2(x + \frac{3}{2})(x - 1)(x + 3)$ $h(x) = -(2x + 3)(x^2 + 2x - 3)$ $h(x) = -2x^3 - 7x^2 + 9$ OR/OF $h(x) = -(2x + 3)(x - 1)(x + 3)$ $h(x) = -(2x + 3)(x^2 + 2x - 3)$ $h(x) = -2x^3 - 7x^2 + 9$	$\checkmark \checkmark - 2(x + \frac{3}{2})(x - 1)(x + 3)$ $\checkmark$ correct simplification (3) OR/OF $\checkmark \checkmark -(2x + 3)(x - 1)(x + 3)$ $\checkmark$ correct simplification (3)
8.2	$h'(x) = -6x^2 - 14x$ $-6x^2 - 14x = 0$ $-2x(3x + 7) = 0$ $x = 0$ or $x = -\frac{7}{3}$	$\checkmark$ first derivative $\checkmark = 0$ $\checkmark$ both answers (3)
8.3	$x < -\frac{7}{3}$ or $x > 0$ OR/OF $x \in \left(-\infty ; -\frac{7}{3}\right) \cup (0 ; \infty)$	$\checkmark \checkmark$ answer (2) OR/OF $\checkmark \checkmark$ answer (2)

8.4	$y = 4x + 7$ $-6x^2 - 14x = 4$ $0 = 6x^2 + 14x + 4$ $0 = 3x^2 + 7x + 2$ $0 = (3x + 1)(x + 2)$ $x = -\frac{1}{3}$ or $x = -2$	✓ $y = 4x + 7$ ✓ $h'(x) = 4$ ✓ standard form ✓ both answers (4) [12]
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QUESTION/VRAAG 9

9.1	Volume of Sphere $= \frac{4}{3}\pi(8)^3$ or $= \frac{2048\pi}{3}$ or $= 2144,66$	✓ answer (1)
9.2	$r^2 + x^2 = 8^2$ (Pythagoras) $r^2 = 64 - x^2$	✓ substitution or reason Pythagoras (1)
9.3	$V_{cone} = \frac{1}{3}\pi r^2 h$ $= \frac{1}{3}\pi(64 - x^2)(8 + x)$ $= \frac{\pi}{3}(512 + 64x - 8x^2 - x^3)$ $\frac{dV}{dx} = \frac{64\pi}{3} - \frac{16\pi}{3}x - \frac{3\pi}{3}x^2$ $0 = 64 - 16x - 3x^2$ $0 = (8 - 3x)(x + 8)$ $x = \frac{8}{3}$ $x \neq -8$ $\frac{V_{cone}}{V_{sphere}} = \frac{\frac{1}{3}\pi\left(\frac{512}{9}\right)\left(\frac{32}{3}\right)}{\frac{2048\pi}{3}}$ $= \frac{8}{27} = 0,3$	✓ $h = 8 + x$ ✓ $\frac{1}{3}\pi(64 - x^2)(8 + x)$ ✓ expansion ✓ $\frac{dV}{dx} = \frac{64\pi}{3} - \frac{16\pi}{3}x - \frac{3\pi}{3}x^2$ ✓ $x = \frac{8}{3}$ ✓ volume of the cone ✓ $\frac{8}{27}$ or 0,3 (7) [9]

QUESTION/VRAAG 10

10.1	$P(\text{One Red and One Blue})$ $= P(\text{Red, Blue}) + P(\text{Blue, Red})$ $= \left(\frac{3}{12}\right) \times \left(\frac{2}{11}\right) + \left(\frac{2}{12}\right) \times \left(\frac{3}{11}\right)$ $= \frac{1}{11}$	$\checkmark \left(\frac{3}{12}\right) \times \left(\frac{2}{11}\right)$ $\checkmark \left(\frac{2}{12}\right) \times \left(\frac{3}{11}\right)$ $\checkmark$ addition of products $\checkmark$ answer (4)
10.2.1	$a = 0,48 \times 250$ $a = 120$	$\checkmark$ answer (1)
10.2.2	$b = 150$ $P(S) \times P(F)$ $= \frac{200}{250} \times \frac{150}{250}$ $= 0,48$ $= P(S \text{ and } F)$ These events are independent / <i>Hierdie gebeurtenisse is onafhanklik</i>	$\checkmark b$ $\checkmark P(S) \times P(F)$ $\checkmark \frac{200}{250} \text{ and } \frac{150}{250}$ $\checkmark$ conclusion (with realistic probabilities) (4)
		[9]

QUESTION/VRAAG 11

11.1	10×9 $= 90$	$\checkmark \checkmark 10 \times 9$ (2)
11.2.1	$10!$ $= 3\,628\,800$	$\checkmark 10!$ (1)
11.2.2	$2! \times 2! \times 2! \times 2! \times 2! \times 4!$ $= 768$	$\checkmark 2! \times 2! \times 2! \times 2! \times 2!$ $\checkmark 4!$ $\checkmark 2! \times 2! \times 2! \times 2! \times 2! \times 4!$ or 768 (3) [6]

TOTAL/TOTAAL: 150