



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE EXAMINATIONS/
SENIORSERTIFIKAAT-EKSAMEN
NATIONAL SENIOR CERTIFICATE EXAMINATIONS/
*NASIONALE SENIORSERTIFIKAAT-EKSAMEN***

**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:

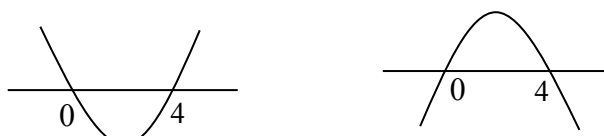
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent Accuracy applies in all aspects of the marking memorandum.

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

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

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

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

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	$T_n = 36\left(-\frac{1}{2}\right)^{n-1}$ $\frac{9}{4096} = 36\left(-\frac{1}{2}\right)^{n-1}$ $\frac{1}{16384} = \left(-\frac{1}{2}\right)^{n-1}$ $\left(-\frac{1}{2}\right)^{14} = \left(-\frac{1}{2}\right)^{n-1}$ $14 = n - 1$ $n = 15$ <p>OR/OF</p> $36; -18; 9; \frac{-9}{2}; \frac{9}{4}; \frac{-9}{8}; \dots; \frac{9}{4096}$ <p>If you look only at the denominator: 2; 4; 8; ...; 4096</p> $2^k = 4096$ $2^k = 2^{12}$ $k = 12$ $\therefore n = 15 \text{ terms}$	$T_n = 36\left(-\frac{1}{2}\right)^{n-1}$ $\frac{1}{16384} = \left(-\frac{1}{2}\right)^{n-1}$ ✓ answer (3) <p>OR/OF</p> $2^k = 4096$ ✓ k = 12 ✓ answer (3)

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

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

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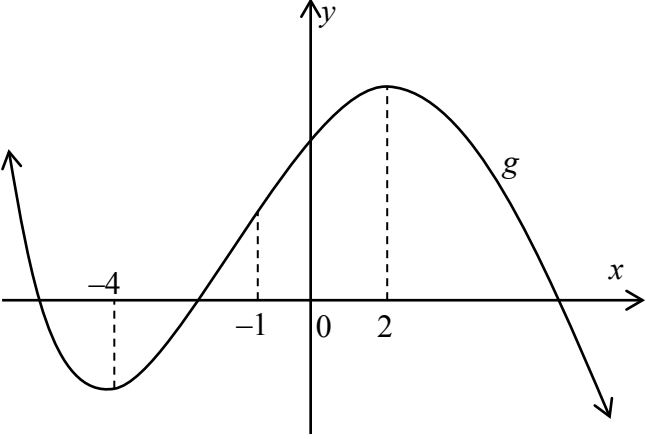
QUESTION/VRAAG 4

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	$-2x + 4 = 0$ $2x = 4$ $x = 2$ $\therefore S(2 ; 0)$	$\checkmark y = 0$ $\checkmark x = 2$ <p style="text-align: right;">(2)</p>
5.2.2	<p>Equation of k:</p> $y = a(x+1)^2 + 18$ $0 = a(2+1)^2 + 18 \quad \text{or} \quad 0 = a(-4+1)^2 + 18$ $9a = -18$ $a = -2$ $y = -2(x+1)^2 + 18$	$\checkmark y = a(x+1)^2 + 18$ \checkmark substitute $(2 ; 0)$ or $(-4 ; 0)$ $\checkmark a$ <p style="text-align: right;">(3)</p>
5.2.3	$-2x^2 - 4x + 16 = -2x + 4$ $-2x^2 - 2x + 12 = 0$ $x^2 + x - 6 = 0$ $(x+3)(x-2) = 0$ $x = -3 \text{ or } x = 2$ $y = -2(-3) + 4 = 10$ $T(-3 ; 10)$	\checkmark equating \checkmark standard form \checkmark factors \checkmark choosing $x = -3$ \checkmark answer <p style="text-align: right;">(5)</p>
5.2.4	$x < -3 \text{ or } x > 2$ <p>OR/OF</p> $(-\infty ; -3) \cup (2 ; \infty)$	$\checkmark\checkmark$ answer <p style="text-align: right;">(2)</p> <p>OR/OF</p> $\checkmark\checkmark$ answer <p style="text-align: right;">(2)</p>
5.2.5(a)	$x < -1$ <p>OR/OF</p> $(-\infty ; -1)$	$\checkmark\checkmark$ answer <p style="text-align: right;">(2)</p> <p>OR/OF</p> $\checkmark\checkmark$ answer <p style="text-align: right;">(2)</p>
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 $x = -1$ <p style="text-align: right;">(3)</p> <p style="text-align: right;">[25]</p>

QUESTION/VRAAG 6

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

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

<p>7.1</p> $f(x) = x^2 + 2$ $f(x+h) = (x+h)^2 + 2$ $= x^2 + 2xh + h^2 + 2$ $f(x+h) - f(x) = x^2 + 2xh + h^2 + 2 - (x^2 + 2)$ $= 2xh + h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $= \lim_{h \rightarrow 0} (2x+h)$ $= 2x$ <p>OR/OF</p> $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 + 2 - (x^2 + 2)}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $= \lim_{h \rightarrow 0} (2x+h)$ $= 2x$	$\checkmark x^2 + 2xh + h^2 + 2$ $\checkmark \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $\checkmark \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $\checkmark \text{answer} \quad (4)$ <p>OR/OF</p> $\checkmark x^2 + 2xh + h^2 + 2$ $\checkmark \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $\checkmark \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $\checkmark \text{answer} \quad (4)$
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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

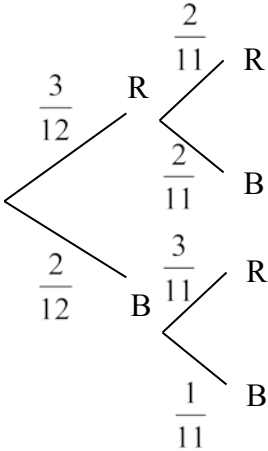
8.1	$h(x) = -2\left(x + \frac{3}{2}\right)(x - 1)(x + 3)$ $h(x) = -(2x + 3)(x^2 + 2x - 3)$ $h(x) = -2x^3 - 7x^2 + 9$ <p>OR/OF</p> $h(x) = -(2x + 3)(x - 1)(x + 3)$ $h(x) = -(2x + 3)(x^2 + 2x - 3)$ $h(x) = -2x^3 - 7x^2 + 9$	$\checkmark \checkmark - 2\left(x + \frac{3}{2}\right)(x - 1)(x + 3)$ \checkmark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

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

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

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

QUESTION/VRAAG 11

<p>11.1</p>	<p>10×9 = 90</p>	<p>✓✓ 10×9 (2)</p>
<p>11.2.1</p>	<p>$10!$ = 3 628 800</p>	<p>✓ $10!$ (1)</p>
<p>11.2.2</p>	<p>$2! \times 2! \times 2! \times 2! \times 2! \times 4!$ = 768</p>	<p>✓ $2! \times 2! \times 2! \times 2! \times 2!$ ✓ $4!$ ✓ $2! \times 2! \times 2! \times 2! \times 2! \times 4!$ or 768 (3) [6]</p>

TOTAL/TOTAAL: 150