

# Soek jy 'n fantastiese tutor?

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# 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**

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



	$y = \frac{2}{3} - \frac{x}{3} \dots\dots\dots(1)$ $x^2 + 4xy - 5 = 0 \dots\dots\dots(2)$ <p>Substitute (1) in (2):</p> $x^2 + 4x\left(\frac{2}{3} - \frac{x}{3}\right) - 5 = 0$ $3x^2 + 8x - 4x^2 - 15 = 0$ $-x^2 + 8x - 15 = 0$ $x^2 - 8x + 15 = 0$ $(x - 5)(x - 3) = 0$ $x = 3 \text{ or } x = 5$ $y = -\frac{1}{3} \text{ or } y = -1$	$\checkmark y = \frac{2}{3} - \frac{x}{3}$ $\checkmark \text{ correct subst into correct formula}$ $\checkmark \text{ either standard form}$ $\checkmark x - \text{values}$ $\checkmark y - \text{values} \quad (5)$
1.3	$ab = 2\sqrt{10}$ $bc = 3\sqrt{2}$ $ac = 6\sqrt{5}$ $ab.bc.ac = 2\sqrt{10}.6\sqrt{5}.3\sqrt{2}$ $(abc)^2 = 36\sqrt{100}$ $abc = \sqrt{360} = 6\sqrt{10}$ <p><b>OR/OF</b></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><b>OR/OF</b></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;"><b>[22]</b></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	$  \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	$S_{\infty} = \frac{a}{1-r}$ $= \frac{36}{1 - \left(-\frac{1}{2}\right)}$ $= 24$	<p>✓ correct subst into correct formula with <math>-1 &lt; r &lt; 1</math></p> <p>✓ answer if <math>-1 &lt; r &lt; 1</math></p> <p>(2)</p>
2.2.4	$S_{250 \text{ even}} = \frac{-18 \left( \left( \frac{1}{4} \right)^{250} - 1 \right)}{\frac{1}{4} - 1}$ $= -24$ $S_{250 \text{ odd}} = \frac{36 \left( \left( \frac{1}{4} \right)^{250} - 1 \right)}{\frac{1}{4} - 1}$ $= 48$ $\frac{S_{\text{odd}}}{S_{\text{even}}} = \frac{48}{-24}$ $= -2$ <p><b>OR/OF</b></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>✓ <math>r = \frac{1}{4}</math> and <math>n = 250</math></p> <p>✓ <math>S_{250 \text{ even}} = -24</math></p> <p>✓ <math>S_{250 \text{ odd}} = 48</math></p> <p>✓ answer</p> <p>(4)</p> <p><b>OR/OF</b></p> <p>✓ <math>a + ar^2 + ar^4 + \dots + ar^{498}</math></p> <p>✓ <math>ar + ar^3 + ar^5 + \dots + ar^{499}</math></p> <p>✓ <math>r(a + ar^2 + ar^4 + \dots + ar^{498})</math></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 <math>-55</math>          ∴ Term 12 sal die eerste term kleiner as <math>-55</math> 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><b>OR/OF</b></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><b>OR/OF</b></p>	✓ $6x - 63$  ✓ $9x - 135$  ✓ 24 ✓ $\frac{15}{2}[(x - 3) + (x - 45)]$  ✓ substitution of $x$ (5)  <b>OR/OF</b>  ✓ expansion ✓ $3x - 72 = 0$  ✓ 24  ✓ substitution of $x$  ✓ sum of 15 terms (5)  <b>OR/OF</b>



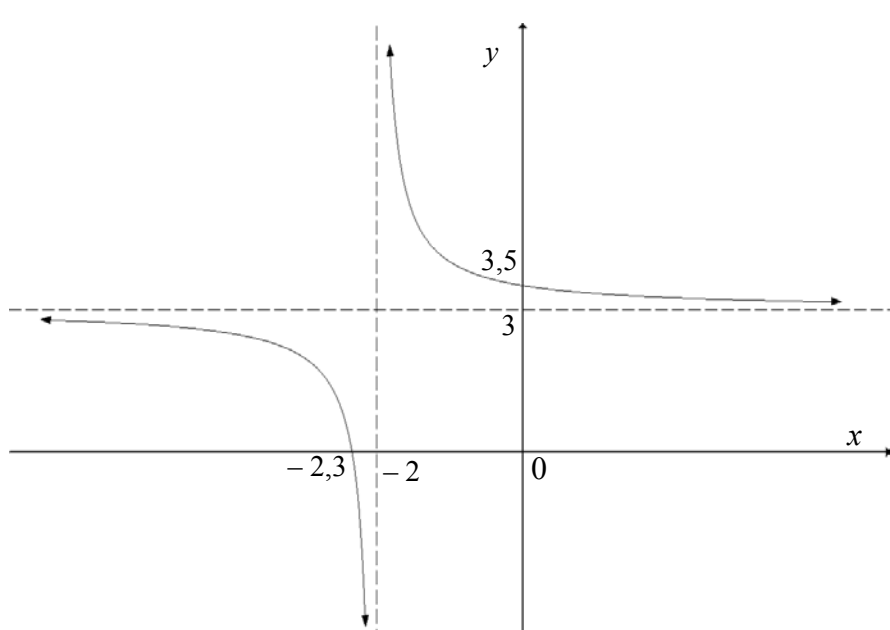
$(x-3) + (x-6) + (x-9) + (x-12) + (x-15) + (x-18)$ $= (x-3) + (x-6) + (x-9) + (x-12) + (x-15) + (x-18)$ $+ (x-21) + (x-24) + (x-27)$ $\therefore 3x - 72 = 0$ $3x = 72$ $x = 24$ $\sum_{k=1}^{15} (24 - 3k)$ $= 21 + 18 + 15 + \dots + -21.$ $S_n = \frac{n}{2}[a + l]$ $= \frac{15}{2}[21 - 21]$ $= 0 = \text{RHS}$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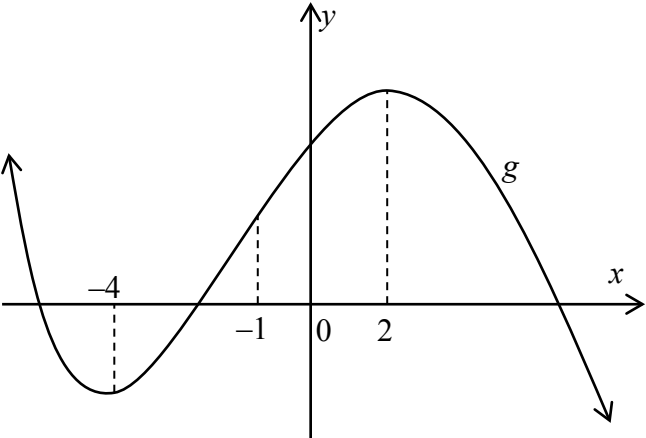
**QUESTION/VRAAG 4**

4.1	$y > 0$  <b>OR/OF</b> $y \in (0 ; \infty)$	✓ answer (1)  <b>OR/OF</b> ✓ 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 <math>g^{-1}</math> slegs eenkeer.</i>  <b>OR/OF</b> Yes. For every $x$ -value there is a unique $y$ -value <i>Ja. Vir elke <math>x</math>-waarde is daar 'n unieke <math>y</math>-waarde</i>  <b>OR/OF</b> Yes. $g$ is a one-to-one function / <i>Ja. <math>g</math> is 'n een-tot-een funksie</i>  <b>OR/OF</b> Yes. The horizontal line cuts $g$ only once <i>Ja. Die horisontale lyn sny <math>g</math> slegs een keer</i>	✓ yes ✓ valid reason (2)  <b>OR/OF</b> ✓ yes ✓ valid reason (2)  <b>OR/OF</b> ✓ yes ✓ valid reason (2)  <b>OR/OF</b> ✓ 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)
		<b>[11]</b>

**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 $x > 2$  <b>OR/OF</b> $(-\infty ; -3) \cup (2 ; \infty)$	$\checkmark\checkmark$ answer  (2)  <b>OR/OF</b> $\checkmark\checkmark$ answer  (2)
5.2.5(a)	$x < -1$  <b>OR/OF</b> $(-\infty ; -1)$	$\checkmark\checkmark$ answer  (2)  <b>OR/OF</b> $\checkmark\checkmark$ 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)  <b>[25]</b>

**QUESTION/VRAAG 6**

6.1.1	$A = P(1 - i)^n$ $79866,96 = 180\,000(1 - 0,15)^n$ $(1 - 0,15)^n = \frac{79866,96}{180\,000}$ $n = \frac{\log\left(\frac{79866,96}{180\,000}\right)}{\log(1 - 0,15)}$ $n = 4,999 \dots \text{ years}$ $n \approx 5 \text{ years}$	<p>✓ substitution</p> <p>✓ use of logs</p> <p>✓ answer</p> <p>(3)</p>
6.1.2	$A = P(1 + i)^n$ $= 49\,000\left(1 + \frac{0,1}{4}\right)^{20}$ $= R80\,292,21$ <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 <math>i</math> and <math>n</math></p> <p>✓ substitution</p> <p>✓ conclusion (consistent with answer)</p> <p>(3)</p>
6.2.1	$P = \frac{x[1 - (1 + i)^{-n}]}{i}$ $P = \frac{7853,15\left[1 - \left(1 + \frac{0,1025}{12}\right)^{-234}\right]}{\frac{0,1025}{12}}$ $P = R793\,749,25$ <p><b>OR/OF</b></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>✓ <math>n = 234</math> ✓ <math>i = \frac{0,1025}{12}</math></p> <p>✓ substitution in present value formula</p> <p>✓ answer</p> <p><b>OR/OF</b></p> <p>✓ <math>n = 6</math> in both</p> <p>✓ <math>i = \frac{0,1025}{12}</math></p> <p>✓ A – F</p> <p>✓ R793 748,94</p> <p>(4)</p>

6.2.2	$A = P(1+i)^n$ $= 793749,25 \left(1 + \frac{0,1025}{12}\right)^3$ $= R814\,263,3052$ <p>New instalment/Nuwe paaiemment:</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;"><b>[15]</b></p>
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**QUESTION/VRAAG 7**

7.1	$f(x) = x^2 + 2$ $f(x+h) = (x+h)^2 + 2$ $= x^2 + 2xh + h^2 + 2$ $f(x+h) - f(x) = x^2 + 2xh + h^2 + 2 - (x^2 + 2)$ $= 2xh + h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $= \lim_{h \rightarrow 0} (2x+h)$ $= 2x$ <p><b>OR/OF</b></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><b>OR/OF</b></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) <b>[14]</b>

**QUESTION/VRAAG 8**

8.1	$h(x) = -2(x + \frac{3}{2})(x - 1)(x + 3)$ $h(x) = -(2x + 3)(x^2 + 2x - 3)$ $h(x) = -2x^3 - 7x^2 + 9$  <b>OR/OF</b> $h(x) = -(2x + 3)(x - 1)(x + 3)$ $h(x) = -(2x + 3)(x^2 + 2x - 3)$ $h(x) = -2x^3 - 7x^2 + 9$	$\checkmark \checkmark - 2(x + \frac{3}{2})(x - 1)(x + 3)$ $\checkmark$ correct simplification (3)  <b>OR/OF</b> $\checkmark \checkmark -(2x + 3)(x - 1)(x + 3)$ $\checkmark$ 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 $x > 0$ <b>OR/OF</b> $x \in \left(-\infty; -\frac{7}{3}\right) \cup (0; \infty)$	$\checkmark \checkmark$ answer (2)  <b>OR/OF</b> $\checkmark \checkmark$ 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) <b>[12]</b>
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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) <b>[9]</b>

**QUESTION/VRAAG 10**

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

**QUESTION/VRAAG 11**

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

**TOTAL/TOTAAL: 150**