



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12/*GRAAD 12***

**MATHEMATICS P1/*WISKUNDE V1***

**MARCH 2017**

**MEMORANDUM**

**MARKS: 150**

***PUNTE: 150***

**This memorandum consists of 18 pages.  
*Hierdie memorandum bestaan uit 18 bladsye.***

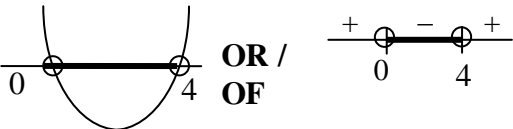
**NOTE:**

- 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	$(x - 3)(x + 1) = 0$ $x = 3$ or $x = -1$	✓ answer ✓ answer (2)
1.1.2	$\sqrt{x^3} = 512$ $x^{\frac{3}{2}} = 512$ $\left(x^{\frac{3}{2}}\right)^{\frac{2}{3}} = \left(512\right)^{\frac{2}{3}}$ $x = 64$  <b>OR</b>  $\sqrt{x^3} = 512$ $x^3 = 262144$ $x^3 = 2^{18}$ $x = 2^6$ $x = 64$	✓ $x^{\frac{3}{2}}$  ✓ $\left(8^3\right)^{\frac{2}{3}}$  ✓ answer (3)  ✓ squaring both sides ✓ $x^3 = 2^{18}$  ✓ answer (3)
1.1.3	$x(x - 4) < 0$    $0 < x < 4$ <b>OR/OF</b> $x \in (0; 4)$	✓ critical values ✓ inequality or interval (2)

<p>1.2.1</p>	$x^2 - 5x + 2 = 0$ $x = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(2)}}{2(1)}$ $x = \frac{5 \pm \sqrt{17}}{2}$ $x = 0,44 \text{ or } x = 4,56$ <p><b>OR</b></p> $x^2 - 5x + 2 = 0$ $x^2 - 5x = -2$ $x^2 - 5x + \left(-\frac{5}{2}\right)^2 = -2 + \left(-\frac{5}{2}\right)^2$ $\left(x - \frac{5}{2}\right)^2 = \frac{17}{4}$ $x = \frac{5 + \sqrt{17}}{2} \text{ or } x = \frac{5 - \sqrt{17}}{2}$ $x = 0,44 \text{ or } x = 4,56$	<p>✓ subst correct formula</p> <p>✓ answer</p> <p>✓ answer</p> <p>(3)</p> <p>✓ <math>\left(x - \frac{5}{2}\right)^2 = \frac{17}{4}</math></p> <p>✓ answer</p> <p>✓ answer</p> <p>(3)</p>
<p>1.2.2</p>	$f(x) = x^2 - 5x + 2$ $x^2 - 5x + 2 = c$ $x^2 - 5x + 2 - c = 0$ $b^2 - 4ac < 0$ $(-5)^2 - 4(1)(2 - c) < 0$ $25 - 8 + 4c < 0$ $4c < -17$ $c < -\frac{17}{4}$	<p>✓ standard form</p> <p>✓ <math>b^2 - 4ac &lt; 0</math></p> <p>✓ substitution</p> <p>✓ answer</p> <p>(4)</p>
<p>1.3</p>	$x = 2y + 2$ $x^2 - 2xy + 3y^2 = 4$ $(2y + 2)^2 - 2y(2y + 2) + 3y^2 = 4$ $4y^2 + 8y + 4 - 4y^2 - 4y + 3y^2 = 4$ $3y^2 + 4y = 0$ $y(3y + 4) = 0$ $y = 0 \text{ or } y = -\frac{4}{3}$ $x = 2 \text{ or } x = -\frac{2}{3}$	<p>✓ substitution</p> <p>✓ simplification</p> <p>✓ standard form</p> <p>✓ factors</p> <p>✓ <math>y = 0 ; y = -\frac{4}{3}</math></p> <p>✓ x-values (ca on both x-values)</p> <p>(6)</p>

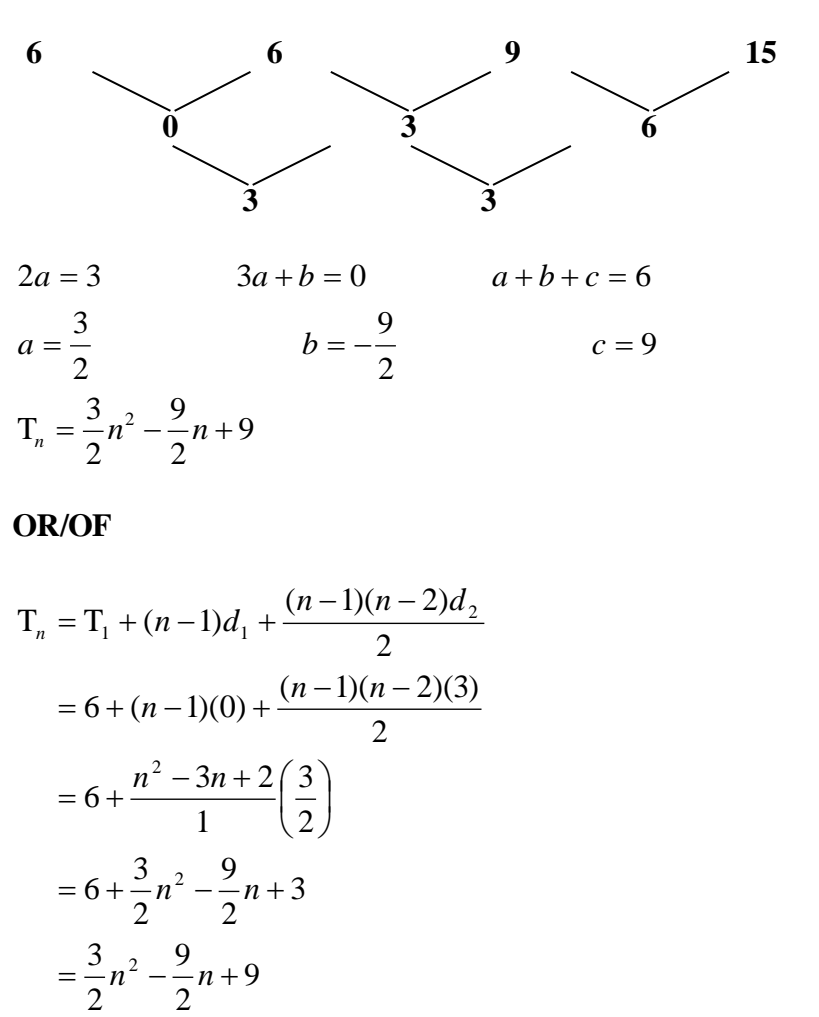
	<p><b>OR / OF</b></p> $x = 2y + 2$ $y = \frac{1}{2}x - 1$ $x^2 - 2xy + 3y^2 = 4$ $x^2 - 2x\left(\frac{1}{2}x - 1\right) + 3\left(\frac{1}{2}x - 1\right)^2 = 4$ $x^2 - x^2 + 2x + 3\left(\frac{1}{4}x^2 - x + 1\right) = 4$ $2x + \frac{3}{4}x^2 - 3x + 3 = 4$ $3x^2 - 4x - 4 = 0$ $(3x + 2)(x - 2) = 0$ $x = 2 \quad \text{or} \quad x = -\frac{2}{3}$ $y = 0 \quad \quad y = -\frac{4}{3}$	<p>✓ substitution</p> <p>✓ simplification</p> <p>✓ standard form</p> <p>✓ factors</p> <p>✓ <math>x = 2 ; x = -\frac{2}{3}</math></p> <p>✓ y-values (ca on both y-values)</p> <p>(6)</p>
<p>1.4</p>	$S = \frac{6}{x^2 + 2}$ <p>For S to be a maximum the denominator needs to be at a minimum.</p> <p><i>Vir S om 'n maksimum waarde te hê, moet die deler 'n minimum waarde h</i></p> <p>Minimum of <math>x^2 + 2</math> is 2</p> $\text{Maximum of } S = \frac{6}{x^2 + 2}$ $= \frac{6}{2}$ $= 3$	<p>✓ Minimum of <math>x^2 + 2</math> is 2</p> <p>✓ 3</p> <p>(2)</p>
<p><b>[22]</b></p>		

**QUESTION/VRAAG 2**

<p>2.1</p>	<p>For geometric:</p> $-\frac{1}{4}; b; -1; \dots$ $\frac{b}{-\frac{1}{4}} = -\frac{1}{b}$ $b^2 = \frac{1}{4}$ $b = \pm \frac{1}{2}$ <p><b>OR</b></p> $b = \pm \sqrt{\left(-\frac{1}{4}\right)(-1)}$ $b = \pm \frac{1}{2}$	$\checkmark \frac{b}{-\frac{1}{4}} = -\frac{1}{b}$ $\checkmark b = \frac{1}{2}$ $\checkmark b = -\frac{1}{2}$ <p style="text-align: right;">(3)</p> $\checkmark b = \pm \sqrt{\left(-\frac{1}{4}\right)(-1)}$ $\checkmark b = \frac{1}{2}$ $\checkmark b = -\frac{1}{2}$ <p style="text-align: right;">(3)</p>
<p>2.2</p>	$-\frac{1}{4}; \frac{1}{2}; -1; \dots$ $r = -2$ $T_{19} = ar^{18}$ $= \left(-\frac{1}{4}\right)(-2)^{18}$ $= \left(-\frac{2^{18}}{2^2}\right)$ $= -2^{16}$ $= -65536$ <p><b>OR / OF</b></p> $T_{19} = ar^{18}$ $= \left(-\frac{1}{4}\right)(-2)^{18}$ $= (-2^{-2})(2^{18})$ $= -2^{16}$ $= -65536$	$\checkmark r = -2$ $\checkmark \text{subst. into correct formula}$ $\checkmark -65536 / -2^{16}$ <p style="text-align: right;">(3)</p> $\checkmark r = -2$ $\checkmark \text{subst. into correct formula}$ $\checkmark -65536 / -2^{16}$ <p style="text-align: right;">(3)</p>

<p>2.3</p>	<p>The series is: <math>-\frac{1}{4}; \frac{1}{2}; -1; 2; -4; 8; \dots</math></p> <p>The new positive term series: <math>\frac{1}{2}; 2; 8; 32; 128; \dots</math></p> <p>.....</p> <p><math>a = \frac{1}{2} \quad r = 4</math></p> <p><math>\sum_{n=1}^{20} \left(\frac{1}{2}\right)(4)^{n-1}</math></p> <p><b>OR/OF</b></p> <p><math>\sum_{p=0}^{19} \left(\frac{1}{2}\right)(4)^p</math> <b>etc.</b></p>	<p>✓ <math>a = \frac{1}{2}</math></p> <p>✓ <math>r = 4</math></p> <p>✓ <math>\sum_{n=1}^{20}</math> or <math>\sum_{p=0}^{19}</math></p> <p>✓ correct formula (4)</p>
<p>2.4</p>	<p>No, the series is not convergent / <i>Nee, die reeks konvergeer nie</i></p> <p><math>r = 4</math> and for convergence <math>-1 &lt; r &lt; 1</math></p> <p><math>r = 4</math> en vir konvergering <math>-1 &lt; r &lt; 1</math></p>	<p>✓ no</p> <p>✓ reason (2)</p>
		<p>[12]</p>

**QUESTION/VRAAG 3**

3.1.1	24	✓ 24 (1)
3.1.2	 <p> <math>2a = 3</math>                      <math>3a + b = 0</math>                      <math>a + b + c = 6</math>  <math>a = \frac{3}{2}</math>                              <math>b = -\frac{9}{2}</math>                              <math>c = 9</math>  <math>T_n = \frac{3}{2}n^2 - \frac{9}{2}n + 9</math> </p> <p><b>OR/OF</b></p> $T_n = T_1 + (n-1)d_1 + \frac{(n-1)(n-2)d_2}{2}$ $= 6 + (n-1)(0) + \frac{(n-1)(n-2)(3)}{2}$ $= 6 + \frac{n^2 - 3n + 2}{1} \left(\frac{3}{2}\right)$ $= 6 + \frac{3}{2}n^2 - \frac{9}{2}n + 3$ $= \frac{3}{2}n^2 - \frac{9}{2}n + 9$	<p>✓ <math>a = \frac{3}{2}</math></p> <p>✓ <math>b = -\frac{9}{2}</math></p> <p>✓ <math>c = 9</math></p> <p>✓ <math>T_n = \frac{3}{2}n^2 - \frac{9}{2}n + 9</math> (4)</p> <p>✓ formula ✓ substitution</p> <p>✓ simplifying</p> <p>✓ <math>T_n = \frac{3}{2}n^2 - \frac{9}{2}n + 9</math> (4)</p>
3.1.3	$\frac{3}{2}n^2 - \frac{9}{2}n + 9 = 3249$ $3n^2 - 9n + 18 = 6498$ $3n^2 - 9n - 6480 = 0$ $n^2 - 3n - 2160 = 0$ $(n + 45)(n - 48) = 0$ $n \neq -45 \quad \text{or} \quad n = 48$	<p>✓ equating general term to 3249</p> <p>✓ standard form</p> <p>✓ factors ✓ <math>n \neq -45</math> or <math>n = 48</math> (4)</p>
3.2	$-1 ; 2 \sin 3x ; 5 ; \dots$ $2 \sin 3x + 1 = 5 - 2 \sin 3x$ $4 \sin 3x = 4$ $\sin 3x = 1$ $3x = 90^\circ$ $x = 30^\circ$	<p>✓ <math>2 \sin 3x + 1 = 5 - 2 \sin 3x</math></p> <p>✓ <math>\sin 3x = 1</math></p> <p>✓ <math>3x = 90^\circ</math></p> <p>✓ <math>x = 30^\circ</math> (4)</p> <p><b>[13]</b></p>

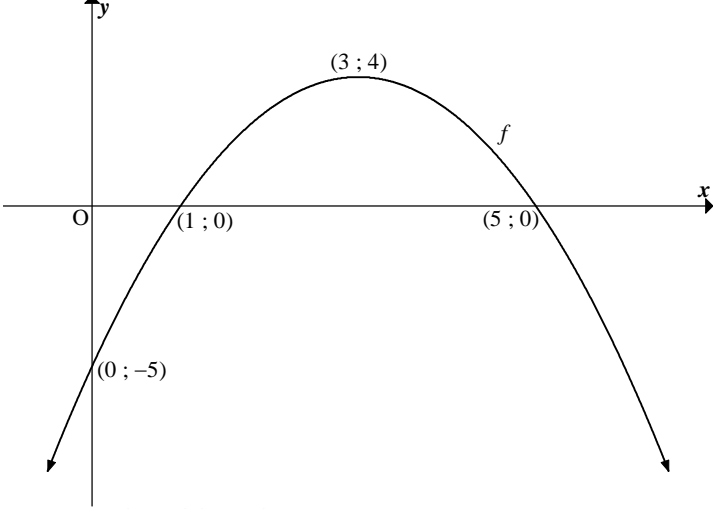
**QUESTION/VRAAG 4**

4.1	U(1; 0)	✓ (1; 0) (1)
4.2	$x = 1$ $y = 1$	✓ $x = 1$ ✓ $y = 1$ (2)
4.3	$\frac{2}{x-1} + 1 = 0$ $2 = -x + 1$ $x = -1$ T(-1; 0)	✓ $y = 0$  ✓ $x = -1$ (2)
4.4	$f(x) = \log_5 x$ $h: x = \log_5 y$ $y = 5^x$	✓ change $x$ and $y$  ✓ $y = 5^x$ (2)
4.5	$y = 0$	✓ answer (1)
4.6	$V(\sqrt{2} + 1; \sqrt{2} + 1)$ $V(2,41; 2,41)$  <b>OR / OF</b>  $x = \frac{2}{x-1} + 1$ $x^2 - x = 2 + x - 1$ $x^2 - 2x - 1 = 0$ $x = \frac{2 \pm \sqrt{4 - 4(1)(-1)}}{2}$ $= \frac{2 \pm \sqrt{8}}{2}$ $= \frac{2 \pm 2\sqrt{2}}{2}$ $= 1 \pm \sqrt{2}$ $V(1 + \sqrt{2}; 1 + \sqrt{2})$  <b>OR / OF</b> $x - 1 = \frac{2}{x-1}$ $(x-1)^2 = 2$ $x = 1 \pm \sqrt{2}$ $V(1 + \sqrt{2}; 1 + \sqrt{2})$	✓✓ $\sqrt{2} + 1$ ✓✓ $\sqrt{2} + 1$ (4)  ✓ $x = \frac{2}{x-1} + 1$  ✓ subs into correct formula  ✓ $x = \sqrt{2} + 1$ ✓ $y = \sqrt{2} + 1$ (4)  ✓ $x - 1 = \frac{2}{x-1}$ ✓ $(x-1)^2 = 2$ ✓ $x = \sqrt{2} + 1$ ✓ $y = \sqrt{2} + 1$ (4)
4.7	T'(3; 2)	✓ $x = 3$ ✓ $y = 2$ (2) <b>[14]</b>



**QUESTION 5**

5.1.1	$C(0; -3)$	✓ $C(0; -3)$ (1)
5.1.2	$f(x) = x^2 - 2x - 3$ $(x-3)(x+1) = 0$ $x = -1$ or $x = 3$ $AB = 3 - (-1)$ $AB = 4$ units	✓ factors ✓ $x$ -value ✓ other $x$ -value  ✓ answer (4)
5.1.3	$x = \frac{2}{2(1)}$ or $2x - 2 = 0$ or $x = \frac{-1+3}{2}$ $= 1$ $y = (1)^2 - 2(1) - 3$ $= -4$ $D(1; -4)$	✓ $x = 1$  ✓ $y$ value (2)
5.1.4	$C(0; -3)$ $D(1; -4)$  Average gradient / <i>Gemiddelde gradiënt</i> $= \frac{-4+3}{1-0}$ or $\frac{-3+4}{0-1}$ $= -1$	✓ $\frac{-4+3}{1-0}$ or $\frac{-3+4}{0-1}$ ✓ $-1$ (2)
5.1.5	$OC = OB = 3$ $\hat{O}CB = 45^\circ$ isosceles right angled triangle <i>Gelykbenige reghoekige driehoek</i>  <b>OR / OF</b> $\tan \beta = m_g$ $\tan \beta = 1$ $\beta = 45^\circ$ $\hat{O}BC = 45^\circ$ $\hat{O}CB = 45^\circ$	✓ equal lengths ✓ $45^\circ$ (2)  ✓ $\tan \beta = 1$  ✓ $45^\circ$ (2)
5.1.6	$-4 < k < -3$ <b>OR</b> $(-4; -3)$	✓ $-4$ ✓ $-3$ ✓ notation (3)
5.1.7	$f'(x) \cdot f''(x) > 0$ $(2x-2) \cdot 2 > 0$ $2x-2 > 0$ $x > 1$	✓ $2x-2$ ✓ $2$  ✓ $x > 1$ (3)

<p>5.2</p>	 <p> <math>f(x) = a(x-1)(x-5)</math>  <math>4 = a(3-1)(3-5)</math>  <math>4 = -4a</math>  <math>a = -1</math>  <math>f(x) = -x^2 + 6x - 5</math> </p>	<p>TP</p> <ul style="list-style-type: none"> <li>✓ <math>x = 3</math></li> <li>✓ <math>y = 4</math></li> <li>✓ <math>x</math> – intercepts</li> <li>✓ <math>y</math>-intercept</li> <li>✓ shape</li> </ul> <p>(5)</p>
		<b>[22]</b>

**QUESTION/VRAAG 6**

<p>6.1.1</p>	<p> <math>A = 150\,000(1 - 0,2)^2</math>  <math>= R96\,000</math> </p>	<ul style="list-style-type: none"> <li>✓ <math>n = 2</math></li> <li>✓ 150 000 in correct formula</li> <li>✓ 96 000 (3)</li> </ul>
<p>6.1.2</p>	<p> <math>150\,000(1 - 0,2)^n = 49\,152</math>  <math>(0,8)^n = \frac{1024}{3125}</math>  <math>n \log(0,8) = \log \frac{1024}{3125}</math>  <math>n = 5</math>                      The machine will need to be replaced at the beginning of 2020 / <i>Masjien moet aan die begin van 2020 vervang word</i>  <b>OR / OF</b>  <math>150\,000(1 - 0,2)^n = 49\,152</math>  <math>(0,8)^n = \frac{1024}{3125}</math>  <math>n = \log_{0,8} \frac{1024}{3125}</math>  <math>n = 5</math>                      The machine will need to be replaced at the beginning of 2020 / <i>Masjien moet aan die begin van 2020 vervang word</i> </p>	<ul style="list-style-type: none"> <li>✓ <math>150\,000(1 - 0,2)^n = 49\,152</math></li> <li>✓ <math>n \log(0,8) = \log \frac{1024}{3125}</math></li> <li>✓ <math>n = 5</math></li> <li>✓ 2020 (4)</li> <li>✓ <math>150\,000(1 - 0,2)^n = 49\,152</math></li> <li>✓ <math>n = \log_{0,8} \frac{1024}{3125}</math></li> <li>✓ <math>n = 5</math></li> <li>✓ 2020 (4)</li> </ul>

<p>6.1.3</p>	<p>R280 000 – R49 152 =R230 848</p> $230\ 848 = \frac{x \left[ \left( 1 + \frac{0,085}{4} \right)^{20} - 1 \right]}{\frac{0,085}{4}}$ <p><math>x = R9\ 383,26</math></p>	<p>✓ R230 848</p> <p>✓ <math>i = \frac{0,085}{4} = 0,02125</math> and <math>n = 20</math></p> <p>✓ subs into correct formula</p> <p>✓ R 9 383,26</p> <p style="text-align: right;">(4)</p>
<p>6.2</p>	$P_v = \frac{x[1 - (1 + i)^{-n}]}{i}$ $= \frac{9\ 000 \left[ 1 - \left( 1 + \frac{0,11}{12} \right)^{-180} \right]}{\frac{0,11}{12}}$ <p>= R791 837,43</p> <p>Lerato qualifies for a loan of R 791 000 under the given conditions / <i>Lerato kwalifiseer vir 'n lening van R 791 000 gegewe die kondisies</i></p>	<p>✓ <math>i = \frac{0,11}{12}</math></p> <p>✓ <math>n = 180</math></p> <p>✓ substitution correct formula</p> <p>✓ R791 837,43</p> <p>✓ R791 000</p> <p style="text-align: right;">(5) <b>[16]</b></p>

**QUESTION/VRAAG 7**

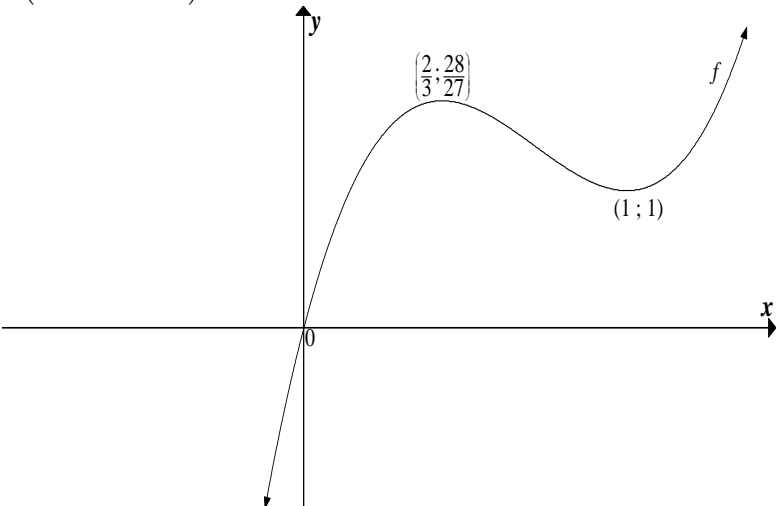
**PENALISE ONLY ONCE** for incorrect notation in this question.

<p>7.1</p>	$f(x+h) = (x+h)^2 - 5 = (x^2 + 2xh + h^2) - 5$ $= x^2 + 2xh + h^2 - 5$ $f(x+h) - f(x) = x^2 + 2xh + h^2 - 5 - (x^2 - 5)$ $= 2xh + h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $= \lim_{h \rightarrow 0} (2x+h)$ $= 2x$ <p><b>OR/OF</b></p> $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - 5 - (x^2 - 5)}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $= \lim_{h \rightarrow 0} (2x+h)$ $= 2x$	<p>✓ simplifying</p> <p>✓ formula</p> <p>✓ subst. into formula</p> <p>✓ factorisation</p> <p>✓ answer (5)</p> <p>✓ formula</p> <p>✓ subst. into formula</p> <p>✓ simplifying</p> <p>✓ factorisation</p> <p>✓ answer (5)</p>
<p>7.2</p>	$g(x) = 5x^2 - \frac{2x}{x^3}$ $= 5x^2 - 2x^{-2}$ $g'(x) = 10x + 4x^{-3}$ $= 10x + \frac{4}{x^3}$	<p>✓ <math>5x^2 - 2x^{-2}</math></p> <p>✓ <math>10x</math></p> <p>✓ <math>4x^{-3}</math> or <math>\frac{4}{x^3}</math></p> <p>(3)</p>

7.3	$h(x) = ax^2, x > 0$ $h^{-1} : x = ay^2 \quad y > 0$ $y = \sqrt{\frac{x}{a}}$ $h^{-1}(8) = \sqrt{\frac{8}{a}}$ $h'(x) = 2ax$ $h'(4) = 2a(4)$ $= 8a$ $\sqrt{\frac{8}{a}} = 8a$ $64a^2 = \frac{8}{a}$ $a^3 = \frac{1}{8}$ $a = \frac{1}{2}$	$\checkmark y = \sqrt{\frac{x}{a}}$ $\checkmark \sqrt{\frac{8}{a}}$ $\checkmark h'(4) = 8a$ $\checkmark \sqrt{\frac{8}{a}} = 8a$ $\checkmark a^3 = \frac{1}{8}$ $\checkmark a = \frac{1}{2}$
		(6)
		<b>[14]</b>

**QUESTION/VRAAG 8**

8.1	$f'(x) = 0$ $6x^2 - 10x + 4 = 0$ $3x^2 - 5x + 2 = 0$ $(3x - 2)(x - 1) = 0$ $x = \frac{2}{3} \quad \text{or} \quad x = 1$ $y = 2\left(\frac{2}{3}\right)^3 - 5\left(\frac{2}{3}\right)^2 + 4\left(\frac{2}{3}\right) \quad y = 2(1)^3 - 5(1)^2 + 4(1)$ $y = \frac{28}{27} \quad \text{or} \quad y = 1$ <p>Turning points are <math>\left(\frac{2}{3}; \frac{28}{27}\right)</math> and <math>(1; 1)</math></p>	$\checkmark \text{ derivative}$ $\checkmark \text{ derivative} = 0$ $\checkmark \text{ factors}$ $\checkmark x\text{-values}$ $\checkmark y\text{-values}$
		(5)

<p>8.2</p>	$2x^3 - 5x^2 + 4x = 0$ $x(2x^2 - 5x + 4) = 0$ $x = 0 \quad \text{or} \quad x = \frac{5 \pm \sqrt{25 - 4(2)(4)}}{4}$ $= \frac{5 \pm \sqrt{-7}}{4}$ <p>No real roots / <i>Geen reële wortels</i></p> <p><b>OR / OF</b></p> $2x^3 - 5x^2 + 4x = 0$ $x(2x^2 - 5x + 4) = 0$ $x = 0 \quad \text{or} \quad b^2 - 4ac = 25 - 4(2)(4)$ $= -7 < 0$ <p>No real roots / <i>Geen reële wortels</i></p>	$\checkmark x(2x^2 - 5x + 4) = 0$ $\checkmark x = 0$ $\checkmark \frac{5 \pm \sqrt{-7}}{4}$ <p>(3)</p> $\checkmark x(2x^2 - 5x + 4) = 0$ $\checkmark x = 0$ $\checkmark b^2 - 4ac < 0$ <p>(3)</p>
<p>8.3</p>	$f(x) = 2x^3 - 5x^2 + 4x$ $x(2x^2 - 5x + 4) = 0$ 	$\checkmark (0 ; 0)$ $\checkmark \text{turning points}$ $\checkmark \text{shape}$ <p>(3)</p>

<p>8.4</p>	<p> <math>f(x) = 2x^3 - 5x^2 + 4x</math>  <math>f'(x) = 6x^2 - 10x + 4</math>  <math>f''(x) = 12x - 10</math>  <math>f''(x) &gt; 0</math>  <math>12x - 10 &gt; 0</math>  <math>x &gt; \frac{5}{6}</math> </p> <p><b>OR</b></p> <p>Point of inflection: <math>x = -\frac{b}{3a}</math>  <math>x = -\frac{(-5)}{3(2)}</math>  <math>x = \frac{5}{6}</math></p> <p>The function is concave up for <math>x &gt; \frac{5}{6}</math> since <math>a &gt; 0</math></p> <p><b>OR</b></p> <p>Point of inflection: <math>x = \frac{\frac{2}{3} + 1}{2}</math>  <math>x = \frac{5}{6}</math></p> <p>The function is concave up for <math>x &gt; \frac{5}{6}</math> since <math>a &gt; 0</math></p>	<p> <math>\checkmark 12x - 10</math>  <math>\checkmark f''(x) &gt; 0</math> </p> <p><math>\checkmark</math> answer (3)</p> <p> <math>\checkmark x = -\frac{(-5)}{3(2)}</math>  <math>\checkmark x = \frac{5}{6}</math>  <math>\checkmark f''(x) &gt; 0</math> </p> <p>(3)</p> <p> <math>\checkmark x = \frac{\frac{2}{3} + 1}{2}</math>  <math>\checkmark x = \frac{5}{6}</math>  <math>\checkmark f''(x) &gt; 0</math> </p> <p>(3)</p> <p><b>[14]</b></p>
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**QUESTION/VRAAG 9**

<p>9.</p>	<p>Length of one side of the square / <i>lengte van sy van vierkant</i>  <math display="block">= \frac{x}{4}</math> <p>Length of the rectangle / <i>lengte van die reghoek</i> :</p> <math display="block">2l + x + \frac{x}{4} = 6</math> <math display="block">l = \frac{6 - \frac{5x}{4}}{2}</math> <math display="block">= \frac{24 - 5x}{8}</math> <math display="block">A = \left(\frac{x}{4}\right)^2 + \frac{x}{4}\left(\frac{24 - 5x}{8}\right)</math> <math display="block">= \frac{x^2}{16} + \frac{24x - 5x^2}{32}</math> <math display="block">= \frac{24x - 3x^2}{32}</math> <math display="block">A = \frac{24x - 3x^2}{32}</math> <p>For minimum area / <i>Vir minimum oppervlakte</i> <math>\frac{dA}{dx} = 0</math></p> <math display="block">\frac{dA}{dx} = \frac{24 - 6x}{32}</math> <math display="block">6x = 24</math> <math display="block">x = 4</math> </p>	<p>✓ <math>\frac{x}{4}</math></p> <p>✓ <math>\frac{6 - \frac{5x}{4}}{2}</math> or <math>\frac{24 - 5x}{8}</math></p> <p>✓ <math>\left(\frac{x}{4}\right)^2</math></p> <p>✓ <math>\frac{x}{4}\left(\frac{24 - 5x}{8}\right)</math></p> <p>✓ <math>\frac{dA}{dx} = 0</math></p> <p>✓ <math>\frac{24 - 6x}{32}</math></p> <p>✓ <math>x = 4</math></p> <p style="text-align: right;">(7)</p>
		<p><b>[7]</b></p>



**QUESTION/VRAAG 10**

10.1.1	$P(S \text{ and } T) = P(S) \times P(T)$ $\frac{1}{6} = \left(\frac{1}{4}\right) \times P(T)$ $P(T) = \frac{2}{3}$	$\checkmark P(S \text{ and } T) = P(S) \times P(T)$ $\checkmark P(T) = \frac{2}{3}$ <p style="text-align: right;">(2)</p>
10.1.2	$P(S \text{ or } T) = P(S) + P(T) - P(S \text{ and } T)$ $= \left(\frac{1}{4}\right) + \left(\frac{2}{3}\right) - \frac{1}{6}$ $= \frac{3}{4}$	$\checkmark \left(\frac{1}{4}\right) + \left(\frac{2}{3}\right) - \frac{1}{6}$ $\checkmark \frac{3}{4}$ <p style="text-align: right;">(2)</p>
10.2.1	$5!$ $= 120$	$\checkmark 5$ $\checkmark 5! \text{ or } 120$ <p style="text-align: right;">(2)</p>
10.2.2	$5^5$ $= 3125$	$\checkmark 5^5 \text{ or } 3125$ <p style="text-align: right;">(1)</p>
10.3	$n(E) = 5! \times 2! \times 2!$ $n(S) = 7!$ $P(E) = \frac{5! \times 2! \times 2!}{7!}$ $= \frac{2}{21}$	$\checkmark 5!$ $\checkmark 2! \times 2!$ $\checkmark \frac{5! \times 2! \times 2!}{7!}$ $\checkmark \frac{2}{21}$ <p style="text-align: right;">(4)</p>
		<b>[11]</b>

**QUESTION/VRAAG 11**

11	<p style="margin-left: 40px;"> <math>P(F \text{ and } W) = 0,595</math>  <math>P(F \text{ and } L) = 0,105</math>  <math>P(\text{not } F \text{ and } W) = 0,165</math>  <math>P(\text{not } F \text{ and } L) = 0,135</math> </p>	
	<p> <math>P(\text{Win}) = P(F \text{ and } W) + P(\text{not } F \text{ and } W)</math>  <math>= 0,7 \times 0,85 + 0,3 \times 0,45</math>  <math>= 0,595 + 0,165</math>  <math>= 0,76</math>  <math>= 76\%</math>  <math>= \frac{19}{25}</math> </p>	<p> <math>\checkmark 0,3</math>   <math>\checkmark P(F \text{ and } W) = 0,7 \times 0,85 = 0,595</math>  <math>\checkmark P(\text{not } F \text{ and } W) = 0,3 \times 0,45 = 0,165</math>  <math>\checkmark 0,595 + 0,165</math>   <math>\checkmark 0,76 / 76\% / \frac{19}{25}</math> </p> <p style="text-align: right;">(5)</p>
		<b>[5]</b>

**TOTAL/TOTAAL: 150**