



# basic education

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

**NATIONAL  
SENIOR CERTIFICATE/  
NASIONALE SENIOR  
SERTIFIKAAT**

**GRADE 12/GRAAD 12**

**MATHEMATICS P1/WISKUNDE VI**

**NOVEMBER 2018**

**MARKING GUIDELINES/NASIENRIGLYNE**

**MARKS: 150**

**PUNTE: 150**

**These marking guidelines consist of 18 pages.  
*Hierdie nasienriglyne bestaan uit 18 bladsye***

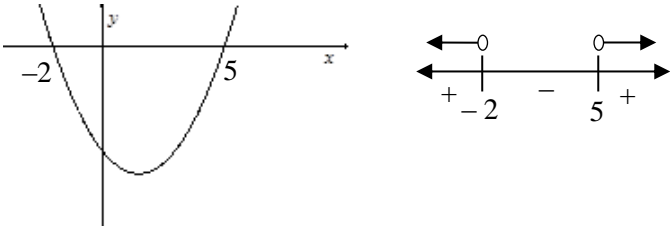
**NOTE:**

- 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 op ALLE aspekte van die nasienriglyne van toepassing.

**QUESTION/VRAAG 1**

<p>1.1.1</p>	$x^2 - 4x + 3 = 0$ $(x - 3)(x - 1) = 0$ $x = 3 \text{ or } x = 1$	<p>✓ factors/correct sub in formula                  ✓ <math>x = 3</math>                  ✓ <math>x = 1</math></p> <p>(3)</p>
<p>1.1.2</p>	$5x^2 - 5x + 1 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{5 \pm \sqrt{25 - 4(5)(1)}}{2(5)}$ $= \frac{5 \pm \sqrt{5}}{10}$ $x = 0,72 \text{ or } x = 0,28$	<p>✓ substitution into the correct formula</p> <p>✓ <math>x = 0,72</math>                  ✓ <math>x = 0,28</math></p> <p>(3)</p>
<p>1.1.3</p>	$x^2 - 3x - 10 > 0$ $(x - 5)(x + 2) > 0$ <p><b>OR/OF</b></p>  $x < -2 \text{ or } x > 5$	<p>✓ factors/ critical values</p> <p>✓✓ <math>x &lt; -2 \text{ or } x &gt; 5</math></p> <p>(3)</p>
<p>1.1.4</p>	$3\sqrt{x} = x - 4$ $9x = x^2 - 8x + 16$ $x^2 - 17x + 16 = 0$ $(x - 16)(x - 1) = 0$ $x = 16 \text{ or } x = 1$ <p>NA</p>	<p>✓ squaring both sides                  ✓ <math>x^2 - 17x + 16 = 0</math>                  ✓ factors                  ✓ answer with selection</p> <p>(4)</p>

	<p><b>OR/OF</b></p> $\frac{1}{3x^2} = x - 4$ $x - 3x^{\frac{1}{2}} - 4 = 0$ $\left(x^{\frac{1}{2}} - 4\right)\left(x^{\frac{1}{2}} + 1\right) = 0$ $\frac{1}{x^2} = 4 \quad \text{or} \quad \frac{1}{x^2} = -1$ $x = 16 \quad \text{NA}$	<p><b>OR/OF</b></p> <ul style="list-style-type: none"> <li>✓ standard form</li> <li>✓ recognize <math>x = \left(x^{\frac{1}{2}}\right)^2</math></li> <li>✓ factors</li> <li>✓ answer with selection</li> </ul> <p style="text-align: right;">(4)</p>
<p>1.2</p>	<p> <math>2y + 9x^2 = -1 \dots\dots(1)</math>  <math>3x - y = 2 \dots\dots (2)</math>  <math>y = 3x - 2 \dots\dots(3)</math>  <math>2(3x - 2) + 9x^2 = -1</math>  <math>6x - 4 + 9x^2 = -1</math>  <math>9x^2 + 6x - 3 = 0</math>  <math>3x^2 + 2x - 1 = 0</math>  <math>(3x - 1)(x + 1) = 0</math>  <math>x = \frac{1}{3} \quad \text{or} \quad x = -1</math>  <math>y = -1 \quad \text{or} \quad y = -5</math> </p> <p><b>OR/OF</b></p> <p> <math>2y + 9x^2 = -1 \dots\dots(1)</math>  <math>3x - y = 2 \dots\dots (2)</math>  <math>x = \frac{y + 2}{3}</math>  <math>2y + 9\left(\frac{y + 2}{3}\right)^2 = -1</math>  <math>2y + 9\left(\frac{y^2 + 4y + 4}{9}\right) = -1</math>  <math>2y + y^2 + 4y + 4 + 1 = 0</math>  <math>y^2 + 6y + 5 = 0</math>  <math>(y + 5)(y + 1) = 0</math>  <math>y = -1 \quad \text{or} \quad y = -5</math>  <math>x = \frac{1}{3} \quad \text{or} \quad x = -1</math> </p>	<ul style="list-style-type: none"> <li>✓ <math>y = 3x - 2</math></li> <li>✓ substitution</li> </ul> <ul style="list-style-type: none"> <li>✓ standard form</li> <li>✓ factors</li> <li>✓ both <math>x</math> values</li> <li>✓ both <math>y</math> values</li> </ul> <p style="text-align: right;">(6)</p> <p><b>OR/OF</b></p> <ul style="list-style-type: none"> <li>✓ <math>x = \frac{y + 2}{3}</math></li> <li>✓ substitution</li> </ul> <ul style="list-style-type: none"> <li>✓ standard form</li> <li>✓ factors</li> <li>✓ both <math>y</math> values</li> <li>✓ both <math>x</math> values</li> </ul> <p style="text-align: right;">(6)</p>

<p>1.3</p>	$3^{9x} = 64$ $(3^{3x})^3 = (4)^3$ $3^{3x} = 4$ $5^{\sqrt{p}} = 64$ $\sqrt{5}^{\sqrt{p}} = \sqrt{64}$ $\sqrt{5}^{\sqrt{p}} = 8$ $\frac{[3^{x-1}]^3}{\sqrt{5}^{\sqrt{p}}} = \frac{3^{3x-3}}{\sqrt{5}^{\sqrt{p}}}$ $= \frac{3^{3x}}{27 \times \sqrt{5}^{\sqrt{p}}}$ $= \frac{4}{27 \times 8}$ $= \frac{1}{54}$ <p><b>OR/OF</b></p> $\frac{(3^{x-1})^3}{\sqrt{5}^{\sqrt{p}}} = \frac{3^{3x} \cdot 3^{-3}}{(5^{0.5})^{\sqrt{p}}}$ $= \frac{3^{3x} \cdot 3^{-3}}{(5^{\sqrt{p}})^{0.5}}$ $= \frac{4 \cdot 3^{-3}}{\sqrt{64}}$ $= \frac{4 \cdot \frac{1}{27}}{8} = \frac{1}{54}$	$\checkmark 3^{3x} = 4$  $\checkmark \sqrt{5}^{\sqrt{p}} = 8$  $\checkmark 3^{3x-3} \text{ or } 3^{3x} \cdot 3^{-3}$  $\checkmark \text{answer}$ <p style="text-align: right;">(4)</p> <p><b>OR/OF</b></p> $\checkmark 3^{3x-3} \text{ or } 3^{3x} \cdot 3^{-3}$  $\checkmark 3^{3x} = 4$ $\checkmark \sqrt{5}^{\sqrt{p}} = 8$ $\checkmark \text{answer}$ <p style="text-align: right;">(4)</p>
		<p><b>[23]</b></p>

**QUESTION/VRAAG 2**

2.1.1	42	✓ answer (1)
2.1.2	$2a = 6$ $a = 3$ $T_n = 3n^2 - 8n + 7$ <p><b>OR/OF</b></p> $2a = 6$ $a = 3$ $T_n = 3n^2 + bn + c$ $T_1 : 3 + b + c = 2$ $T_2 : 12 + 2b + c = 3$ $T_2 - T_1 : b = -8$ <p>Subst. in (1): <math>-8 + c = -1</math></p> $c = 7$ $T_n = 3n^2 - 8n + 7$	$3a + b = 1$ $3(3) + b = 1$ $b = -8$ $a + b + c = 2$ $(3) + (-8) + c = 2$ $c = 7$ <p><b>OR/OF</b></p> $b + c = -1 \dots\dots(1)$ $2b + c = -9 \dots\dots(2)$ $b = -8$ $-8 + c = -1$ $c = 7$
2.1.3	$T_{20} = 3(20)^2 - 8(20) + 7$ $= 1047$	✓ substitution ✓ answer (2)
2.2	$T_n = -7n + 42$ $-7n + 42 = -140$ $-7n = -182$ $n = 26$	✓ $T_n = -7n + 42$ ✓ $-7n + 42 = -140$ ✓ $n = 26$ (3)
2.3	$S_n = \frac{n}{2}(a + l)$ $S_n = \frac{n}{2}(35 - 7n + 42)$ $S_n = \frac{n}{2}(-7n + 77)$ $S_n = -\frac{7}{2}n^2 + \frac{77}{2}n$ $-\frac{7}{2}n^2 + \frac{77}{2}n = 3n^2 - 8n + 7$ $13n^2 - 93n + 14 = 0$ $(n - 7)(13n - 2) = 0$ $n = 7 \text{ or } n = \frac{2}{13}$ <p>NA</p> $\therefore n = 7$	<p><b>OR/OF</b> <math>S_n = \frac{n}{2}[2a + (n - 1)d]</math></p> $S_n = \frac{n}{2}(70 - 7n + 7)$ $S_n = \frac{n}{2}(35 - 7n + 42) \text{ or}$ $S_n = \frac{n}{2}(70 - 7n + 7)$ <p>✓ simplification of <math>S_n</math>                  ✓ equating                  ✓ standard form                  ✓ factors                  ✓ answer with selection                  (6)</p>
		<b>[16]</b>

**QUESTION/VRAAG 3**

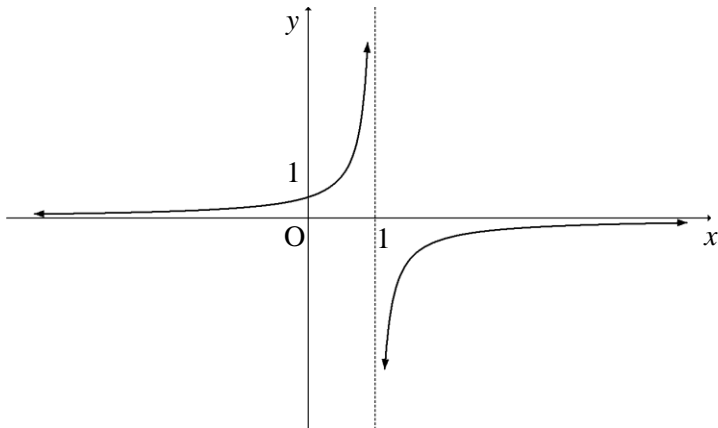
3.1	$r = \frac{1}{2} \text{ and } S_{\infty} = 6$ $S_{\infty} = \frac{a}{1-r}$ $6 = \frac{a}{1-\frac{1}{2}}$ $a = 3$	<p>✓ substitution</p> <p>✓ answer</p> <p>(2)</p>
3.2	$T_n = ar^{n-1}$ $T_8 = 3\left(\frac{1}{2}\right)^7$ $T_8 = \frac{3}{128}$	<p>✓✓ <math>T_8 = 3\left(\frac{1}{2}\right)^7</math></p> <p>(2)</p>
3.3	$\sum_{k=1}^n 3(2)^{1-k} = 5,8125$ $3 + \frac{3}{2} + \frac{3}{4} + \dots = 5,8125$ $S_n = \frac{a(1-r^n)}{1-r} = 5,8125$ $\frac{3\left[1-\left(\frac{1}{2}\right)^n\right]}{1-\frac{1}{2}} = 5,8125$ $6\left[1-\left(\frac{1}{2}\right)^n\right] = 5,8125$ $\left(\frac{1}{2}\right)^n = \frac{1}{32} = 0,03125$ $2^{-n} = 2^{-5} \quad \text{or} \quad n \log \frac{1}{2} = \log \frac{1}{32}$ $n = 5 \quad \quad \quad n = 5$	<p>✓ <math>r = \frac{1}{2}</math></p> <p>✓ substitution</p> <p>✓ simplification</p> <p>✓ answer</p> <p>(4)</p>

<p>3.4</p>	$\sum_{k=1}^{20} 3(2)^{1-k} = p$ $3 + \frac{3}{2} + \frac{3}{4} + \dots + 3 \cdot 2^{-19} = p$ $\sum_{k=1}^{20} 24(2)^{-k}$ $= 12 + 6 + 3 + \dots + 24 \cdot 2^{-20}$ $= 4 \left( 3 + \frac{3}{2} + \frac{3}{4} + \dots + 3 \cdot 2^{-19} \right)$ $= 4p$ <p><b>OR/OF</b></p> $\sum_{k=1}^{20} 3(2)^{1-k} = p$ $\sum_{k=1}^{20} 6(2)^{-k} = p$ $\therefore \sum_{k=1}^{20} 24(2)^{-k} = 4p$ <p><b>OR/OF</b></p> $\sum_{k=1}^{20} 24(2)^{-k} = \sum_{k=1}^{20} 4 \times 3 \times 2(2)^{-k}$ $= 4 \sum_{k=1}^{20} 3 \times 2(2)^{-k}$ $= 4 \sum_{k=1}^{20} 3 \times (2)^{1-k} = 4p$ <p><b>OR/OF</b></p> $S_{20} = \frac{3 \left( \left( \frac{1}{2} \right)^{20} - 1 \right)}{\frac{1}{2} - 1} = 6 = p$ $S_{20} = \frac{12 \left( \left( \frac{1}{2} \right)^{20} - 1 \right)}{\frac{1}{2} - 1} = 24$ $24 = 4 \times 6 = 4p$	<p>✓ expansion</p> <p>✓ expansion</p> <p>✓ answer (3)</p> <p><b>OR/OF</b></p> <p>✓ <math>\sum_{k=1}^{20} 6(2)^{-k} = p</math></p> <p>✓ <math>\sum_{k=1}^{20} 4 \times 6(2)^{-k}</math></p> <p>✓ <math>4p</math> (3)</p> <p><b>OR/OF</b></p> <p>✓ <math>\sum_{k=1}^{20} 4 \times 3 \times 2(2)^{-k}</math></p> <p>✓ <math>4 \sum_{k=1}^{20} 3 \times 2(2)^{-k}</math></p> <p>✓ <math>4p</math> (3)</p> <p><b>OR/OF</b></p> <p>✓ substitution and answer</p> <p>✓ substitution and answer</p> <p>✓ <math>4p</math> (3)</p> <p style="text-align: right;"><b>[11]</b></p>
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**QUESTION/VRAAG 4**

4.1	Yes For every $x$ -value there is only one corresponding $y$ value <b>OR/OF</b> One to one mapping (vertical line test)	✓ answer ✓ reason  (2)
4.2	$R(-12 ; -6)$	✓ answer (1)
4.3	$f(x) = ax^2$ substitute $(-6 ; -12)$ $-12 = a(-6)^2$ $a = \frac{-1}{3}$	✓ substitution ✓ answer (2)
4.4	$f : y = -\left(\frac{1}{3}\right)x^2$ $f^{-1} : x = -\left(\frac{1}{3}\right)y^2$ $y^2 = -3x$ $y = \pm\sqrt{-3x}$ Only $y = -\sqrt{-3x}$ and $x \leq 0$	✓ swapping $x$ and $y$ ✓ $y^2 = -3x$ ✓ $y = -\sqrt{-3x}$  (3)
		<b>[8]</b>

**QUESTION/VRAAG 5**

5.1	Domain: $x \in R ; x \neq 1$ <b>OR/OF</b> $x \in (-\infty;1) \cup (1;\infty)$	✓ answer  (1)
5.2	$x = 1$ $y = 0$	✓ $x = 1$ ✓ $y = 0$ (2)
5.3		✓ $y$ intercept ✓ vertical asymptote ✓ shape  (3)
5.4	$x \geq 0 ; x \neq 1$ <b>OR/OF</b> $0 \leq x < 1$ or $x > 1$ <b>OR/OF</b> $x \in [0;1) \cup (1;\infty)$	✓ $x \geq 0$ ✓ $x \neq 1$ <b>OR/OF</b> ✓ $0 \leq x < 1$ ✓ $x > 1$  (2)
		<b>[8]</b>



**QUESTION/VRAAG 6**

6.1	$y = mx + c$ $m = \frac{5-1}{4-0}$ $m = 1$ $c = 1$ $g(x) = x + 1$ <b>OR/OF</b> $y = mx + c$ $5 = m(4) + 1$ $m = 1$ $g(x) = x + 1$	✓ substitution into gradient formula ✓ y-intercept (0 ; 1) (2) <b>OR/OF</b> ✓ substitute (4 ; 5) ✓ c = 1 (2)
6.2	$x^2 - 2x - 3 = 0$ $(x+1)(x-3) = 0$ $x = -1$ or $x = 3$ A(-1 ; 0) B(3 ; 0)	✓ y = 0 ✓ factors ✓ x-values (3)
6.3	$x = \frac{-1+3}{2}$ or $x = \frac{-b}{2a} = \frac{-(-2)}{2(1)}$ or $f'(x) = 2x - 2 = 0$ $x = 1$ $f(x) = x^2 - 2x - 3$ $y = (1)^2 - 2(1) - 3$ or $y = (x^2 - 2x + (-1)^2) - 3 - 1$ $y = -4$ $= (x-1)^2 - 4$ $y \geq -4$ or $[-4; \infty)$	✓ x -value ✓ substitution/ completing the square ✓ answer (3)
6.4.1	<b>MN:</b> $y = (x^2 - 2x - 3) - (x + 1)$ $= x^2 - 3x - 4$ $6 = x^2 - 3x - 4$ $0 = x^2 - 3x - 10$ $0 = (x-5)(x+2)$ $x = 5$ or $x = -2$  OT = 2 or OT = 5 NA	✓ $x^2 - 3x - 4$ ✓ substituting y = 6  ✓ values of x ✓ OT = 2 (4)
6.4.2	$y = x + 1$ substitute $x = -2$ $= (-2) + 1$ $= -1$ N(-2 ; -1)	✓ substituting $x = -2$  ✓ answer (2)

<p>6.5</p>	$f'(x) = 2x - 2$ $2x - 2 = 1$ $x = \frac{3}{2}$ $f\left(\frac{3}{2}\right) = \frac{-15}{4}$ $y + \frac{15}{4} = 1\left(x - \frac{3}{2}\right) \quad \text{or} \quad -\frac{15}{4} = \frac{1}{2} + c$ $y = x - \frac{21}{4}$ <p><b>OR/OF</b></p> $x^2 - 2x - 3 = x + p$ $x^2 - 2x - 3 - x - p = 0$ <p>This equation will have equal roots, therefore:</p> $b^2 - 4ac = 0$ $(-3)^2 - 4(1)(-3 - p) = 0$ $9 + 12 + 4p = 0$ $p = \frac{-21}{4}$ $y = x - \frac{21}{4}$	$\checkmark f'(x) = 2x - 2$ $\checkmark 2x - 2 = 1$ $\checkmark x = \frac{3}{2}$ $\checkmark f\left(\frac{3}{2}\right) = \frac{-15}{4}$ $\checkmark \text{answer} \quad (5)$ <p><b>OR/OF</b></p> $\checkmark \text{equating}$ $\checkmark \text{equal roots}$ $\checkmark \text{substitution}$ $\checkmark \text{simplification}$ $\checkmark \text{answer} \quad (5)$
<p>6.6</p>	$k < \frac{-21}{4}$	$\checkmark \text{answer} \quad (1)$
		<p><b>[20]</b></p>

**QUESTION/VRAAG 7**

<p>7.1.1</p>	$F = \frac{x[(1+i)^n - 1]}{i}$ $F = \frac{15\,000 \left[ \left( 1 + \frac{0,088}{4} \right)^{16} - 1 \right]}{\frac{0,088}{4}}$ $F = R283\,972,28$	<p>✓ <math>\frac{0,088}{4}</math> and <math>n = 16</math>                  ✓ substitution into correct formula                  ✓ answer</p> <p style="text-align: right;">(3)</p>
<p>7.1.2</p>	$A = R283\,972,28 - 100\,000 \left( 1 + \frac{0,088}{4} \right)^4$ $= R\,174\,877,60$ <p><b>OR/OF</b>                  Amount at end of 3 years:</p> $F = \frac{15\,000 \left[ \left( 1 + \frac{0,088}{4} \right)^{12} - 1 \right]}{\frac{0,088}{4}} - 100\,000$ $= R103\,459,12$ <p>Amount at end of 4 years:</p> $P(1+i)^n + \frac{x[(1+i)^n - 1]}{i}$ $= 103\,459,12 \left( 1 + \frac{0,088}{4} \right)^4 + \frac{15\,000 \left[ \left( 1 + \frac{0,088}{4} \right)^4 - 1 \right]}{\frac{0,088}{4}}$ $= R\,174\,877,60$	<p>✓ future value – amount including interest                  ✓ <math>100\,000 \left( 1 + \frac{0,088}{4} \right)^4</math>                  ✓ answer</p> <p><b>OR/OF</b></p> <p>✓ R15 000 including interest – R100 000</p> <p>✓ <math>\left( 1 + \frac{0,088}{4} \right)^4</math> on <math>P</math> and <math>x</math> in <math>F_v</math>                  ✓ method</p> <p style="text-align: right;">(3)</p>
<p>7.2.1</p>	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $1\,500\,000 = \frac{x \left[ 1 - \left( 1 + \frac{0,105}{12} \right)^{-12 \times 20} \right]}{\frac{0,105}{12}}$ $x = R14\,975,70$	<p>✓ <math>i = \frac{0,105}{12}</math>                  ✓ <math>n = 240</math>                  ✓ substitution into correct formula                  ✓ answer</p> <p style="text-align: right;">(4)</p>

<p>7.2.2</p>	$P = \frac{x[1 - (1 + i)^{-n}]}{i}$ $P = \frac{14\,975,70 \left[ 1 - \left( 1 + \frac{0,105}{12} \right)^{-12 \times 8} \right]}{\frac{0,105}{12}}$ $P = R969\,927,74$ <p><b>OR/OF</b></p> <p>Balance outstanding = A – F</p> $= 1\,500\,000 \left( 1 + \frac{0,105}{12} \right)^{144} - \frac{14\,975,70 \left[ \left( 1 + \frac{0,105}{12} \right)^{144} - 1 \right]}{\frac{0,105}{12}}$ $= R5\,259\,229,61 - R4\,289\,302,47$ $= R969\,927,14$	<p>✓ R14 975,70 in P<sub>v</sub>-formula                  ✓✓ n = 96</p> <p>✓ substitution into correct formula</p> <p>✓ answer (5)</p> <p><b>OR/OF</b></p> <p>✓ n = 144 in A-formula                  ✓ n = 144 in F<sub>v</sub>-formula                  ✓ R14 975,70                  ✓ A – F</p> <p>✓ answer (5)</p>
<b>[15]</b>		

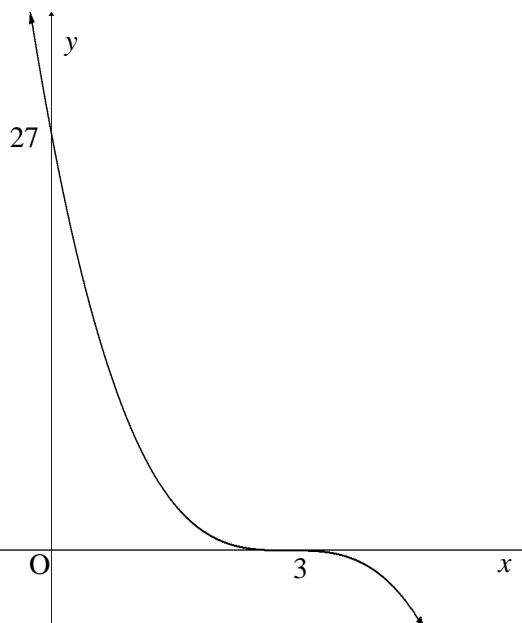
**QUESTION/VRAAG 8**

<p>8.1</p>	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - 5 - x^2 + 5}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $= \lim_{h \rightarrow 0} (2x+h)$ $= 2x$ <p><b>OR/OF</b></p> $f(x+h) = (x+h)^2 - 5$ $= x^2 + 2xh + h^2 - 5$ $f(x+h) - f(x) = x^2 + 2xh + h^2 - 5 - (x^2 - 5)$ $= 2xh + h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $= \lim_{h \rightarrow 0} (2x+h)$ $= 2x$	<p>✓ <math>x^2 + 2xh + h^2 - 5</math>                  ✓ simplification                  ✓ factorisation                  ✓ <math>\lim_{h \rightarrow 0} (2x+h)</math>                  ✓ <math>2x</math></p> <p>(5)</p> <p><b>OR/OF</b></p> <p>✓ <math>x^2 + 2xh + h^2 - 5</math>                  ✓ simplification                  ✓ factorisation                  ✓ <math>\lim_{h \rightarrow 0} (2x+h)</math>                  ✓ <math>2x</math></p> <p>(5)</p>
<p>8.2.1</p>	$y = 3x^3 + 6x^2 + x - 4$ $\frac{dy}{dx} = 9x^2 + 12x + 1$	<p>✓ <math>9x^2</math>                  ✓ <math>12x</math>                  ✓ <math>1</math></p> <p>(3)</p>
<p>8.2.2</p>	$y(x-1) = 2x(x-1)$ $y = \frac{2x(x-1)}{x-1} \text{ if } x \neq 1$ $y = 2x$ $\frac{dy}{dx} = 2$	<p>✓ <math>y(x-1)</math>                  ✓ <math>2x(x-1)</math>                  ✓ <math>y = 2x</math>                  ✓ answer</p> <p>(4)</p>
<p><b>[12]</b></p>		

**QUESTION/VRAAG 9**

9.1.1	$g(x) = (x+5)(x-x_1)^2$ $20 = 5(x_1)^2$ $x_1^2 = 4$ $x_1 = 2$ $g(x) = (x+5)(x-2)^2$ $g(x) = (x+5)(x^2 - 4x + 4)$ $g(x) = x^3 + x^2 - 16x + 20$	<p>✓ <math>(x+5)</math></p> <p>✓ repeated root ✓ <math>x_1 = 2</math></p> <p>✓ <math>g(x) = (x+5)(x^2 - 4x + 4)</math></p> <p>(4)</p>
9.1.2	$g(x) = x^3 + x^2 - 16x + 20$ $g'(x) = 3x^2 + 2x - 16$ $3x^2 + 2x - 16 = 0$ $(3x+8)(x-2) = 0$ $x = \frac{-8}{3} \text{ or } x = 2$ $R\left(\frac{-8}{3}; \frac{1372}{27}\right) \text{ or } R(-2,67; 50,81)$ $P(2; 0)$	<p>✓ derivative</p> <p>✓ equating to zero ✓ factors</p> <p>✓ co-ordinates of R ✓ co-ordinates of P</p> <p>(5)</p>
9.1.3	$g''(x) = 6x + 2$ $g''(0) = 2$ <p>∴ concave up</p> <p><b>OR/OF</b></p> $g''(x) = 6x + 2$ $6x + 2 = 0$ $x = -\frac{1}{3} \text{ is the point of inflection}$ <p>∴ concave up</p>	<p>✓ <math>g''(x) = 6x + 2</math> ✓ <math>g''(0) = 2</math> ✓ conclusion</p> <p>(3)</p> <p><b>OR/OF</b></p> <p>✓ <math>g''(x) = 6x + 2</math> ✓ <math>x = -\frac{1}{3}</math></p> <p>✓ conclusion</p> <p>(3)</p>

9.2

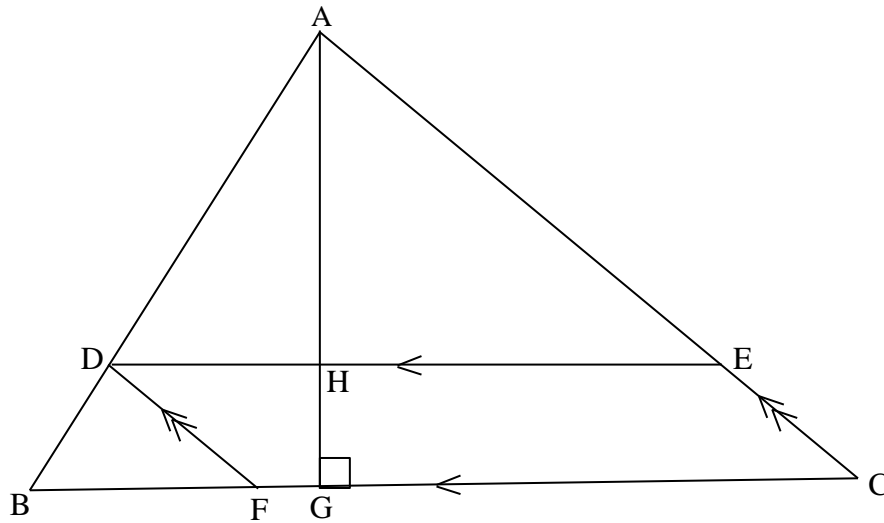


- ✓  $y$  – intercept of a cubic graph
- ✓ point of inflection and stationary point,  $x = 3$
- ✓ concave up for  $x < 3$  and concave down for  $x > 3$

(3)

[15]

**QUESTION/VRAAG 10**



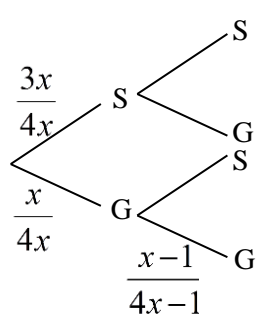
10.1	$\frac{AH}{HG} = \frac{3}{2}$	✓ answer (1)
10.2	Area of a parallelogram = base $\times$ $\perp$ height $\text{Area} = \frac{3}{5}(5-t) \cdot \frac{2}{5}t$ $\text{Area} = \frac{6}{25}(5-t)t$ $A(t) = -\frac{6}{25}t^2 + \frac{6}{5}t$ $A'(t) = -\frac{12}{25}t + \frac{6}{5}$ $-\frac{12}{25}t + \frac{6}{5} = 0$ $12t - 30 = 0$ $t = \frac{30}{12} \text{ or } \frac{5}{2}$	$\checkmark \frac{2}{5}t$ $\checkmark \frac{3}{5}(5-t)$ $\checkmark A(t) = -\frac{6}{25}t^2 + \frac{6}{5}t$ $\checkmark -\frac{12}{25}t + \frac{6}{5}$ ✓ answer (5)
		<b>[6]</b>



**QUESTION/VRAAG 11**

11.1.1	$7^5 = 16\ 807$	✓✓ answer (2)
11.1.2	$7 \times 6 \times 5 \times 4 \times 3$ $= \frac{7!}{2!} = 2520$	✓ $7 \times 6 \times 5 \times 4 \times 3$ or $\frac{7!}{2!}$ ✓ answer (2)
11.2	$2 \times 7 \times 1 = 14$	✓✓✓ $2 \times 7 \times 1$ (3)
		[7]

**QUESTION/VRAAG 12**

12.1	$P(A \text{ or } B) = P(A) + P(B)$ $0,74 = 0,45 + y$ $y = 0,29$	✓ $P(A \text{ or } B) = P(A) + P(B)$ ✓ substitution ✓ answer (3)
12.2	 <p>Let the number of mystery gift bags = <math>x</math> The total number of bags = <math>4x</math></p> $\left(\frac{x}{4x}\right) \times \left(\frac{x-1}{4x-1}\right) = \frac{7}{118}$ $\frac{1}{4} \times \frac{x-1}{4x-1} = \frac{7}{118}$ $\frac{x-1}{4x-1} = \frac{28}{118}$ $118x - 118 = 112x - 28$ $x = 15$	<p>✓ <math>4x</math></p> <p>✓ <math>\left(\frac{x}{4x}\right)</math> or <math>\left(\frac{1}{4}\right)</math></p> <p>✓ <math>\left(\frac{x-1}{4x-1}\right)</math></p> <p>✓ <math>\frac{1}{4} \times \frac{x-1}{4x-1}</math></p> <p>✓ equating to <math>\frac{7}{118}</math></p> <p>✓ answer (6)</p>

	<p><b>OR/OF</b></p> <p><math>P(\text{gift and gift}) = P(\text{gift at first draw}) \times P(\text{gift at second draw})</math></p> $\frac{7}{118} = \frac{1}{4} \times P(\text{gift at second draw})$ <p><math>P(\text{gift at second draw}) = \frac{7}{118} \div \frac{1}{4}</math></p> $= \frac{14}{59}$ <p>Therefore: <math>P(\text{gift at first draw}) = \frac{15}{60}</math></p> <p>And: 15 bags had mystery gifts inside</p>	<p><b>OR/OF</b></p> $\checkmark \frac{1}{4}$ $\checkmark \frac{1}{4} \times P(\text{gift at 2}^{\text{nd}} \text{ draw})$ $\checkmark \frac{7}{118} = \frac{1}{4} \times P(\text{gift at 2}^{\text{nd}} \text{ draw})$ $\checkmark \frac{14}{59}$ $\checkmark \frac{15}{60}$ $\checkmark \text{answer} \quad (6)$
		<b>[9]</b>

**TOTAL/TOTAAL: 150**