



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE/  
NASIONALE  
SENIOR SERTIFIKAAT**

**GRADE 12/GRAAD 12**

**SEPTEMBER 2019**

**TECHNICAL MATHEMATICS P1/TEGNIESE WISKUNDE VI  
MARKING GUIDELINE/NASIENRIGLYN**

**MARKS/PUNTE: 150**

<i>Marking Codes/Nasienriglyne</i>	
<b>A</b>	<b>Accuracy/Akkuraatheid</b>
<b>CA</b>	<b>Consistent accuracy/Volgehoue akkuraatheid</b>
<b>M</b>	<b>Method/Metode</b>
<b>R</b>	<b>Rounding/Afronding</b>
<b>NPR</b>	<b>No penalty for rounding/Geen penalisering vir afronding</b>
<b>NPU</b>	<b>No penalty for units omitted/Geen penalisering vir eenhede weggelaat</b>
<b>S</b>	<b>Simplification/Vereenvoudiging</b>
<b>SF</b>	<b>Substitution in the correct formula/Vervanging in die korrekte formule</b>
<b>AO</b>	<b>Answer only/Slegs antwoord</b>

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This marking guideline consists of 17 pages./  
*Hierdie nasienriglyn bestaan uit 17 bladsye.*

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**NOTE:**

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed-out version.
- Consistent accuracy (CA) applies to ALL aspects of the marking guideline.
- Assuming answers/values to solve a problem is NOT acceptable.

**LET WEL:**

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, sien slegs die EERSTE poging na.
- Indien 'n kandidaat 'n poging gekanselleer het, maar nie die vraag oor beantwoord het nie, merk dan die gekanselleerde poging.
- Volgehoue akkuraatheid (CA) is van toepassing op ALLE aspekte van die nasienriglyn.
- Aanvaarding van antwoorde / waardes om 'n probleem op te los is NIE aanvaarbaar NIE.

QUESTION/VRAAG 1				
1.1	1.1.1	$x(x - 5) = 6$ $x^2 - 5x = 6$ $x^2 - 5x - 6 = 0$ $(x - 6)(x + 1) = 0$ $x = 6 \text{ or } x = -1$	✓Expansion/uitbreiding <b>A</b>  ✓Standard form / <i>standaardvorm</i> <b>CA</b> ✓Factors / <i>faktore</i> <b>CA</b> ✓ $x = 6$ or/of $x = -1$ <b>CA</b>	
		<b>OR/OF</b>		
		$x(x - 5) = 6$ $x^2 - 5x = 6$ $x^2 - 5x - 6 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-6)}}{2(1)}$ $x = 6 \text{ or } x = -1$	✓Expansion/uitbreiding <b>A</b> ✓Standard form/ <i>standaardvorm</i> <b>CA</b>  ✓Substitution/ <i>vervanging</i> <b>CA</b>  ✓ $x = 6$ or/of $x = -1$ <b>CA</b>	(4)
	1.1.2	$-2x^2 - 4x - 1 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(-2)(-1)}}{2(-2)}$ $x = -1,7 \text{ or/of } x = -0,3$	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 10px;"> <b>-1 PUNT vir verkeerde afronding</b> </div> ✓Formula/formule <b>A</b>  ✓Substitution/ <i>vervanging</i> <b>SF</b>  ✓Both values of $x$ / <i>Beide waardes van <math>x</math></i> <b>CA</b> <b>R</b>	(3)

	<p>1.1.3</p>	$x^2 \left( 1 - \frac{2}{x} \right) > 0$ <p>Critical values/<i>Kritiese waardes</i>: 0 and/en 2</p> <p><math>x &lt; 0</math> or/of <math>x &gt; 2</math></p> <p><b>OR/OF</b></p> <p><math>x \in (-\infty; 0) \cup (2; \infty)</math></p> 	<p>✓ Critical values <i>/Kritiese waardes</i>      <b>A</b></p> <p>✓ Correct notation <i>/Korrekte notasie</i>      <b>A</b></p> <p>✓ or/of / U      <b>A</b></p> <p>✓ Number line / <i>Getalleglyn</i>      <b>CA</b></p>	<p>(4)</p>
<p>1.2</p>	<p>1.2.1</p>	<p>20 Seconds/<i>sekondes</i></p>	<p>✓ 20      <b>A NPU</b></p>	<p>(1)</p>
	<p>1.2.2</p>	<p>20 Seconds / <i>sekondes</i> = <math>\frac{20 \text{ Hours / ure}}{60 \times 60}</math></p>	<p>✓ <math>\frac{20 \text{ Hours / ure}}{60 \times 60}</math></p> <p><b>A</b></p>	<p>(1)</p>
	<p>1.2.3</p>	<p><math>\frac{20 \text{ Hours / ure}}{60 \times 60} = 5,55 \times 10^{-3} \text{ Hours / ure}</math></p>	<p>✓ Notation/<i>notasie</i>      <b>CA</b></p>	<p>(1)</p>
<p>1.3</p>		<p><math>\frac{x}{y} = 2</math>.....(1)</p> <p><math>x^2 + xy + y = 2</math>.....(2)</p> <p><math>x = 2y</math>.....(3)</p> <p>Then / dan,</p> <p><math>(2y)^2 + (2y)y + y = 2</math></p> <p><math>4y^2 + 2y^2 + y - 2 = 0</math></p> <p><math>6y^2 + y - 2 = 0</math></p> <p><math>(2y - 1)(3y + 2) = 0</math></p> <p><math>y = \frac{1}{2}</math> or / of <math>y = -\frac{2}{3}</math></p> <p><math>\therefore x = 1</math> or / of <math>x = -\frac{4}{3}</math></p>	<p>✓ <math>x</math> – the subject/ <i>x – die onderwerp</i>      <b>A</b></p> <p>✓ Substitution by/ <i>vervanging deur</i></p> <p><math>x = 2y</math>      <b>SF CA</b></p> <p>✓ Simplification/Std form <i>Vereenvoudiging/Stdvorm</i>      <b>S CA</b></p> <p>✓ Factors/<i>faktore</i>      <b>CA</b></p> <p>✓ <math>y</math>-values/<i>waardes</i>      <b>CA</b></p> <p>✓ <math>x</math>-values/<i>waardes</i>      <b>CA</b></p>	<p>(6)</p>

	<p style="text-align: center;"><b>OR/OF</b></p> $\frac{x}{y} = 2 \dots\dots\dots(1)$ $x^2 + xy + y = 2 \dots\dots\dots(2)$ $\frac{x}{2} = y \dots\dots\dots(3)$ <p>Then / dan,</p> $x^2 + x \left( \frac{x}{2} \right) + \frac{x}{2} = 2$ $2x^2 + x^2 + x = 4$ $3x^2 + x - 4 = 0$ $(3x + 4)(x - 1) = 0$ $x = -\frac{4}{3} \text{ or / of } x = 1$ $\therefore y = -\frac{2}{3} \text{ or / of } y = \frac{1}{2}$	<p>✓ y – the subject/ y – die onderwerp      <b>A</b></p> <p>✓ Substitute/Vervang</p> $\frac{x}{2} = y \quad \text{SF CA}$ <p>✓ Simplification /Std form Vereenvoudiging /Stdvorm</p> <p><b>S CA</b></p> <p>✓ Factors/faktore      <b>CA</b></p> <p>✓ x-values/waarde      <b>CA</b></p> <p>✓ y-values/waarde      <b>CA</b></p>	(6)
1.4	<p>1.4.1    <math>b = 2a = 2 \times 2 = 4</math></p> <p style="text-align: center;">and / en</p> <p>          <math>c = 2b = 2 \times 4 = 8</math></p> <hr/> <p>1.4.2    <math>b^2 - 4ac = (4)^2 - 4(2)(8)</math></p> <p style="text-align: center;">          <math>= 16 - 64</math></p> <p>          <math>b^2 - 4ac = -48</math></p> <p>          ∴ Roots are non - real or imaginary /</p> <p style="text-align: center;">          Wortels is nie - reëel of imaginêr</p>	<p>✓ <math>b = 4</math>      <b>A</b></p> <p>✓ <math>c = 8</math>      <b>CA</b></p> <hr/> <p>✓ <math>\Delta = -48</math>      <b>SF CA</b></p> <p>✓ Imaginary/non-real Imaginêr/nie-reëel      <b>CA</b></p>	(2)
1.5	$41 = 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$ $= 101001_2$ <p style="text-align: center;"><b>OR/OF</b></p> $41 = 32 + 8 + 1$ $= 101001_2$ <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;">-1 MARK if base 2 is omitted</div> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;">-1 PUNT as basis 2 ontbreek</div> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;">AO = 2/2</div>	<p>✓ Method/Metode      <b>A</b></p> <p>✓ <math>101001_2</math>      <b>A</b></p>	(2)
			<b>[26]</b>

QUESTION/VRAAG 2			
2.1	2.1.1	$\frac{3 \cdot 2^{x+3} - 2 \cdot 6^{x+1}}{2^{x+4} - 8 \cdot 6^x}$ $= \frac{3 \cdot 2^x \cdot 2^3 - 2 \cdot 2^x \cdot 3^x \cdot 2 \cdot 3}{2^x \cdot 2^4 - 2^3 \cdot 2^x \cdot 3^x}$ $= \frac{3 \cdot 4 \cdot 2^x (2 - 3^x)}{2^3 \cdot 2^x (2 - 3^x)}$ $= \frac{3 \cdot 4}{2^3}$ $= \frac{3}{2}$	✓ Prime factors/ <i>priemfaktore</i> <b>A</b>  ✓ CF numerator/ <i>GF teller</i> <b>CA</b>  ✓ CF denominator/ <i>GF noemer</i> <b>CA</b>  ✓ $\frac{3}{2}$ <b>S CA</b>
	<b>OR/OF</b>		
			$\frac{3 \cdot 2^{x+3} - 2 \cdot 6^{x+1}}{2^{x+4} - 8 \cdot 6^x}$ $= \frac{3 \cdot 2^x \cdot 2^3 - 2 \cdot 6^x \cdot 6}{2^x \cdot 2^4 - 2^3 \cdot 6^x}$ $= \frac{3 \cdot 2 (2^x \cdot 4 - 6^x \cdot 2)}{2^2 (2^x \cdot 4 - 6^x \cdot 2)}$ $= \frac{6}{4}$ $= \frac{3}{2}$
		<b>AO = 1/3</b>	
	2.1.2	$\frac{\log\left(\frac{1}{8}\right)}{\log 32}$ $= \frac{\log 8^{-1}}{\log 32}$ $= \frac{\log 2^{-3}}{\log 2^5}$ $= \frac{-3 \log 2}{5 \log 2}$ $= \frac{-3}{5}$	✓ $\log 8^{-1}$ <b>A</b>  ✓ Same base rule / <i>Dieselfde basis reël</i> <b>A</b>  ✓ $\frac{-3}{5}$ <b>S CA</b>
<b>OR/OF</b>			

(4)

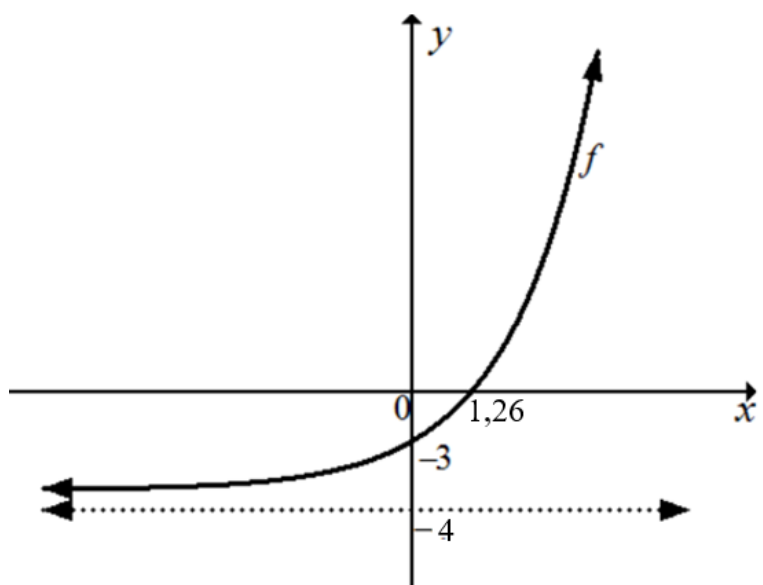
(3)

	$\frac{\log\left(\frac{1}{8}\right)}{\log 32}$ $= \frac{\log 1 - \log 8}{\log 32}$ $= \frac{-\log 2^3}{\log 2^5}$ $= \frac{-3 \log 2}{5 \log 2}$ $= \frac{-3}{5}$	<b>AO = 1/3</b>	<p>✓ <math>\log 1 - \log 8</math>      <b>A</b></p> <p>✓ Same base rule / <i>Dieselfde basis reël</i>      <b>A</b></p> <p>✓ <math>\frac{-3}{5}</math>      <b>S CA</b></p>	
2.2	$2(x - y)(x + y)$ $= 2(\sqrt{2} - \sqrt{3})(\sqrt{2} + \sqrt{3})$ $= 2(2 - 3)$ $= -2$ <p style="text-align: center;"><b>OR</b></p> $2(x - y)(x + y)$ $= 2(x^2 - y^2)$ $= 2\left[(\sqrt{2})^2 - (\sqrt{3})^2\right]$ $= 2(2 - 3)$ $= -2$	<b>AO = 1/3</b>	<p>✓ Substitution/ <i>Vervanging</i>      <b>A</b></p> <p>✓ Expansion/ <i>Uitbreiding</i>      <b>A</b></p> <p>✓ Simplification/ <i>Vereenvoudiging</i>      <b>S CA</b></p>	(3)

<p>2.3</p>	$(3^{x+1} - 1) \left( 3^{\frac{x}{2}} - 2 \right) = 0$ $3^{x+1} - 1 = 0 \quad \text{or} \quad 3^{\frac{x}{2}} - 2 = 0$ $3^{x+1} = 1 \quad \text{or} \quad 3^{\frac{x}{2}} = 2$ $3^{x+1} = 3^0 \quad \text{or} \quad \frac{x}{2} = \log_3 2$ $x + 1 = 0 \quad \text{or} \quad x = 2 \log_3 2$ $x = -1 \quad \text{or} \quad x = 1, 2, 6$	$\checkmark 3^{x+1} = 1 \quad \mathbf{A}$ $\checkmark 3^{\frac{x}{2}} = 2 \quad \mathbf{A}$ $\checkmark 0 \text{ Exponent rule/}$ $\quad \text{Eksponent r\ae}el \quad \mathbf{CA}$ $\checkmark \text{Log form/logvorm} \quad \mathbf{CA}$ $3^{x+1} = 1$ $\checkmark \text{Same base/}$ $\quad \text{dieselfde basis} \quad \mathbf{CA}$ $\checkmark x = -1 \quad \mathbf{CA}$ $3^{\frac{x}{2}} = 2$ $\checkmark x = 2 \log_3 2 \quad \mathbf{CA}$ $\checkmark x = 1, 2, 6 \quad \mathbf{CA}$ $\mathbf{NPR}$	
<b>OR/OF</b>			
	$(3^{x+1} - 1) \left( 3^{\frac{x}{2}} - 2 \right) = 0$ $3^{x+1} - 1 = 0 \quad \text{or / of} \quad 3^{\frac{x}{2}} - 2 = 0$ $3^{x+1} = 1 \quad \text{or / of} \quad 3^{\frac{x}{2}} = 2$ $\log_3 1 = x + 1 \quad \text{or / of} \quad \frac{x}{2} = \log_3 2$ $x + 1 = 0 \quad \text{or / of} \quad x = 2 \log_3 2$ $x = -1 \quad \text{or / of} \quad x = 1, 2, 6$	$\checkmark 3^{x+1} = 1 \quad \mathbf{A}$ $\checkmark 3^{\frac{x}{2}} = 2 \quad \mathbf{A}$ $\checkmark \log_3 1 \quad \mathbf{CA}$ $\checkmark \log_3 2 \quad \mathbf{CA}$ $\checkmark x + 1 = 0 \quad \mathbf{S CA}$ $\checkmark x = 2 \log_3 2 \quad \mathbf{S CA}$ $\checkmark x = -1 \quad \mathbf{CA}$ $\checkmark x = 1, 2, 6 \quad \mathbf{CA}$ $\mathbf{NPR}$	(8)
<p>2.4</p>	$3x = -3 \text{ and / en } -5y = 0$ $x = -1 \text{ and / en } y = 0$	$\checkmark \text{Equating parameters /}$ $\quad \text{Gelykstelling parameters}$ $\checkmark x = -1 \quad \mathbf{A}$ $\checkmark y = 0 \quad \mathbf{A}$	(3)

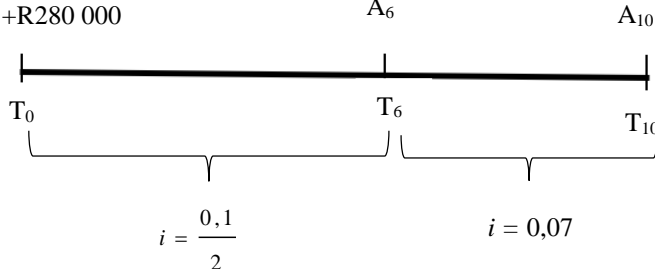
2.5	$z = \sqrt{3} - 2i$ $ z  = \sqrt{(\sqrt{3})^2 + (-2)^2}$ $ z  = \sqrt{7} = 2,65$ $\tan \theta = \frac{-2}{\sqrt{3}}$ $\theta = \tan^{-1} \left( \frac{-2}{\sqrt{3}} \right)$ <p>Reference Angle / Verwysingshoek : <math>\theta = 49,11^\circ</math></p> $\theta = 360^\circ - 49,11^\circ$ $\theta = 310,89^\circ$ $z = \sqrt{7} [ \cos(310,89^\circ) + i \sin(310,89^\circ) ]$	<p>✓ Finding/Vind <math>r</math>      <b>SF</b></p> <p>✓ <math> z  = \sqrt{13} / 2,65</math>      <b>S CA</b></p> <p>✓ <math>\tan \theta = \frac{-2}{\sqrt{3}}</math>      <b>A</b></p> <p>✓ Reference angle/ Verwysingshoek      <b>CA</b></p> <p>✓ <math>\theta = 310,88^\circ</math>      <b>CA</b></p> <p>✓ Correct form / Korrekte vorm      <b>CA</b></p>	(6)
			<b>[27]</b>



QUESTION/VRAAG 3				
3.1	$y = -4$	$\checkmark y = -4$	<b>A</b>	(1)
3.2	$3^x - 4 = 0$ $3^x = 4$ $x = \log_3 4$ $x = 1,26$	$\checkmark f(x) = 0$ $\checkmark$ Log form/vorm $\checkmark x = 1,26$	<b>A</b> <b>A</b> <b>CA</b>	(3)
3.3	$f(x) = 3^x - 4$ $f(0) = 3^0 - 4$ $y = -3$	$\checkmark$ Subst./Vervang $x = 0$ $\checkmark y = -3$	<b>A</b>	(2)
3.4		$\checkmark$ Shape/vorm $\checkmark$ Both intercepts / <i>Beide afsnitte</i> $\checkmark$ Asymptote / <i>Asimptote</i>	<b>A</b> <b>CA</b> <b>CA</b>	(3)
3.5	$y > -4$ <b>OR/OF</b> $y \in (-4; \infty)$ <b>OR/OF</b> $-4 < y < \infty$	$\checkmark -4$	<b>A</b>	(1)
				<b>[10]</b>

QUESTION/VRAAG 4			
4.1	B (0 ; 2)	✓ B(2;0)	A (1)
4.2	$g(x) = \sqrt{2^2 - x^2} = \sqrt{4 - x^2}$	✓ Substitution/ Vervanging	SF
		✓ $g(x) = \sqrt{4 - x^2}$	CA (2)
4.3	$x \in [-2; 2]$ <b>OR / OF</b> $-2 \leq x \leq 2$ <b>OR / OF</b> $x \geq -2$ and / en $x \leq 2$	✓ Critical values/ Kritiese waardes	CA
		<b>From/vanaf 4.1</b> ✓ Notation/Notasie	A (2)
4.4	$x \in (-2; 0)$ <b>OR/OF</b> $-2 < x < 0$	✓ Critical values/Kritiese waardes	CA
		<b>From/vanaf 4.1</b> ✓ Notation/Notasie	A (2)
			[7]

<b>QUESTION/VRAAG 5</b>			
5.1	$h(0) = -(0)^2 + 4(0) - 3 = -3$ $C(0; -3)$	<b>AO = 2/2</b>	$\checkmark 0$ $\checkmark -3$ <b>A</b> <b>A</b> (2)
5.2	$m(x) = \frac{p}{x} - 3$ $-1 = \frac{p}{1} - 3$ $p = 2$		$\checkmark$ Substitution/ Vervanging <b>SF</b> $\checkmark p = 2$ <b>CA</b> (2)
5.3	$m(x) = \frac{2}{x} - 3$		$\checkmark$ Substitute 2 and -3/ Vervang 2 en -3 <b>SF</b> (1)
5.4	$x = \frac{-b}{2a}$ $= \frac{-4}{2(-1)}$ $= 2$ $h(2) = -(2)^2 + 4(2) - 3$ $= 1$ $D(2;1)$		$\checkmark$ Substitution / Vervanging <b>M</b> $\checkmark x = 2$ <b>CA</b> $\checkmark h(2)$ <b>CA</b> $\checkmark D(2;1)$ <b>CA</b>
	<b>OR/OF</b>		
	$h'(x) = -2x + 4$ $= 0$ $\therefore x = 2$ $h(2) = -(2)^2 + 4(2) - 3$ $= 1$ $D(2;1)$		$\checkmark h'(x) = -2x + 4$ <b>M</b> $\checkmark x = 2$ <b>CA</b> $\checkmark h(2)$ <b>CA</b> $\checkmark D(2;1)$ <b>CA</b> (4)
	<b>OR/OF</b>		
	$(-x + 1)(x - 3) = 0$ $x = 1$ or / of $x = 3$ $\therefore$ Axis of symmetry / Simmetriese - as : $x = \frac{1+3}{2} = 2$ $h(2) = -(2)^2 + 4(2) - 3 = 1$ $D(2;1)$		$\checkmark$ x-intercepts/ x-afsnitte <b>M</b> $\checkmark x = 2$ <b>CA</b> $\checkmark h(2)$ <b>CA</b> $\checkmark D(2;1)$ <b>CA</b>
5.5	$DE = 1 + 3 = 4$ units/eenhede		$\checkmark$ OE+OD <b>A</b> $\checkmark 4$ <b>CA</b> (2)
			<b>[11]</b>

QUESTION/VRAAG 6			
6.1	$i_{eff} = \left(1 + \frac{i}{m}\right)^m - 1$ $i_{eff} = \left(1 + \frac{0,062}{12}\right)^{12} - 1$ $i_{eff} = 0,0637$ <p><math>\therefore</math> Effective interest rate <math>\approx 6,4\%</math></p>	<p>✓ Formula/formule <b>A</b></p> <p>✓ Substitution/ vervanging <b>SF</b></p> <p>✓ <math>i_{eff} \approx 6,4\%</math> <b>S</b></p> <p><b>NPR</b></p>	(3)
6.2	$A = P(1 - in)$ $40\,000 = P(1 - 0,1 \times 3)$ $P = \frac{40\,000}{(1 - 0,1 \times 3)} = R\,57\,142,86$	<p>✓ Substitute <math>i</math> and <math>n</math> / Vervang <math>i</math> en <math>n</math> <b>A</b></p> <p>✓ Substitution / Vervanging <b>SF</b></p> <p>✓ <math>P</math> subject /onderwerp <b>CA</b></p> <p>✓ Simplification / Vereenvoudiging <b>S CA</b></p>	(4)
6.3	 <p><math>i = \frac{0,1}{2}</math></p> <p><math>i = 0,07</math></p> $A_6 = 280\,000 \left(1 + \frac{0,1}{2}\right)^{6 \times 2}$ $A_6 = R\,502\,839,7713$ $P_6 = R\,502\,839,7713 - R\,150\,000$ $P_6 = R\,352\,839,7713$ $A_{10} = R\,352\,839,7713(1 + 0,07)^4$ $A_{10} = R\,462\,500,96$	<p>✓ Values of <math>i</math> and <math>n</math> / Wardes van <math>i</math> and <math>n</math> <b>A</b></p> <p>✓ Substitute <math>P</math>, <math>i</math> and <math>n</math> / Vervang <math>P</math>, <math>i</math> en <math>n</math> <b>SF</b></p> <p><b>CA <math>i</math> and <math>n</math></b></p> <p>✓ <math>A_6</math> <b>CA</b></p> <p>✓ <math>P_6</math> <b>CA</b></p> <p>✓ Substitution <math>P_6</math>, <math>i</math> and <math>n</math> / Vervang <math>P_6</math>, <math>i</math> en <math>n</math> <b>SF CA</b></p> <p>✓ Value of <math>A_{10}</math> / waarde van <math>A_{10}</math> <b>CA</b></p>	

<b>OR/OF</b>			
	$A_6 = 280\,000 \left(1 + \frac{0,1}{2}\right)^{6 \times 2}$ $A_6 = R\,502\,839,7713$ $A_{6(1)} = R\,502\,839,7713 (1 + 0,07)^4$ $A_{6(1)} = R\,659\,120,3659$ $A_{7(1)} = R\,150\,000 (1 + 0,07)^4$ $A_{7(1)} = R\,196\,619,4015$ $A_{10} = R\,659\,120,3659 - R\,196\,619,4015$ $A_{10} = R\,462\,500,96$	✓ Values of $i$ and $n$ / Waardes van $i$ en $n$ <b>A</b>  ✓ Substitute $P, i$ and $n$ / Vervang $P, i$ en $n$ <b>SF</b> <b>CA <math>i</math> and <math>n</math></b>  ✓ $A_6$ <b>CA</b>  ✓ $A_{6(1)}$ <b>CA</b>  ✓ $A_{7(1)}$ <b>A</b>  ✓ Value of $A_{10}$ / Waarde van $A_{10}$ <b>CA</b>	(6) <b>[13]</b>
<b>QUESTION/VRAAG 7</b>			
<b>NOTE: Deduct 1 mark for incorrect notation from 7.1 to 7.2.2</b>			
<b>LET WEL: Penaliseer 1 punt vir verkeerde notasie vanaf 7.1 tot 7.2.2</b>			
7.1	$f(x) = -2x + 2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-2(x+h) + 2 - (-2x + 2)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-2x - 2h + 2 + 2x - 2}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-2h}{h}$ $f'(x) = -2$	✓ Definition/definisie <b>A</b>  ✓ Substitution/vervanging <b>SF</b>  ✓ Simplification/ vereenvoudiging <b>S CA</b>  ✓ Simplification/ vereenvoudiging <b>S CA</b>  ✓ $f'(x) = -2$ <b>CA</b>	(5)
7.2	$\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2}$ $= \lim_{x \rightarrow 2} \frac{(x-2)(x^2 + 2x + 4)}{x - 2}$ $= \lim_{x \rightarrow 2} x^2 + 2x + 4$ $= 12$	✓ $(x-2)(x^2+2x+4)$ <b>A</b>  ✓ Simplification/ Vereenvoudiging <b>CA</b> ✓ 12 <b>CA</b>	(3)

7.3	7.3.1	$y = -\frac{3}{5x^2} - 2x^2 + 2x$ $y = -\frac{3x^{-2}}{5} - 2x^2 + 2x$ $\frac{dy}{dx} = \frac{6x^{-3}}{5} - 4x + 2$	$\checkmark -\frac{3x^{-2}}{5}$ $\checkmark \frac{6x^{-3}}{5}$ $\checkmark -4x$ $\checkmark 2$	<p style="text-align: right;"><b>A</b></p> <p style="text-align: right;"><b>CA</b></p> <p style="text-align: right;"><b>A</b></p> <p style="text-align: right;"><b>A</b></p>	(4)
	7.3.2	$D_x (\sqrt[3]{x^2} - 2x^{-3} - 4)$ $= D_x \left( x^{\frac{2}{3}} - 2x^{-3} - 4 \right)$ $= \frac{2}{3} x^{-\frac{1}{3}} + 6x^{-4} + 0$	$\checkmark x^{\frac{2}{3}}$ $\checkmark \frac{2}{3} x^{-\frac{1}{3}}$ $\checkmark 6x^{-4}$	<p style="text-align: right;"><b>A</b></p> <p style="text-align: right;"><b>CA</b></p> <p style="text-align: right;"><b>A</b></p>	(3)
					<b>[15]</b>

QUESTION/VRAAG 8					
8.1	8.1.1	$y = -4$	$\checkmark y = -4$	<b>A</b>	(1)
	8.1.2	$f(x) = (1 - 2x)(x^2 - 4)$ $0 = (1 - 2x)(x^2 - 4)$ $x = \frac{1}{2}$ or / of $x = 2$ or / of $x = -2$	$\checkmark f(x) = 0$ $\checkmark x = \frac{1}{2}$ $\checkmark x = \pm 2$	<b>A</b> <b>A</b> <b>A</b>	(3)
	8.1.3	$f(x) = -2x^3 + x^2 + 8x - 4$	$\checkmark f(x) = -2x^3 + x^2 + 8x - 4$	<b>A</b>	(1)
	8.1.4	$f(x) = -2x^3 + x^2 + 8x - 4$ $f'(x) = -6x^2 + 2x + 8$ $0 = -6x^2 + 2x + 8$ $0 = 3x^2 - x - 4$ $0 = (x + 1)(3x - 4)$ $x = \frac{4}{3}$ $f\left(\frac{4}{3}\right) = -2\left(\frac{4}{3}\right)^3 + \left(\frac{4}{3}\right)^2 + 8\left(\frac{4}{3}\right) - 4$ $f\left(\frac{4}{3}\right) = \frac{100}{27} = 3,70$ Turning Point / Draaipunt : $\left(\frac{4}{3}; \frac{100}{27}\right)$	$\checkmark f'(x)$ <b>CA from/vanaf 8.3</b> $\checkmark f'(x) = 0$ <b>CA</b> $\checkmark$ Factors/faktore <b>CA</b> $\checkmark x = \frac{4}{3}$ <b>CA</b> $\checkmark \left(\frac{100}{27}\right)$ <b>CA</b>		(5)
	8.1.5		$\checkmark$ x-intercepts/afsnitte <b>CA</b> $\checkmark$ y-intercept/afsnit <b>CA</b> $\checkmark$ Turning Points/ Draaipunte <b>CA</b> $\checkmark$ Shape/vorm <b>CA</b>		(4)

8.2	<p>Average gradient / Gemiddelde gradiënt</p> $= \frac{g(a) - g(4)}{a - 4} = 9$ $\frac{(2a^2 - a - 3) - 25}{a - 4} = 9$ $2a^2 - a - 28 = 9a - 36$ $2a^2 - 10a + 8 = 0$ $a^2 - 5a + 4 = 0$ $(a - 4)(a - 1) = 0$ $a = 1$	<p>✓ <math>\frac{g(a) - g(4)}{a - 4}</math></p> <p>✓ =9</p> <p>✓ STD form/vorm</p> <p>✓ Factors/faktore</p> <p>✓ <math>a = 1</math></p>	<p>SF</p> <p>A</p> <p>CA</p> <p>CA</p> <p>CA</p>	(5)
				[19]
<b>QUESTION/VRAAG 9</b>				
9.1	<p><math>V(t) = t^2 - 9t + 35</math></p> <p><math>V(0) = (0)^2 - 9(0) + 35 = 35l</math></p>	<p>✓ Substitution / vervanging</p> <p>✓ <math>V(0) = 35l</math></p>	<p>SF</p> <p>A</p> <p>NPU</p>	(2)
9.2	<p><math>V(t) = t^2 - 9t + 35</math></p> <p><math>V(1) = (1)^2 - 9(1) + 35 = 27l</math></p>	<p>✓ Substitution/ Vervanging</p> <p>✓ <math>V(1) = 27l</math></p>	<p>SF</p> <p>A</p> <p>NPU</p>	(2)
9.3	<p><math>V(t) = t^2 - 9t + 35</math></p> <p><math>V'(t) = 2t - 9</math></p> <p><math>V'(t) = 2t - 9 = 0</math></p> <p><math>t = \frac{9}{2}</math></p>	<p>✓ <math>V'(t)</math></p> <p>✓ <math>V'(t) = 0</math></p> <p>✓ <math>t = \frac{9}{2}</math></p>	<p>A</p> <p>A</p> <p>CA</p>	(3)
9.4	<p>Maximum amount of fuel leaked / Maksimum brandstof wat uitgelek het:</p> <p><math>V\left(\frac{9}{2}\right) = \left(\frac{9}{2}\right)^2 - 9\left(\frac{9}{2}\right) + 35 \approx 14,75l</math></p>	<p>✓ Substitution/ vervanging</p> <p>✓ <math>V \approx 14,75l</math></p>	<p>CA</p> <p>CA</p>	(2)
				[9]



QUESTION/VRAAG 10				
10.1		$\int \left( x^2 + \frac{3}{x} - 1 \right) dx = \frac{x^3}{3} + 3 \ln x - x + c$	$\checkmark \frac{x^3}{3}$ <b>A</b> $\checkmark 3 \ln x$ <b>A</b> $\checkmark x$ <b>A</b> $\checkmark c$ <b>A</b>	(4)
10.2	10.2.1	<p>Area under the curve:  <i>Oppervlakte onder die kurwe:</i></p> $= \int_{0,59}^{3,41} (-x + 4) dx$ $= \left( -\frac{x^2}{2} + 4x \right)_{0,59}^{3,41}$ $= \left( -\frac{(3,41)^2}{2} + 4(3,41) \right) - \left( -\frac{(0,59)^2}{2} + 4(0,59) \right)$ <p>= 5,64 square units / vierkante eenhede</p>	$\checkmark$ Integral function/ <i>Integraalfunksie</i> <b>A</b>  $\checkmark$ Correct lower and upper bounds/ <i>Korrekte onder- en                      bogrense</i> <b>A</b> $\checkmark$ Simplification/ <i>Vereenvoudiging</i> <b>CA</b>  $\checkmark$ Substitute/ <i>Vervang 3,41</i> <b>CA</b>  $\checkmark$ Substitute/ <i>Vervang 0,59</i> <b>CA</b>  $\checkmark$ 5,64 <b>CA</b>	(6)
	10.2.2	<p>Striped A = A under <math>f(x)</math> – A under <math>g(x)</math>                      Striped area = 5,64 – 3,5                      Striped area = 2,13 square units</p> <p><i>Gestreepte A = A onder <math>f(x)</math> – A onder <math>g(x)</math>                      Gestreepte opperv = 5,64 – 3,5                      Gestreepte opperv = 2,13 vierkante eenhede</i></p>	$\checkmark$ Difference/ <i>Verskil</i> $\checkmark$ Substitution/ <i>Vervanging</i> $\checkmark$ 2,13 square units/ <i>vierkante eenhede</i> <b>CA</b>	(3)
				[13]
<b>TOTAL/TOTAAL:</b>				<b>150</b>