Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 12

SEPTEMBER 2021

TECHNICAL MATHEMATICS P1/*TEGNIESE WISKUNDE V1*
MARKING GUIDELINE/*NASIENRIGLYN*

MARKS/PUNTE: 150

MARKING CODES/*NASIENKODES*	
A	Accuracy/*Akkuraatheid*
AO	Answer only/*Slegs antwoord*
CA	Consistent accuracy/*Volgehoue akkuraatheid*
M	Method/*Metode*
R	Rounding/*Afronding*
NPR	No penalty for rounding/*Geen penalisering vir afronding nie*
NPU	No penalty for units omitted/*Geen penalisering vir eenhede weggelaat nie*
S	Simplification/*Vereenvoudiging*
SF	Substitution in the correct formula/*Vervanging met korrekte formule*

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

NOTE/*LET WEL*:

- **If a candidate answers a question TWICE, only mark the FIRST attempt./***Indien 'n kandidaat 'n vraag TWEE KEER beantwoord, merk slegs die EERSTE poging.*
- **If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed-out version./***Indien 'n kandidaat 'n poging op 'n vraag kanselleer, maar nie die vraag weer beantwoord nie, merk die gekanselleerde poging.*
- **Consistent accuracy (CA) applies as indicated on the marking guidelines./***Volgehoue akkuraatheid is van toepassing soos in die nasienriglyn aangedui.*
- **Assuming answers/values to solve a problem is NOT acceptable./** *Om antwoorde of waardes te aanvaar om 'n probleem op te los is onaanvaarbaar.*

QUESTION/*VRAAG* 1

1.1.1	$21x^2+13x=0$ $x(21x+13)=0$ $x=0$ or $x=-\frac{13}{21}$ **OR/*OF*** $21x^2+13x=0$ $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $x=\frac{-(13)\pm\sqrt{(13)^2-4(21)(0)}}{2(21)}$ $x=0$ or/*of* $x=-\frac{13}{21}$	✓ Factors/*faktore* ✓ Both x-values/*beide x-waardes* **OR/*OF*** ✓ Substitution/*Vervanging* ✓ Both x-values/*beide x-waardes*	**A** **CA** **A** **CA**	(2)
1.1.2	$x+5=\frac{7}{x}$ $x^2+5x=7$ $x^2+5x-7=0$ $x=\frac{-(5)\pm\sqrt{(5)^2-4(1)(-7)}}{2(1)}$ $x=1$, 14 or/*of* $x=-6$, 14	✓ $x^2+5x=7$ ✓ Standard form/*standaardvorm* ✓ Substitution/*vervanging* ✓ Both values of x/*beide x-waardes* **R**	**A** **CA** **CA** **CA**	(4)
1.1.3	$-5x^2-4x+1\geq 0$ $-(x+1)(5x-1)\geq 0$ CVs: -1 and $\frac{1}{5}$ $-1\leq x\leq\frac{1}{5}$ or/*of* $x\in\left[-1\,;\,\frac{1}{5}\right]$ or / *of* $x\geq -1$ and / *en* $x\leq\frac{1}{5}$ **OR/*OF***	✓ Factors/*faktore* **M** ✓ Critical Values/*Kritiese waardes* **NPR** ✓ Correct notation/*Korrekte notasie* **OR/*OF***	**A** **CA** **CA**	

	$-5x^2-4x+1\geq 0$ $x=\frac{-(-4)\pm\sqrt{(-5)^2-4(-5)(1)}}{2(-5)}$ CVs/ / *KWs*: -1 and/*en* $\frac{1}{5}$ $-1\leq x\leq\frac{1}{5}$ or/*of* $x\in\left[-1\,;\,\frac{1}{5}\right]$ or/*of* $x\geq -1$ and/*en* $x\leq\frac{1}{5}$	✓ Substitution/*Vervanging* **M** ✓ Critical values/*Kritiese waardes* **NPR** ✓ Correct notation/*Korrekte notasie*	**A** **CA** **CA**	(3)
1.2	$2x+y=1.....(1)$ $x^2+y^2+2x-6y=9.....(2)$ $y=1-2x.....(3)$ $x^2+(1-2x)^2+2x-6(1-2x)=9$ $x^2+1-4x+4x^2+2x-6+12x=9$ $5x^2+10x-14=0$ $x=\frac{-(10)\pm\sqrt{(10)^2-4(5)(-14)}}{2(5)}$ $x=0\,,95$ or/*of* $x=-2\,,95$ $\therefore y=1-2(0\,,95)$ or / *of* $x=1-2(-2\,,95)$ $y=-0\,,9$ or/*of* $y=6\,,9$	✓ Subject of the formula/ *Onderwerp van die formule* ✓ Substitution/*vervanging* ✓ Simplification/ *vereenvoudiging* ✓ Standard form/ *standaardvorm* ✓ Substitution into the formula/*vervanging in die formule* ✓ Both *x*-values/*beide x-waardes* ✓ Both *y*-values/*beide y-waardes* **NPR**	**A** **CA** **S** **CA** **SF** **CA** **CA**	

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OR / *OF*

$2x+y=1 \quad \ldots\ldots(1)$

$x^2+y^2+2x-6y=9 \quad \ldots\ldots(2)$

$x=\frac{1-y}{2} \quad \ldots\ldots(3)$

$\left(\frac{1-y}{2}\right)^2+y^2+2\left(\frac{1-y}{2}\right)-6y=9$

$\frac{1-2y+y^2}{4}+y^2+1-y-6y-9=0$

$1-2y+y^2+4y^2+4-4y-24y-36=0$

$5y^2-30y-31=0$

$x=\frac{-(-30)\pm\sqrt{(-30)^2-4(5)(-31)}}{2(5)}$

$y=-0\,,9 \quad$ or/*of* $\quad y=6\,,9$

$\therefore x=\frac{1-(-0\,,9)}{2} \quad$ or/*of* $\quad x=\frac{1-(6\,,9)}{2}$

$x=0\,,95 \quad$ or/*of* $\quad x=-2\,,95$

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OR/*OF*

✓ Subject of the formule/ *Onderwerp van formulae* **A**

✓ Substitution/*Vervanging* **CA**

✓ Simplification/ *Vereenvoudiging* **S**

✓ Standard form/ *Standaardvorm* **CA**

✓ SF **SF**

✓ Both *y*-values/*Beide y-waardes* **CA**

✓ Both *x*-values/*Beide x-waardes* **CA**

NPR

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<td>(7)</td>
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<tr>
<td>1.3.1</td>
<td>110 km/h $= \frac{110\times1000}{1\times60\times60}$
$= 30{,}55$ m/s
AO: 1 Mark/*punt*</td>
<td>✓ 30,55 m/s **NPU**</td>
<td>**A**</td>
<td>(1)</td>
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<td>1.3.2</td>
<td>30,55 m/s = $3{,}055 \times 10^1$ m</td>
<td>✓ $3{,}055 \times 10^1$</td>
<td>**A**</td>
<td>(1)</td>
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<td>1.4</td>
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2	315	Remainder/*Res*
2	157	1
2	78	1
2	39	0
2	18	1
2	9	1
2	4	1
2	2	0
2	1	0
1	0	1

So $315 = 100111011_2$

OR/*OF*

$2^8+2^5+2^4+2^3+2^1+2^0=315$

$1\ 0\ 0\ 1\ 1\ 1\ 0\ 1\ 1_2 \quad = 315$

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✓ Method/*Metode*

✓ 100111011_2

AO: 1 Mark/*Punt*
Ignore: No base
Ignoreer: Geen basis

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<td>**A**

A</td>
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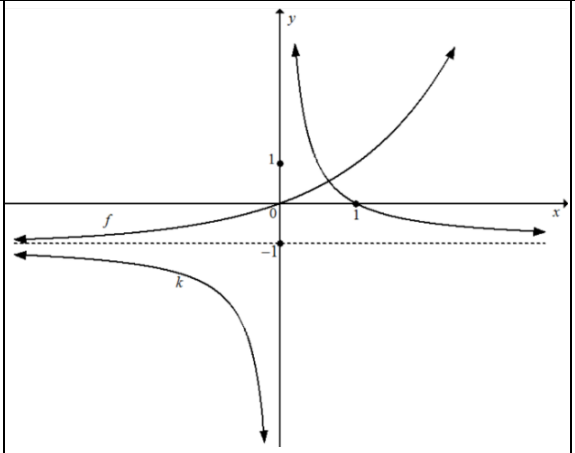
QUESTION/*VRAAG* 2				
2.1.1	It has one root/*Dit het een wortel.*	✓ one/*een*	**A**	(1)
2.1.2	Real/*Reëel* Rational/*Rasionaal* and/*en* Equal/*Gelyk*	✓ Real/*Reëel* ✓ Rational/*Rasionaal* ✓ Equal/*Gelyk*	**A** **A** **A**	(3)
2.2	(a) $P = 1$ and/*en* $b = 3$ (d) S = 1 and/*en* $b = -3$	✓ $a = 1$ and/*en* $b = 3$ ✓ $a = 1$ and/*en* $b = -3$	**A** **A**	(2)
				[6]

QUESTION/*VRAAG* 3				
3.1	$\frac{\sqrt{5}.\sqrt{15}+\sqrt{3}}{\sqrt{12}}$ $=\frac{\sqrt{5}.\sqrt{3.5}+\sqrt{3}}{\sqrt{2^2.3}}$ $=\frac{5\sqrt{3}+\sqrt{3}}{2\sqrt{3}}$ $=\frac{6\sqrt{3}}{2\sqrt{3}}$ $=3$ **OR/*OF*** $\frac{\sqrt{5}.\sqrt{15}+\sqrt{3}}{\sqrt{12}}$ $=\frac{\sqrt{75}+\sqrt{3}}{\sqrt{12}}$ $=\frac{\sqrt{25.3}+\sqrt{3}}{\sqrt{4.3}}$ $=\frac{5\sqrt{3}+\sqrt{3}}{2\sqrt{3}}$ $=\frac{6\sqrt{3}}{2\sqrt{3}}$ $=3$	✓ Prime factors/*Priemfaktore* ✓ Simplification/*Vereenvoudiging* ✓ Simplification/*Vereenvoudiging* ✓ 3 **OR/*OF*** ✓ Simplification/*Vereenvoudiging* ✓ Simplification/*Vereenvoudiging* ✓ Simplification/*Vereenvoudiging* ✓ 3	**A** **CA** **CA** **CA**	(4)
3.2	$\log 5+\log\left(\frac{8}{12}\right)-2\log\left(\frac{1}{10}\right)$ $=\log 5+\log\left(\frac{8}{12}\right)-2\log 10^{-1}$ $=\log 5+\log\left(\frac{2}{3}\right)+2$ $=\log\left(5\times\frac{2}{3}\right)+2$ $=\log\left(\frac{10}{3}\right)+2$ $=\log 10-\log 3+2$ $=1+2-\log 3$ $=3-\log 3$	✓ Simplification/*Vereenvoudiging* ✓ Log Property/*Eienskap* ✓ Same Base Rule/*Dieselfde basisreël* ✓ Log Property/*Eienskap* ✓ Log Property/*Eienskap*	**S** **CA** **CA** **S** **CA**	

	OR/*OF*	**OR/*OF***		
	$\log 5+\log\left(\frac{8}{12}\right)-2\log\left(\frac{1}{10}\right)$ $=\log 5+\log 8-\log 12-2(\log 1-\log 10)$ $=\log\left(\frac{40}{12}\right)-2(0-1)$ $=\log\left(\frac{10}{3}\right)+2$ $=\log 10-\log 3+2$ $=1+2-\log 3$ $=3-\log 3$	✓ Log Property/*Eienskap* ✓ Log Property/*Eienskap* ✓ Log Property/*Eienskap* ✓ Log Property/*Eienskap* ✓ Log Property/*Eienskap*	**S** **CA** **CA** **S** **CA**	(5)
3.3	$3\cdot 2^{2n+1}-8^{n-1}=4^n$ $-2^{3n-3}+3.2^{2n+1}=2^{2n}$ $2^{2n}\left(-2^n.2^{-3}+3.2\right)=2^{2n}$ $-2^n.2^{-3}+6=1$ $-\frac{2^n}{8}=1-6$ $2^n=40$ $n=\log_2 40$ $n=5,32$	✓ Common Factor/*Gemene faktor* ✓ Simplification/*Vereenvoudiging* ✓ Log form/*vorm* ✓ n = 5,32	**A** **CA** **CA** **CA**	(4)
3.4.1	$z = 5 - 3i$	✓ $5 - 3i$	**A**	(1)
3.4.2	$\lvert z\rvert=\sqrt{(5)^2+(-3)^2}$ $\lvert z\rvert=\sqrt{34}$	✓Substitution/*Vervanging* ✓Modulus	**A** **CA**	(2)
3.4.3	$\tan\theta=\frac{3}{5}$ Reference/*Verwys*$\angle = 30,96°$ $\theta = 360° - 30,96° = 329,04°$ $z=\sqrt{34}\ cis(329,04°)$	✓ Tan ratio/*verhouding* ✓ Reference angle/ *Verwysingshoek* ✓ 329,04° ✓ $\sqrt{34}cis(329,04°)$	**A** **CA** **CA** **CA**	(4)

3.5	$(2-3i)i+7y+9=11+13ix$ $2i-3i^2+7y+9=11+13ix$ $2i+3+7y+9=11+13ix$ $12+7y+2i=11+13ix$ $\therefore 12+7y=11$ and/*en* $2=13x$ $y=-\frac{1}{7}$ and/*en* $x=\frac{2}{13}$	✓ Simplification/*Vereenvoudiging* ✓ $i^2=-1$ ✓ Simplification/*Vereenvoudiging* ✓ $y=-\frac{1}{7}$ ✓ $x=\frac{2}{13}$	**S** **A** **S** **CA** **CA**	(5)
				[25]
QUESTION/*VRAAG* 4				
4.1.1	$0=2^x-1$ $1=2^x$ $2^0=2^x$ $x=0$	✓ $y=0$ ✓ $2^0=2^x$/ Logarithm/*Logaritme* ✓ $x=0$	**A** **CA** **CA**	(3)
4.1.2	$y=-1$	✓ $y=-1$	**A**	(1)
4.1.3	$x=0$ and/*en* $y=-1$	✓ $x=0$ ✓ $y=-1$	**A** **A**	(2)
4.1.4	$k(x)=0$ $\therefore x=1$	✓ $k(x)=0$ ✓ $x=1$	**A** **CA**	(2)
4.1.5		✓ Common asymptote/*Gemene asimptoot* *f*: ✓ Shape/*vorm* ✓ *x*-Intercept/*afsnit* *k*: ✓ Shape/*vorm* ✓ *x*-intercept/*afsnit*	**CA** **CA** **CA** **CA** **CA**	(5)
4.1.6	$x\neq 0$ ***OR*/OF**, $x\in R$ ***OR*/OF** $-\infty < x < \infty\ x\neq 0$	✓	**CA**	(1)
4.1.7	$f(x) > -1$	✓ Critical value/*Kritiese waarde* ✓ Notation/*Notasie*	**CA** **CA**	(2)

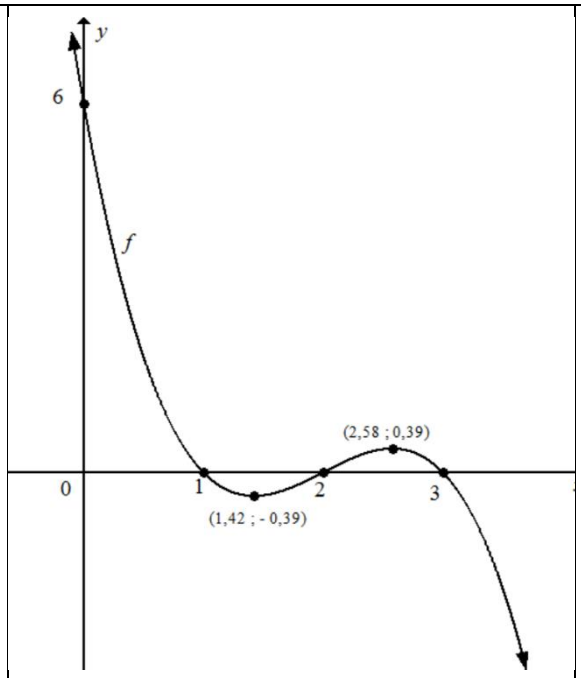
4.2.1	$q = -4$	✓ -4	**A**	(1)
4.2.2	$0 = \sqrt{9 - x^2}$ $x = 3$	✓ $h(x) = 0$ ✓ $x = 3$	**A** **CA**	(2)
4.2.3	$p = \frac{-1+3}{2}$ $\therefore p = 1$	✓ Mid-point/*middelpunt* ✓ Value of/*waarde van p*	**A** **CA**	(2)
4.2.4	$g(x) = a(x-1)^2 - 4$ $0 = a(-1-1)^2 - 4$ $4 = 4a$ $\therefore a = 1$ **OR/*OF*** $g(x) = a(x-1)^2 - 4$ $0 = a(3-1)^2 - 4$ $4 = 4a$ $\therefore a = 1$	✓ Substitute *p* and *q*/*Vervang p en q* ✓ Substitute point/*Vervang punt* $(-1; 0)$ ✓ $a = 1$ **OR/*OF*** ✓ Substitute *p* and *q*/*Vervang p en q* ✓ Substitute point/*Vervang punt* $(3; 0)$ ✓ $a = 1$	**CA** **CA** **CA** **CA** **CA** **CA**	(3)
4.2.5	$y = (0-1)^2 - 4 = -3$ D $(3; -1)$	✓ D $(3; -1)$	**CA**	(1)
4.2.6	$0 \leq x < 3$	✓ Critical values/*Kritiese waardes* ✓ Correct notation/*Korrekte notasie*	**CA** **CA**	(2)
				[27]

QUESTION/*VRAAG* 5				
5.1	$i_{eff} = \left(1+\frac{i}{m}\right)^{m} - 1$ $i_{eff} = \left(1+\frac{0{,}045}{12}\right)^{12} - 1$ Effective Interest Rate/*Effektiewe rentekoers* = 4,59% ≈ 4,6%	✓ Formula/*Formule* ✓ Substitution/*Vervanging* ✓ 4,6% **Accept/*Aanvaar* 4,59%**	**A** **A** **CA**	(3)
5.2.1	y = 350 kPa	✓ 350	**A**	(1)
5.2.2	(c) Compound depreciation/*Saamgestelde vermindering*	✓ Compound depreciation/ *Saamgestelde vermindering*	**A**	(1)
5.2.3	$27{,}216 = 350(1-i)^{5}$ $i = 1-\sqrt[5]{\frac{27{,}216}{350}}$ $i = 0{,}40$ Rate of Depreciation/*Ver min deringskoers* = 40%	✓ Substitution/*Vervanging* **SF** ✓ Simplification/*Vereenvoudiging* **S** ✓ i ✓ 40%	**A** **CA** **CA** **CA**	(4)
5.3	$A = 50\ 000\left(1+\frac{0{,}065}{4}\right)^{4\times5}\left(1+\frac{0{,}05}{12}\right)^{12\times3}$ $A = R80\ 165\ ,\ 96$ **OR/*OF***	✓ Formula/*Formule* ✓ Substitute/*Vervang* R50 000 ✓ Substitute/*Vervang i* and/*en n* ✓ Substitute/*Vervang i* and/*en n* ✓ R80 165, 96 **OR/*OF***	**A** **A** **A** **A** **CA**	
	$A_5 = 50\ 000\left(1+\frac{0{,}065}{4}\right)^{4\times5}$ $= R69\,020{,}98874$ $A_3 = R69\,020{,}98874\left(1+\frac{0{,}05}{12}\right)^{12\times3}$ $A = R80\ 165\ ,\ 96$	✓ Formula/*Formule* ✓ Substitute/*Vervang* R50 000 ✓ Substitute/*Vervang i* and/*en n* ✓ Substitute/*Vervang i* and/*en n* ✓ R80 165, 96	**A** **A** **A** **A** **CA**	(5)
				[14]

QUESTION/*VRAAG* 6				
NOTE: PENALISE 1 MARK FOR NOTATION IN QUESTION 6				
LET WEL: PENALISEER 1 PUNT VIR NOTASIE IN VRAAG 6				
6.1	$f(x)=13ax-2b$ $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $f'(x)=\lim_{h\to 0}\frac{13a(x+h)-2b-(13ax-2b)}{h}$ $f'(x)=\lim_{h\to 0}\frac{13ax+13ah-2b-13ax+2b}{h}$ $f'(x)=\lim_{h\to 0}\frac{13ah}{h}$ $f'(x)=\lim_{h\to 0}13a$ $f'(x)=13a$	✓ Definition/*Definisie* ✓ Substitution/*Vervanging* ✓ Simplification/*Vereenvoudiging* ✓ Simplification/*Vereenvoudiging* ✓ $f'(x)=13a$	**A** **CA** **CA** **CA** **CA**	(5)
6.2.1	$x(-6x+y)=x^3$ $-6x+y=x^2$ $y=x^2+6x$ $\frac{dy}{dx}=2x+6$	✓ Divide by/*Deel deur* x ✓ y Subject/*Onderwerp* ✓ $2x$ ✓ 6	**A** **CA** **CA** **CA**	(4)
6.2.2	$D_t\left(\sqrt[3]{t^2}+\frac{x}{t}\right)$ $=D_t\left(t^{\frac{2}{3}}+\frac{x}{t}\right)$ $=D_t\left(t^{\frac{2}{3}}+x.t^{-1}\right)$ $=\frac{2}{3}t^{\frac{2}{3}-1}-x.t^{-1-1}$ $=\frac{2}{3}t^{-\frac{1}{3}}-x.t^{-2}$	✓ Exponential form/ *Eksponensiële vorm* ✓ Simplify fraction/*Vereenvoudig breuk* ✓ $\frac{2}{3}t^{-\frac{1}{3}}$ ✓ $-x.t^{-2}$	**A** **CA** **CA** **CA**	(4)

6.3	$g(-2)=(-2)^2+3(-2)-4$ $g(-2)=-6$ $g(1)=(1)^2+3(1)-4$ $g(1)=0$ Average gradient $=\frac{0-(-6)}{1-(-2)}$ $\therefore$ *Gemiddelde gradiënt* $=2$	✓ $g(-2)=-6$ ✓ $g(1)=0$ ✓ 2	**A** **A** **CA**	(3)
				[16]

QUESTION/*VRAAG* 7				
7.1	$y = 6$	✓ 6	**A**	(1)
7.2	$f(1) = 0$ $x = 1$ or/*of* $-x^2 + 5x - 6 = 0$ $x = 1$ or/*of* $(x - 2)(x - 3) = 0$ $x = 1$ or/*of* $x = 2$ or/*of* $x = 3$ **OR/*OF*** $f(2) = 0$ $x = 2$ or/*of* $-x^2 + 4x - 3 = 0$ $x = 2$ or/*of* $(x - 1)(x - 3) = 0$ $x = 2$ or/*of* $x = 1$ or/*of* $x = 3$ **OR/*OF*** $f(3) = 0$ $x = 3$ or/*of* $-x^2 + 3x - 2 = 0$ $x = 3$ or/*of* $(x - 1)(x - 2) = 0$ $x = 3$ or/*of* $x = 1$ or/*of* $x = 2$	✓ $f(1) = 0$ ✓ Quadratic factor/*Kwadratiese faktor* ✓ $x = 2$ ✓ $x = 3$ **OR/*OF*** ✓ $f(2) = 0$ ✓ Quadratic factor/*Kwadratiese faktor* ✓ $x = 1$ ✓ $x = 3$ **OR/*OF*** ✓ $f(3) = 0$ ✓ Quadratic factor/*Kwadratiese faktor* ✓ $x = 1$ ✓ $x = 2$	**A** **CA** **CA** **CA** **A** **CA** **CA** **CA** **A** **CA** **CA** **CA**	(4)
7.3	$f(x) = -x^3 + 6x^2 - 11x + 6$ $f'(x) = -3x^2 + 12x - 11$ $-3x^2 + 12x - 11 = 0$ $x = \frac{-(12) \pm \sqrt{144 - 4(-3)(-11)}}{2(-3)}$ $x = 1{,}42$ or/*of* $x = 2{,}58$ $f(1{,}42) = -(1{,}42)^3 + 6(1{,}42)^2 - 11(1{,}42) + 6$ $y = -0{,}39$ $f(2{,}58) = -(2{,}58)^3 + 6(2{,}58)^2 - 11(2{,}58) + 6$ $y = 0{,}39$	✓ $f'(x) = -3x^2 + 12x - 11$ ✓ $f'(x) = 0$ ✓ Substitution/*Vervanging* ✓ (1,42; − 0;39) ✓ (2,58 ; 0,39)	**A** **A** **CA** **CA** **CA**	(5)

7.4		✓ Shape/*Vorm* ✓ *y*-intercept/*afsnit* ✓ All 3 *x*-intercepts/*afsnitte* ✓ (1,42; − 0;39) ✓ (2,58; 0,39)	**A** **CA** **CA** **CA** **CA**	(5)
7.5	$f'(x) = m_{\text{tangent/raaklyn}}$ $-3x^2 + 12x - 11 = -11$ $-3x(x-4) = 0$ $x = 0$ or/*of* $x = 4$	✓ $f'(x) = m_{\text{tangent/raaklyn}}$ ✓ Factors/substitution – *Faktore/vervanging* ✓ $x = 0$ ✓ $x = 4$	**A** **CA** **CA** **CA**	(4)
				[19]

QUESTION/*VRAAG* 8				
8.1	$H(0) = 400^{\circ}C$ **NPU**	✓ 400 °C	**A**	(1)
8.2	$H(3) = -2(3)^2 + 20(3) + 400$ $H(3) = 442^{\circ}C$	✓ Substitution/*Vervanging* ✓ 442 °C	**A** **CA**	(2)
8.3	$\frac{dH}{dt} = -4t + 20$ $-4t + 20 = 0$ $t = 5s$ $0 = -2t^2 + 20t + 400$ $0 = t^2 - 10t - 200$ $0 = (t - 20)(t + 10)$ $\therefore t = 20$ or/*of* $t \neq -10$ Time/*Tyd* = 20 – 5 = 15 seconds/*sekondes*	✓ $\frac{dH}{dt} = -4t + 20$ ✓ $\frac{dH}{dt} = 0$ ✓ 5 ✓ $H(x) = 0$ ✓ Factors/substitution – *Faktore/vervanging* ✓ $t = 20$ ✓ $t \neq -10$ ✓ 15 seconds/*sekondes* **NPU**	**A** **A** **CA** **A** **CA** **CA** **CA** **CA**	(8)
				[11]

QUESTION/*VRAAG* 9					
9.1	9.1.1	$\int\left(\pi\, x^{\frac{2}{3}}\right)dx$ $=\frac{\pi\, x^{\frac{2}{3}+1}}{\frac{2}{3}+1}+C$ $=\frac{\pi\, 3x^{\frac{5}{3}}}{5}+C$	✓ $\frac{3x^{\frac{5}{3}}}{5}$ ✓ C	**A** **A**	(2)
	9.1.2	$\int\left(\frac{t}{x}-x^2\sqrt{t^2}\right)dt$ $=\int\left(\frac{t}{x}-x^2t\right)dt$ $=\frac{t^2}{2x}-\frac{x^2t^2}{2}+C$	✓ Simplification/ *Vereenvoudiging* ✓ $\frac{t^2}{2x}$ ✓ $-\frac{x^2t^2}{2}+C$	**S** **A** **CA**	(3)
9.2	Area $=\int_{-1}^{0}\left(x^3-x\right)dx+\int_{0}^{1}\left(x^3-x\right)dx$ Area $=\left[\frac{x^{3+1}}{3+1}-\frac{x^{1+1}}{1+1}+C\right]_{-1}^{0}+\left[\frac{x^{3+1}}{3+1}-\frac{x^{1+1}}{1+1}+C\right]_{0}^{1}$ Area $=\left(0-\left(\frac{(-1)^4}{4}-\frac{(-1)^2}{2}\right)\right)+\left(\frac{(1)^4}{4}-\frac{(1)^2}{2}-0\right)$ Area $=\frac{1}{4}+\frac{1}{4}$ Area $=\frac{1}{2}$	✓✓ Integral form/ *Integraalvorm* ✓ integral/*integraal* ✓✓ Substitution/ *Vervanging* ✓ Simplification/ *Vereenvoudiging* ✓ Area	**A** **A** **CA** **CA** **CA** **CA**	(7)
					[12]
				TOTAL/*TOTAAL*:	**150**