Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 12

JUNE/*JUNIE* 2022

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

MARKS/*PUNTE*: 150

MARKING CODES/*NASIENKODES*	
A	Accuracy/*Akkuraatheid*
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 correct formula/*Vervanging in korrekte formule*

This marking guideline consists of 21 pages./
Hierdie nasienriglyn bestaan uit 21 bladsye.

NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- The method of consistent accuracy marking must be applied to all aspects of the marking guideline where applicable as indicated with the marking code **CA**.
- If a candidate strikes off a response to a question and does not attempt the question again, then the struck off question should be marked

LET WEL:

- *Indien 'n kandidaat 'n vraag TWEE keer beantwoord, sien slegs die EERSTE poging na.*
- *Die metode van volgehoue akkuraatheid-nasien moet waar moontlik op alle aspekte van die nasienriglyne toegepas word soos aangedui deur die nasienkode CA.*
- *Indien 'n kandidaat 'n antwoord deurhaal en nie poog om die vraag weer te beantwoord dan moet die deurgehaalde antwoord gemerk word.*

QUESTION/*VRAAG* 1

1.1.1	$(2x+3)(3x+1)=0$ $x=-\frac{3}{2}$ or/*of* $x=-\frac{1}{3}$	✓ both values of /*beide waardes van x* **CA**	(1)
1.1.2	$5x+1=-2x^2$ $2x^2+5x+1=0$ $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $=\frac{-(5)\pm\sqrt{(5)^2-4(2)(1)}}{2(2)}$ $=\frac{-5\pm\sqrt{17}}{4}$ $\therefore x\approx-0,2$ or/*of* $x\approx-2,3$	✓ standard form/*standaardvorm* **A** ✓ **SF** **CA** ✓ ✓ each x-value/*elke waarde* **CA** **R**	(4)
1.1.3	$x^2-5x-6>0$ $(x-6)(x+1)>0$ Critical values/*kritiese waardes*: -1 and / *en* 6 $x<-1$ or / *of* $x>6$ **OR/*OF*** $x\in(0;6)$	✓ factors/formula / *faktore/formule* **A** ✓ both critical values/ *albei kritiese waardes* **CA** ✓ correct notation/*notasie* **A**	(3)

1.2	$y = 8x - 1$ and / *en* $y = 3x^2 + 4$ $8x - 1 = 3x^2 + 4$ $3x^2 - 8x + 5 = 0$ $(3x - 5)(x - 1) = 0$ $\therefore x = \frac{5}{3} \approx 1,67$ or/*of* $x = 1$ $y = 8\left(\frac{5}{3}\right) - 1$ or/*of* $y = 8(1) - 1$ $\therefore y = \frac{37}{3} \approx 12,33$ or/*of* $y = 7$ **OR/*OF*** $x = \frac{y+1}{8}$ $y = 3\left(\frac{y+1}{8}\right)^2 + 4$ $y = 3\left(\frac{y^2 + 2y + 1}{64}\right) + 4$ $64y = 3y^2 + 6y + 3 + 256$ $0 = 3y^2 - 58y + 259$ $(3y - 37)(y - 7) = 0$ $\therefore y = \frac{37}{3} \approx 12,33$ or/*of* $y = 7$ $x = \frac{\frac{37}{3} + 1}{8}$ or/*of* $x = \frac{7+1}{8}$ $\therefore x = \frac{5}{3} \approx 1,67$ or/*of* $x = 1$	✓ substitution/*vervanging* **A** ✓correct standard form/ *korrekte standaardvorm* **CA** ✓ factors/formula / *faktore/formule.* **CA** ✓ both *x*-values/-*beide waardes* **CA** ✓ both *y*-values/-*beide waardes* **CA** **OR/*OF*** ✓ substitution/*vervanging* **A** ✓ correct standard form/ *korrekte standaardvorm* **CA** ✓ factors/form./*faktore/vorm.* **CA** ✓ both *y*-values/-*waarde* **CA** ✓ both *x*-values/-*waardes* **CA** **NPR**	(5)

1.3.1	$R = \frac{R_1 R_2}{R_1 + R_2}$ where / *waar* $R_1 = x^{\frac{3}{2}}$ and / *en* $R_2 = \sqrt{x}$ $= \frac{x^{\frac{3}{2}} \times \sqrt{x}}{x^{\frac{3}{2}} + \sqrt{x}}$ $= \frac{x^{\frac{3}{2}} \times x^{\frac{1}{2}}}{x^{\frac{3}{2}} + x^{\frac{1}{2}}}$ $= \frac{x^{\frac{3}{2}} \times x^{\frac{1}{2}}}{x^{\frac{1}{2}}(x+1)}$ $= \frac{x^{\frac{3}{2}}}{x+1}$ **OR/*OF*** $= \frac{\sqrt{x^3} \times \sqrt{x}}{\sqrt{x^3} + \sqrt{x}}$ $= \frac{\sqrt{x^3} \times \sqrt{x}}{\sqrt{x}\left(\sqrt{x^2}+1\right)}$ $= \frac{\sqrt{x^3}}{\left(\sqrt{x^2}+1\right)}$	✓ **SF** **A** ✓ Exp. property/*eienskap* **CA** ✓ **S** **CA** **OR/*OF*** ✓ **SF** **A** ✓ surd property/ *wortelvorm eienskap* **CA** ✓ **S** **CA**	(3)
1.3.2	$R = \frac{x^{\frac{3}{2}}}{x+1}$ $= \frac{25^{\frac{3}{2}}}{25+1}$ $= \frac{125}{26}$ $= 4,81\ \Omega$	✓ **SF** **CA** ✓ value of/*waarde van R* **CA** **NPR** **NPU**	(2)

1.4	$75 \div 5 = 15$ 2^3 | 2^2 | 2^1 | 2^0 | 1 | 1 | 1 | 1 | =75 $15 = 1111_2$	✓ 15 **A** ✓ binary form/*binêre vorm* **CA** **AO: full marks/*volpunte***	(2)
			[20]

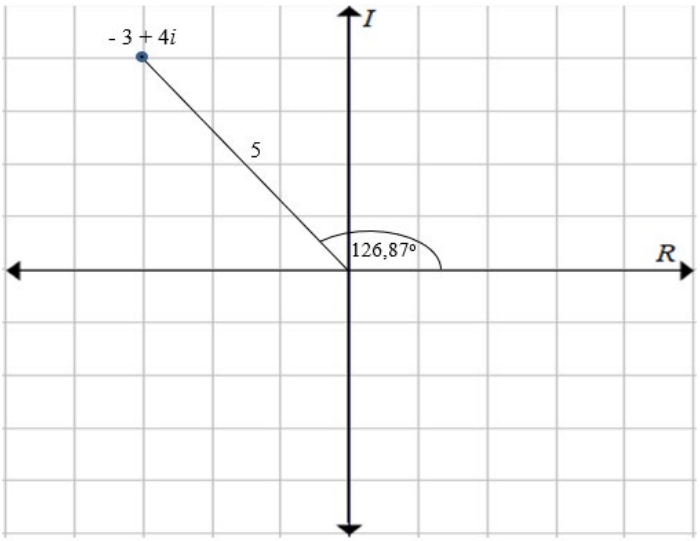
QUESTION/*VRAAG* 2

2.1	$\Delta = b^2 - 4ac$ $\Delta = (5)^2 - 4(2)(8)$ $= -39$ Roots are Non-real/ *Wortels is nie-reeël* **Accept Imaginary/*Aanvaar Imaginêr***	✓ **SF** ✓ **S** ✓ non-real/*nie-reeël*	(3)
2.2	$5x^2 - kx - 2 = 0$ $b^2 - 4ac > 0$ $(-k)^2 - 4(5)(-2) > 0$ $k^2 + 40 > 0$ 49 is least perfect square after 40 and so $k = \pm 3$ 49 *is kleinste volkome kwadraat na* 40 *en so* $k = \pm 3$ $\therefore k = 3$	✓ $\Delta > 0$ **A** ✓ **SF** **CA** ✓ **S** **CA** ✓ $k = 3$ **CA**	(4)
			[7]

QUESTION/*VRAAG* 3

3.1.1	$\dfrac{3^{2x}-3^x-6}{3^x+2}$ $=\dfrac{\left(3^x+2\right)\left(3^x-3\right)}{\left(3^x+2\right)}$ $=3^x-3$	✓ Factors/*faktore* **A** ✓ 3^x-3 **CA**	(2)
3.1.2	$81^{\frac{3}{4}}-\sqrt[3]{27^2}+\sqrt[4]{625}$ $=\left(3^4\right)^{\frac{3}{4}}-\left(3^3\right)^{\frac{2}{3}}+\left(5^4\right)^{\frac{1}{4}}$ $=3^3-3^2+5$ $=23$ **OR/*OF*** $81^{\frac{3}{4}}-\sqrt[3]{27^2}+\sqrt[4]{625}$ $=(3)^{\frac{12}{4}}-(3)^{\frac{6}{3}}+(5)^{\frac{4}{4}}$ $=27-9+5$ $=23$	✓ $\left(3^4\right)^{\frac{3}{4}}$ **A** ✓ $\left(3^3\right)^{\frac{2}{3}}$ **A** ✓ $\left(5^4\right)^{\frac{1}{4}}$ **A** ✓ 23 **CA** **OR/*OF*** ✓ $(3)^{\frac{12}{4}}$ **A** ✓ $(3)^{\frac{6}{3}}$ **A** ✓ $(5)^{\frac{4}{4}}$ **A** ✓ 23 **CA**	(4)
3.1.3	$\dfrac{\log_2 16-\log_2 8}{\log_2 4}$ $=\dfrac{4\log_2 2-3\log_2 2}{2\log_2 2}$ $=\dfrac{\log_2 2}{2\log_2 2}$ $=\dfrac{1}{2}$ **OR/*OF*** $\dfrac{\log_2 16-\log_2 8}{\log_2 4}$ $=\dfrac{\log_2 2^4-\log_2 2^3}{\log_2 2^2}$ $=\dfrac{4\log_2 2-3\log_2 2}{2\log_2 2}$ $=\dfrac{\log_2 2(4-3)}{2\log_2 2}$ $=\dfrac{1}{2}$	✓ log property/*eienskap* **A** ✓ **S** **CA** ✓ $\frac{1}{2}$ **CA** **OR/*OF*** ✓ **S** **CA** ✓ $\frac{1}{2}$ **CA** ✓ log property/*eienskap* **A**	

	OR/*OF*	**OR/*OF***	
	$= \dfrac{\log_2 \frac{16}{8}}{\log_2 2^2}$ $= \dfrac{\log_2 2}{2\log_2 2}$ $= \dfrac{1}{2}$	✓ log property/*eienskap* **A** ✓ **S** **CA** ✓ $\frac{1}{2}$ **CA**	(3)
3.2	$(\log x - 4) \times \log(x-4) = 0$ $\log x - 4 = 0$ or/*of* $\log(x-4) = 0$ $\log x = 4$ or/*of* $(x-4) = 10^0$ $x = 10^4 = 10\,000$ or/*of* $x = 1 + 4 = 5$	✓ Factors/*faktore* **A** ✓ exponential/log form/*eksponensiële /log vorm* **CA** ✓ x =10 000 **CA** ✓ x =5 **CA**	(4)
3.3.1	$z = -3 + 4i$ $\lvert z \rvert = r = \sqrt{x^2 + y^2}$ $r = \sqrt{(4)^2 + (-3)^2}$ $= \sqrt{25} = 5$	✓ **SF** **A** ✓ value of/*waarde van* r **CA**	(2)
3.3.2	$\tan\theta = \dfrac{4}{-3}$ ref.angle / *verw. hoek* $= 53{,}13^{\circ}$ $\theta = 180^o - 53{,}13^o = 126{,}87^o$	✓ Ratio/*verhouding* **A** ✓ ref. angle/*verw. hoek* **CA** ✓ value of/waarde van θ **CA**	(3)

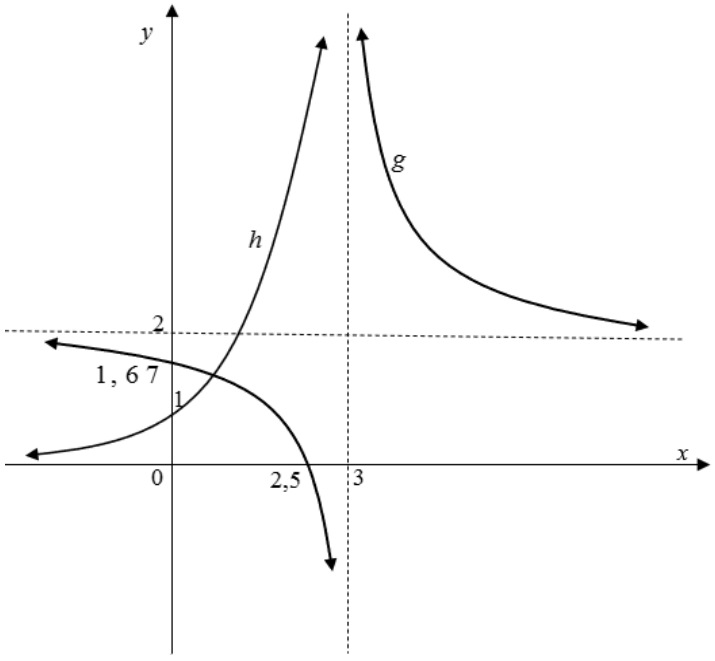
3.3.3	$\therefore z = 5\,cis\,126{,}87^{o}$ **OR/*OF*** $\therefore z = 5\left(\cos 126{,}87^{o} + i\sin 126{,}87^{o}\right)$  	✓ *z* in polar form/*polêre vorm* **CA** ✓correct quadrant/*korrekte kwadrant* **CA** ✓ correct angle/*korrekte hoek* **CA** **OR/*OF*** ✓ *z* in polar form/*polêre vorm* **CA** ✓correct quadrant/*korrekte kwadrant* **CA** ✓ correct angle/*korrekte hoek* **CA**	(3)
3.4	$2p - qi - 8i = -2i(3i + 7)$ $2p - qi - 8i = -6i^{2} - 14i$ $2p - (q + 8)i = -6(-1) - 14i$ $2p - (q + 8)i = 6 - 14i$ $\therefore 2p = 6$ $p = 3$ and/*en* $\therefore -(q + 8)i = -14i$ $q = 6$ **OR/*OF*** $2p - qi - 8i = -2i(3i + 7)$ $2p - qi - 8i = -6i^{2} - 14i$ $2p - (q + 8)i = -6(-1) - 14i$ $2p - (q + 8)i = 6 - 14i$ $2p - 6 = (q + 8)i - 14i$ $\therefore 2p - 6 = 0$ and / *en* $(q + 8)i - 14i = 0$ $p = 3$ $-(q + 8)i = -14i$ $q = 6$	✓ Product/*produk* **A** ✓ substituting i^2 with – 1/ *vervang* i^2 *met* – 1 **A** ✓ value of/*waarde van p* **CA** ✓ value of/*waarde van q* **CA** **OR/*OF*** ✓ Product/*produk* **A** ✓ substituting i^2 with – 1/ *vervang* i^2 *met* – 1 **A** ✓ value of/*waarde van p* **CA** ✓ value of/*waarde van q* **CA**	

	OR/*OF*	**OR/*OF***	
	$2p - qi - 8i = -2i(3i + 7)$	✓ Product/*produk* **A**	
	$2p - qi - 8i = -6i^2 - 14i$	✓ substituting i^2 with -1/ *vervang* i^2 *met* -1 **A**	
	$2p - (q + 8)i = -6(-1) - 14i$		
	$2p - 6 = qi - 6i$		
	$\therefore 2p - 6 = 0$ and / *en* $q - 6 = 0$ $p = 3$ and / *en* $q = 6$	✓ value of/*waarde van p* **CA** ✓ value of/*waarde van q* **CA**	(4)
			[25]

QUESTION/*VRAAG* 4

4.1.1	$f(x)=x^2-8x-20$ $x-$ints/*afsn..:* $x^2-8x-20=0$ $(x-10)(x+2)=0$ **OR/*OF*** $x=\frac{-(-8)\pm\sqrt{(-8)^2-4(1)(-20)}}{2(1)}$ $x=10$ *or / of* $x=-2$ A $(-2;0)$ and/*en* B (10;0)	✓ factors/form./*faktore/vorm.* **A** ✓ coordinates of/*koördinate van* A **CA** ✓ coordinates of/*koördinate van* B **CA**	(3)
4.1.2	$x=\frac{-b}{2a}=\frac{-(-8)}{2(1)}$ $=4$ **OR/*OF*** $x=\frac{10-2}{2}=4$ **OR/*OF*** $f'(x)=2x-8=0$ $x=4$	✓ **SF** **A** ✓ x-value/*waarde* **CA** **OR/*OF*** ✓ **M** **CA** ✓ x-value/*waarde* **CA** **OR/*OF*** ✓ **M** **CA** ✓ x-value/*waarde* **CA**	(2)
4.1.3	$y=(4)^2-8(4)-20=-36$ C $(0;-36)$ **OR/*OF*** $y=\frac{4(1)(-20)-(-8)^2}{4(1)}=-36$	✓ **M** **CA** ✓ y-value/ *waarde* **CA** **OR/*OF*** ✓ **M** **CA** ✓ y-value/*waarde* **CA**	(2)

4.1.4	A $(-2;0)$ and/*en* D $(7;-27)$ $m = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-27 - 0}{7 + 2}$ $= -3$ $y = mx + c$ $0 = -3(-2) + c$ $c = -6$ $\therefore y = -3x - 6$ **OR/*OF*** $y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$ $y - 0 = \frac{-27 - 0}{7 + 2}(x + 2)$ $y = -3x - 6$	✓ **M** **CA** ✓ *m* **CA** ✓ equation of/*vergelyking van* AD **CA** **OR/*OF*** ✓ **M** **CA** ✓ *m* **CA** ✓ equation of/*vergelyking van* AD **CA**	(3)
4.1.5	$x < 0$ or $x > 8$ **OR/*OF*** $x \in (-\infty;0)$ or / *of* $x \in (8;\infty)$ **OR/*OF*** $-\infty < x < 0$ or / *of* $8 < x < \infty$	✓ critical values/*kritiese waardes* **CA** ✓ correct notation/ *korrekte notasie* **A** ✓ critical values/*kritiese waardes* **CA** ✓ correct notation/ *korrekte notasie* **A**	(2)

4.2.1	$\therefore x = 3$	✓ eq. of asymptote/*vergl van asimptoot* **A**	(1)
4.2.2	$g(x) = \frac{1}{x-3} + 2$ $0 = \frac{1}{x-3} + 2$ $-2(x-3) = 1$ $-2x + 6 = 1$ $\therefore x = \frac{5}{2}$	✓ **SF** **A** ✓ **S** **A** ✓ value of/*waarde van x* **CA**	(3)
4.2.3	For *y*-int/*Vir y-afsnit*. Let/*laat* $x = 0$ $g(0) = \frac{1}{0-3} + 2$ $\therefore y = \frac{5}{3}$ And/*en* $h(0) = 3^0$ $\therefore y = 1$	✓Subst/*Vervang*. $x = 0$ **A** ✓ *y*-int.of/*y-afsnit van* g **A** ✓ *y*-int. Of/*y-afsnit van* h **A**	(3)
4.2.4		*g* : ✓ shape/*vorm* **A** ✓ *x* and *y*- int./*afsn* **CA** ✓ asymptotes/*asimptote* **CA** *h*: ✓ shape/*vorm* **A** ✓ *y* int../*afsn* **CA** ✓ asymptote/*asimptote* **A**	(6)
4.2.5(a)	$x \in \mathbb{R}, x \neq 3$	✓ $x \neq 3$ **A**	(1)
4.2.5(b)	$x = 0$	✓ $x = 0$ **A**	(1)
4.2.5(c)	$k(x) = 3^x - 2$	✓ eq. of /*vergl. van k* **A**	(1)
			[28]

QUESTION/*VRAAG* 5

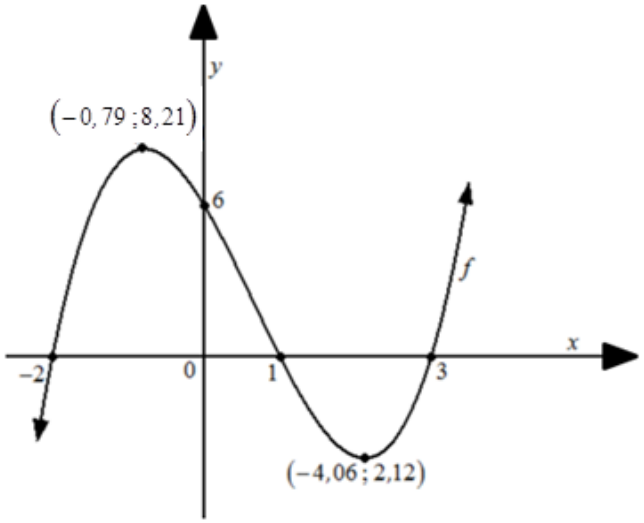
5.1	$A = P(1+i)^n$ $1\,200 = P\left(1+\frac{5,5\%}{24}\right)^{24\times 10}$ $\frac{1\,200}{\left(1+\frac{0,055}{24}\right)^{240}} = P$ $693 = P$	✓ **SF** **A** ✓ *i* **CA** ✓ *n* **CA** ✓ P the subject/ *die onderwerp* **CA** ✓ value of/*waarde van 'n* **CA**	(5)
5.2.1	Value of investment after 24 months/ *Waarde van belegging na* 24 *maande* $A = P(1+i)^n$ $= R500\,000\left(1+\frac{7,5\%}{12}\right)^{24}$ $\approx R580646,0091$ Value of investment after the withdrawal / *Waarde van belegging na onttrekking* $A = R580\,646,0091 - R365\,000,00 = R215\,646,01$ **OR/*OF*** $A = R500\,000\left(1+\frac{7,5\%}{12}\right)^{24} - R365\,000$ $\therefore \quad A = R215\,646,01$	✓ **SF** **A** ✓ $\left(1+\frac{7,5\%}{12}\right)^{24}$ **A** ✓value of/*waarde van* A **CA** ✓ **M** subtraction/*aftrekking* **A** ✓value of/*waarde van* A **CA** ✓ **SF** **A** ✓ $\left(1+\frac{7,5\%}{12}\right)^{24}$ **A** ✓value of/*waarde van* A **CA** ✓ **M** subtraction/*aftrekking* **A** ✓ **M** **A**	(5)
5.2.2	Value of investment at the end of 5 years/ *Waarde van belegging aan die einde van 5 jaar* $A = P(1+i)^n$ $= R215\,646,01\left(1+\frac{6,75\%}{4}\right)^{4\times 5}$ $\approx R301\,365,01$	✓ $\left(1+\frac{7,5\%}{12}\right)^{24}$ **A** ✓**SF** **CA** ✓value of/*waarde van* A **CA**	(3)
			[13]

QUESTION/*VRAAG* 6

6.1	$f(x) = -6x + 3$ $f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$ $= \lim_{h\to 0} \frac{-6(x+h)+3-(-6x+3)}{h}$ $= \lim_{h\to 0} \frac{-6x-6h+3+6x-3}{h}$ $= \lim_{h\to 0} \frac{-6h}{h}$ $= \lim_{h\to 0} (-6)$ $\therefore f'(x) = -6$	✓ definition/*definisie* **A** ✓ **SF** **CA** ✓ **S** **CA** ✓ **S** **CA** ✓ -6 **CA** **AO**: **1 mark/*punt*** **Penalty of one mark for incorrect notation** ***Penaliseer een punt indien notasie foutief is.***	(5)
6.2.1	$D_x\left[\frac{x^2-x-12}{x-4}\right]$ $D_x\left[\frac{(x-4)(x-3)}{x-4}\right]$ $D_x\left[(x-3)\right]$ $=1$	✓ Factors/*faktore* **A** ✓ **S** **CA** ✓ 1 **CA**	(3)
6.2.2	$\frac{dy}{dx}$ if / *as* $y = \frac{2}{3x^3} - 7x^2 + x$ $y = \frac{2x^{-3}}{3} - 7x^2 + x$ $\frac{dy}{dx} = -2x^{-2} - 14x + 1$	✓ **S** **A** ✓ $-2x^{-2}$ **CA** ✓ $-14x$ **CA** ✓ 1 **CA**	(4)
6.3	$g(x) = x^2 - 2x + 1$ Ave. grad./*Gem grad* $= \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{4-0}{3-1}$ $= 2$	✓ **SF** **A** ✓ $m_{ave/gemid}$ value/*waarde* **CA**	(2)
			[14]

QUESTION/*VRAAG* 7

7.1	$f(x) = x^3 - 2x^2 - 7x - 4$ $y = 6$ **OR/*OF*** $(0;6)$	✓ *y*-intercept/*afsnit* **A**	(1)
7.2	$f(1) = (1)^3 - 2(1)^2 - 5(1) + 6$ $= 0$ $\therefore (x-1)$ is a factor of/ *is 'n faktor van* $f(x)$	✓ substitution/*vervanging* **A** ✓ 0 **A**	(2)
7.3	x-intercepts/*afsnitte*; $y = 0$ $(x-1)(x^2 - x - 6) = 0$ $(x-1)(x+2)(x-3) = 0$ $\therefore\ x = 1$ or/*of* $x = -2$ or/*of* $x = 3$ **OR/*OF*** $(x+2)(x^2 - 4x + 3) = 0$ $(x+2)(x-1)(x-3) = 0$ $\therefore\ x = -2$ or/*of* $x = 1$ or/*of* $x = 3$ **OR/*OF*** $(x-3)(x^2 + x - 2) = 0$ $(x-3)(x-1)(x+2) = 0$ $\therefore\ x = 3$ or/*of* $x = 1$ or/*of* $x = -2$	✓ quadratic factor/*kwdr.faktor* **A** ✓ factors/*faktore* **CA** ✓ *x*-intercepts/*afsnitte* **CA** **OR/*OF*** ✓ quadratic factor/*kwdr.faktor* **A** ✓ factors/*faktore* **CA** ✓ *x*-intercepts/*afsnitte* **CA** **OR/*OF*** ✓ quadratic factor/*kwdr.faktor* **A** ✓ factors/*faktore* **CA** ✓ *x*-intercepts/*afsnitte* **CA** **AO**: **Full marks/*Volpunte***	(3)

7.4	$f'(x) = 3x^2 - 4x - 5 = 0$ $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-5)}}{2(3)}$ $\therefore x = 2{,}12$ or/*of* $x = -0{,}79$ $f(2{,}12) = (2{,}12)^3 - 2(2{,}12)^2 - 5(2{,}12) + 6$ $\approx -4{,}06$ $f(-0{,}79) = (-0{,}79)^3 - 2(-0{,}79)^2 - 5(-0{,}79) + 6$ $\approx 8{,}21$ $\therefore (2{,}12 ; -4{,}06)$ and /*en* $(-0{,}79 ; 8{,}21)$	✓ derivative/*afgeleide* **A** ✓ equating derivative to 0/ *stel afgeleide gelyk aan 0* **A** ✓ **SF** **CA** ✓ both values of/*beide waardes van x* **CA** ✓ both values of/*beide waardes van y* **CA**	(5)
7.5		✓ shape/*vorm y-* **A** ✓ *y*-intercept/*afsnit* **CA** ✓ both *x*-intercepts/*beide x-afsnitte* **CA** ✓ both turning points/*beide draaipunte* **CA**	(4)
7.6	$f'(x) = 3x^2 - 4x - 5$ $f'(3) = 3(3)^2 - 4(3) - 5 = 10$ $\tan\theta = 10$ $\theta = 84{,}3°$	✓ derivative/*afgeleide* **A** ✓ substitution/*vervanging* **CA** ✓ *m* of tangent/*van raaklyn* **CA** ✓ $\theta = 84{,}3°$ **CA**	(4)
			[19]

QUESTION/*VRAAG* 8

8.1	$\text{Wages} = \text{time} \times \text{hourly}$ $\text{Loon} = \text{tyd} \times \text{uurliks}$ $= \frac{2(75)}{x} \times 145$ $= \frac{21750}{x}$	✓ **SF** **A** ✓ $\frac{21750}{x}$ **CA** **NPU**	(2)
8.2	Petrol costs = time x fuel consumption x fuel price Brandstofkoste = tyd x brandstofverbruik x brandstofprys $= \frac{2(75)}{x} \times \left(2 + \frac{x^2}{100}\right) \times 18$ $= \frac{5400}{x} + 27x$	✓ Setting up a formula/ *Opstelling van formule* **A** ✓ **SF** **CA** ✓ **S** **CA** **NPU**	(3)
8.3	$C(x) = \text{Wages} + \text{Petrol costs}$ $= \textit{Loon} + \textit{brandstof kostes}$ $C(x) = \frac{21750}{x} + \frac{5400}{x} + 27x$ $C(x) = \frac{27150}{x} + 27x$	✓ Setting up a formula/ *Opstelling van formule* **A** ✓ **SF** **CA** **NPU**	(2)
8.4	$C(x) = \frac{27150}{x} + 27x$ $= 27150x^{-1} + 27x$ $D_x = -27150x^{-2} + 27 = 0$ $-27150x^{-2} - 27 = 0$ $-27150x^{-2} = -27$ $x^{-2} = \frac{27}{21750}$ $\frac{1}{x^2} = \frac{27}{21750}$ $27x^2 = 21750$ $\therefore x^2 = 805{,}56$ $\therefore x \approx 28{,}38$ km/h Ethans speed to minimise costs is Ethans se spoed om koste te verminder is $x \approx 28{,}38$ km/h	✓ derivative/*afgeleide* **A** ✓ equating derivative to/*stel afgeleide aan* 0 **A** ✓ **S** **CA** ✓ **S** **CA** ✓ $x \approx 28{,}38$ km/h **CA** **NPU**	(5)
			[12]

QUESTION/*VRAAG* 9

9.1.1	$\int\left(\frac{1}{x}+1\right)dx$ $= \ln x + x + \mathrm{C}$	✓ $\ln x$ **A** ✓ x **A** ✓ C **A**	(3)
9.1.2	$\int\left(x^5+6x\right)dx$ $= \frac{x^6}{6} + 3x^2 + \mathrm{C}$	✓ $\frac{x^6}{6}$ **CA** ✓ $3x^2 + \mathrm{C}$ **CA**	(2)
9.2	$\mathrm{A} = \int_m^2 f(x)\,dx$ $= \int_m^2 x^3\,dx$ $= \frac{x^4}{4}\Big]_m^2$ $= \frac{(2)^4}{4} - \frac{(m)^4}{4}$ $\therefore\ 4 - \frac{m^4}{4} = 3{,}75$ $\therefore m^4 = 1$ $\therefore m = \pm\sqrt[4]{1}$ $\therefore m = -1$ **OR/*OF*** $\mathrm{A} = \int_0^2 f(x)\,dx$ $= \int_0^2 x^3\,dx$ $= \frac{x^4}{4}\Big]_0^4$ $= \frac{(2)^4}{4} - \frac{(0)^4}{4} = 4$ **OR/*OF***	✓ **M** Area notation using integrals/*Area-notasie met gebruik van integrale* **A** ✓ $\frac{x^4}{4}$ **A** ✓✓ **SF** **CA** ✓ equating area to/*stel oppervl.gelyk aan* 3,75 **CA** ✓ **S** **CA** ✓value of/*waarde van m* **CA** **OR/*OF*** ✓ **M** Area notation using integrals/*Area-notasie met gebruik van integrale* **A** ✓ $\frac{x^4}{4}$ **A** ✓✓ **SF** **CA** **OR/*OF***	

	$A = \int_m^0 f(x)\,dx$ $= \frac{x^4}{4}\ ]_m^0$ $= \frac{(0)^4}{4} - \frac{(m)^4}{4} = \frac{m^4}{4}$ $\therefore 4 - \frac{m^4}{4} = 3,75$ $\therefore m^4 = 1$ $\therefore m = \pm\sqrt[4]{1}$ $\therefore m = -1$	✓ **S** **CA** ✓ **M** **CA** ✓ value of/*waarde van m* **CA**	(7)
			[12]
		TOTAL/*TOTAAL*:	**150**