

SA's Leading Past Year

Exam Paper Portal



You have Downloaded, yet Another Great
Resource to assist you with your Studies 😊

Thank You for Supporting SA Exam Papers

Your Leading Past Year Exam Paper Resource Portal

Visit us @ www.saexampapers.co.za



SA EXAM
PAPERS



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS
SENIORSERTIFIKAAT-EKSAMEN/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN**

TECHNICAL MATHEMATICS P1/TEGNIESE WISKUNDE V1

2019

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

<i>Marking Codes / Nasienkodes</i>	
A	Accuracy / Akkuraatheid
CA	Consistent Accuracy / Volgehoue Akkuraatheid
M	Method / Metode
R	Rounding/ Afronding
NPR	No Penalty for Rounding/ Geen penaliseering vir Afronding
NPU	No Penalty for Units omitted /Geen penaliseering vir Eenhede weggelaat
S	Simplification / Vereenvoudiging
F	Correct/Korrekte formula
SF	Substitution in correct formula/ Vervanging in korrekte formule

Date approved/ Datum goedgekeur:	EXTERNAL MODERATOR	INTERNAL MODERATORS	
	MA HENDRICKS	N TOM	NS MUTHIGE
19 MAY 2019	SIGNATURE	SIGNATURE	SIGNATURE

**These marking guidelines consist of 17 pages./
Hierdie nasienriglyne bestaan uit 17 bladsye**

NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent accuracy method of marking must be applied as indicated..

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, sien slegs die EERSTE poging na.
- Volgehoue akkuraatheid metode van nasien moet deurgaans toegepas word soos aangedui.

QUESTION/VRAAG 1

1.1.1	$6x - 2x^2 = 0$ $2x(3 - x) = 0$ $\therefore x = 0$ or/of $x = 3$ OR/OF $6x - 2x^2 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-6 \pm \sqrt{(-6)^2 - 4(-2)(0)}}{2(-2)}$ $= \frac{-6 \pm 6}{-4}$ $\therefore x = 0$ or/of $x = 3$	$\checkmark$ M factors/faktore/formula A $\checkmark x = 0$ CA $\checkmark x = 3$ CA OR/OF $\checkmark$ SF A $\checkmark x = 0$ CA $\checkmark x = 3$ CA AO: Full marks/volpunte
		(3)
1.1.2	$x(2x + 1) = 5$ $2x^2 + x - 5 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-1 \pm \sqrt{1^2 - 4(2)(-5)}}{2(2)}$ $x = \frac{-1 \pm \sqrt{41}}{4}$ $\therefore x \approx 1,35$ or/of $x \approx -1,85$	$\checkmark$ standard form/ Standaardvorm A $\checkmark$ SF CA $\checkmark$ S CA $\checkmark$ both x-values/beide x-waardes CA $\checkmark$ R CA AO: Full marks/volpunte
		(5)
1.1.3	$3x^2 \leq 12$ OR/OF for critical values $3x^2 - 12 \leq 0$; $3x^2 - 12 = 0$ $3(x - 2)(x + 2) \leq 0$; $3(x - 2)(x + 2) = 0$ critical values: 2 and -2 kritieke waardes: 2 en -2 $\therefore -2 \leq x \leq 2$ OR/OF $x \in [-2 ; 2]$	$\checkmark$ standard form/standaardvorm A $\checkmark$ M factors/faktore/formula/formule A $\checkmark$ both critical values/beide kritieke waardes CA $\checkmark$ correct notation/korrekte notasie CA AO: Full marks/volpunte
		(4)

1.2	NOT TO BE MARKED/ MOET NIE GEMERK WORD NIE	
1.3.1	$v = \frac{2\pi r}{t}$ $2\pi r = vt$ $\therefore r = \frac{vt}{2\pi}$ OR/OF $v = \frac{2\pi r}{t}$ $\frac{v}{2\pi} = \frac{r}{t}$ $\therefore r = \frac{v}{\frac{2\pi}{t}} = \frac{vt}{2\pi}$	✓M multiplying by t/ vermenigvuldiging met t A ✓M dividing by 2π / deling deur 2π CA OR/OF ✓M dividing by/deel deur $\frac{2\pi}{t}$ A ✓ r as the subject/as onderwerp CA AO: Full marks/volpunte (2)
1.3.2(a)	$t = 1,94 \times 10^{-5}$ hours/ure OR/OF $t = 1,94 \times 10^{-5} \times 3600$ $= 6,984 \times 10^{-2}$ sec/sek	✓ 1,94 ✓ 10^{-5} A OR/OF ✓ 6,984 ✓ 10^{-2} A NPR (2)
1.3.2(b)	$r = \frac{vt}{2\pi}$ $r = \frac{91,116 \times 1,94 \times 10^{-5}}{2\pi}$ km OR / OF $r = \frac{91,116 \times 0,0000194}{2\pi}$ km $r \approx 2,81 \times 10^{-4}$ km OR/OF $v = \frac{2\pi r}{t}$ $91,116 = \frac{2\pi r}{1,94 \times 10^{-5}}$ $r \approx 2,81 \times 10^{-4}$ km	✓ SF CA from/vanaf Q 1.3.1 and/en Q 1.3.2 (a) ✓ $r \approx 2,81 \times 10^{-4}$ km CA OR/OF ✓ SF CA from Q 1.3.1 and Q 1.3.2 (a) ✓ $r \approx 2,81 \times 10^{-4}$ km CA NPR NPU AO: Full marks/volpunte (2)
1.4	$10111_2 = 16 + 4 + 2 + 1$ $= 23$	✓ M A ✓ 23 A AO: Full marks/volpunte (2)

[20 MARKS TO BE SCALED TO 26 MARKS AS PER TABLE PROVIDED/ 20 PUNTE MOET OPGESKAAL WORD A 26 PUNTE, PER TABELVOORSIEN]

QUESTION/VRAAG 2

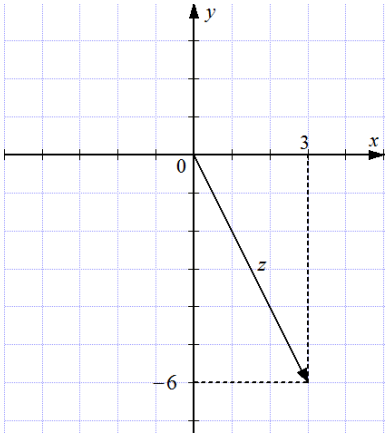
2.1.1	$2p + 7 \neq 0$ $p \neq -\frac{7}{2}$ OR/OF $p \in \mathbb{R} - \left\{ -\frac{7}{2} \right\}$	$\checkmark p \neq -\frac{7}{2}$ A OR/OF $\checkmark p \in \mathbb{R} - \left\{ -\frac{7}{2} \right\}$ AO: Full marks/volpunte (1)
2.1.2	$p + 3 \geq 0$ $p \geq -3$ OR/OF $p \in [-3; \infty)$	$\checkmark$ M A $\checkmark$ value of p /waarde van p CA only if inequality used/ slegs as ongelykheid gebruik word (2)
2.2.1	$kx^2 + 2 = 10x$ $kx^2 - 10x + 2 = 0$ $\Delta = b^2 - 4ac$ $= (-10)^2 - 4(k)(2)$ $= 100 - 8k$	$\checkmark$ M standard form/standaardvorm A $\checkmark$ SF CA $\checkmark$ S in terms of k /in terme van k CA (3)
2.2.2	For equal roots/Vir gelyke wortels: $\Delta = 0$ $100 - 8k = 0$ $k = \frac{25}{2}$	$\checkmark$ M CA from/vanaf Q/V 2.2.1 $\checkmark$ S value of k /waarde van k CA AO: Full marks/volpunte (2)

[8]

QUESTION/VRAAG 3

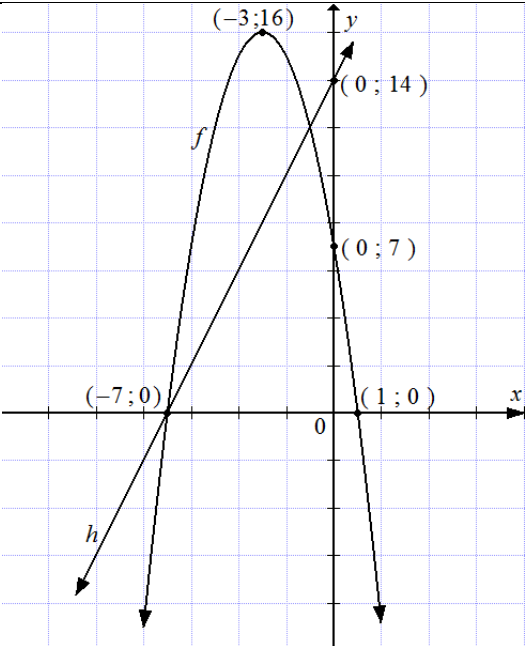
3.1.1	$3(2x)^0 = 3(1) = 3$	✓ S	A (1)
3.1.2	$\log (-10)$ is undefined/is ongedefinieerd	✓ undefined/ ongedefinieerd	A
		Accept/aanvaar: Unanswerable, impossible , no value/geen anwoord, onmoontlik. aeen waarde	
			(1)
3.1.3	$\frac{5^{2n+1} + 4 \times 5^{2n}}{25^n}$$= \frac{5^{2n} \times 5^1 + 4 \times 5^{2n}}{5^{2n}} \text{ OR/OF } = 5^{-2n}(5^{2n} \times 5^1 + 4 \times 5^{2n})$$= \frac{5^{2n}(5 + 4)}{5^{2n}} = 5 + 4$$= 9 = 9$ OR/OF $\frac{5^{2n+1} + 4 \times 5^{2n}}{25^n}$$= \frac{5^{2n+1}}{5^{2n}} + \frac{4 \times 5^{2n}}{5^{2n}}$$= 5 + 4$$= 9$ OR/OF $\frac{5^{2n+1} + 4 \times 5^{2n}}{25^n}$$= \frac{5 \times 25^n + 4 \times 25^n}{25^n}$$= \frac{25^n(5 + 4)}{25^n}$$= 9$ OR/OF $\frac{5^{2n+1} + 4 \times 5^{2n}}{25^n}$$= \frac{5 \cdot 5^{2n} + 4 \cdot 5^{2n}}{5^{2n}}$$= \frac{9 \cdot 5^{2n}}{5^{2n}}$$= 9$	✓ M $25^n = 5^{2n}$ A ✓ M factorisation/ faktorisering A ✓ S CA OR/OF ✓ M $25^n = 5^{2n}$ A ✓ M division/deling A ✓ S CA OR/OF ✓ M $5^{2n} = 25^n$ A ✓ M factorisation/ faktorisering A ✓ S CA ✓ M $25^n = 5^{2n}$ A ✓ M adding like terms/ optel van gelyksoortige terme A ✓ S CA (3)	

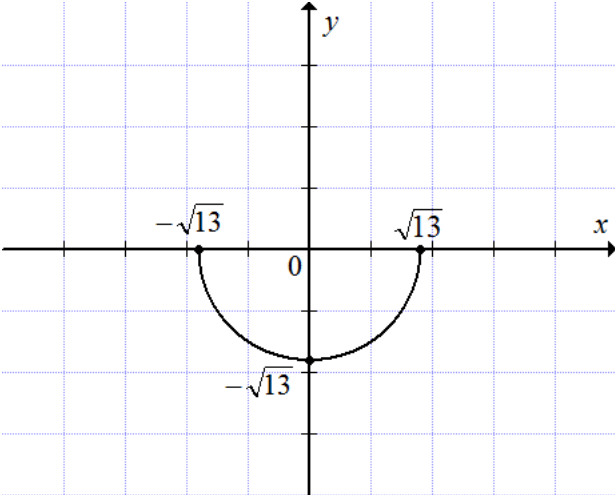
3.2	$\log_3(x + 36) = \log_3 2x + \log 100$ $\log_3(x + 36) - \log_3 2x = 2$ $\log_3\left(\frac{x + 36}{2x}\right) = 2$ $\frac{x + 36}{2x} = 3^2 = 9$ $18x = x + 36$ $17x = 36$ $\therefore x = \frac{36}{17}$ OR/OF $\log_3(x + 36) = \log_3 2x + \log 100$ $\log_3(x + 36) = \log_3 2x + 2$ $\log_3(x + 36) - \log_3 2x + \log_3 9 = 0$ $\log_3\left(\frac{x + 36}{2x \times 9}\right) = 0$ $\log_3\left(\frac{x + 36}{18x}\right) = 0$ $\frac{x + 36}{18x} = 3^0$ $18x = x + 36$ $17x = 36$ $\therefore x = \frac{36}{17}$ OR/OF $\log_3(x + 36) = \log_3 2x + \log 100$ $\log_3(x + 36) = \log_3 2x + 2\log_3 3$ $\log_3(x + 36) = \log_3 2x - \log_3 9$ $\log_3(x + 36) = \log_3 18x$ $x + 36 = 18x$ $17x = 36$ $\therefore x = \frac{36}{17}$	$\checkmark 2$ A $\checkmark \mathbf{M}$ log property/ log-eienskap A $\checkmark \mathbf{M}$ exp. notation/ eksp. Notasie CA $\checkmark \mathbf{S}$ CA $\checkmark \mathbf{S}$ value of x /waarde van x CA OR/OF $\checkmark 2$ A $\checkmark \mathbf{M}$ log property/ log-eienskap A $\checkmark \mathbf{M}$ exp. notation/ eksp. Notasie CA $\checkmark \mathbf{S}$ CA $\checkmark \mathbf{S}$ value of x /waarde van x CA OR/OF $\checkmark 2$ A $\checkmark \mathbf{M}$ log property/ log-eienskap A $\checkmark \mathbf{M}$ log property/ log-eienskap CA $\checkmark \mathbf{S}$ CA $\checkmark \mathbf{S}$ value of x /waarde van x CA (5)
-----	---	--

3.3	$z = 3 - 6i$ $x = 3 \text{ and/en } y = -6 \text{ OR/OF } (3; -6)$ 	✓ M real component/reele komponent A ✓ M complex component/komplekse komponent A ✓ correct plotting of point/korrekte plot van punt (3; -6) CA (3)
3.4	$p + qi = \frac{3 - 4i}{2 + i}$ $= \frac{3 - 4i}{2 + i} \times \frac{2 - i}{2 - i}$ $= \frac{6 - 11i + 4i^2}{4 - i^2}$ $= \frac{6 - 11i + 4(-1)}{4 - (-1)}$ $= \frac{2}{5} - \frac{11}{5}i$ $\therefore p = \frac{2}{5} \text{ and } q = -\frac{11}{5}$ OR/OF $p + qi = \frac{3 - 4i}{2 + i}$ $(p + qi)(2 + i) = 3 - 4i$ $2p + pi + 2qi + qi^2 = 3 - 4i$ $2p - q + i(p + 2q) = 3 - 4i$ $2p - q = 3 \quad (1)$ $p + 2q = -4 \quad (2)$ $p = \frac{2}{5}$ $q = 2\left(\frac{2}{5}\right) - 3 = -\frac{11}{5}$	✓ M multiplying by/vermenigvuldiging deur $\frac{2-i}{2-i}$ A ✓ S CA ✓ S $i^2 = -1$ A ✓ S value of p/waarde van p CA ✓ S value of q/waarde van q CA OR/OF ✓ M product/produk A ✓ S CA ✓ Eqs./Vgl (1) and/en (2) CA ✓ S value of p/waarde van p CA ✓ S value of q/waarde van q CA AO: Full marks/volpunte (5) [18]

QUESTION / VRAAG 4

4.1.1	$(0; 7)$ OR/OF $y = 7$	✓ M y-intercept/-afsnit A (1)
4.1.2	$-x^2 - 6x + 7 = 0$ $x^2 + 6x - 7 = 0$ $(x + 7)(x - 1) = 0$ $x = -7$ or $x = 1$ OR/OF $-x^2 - 6x + 7 = 0$ $x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(-1)(7)}}{2(-1)}$ $x = -7$ or $x = 1$	✓ M factors/faktore A ✓ S x value/ x-waarde CA ✓ S x value/ x-waarde CA OR/OF ✓ SF formula/fomule A ✓ S x value/ x-waarde A ✓ S x value/ x-waarde A Accept/aanvaar $(-7; 0)$ and $(1; 0)$ AO: Full marks/volpunte (3)
4.1.3	$f(x) = -x^2 - 6x + 7$ $x = -\frac{b}{2a} = -\frac{(-6)}{2(-1)} = -3$ $y = -(-3)^2 - 6(-3) + 7 = 16$ OR/OF $y = \frac{4(-1)(7) - (-6)^2}{4(-1)} = 16$ TP/DP $(-3; 16)$ OR/OF $f(x) = -x^2 - 6x + 7$ $x = \frac{-7+1}{2} = -3$ $y = -(-3)^2 - 6(-3) + 7 = 16$ TP / DP $(-3; 16)$ OR/OF $f(x) = -x^2 - 6x + 7$ $f'(x) = -2x - 6$ $0 = -2x - 6$ $\therefore x = -3$ $y = -(-3)^2 - 6(-3) + 7$ $\therefore y = 16$ TP/DP $(-3; 16)$	✓ SF A ✓ S x value/x-waarde CA ✓ y value/y-waarde CA OR/OF ✓ M A ✓ S x value/x-waarde CA ✓ S y value/y-waarde CA OR/OF ✓ M $f'(x) = 0$ A ✓ S x value/x-waarde CA ✓ y value/y-waarde CA AO: Full marks/volpunte (3)

4.1.4		✓ correct intercepts on both axes/ korrekte afsnitte op beide asse CA ✓ correct turning point/korrekte draaipunt CA ✓ shape/vorm A (3)
4.1.5	$h(x) = 2x + 14$ y-intercept/y-afsnit: $y = 14$ x - intercepts/-afsnitte: $2x + 14 = 0$ $\therefore x = -7$	✓ correct intercepts on both axes/ korrekte afsnitte op beide asse A ✓ shape/vorm (diagram in Q/V 4.1.4) A (2)
4.1.6	$-x^2 - 6x + 7 = 2x + 14$ $x^2 + 8x + 7 = 0$ $(x + 7)(x + 1) = 0$ $x = -7$ or $x = -1$ $\therefore -7 \leq x \leq -1$ OR/OF $x \in [-7; -1]$ OR/OF $-x^2 - 6x + 7 \geq 2x + 14$ $x^2 + 6x - 7 + 2x + 14 \leq 0$ $x^2 + 8x + 7 \leq 0$ $(x + 7)(x + 1) \leq 0$ $\therefore -7 \leq x \leq -1$ OR / OF $x \in [-7; -1]$	✓ M equating $f(x)$ and $h(x)$/stel $f(x)$ en $h(x)$ gelyk A ✓ S standard form/standaardvorm CA ✓ M factors/faktore/formula CA ✓ S both critical values/beide kritieke waardes CA ✓ correct notation/korrekte notasie CA OR/OF ✓ M setting inequality/opstel v. ongelyk. A ✓ S standard form/standaardvorm CA ✓ M factors/faktore/formula CA ✓ S both critical values/beide kritieke waardes CA ✓ correct notation/korrekte notasie CA AO: Full marks/volpunte (5)

4.2.1	$q = 1$	✓1 A (1)
4.2.2	$f(x) = \frac{4}{x} + 1$ $0 = \frac{4}{x} + 1$ $-1 = \frac{4}{x}$ $x = -4$ $\therefore T(-4; 0)$	✓ M $0 = \frac{4}{x} + 1$ A ✓ S coordinates of /koördinate van T CA AO: Full marks/volpunte (2)
4.2.3	$x \neq 0$ OR/OF $x \in (-\infty; 0) \cup (0; \infty)$ OR/OF $x \in \mathbb{R} - \{0\}$ OR/OF $x \in \mathbb{R}; x \neq 0$	✓ correct domain/korrekte gebied (definisieversameling) A (1)
4.2.4	$y > 1$ OR/OF $y \in (1; \infty)$	✓ correct range/korrekte terrein (waardeversameling) A (1)
4.3		✓ both x-intercepts/beide x-afsnitte A ✓ y-intercept/y-afsnit A ✓ correct shape/korrekte vorm A (3) Accept/aanvaar 3,61

[25]

QUESTION/VRAAG 5

5.1	$A = P(1-i)^n$ $90 = 159(1 - 8\%)^n$ $\frac{90}{159} = (0,92)^n$ $n = \log_{0,92} \left(\frac{90}{159} \right)$ $\therefore n \approx 6,83 \text{ min.}$	✓ F ✓ SF substitution/vervanging A ✓ M applying log property /pas log-eienskap toe A ✓ S value of /waarde van n CA NPR (4)
5.2.1	R30 000 OR/OF 30 thousand rand/ 30 duisend rand	✓ correct initial amount/korrekte aanvanklike bedrag A (1)
5.2.2	$A = P(1+i)^n$ $= 30\,000(1 + 9,5\%)^3$ $\approx R\,39\,387,97$	✓ F A ✓ SF CA ✓ exact value/presiese waarde CA (3)
5.2.3	12,5% p.a. compounded quarterly/p.j. kwartaalliks saamgestel: $A = P(1+i)^n$ $= 39\,387,97 \left(1 + \frac{12,5\%}{4} \right)^{4 \times 4}$ $\approx R\,64\,444,67$ With interest at 9,5% p.a $A = P(1+i)^n$ $= R\,30\,000(1 + 9,5\%)^7$ OR/OF $R\,39\,387,97(1 + 9,5\%)^7$ $\approx R\,56\,626,55$ The additional amount the investor will receive/Die addisionele bedrag wat die belegger sal ontvang: $R\,64\,444,67 - R\,56\,626,55 = R\,7\,818,12$	✓ value of P from Q 5.2.2/ waarde van P van V 5.2.2 CA ✓ SF A ✓ value of A/waarde van A CA ✓ SF A ✓ value of A/waarde van A CA ✓ S difference/verskil CA (6)

[14]

QUESTION/VRAAG 6

6.1	$f(x) = 1 - x$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{[1 - (x+h)] - (1 - x)}{h}$ $= \lim_{h \rightarrow 0} \frac{1 - x - h - 1 + x}{h}$ $= \lim_{h \rightarrow 0} \frac{-h}{h}$ $= \lim_{h \rightarrow 0} (-1)$ $\therefore f'(x) = -1$	✓ M using the definition/ gebruik die definisie A ✓ SF A ✓ S CA ✓ S CA ✓ -1 CA AO: only 1 mark/sleg 1 punt Penalty of 1 mark for incorrect notation/Penaliseer een punt indien notasie foutief is. (5)
No penalty for notation in the remaining question/Geen penalisering vir notasie in volgende vraag.		
6.2.1	$\frac{d}{dx}(2x^{-3} - 9x + 4\pi)$ $= -6x^{-4} - 9$	✓ M $-6x^{-4}$ A ✓ M -9 A (2)
6.2.2	$D_x \left[\frac{x^3 - 27}{x - 3} \right]$ $= D_x \left[\frac{(x-3)(x^2 + 3x + 9)}{x - 3} \right]$ $= D_x (x^2 + 3x + 9)$ $= 2x + 3$	✓ M $(x-3)(x^2 + 3x + 9)$ A ✓ S only if factorized or long division/ slegs as faktorisering of langdeling CA ✓ $2x$ CA ✓ 3 CA (4)
6.2.3	$xy = 7\sqrt{x}$ $y = \frac{7x^{\frac{1}{2}}}{x}$ $= 7x^{-\frac{1}{2}}$ $\therefore \frac{dy}{dx} = -\frac{7}{2}x^{-\frac{3}{2}}$	✓ M exponential form/ eksponensiële vorm A ✓ M division/deling A ✓ $-\frac{7}{2}x^{-\frac{3}{2}}$ only if divided by x/ slegs as deur x gedeel word CA (3)

6.3.1	$g(x) = 1 - x^3$ $g(-1) = 1 - (-1)^3$ $= 2$ $g(2) = 1 - (2)^3$ $= -7$ Average/gemid.gradient = $\frac{g(x_2) - g(x_1)}{x_2 - x_1}$ $= \frac{-7 - 2}{2 - (-1)}$ $= -3$	✓M 2 A ✓M -7 A ✓SF CA ✓S CA (4)
6.3.2	$g(x) = 1 - x^3$ $2 = 1 - x^3$ $x^3 = 1$ $\therefore x = -1$ $g'(x) = -3x^2$ $m = -3(-1)^2 = -3$ $y - y_1 = m(x - 1)$ OR/OF $y = mx + c$ $y - 2 = -3(x - (-1))$ $2 = -3(-1) + c$ $c = -1$ $y = -3x - 1$	✓M substituting/vervang A $y = 2$ ✓value of /waarde van x CA ✓M derivative/afgeleide A ✓value of/waarde van m CA ✓SF CA ✓equation/vergelyking CA (6) Accept any form of eq./aanvaar enige vorm van die vgl.
		[24]

QUESTION/VRAAG 7

7.1	$f(x) = x^3 - x^2 - 8x + 12$ $f(0) = (0)^3 - (0)^2 - 8(0) + 12$ $= 12$ $\therefore A(0;12)$ $\therefore OA = 12 \text{ units/eenhede}$	✓ M substitution/vervanging A ✓ length of OA/<i>lengte van OA</i> A AO: Full marks/volpunte (2)
7.2	$f(x) = x^3 - x^2 - 8x + 12$ $f(2) = (2)^3 - (2)^2 - 8(2) + 12$ $f(2) = 0$ $\therefore x - 2$ is a factor of f / <i>faktor van f</i>	✓ S A ✓ 0 A Accept long division/aanvaar langdeling (2)
7.3	$f(-3) = (-3)^3 - (-3)^2 - 8(-3) + 12$ $= 0$ $\therefore f(x) = (x + 3)(x - 2)(x - 2)$ OR/OF $f(x) = (x - 2)(x - 2)(x + 3)$ OR/OF $\begin{array}{r} x - 2 \overline{) x^3 - x^2 - 8x + 12} \\ \underline{x^3 - x^2 - 6x + 12} \\ 2x \\ \underline{2x - 4} \\ 6x - 4 \\ \underline{6x - 12} \\ 8 \end{array}$ $f(x) = (x - 2)(x^2 + x - 6)$ $\therefore f(x) = (x - 2)(x + 3)(x - 2)$ OR/OF $f(x) = (x - 2)(x^2 + bx - 6)$ $-2x^2 + bx^2 = -x^2$ $bx^2 = x^2$ $\therefore b = 1$ $f(x) = (x - 2)(x^2 + x - 6)$ $\therefore f(x) = (x - 2)(x + 3)(x - 2)$	✓ M $f(-3)$ A ✓ recognising TP as a repeated factor/<i>herken TP as 'n herhaalde factor</i> $(x - 2)(x - 2)$ A ✓ factors of /<i>faktore van</i> $f(x)$ A OR/OF ✓✓ M dual factors/<i>dubbel faktore</i> A ✓ factors of /<i>faktore van</i> $f(x)$ A OR/OF ✓ M long division, inspection, substitution/<i>langdeling, inspeksie, vervanging</i> A ✓ $x^2 + x - 6$ A ✓ factors of /<i>faktore van</i> $f(x)$ A OR/OF ✓ M finding quadratic factor/<i>kwadratiese faktor te vind</i> A ✓ quadratic term/<i>kwadratiese term</i> A ✓ factors of /<i>faktore van</i> $f(x)$ A (3)

7.4	$T(-3; 0)$ $P(2; 0)$	✓ $T(-3; 0)$ CA only if neg./slegs as neg. ✓ $P(2; 0)$ A (2)
7.5	$f(x) = x^3 - x^2 - 8x + 12$ $f'(x) = 3x^2 - 2x - 8$ $f'(x) = 0$ $3x^2 - 2x - 8 = 0$ $(3x + 4)(x - 2) = 0$ $\therefore x = -\frac{4}{3} = -1\frac{1}{3}$ or $x = 2$ $f\left(-\frac{4}{3}\right) = \left(-\frac{4}{3}\right)^3 - \left(-\frac{4}{3}\right)^2 - 8\left(-\frac{4}{3}\right) + 12$ $= \frac{500}{27} = 18\frac{14}{27}$ $\therefore R\left(-1\frac{1}{3}; 18\frac{14}{27}\right)$ OR/OF $R(-1,33; 18,52)$	✓ M derivative/afgeleide A ✓ equating derivative to 0/stel afgeleide gelyk aan 0 A ✓ factors/faktore CA ✓ both values of x/beide waardes van x CA ✓ value of y/beide waardes van y CA (5)
7.6	$x \in \left(-1\frac{1}{3}; 2\right)$ OR/OF $-1\frac{1}{3} < x < 2$	✓ both end points/beide eindpunte CA ✓ notation/notasie A OR/OF ✓ both end points/beide eindpunte CA ✓ notation/notasie A (2)

[16]

QUESTION/VRAAG 8

NPU		
8.1	$s(t) = 7,5t^3 - 20t^2 + 27$ $= 7,5(0)^3 - 20(0)^2 + 27 \text{ m}$ $= 27 \text{ m}$	✓ initial displacement/ Aanvanklike verplasing A (1)
8.2	$s'(t) = 22,5t^2 - 40t$ $s'(3) = 22,5(3)^2 - 40(3) \text{ m/s}$ $= 82,5 \text{ m/s}$	✓ derivative/afgeleide A ✓ substitution/vervanging CA ✓ rate of change/ veranderingstempo CA (3)
8.3	$s'(t) = 0$ $s'(t) = 22,5t^2 - 40t = 0$ $t(22,5t - 40) = 0$ $t = 0 \text{ or } t = 1,78$ $\therefore t \approx 1,78 \text{ sec/sek}$	✓ M derivative equal to 0/ afgeleide gelyk aan 0 CA from Q/V 8.2 ✓ M factors/faktore CA ✓ both values of t /beide waardes van t CA ✓ correct value of/ korrekte waarde van t CA NPR (4)

[8]

QUESTION /VRAAG 9

9.1.1	$\int (\pi x) dx$ $= \frac{\pi}{2} x^2 + C$	✓ M $\frac{\pi}{2} x^2$ ✓ C	A A (2)
9.1.2	$\int (x^{-1} - \sqrt{x} - 11) dx$ $\int \left(\frac{1}{x} - x^{\frac{1}{2}} - 11 \right) dx$ $= \ln x - \frac{x^{\frac{3}{2}}}{\frac{3}{2}} - 11x + C$ $= \ln x - \frac{2x^{\frac{3}{2}}}{3} - 11x + C$	✓ M power form/magvorm vorm A ✓ $\ln x$ ✓ $-\frac{x^{\frac{3}{2}}}{\frac{3}{2}}$ ✓ $-11x + C$	CA CA A (4)
9.2	$g(x) = x^3$ $A = \int_1^a x^3 dx$ $A = \left[\frac{x^4}{4} \right]_1^a$ $3,75 = \left(\frac{a^4}{4} \right) - \left(\frac{1^4}{4} \right)$ $3,75 = \frac{a^4}{4} - \frac{1}{4}$ $15 = a^4 - 1$ $a^4 = 16$ $a = \pm 2$ $\therefore a = 2$	✓ M Area notation using integrals/ Area-notasie deur gebruik van <i>integraal notasie</i> ✓ $\left[\frac{x^4}{4} \right]_1^a$ ✓ substitution/vervanging ✓ $a^4 = 16$ ✓ positive value of / positiewe waarde van a	A A CA CA CA (5)

[11]

TOTAL/TOTAAL: 150