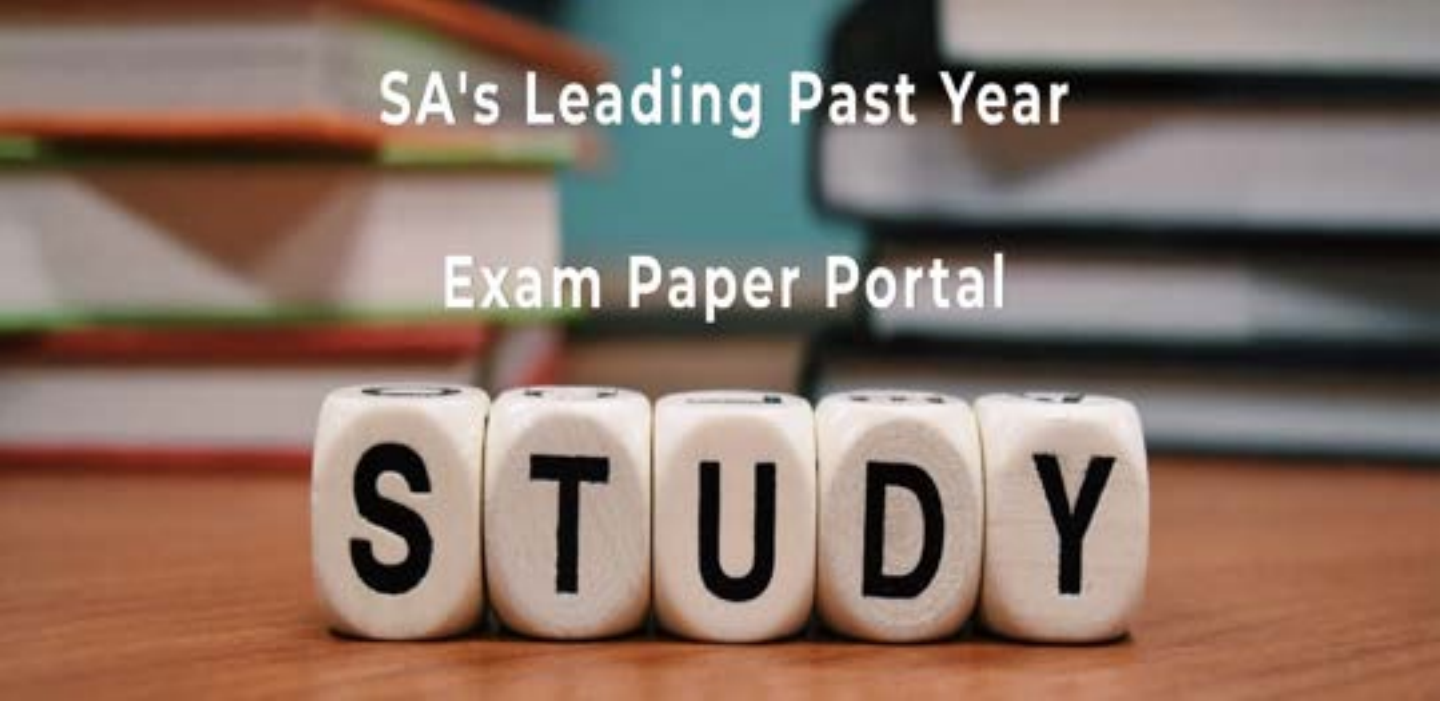

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GRADE/GRAAD 12

TECHNICAL MATHEMATICS P1/*TEGNIESE WISKUNDE V1*

2022

FINAL MARKING GUIDELINES/*NASIENRIGLYNE*

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 Penaliseering vir Eenhede Weggelaat nie*
S	Simplification/*Vereenvoudiging*
SF	Substitution in Correct Formula/*Vervanging in Korrekte Formule*
AO	Answer only/ *Slegs antwoord*

These marking guidelines consist of 21 pages.
Hierdie nasienriglyne bestaan uit 21 bladsye.

NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent accuracy applies to all aspects of the marking guidelines where indicated.
- 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.*
- *Volgehoue akkuraatheid is deurgaans op alle aspekte van die nasienriglyne van toepassing.*
- *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	$x^2 - 3x - 10 = 0$ $(x-5)(x+2) = 0$ **OR/*OF*** $x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-10)}}{2(1)}$ $x = -2$ or/*of* $x = 5$	✓factors/ *faktore* or/*of* **SF** **A** ✓ both values /*beide waardes van x* **CA** (2)
1.1.2	$x^2 - 3x - 10 < 0$ $(x-5)(x+2) < 0$ $-2 < x < 5$ **OR/*OF*** $x \in (-2;5)$ **OR/*OF*** $x > -2$ and/*en* $x < 5$  **Note: If correct number line representation is shown and where no other calculations are shown then Award full marks.** ***Nota: Indien slegs die korrekte getallelyn en geen ander berekeninge vertoon word kan volpunte toegeken word.***	✓ critical values/*kritiese waardes* **CA** ✓ correct notation/*korrekte notasie* **A** ✓ number line representation/ *Getallelyn voorstelling* **CA** (3)
1.2	$2x^2 - 11 = -7x$ $2x^2 + 7x - 11 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-7 \pm \sqrt{7^2 - 4(2)(-11)}}{2(2)}$ $x = -4{,}68$ or/*of* $x = 1{,}18$	✓ standard form/*standaardvorm* **A** ✓ **SF** **CA** ✓ both values of *x* correctly rounded/ *beide waardes van x korrek afgerond* **CA**

OR/*OF*

$0=-2x^2-7x+11$

$\therefore x=\dfrac{-(-7)\pm\sqrt{(-7)^2-4(-2)(11)}}{2(-2)}$

$\therefore x=-4{,}68 \quad \text{or/}of \quad x=1{,}18$

Penalty for Rounding/ *Penalisering vir Afronding*

OR/*OF*

✓ standard form/*standaardvorm* **A**

✓ **SF** **CA**

✓ both values of *x* correctly rounded/ *beide waardes van x korrek afgerond* **CA**

(3)

1.3

$y-x+1=0 \quad .....1$

$y+7=x^2+2x \quad .....2$

$y=x-1$

$(x-1)+7=x^2+2x$

$\therefore x^2+x-6=0$

$(x+3)(x-2)=0$ **OR/*OF*** $x=\dfrac{-(1)\pm\sqrt{(1)^2-4(1)(-6)}}{2(1)}$

$x=-3 \quad \text{or/}of \quad x=2$

$y=-3-1 \quad \text{or/}of \quad y=2-1$

$y=-4 \quad \text{or/}of \quad y=1$

✓*y subject of formula/onderwerp van formule* ***A***

✓*substitution/vervanging* ***CA***

✓*standard form/standaardvorm* ***CA***

✓*factors/ faktore or/of* ***SF*** ***CA***

✓*both/beide x-values/-waardes* ***CA***

✓*both/ beide y-values/-waardes* ***CA***

OR/*OF*

$x=y+1$

$y+7=(y+1)^2+2(y+1)$

$y+7=y^2+2y+1+2y+2$

$y^2+3y-4=0$

$(y+4)(y-1)=0 \quad \text{or/}of \quad y=\dfrac{-(3)\pm\sqrt{(3)^2-4(1)(-4)}}{2(1)}$

$\therefore y=-4 \quad \text{or/}of \quad y=1$

$x=-4+1 \quad \text{or/}of \quad x=1+1$

$\therefore x=-3 \quad \text{or/}of \quad x=2$

OR/OF

✓*x subject of formula/onderwerp van formule* ***A***

✓*substitution/vervanging* ***CA***

✓*correct standard form/korrekte standaardvorm* ***CA***

✓*factors/ faktore or/of* ***SF*** ***CA***

✓*both/ beide y-values/-waardes* ***CA***

✓*both/ beide x-values/-waardes* ***CA***

(6)

1.4.1	$\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2}$ $\frac{1}{R_P} = \frac{R_1 + R_2}{R_1 . R_2}$ $R_P = \frac{R_1 . R_2}{R_2 + R_1}$ **OR/*OF*** $\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2}$ $R_P\left(\frac{1}{R_P}\right) = R_P\left(\frac{1}{R_1} + \frac{1}{R_2}\right)$ $R_P = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}}$	✓ simplification/*vereenvoudiging* **A** ✓ subject/*onderwerp* **CA** **OR/*OF*** ✓ simplification/*vereenvoudiging* **A** ✓ subject/*onderwerp* **CA** **AO:** full marks/*volpunte* (2)
1.4.2	$R_P = \frac{40 \times 45}{45 + 40} = \frac{1800}{85}$ $R_P = \frac{360}{17}\ \Omega$ **OR/*OF*** $21{,}18\,\Omega$ **OR/*OF*** $\frac{1}{R_P} = \frac{1}{40} + \frac{1}{45} = \frac{17}{360}$ $R_P = \frac{360}{17}\Omega$ **OR/*OF*** $21{,}18\,\Omega$ **OR/*OF*** $R_P = \frac{1}{\frac{1}{40} + \frac{1}{45}}$ $R_P = \frac{360}{17}\Omega$ **OR/*OF*** $21,18\ \Omega$	✓ **SF** **CA** ✓ value of/*waarde van* R_P **CA** **OR/*OF*** ✓ **SF** **A** ✓ value of/*waarde van* R_P **CA** **OR/*OF*** ✓ **SF** **CA** ✓ value of/*waarde van* R_P **CA** **AO:** full marks/*volpunte* (2)

1.5

$1101100_2 \div 1100_2 = 1001_2$

2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	1	0	1	1	0	0
			1	1	0	0

✓ **M** **A**

$64 + 32 + 8 + 4 = 108$

$8 + 4 = 12$

$\therefore 108 \div 12 = 9$

$9 = 1001_2$ ✓ 1001_2 **CA**

OR/*OF*

OR/*OF*

```
      1001
1100 ⟌1101100
     1100
       11
        0
       110
        0
       1100
       1100
```

✓ **M** **A**

$1101100_2 \div 1100_2 = 1001_2$ ✓ 1001_2 **CA**

AO: full marks/*volpunte* (2)
[20]

QUESTION/*VRAAG* 2

2.1.1	$e = 4$	✓ Value of/*Waarde van e*	**A** (1)
2.1.2	$e < 4$	✓ Value of/*Waarde van e*	**A** (1)
2.2	$mx^2 - 12x + 9 = 0$ $\Delta = b^2 - 4ac$ $\Delta = (-12)^2 - 4(m)(9)$ $\Delta = 144 - 36m$ For equal roots /*Vir gelyke wortels*: $\Delta = 0$ $144 - 36m = 0$ $m = 4$	✓ **SF** ✓ **S** ✓ $\Delta = 0$ ✓ Value of/*Waarde van m*	**A** **CA** **A** **CA** (4) **[6]**

QUESTION/*VRAAG* 3

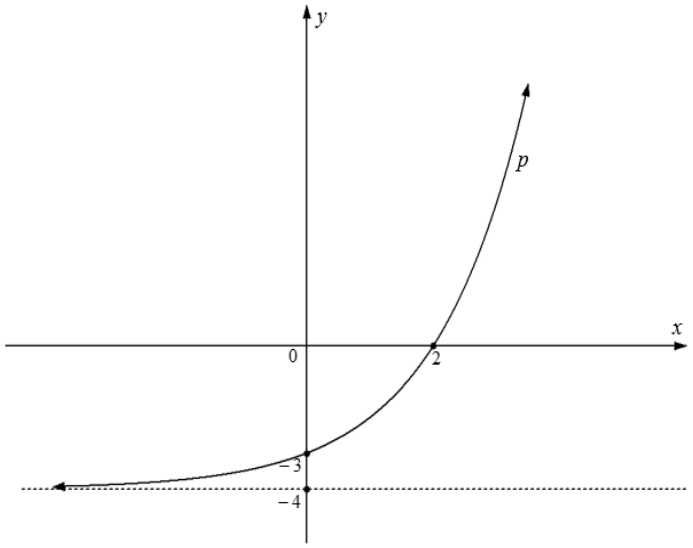
3.1.1	$\frac{3^x \times 3^{x-2}}{9^{x-3}}$ $= \frac{3^x \times 3^{x-2}}{3^{2x-6}}$ $= 3^{x+x-2-2x+6}$ $= 3^4 = 81$ **OR/*OF*** $\frac{3^x \times 3^{x-2}}{9^{x-3}}$ $= \frac{3^x \times 3^{x-2}}{3^{x-3} \times 3^{x-3}}$ $= 3^{x+x-2-x+3-x+3}$ $= 3^4 = 81$ **OR/*OF*** $\frac{3^x \times 3^{x-2}}{9^{x-3}}$ $= \frac{3^x \times 3^x \times 3^{-2}}{9^x \times 9^{-3}}$ $= \frac{9^x \times 9^{-1}}{9^x \times 9^{-3}}$ $= 9^2 = 81$	✓ prime base/*priembasis* 3^2 **A** ✓exponent properties/*eksponent- eienskap* **CA** ✓ 3^4 or/*of* 81 **CA** **OR/*OF*** ✓ prime base/*priembasis* **A** ✓exponent properties/*eksponent- eienskap* **CA** ✓ 3^4 or/*of* 81 **CA** **OR/*OF*** ✓ Split powers /*Verdee*l *magte* **A** ✓exponent properties/*eksponent- eienskap* **CA** ✓ 9^2 or/*of* 81 **CA** (3)
3.1.2	$\left(\sqrt{5}+4\right)^2 - \sqrt{45}$ $= 5+8\sqrt{5}+16 - 3\sqrt{5}$ $= 21+ 5\sqrt{5}$	✓ squaring binomial/*kwadreer binoom* **A** ✓ $3\sqrt{5}$ **A** ✓ $21+ 5\sqrt{5}$ **CA** (3)

3.1.3	$\log_{32} 8 + \log 10$ $= \frac{\log 8}{\log 32} + 1$ $= \frac{\log 2^3}{\log 2^5} + 1$ $= \frac{3\log 2}{5\log 2} + 1$ $= \frac{3}{5} + 1$ $= \frac{8}{5} = 1,6$	✓ change of base law/*verandering van basis wet* **A** ✓ 1 **A** ✓ log property/*-eienskap* **A** ✓ $\frac{8}{5}$ or/*of* $1,6$ **CA** **AO:** zero marks/*punte* (4)
3.2	$\log_4 x + \log_4 (x-6) = \log_5 25$ $\log_4 x(x-6) = log_5 5^2$ $\log_4 (x^2 - 6x) = 2$ $x^2 - 6x = 4^2$ **OR / *OF*** $\log_4 (x^2 - 6x) = \log_4 4^2$ $x^2 - 6x - 16 = 0$ $(x-8)(x+2) = 0$ **OR/*OF*** $x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-16)}}{2(1)}$ $x = 8$ *or/of* $x \neq -2$ $\therefore\ x = 8$	✓ $\log_4 x(x-6)$ **A** ✓ 2 **A** ✓ log definition/prop./ *-definisie/-eiensk.* **CA** ✓ factors/ *faktore* or/*of* **SF** **CA** ✓ $x = 8$ **CA** ✓ $x \neq -2$ **CA** (6)
3.3.1	$z_1 = 4\sqrt{2}\, cis(225°)$ $= 4\sqrt{2}\cos 225° + 4\sqrt{2}\sin 225°.i$ $= -4 - 4i$	✓ polar expansion/*polêre uitbrei* **A** ✓ $-4-4i$ **CA** **AO:** full marks/*volpunte* (2)
3.3.2	$z_1 + z_2$ $= (-4-4i) + (3-4i)$ $= -4 - 4i + 3 - 4i$ $= -1 - 8i$	✓ Substitution/*Vervanging* **CA** ✓ $-1-8i$ **CA** (2)

3.4	$-p+qi=4i^5-2(7+3i)$ $-p+qi=4\left(i^2\right)^2 i-14-6i$ $-p+qi=4(-1)^2 i-14-6i$ $-p+qi=4i-14-6i$ $-p+qi=-14-2i$ $\therefore p=14$ and/*en* $q=-2$	✓ rewriting/*herskryf* i^5 as $\left(i^2\right)^2 i$ **A** ✓ replacing/*vervang* i^2 with/*met* -1 **A** ✓ **S** **CA** ✓ *p* value/*-waarde* **CA** ✓ *q* value/*-waarde* **CA** (5) **[25]**

QUESTION/*VRAAG* 4

4.1.1	$f(x) = \frac{a}{x} + 2$ $4 = \frac{a}{-2} + 2$ $\frac{a}{2} = -2$ $a = -4$ $\therefore\ f(x) = -\frac{4}{x} + 2$	✓ substituting/*vervang.* 2 **A** ✓ subt./*verv.* $(-2;4)$ **A** ✓ value of/*waarde van* a **CA** (3)
4.1.2	$g(x) = x + 2$	✓ equation/*vergelyking* **A** (1)
4.1.3	$y \in \mathbb{R}\ , y \neq 2$ **OR/*OF*** $y \in (-\infty;2) \cup (2\ ;\ \infty)$ **OR/*OF*** $y > 2$ or/*of* $y < 2$	✓ critical value/*kritiese waarde* **A** ✓ notation/*notasie* **A** **OR/*OF*** ✓ critical value/*kritiese waarde* **A** ✓ notation/*notasie* **A** **OR/*OF*** ✓ critical value/*kritiese waarde* **A** ✓ notation/*notasie* **A** (2)
4.1.4	$f(x) = -\frac{4}{x} + 2$ $0 = -\frac{4}{x} + 2$ $\frac{4}{x} = 2$ $2x = 4$ $x = 2$ **OR/*OF*** W(2 ; 0)	✓ $0 = -\frac{4}{x} + 2$ **A** ✓ x-coordinate of/*koördinaat van* W **CA** **OR/*OF*** ✓ x-coordinate /*koördinaat* **A** ✓ y-coordinate /*koördinaat* **A** (2)

4.1.5	$g(x) = 2 + 2 = 4$ $\therefore$ V(2 ; 4) **OR/*OF*** $\therefore$ V(2 ; 4)	✓substitution of *x*-value of W **CA** ✓ coordinates of/*koördinate van* V **CA** **OR/*OF*** ✓ *x*-coordinate /*koördinaat* **A** ✓ *y*-coordinate /*koördinaat* **A** (2)
4.2.1	$y = -4$	✓ equation/*vergelyking* **A** (1)
4.2.2	$p(x) = 2^x - 4$ *y*-intercept/-*afsnit*; $x = 0$ $p(0) = 2^0 - 4$ $\therefore y = -3$ *x*- intercept/-*afsnit*; $y = 0$ $0 = 2^x - 4$ $2^x = 2^2$ **OR/*OF*** $\therefore x = 2$ $2^x = 4$ $\therefore x = \log_2 4$ $\therefore x = 2$	✓ $y = -3$ **A** ✓ $2^x = 2^2$ or/*of* $x = \log_2 4$ **A** ✓ $x = 2$ **CA** **AO:** full marks/*volpunte* (3)
4.2.3		✓ shape/*vorm* **A** ✓ both intercepts/beide *afsnitte* **CA** ✓ asymptote/*asimptoot* **CA** (3)
4.3.1	$k = (4)^2 - 2(4) + 4$ $\therefore k = 12$	✓ substitution/vervanging **A** ✓ value of/*waarde van k* **CA** **AO:** full marks/*volpunte* (2)

4.3.2	$g(x) = x + 1$ $C(4;y)$ $y_C = 4 + 1 = 5$ **OR / *OF*** $AC = \sqrt{(x_2 - x_1)^2 - (y_2 - y_1)^2}$ $AC = y_A - y_C$ $= 12 - 5$ $= \sqrt{(4-4)^2 + (5-12)^2}$ $= 7$ units/*eenhede* $= 7$ units/*eenhede* **OR/*OF*** $AC = (x^2 - 2x + 4) - (x+1)$ $= x^2 - 3x + 3$ $= (4)^2 - 3(4) + 3$ $= 7$ units/*eenhede*	✓ y_C value/-*waarde* **A** ✓ **M** **A** ✓ length of/*lengte van* AC **CA** **OR/*OF*** ✓ **M** **A** ✓ substitution/vervanging **CA** ✓ length of/*lengte van* AC **CA** (3)
4.3.3	$f(x) = x^2 - 2x + 4$ $x = -\frac{b}{2a}$ **OR/*OF*** $f'(x) = 0$ $x = -\frac{(-2)}{2(1)}$ $2x - 2 = 0$ $x = 1$ $x = 1$ $\therefore = \frac{x_P + 4}{2} = 1$ $\therefore x_P = -2$ $f(-2) = (-2)^2 - 2(-2) + 4 = 12$ $\therefore$ P$(-2;12)$ **OR/*OF*** $f(x) = x^2 - 2x + 4$ P$(x;12)$ $12 = x^2 - 2x + 4$ $x^2 - 2x - 8 = 0$ $(x - 4)(x + 2) = 0$ **OR / *OF*** $x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-8)}}{2(1)}$ $\therefore x = 4$ or/*of* $x = -2$ $\therefore$ P$(-2;12)$	✓ **SF** or/of $2x - 2 = 0$ **A** ✓ value of /*waarde van* x **CA** ✓ value of/ *waarde van* x_P **CA** ✓ coordinate/*koördinaat* **CA** **OR/*OF*** ✓ equating/*gelykstelling* **CA** ✓ standard form/*standaardvorm* **CA** ✓ factors/ *faktore* or/*of* **SF** **CA** ✓ $x = -2$ **CA** (4) **[26]**

QUESTION/*VRAAG* 5

Note: in Q5 the use of wrong formula must be regarded as a breakdown
Nota*: *in V5 moet die gebruik van verkeerde formule as 'n afbreek

5.1	$A = P(1+in)$ $A = R15350\left(1+\frac{21}{100}\times 2\right)$ $A = R21\,797$ Monthly payment/ *Maandelikse paaiement* $= \frac{R21797}{24} = R908,21$ **OR/*OF*** $SI = P\times i\times n$ $SI = 15350\times 21\%\times 2 = R6\,447$ $\therefore A = 15350+6\,447 = R21797$ Monthly payment/ *Maandelikse paaiement* $= \frac{R21797}{24} = R908,21$	✓ **SF** ✓ value of/*waarde van* A ✓**M** divide by/*deel deur* 24 ✓monthly payment/*maandelikse paaiement* **OR/*OF*** ✓ **SF** ✓ value of/*waarde van* A ✓**M** divide by/*deel deur* 24 ✓monthly payment/*maandelikse paaiement* **NPR** (4)	**A** **CA** **CA** **CA** **A** **CA** **CA** **CA**
5.2.1	$500\times 1,25 = 625$	✓ value/*waarde*	**A** (1)
5.2.2	$A = P(1+i)^n$ $= 500\,(1+0,25)^{10}$ $= 4656,61$ ≈ 4656	✓ **F** ✓ **SF** ✓ value of/*waarde van*	**A** **A** **CA** (3)
5.3	$A = P(1+i)^n$ $50\,962,58 = P\left(1+\frac{6,78\%}{12}\right)^{24}\left(1+\frac{5,20\%}{4}\right)^{6}$ $P = \frac{50\,962,58}{\left(1+\frac{6.78\%}{12}\right)^{24}\left(1+\frac{5,20\%}{4}\right)^{6}}$ $\approx R41197,43$	✓24 ✓$\left(1+\frac{6,78\%}{12}\right)$ ✓6 ✓$\left(1+\frac{5,20\%}{4}\right)$ ✓P the subject/*die onderwerp* ✓value/*waarde*	**A** **A** **A** **A** **CA** **CA**

OR/*OF*

$$A = P(1+i)^n$$

$$A_2 = P\left(1+\frac{6{,}78\%}{12}\right)^{24}$$

$$= (1{,}144.....)P$$

$$A_{3,5} = 1{,}145P\left(1+\frac{5{,}20\%}{4}\right)^{6}$$

$$50\,962{,}58 = 1{,}237P$$

$$\frac{50\,962{,}58}{1{,}237} = P$$

$$P \approx R\,41197{,}43$$

OR/*OF*

✓24	**A**
✓ 1,145P	**CA**
✓6	**A**
✓1,237P	**CA**
✓P the subject/*die onderwerp*	**CA**
✓ value/*waarde*	**CA**

OR/*OF*

$$P_1 = \frac{50962{,}58}{\left(1+\frac{5{,}20\%}{4}\right)^{6}}$$

$$= R\,47162{,}27$$

$$\therefore P_2 = \frac{47162{,}27}{\left(1+\frac{6{,}78\%}{12}\right)^{24}}$$

$$\approx R\,41197{,}43$$

OR/*OF*

✓6	**A**
✓$\left(1+\frac{5{,}20\%}{4}\right)$	**A**
✓ R 47162, 27	**CA**
✓24	**A**
✓$\left(1+\frac{6{,}78\%}{12}\right)$	**A**
✓value/*waarde*	**CA**
	NPR
	(6)
	[14]

QUESTION/*VRAAG* 6

6.1	$f(x) = 5 + x$ $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \to 0} \frac{5 + x + h - (5 + x)}{h}$ $= \lim_{h \to 0} \frac{5 + x + h - 5 - x}{h}$ $= \lim_{h \to 0} \frac{h}{h}$ $= \lim_{h \to 0} (1)$ $\therefore f'(x) = 1$	✓definition/*definisie* **A** ✓ Substitution/*Verv.* **CA** ✓ **S** **CA** ✓ **S** **CA** ✓1 **CA** **Penalty of one mark for incorrect notation** ***Penaliseer een punt indien notasie foutief is.*** **AO:** zero marks/*punte* (5)
6.2.1	$y = x(x+9)$ $= x^2 + 9x$ $\frac{dy}{dx} = 2x + 9$	✓ expansion/*ontwikkeling* **A** ✓ $2x$ **CA** ✓ 9 **CA** (3)
6.2.2	$D_x\left[\sqrt[7]{x} + \pi p^3\right]$ $= D_x\left[x^{\frac{1}{7}} + \pi p^3\right]$ $= \frac{1}{7}x^{-\frac{6}{7}}$	✓ $x^{\frac{1}{7}}$ **A** ✓✓ $\frac{1}{7}x^{-\frac{6}{7}}$ **CA** (3)
6.2.3	$f(x) = \frac{1 - x^9}{x^2}$ $= x^{-2} - x^7$ $f'(x) = -2x^{-3} - 7x^6$	✓ x^{-2} **A** ✓ $-x^7$ **A** ✓ $-2x^{-3}$ **CA** ✓ $-7x^6$ **CA** (4)
6.3.1	$g(x) = -4x^2$ $g(2) = -4(2)^2 = -16$	✓ -16 **A** (1)

6.3.2	$g'(x) = -8x$ $m = g'(2) = -8(2)$ $m = -16$ $y + 16 = -16(x - 2)$ **OR/OF** $-16 = -16(2) + c$ $\therefore c = 16$ $\therefore y = -16x + 16$	✓ derivative/*afgeleide* ✓ gradient/*gradiënt* ✓ substitution/*verv*. ✓ equation/*verg*.	**A** **CA** **CA** **CA** (4)
			[20]

QUESTION/*VRAAG* 7

7.1	C(3 ; 0)	✓3 **A** ✓ 0 **A** (2)
7.2	$h(x) = 2x + p$ subst. point/*verv. punt* C $0 = 2(3) + p$ $0 = 6 + p$ $\therefore\ p = -6$ **OR/*OF*** $g(x) = -(x + 2)(x - 1)(x - 3)$ *y*-int./*afsn.*; $x = 0$ $g(0) = -(0 + 2)(0 - 1)(0 - 3) = -6$ D(0 ; – 6) $\therefore\ p = -6$	✓ value/ *waarde p* **A** **OR/*OF*** ✓ value/ *waarde p* **A** **AO:** full marks/*volpunte* (1)
7.3	$g(x) = -(x + 2)(x - 1)(x - 3)$ A(– 2;0) AC = 2 + 3 **OR / *OF*** $AC = \sqrt{(3+2)^2 + (0-0)^2}$ = 5 units/*eenhede* = 5 units/*eenhede*	✓ **M** **A** ✓ length of/*lengte van* AC **CA** **AO:** full marks/*volpunte* (2)
7.4	$g(x) = -(x + 2)(x - 1)(x - 3)$ $g(x) = -(x+2)(x^2 - 4x + 3)$ $g(x) = -x^3 + 2x^2 + 5x - 6$ **OR/*OF*** $g(x) = -(x + 2)(x - 1)(x - 3)$ $g(x) = -(x-1)(x^2 - x - 6)$ $g(x) = -x^3 + 2x^2 + 5x - 6$ **OR/*OF*** $g(x) = -(x + 2)(x - 1)(x - 3)$ $g(x) = -(x-3)(x^2 + x - 2)$ $g(x) = -x^3 + 2x^2 + 5x - 6$	✓ quadratic bracket/*kwadratiese hakie* **A** ✓cubic form/*derdegraadse vorm* **CA** ✓ quadratic bracket/*kwadratiese hakie* **A** ✓cubic form/*derdegraadse vorm* **CA** ✓ quadratic bracket/*kwadratiese hakie* **A** ✓cubic form/*derdegraadse vorm* **CA** (2)

7.5	$g(x) = -x^3 + 2x^2 + 5x - 6$ $g'(x) = -3x^2 + 4x + 5$ $-3x^2 + 4x + 5 = 0$ $x = \frac{-4 \pm \sqrt{(4)^2 - 4(-3)(5)}}{2(-3)}$ $x = 2{,}12$ or/*of* $x = -0{,}79$ $g(2{,}12) = -(2{,}12)^3 + 2(2{,}12)^2 + 5(2{,}12) - 6$ $= 4{,}06$ $g(-0{,}79) = -(-0{,}79)^3 + 2(-0{,}79)^2 + 5(-0{,}79) - 6$ $= -8{,}21$ E$(-0{,}79\,;-8{,}21)$ and/en F$(2{,}12\,;4{,}06)$	✓derivative/*afgeleide* **CA** ✓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** **NPR** (5)
7.6	$x < -2$ or/*of* $1 < x < 3$ **OR/*OF*** $x \in (-\infty;-2)$ or/*of* $x \in (1\,;3)$ **OR/*OF*** $x < -2$ or/*of* $x > 1$ and/*en* $x < 3$	✓ $x < -2$ **CA** ✓ critical values/*kritiese waardes* **CA** ✓ correct notation/*korrekte notasie* **A** **OR/*OF*** ✓ $x \in (-\infty;-2)$ **CA** ✓ critical values/*kritiese waardes* **CA** ✓ notation/*notasie* **A** **OR/*OF*** ✓ $x < -2$ **CA** ✓ critical values/*kritiese waardes* **CA** ✓ correct notation/*korrekte notasie* **A** (3) **[15]**

QUESTION/*VRAAG* 8

8.1	$h(t) = -5t^2 + 25t$ $h(1) = -5(1)^2 + 25(1)$ $= 20\text{ m}$	✓ substitution/*verv.* **A** ✓ height/*hoogte* **CA** **NPU** (2)
8.2	$h'(t) = -10t + 25$ $h'(0) = -10(0) + 25$ $= 25\text{ m/s}$	✓ $-10t + 25$ **A** ✓ substituting/*verv.* 0 **CA** ✓ initial velocity/*aanvangsnelheid* **CA** **NPU** (3)
8.3	$-10t + 25 = 0$ $10t = 25$ $t = \frac{5}{2} = 2,5\text{ s}$ $h(2,5) = -5(2,5)^2 + 25(2,5)$ $= 31,25\text{ m}$ **OR/*OF*** $h = \frac{4ac - b^2}{4a}$ $h = \frac{4(-5)(0) - (25)^2}{4(-5)}$ $h = 31,25\text{ m}$ **OR/*OF*** $t = -\frac{b}{2a} = -\frac{(25)}{2(-5)}$ $t = = 2,5\text{ s}$	✓ $h'(t) = 0$ or/*of* **SF** **A** ✓ value of/*waarde van t* **CA** ✓ max. height/*maks. hoogte* **CA** **OR/*OF*** ✓ **F** **A** ✓ **SF** **A** ✓ max. height/*maks. hoogte* **CA** **NPU** **Note: The 3rd mark (CA) should not be awarded if the *t*-value is not calculated using optimisation.** ***Nota: Die 3de punt (CA) moet nie toegeken word indien die waarde van t nie vanuit optimalisering*.** (3)

8.4	$h(t) = -5t^2 + 25t$ $30 = -5t^2 + 25t$ $0 = -5t^2 + 25t - 30$ $0 = t^2 - 5t + 6$ $0 = (t-2)(t-3)$ **OR / *OF*** $t = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(6)}}{2(1)}$ $t = 2\text{s}$ or / *of* $t = 3\text{s}$	✓ equating to/*gelykstelling aan* 30 **A** ✓ factors/ *faktore* or/*of* **SF** **CA** ✓ both values of/*beide waardes van t* **CA** **NPU** (3) **[11]**

QUESTION/*VRAAG* 9

9.1.1	$\int (10^x + 6)dx$ $= \frac{10^x}{\ln 10} + 6x + C$	✓ $\frac{10^x}{\ln 10}$ **A** ✓ $6x$ **A** ✓ C **A** (3)
9.1.2	$\int (x^4(x+2) - 2x^{-3})dx$ $= \int (x^5 + 2x^4 - 2x^{-3})dx$ $= \frac{x^6}{6} + \frac{2x^5}{5} + x^{-2} + C$ **Note: No penalty if C is omitted** ***Nota: Geen penaliseering indien C weggelaat is***	✓ $x^5 + 2x^4$ **A** ✓ $\frac{x^6}{6}$ **CA** ✓ $\frac{2x^5}{5}$ **CA** ✓ x^{-2} **A** (4)
9.2	$A = -\int_2^4 \left(\frac{3}{x} - 4\right) dx$ $= -(3\ln x - 4x)\Big\|_2^4$ $= -\left[-[3\ln(4) - 4(4)] - [3\ln(2) - 4(2)]\right]$ $\approx 5{,}92$ square units/*vierkante eenhede* **OR/*OF*** $A = \int_2^4 \left(\frac{3}{x} - 4\right) dx$ $= (3\ln x - 4x)\Big\|_2^4$ $= [3\ln(4) - 4(4)] - [3\ln(2) - 4(2)]$ $\approx -5{,}92$ $\therefore A \approx 5{,}92$ square units/ *vierkante eenhede*	✓Area notation using integrals/ *Oppervlakte-notasie met gebruik van integrale* **A** ✓ $3\ln x$ **A** ✓ $-4x$ **A** ✓✓ **SF** **CA** ✓Shaded area/*gearseerde oppervaklte* **CA** **OR/*OF*** ✓Area notation using integrals/ *Oppervlakte-notasie met gebruik van integrale* **A** ✓ $3\ln x$ **A** ✓ $-4x$ **A** ✓✓ **SF** **CA** ✓***positive*** shaded area/***positiewe*** *gearseerde oppervaklte* **CA** **NPU NPR** (6) **[13]**

TOTAL/*TOTAAL*: 150