Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE / *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 12

JUNE/*JUNIE* 2024

MATHEMATICS P1 MARKING GUIDELINE/ *WISKUNDE V1 NASIENRIGLYN*

MARKS/*PUNTE*: **150**

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

NOTE/*LET OP*:

- If a candidate answered a question TWICE, mark the FIRST attempt ONLY.
  Indien 'n kandidaat 'n vraag TWEE keer beantwoord het, merk SLEGS die EERSTE poging.
- Consistent accuracy(CA) applies in ALL aspects of the memorandum.
  Volgehoue akkuraatheid geld deurgaans in ALLE aspekte van die memorandum.
- If a candidate crossed out an attempt of a question and did not redo the question, mark the crossed-out attempt.
  Indien 'n kandidaat 'n poging vir 'n vraag deurgetrek het en nie die vraag weer beantwoord het nie, merk die poging wat deurgetrek is.
- The mark for substitution is awarded for substitution into the correct formula.
  Die punt vir substitusie word toegeken vir substitusie in die korrekte formule.

QUESTION 1/*VRAAG 1*

1.1.1	$x^2-8(x-2)=25$ $x^2-8x+16-25=0$ $x^2-8x-9=0$ $(x+1)(x-9)=0$ $x+1=0$ or/*of* $x-9=0$ $x=-1$ or/*of* $x=9$ **OR / *OF*** $x^2-8x-9=0$ $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $=\frac{-(-8)\pm\sqrt{(-8)^2-4(1)(-9)}}{2(1)}$ $=\frac{8\pm\sqrt{100}}{2}$ $x=-1$ or / *of* $x=9$ Answers only – Full marks *Slegs antwoorde – Volpunte*	✓ standard form / *standaardvorm* ✓ factors / *faktore* ✓ both answers / *beide antwoorde* (3) **OR / *OF*** ✓ standard form / *standaardvorm* ✓ correct substitution into correct formula / *korrekte vervanging in korrekte formule* ✓ both answers / *beide antwoorde* (3)
1.1.2	$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $x=\frac{-(2)\pm\sqrt{(2)^2-4(-3)(2)}}{2(-3)}$ $x=\frac{-2\pm\sqrt{28}}{-6}$ $\therefore x=-0,55$ or / *of* $x=1,22$ Penalise 1 mark for incorrect rounding off./ *Penaliseer 1 punt vir verkeerde afronding.*	✓ substitution / *vervanging* ✓✓ x-values / *x–waardes* (3)

1.1.3	$(x+3)(5-x) \le 0$ $(x+3)(x-5) \ge 0$ critical values/*kritieke waardes* $x=-3$ or/*of* $x=5$  $x \le -3$ or / *of* $5 \le x$ **OR/*OF*** $x \in (-\infty\,;-3]$ or / *of* $x \in [5\,;\infty)$	✓ critical values / *kritieke waardes* ✓✓ $x \le -3$ or / *of* $x \ge 5$ (accuracy / *akkuraatheid*) **OR/*OF*** $x \in (-\infty\,;-3]$ or / *of* $x \in [5\,;\infty)$ (3)
1.1.4 (a)	$x \neq -5$ UD $x+5=0$	✓✓ answer / *antwoord* (2)
1.1.4 (b)	$x+3=\sqrt{x+5}$ $(x+3)^2=\left(\sqrt{x+5}\right)^2$ $x^2+6x+9=x+5$ $x^2+5x+4=0$ $(x+1)(x+4)=0$ $\therefore x=-1$ or / *of* $x \neq -4$	✓ isolating surd / *isoleer wortelvorm* ✓ square both sides / *kwadreer beide kante* ✓ standard form / *standaardvorm* ✓ selection / keuse (4)

1.2	$y+2x=5$ ....(1) $2x^2-xy-4y^2=8$ .....(2) *From / Vanaf* (1): $y=-2x+5$ .....(3) (3) into/*in* (2): $2x^2-x(-2x+5)-4(-2x+5)^2=8$ $2x^2-x(-2x+5)-4(4x^2-20x+25)-8=0$ $2x^2+2x^2-5x-16x^2+80x-100-8=0$ $-12x^2+75x-108=0$ $4x^2-25x+36=0$ $(4x-9)(x-4)=0$ $x=\frac{9}{4}$ or/*of* $x=4$ $y=\frac{1}{2}$ or/*of* $y=-3$	✓ $y=-2x+5$ ✓ substitution / *vervanging* ✓ standard form / *standaardvorm* ✓ factors / *faktore* ✓ x-values / *waardes* ✓ y-values / *waardes* (6)
1.3	For M to be a maximum, the denominator must be a minimum. *Vir M om 'n maksimum te wees, moet die noemer 'n minimum wees.* *Min. value of denominator is at* $x=\frac{-b}{2a}=\frac{-(-4)}{2(1)}=2$ *Min.value / waarde* $=(2)^2-4(2)+8=4$ $\therefore$ *Max.value of / Maks.waarde van*: $M=\frac{108}{4}=27$	✓ denominator to be minimum / *noemer moet minimum wees* ✓ value of x for minimum denominator / *waarde van x vir minimum noemer* ✓ minimum value / *minimumwaarde* ✓ answer / *antwoord* (4)
		[25]

QUESTION 2/*VRAAG 2*

2.1.1	$T_{43} = a + 42d$ $= 2 + 42(-5)$ $= -208$	✓ value of d / *waarde van* d ✓ substitution / *vervanging* ✓ answer / *antwoord* (3)
2.1.2	$S_n = \frac{n}{2}[a + l]$ $\qquad$ $S_n = \frac{n}{2}[2a + (n-1)d]$ $S_{43} = \frac{43}{2}[2 + (-208)]$ **OR / *OF*** $S_{43} = \frac{43}{2}[2(2) + (43-1)(-5)]$ $= -4\,429$ $\qquad$ $= -4\,429$	✓ substitution / *vervanging* ✓ answer / *antwoord* (2)
2.1.3	$T_n = -5n + 7 = -2023$ $-5n = -2030$ $n = 406$	✓ general term / *algemene term* ✓ equating to ~~-2030~~ -2023 / *gelykstel aan* -2030 ✓ answer / *antwoord* (3)
2.2.1	$r = \frac{2(3x-1)^2}{2(3x-1)} = 3x - 1$ For convergence / *Vir konvergensie*: $-1 < r < 1$ $\therefore\ -1 < 3x - 1 < 1$ $0 < 3x < 2$ $0 < x < \frac{2}{3}$	✓ value r i.t.o x / *waarde van* r *i.t.v* x ✓ substitution / *vervanging* ✓ answer / *antwoord* (3)
2.2.2	$T_1 = 2\left(3(\frac{1}{2}) - 1\right)^1 = 1$ $T_2 = 2\left(3(\frac{1}{2}) - 1\right)^2 = \frac{1}{2} \quad \Rightarrow \quad r = \frac{1}{2}$ $T_3 = 2\left(3(\frac{1}{2}) - 1\right)^3 = \frac{1}{4}$ $S_\infty = \frac{a}{1-r}$ $= \frac{1}{1-\frac{1}{2}}$ $= 2$	✓ first 3 terms and r / *eerste 3 terme en r* ✓ substitution / *vervanging* ✓ answer / *antwoord* (3)

2.3	$a+ar+ar^2=21$ .....(1) $a\times ar\times ar^2=64$.....(2) $(ar)^3=(4)^3$ $ar=4$ $a=\frac{4}{r}$.....(3) (3) into/*in* (1): $\frac{4}{r}+\frac{4}{r}\times r+\frac{4}{r}\times r^2=21$ $4r^2-17r+4=0$ $(4r-1)(r-4)=0$ $r=\frac{1}{4}$ reject/*of* $r=4$ $\Rightarrow a=1$ $r\in\mathbb{Z}$ $a=\frac{4}{4}=1$	✓ equations 1 and 2 / *vergelykings 1 en 2* ✓ $a=\frac{4}{r}$ ✓ substitution / *vervanging* ✓ answer / *antwoord* (4)
		[18]

2.3. Geometric $\quad r \in \mathbb{Z}$

$T_1 + T_2 + T_3 = 21$

$a + ar + ar^2 = 21$

$a(1 + r + r^2) = 21$

$T_1 . T_2 . T_3 = 64$

$a . ar . ar^2 = 64$

$a^3 . r^3 = 64$

$a^3 = \frac{64}{r^3}$

$a = \sqrt[3]{\frac{64}{r^3}}$

$= \frac{4}{r}$

$\frac{4}{r}(1 + r + r^2) = 21$

$\frac{4}{r} + 4 + 4r = 21$

$4r - 17 + \frac{4}{r} = 0$

$4r^2 - 17r + 4 = 0$ $\quad$ x by r $(r \neq 0)$

$(r - 4)(4r - 1) = 0$

$r = 4$ or ~~$\frac{1}{4}$~~

reject $\notin \mathbb{Z}$

$a = \frac{4}{4}$

$= 1$

QUESTION 3/*VRAAG 3*

3.1	**3 ; 12 ; 33 ; ...** **9 ; 21 ; *33*** **12 ; *12*** $T_4 = 66$	✓ answer / *antwoord* (1)
3.2	$2a = 12 \quad 3(6)+b=9 \quad 6-9+c=3$ $a = 6 \quad b=-9 \quad c=6$ $T_n = 6n^2 - 9n + 6$	✓ $a=6$ ✓ $b=-9$ ✓ $c=6$ (3)
3.3	$t_n = 12n-3 = 345$ $12n = 348$ $n = 29$ $\Rightarrow T_{29}$ & T_{30} **OR / *OF*** $T_{n+1} - T_n = 345$ $6(n+1)^2 - 9(n+1) + 6 - 6n^2 + 9n - 6 = 345$ $6n^2 + 12n + 6 - 9n - 9 + 6 - 6n^2 + 9n - 6 - 345 = 0$ $12n - 348 = 0$ $12n = 348$ $n = 29$ $\Rightarrow T_{29}$ & T_{30} **OR / *OF*** by inspection: / *deur inspeksie* : $T_{30} = 6(30)^2 - 9(30) + 6 = 5136$ $T_{29} = 6(29)^2 - 9(29) + 6 = 4791$ $T_{30} - T_{29} = 5136 - 4791 = 345$	✓ equating / *gelykstel* ✓ value of n / *waarde van n* ✓ answer / *antwoord* **OR / *OF*** ✓ substitution / *vervanging* ✓ expanding / uitbreiding ✓ answer / *antwoord* **OR / *OF*** ✓ $T_{30} = 5136$ ✓ $T_{29} = 4791$ ✓ $T_{30} - T_{29} = 345$ (3)
		[7]

3.3. $T_n = 6n^2 - 9n + 6$

$T_{n-1} = 6(n-1)^2 - 9(n-1) + 6$

$= 6(n^2 - 2n + 1) - 9n + 9 + 6$

$= 6n^2 - 12n + 6 - 9n + 9 + 6$

$= 6n^2 - 21n + 21$

$T_n - T_{n-1} = 345$

$6n^2 - 9n + 6 - (6n^2 - 21n + 21) = 345$

$6n^2 - 9n + 6 - 6n^2 + 21n - 21 = 345$

$12n - 15 = 345$

$12n = 360$

$n = 30$

$\therefore T_n = T_{30}$

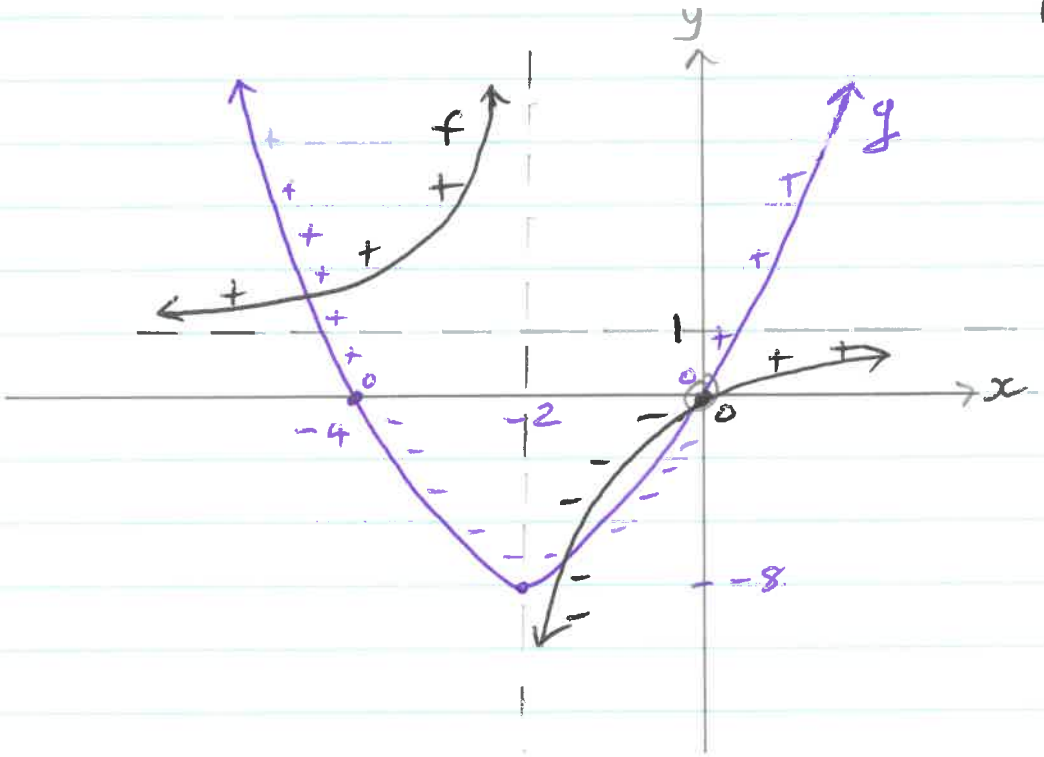
$T_{n-1} = T_{29}$

$\therefore$ T_{30} and T_{29} ▷

QUESTION 4/*VRAAG 4*

4.1	D(−2;−8)	✓ answer / *antwoord* (1)
4.2	$x = -2$ *and* $y = 1$	✓ $x=-2$ and/*en* ✓ $y=1$ (2)
4.3.1	$0 = a(0+2)^2 - 8$ sub O(0;0) $8 = 4a$ $2 = a$ $\Rightarrow g(x) = 2(x+2)^2 - 8$	✓ substitution / *vervanging* ✓ answer / antwoord (2)
4.3.2	$2(x+2)^2 - 8 = 0$ $(x+2)^2 = 4$ $x+2 = \pm 2$ $\therefore\ x = 0$ or / *of* $x = -4$ OA = 4 units / *eenhede* **OR / OF** Using symmetry of parabola / *Gebruik van simmetrie van parabool* O(0 ; 0) is 2 units away from axis of symmetry O(0 ; 0) *is 2 eenhede vanaf simmetrie-as* Therefore, coordinates of A(−4 ; 0) *Daarom is die koördinate van* A(−4 ; 0) ⇨ Length of OA = 4 units ⇨ *Lengte van* OA = 4 *eenhede*	✓ equating to 0 / *stel gelyk aan* 0 ✓ solving for x / *los op vir* x ✓ answer / *antwoord* **OR / OF** ✓ use of symmetry / *gebruik van simmetrie* ✓ coordinates of A / *koördinate van A* ✓ answer / *antwoord* (3)
4.3.3	Range of / *Terrein van* f : $y \in \mathbb{R}$; $y \neq 1$	✓ answer / *antwoord* (1)
4.3.4	$y = -x$ $\therefore\ y = -(x+2)+1$ $y = -x - 1$	✓ ~~method / *metode*~~ ✓ answer / *antwoord* (2)
4.4.1	$x \in (-4\ ;\ 0)$ ✓CV ✓not^ - only if CV correct PTO	✓✓ answer / *antwoord* (2)
4.4.2	$x \leq -4$ or / *of* $x > -2$ PTO	✓✓ answer / *antwoord* (2)
4.5	$-8 < k < 0$ PTO	✓ −8 ✓ 0 ✓ answer / *antwoord* (A) (3)
		[18]

4.4.



4.4.1. $g(x) < 0$

$y_g < 0$

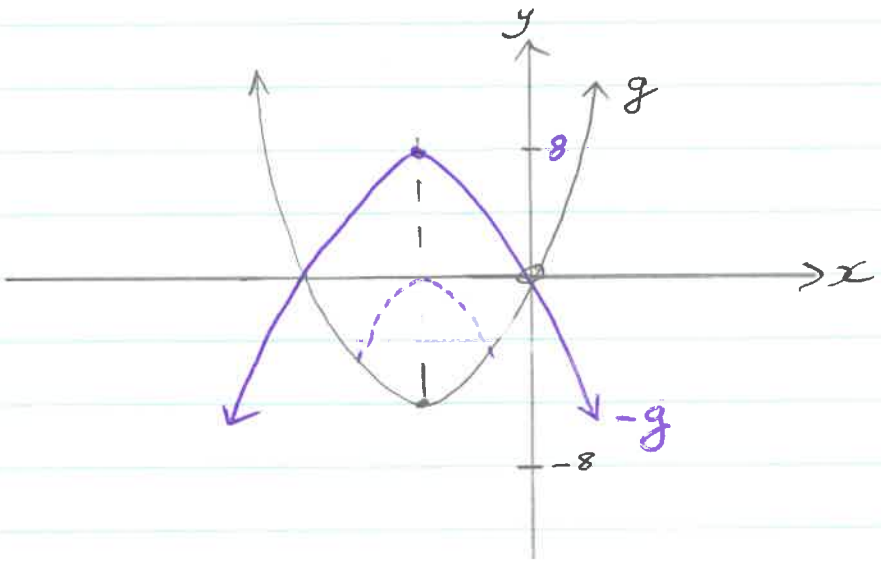
$\therefore x \in (-4;0)$ ▷

4.4.2. $g(x) \cdot f(x) \geq 0$

$y_g \cdot y_f \quad \pm$

$\therefore x \in (-\infty;-4] \text{ or } (-2;\infty)$ ▷

4.5.



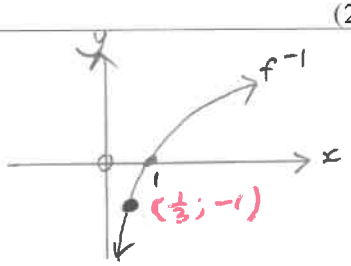
$$\begin{aligned} h(x) &= -g(x) + k \\ &= -\left(a(x+2)^2 - 8\right) + k \\ &= -a(x+2)^2 + 8 + k \end{aligned}$$

$8 + k = q_h$

2 ≠ ℝ roots both ... — (same sign!)

$$0 < q_h < 8$$
$$0 < k+8 < 8$$
$$-8 < k < 0$$

QUESTION 5/*VRAAG 5*

5.1	C(0 ; 1)	✓ answer / *antwoord* (1)
5.2	Range of / *Waardeversameling van* f : $y \in (0\,;\infty)$	✓ answer / *antwoord* (1)
5.3	$y = 3^x$ $x = 3^y$ $\therefore\ y = \log_3 x$	✓ interchanging x and y / *omruil van x en y* ✓ answer / *antwoord* (2)
5.4	$\log_3 x = -1$ $\therefore\ 3^{-1} = x$ $\therefore\ \frac{1}{3} = x$ $(\frac{1}{3};-1)$ $\log_3 x < -1$ $y_{\text{f}^{-1}} < -1$ $\therefore\ 0 < x < \frac{1}{3}$	✓ $x < \frac{1}{3}$  ✓ answer / *antwoord* (2)
5.5	$g(x) = -x+1$ $0 = -x+1$ $x = 1$ $\Rightarrow P(1;0)$ $y = 3^{-2} = \frac{1}{9}$ $\Rightarrow S(-2;\frac{1}{9})$ $y = 3^x = 3^1 = 3$ $\Rightarrow Q(1;3)$ $-x+1 = 3$ $-x = 2$ $x = -2$ $\Rightarrow R(-2;3)$	✓ coordinates of P / *koördinate van P* ✓ coordinates of Q / *koördinate van Q* ✓ coordinates of R / *koördinate van R* ✓ coordinates of S / *koördinate van S* (4)
5.6	$f(x) = 3^x$ $p(x) = 3(3)^x - 2 = 3^{x+1} - 2$ $\Rightarrow$ Horizontal shift of 1 unit to the left Vertical shift of 2 units down *Horisontale skuif van 1 eenheid na links* *Vertikale skuif van 2 eenhede af*	✓ horizontal shift / *horisontale skuif* ✓ vertical shift / *vertikale skuif* (2)
		[12]

QUESTION 6/*VRAAG 6*

6.1	$A = P(1-i)^n$ $20\,000 = 80\,000(1-i)^5$ $(1-i)^5 = 0,25$ $1-i = 0,7578582833$ $i = 0,242141...$ $\therefore$ Annual rate of depreciation, r *Jaarlikse verminderingskoers*, r $= 24,21\%$	✓ substitution / *vervanging* ✓ simplification / *vereenvoudiging* ✓ answer / *antwoord* (3)
6.2	$1+i_{eff} = \left(1+\frac{i_{nom}}{m}\right)^m$ $= \left(1+\frac{8,5\%}{4}\right)^4$ $i_{eff} = \left(1+\frac{8,5\%}{4}\right)^4 - 1$ $= 0,0877...$ effective rate / *effektiewe koers* $= 8,77\%$ *p.a.*	✓ substitution / *vervanging* ✓ simplification / *vereenvoudiging* ✓ answer / *antwoord* (3)
6.3.1	$A = P(1+i)^n$ $= x\left(1+\frac{11\%}{12}\right)^{36}$ $= 1,39x$	✓ substitution / *vervanging* ✓ answer / *antwoord* (2)

6.3.2

$$\left[\left(x\left(1+\frac{11\%}{12}\right)^{36}+15\,000\right)\left(1+\frac{11\%}{12}\right)^{24}-7\,000\right]\left(1+\frac{12\%}{2}\right)^{6}=90132,56$$

✓ $\left(x\left(1+\frac{11\%}{12}\right)^{36}+15\,000\right)$

✓ $\left(1+\frac{11\%}{12}\right)^{24}-7000$

✓ $\times\left(1+\frac{12\%}{2}\right)^{6}$ and equating to R90 132,56 / *en gelyk stel aan R90 132,56*

$$x=\left[\left(\frac{90132,56}{\left(1+\frac{12\%}{2}\right)^{6}}+7000\right)\div\left(1+\frac{11\%}{12}\right)^{24}-15000\right]\div\left(1+\frac{11\%}{12}\right)^{36}$$

✓ simplification / *vereenvoudiging*

$=R30\,000,00$

✓ answer / *antwoord* (A)

(5)

OR / *OF*

OR / *OF*

$$x\left(1+\frac{11\%}{12}\right)^{36}+15\,000=1,388878629x+15\,000$$

✓ $x\left(1+\frac{11\%}{12}\right)^{36}+15\,000$

$$\left(1,388878629x+15\,000\right)\left(1+\frac{11\%}{12}\right)^{24}=1,72891573x+18672,43$$

✓ $\left(1.388878629x+15000\right)\left(1+\frac{11\%}{12}\right)^{24}$ and subtracting R7 000 *en aftrekking van R7 000*

$$\left(1,72891573x+18672,43-7000\right)\left(1+\frac{12\%}{2}\right)^{6}=90132,56$$

✓ $\times\left(1+\frac{12\%}{2}\right)^{6}$ and/*en* equating to R90 132,56 / *en gelyk stel aan R90 132,56*

$$2,4525x+16557,56=90132,56$$

$$2,4525x=73575,00$$

$$x=R30\,000,00$$

✓ simplification / *vereenvoudiging*

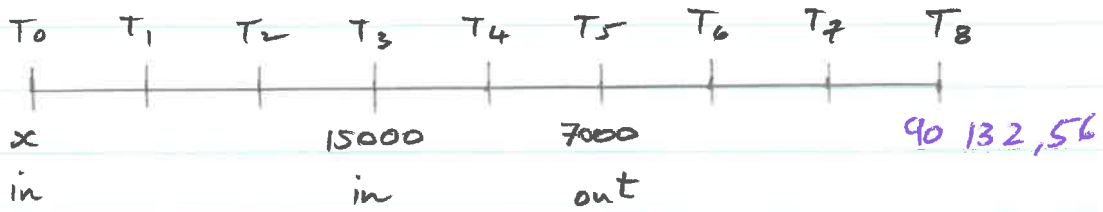
✓ answer / *antwoord* (A)

(5)

[13]

PTO

6.3.2.



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$T_8 \to T_5$: $A = P(1+i)^n$

$90\,132{,}56 = P\left(1+\frac{12}{200}\right)^{3\times 2}$ ✓

$P = 63\,539{,}89\ldots$

snow ball method

$T_5 \to T_3$: $+7000$ ✓

$70\,539{,}89\ldots$ ✓ $= P\left(1+\frac{11}{1200}\right)^{2\times 12}$

$P = 56\,666{,}35\ldots$

$T_3 \to T_0$: -15000 ✓

$41\,666{,}35\ldots = x\left(1+\frac{11}{1200}\right)^{3\times 12}$

$R\,30\,000 = x$ ✓ 5

OR

x $T_0 \to T_5$ $A = x\left(1+\frac{11}{1200}\right)^{5\times 12}$

$T_5 \to T_8$ $A = x\left(1+\frac{11}{1200}\right)^{60} \cdot \left(1+\frac{12}{200}\right)^{3\times 2}$

$= 2{,}45\ldots x$ ✓ $\to A$

15000 $T_3 \to T_5$ $A = 15000\left(1+\frac{11}{1200}\right)^{2\times 12}$

$= 18\,672{,}42\ldots$

$T_5 \to T_8$ $A = 18672{,}42\ldots\left(1+\frac{12}{200}\right)^{3\times 2}$

$= 26\,487{,}19\ldots$ ✓ $\to B$

7000 $T_5 - T_8$ $A = 7000(1 + \frac{12}{200})^{2 \times 2}$

$= 9\,929{,}63\ldots$ ✓ C

Being the "parallel method":

$A + B - C = 90\,132{,}56$ ✓

$2{,}45\ldots x + 26\,487{,}19\ldots - 9\,929{,}63\ldots = 90\,132{,}56$

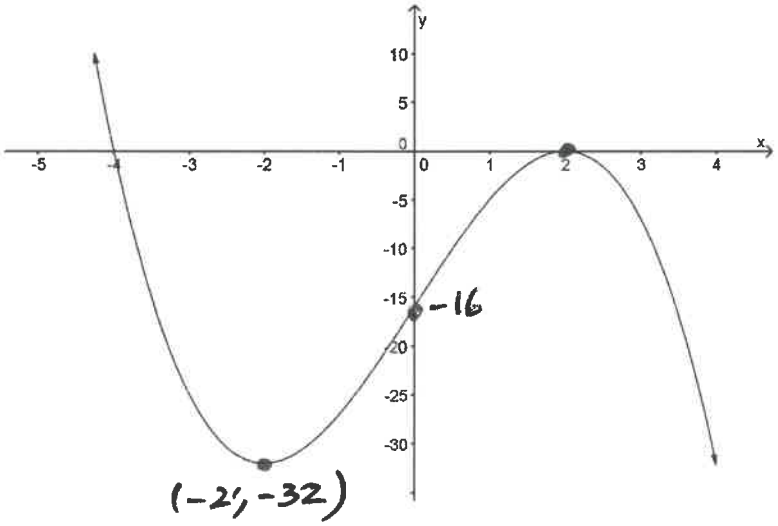
$2{,}45\ldots x = 73\,574{,}99\ldots$

$x = R\ 30\ 000$ ✓ 5

QUESTION 7/*VRAAG 7*

7.1	$f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $=\lim_{h\to 0}\frac{\frac{1}{2}(x+h)^2-\frac{1}{2}x^2}{h}$ $=\lim_{h\to 0}\frac{\frac{1}{2}x^2+xh+\frac{1}{2}h^2-\frac{1}{2}x^2}{h}$ $=\lim_{h\to 0}\frac{xh+\frac{1}{2}h^2}{h}$ $=\lim_{h\to 0}\frac{h(x+\frac{1}{2}h)}{h}$ $=\lim_{h\to 0}\left(x+\frac{1}{2}h\right)$ $=x$ Penalise 1 mark for incorrect notation in this question *Penaliseer 1 punt vir verkeerde notasie in hierdie* Answer ONLY: 0 marks *SLEGS antwoord*: 0 *punte*	✓ $\frac{1}{2}x^2+xh+\frac{1}{2}h^2$ ✓ simplification / *vereenvoudiging* ✓ factorisation / *faktorisering* (dividing by h / *deel deur* h) ✓ answer / *antwoord* (4)
7.2.1	$f(x)=\frac{1}{5}x^5-6x^{-2}$ $f'(x)=x^4+12x^{-3}$	✓ x^4 ✓ $12x^{-3}$ (2)
7.2.2	$\frac{d}{dx}\left(x+\sqrt{x}\right)^2$ $=\frac{d}{dx}\left(x^2+2x\sqrt{x}+x\right)$ $=\frac{d}{dx}\left(x^2+2x^{\frac{3}{2}}+x\right)$ $=2x+3x^{\frac{1}{2}}+1$ only CA middle term if exponent is fraction	✓ $x^2+2x^{\frac{3}{2}}+x$ ✓✓✓ answer / *antwoord* (4)
		[10]

QUESTION 8/*VRAAG 8*

8.1.1	$f(x)=-x^3+12x-16$ $f(2)=-(2)^3+12(2)-16$ $=-8+24-16$ $=0$ $\therefore$ $(x-2)$ is a factor / *is 'n faktor*	✓ substitution / *vervanging* ✓ answer = 0 / *antwoord* = 0 (2)
8.1.2	$0=-x^3+0x^2+12x-16$ $\div -1$ $0=x^3+0x^2-12x+16$ $0=(x-2)(x^2+2x-8)$ $0=(x-2)(x+4)(x-2)$ $\therefore x=2$ or -4 PTO	(3)
8.1.3	$f'(x)=-3x^2+12=0$ $-3x^2=-12$ $x^2=4$ $x=\pm 2$ $\therefore (2;0)$ & $(-2;-32)$	✓ $f'(x)=0$ ✓ simplification / *vereenvoudiging* ✓ *x*-values / *x-waardes* ✓ *y*-values / *y-waardes* (4)
8.1.4		✓ *x*-intercepts / *x-afsnitte* and/*en* *y*-intercept / *y-afsnit* ✓ turning points / *draaipunte* ✓ shape / *vorm* (3)

8.1.2.

$$\begin{aligned} 0 &= -x^3 + 0x^2 + 12x - 16 \\ &= (x-2)(-x^2 - 2x + 8) \\ &= (x-2)[-(x^2 + 2x - 8)] \\ &= -(x-2)(x^2 + 2x - 8) \\ &= -(x-2)(x-2)(x+4) \end{aligned}$$

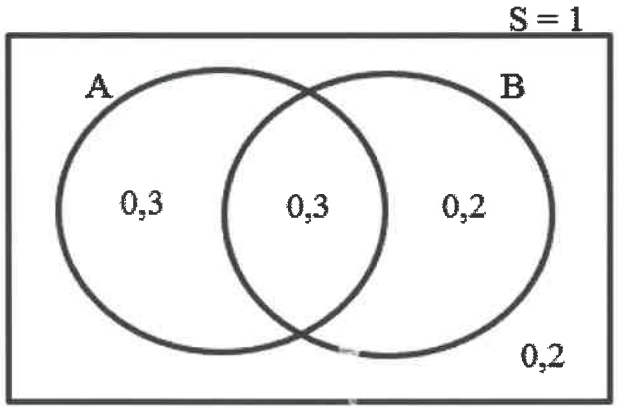
$\therefore \quad x = 2 \text{ or } -4$

8.1.5	$f(x)=-x^3+12x-16$ $f'(x)=-3x^2+12$ $f''(x)=-6x=0$ $x=0$; $y=-16$ **OR / *OF*** (otherwise / *andersins*) Point of inflection / *infleksie - /buigpunt*: $(0\ ;-16)$ $m=f'(0)=-3(0)^2+12=12$ $y=12x-16$	✓ x-coordinate / *x-koördinaat* ✓ y-coordinate / *y-koördinaat* ✓ gradient of tangent *gradiënt van raaklyn* ✓ equation of tangent *vergelyking van raaklyn* (4)
8.2.1	$x \in \mathbb{R}; x \neq 0$	✓✓ answer / *antwoord* (2)
8.2.2	$x>0$	✓✓ answer /*antwoord* (2)
		[20]

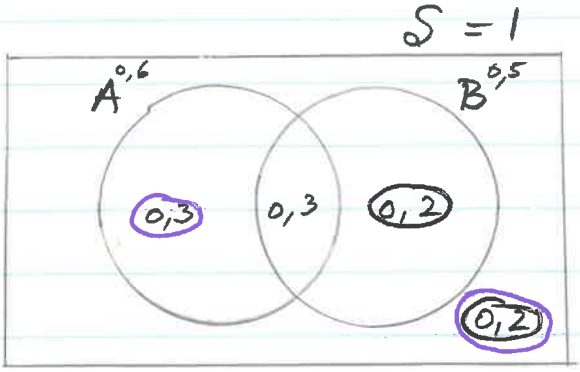
QUESTION 9/*VRAAG 9*

9.1	$PQ = \sqrt{x^2 + x^2}$ Pythag $= \sqrt{2}x$ $QR = \sqrt{2(200-x)^2} = \sqrt{2}(200-x)$ Area / *Oppervlakte* $= l \times b$ $= \sqrt{2}x \times \sqrt{2}(200-x)$ $= 2(200x - x^2)$	QC = 200 − x ✓ PQ = $\sqrt{2}x$ ✓ QR = $\sqrt{2}(200-x)$ ✓ substitution into area formula *vervanging in oppervlakte formule* (3)
9.2	$A(x) = 400x - 2x^2$ $A'(x) = 400 - 4x = 0$ $400 = 4x$ $100 \text{ cm} = x$	✓ $A'(x)$ ✓ $A'(x) = 0$ ✓ answer / *antwoord* (3)
9.3	*Max area of PQRS / Maks.oppervlakte van PQRS* $= 400(100) - 2(100)^2$ $= 40\,000 - 20\,000$ $= 20\,000\ cm^2$ *Area / Oppervlakte ABCD* $= 200 \times 200 = 40\,000\,cm^2$ Ratio / *Verhouding is* 1:2 **OR / *OF*** $\frac{1}{2}$	✓ max. area of PQRS *Maks. oppervlakte van* PQRS ✓ area of ABCD / *oppervlakte van* ABCD ✓ answer / *antwoord* (3)
		[9]

QUESTION 10/*VRAAG 10*

10.1.1	NO / *NEE* $P(A \text{ and/}en\ B) = P(A) \times P(B)$ $= 0,6 \times 0,5$ $= 0,3$ $\therefore\ P(A \text{ and/}en\ B) \neq 0$	✓ No / *Nee* ✓ valid reason / *geldige rede* (2)
10.1.2		✓ (A and / *en* B) = 0,3 ✓ A(only / *alleen*) = 0,3 and/*en* B(only / *alleen*) = 0,2 ✓ not(A or B) = 0,2 *nie*(A *of* B) = 0,2 (3)
10.1.3 (a)	$P(\text{only/}slegs\ A) = 0,6 - 0,3$ $= 0,3$	✓ answer / *antwoord* (1)
10.1.3 (b)	$P(\text{not } A \text{ or not } B)$ / $P(nie\ A\ of\ nie\ B)$ $= P(\text{not } A) + P(\text{not } B) - P(\text{not } A \text{ and not } B)$ $P(nie\ A) + P(nie\ B) - P(nie\ A\ en\ nie\ B)$ $= 0,4 + 0,5 - 0,2$ $= 0,7$ PTO **OR / *OF*** $P(\text{not } A \text{ or not } B) = 1 - P(A \text{ and } B)$ $P(nie\ A\ of\ nie\ B) = 1 - P(A\ en\ B)$ $= 1 - 0,3$ $= 0,7$	✓ rule / *reël* ✓ answer / *antwoord* **OR / *OF*** ✓ rule / *reël* ✓ answer / *antwoord* (2)

10.1.3. (b)



$P(A' \text{ or } B') = 0 + 0 + 0$

$= 0,2 + 0,3 + 0,2$

$= 0,7$

10.2.2 like camp = L

Considering a gender of

Girl = G		Boy = B	
$P(L \cap G)$	$P(L) \times P(G)$	$P(L \cap B)$	$P(L) \times P(B)$
$= \frac{30}{100}$	$= \frac{54}{100} \times \frac{62}{100}$	$= \frac{24}{100}$	$= \frac{54}{100} \times \frac{38}{100}$ ✓
$= 0,3$	$= 0,3348$	$= 0,24$ ✓	$= 0,2052$ ✓
$P(L \cap G) \neq P(L) \times P(G)$		$P(L \cap B) \neq P(L) \times P(B)$	
∴ L and G are NOT independent (ie dependent)		✓ L and B are NOT independent (ie dependent)	

So, "like camping" and "gender" are NOT independent events

10.2.1	$P(\text{Girl / } Meisie) = \frac{62}{100}$	✓ answer / *antwoord* (1)
10.2.2	$P(\text{Boy / } Seun) = \frac{38}{100}$ & $P(Like\ camping / Hou\ van\ kamp) = \frac{54}{100}$ $P(Boy / Seun) \times P(Like\ camping / Hou\ van\ kamp)$ $= \frac{38}{100} \times \frac{54}{100}$ $= 0,2025$ $P(Boy\ \ and\ \ Like\ camping) / P(Seun\ \ en\ \ Hou\ van\ kamp)$ $= \frac{24}{100}$ $= 0,24$ $\Rightarrow$ *Events are not independent / Gebeurtenisse is nie onafhanklik nie*	✓ P(Boy) x P(like camping) P(*Seun*) x P(*hou van kamp*) ✓ answer / *antwoord* ✓ P(Boy **and** Like camping) P(*Seun **en** hou van kamp*) ✓ conclusion / *gevolgtrekking* (4)
10.3	Ratio / *Verhouding* : Green/*Groen* : Red/*Rooi* $3x : 4x$ Green+Red / *Groen* + *Rooi* = $7x$ New Ratio / *Nuwe verhouding* : Green/*Groen*: Red/*Rooi* $3x+3 \ : \ 4x+2$ Green+Red / *Groen* + *Rooi* = $7x+5$ $\Rightarrow \frac{3x+3}{7x+5} = \frac{6}{13}$ $39x+39 = 42x+30$ $9 = 3x$ $3 = x$ Green / *Groen* = 9 balls / *balle* Red / *Rooi* = 12 balls / *balle*	✓ ratio in terms of x *verhouding i.t.v* x ✓ new ratio in terms of x *nuwe verhouding i.t.v* x ✓ $\frac{3x+3}{7x+5} = \frac{6}{13}$ ✓ value of x / *waarde van* x ✓ answer / *antwoord* (5)
		[18]
		TOTAL/*TOTAAL*: 150

PTO

10.3 Red = x

Green = y

$P(G) = \frac{3}{7}$

$\frac{y}{x+y} = \frac{3}{7}$ ✓

$7y = 3x + 3y$

$0 = 3x - 4y$

- Ball replaced
- + 2R + 3G

Red = $x+2$

Green = $y+3$

$P(G) = \frac{6}{13}$

$\frac{y+3}{x+2+y+3} = \frac{6}{13}$

✓ $\frac{y+3}{x+y+5} = \frac{6}{13}$ ✓

$13y + 39 = 6x + 6y + 30$

$0 = 6x - 7y - 9$

$y = \frac{3}{4}x$

$0 = 6x - 7(\frac{3}{4}x) - 9$

$9 = 6x - \frac{21}{4}x$

$9 = \frac{3}{4}x$

$12 = x$ ✓ RED

$y = \frac{3}{4}(12)$

$= 9$ ✓ GREEN

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