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NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 10

NOVEMBER 2020

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TECHNICAL MATHEMATICS P1/ *TEGNIESE WISKUNDE V1* MARKING GUIDELINE/*NASIENRIGLYN* (EXEMPLAR/*EKSEMPLAAR*)

MARKS/*PUNTE*: **100**

This marking guideline consists of 9 pages./
Hierdie nasienriglyn bestaan uit 9 bladsye.

QUESTION/*VRAAG 1*

NO.	SOLUTION/*OPLOSSING*	EXPLANATION/ *VERDUIDELIKING*	
1.1.1	$\sqrt[3]{27}$	✓Answer / *antwoord*	(1)
1.1.2	$\sqrt{-4}$	✓ Answer / *antwoord*	(1)
1.2	2 | 147 | 2 | 73 | r | 1 2 | 36 | r | 1 2 | 18 | r | 0 2 | 9 | r | 0 2 | 4 | r | 1 2 | 2 | r | 0 2 | 1 | r | 0 | 0 | r | 1 $\therefore 147_{10} = 10010011_2$	✓Method / *metode* ✓Answer / *antwoord* No mark awarded for answer if base NOT indicated.	(2)
1.3.1	1101 x 101 1101 00000 110100 1000001 2^6 | 2^5 | 2^4 | 2^3 | 2^2 | 2^1 | 2^0 1 | 0 | 0 | 0 | 0 | 0 | 1 $\therefore 1000001_2 = (1 \times 2^0) + (0 \times 2^1) + (0 \times 2^2) + (0 \times 2^3) + (0 \times 2^4) + (0 \times 2^5) + (1 \times 2^6)$ $= 1 + 64$ $= 65$	✓ Answer / *antwoord* ✓ Method / *metode* ✓ Answer / *antwoord*	(3)
1.3.2	°°1100 r 11 101⌈111111 101 °101 101 ° ° °11	✓ Answer / *antwoord* ✓ Method / *metode*	(2)
1.4	$4{,}158 \times 10^{-6}$	✓ Answer / *antwoord*	(1)
1.5	$x^2y^2 - 5xy + 4 = (-5)^2(2)^2 - 5(-5)(2) + 4$ $= 154$	✓ Substitution / *substitusie* ✓ Answer / *antwoord*	(2)
			[12]

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QUESTION/*VRAAG 2*

NO.		SOLUTION/*OPLOSSING*	EXPLANATION/ *VERDUIDELIKING*	
2.1	2.1.1	$(x-2)(x^2+2x+4)$ $=x^3+2x^2+4x-2x^2-4x-8$ $=x^3-8$	✓ Expand / *uitbreiding* ✓ Simplification / *vereenvoudiging*	(2)
	2.1.2	$3a(a-8)+3a^2-4(a-1)-a^3$ $=3a^2-24a+3a^2-4a+4-a^3$ $=-a^3+6a^2-28a+4$	✓ Expand / *uitbreiding* ✓ $-a^3$ ✓ $+6a^2$ ✓ $-28a$ ✓ $+4$	(5)
	2.1.3	$-2i(5-3i)$ $=-10i+6i^2$ $=-10i+6(-1)$ $=-10i-6$ $=-6-10i$	✓ Expand / *uitbreiding* ✓ Substitution / *vervanging* -1 ✓ Simplification / *vereenvoudiging*	(3)
2.2	2.2.1	$\frac{64^{x-1}.4^{2x+2}}{8^x}$ $=\frac{(2^6)^{x-1}.(2^2)^{2x+2}}{(2^3)^x}$ $=\frac{2^{6x-6}.2^{4x+4}}{2^{3x}}$ $=\frac{2^{6x-6+4x+4}}{2^{3x}}$ $=\frac{2^{10x-2}}{2^{3x}}$ $=2^{10x-2-3x}$ $=2^{7x-2}$	✓ All prime factors correct / *alle priemfaktore korrek* ✓ Exponent law / *Eksponent wet* ✓ Answer / *antwoord*	(3)
	2.2.2	$\frac{1}{x^2-4xy+4y^2}+\frac{x^2+2xy+4y^2}{x^3-8y^3}-\frac{1}{x^2-4y^2}$ $=\frac{1}{(x-2y)^2}+\frac{x^2+2xy+4y^2}{(x-2y)(x^2+2xy+4y^2)}-\frac{1}{(x-2y)(x+2y)}$ $=\frac{1}{(x-2y)^2}+\frac{1}{(x-2y)}-\frac{1}{(x-2y)(x+2y)}$ $=\frac{x+2y+(x-2y)(x+2y)-(x-2y)}{(x-2y)^2(x+2y)}$ $=\frac{x+2y+x^2-4y^2-x+2y}{(x-2y)^2(x+2y)}$ $=\frac{x^2+4y-4y^2}{(x-2y)^2(x+2y)}$	✓ $(x-2y)^2$ ✓ $(x-2y)(x^2+2xy+4y^2)$ ✓ $(x-2y)(x+2y)$ ✓ $\frac{1}{(x-2y)}$ ✓ Numerator / *teller* ✓ Denominator / *noemer* ✓ Simplification / *vereenvoudiging* ✓ Simplification / *vereenvoudiging*	(8)
				[21]

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QUESTION/*VRAAG 3*			
NO.	**SOLUTION/*OPLOSSING***	**EXPLANATION/ *VERDUIDELIKING***	
3.1	$3x^8 - 3$ $= 3(x^8 - 1)$ $= 3(x^4 - 1)(x^4 + 1)$ $= 3(x^2 - 1)(x^2 + 1)(x^4 + 1)$ $= 3(x - 1)(x + 1)(x^2 + 1)(x^4 + 1)$	✓ 3 common factor / *gemene faktor* ✓ $(x^4 - 1)(x^4 + 1)$ ✓ $(x^2 - 1)(x^2 + 1)(x^4 + 1)$ ✓ $3(x - 1)(x + 1)(x^2 + 1)(x^4 + 1)$	(4)
3.2	$x^2 - 5x + 6$ $= (x - 3)(x - 2)$	✓ $(x - 3)$ ✓ $(x - 2)$	(2)
3.3	$8x^3 - 27$ $= (2x - 3)(4x^2 + 6x + 9)$	✓ $(2x - 3)$ ✓ $(4x^2 + 6x + 9)$	(2)
			[8]

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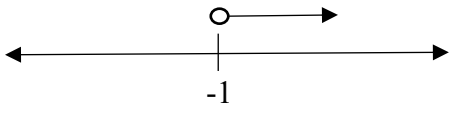
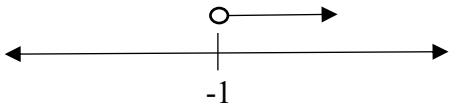
QUESTION/*VRAAG 4*

NO.		SOLUTION/*OPLOSSING*	EXPLANATION/ *VERDUIDELIKING*	
4.1	4.1.1	$(x-3)(4x+20)=0$ $x-3=0$ or / *of* $4x+20=0$ $x=3$ $4x=-20$ $x=-5$	✓ $x=3$ ✓ $x=-5$	(2)
	4.1.2	$\frac{4}{x-2}-\frac{10}{x}=\frac{2}{x^2-2x}$ $\frac{4}{x-2}-\frac{10}{x}=\frac{2}{x(x-2)}$ $\times x(x-2)$: $4x-10(x-2)=2$ $4x-10x+20=2$ $-6x=-18$ $x=3$	✓ $x(x-2)$ ✓ Simplification / *vereenvoudiging* ✓ Answer / *antwoord*	(3)
	4.1.3	$81^{x-3}=\frac{1}{729}$ $(3^4)^{x-3}=3^{-6}$ $3^{4x-12}=3^{-6}$ $\therefore 4x-12=-6$ $4x=6$ $x=\frac{6}{4}=\frac{3}{2}$	✓ 3^4 & 3^{-6} ✓ Exponent Law / *eksponent wet* ✓ Equation exponents / *Gelykstelling van eksponente* ✓ Answer / *antwoord*	(4)
4.2		$-\frac{2}{3}(7x-2)<6$ $\frac{-14}{3}x+\frac{4}{3}<6$ $\times 3$: $-14x+4<18$ $-14x<14$ $x>-1$  **OR/OF** $-\frac{2}{3}(7x-2)<6$ $7x-2<6\times-\frac{3}{2}$ $7x-2<-9$ $7x<-7$ $x>-1$  	✓ Expand / *uitbreiding* ✓ Simplification / *vereenvoudiging* ✓ Answer / *antwoord* ✓ Diagram / *diagram* **OR/OF** ✓ × Reciprocal / *Resiprook* ✓ Simplification / *vereenvoudiging* ✓ Answer / *antwoord* ✓ Diagram / *diagram*	(4)

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4.3	$\frac{1}{b}+\frac{2b}{x}=2$ $\frac{x+2b^2}{bx}=2$ $x+2b^2=2bx$ $2b^2=2bx-x$ $2b^2=x(2b-1)$ $\frac{2b^2}{2b-1}=x$ **OR/OF** $\frac{1}{b}+\frac{2b}{x}=2$ $\frac{2b}{x}=2-\frac{1}{b}$ $\frac{2b}{x}=\frac{2b-1}{b}$ $\frac{x}{2b}=\frac{b}{2b-1}$ $2b^2=2bx-x$ $2b^2=x(2b-1)$ $\frac{2b^2}{2b-1}=x$	✓ $\frac{x+2b^2}{bx}$ ✓ $2b^2=x(2b-1)$ ✓ Answer / *antwoord* **OR/OF** ✓ $\frac{2b}{x}=\frac{2b-1}{b}$ ✓ $\frac{x}{2b}=\frac{b}{2b-1}$ or/of $x(2b-1)=2b^2$ ✓ Answer / *antwoord*	(3)
4.4	Number of adults = x Number of children = y $x+y=2200$ ... (1) $40x+15y=50500$ ... (2) $x=2200-y$ ... 3 Sub (3) into (2): $40(2200-y)+15y=50500$ $88000-40y+15y=50500$ $-25y=-37500$ $y=1500$ Sub $y=1500$ in (3): $x=2200-1500$ $x=700$ ∴ 1 500 children and 700 adults **OR/OF** $x+y=2200$ .....(1) $40x+15y=50500$ .....(2) $\therefore y=2200-x$ .....(3) Sub (3) into (2) $40x+15(2200-x)=50500$ $40x+33000-15x=50500$ $25x=17500$ $x=700$ Sub x = 700 into (3) y = 1500 ∴ 1500 children and 700 adults / *1 500 kinders en 700 volwassenes*	✓✓ Setting up equation / *opstel van vergelykings* ✓ Substitution / *vervanging* ✓ Answer for y / *antwoord vir y* ✓ Answer for x / *antwoord vir x*	(5)
			[21]

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QUESTION/*VRAAG 5*				
NO.		**SOLUTION/*OPLOSSING***	**EXPLANATION/ *VERDUIDELIKING***	
5.1	$A = P(1+i)^n$ $A = 7\,440(1+5{,}75\%)^8$ $A = R11\,636{,}33$		✓ Correct formula / *korrekte formule* ✓ Substitution into correct formula / *vervanging in korrekte formule* ✓Answer / *antwoord*	(3)
5.2	5.2.1	Deposit / *deposito* $= R8\,000 \times 22\%$ $= R1\,760$ ∴ Principal amount / *begin waarde* $= R8\,000 - R1\,760$ $= R6\,240$	✓Answer / *antwoord* ✓Method / *metode* ✓Answer / *antwoord*	(3)
	5.2.2	$A = P(1+in)$ $A = 6\,240(1+(10\%)(1))$ $A = R6\,864{,}00$	✓ Substitution into correct formula / *vervanging in korrekte formule* ✓ Answer / *antwoord*	(2)
	5.2.3	Monthly installment / *maandelikse betaling* $= R6\,864 \div 12$ $= R572$	✓Method / *metode* ✓Answer / *antwoord*	(2)
	5.2.4	$Total = R6\,864 + R1\,760$ $= R8\,624$	✓Method / *metode* ✓Answer / *antwoord*	(2)
5.3	$A = P(1+i)^n$ $A = R24{,}99(1+15\%)^5$ $A = R50{,}26$		✓ Correct formula / *korrekte formule* ✓ Substitution into correct formula / *vervanging in korrekte formule* ✓Answer / *antwoord*	(3)
				[15]

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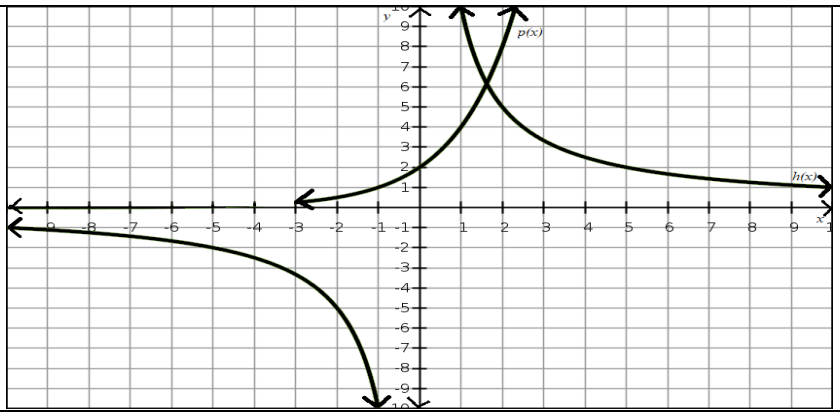
QUESTION/*VRAAG 6*			
NO.	**SOLUTION/*OPLOSSING***	**EXPLANATION/ *VERDUIDELIKING***	
6.1		*h(x)*: ✓ Shape / *vorm* ✓ Quadrants / *kwadrante* ✓ *x*- and *y*- intercepts / *x- en y- afsnitte* *p(x):* ✓ Shape / *vorm* ✓ *y*-intercept / *y-afsnit*	(5)
6.2.1 a)	$m = \frac{\Delta y}{\Delta x} = \frac{0-3}{0-2} = \frac{-3}{-2} = \frac{3}{2}$ $c = 3$	✓method / *metode* ✓$m = \frac{3}{2}$ ✓$c = 3$	(3)
6.2.1 b)	$b = 7$	✓answer / *antwoord*	(1)
6.2.1 c)	Substitute any of the points A or D into *f*(*x*) to calculate *a* $0 = a(-2)^2 + 7$ $0 = 4a + 7$ $-7 = 4a$ $-\frac{7}{4} = a$ **OR/OF** $0 = a(2)^2 + 7$ $0 = 4a + 7$ $-7 = 4a$ $-\frac{7}{4} = a$	✓ Substituting / *vervanging* ✓ Simplification / *vereenvoudiging* ✓ $-\frac{7}{4} = a$	(3)
6.2.2	$EB = 7 - 3$ $= 4$ units / *eenhede*	✓Method / *metode* ✓Answer / *antwoord*	(2)
6.2.3	$x = 0$	✓Answer / *antwoord*	(1)
6.2.4(a)	$m_{q(x)} \times m_{g(x)} = -1$ $m_{q(x)} \times \frac{3}{2} = -1$ $m_{q(x)} = -\frac{2}{3}$	✓ $m_{q(x)} = -\frac{2}{3}$	(1)

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6.2.4(b)	$q(x) = -\frac{2}{3}x + c$ $(2;0)$: $0 = -\frac{2}{3}(2) + c$ $0 = -\frac{4}{3} + c$ $\frac{4}{3} = c$ $\therefore q(x) = -\frac{2}{3}x + \frac{4}{3}$	✓ Substituting / *vervanging* ✓ $\frac{4}{3} = c$ ✓ Equation / *vergelyking*	(3)
6.2.5	$-2 \leq x \leq \frac{8}{7}$	✓ interval notation / *notasie* ✓ endpoints / *eindpunte*	(2)
6.2.6	$x > 2$ or / *of* $x < -2$	✓x < -2 ✓ x > 2	(2)
			[23]
		TOTAL/*TOTAAL*:	**100**

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