NASIENRIGLYNE

EKSAMEN	NASIONALE SENIOR SERTIFIKAAT
GRAAD	12
DATUM	NOVEMBER 2024
VAK	WISKUNDE
VRAESTEL	1
PUNTETOTAAL	150
TYDSDUUR (UUR)	3
AANTAL BLADSYE	13

SOUTH AFRICAN COMPREHENSIVE ASSESSMENT INSTITUTE

SUID-AFRIKAANSE KOMPREHENSIEWE ASSESSERINGSINSTITUUT

NOTA:

Indien 'n kandidaat 'n vraag twee keer beantwoord, sien slegs die EERSTE poging na.

Voortgaande akkuraatheid geld in al die aspekte van die nasiengids tensy anders gespesifiseer.

VRAAG 1

1.1.1	$x(x-8)=0$ $x=0$ or $x=8$	✓ Faktoriseer = 0 ✓Antwoorde SLEGS ANTWOORD VOLPUNTE (2)
1.1.2	$3x^2-9x+2=0$ $x=\frac{-(-9)\pm\sqrt{(-9)^2-4(3)(2)}}{2(3)}$ $x=\frac{9\pm\sqrt{57}}{6}$ $x=2{,}76 \ \ or \ \ x=0{,}24$	✓ Standard vorm ✓ Vervang in formule ✓✓ Antwoorde (4)
1.1.3	$2x^2-3x-5\leq 0$ $(2x-5)(x+1)\leq 0$ $-1\leq x\leq \frac{5}{2}$ OR $x\in[-1;\frac{5}{2}]$	✓ Faktoriseer/KV ✓ Kritiese waardes ✓ Korrekte notasie (3)
1.2	$x=2y+3$ $4(2y+3)^2+6y=5y(2y+3)+3$ $16y^2+48y+36+6y=10y^2+15y+3$ $2y^2+13y+11=0$ or $6y^2+29y+33=0$ $(2y+11)(y+1)=0$ or $(2y+11)(3y+3)=0$ $y=-\frac{11}{2}$ OR $y=-1$ $x=-8$ OR $x=1$ OR	✓ $x=3+2y$ ✓ Vervanging ✓ Vereenvoudiging ✓ Standard vorm ✓ Faktoriseer/KV ✓ Antwoorde vir y ✓Antwoorde vir x (7) OR

	$y = \frac{x}{2} - \frac{3}{2}$ $4x^2 + 6(\frac{x}{2} - \frac{3}{2}) = 5x(\frac{x}{2} - \frac{3}{2}) + 3$ $4x^2 + 3x - 9 = \frac{5x^2}{2} - \frac{15x}{2} + 3$ $8x^2 + 6x - 18 = 5x^2 - 15x + 6$ $3x^2 + 21x - 24 = 0$ $x^2 + 7x - 8 = 0$ $(x + 8)(x - 1) = 0$ $x = -8$ or $x = 1$ $y = -\frac{11}{2}$ or $y = -1$	✓ $y = \frac{x}{2} - \frac{3}{2}$ ✓ Vervanging ✓ Vereenvoudiging ✓ Standard vorm ✓ Faktoriseer/KV ✓ Antwoorde vir x ✓Antwoorde vir y
1.3	**WITH "K" METHOD:** $\sqrt{3x+1} - \frac{4}{\sqrt{3x+1}} - 3 = 0$ Let: $\sqrt{3x+1} = k$ $k - \frac{4}{k} - 3 = 0$ $k^2 - 4 - 3k = 0$ $k^2 - 3k - 4 = 0$ $(k - 4)(k + 1) = 0$ $k = 4 \quad or \quad k = -1$ $\sqrt{3x+1} = 4$ $\qquad$ $\sqrt{3x+1} = -1$ $3x + 1 = 16$ $\qquad$ nie geldig $\therefore x = 5$ OF $\sqrt{3x+1} - \frac{4}{\sqrt{3x+1}} - 3 = 0$ $3x + 1 - 4 - 3\sqrt{3x+1} = 0$ $3x - 3 = 3\sqrt{3x+1}$ $x - 1 = \sqrt{3x+1}$ $x^2 - 2x + 1 = 3x + 1$ $x^2 - 5x = 0$ $x(x - 5) = 0$ $x = 0$ or $x = 5$ Maar $x \neq 0$, $\therefore x = 5$	✓ Vervang k ✓ Std. vorm ✓ Faktore/KV ✓ Beide Antwoorde vir k ✓$x = 5$ If beide Antwoorde, 4/5 ✓ Vereenvoudig ✓Kwadreer beide kante ✓ Standard vorm ✓ Faktorisering ✓ Antwoord If beide Antwoorde, 4/5 (5)

1.4	$5^{x+1} - 5^{x-1} = 120\sqrt{5}$ $5^x\left(5 - \frac{1}{5}\right) = 120\sqrt{5}$ $5^x = 5^2.5^{\frac{1}{2}}$ $5^x = 5^{\frac{5}{2}}$ $x = \frac{5}{2}$ OR $5^{x(5-5^{-1})} = 120\sqrt{5}$ $5^x = 55{,}90169944$ $x = \log_5 55{,}90169944$ $x = \frac{5}{2}$	✓ GGD 5^x ✓ Vereenvoudig ✓ Antwoord (3)
1.5	$3x^2 - 5x + k = 0$ always have real roots? $(-5)^2 - 4(3)(k) \geq 0$ $\therefore 25 - 12k \geq -0$ $12k \leq 25$ $k \leq \frac{25}{12}$	✓ $(-5)^2 - 4(3)(k) \geq 0$ ✓✓ Vereenvoudig ✓Antwoord (4)
		[28]

VRAAG 2

2.1.1	$a = 8$ and $d = 7$ $T_n = 1 + 7n$ $T_{34} = 1 + 7 \times 34 = 239$	✓ a en d ✓ Vervang in regte formule ✓ Antwoord (3)
2.1.2	$S_n = \frac{n}{2}[2a + (n-1)d]$ $S_{14} = \frac{40}{2}[2(8) + 39(7)]$ $= 5780$	✓ Formule ✓ Vervanging ✓ Antwoord (3)
2.2	$\sum_{k=1}^{8} \frac{(2)^{k+1}}{3^k}$ $= \frac{4}{3} + \frac{8}{9} + \frac{16}{27} - \cdots$ $a = \frac{4}{3}$ and $r = \frac{2}{3}$ $S_8 = \frac{\frac{4}{3}\left(1-\left(\frac{2}{3}\right)^8\right)}{1-\frac{2}{3}}$ = 3,84	Brei uit ✓ a ✓ r ✓ Vervanging in regte formule ✓ Antwoord (5)
2.3	$a = 5$ and $r = 0{,}6$ $S_\infty = \frac{5}{1-0{,}6}$ $= 12{,}5$ m Nee, dit sal nie	✓ a and r ✓ Vervanging in regte formule ✓✓ Antwoord en gevolgtrekking (4)
		[15]

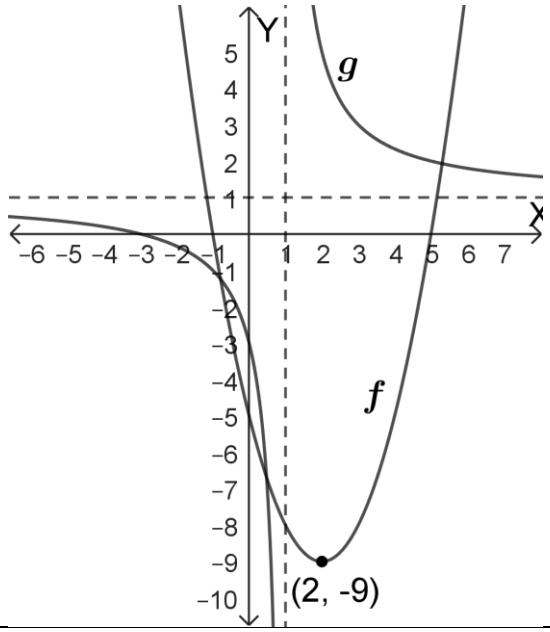
VRAAG 3

3.1	$1;\ k;\ 3k+1;\ 8k$ ↖↗↖↗ ↖↗ $k-1;\ 2k+1;\ 5k-1$ ↖↗ ↖↗ $k+2;\quad 3k-2$ $\therefore k+2=3k-2$ $k=2$	✓ 1st diff. ✓ 2de diff ✓ Vergelyking \✓Antwoord (4)
3.2	$2a=4;\ a=2$ $3(2)+b=1;\ b=-5$ $2-5+c=1;\ c=4$ $T_n=2n^2-5n+4$	✓✓✓ a, b en c ✓ T_n (4)
		[8]

VRAAG 4

4.1.1	$105400 = 200000\left(1-\frac{15}{100}\right)^n$ old $\frac{527}{1000} = \left(\frac{17}{20}\right)^n$ (OR 0,527=0,85^n) $n = \log_{0,85}\frac{527}{1000}$ $n = 3{,}94$ jaar (Aanvaar 4 jaar)	✓ Regte vervanging in regte formule ✓ Vereenvoudig ✓ log ✓ Antwoord (4)
4.2.1	$2000000 = x.\frac{1-\left(1+\frac{11}{1200}\right)^{-240}}{\frac{11}{1200}}$ x =R20643,77	✓ Regte formule met regte Vervanging ✓ n and i (onafhanklik) ✓ Antwoord (3)
4.2.2	OB at $T_{91} = 2000000\left(1+\frac{11}{1200}\right)^{91} -$ $20\,643{,}77(\frac{\left(1+\frac{11}{1200}\right)^{89}-1}{\frac{11}{1200}}$ = R4505342,76 = R4505342,76 – R2821075,62 =R 1684267,14 $OB = 1684267{,}14\left(1+\frac{11}{1200}\right)^2$ $= R1715286{,}90$ OR $OB = 20643{,}77\left(\frac{1-\left(1+\frac{11}{1200}\right)^{-11}}{\frac{11}{1200}}\right)\left(1+\frac{11}{1200}\right)^2$ $OB = 1715287{,}37$	✓$2000000\left(1{,}1+\frac{11}{1200}\right)^{91}$ ✓$20\,643{,}77(\frac{\left(1+\frac{11}{1200}\right)^{89}-1}{\frac{11}{1200}}$ ✓ R4588319,285 ✓ R2821075,62 ✓ Antwoord ()
4.2.3	$OB = \frac{21000\left(1-\left(1+\frac{11}{1200}\right)^{-n}\right)}{\frac{11}{1200}}$ $0.251\ldots = \left(1+\frac{11}{1200}\right)^{-n}$ $-n = \log_{1+\frac{11}{100}} 0{,}251$ $n = 151{,}37$	✓ Vervanging in regte formule ✓ log ✓ Antwoord (3)
		[15]

VRAAG 5

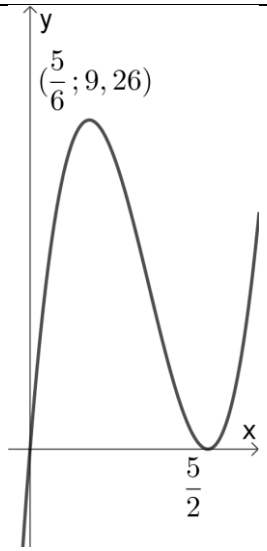
5.1	$g(x) = \frac{4+x-1}{x-1}$ $= \frac{4}{x-1} + \frac{x-1}{x-1}$ $= \frac{4}{x-1} + 1$	✓Regte teller ✓ Verskillende breuke ✓ Antwoord SLEGS ANTWOORD (0) (3)
5.2	$x^2 - 4x - 5 = (x-5)(x+1) = 0$ $x = 5$ or $x = -1$ $y = -5$ $y = \frac{4}{0-1} + 1 = -3$ $\frac{4}{x-1} = -1$ $4 = -x + 1, \quad \therefore x = -3$	✓ $x = 5$ *or* $x = -1$ ✓ $y = -5$ ✓ $x = -3$ ✓ $y = -3$ (4)
5.3		✓f draaipunt ✓f vorm ✓ g asimptote ✓ g vorm (4)
5.4	$y = 1^2 - 4(1) - 5$ $y = -8$ B$(1; -8)$	✓ $x = 1$ ✓Antwoord (2)
5.5	$m = f'(x) = 2x - 4$ $2x - 4 = -2$ $x = 1$ en $y = -8$ Hierdie is punt B	✓m = $f'(x)$ ✓ m = -2 ✓ waarde van x ✓ Afleiding (4)
		[17]

VRAAG 6

6.1.1	$8 = a^3$ $a = 2$	✓✓ Vervang (3; 8) ✓ $a = 2$ (3)
6.1.2	$h(x) = 2^{x-1} - 3$	✓$x - 1$ ✓-3 (2)
6.1.3	$x = 2^y$ $y = \log_2 x$	✓ $x = y$ ✓ Omskakeling ✓ Antwoord (3)
6.2.1	$2x^2 + 4x - 2 = -x + 1$ $2x^2 + 5x - 3 = 0$ $(2x - 1)(x + 3) = 0$ $x = -3$	✓ Stel vgls gelyk ✓Standard vorm ✓Faktoriseer ✓Antwoord (4)
6.2.2	$AB = -x + 1 - 2x^2 - 4x + 2$ $AB = -2x^2 - 5x + 3 = 5$ $2x^2 + 5x + 2 = 0$ $(2x + 1)(x + 2) = 0$ $x = -\frac{1}{2}$ or $x = -2$ $OC = 2$ OF $OC = \frac{1}{2}$	✓ AB ✓ AB =5 ✓ Standard vorm ✓Faktoriseer ✓ Waardes van x ✓ OC (6)
		[18]

VRAAG 7

Penaliseer slegs EEN keer vir notasie in hierdie Vraag		
7.1	$f(x) = -5x^2$ $f(x+h) = -5(x+h)^2$ $= -5x^2 - 10xh - 5h^2$ $f'(x) = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h\to 0} \frac{-5x^2 - 10xh - 5h^2 + 5x^2}{h}$ $f'(x) = \lim_{h\to 0} \frac{-10xh - 5h^2}{h}$ $f'(x) = \lim_{h\to 0} \frac{h(-10x - 5h)}{h}$ $f'(x) = \lim_{h\to 0} (-10x - 5h)$ $f'(x) = -10x$	✓ $f(x+h)$ ✓Regte vervanging ✓ Vereenvoudig ✓ Antwoord (4)
7.2	$\frac{d}{dx}\left(8 - \frac{4}{x^2} + \sqrt[5]{x^4}\right)$ $= \frac{d}{dx}(8 - 4x^{-2} + x^{\frac{4}{5}})$ $= 8x^{-3} + \frac{4}{5}x^{-\frac{1}{5}}$	✓ $-4x^{-2}$ ✓ $x^{\frac{4}{5}}$ ✓ $8x^{-3}$ ✓ $\frac{4}{5}x^{-\frac{1}{5}}$ (4)
7.3.1	$x(4x^2 - 20x + 25) = 0$ $x(2x-5)(2x-5) = 0$ $x = 0$ or $x = \frac{5}{2}$ $y = 0$	✓ $x(4x^2 - 20x + 25)$ ✓ Faktore $x(2x-5)(2x-5)$ ✓ Antwoorde (3)

7.3.2	$f'(x) = 12x^2 - 40x + 25 = 0$ $(2x - 5)(6x - 5) = 0$ $x = \frac{5}{2}$ or $x = \frac{5}{6}$ $y = 0$ or $y = \frac{250}{27} = 9{,}26$ $TP\left(\frac{5}{2}; 0\right)$ and $TP\left(\frac{5}{6}; \frac{250}{27}\right)$	✓ Afgeleide = 0 ✓ Faktore ✓ x - waardes ✓ koördinate (VRAAG vra vir koördinate) (4)
7.3.3		✓ Afsnitte ✓Draaipunte ✓Vorm (3)
7.3.4	$f''(x) = 24x - 40 = 0$ $x = \frac{5}{3}$ OF $x = -\frac{b}{2a}$ $x = \frac{5}{3}$	✓ 2nd afgeleide = 0 ✓ Antwoord (2)
7.3.4	$x > \frac{5}{3}$	✓ Notasie ✓Waarde (2)
7.3.5	$-9{,}26 < k < 0$	✓✓ Waardes ✓ Regte ongelykheid (3)
		[25]

VRAAG 8

8.1	DC =$2x$ BC = $6-y$ $BC = 6-x^2$	✓ CD ✓ ✓ BC (3)
8.2	Area = $l \times b$ $= 2x(6-x^2)$ Area =$12x-2x^3$	✓ Oppervl reghoek ✓$2x$ ✓ $6-x^2$ ✓ Vervang (4)
8.3	Maks x as $A'(x)=0$ $A'(x) = 12-6x^2 = 0$ $x = \sqrt{2}$ Maks oppervl = $12(\sqrt{2}) - 2(\sqrt{2})^3$ = $8\sqrt{2}$ = 11,31	✓ $A' = 0$ ✓ $x = 3$ ✓ Vervang ✓ Antwoord (4)
		[11]

VRAAG 9

9.1.1	$a = 872-428 = 448$ $b = 780-424 = 356$ $c = 720-448 = 272$ OR $c = 628-356 = 272$	✓ ✓✓ a, b, c (3)
9.1.2	$\frac{448}{872}$ $= \frac{56}{109} = 0{,}51$	✓ 448 ✓ 872 (2)
9.1.3	P(A) x P(B) = $\frac{720}{1500} \times \frac{872}{1500} = 0{,}28$ P(A en B) = 0,30 Die antwoorde is nie dieselfde nie. Nie onafhanklik nie.	✓ $\frac{720}{1500} \times \frac{872}{1500} =$ ✓ 0,28 ✓0,30 ✓Nee (4)
9.2	8 Mens: 8! = 40320 Pare sit saam: 2 x 2 x 2 x 2 x 4! = 384 P(Pare sit saam): $\frac{384}{40320}$	✓ 8! ✓ 2 x 2 x 2 x 2 ✓ x4!

	$= \frac{1}{105}$	✓ $\frac{1}{105}$ (4)
		[13]