

MARKING GUIDELINES / NASIENRIGLYNE

EXAMINATION EKSAMEN	NATIONAL SENIOR CERTIFICATE NASIONALE SENIOR SERTIFIKAAT
GRADE / GRAAD	12
DATE / DATUM	MAY/JUNE 2026 MEI/JUNIE 2026
SUBJECT / VAK	MATHEMATICS / WISKUNDE
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MARK TOTAL / PUNTETOTAAL	150
DURATION (HOURS) / TYDSDUUR (UUR)	3
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SOUTH AFRICAN COMPREHENSIVE ASSESSMENT INSTITUTE
SUID-AFRIKAANSE KOMPREENSIEWE ASSESSERINGSINSTITUUT

FINAL APPROVED MARKING GUIDELINES / FINAAL GOEDGEKEURDE NASIENRIGLYNE	
DATE OF MEETING / VERGADERINGSDATUM	
UMALUSI MODERATOR / UMALUSI-MODERATOR	
CHIEF MARKER / HOOFNASIENER	
INTERNAL MODERATOR / INTERNE MODERATOR	



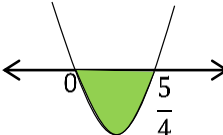
NOTE:

- If a candidate answered a question **TWICE**, only mark the first attempt.
- If a candidate cancelled the first attempt and did not answer the question again, mark the cancelled attempt.
- The principle of consistent accuracy (**CA**) will be applied throughout the marking guideline.
- If a candidate has given the answer only, without showing any necessary working out, only **ONE** mark will be given, unless stated otherwise.

NOTA:

- *As 'n kandidaat 'n vraag **TWEE** keer beantwoord, merk slegs die eerste poging.*
- *As 'n kandidaat die eerste poging kansleer en nie die vraag weer beantwoord nie, merk die gekanseleerde poging.*
- *Die beginsel van volgehoue akkuraatheid (**CA**) sal deur die hele nasiegriglyn toegepas word.*
- *As 'n kandidaat slegs die antwoord neerskryf, sonder om enige nodige bewerkings te toon, sal slegs **EEN** punt gegee word, tensy anders vermeld.*



QUESTION / VRAAG 1			
1.1.1	$x^2 - 2x = 24$ $x^2 - 2x - 24 = 0$ $(x - 6)(x + 4) = 0$ $x - 6 = 0$ or/of $x + 4 = 0$ $x = 6$ or/of $x = -4$	✓ Standard form/ <i>Standaard vorm</i> ✓ Factors/ <i>Faktore</i> ✓ Both Answers/ <i>Beide antwoorde</i>	(3)
1.1.2	$3x^2 - 7x = 3$ $3x^2 - 7x - 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(3)(-3)}}{2(3)}$ $x = 2,70$ or/of $x = -0,37$	✓ Standard form/ <i>Standaard vorm</i> ✓ Substitution/ <i>Vervanging</i> ✓ $x = 2,70$ ✓ $x = -0,37$	(4)
1.1.3	$7^{x+3} - 7^{x+2} + 7^0 = 100\,843$ $7^x \cdot 7^3 - 7^x \cdot 7^2 + 1 = 100\,843$ $7^x \cdot 7^3 - 7^x \cdot 7^2 = 100\,842$ $7^x(7^3 - 7^2) = 100\,842$ $7^x(294) = 100\,842$ $7^x = 343$ $7^x = 7^3$ $x = 3$	✓ Simplification/ <i>Vereenvoudiging</i> ✓ Factorise/ <i>Faktore</i> ✓ Same bases/ <i>Gelyke basisse</i> ✓ Answer/ <i>Antwoord</i>	(4)
1.1.4	$4x^2 - 5x < 0$ Roots/wortels: $: x(4x - 5) = 0$ $x = 0$ or $x = \frac{5}{4}$ $0 < x < \frac{5}{4}$	 ✓ Factors/ <i>Faktore</i> ✓ Critical Values/ <i>Kritieke Waardes</i> ✓ Notation/ <i>Notasie</i>	(3)



1.2	$x^2 + xy - y^2 = 16 \dots (1)$ $2x - y = 4 \dots (2)$ From/ <i>Vanuit</i> (2): $y = 2x - 4 \dots (3)$ (3) <i>into / in</i> (1): $x^2 + x(2x - 4) - (2x - 4)^2 = 16$ $x^2 + 2x^2 - 4x - 4x^2 + 16x - 16 = 16$ $-x^2 + 12x - 32 = 0$ $x^2 - 12x + 32 = 0$ $(x - 4)(x - 8) = 0$ $x = 4$ or/of $x = 8$ $y = 2(4) - 4$ or/of $y = 2(8) - 4$ $y = 4$ or/of $y = 12$ OR / OF From (2): $x = \frac{y}{2} + 2 \dots (3)$ (3) <i>into/in</i> (1): $\left(\frac{y}{2} + 2\right)^2 + y\left(\frac{y}{2} + 2\right) - y^2 = 16$ $\frac{y^2}{4} + 2y + 4 + \frac{y^2}{2} + 2y - y^2 = 16$ $-\frac{y^2}{4} + 4y - 12 = 0$ $y^2 - 16y + 48 = 0$ $(y - 12)(y - 4) = 0$ $y = 12$ or/of $y = 4$ $x = \frac{12}{2} + 2$ or/of $x = \frac{4}{2} + 2$ $x = 8$ or/of $x = 4$	✓ $y = 2x - 4$ ✓ Substitution/ <i>Vervanging</i> ✓ Simplification/ <i>Vereenvoudiging</i> ✓ Standard form/ <i>Standaard vorm</i> ✓ Both x values/ <i>Beide x waardes</i> ✓ Both y values/ <i>Beide y waardes</i> ✓ $x = \frac{y}{2} + 2$ ✓ Substitution/ <i>Vervanging</i> ✓ Simplification/ <i>Vereenvoudiging</i> ✓ Standard form/ <i>Standaard vorm</i> ✓ Both y values/ <i>Beide y waardes</i> ✓ Both x values/ <i>Beide x waardes</i>	(6)
1.3	$4^x \cdot 4 + 4^x = 5^y \cdot 5 - 5^y$ $4^x(4 + 1) = 5^y(5 - 1)$ $4^x(5) = 5^y(4)$ $\frac{4^x}{4} = \frac{5^y}{5}$ $4^{x-1} = 5^{y-1}$ $x - 1 = 0$ and/en $y - 1 = 0$ $x = 1$ and/en $y = 1$	✓ Exponential laws/ <i>Eksponensiële wette</i> ✓ Factors/ <i>Faktore</i> ✓ Simplification/ <i>Vereenvoudiging</i> ✓ $4^{x-1} = 5^{y-1}$ ✓ Both answers/ <i>Beide Antwoorde</i>	(5)
[25]			



QUESTION / VRAAG 2			
2.1.1	$ \begin{array}{ccccccccc} 100 & & 202 & & 310 & & 424 & & 544 \\ & \swarrow & & \swarrow & & \swarrow & & \swarrow & \\ & 102 & & 108 & & 114 & & 120 & \\ & & \swarrow & & \swarrow & & \swarrow & & \\ & & 6 & & 6 & & 6 & & \end{array} $	✓ 544	(1)
2.1.2	$ \begin{array}{lll} 2a = 6 & 3(3) + b = 102 & 3 + 93 + c = 100 \\ a = 3 & 9 + b = 102 & c = 4 \\ & b = 93 & \\ T_n = 3n^2 + 93n + 4 & & \end{array} $	✓ $a = 3$ ✓ $b = 93$ ✓ $c = 4$	(3)
2.1.3	1 st Difference/1 ^{ste} Verskille: $P_n = 6n + 96$ $2022 = 6n + 96$ $1926 = 6n$ $n = 321$ Between term 321 and 322 / Tussen term 321 en 322	✓ $P_n = 6n + 96$ ✓ Substitution/Vervanging ✓ Conclusion/ Gevolgtrekking	(3)
2.2	$\sum_{k=1}^n (-3k + 20) = -11\,780$ $17 + 14 + 11 + \dots$ $a = 17 \quad d = -3$ $S_n = \frac{n}{2}[2a + (n-1)d]$ $-11780 = \frac{n}{2}[2(17) + (n-1)(-3)]$ $-23560 = n(37 - 3n)$ $-3n^2 + 37n + 23560 = 0$ $3n^2 - 37n + 23560 = 0$ $(n - 95)(3n + 248) = 0$ $n = 95 \quad \text{or} \quad n \neq -\frac{248}{3}$	✓ Expansion/Uitbreiding $T_1; T_2; T_3$ ✓ a and/en d ✓ Substitution into correct formula/Vervanging in die regte formule ✓ Standard form/Standaard vorm ✓ Answer/Antwoord	(5)
[12]			



QUESTION / VRAAG 3			
3.1.1	$\frac{5}{16} \times \frac{1}{4} = \frac{5}{64}$	✓ $\frac{5}{64}$ ✓ $r = \frac{1}{4}$	(2)
3.1.2	$-1 < \frac{1}{4} < 1$	✓ Answer/Antwoord	(1)
3.1.3	$S_n = \frac{a(r^n - 1)}{r - 1}$ $S_{10} = \frac{20\left(\frac{1}{4}^{10} - 1\right)}{\frac{1}{4} - 1}$ $S_{10} = 26,67$	✓ Correct Substitution into the correct formula / Korrekte vervanging in die regte formule ✓ Answer/Antwoord	(2)
3.2.1	$70 + 67,9 + 65,863 + \dots$ $a = 70 \quad r = 0,97$ $S_{60} = \frac{70(0,97^{60} - 1)}{0,97 - 1}$ $S_{60} = 1\,958,12m$	✓ a ✓ r ✓ Substitution/Vervanging ✓ Answer/Antwoord	(4)
3.2.2	$S_{\infty} = \frac{a}{1 - r}$ $S_{\infty} = \frac{70}{1 - 0,97}$ $S_{\infty} = 2\,333,33m$	✓ Substitution/Vervanging ✓ Answer/Antwoord	(2)
3.2.3	$1230 \div 250 = 4,92$ $0,92 \times 250 = 230$ Thus 4 full rotation and 230m / Dus 4 volle rotasies en 230m $\therefore$ on side / op sy AE	✓ 4,92 ✓ 230m ✓ Answer/Antwoord	(3)
[14]			



QUESTION / VRAAG 4			
4.1	$A = P(1 + i)^n$ $3x = x(1 + 0,09)^n$ $3 = (1,09)^n$ $n = \log_{1,09} 3$ $n = 12,75 \text{ years / jare}$	✓ Substitution (must show triple)/Vervanging (moet trippel wys) ✓ Use of log/Gebruik van log ✓ Answer/Antwoord	(3)
4.2.1	$1 + i_{eff} = \left(1 + \frac{i_{nom}}{n}\right)^n$ $1 + 0,1127 = \left(1 + \frac{i_{nom}}{12}\right)^{12}$ $\sqrt[12]{1,1127} = \sqrt[12]{\left(1 + \frac{i_{nom}}{12}\right)^{12}}$ $\sqrt[12]{1,1127} - 1 = \frac{i_{nom}}{12}$ $i_{nom} = 0,1072660733$ $\therefore 10,73\% \text{ per annum compounded monthly / per jaar maandeliks saamgesteld}$	✓ Substitution into correct formula/Vervanging in korrekte formule ✓ Simplification/Vereenvoudiging	(2)
4.2.2	$P = \frac{x[1-(1+i)^{-n}]}{i}$ $650\,000 = \frac{x\left[1-\left(1+\frac{0,1073}{12}\right)^{-5 \times 12}\right]}{\frac{0,1073}{12}}$ $x = R14\,045,21$	✓ Substitution into correct formula/Vervanging in korrekte formule ✓ i ✓ n ✓ Answer/Antwoord	(4)
4.2.3	$P(1 - i)^n = P(1 + i)^n - \frac{x[(1+i)^n - 1]}{i}$ $650\,000(1 - i)^3 = 650\,000 \left(1 + \frac{0,1073}{12}\right)^{36} - \frac{14045,21 \left[\left(1 + \frac{0,1073}{12}\right)^{36} - 1\right]}{\frac{0,1073}{12}}$ $650\,000(1 - i)^3 = 895\,553,2856 - 593\,392,6383$ $650\,000(1 - i)^3 = 302\,160,6473$ $(1 - i)^3 = 0,4648625343$ $1 - i = 0,7746547386$ $i = 0,2253452614$ $\therefore 22,53\%$	✓ $650\,000(1 - i)^3$ ✓ $i = \frac{0,1073}{12}$ ✓ $n = 36$ ✓ $\frac{14045,21 \left[\left(1 + \frac{0,1073}{12}\right)^{36} - 1\right]}{\frac{0,1073}{12}}$ ✓ Simplification/Vereenvoudiging ✓ Answer/Antwoord	(6)
[15]			

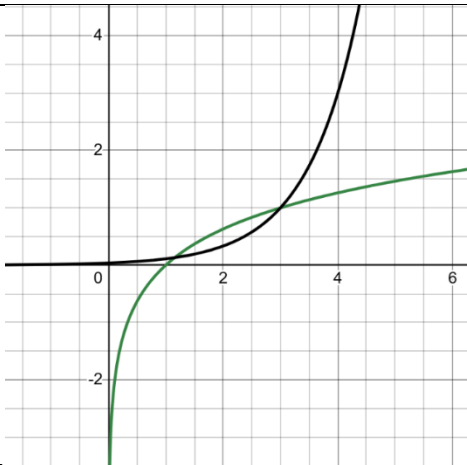


QUESTION / VRAAG 5			
5.1	$10 = \frac{1}{2}x$ $x = 20$	✓ Answer/Antwoord	(1)
5.2	$10 = \sqrt{a(20)}$ $100 = 20a$ $a = 5$	✓ Substitution/Vervanging ✓ Answer/Antwoord	(2)
5.3	$y = \sqrt{5x}$ $x = \sqrt{5y}$ $x^2 = 5y$ $k^{-1}(x) = \frac{x^2}{5}; x \geq 0$	✓ Swop x and y /Ruil x en y om ✓ Answer/Antwoord Penalise restriction/Penaliseer beperking	(2)
5.4	$\sqrt{5x} = -x + 10$ $5x = (-x + 10)^2$ $5x = x^2 - 20x + 100$ $x^2 - 25x + 100 = 0$ $(x - 20)(x - 5) = 0$ $x \neq 20$ or $x = 5$ $y = -5 + 10$ $y = 5$ $(5; 5)$ Co-ordinate form not necessary/Koördinaat vorm nie nodig.	✓ Equating/Gelykstel ✓ Square both sides/Kwadreer beide kante ✓ Standard form/Standaard vorm ✓ $x \neq 20; x = 5$ ✓ $y = 5$	(5)
5.5	$0 < x < 5$	✓ Critical Values/Kritieke waardes ✓ Notation/Notasie	(2)
[12]			



QUESTION / VRAAG 6			
6.1	$f(x) = \frac{a}{x+2} - 3$ $0 = \frac{a}{-1+2} - 3$ $3 = a$ $\therefore f(x) = \frac{3}{x+2} - 3$	✓ $q = -2$ ✓ Substitution of/Vervanging van $(-1; 0)$ ✓ $a = 3$	(3)
6.2	$-6 = 3b + 3$ $-9 = 3b$ $b = -3$ OR / OF $-6 = \frac{3}{b+2} - 3$ $-3(b+2) = 3$ $b+2 = -1$ $b = -3$ OR / OF $\frac{3}{x+2} - 3 = 3x + 3$ $\frac{3}{x+2} = 3x + 6$ $3 = (3x+6)(x+2)$ $0 = 3x^2 + 12x + 9$ $0 = x^2 + 4x + 3$ $0 = (x+1)(x+3)$ $x = -1 \text{ or } x = -3$ $\therefore x = -3$	✓ Substitution/ Vervanging ✓ Answer/Antwoord ✓ Substitution/Vervanging ✓ Answer/Antwoord ✓ Substitution/Vervanging ✓ Answer/Antwoord	(2)
6.3	$y - y_1 = x - x_1$ $y - (-3) = x - (-2)$ $y = x - 1$	✓ Substitution/Vervanging ✓ $y = x - 1$	(2)
6.4	$\frac{3}{x+2} - 3 > 0$ $-2 < x < -1$	✓ Notation/Notasie ✓ Critical Values/Kritieke waardes	(2)
6.5	Translation of 2 units right/ <i>Translasie van 2 eenhede regs</i>	✓ 2 unit/eenhede ✓ Right/Regs	(2)
[11]			



QUESTION / VRAAG 7			
7.1	$(9; 2)$ lies on f^{-1} ; $\therefore (2; 9)$ lies on f $9 = a^2$ $9 = a^2$ $\therefore a = 3$	✓ $(2; 9)$ on/op f ✓ Substitution/Vervanging ✓ Answer/Antwoord	(3)
7.2	$y = 3^x$ $\therefore x = (3)^y$ $f^{-1}(x) = \log_3 x$	✓ Swop x and y /Ruil x en y om ✓ Answer/Antwoord	(2)
7.3	$g(x) = 3^{x-3}$ $g(x) = 3^x \cdot 3^{-3}$ $\therefore g(x) = \frac{1}{27}(3)^x$	✓ Exponential Laws/Eksponeensieële wette ✓ Answer/Antwoord	(2)
7.4		✓ Intercepts/Afsnitte $(1; 0)$ ✓ Shape of g (including asymptote)/Vorm van g (asymptoot ingesluit) ✓ Shape of f^{-1} (including asymptote)/Vorm van f^{-1} (asymptoot ingesluit)	(3)
7.5	$f: 1 = \frac{1}{27}(3)^x$ $27 = 3^x$ $3^3 = 3^x$ $x = 3$ $\therefore P(1; 3)$ $f^{-1}: y = \log_3 3$ $y = 3$ $\therefore P$ lies on f^{-1} OR / OF If $y = 1$ is drawn through the intersection point at $x = 3$ of the graphs full marks are awarded. / As $y = 1$ geteken word deur die snypunt by $x = 3$ op die skets gee volpunte	✓ Substitution/Vervanging ✓ $x = 3$ ✓ Substitution into/Vervanging in f^{-1} ✓ Drawing $y = 1$ / Skets $y = 1$ ✓✓ Indicate that the line passes through the point of intersection / aandui dat die lyn deur die snypunt gaan	(3)
[13]			



QUESTION / VRAAG 8			
8.1	$f(x+h) = (x+h)^2 - 3(x+h)$ $= x^2 + 2xh + h^2 - 3x - 3h$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h)-f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2+2xh+h^2-3x-3h-x^2+3x}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh+h^2-3h}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x+h-3)}{h}$ $= \lim_{h \rightarrow 0} (2x+h-3)$ $= 2x+0-3$ $= 2x-3$	✓ $f(x+h)$ ✓ Substitution/Vervanging ✓ Simplification/ Vereenvoudiging ✓ Factorisation/ Faktorisering ✓ Answer/Antwoord	(5)
8.2.1	$D_x \left[x^4 - 3x^{\frac{2}{3}} + \frac{3}{4} \right]$ $= 4x^3 - 2x^{-\frac{1}{3}}$	✓ $-3x^{\frac{2}{3}}$ ✓ $4x^3$ ✓ $-2x^{-\frac{1}{3}}$	(3)
8.2.2	$f(x) = 4x^{-1}$ $f'(x) = -4x^{-2}$ $-\frac{4}{x^2} = -1$ $-4 = -x^2$ $x^2 = 4$ $x = \pm 2$	✓ $-4x^{-2}$ ✓ $-4x^{-2} = -1$ ✓ $x = \pm 2$	(3)
[11]			



QUESTION / VRAAG 9			
9.1.1	$-3 < x < 5$	✓ Answer/Antwoord	(1)
9.1.2	$x = -3$ and $x = 5$	✓ Answer/Antwoord	(1)
9.2	$f'(x) = 3px^2 + 2qx + r$ $f'(x) = x^2 - 2x - 15$ $r = -15$ $-2 = 2q$ $q = -1$ $3p = 1$ $p = \frac{1}{3}$	✓ $f'(x)$ ✓ $r = -15$ ✓ $q = -1$ ✓ $p = \frac{1}{3}$	(4)
9.3	$f''(x) = 2x - 2$ $2x - 2 > 0$ $2x > 2$ $x > 1$	✓ $f''(x) > 0$ ✓ Answer/Antwoord	(2)
9.4	$f''(x) = 2x - 2 = m$ $f''(2) = 2(2) - 2$ $= 2$ $2 \times -\frac{1}{2} = -1$ $\therefore$ the lines are perpendicular / Die lyne is loodreg	✓ $f''(x) = 2x - 2$ ✓ $f''(2) = 2$ ✓ $2 \times -\frac{1}{2} = -1$	(3)
9.5	$f'(2) = (2)^2 - 2(2) - 15$ $= -15$ $y = -\frac{1}{2}(2) - 14$ $y = -15$	✓ Substitute into derivative/Vervanging in afgeleide ✓ $f'(2) = -15$ ✓ $g(2) = -15$	(3)
9.6		✓ Shape/Vorm ✓ All intercepts/Alle afsnitte	(2)
[16]			



QUESTION / VRAAG 10			
10.1	$200 - 40 = 4h + 8r$ $160 = 4h + 8r$ $4h = 160 - 8r$ $h = 40 - 2r$	✓ Substitution/Vervanging ✓ Answer/Antwoord	(2)
10.2	$\text{Volume} = \pi r^2 \times h$ $V(r) = \pi r^2(40 - 2r)$ $V(r) = 40\pi r^2 - 2\pi r^3$ $V'(r) = 80\pi r - 6\pi r^2 = 0$ $r(80\pi - 6\pi r) = 0$ $r \neq 0 \quad \text{or} \quad 80\pi - 6\pi r = 0$ $r = \frac{80\pi}{6\pi}$ $r = 13,33\text{cm}$ $\text{Max volume} = \pi(13,33)^2(40 - 2(13,33))$ $= 7\,446,74\text{cm}^3$	✓ $V(r)$ ✓ $V'(r)$ ✓ $r = 13,33$ ✓ Answer/Antwoord	(4)
			[6]



QUESTION / VRAAG 11			
11.1.1	$P(S \cap T) = 0$ $\therefore P(S \cup T) = P(S) + P(T)$ $0,8 = 0,5 + y$ $y = 0,3$	✓ Substitution/Vervanging ✓ Answer/Antwoord	(2)
11.1.2	$P(S \cap T) = P(S) \times P(T)$ $\therefore P(S \cup T) = P(S) + P(T) - P(S) \times P(T)$ $0,8 = 0,5 + y - 0,5y$ $0,3 = 0,5y$ $y = 0,6$	✓ Substitution/Vervanging ✓ Answer/Antwoord	(2)
11.2	$P(D) = P(R \cap D) + P(R' \cap D)$ $= \left(0,65 \times \frac{28}{36}\right) + \left(0,35 \times \frac{9}{44}\right)$ $= 0,5771464646$ $\therefore 0,58 \text{ or } 58\%$	✓ Branch/Tak 1 ✓ Branch/Tak 2 ✓ $\left(0,65 \times \frac{28}{36}\right)$ ✓ $\left(0,35 \times \frac{9}{44}\right)$ ✓ Answer/Antwoord	(5)
11.3.1	$7! = 5\,040$	✓ Answer/Antwoord	(1)
11.3.2	$1 \times 5! \times 2!$ $= 240$	✓ $5! \times 2!$ ✓ Answer/Antwoord	(2)
11.3.3	$P(\text{Window seat}) = \frac{2! \times 6!}{7!}$ $= \frac{1\,440}{5\,040}$ $= \frac{2}{7}$	✓ $2! \times 6!$ ✓ $7!$ ✓ Answer/Antwoord	(3)
[15]			
GRAND TOTAL/GROOTTOTAAL: [150]			