



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NASIONALE SENIOR SERTIFIKAAT

GRAAD 11

WISKUNDE V1

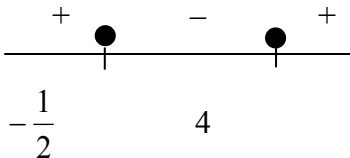
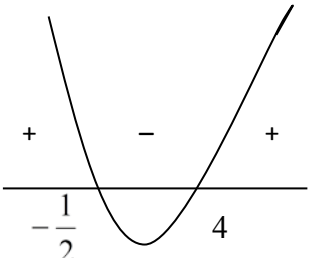
NOVEMBER 2014

MEMORANDUM

PUNTE: 150

Hierdie memorandum bestaan uit 14 bladsye.

VRAAG 1

1.1.1	$x = -2$ of $x = \frac{7}{3}$	✓ $x = -2$ ✓ $x = \frac{7}{3}$ (2)
1.1.2	$x^2 - 5x - 2 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{5 \pm \sqrt{25 - 4(1)(-2)}}{2}$ $x = \frac{5 \pm \sqrt{33}}{2}$ $x = 5,37$ or $x = -0,37$ OF $x^2 - 5x + \left(\frac{25}{4}\right) = 2 + \left(\frac{25}{4}\right)$ $\left(x - \frac{5}{2}\right)^2 = \frac{33}{4}$ $x - \frac{5}{2} = \pm \frac{\sqrt{33}}{2}$ $x = \frac{5 + \sqrt{33}}{2}$ or $x = \frac{5 - \sqrt{33}}{2}$ $x = 5,37$ or $x = -0,37$	✓ standaard vorm ✓ korrekte substitusie in korrekte formule ✓ $x = 5,37$ ✓ $x = -0,37$ (4) ✓ voltooi die vierkant ✓ $\sqrt{33}$ ✓ $x = 5,37$ ✓ $x = -0,37$ (4)
1.1.3	$\sqrt{x-3} = 5+4$ $(\sqrt{x-3})^2 = (9)^2$ $x-3 = 81$ $x = 84$	✓ isoleer $\sqrt{\quad}$ ✓ kwadreer beide kante ✓ vereenvoudiging ✓ antwoord (4)
1.1.4	$2x^2 - 7x - 4 \geq 0$ $(2x+1)(x-4) \geq 0$ CV's: $-\frac{1}{2}; 4$  $x \leq -\frac{1}{2}$ or $x \geq 4$ OF $x \in (-\infty; -\frac{1}{2}] \cup [4; \infty)$	 ✓ faktore ✓ metode ✓ notasie ✓ kritieke waardes (4) ✓ notasie ✓ kritieke waardes

1.2	$x = 2y + 1 \quad \dots\dots(1)$ $x^2 - 2y + 3xy = 6 \quad \dots\dots(2)$ $(2y + 1)^2 - 2y + 3y(2y + 1) = 6$ $4y^2 + 4y + 1 - 2y + 6y^2 + 3y - 6 = 0$ $10y^2 + 5y - 5 = 0$ $2y^2 + y - 1 = 0$ $(2y - 1)(y + 1) = 0$ $y = \frac{1}{2} \quad \text{of} \quad y = -1$ $x = 2 \quad \quad x = -1$ OF $y = \frac{x-1}{2}$ $x^2 - 2\left(\frac{x-1}{2}\right) + 3x\left(\frac{x-1}{2}\right) = 6$ $2x^2 - 2x + 2 + 3x^2 - 3x - 12 = 0$ $5x^2 - 5x - 10 = 0$ $x^2 - x - 2 = 0$ $(x+1)(x-2) = 0$ $x = -1 \quad \text{or} \quad x = 2$ $y = -1 \quad \quad y = \frac{1}{2}$	✓ substitusie van $x = 2y + 1$ ✓ vereenvoudiging ✓ standaard vorm ✓ faktore ✓ beide y waardes ✓ beide x waardes (6) ✓ substitusie van $y = \frac{x-1}{2}$ ✓ vereenvoudiging ✓ standaard vorm ✓ faktore ✓ beide x waardes ✓ beide y waardes (6) [20]
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VRAAG 2

2.1	$\frac{3^x(3-3^{-1})}{2 \cdot 3^x}$ $= \frac{3 - \frac{1}{3}}{2}$ $= \frac{8}{3} \times \frac{1}{2}$ $= \frac{4}{3}$ OF $\frac{3^{x-1}(3^2-1)}{2 \cdot 3^x}$ $= \frac{3^x \cdot 3^{-1} (8)}{2 \cdot 3^x}$ $= \frac{1}{3} \times 4$ $= \frac{4}{3}$	✓ gemeen faktor 3^x ✓ $3-3^{-1}$ ✓ antwoord (3) ✓ gemeen faktor 3^{x-1} ✓ vereenvoudiging ✓ antwoord (3)
2.2	$(x-2)^{-\frac{3}{2}} = 64$ $x-2 = \left[(4^3)\right]^{\frac{-2}{3}}$ $x-2 = 4^{-2}$ $x = 2 + \frac{1}{16}$ $\therefore x = 2\frac{1}{16}$ OF $\sqrt{(x-3)^{-3}} = 64$ $(x-3)^{-3} = 4096$ $(x-2)^3 = \frac{1}{4096}$ $x-2 = \frac{1}{16}$ $x = 2\frac{1}{16}$	✓ toepassing van exp. wet ✓ 4^3 ✓ vereenvoudiging ✓ antwoord (4) ✓ kwadrering ✓ toepassing van eksp. wet ✓ vereenvoudiging ✓ antwoord (4)

2.3	$\frac{x \cdot x^{\frac{1}{2}} \cdot x^{\frac{1}{4}} \cdot x^{\frac{1}{8}}}{\sqrt[8]{x^7}}$ $= \frac{x^{\frac{7}{8}}}{x^{\frac{7}{8}}}$ $= x$	✓toepassing van wortel wet ✓toepassing van wortel wet ✓vereenvoudiging ✓antwoord (4)
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[11]

VRAAG 3

3	$AC \cdot (x-2) = x^2 + 2x - 8$ $AC \cdot (x-2) = (x+4)(x-2)$ $AC = (x+4) \text{ cm}$ $\therefore FD = (x+4) \text{ cm}$ $\therefore ED = x+4 - (x-2)$ $ED = 6 \text{ cm}$	✓ stelling ✓ faktore ✓ $AC = (x+4) \text{ cm}$ ✓ metode ✓ antwoord (6)
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[6]

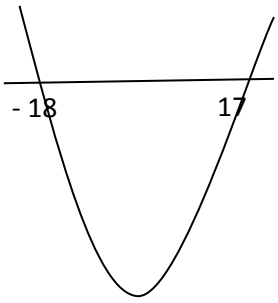
VRAAG 4

4.1	$\begin{array}{cccc} -7 & 0 & 9 & 20 \\ & 7 & 9 & 11 \\ & & 2 & 2 \end{array}$ $2a = 2$ $a = 1$ $3(1) + b = 7$ $b = 4$ $(1) + (4) + c = -7$ $c = -12$ $\therefore T_n = n^2 + 4n - 12$ OF $2a = 2$ $a = 1$ $T_2 = 2^2 + b(2) + c = 0$ $2b + c = -4$ (1) $3(1) + b = 7$ $T_3 = 3^2 + b(3) + c = 9$ $3b + c = 0$ (2) OF $b = 4$ $1 + a + c = -7$ $c = -12$ $(2) - (1) \quad b = 4$ $\therefore c = -4 - 2(4) = -12$ $T_n = n^2 + 4n - 12$	✓ $2a = 2$ ✓ a waarde ✓ b waarde ✓ c waarde (4) ✓ $2a = 2$ ✓ a waarde ✓ b waarde ✓ c waarde (4)
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	OF $T_n = T_1 + (n-1)d_1 + \frac{(n-1)(n-2)}{2} \cdot d_2$ $= -7 + (n-1) \cdot 7 + \frac{(n-1)(n-2)}{2} \cdot 2$ $= -7 + 7n - 7 + n^2 - 3n + 2$ $= n^2 + 4n - 12$	✓ formula ✓✓ substitusie ✓ vereenvoudiging (4)
4.2	$n^2 + 4n - 12 = 128$ $n^2 + 4n - 140 = 0$ $(n+14)(n-10) = 0$ $n \neq -14$ or $n = 10$ ongeldig $\therefore n = 10$	✓ vergelyking ✓ faktore ✓ antwoords vir n ✓ $n = 10$ (keuse) (4)
4.3	$-7; 0; 9; 20; \dots$ eerste verskil $7 \quad 9 \quad 11$ tweede verskil $2 \quad 2$ $F_n = 2n + c$ $F_1 = 2(1) + c = 7$ $\therefore c = 5$ $F_n = 2n + 5$	✓ eerste verskil Slegs antwoord: Vol Punte ✓ $c = 5$ (3)
4.4	$F_n = 2n + 5 = 599$ $2n = 594$ $\therefore n = 297$ hierdie verskil sal tussen term 297 term 298 wees	✓ stel gelyk ✓ 297 ✓ 298(3) [14]

VRAAG 5

5.1	Patroon	1	2	3	
	Wit vierkante	4	12	24	
	40				✓✓ antwoord(2)
5.2	$W_n = 2n^2 + 2n$ $W_{157} = 2(157)^2 + 2(157)$ $= 49612$				✓ W_n ✓ substitusie antwoord (3) ✓

5.3	$2n^2 + 2n + 1 < 613$ $2n^2 + 2n - 612 < 0$ $n^2 + n - 306 < 0$ $(n - 17)(n + 18) < 0$  $\therefore n = 16$	✓ stel ongelykheid op ✓ faktore ✓ metode ✓ antwoord (4)
5.4	$P_n = 4n^2 + 4n + 1$ $= (2n)^2 + 2(2n) + 1$ $2n$ is ewe vir alle $n \in \mathbb{Z}$ $\therefore$ Totale aantal vierkante in die n^{de} patroon sal altyd onewe wees. OF $P_n = 4n^2 + 4n + 1$ $= 2(2n^2 + 2n) + 1$ $2(2n^2 + 2n)$ is onewe vir alle $n \in \mathbb{Z}$ $2(2n^2 + 2n) + 1$ is onewe vir alle $n \in \mathbb{Z}$ $\therefore$ Totale aantal vierkante in die n^{de} patroon sal altyd onewe wees.	✓ $P_n = 4n^2 + 4n + 1$ ✓ herskryf P_n ✓ afleiding (3) ✓ $P_n = 4n^2 + 4n + 1$ ✓ herskryf P_n ✓ afleiding (3) [12]

VRAAG 6

6.1	$x = 2$ $y = 3$	✓ $x = 2$ ✓ $y = 3$ (2)
6.2	$x.\text{int} : \frac{8}{x-2} + 3 = 0$ $8 + 3(x-2) = 0$ $3x + 2 = 0$ $\therefore x = -\frac{2}{3}$ $\therefore x - \text{int} \left(-\frac{2}{3}; 0 \right)$ $y = \frac{8}{0-2} + 3$ $y = -1$ $y.\text{int} : (0; -1)$	✓ $\frac{8}{x-2} + 3 = 0$ ✓ $\left(-\frac{2}{3}; 0 \right)$ ✓ $(0; -1)$ (3)

6.3		✓ asimptote ✓ afsnitte met asse ✓ vorm (3)
6.4	$3 = 2 + k$ $k = 1$ OF $y = (x - 2) + 3$ $y = x + 1$ $\therefore k = 1$	✓ substitusie ✓ antwoord (2) ✓ $y = x + 1$ ✓ antwoord (2) [10]

VRAAG 7

7.1	$q = -6$	✓ antwoord (1)
7.2	$-5\frac{1}{4} = a \cdot 2^{-1-1} - 6$ $\frac{3}{4} = \frac{1}{4}a$ $a = 3$	✓ vervang x ✓ vervang y ✓ vereenvoudiging ✓ antwoord (4)
7.3	$x \text{ int : } 2^{x-1} = 2 \quad \therefore x = 2 \therefore (2; 0)$ $y \text{ int : } y = 3 \cdot 2^{-1} - 6 = -4\frac{1}{2} \therefore \left(0; -4\frac{1}{2}\right)$ Gemiddelde Gradient $= \frac{0 + 4\frac{1}{2}}{2 - 0}$ $= \frac{9}{4} \text{ of } 2\frac{1}{4}$	✓ $2^{x-1} = 2$ ✓ $x = 2$ ✓ $y = -4\frac{1}{2}$ ✓ subst. in gradient formule ✓ antwoord (5)
7.4	$y = 3 \cdot 2^{x-3} - 6$	✓✓ antwoord (2) [12]

VRAAG 8

8.1	$C(-1; 0)$	✓ $C(-1; 0)$ (1)
8.2	$y = (x-3)(x+1)$ $y = x^2 - 2x - 3$	✓ $(x-3)$ ✓ $(x+1)$ ✓ $y = x^2 - 2x - 3$ (3)
8.3	TP: $y = (1)^2 - 2(1) - 3$ $y = -4$ R: $y \in [-4; \infty)$ OF $y \geq -4$	✓ $y = -4$ ✓ $[-4; \infty)$ (2) ✓ $y \geq -4$
8.4	$m = \frac{0+4}{3-1} = 2$ $y - 0 = 2(x-3)$ $y = 2x - 6$	✓ substitusie in gradient formule ✓ $m = 2$ ✓ vergelyking (3)
8.5.1	$x \leq -1$ of $x \geq 3$ OF $x \in (-\infty; -1] \cup [3; \infty)$	✓ $x \leq -1$ ✓ $x \geq 3$ (2) ✓ $(-\infty; -1]$ ✓ $[3; \infty)$ (2)
8.5.2	$-1 < x < 3$ of $x > 3$ OF $x > -1$; $x \neq 3$ OF $(-1; 3) \cup (3; \infty)$	✓ kritieke waardes ✓ notasie (2) ✓ $x > -1$ ✓ $x \neq 3$ (2) ✓ $(-1; 3)$ ✓ $(3; \infty)$ (2)
8.5.3	$-1 < x < 0$ of $x > 3$ OF $(-1; 0) \cup (3; \infty)$	✓ kritieke waardes ✓ notasie (2) ✓ $(-1; 0)$ ✓ $(3; \infty)$ (2)

8.6	$x^2 - 2x - p = 0$ $\Delta = (-2)^2 - 4(1)(-p)$ $= 4 + 4p$ vir nie-rieele wortels $\Delta < 0$ $4 + 4p < 0$ $4p < -4$ $\therefore p < -1$ OF $A(1; -4)$ $x^2 - 2x - 3 = 0$ $x^2 - 2x - p = 0$ $-p > 1$ $\therefore p < -1$	$\checkmark 4 + 4p < 0$ $\checkmark p < -1(2)$ $\checkmark -p > 1$ $\checkmark p < -1(2)$
8.7	$PM = (2x - 6) - (x^2 - 2x - 3)$ $= -x^2 + 4x - 3$ $x = -\frac{b}{2a}$ $= -\frac{4}{2(-1)} = 2$ $Max.PM = -(2)^2 + 4(2) - 3 = 1$ eenheid OF $PM = (2x - 6) - (x^2 - 2x - 3)$ $= -x^2 + 4x - 3$ $= -(x^2 - 4x + 4 - 4 + 3)$ $= -[(x - 2)^2 - 1]$ $= -(x - 2)^2 + 1$ $Max.PM = 1$ eenheid	$\checkmark$ aftrekking $\checkmark$ kwadratiese uitdrukking $\checkmark$ metode $\checkmark$ maks waarde (4) $\checkmark$ aftrekking $\checkmark$ kwadratiese uitdrukking $\checkmark$ metode $\checkmark$ maks waarde (4) [21]

VRAAG 9

9.1	$A = P(1 - i)^n$ $11090,41 = 120000(1 - i)^{12}$ $\therefore i = 1 - \sqrt[12]{\frac{11090,41}{120000}}$ Dus $i = 0,179999...$ Depresiasie – koers = 18%	$\checkmark$ substitusie $\checkmark$ maak i onderwerp $\checkmark i$ waarde as desimaal $\checkmark$ antwoord (4)
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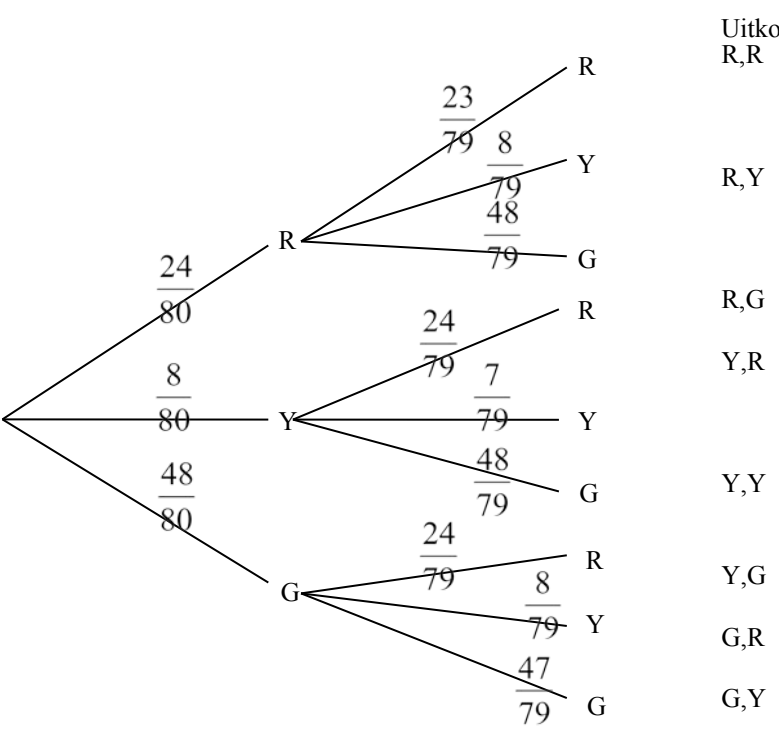
9.2	$i_{eff} = \left(1 + \frac{i}{m}\right)^m - 1$ $= \left(1 + \frac{0,098}{12}\right)^{12} - 1$ $= 0,10252.....$ koers = 10,25%	✓ formula ✓ substitusie in formule ✓ 10,25% (3)
9.3	$A = P(1+i_1)^{n_1}(1+i_2)^{n_2}$ $= 80000\left(1 + \frac{0,075}{4}\right)^{16} \left(1 + \frac{0,092}{12}\right)^{36}$ $= R141768,60$ OF $A_1 = 80000\left(1 + \frac{0,075}{4}\right)^{16}$ $= 107689,1465..$ $A_2 = 107689,1465\left(1 + \frac{0,092}{12}\right)^{36}$ $= R141768,60$	✓ $\left(1 + \frac{0,075}{4}\right)^{16}$ ✓ $\left(1 + \frac{0,092}{12}\right)^{36}$ ✓ vermenigvuldiging ✓ antwoord (4) ✓ $\left(1 + \frac{0,075}{4}\right)^{16}$ ✓ A_1 ✓ $\left(1 + \frac{0,092}{12}\right)^{36}$ ✓ antwoord (4)
9.4.1	Belegging : einde van derde jaar : $A = P(1+i)^n$ $= 30000\left(1 + \frac{0,065}{12}\right)^{96}$ $= R50390,07$	✓ $\frac{0,065}{12}$ ✓ subst. in korrekte formule ✓ antwoord (3)
9.4.2	$\frac{T_0 \quad T_3 \quad T_5 \quad T_8}{30000 \quad -10000 \quad +10000}$ $A = 30000\left(1 + \frac{0,65}{12}\right)^{96} - 10000\left(1 + \frac{0,65}{12}\right)^{60} + 10000\left(1 + \frac{0,65}{12}\right)^{36}$ $A = R48708,61$ ∴ verskil = 48708,61 – 50390,07 $= -R1681,46$	✓ $30000\left(1 + \frac{0,65}{12}\right)^{96}$ ✓ $-10000\left(1 + \frac{0,65}{12}\right)^{60}$ ✓ $10000\left(1 + \frac{0,65}{12}\right)^{36}$ ✓ R48708,61 ✓ aftrek ✓ antwoord (7)

10.3.4	$P(B \text{ of } V) = P(B) + P(V) - P(B \text{ en } V)$ $= \frac{84}{240} + \frac{82}{240} - \frac{15}{240}$ $= \frac{151}{240}$ OF $P(B \text{ of } V) = \frac{17 + 52 + 12 + 3 + 9 + 58}{240}$ $= \frac{151}{240}$	$\checkmark \frac{84}{240}$ $\checkmark \frac{82}{240}$ $\checkmark \frac{15}{240}$ $\checkmark \frac{151}{240} (4)$ $\checkmark \checkmark \text{teller en noemer}$ $\checkmark \checkmark \text{antwoord} \quad (4)$ [12]
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VRAAG 11

	$P(A \text{ of } B) = P(A) + P(B) - P(A \cap B)$ $0,428 = 0,12 + 0,35 - P(A \cap B)$ $P(A \cap B) = 0,042$ $P(A) \times P(B) = 0,12 \times 0,35 = 0,042$ $\therefore P(A \cap B) = P(A) \times P(B)$ Dus is A en B onafhanklike gebeure	$\checkmark \text{substitusie}$ $\checkmark \text{waarde van } P(A \cap B)$ $\checkmark \text{waarde van } P(A) \times P(B)$ $\checkmark \text{afleiding} \quad (4)$ [4]
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VRAAG 12

12.1	Daar is $100\% - 60\% - 10\% = 30\%$ rooi albasters $\therefore \frac{30}{100} \times 80 = 24$ rooi albasters	✓30% ✓24 (2)
12.2	 Uitkoms R,R R,Y R,G Y,R Y,Y Y,G G,R G,Y ✓eerste tak ✓tweede tak ✓waardes op diagram (3)	
12.3	$P(G \text{ en } Y) = P(G, Y) + P(Y, G)$ $= \frac{48}{80} \times \frac{8}{79} + \frac{8}{80} \times \frac{48}{79}$ $= \frac{48}{395}$	✓ vermenigvuldig reel ✓ optel ✓ antwoord (3) [8]
		TOTAAL: 150