



GAUTENG PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

**GAUTENG DEPARTMENT OF EDUCATION /
GAUTENGSE DEPARTEMENT VAN ONDERWYS
PROVINCIAL EXAMINATION / PROVINSIALE EKSAMEN**

JUNE / JUNIE 2019

GRADE / GRAAD 11

**MATHEMATICS / WISKUNDE
PAPER / VRAESTEL 1**

MARKING GUIDELINE / NASIENRIGLYN

12 pages / bladsye

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**PROVINCIAL EXAMINATION /
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**MATHEMATICS / WISKUNDE
(Paper / Vraestel 1)**

**MARKING GUIDELINE /
NASIENRGLYN**

INSTRUCTIONS AND INFORMATION

A – accuracy

C.A. – continued accuracy

NOTE:

- If a candidate answered a question TWICE, mark only the first attempt.
- If a candidate crossed OUT an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking guideline.
- Assuming values / answers in order to solve a problem is UNACCEPTABLE.

INSTRUKSIES EN INLIGTING

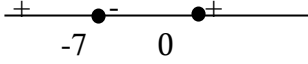
A – Akkuraatheid

C.A – Volgehoue akkuraatheid

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE keer antwoord, sien slegs die eerste poging na.
- Indien die kandidaat die antwoord deurgehaal het en nie oorgedoen het nie, sien die deurgehaalde poging na.
- Volgehoue akkuraatheid is op ALLE aspekte van die nasienriglyne van toepassing.
- Dit is ONAANVAARBAAR om waardes / antwoorde te veronderstel om 'n probleem op te los.

	QUESTION / VRAAG 1	MARKS / PUNTE: 25
1.1.1	$x^2 - 6x = 7$ $x^2 - 6x - 7 = 0$ $(x - 7)(x + 1) = 0$ $x = 7 \text{ or / of } x = -1$ <p style="text-align: center;">OR / OF</p> $x^2 - 6x - 7 = 0$ $= \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-7)}}{2(1)}$ $x = 7 \text{ or / of } x = -1$ <p>ANY OTHER VALID METHOD / ENIGE ANDER GELDIGE METODE</p>	<ul style="list-style-type: none"> ✓ standard form / <i>standaardvorm</i> ✓ correct factors / <i>korrekte faktore</i> ✓ both x answers / <i>beide x antwoorde</i> <p>OR / OF</p> <ul style="list-style-type: none"> ✓ standard form / <i>standaardvorm</i> ✓ substitution into corr. formula / <i>vervanging in korrekte formule</i> ✓ both x answers / <i>beide x antwoorde</i> <p style="text-align: right;">(3)</p>
1.1.2	$3x^2 - 2x - 14 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-14)}}{2(3)}$ $= \frac{-2 \pm \sqrt{172}}{6}$ $\therefore x = 2,52 \text{ or/of } x = -1,85$ <p>PENALISE INCORRECT ROUNDING OFF/ PENALISEER VERKEERDE AFRONDING ANY OTHER VALID METHOD / ENIGE ANDER GELDIGE METODE</p>	<ul style="list-style-type: none"> ✓ standard form / <i>standaardvorm</i> ✓ substitution into corr. formula / <i>vervanging in korrekte formule</i> ✓✓ correct answers / <i>korrekte antwoorde</i> <p style="text-align: right;">(4)</p>
1.1.3	$\sqrt{x - 2} + x = 2$ $(\sqrt{x - 2})^2 = (2 - x)^2$ $x - 2 = x^2 - 4x + 4$ $0 = x^2 - 5x + 6$ $0 = (x - 3)(x - 2)$ $x = 3 \text{ or/of } x = 2$ <p>ONLY applicable / <i>SLEGS van toepassing:</i> $x = 2$</p>	<ul style="list-style-type: none"> ✓ squaring both sides / <i>kwadreer albei kante</i> ✓ standard form / <i>standaardvorm</i> ✓ factors / <i>faktore</i> ✓ choosing $x = 2$ / <i>kies $x = 2$</i> <p style="text-align: right;">(4)</p>

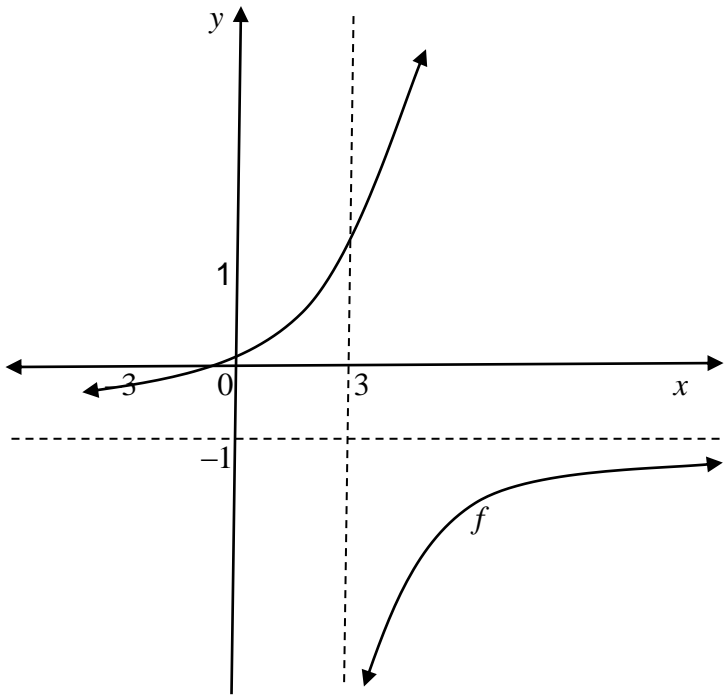
1.1.4	$x^2 + 7x < 0$ $x(x + 7) < 0$  $-7 < x < 0$	<ul style="list-style-type: none"> ✓ correct factors / <i>korrekte faktore</i> ✓ correct critical values / <i>korrekte kritieke waardes</i> ✓ correct inequalities / <i>korrekte ongelykhede</i> <p style="text-align: right;">(3)</p>
1.1.5	$3^{x+3} - 3^{x+2} = 486$ $3^x \cdot 3^3 - 3^x \cdot 3^2 = 486$ $3^x(3^3 - 3^2) = 486$ $3^x = 27$ $3^x = 3^3$ $x = 3$ <p>OR / OF</p> $3^{x+3} - 3^{x+2} = 486$ $3^{x+2}(3 - 1) = 486$ $3^{x+2} = 243$ $3^{x+2} = 3^5$ $x + 2 = 5$ $x = 3$	<ul style="list-style-type: none"> ✓ factors / <i>faktore</i> ✓ simplification / <i>vereenvoudiging</i> (27) ✓ $27 = 3^3$ ✓ answer / <i>antwoord</i> <p>OR / OF</p> <ul style="list-style-type: none"> ✓ factorisation / <i>faktorisering</i> ✓ simplification / <i>vereenvoudiging</i> (243) ✓ simplification / <i>vereenvoudiging</i> ($243 = 3^5$) ✓ answer / <i>antwoord</i> <p style="text-align: right;">(4)</p>
1.2.1	$x^2 + 2xy - 8y^2 = 0$ $(x + 4y)(x - 2y) = 0$ $\frac{x}{y} = -4 \quad \text{or/of} \quad \frac{x}{y} = 2$	<ul style="list-style-type: none"> ✓ correct factors / <i>korrekte faktore</i> ✓ both ratios correct / <i>beide verhoudings korrek</i> <p style="text-align: right;">(2)</p>

1.2.2	$x = 6 - y$ $\frac{6 - y}{y} = -4$ $6 - y = -4y$ $-2 = y$ $8 = x$ $\frac{6 - y}{y} = 2$ $6 - y = 2y$ $2 = y$ $4 = x$	<p>✓ <i>x or y corr. as subj. of equation / x en y korrek as onderwerp van vergelyking</i></p> <p>✓ <i>correct y answer / korrekte y antwoord</i></p> <p>✓ <i>correct x answer / korrekt x antwoord</i></p> <p>✓ <i>correct y answer / korrekte y antwoord</i></p> <p>✓ <i>correct x answer / korrekte x antwoord</i></p> <p style="text-align: right;">(5)</p>
	QUESTION / VRAAG 2	MARKS / PUNTE : 17
2.1.1	$2x^2 - 3x + k = 0$ $2(3)^2 - 3(3) + k = 0$ $18 - 9 + k = 0$ $k = -9$	<p>✓ <i>correct substitution / korrekte vervanging</i></p> <p>✓ <i>answer / antwoord</i></p> <p style="text-align: right;">(2)</p>
2.1.2	$2x^2 - 3x - 9 = 0$ $(2x + 3)(x - 3) = 0$ $x = -\frac{3}{2} \text{ or/of } x = 3$ <p>$-\frac{3}{2}$ is the other root / <i>is die ander wortel</i></p>	<p>✓ <i>correct factors / korrekte faktore</i></p> <p>✓ <i>correct answer / korrekte antwoord</i></p> <p style="text-align: right;">(2)</p>

2.2	$2 = x - 2y \dots\dots\dots(1)$ $2 = x^2 - 2xy + 3y^2 - 2\dots\dots(2)$ <p>from / van (1) $x = 2 + 2y$ subst. / vervang $x = 2 + 2y$ in (2) $(2 + 2y)^2 - 2y(2 + 2y) + 3y^2 - 2 = 2$</p> $3y^2 + 4y = 0$ $y(3y + 4) = 0$ $y = -\frac{4}{3} \text{ or / of } y = 0$ $x = -\frac{2}{3} \text{ or / of } x = 2$ <p>ANY OTHER VALID ALTERNATIVE METHOD / ENIGE GELDIGE ALTERNATIEF</p>	<ul style="list-style-type: none"> ✓ x as subject in equation (1) / x as onderwerp in vergelyking (1) ✓ substitution into equation (2) / vervanging in vergelyking (2) ✓ standard form / standaardvorm ✓ factors / faktore ✓ both y values / beide y waardes ✓ both x values / beide x waardes <p style="text-align: right;">(6)</p>
2.3	$\sqrt[4]{\frac{3^x \cdot 9^{x+1}}{27^{x+2}}}$ $= \sqrt[4]{\frac{3^x \cdot (3^2)^{x+1}}{(3^3)^{x+2}}}$ $= \sqrt[4]{\frac{3^x \cdot 3^{2x+2}}{3^{3x+6}}}$ $= \sqrt[4]{\frac{3^{3x+2}}{3^{3x+6}}}$ $= \sqrt[4]{3^{-4}}$ $= 3^{-1}$ $= \frac{1}{3}$ <p>ANY OTHER VALID ALTERNATIVE METHOD / ENIGE GELDIGE ALTERNATIEWE METODE</p>	<ul style="list-style-type: none"> ✓ correct prime bases / korrekte priem grondtal ✓ simplification / vereenvoudiging $\left(\frac{3^{3x+2}}{3^{3x+6}}\right)$ ✓ simplification (3^{-4}) vereenvoudiging ✓ answer / antwoord <p style="text-align: right;">(4)</p>
2.4	$2x^2 + mx - 5x - 8 = 0$ $2x^2 + (m - 5)x - 8 = 0$ $m - 5 = 0$ $m = 5$	<ul style="list-style-type: none"> ✓ common factor / gemene faktor ✓ equating / gelykstel: $b = 0$ ✓ answer / antwoord <p style="text-align: right;">(3)</p>

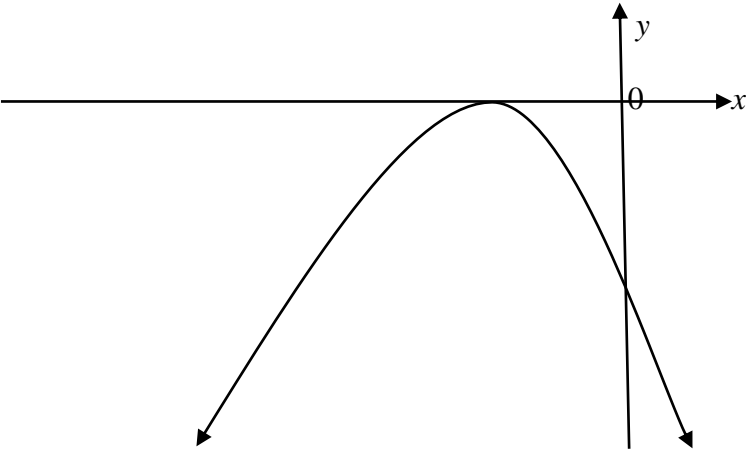
	QUESTION / VRAAG 3	MARKS / PUNTE: 19
3.1.1	$T_n = -4n + 11$	<ul style="list-style-type: none"> ✓✓ correct answer / korrekte antwoord <p style="text-align: right;">(2)</p>
3.1.2	$-237 = -4n + 11$ $-248 = -4n$ $n = 62$	<ul style="list-style-type: none"> ✓ equating correctly / korrekte gelykstelling ✓ answer / antwoord <p style="text-align: right;">(2)</p>
3.2.1	$p - 0; 2 - p; 6 - 2$ $(2 - p) - p = (6 - 2) - (2 - p)$ $2 - 2p = 4 - 2 + p$ $-3p = 2 - 2$ $p = 0$	<ul style="list-style-type: none"> ✓ determining 1st difference/ bepaal 1^{ste} verskil ✓ equating correctly for 2nd difference / korrekte gelykstelling vir 2^{de} verskil ✓ answer / antwoord <p style="text-align: right;">(3)</p>
3.2.2	$2a = 2$ $a = 1$ $0 = 3(1) + b$ $-3 = b$ $0 = 1 - 3 + c$ $c = 2$ $T_n = n^2 - 3n + 2$	<ul style="list-style-type: none"> ✓ $a = 1$ ✓ $b = -3$ ✓ $c = 2$ ✓ $T_n = n^2 - 3n + 2$ <p style="text-align: right;">(4)</p>
3.2.3	<p>Min. value at / min waarde by: $-\frac{b}{2a} = 1\frac{1}{2}$</p> <p>but $T_1 = 0$ and $T_2 = 0$ $T \neq 1,5$ since / sedert $T \in \mathbb{N}$ \therefore no terms can be negative / geen terme kan negatief wees nie.</p>	<ul style="list-style-type: none"> ✓ min value at / min waarde $x = 1\frac{1}{2}$ ✓ deduction about T_1 and T_2 / afleiding oor T_1 en T_2 ✓ explanation / verduideliking <p style="text-align: right;">(3)</p>

3.3	<p>Anne's general term: $T_n = n(n + 1)$ <i>Anne se algemene term</i> $= n^2 + n$</p> <p>Jerry's general term: $T_n = (n + 1)^2 - (n + 1)$ <i>Jerry se algemene term</i> $= n^2 + 2n + 1 - n - 1$ $= n^2 + n$</p> <p>BOTH ARE CORRECT / BEIDE IS KORREK</p>	<p>✓ formulating Anne's gen. term / <i>formulering van Anne se algemene term</i></p> <p>✓ simplification / <i>vereenvoudiging</i></p> <p>✓ formulating Jerry's gen. term / <i>formulering Jerry algemene term</i></p> <p>✓ simplification / <i>vereenvoudiging</i></p> <p>✓ correct conclusion / <i>korrekte gevolgtrekking</i></p> <p style="text-align: right;">(5)</p>
QUESTION / VRAAG 4		MARKS / PUNTE: 15
4.1	<p>$y = f(0)$ $= \frac{-6}{0-3} - 1$ $= 1$ (0 ; 1)</p> <p>ANSWER MUST BE IN COORDINATE FORM / ANTWOORD MOET IN KOÖRDINAATVORM WEES</p>	<p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(1)</p>
4.2	<p>$0 = \frac{-6}{0-3} - 1$</p> <p>$1 = \frac{-6}{x-3}$</p> <p>$x - 3 = -6$ $x = -3$ (-3 ; 0)</p> <p>NO PENALTY IF ANSWER NOT IN COORDINATE FORM / GEEN PENALISERING INDIEN ANTWOORD NIE IN KOÖRDINAATVORM IS NIE</p>	<p>✓ simplification / <i>vereenvoudiging</i> ($x - 3 = -6$)</p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(2)</p>
4.3	<p>$x = 3$</p> <p>$y = -1$</p>	<p>✓ <i>x</i>-asymptote / <i>x-asimptoot</i></p> <p>✓ <i>y</i>-asymptote / <i>y-asimptoot</i></p> <p style="text-align: right;">(2)</p>

<p>4.4</p>		<p>✓ shape / vorm</p> <p>✓ correct x and y-intercepts / korrekte x en y afsnitte</p> <p>✓ correct asymptotes / korrekte asimptote</p> <p style="text-align: right;">(3)</p>
<p>4.5</p>	<p>$-3 < x < 3$</p>	<p>✓ correct answer / korrekte antwoord</p> <p style="text-align: right;">(1)</p>
<p>4.6</p>	$y = \frac{-6}{-2-3} - 1$ $= \frac{1}{5}$ $m = \frac{1 - \frac{1}{5}}{0 - (-2)}$ $m = \frac{2}{5}$ <p>OR / OF</p> $m = \frac{f(0) - f(-2)}{0 - (-2)}$ $= \frac{1 - \frac{1}{5}}{0 - (-2)}$ $= \frac{2}{5}$ <p>ANY OTHER VALID METHOD / ENIGE ANDER GELIGE METODE</p>	<p>✓ $\frac{1}{5}$</p> <p>✓ correct substitution / korrekte vervanging</p> <p>✓ answer / antwoord</p> <p>OR / OF</p> <p>✓ $f(0) = 1$ and / en $f(-2) = \frac{1}{5}$</p> <p>✓ correct substitution / korrekte vervanging</p> <p>✓ answer / antwoord</p> <p style="text-align: right;">(3)</p>

4.7	$y - y_1 = m(x - x_1)$ $y + 1 = 1(x - 3) \quad \text{sub. point / verv. punt } (3 ; -1)$ $y = x - 4$ <p>ANY OTHER VALID METHOD / ENIGE ANDER GELDIGE METODE</p>	<p>✓ $m = 1$ ✓ substituting point correctly / korrekte vervanging van punt ✓ answer / antwoord</p> <p style="text-align: right;">(3)</p>
QUESTION / VRAAG 5		MARKS / PUNTE: 17
5.1	$x = \frac{-b}{2a}$ $= \frac{-(-2)}{2(-1)}$ $x = -1$ $y = -(-1)^2 - 2(-1) + 3$ $= -1 + 2 + 3$ $y = 4$ <p>C (-1 ; 4)</p> <p>NO PENALTY FOR ANSWER NOT IN COORDINATE FORM / GEEN PENALISERING INDIEN ANTWOORD NIE IN KOÖRDINAATVORM IS NIE</p>	<p>✓ x-ordinate / x-ordinaat</p> <p>✓ substitute into correct equation / vervanging in korrekte vergelyking</p> <p>✓ y-ordinate / y-ordinaat</p> <p style="text-align: right;">(3)</p>
5.2	$-x^2 - 2x + 3 = 0$ $x^2 + 2x - 3 = 0$ $(x + 3)(x - 1) = 0$ $x + 3 = 0 \text{ or / of } x - 1 = 0$ $x = -3 \text{ or / of } x = 1$ <p>A(-3 ; 0) B(1 ; 0)</p> <p>∴ AB = 4 units / eenhede</p>	<p>✓ factors / faktore</p> <p>✓ critical values / kritieke waardes</p> <p>✓ answer / antwoord</p> <p style="text-align: right;">(3)</p>

5.3	<p>$A(-3; 0) C(-1; 4)$</p> $m = \frac{\Delta y}{\Delta x}$ $= \frac{4 - 0}{-1 + 3}$ $m = 2$ <p>substituting either point $C(-1; 4)$ or point $A(-3; 0)$ <i>vervang punt $C(-1; 4)$ of punt $A(-3; 0)$ in</i></p> $y - y_1 = m(x - x_1)$ $y - 4 = 2(x + 1) \quad \text{sub. point / verv. punt } C(-1; 4)$ $y = 2x + 6$ <p>ANY OTHER VALID METHOD / ENIGE ANDER GELDIGE METODE</p>	<p>✓ value of m / waarde van m</p> <p>✓ substitute point into correct equation / <i>vervang punt in korrekte vergelyking</i></p> <p>✓ answer / antwoord</p> <p style="text-align: right;">(3)</p>
5.4	$CE^2 = (-1)^2 + (2)^2$ $= 5$ $CE = \sqrt{5}$ <p>OR / OF</p> <p>$C(-1; 4)$ and / en $E(0; 6)$</p> $CE = \sqrt{(0 + 1)^2 + (6 - 4)^2}$ $= \sqrt{5}$	<p>✓ substitution / vervanging</p> <p>✓ answer / antwoord</p> <p>OR / OF</p> <p>✓ substitution in correct formula / <i>vervanging in korrekte formule</i></p> <p>✓ answer / antwoord</p> <p style="text-align: right;">(2)</p>
5.5.1	$x = -1$ $x = -3$	<p>✓ answer / antwoord</p> <p>✓ answer / antwoord</p> <p style="text-align: right;">(2)</p>
5.5.2	$x > 1$	<p>✓ correct critical value / <i>korrekte kritiese waarde</i></p> <p>✓ answer / antwoord</p> <p style="text-align: right;">(2)</p>

5.6		<p>✓ shape / vorm</p> <p>✓ maximum turning point on the x axis to the left of the origin. / maksimum draaipunt op die x-as links van die oorsprong</p> <p style="text-align: right;">(2)</p>
QUESTION / VRAAG 6		MARKS / PUNTE: 7
6.1	$9 = a^2$ $a = 3$	<p>✓ correct substitution / korrekte vervanging</p> <p>✓ answer / antwoord</p> <p style="text-align: right;">(2)</p>
6.2	$y = 0$	<p>✓ answer / antwoord</p> <p style="text-align: right;">(1)</p>
6.3	$y > 0$	<p>✓ answer / antwoord</p> <p style="text-align: right;">(1)</p>
6.4	$R(0 ; 1)$	<p>✓ answer / antwoord</p> <p style="text-align: right;">(1)</p>
6.5	$g(x) = 3^{-x}$ OR / OF $g(x) = \left(\frac{1}{3}\right)^x$	<p>✓ answer / antwoord</p> <p>OR / OF</p> <p>✓ answer / antwoord</p> <p style="text-align: right;">(1)</p>
6.6	$y > 0$	<p>✓ answer / antwoord</p> <p style="text-align: right;">(1)</p>

TOTAL / TOTAAL: 100