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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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 accurancy applies to ALL aspects of the marking guideline.
- Assuming values / answers in order to solve a problem is UNACCEPTAB LE.

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	$x^2 - 6x = 7$ $x^2 - 6x - 7 = 0$ $(x - 7)(x + 1) = 0$ $x = 7$ or / *of* $x = -1$ **OR / *OF*** $x^2 - 6x - 7 = 0$ $= \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-7)}}{2(1)}$ $x = 7$ or / *of* $x = -1$ ANY OTHER VALID METHOD / *ENIGE ANDER GELDIGE METODE*	✓ standard form / *standaardvorm* ✓ correct factors / *korrekte faktore* ✓ both *x* answers / *beide x antwoorde* **OR / *OF*** ✓ standard form / *standaardvorm* ✓ substitution into corr. formula / *vervanging in korrekte formule* ✓ both *x* answers / *beide x antwoorde* **(3)**
1.1.2	$3x^2 - 2x - 14 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-14)}}{2(3)}$ $= \frac{-2 \pm \sqrt{172}}{6}$ $\therefore x = 2{,}52$ or/*of* $x = -1{,}85$ PENALISE INCORRECT ROUNDING OFF/ *PENALISEER VERKEERDE AFRONDING* ANY OTHER VALID METHOD / *ENIGE ANDER GELDIGE METODE*	✓ standard form / *standaardvorm* ✓ substitution into corr. formula / *vervanging in korrekte formule* ✓✓ correct answers / *korrekte antwoorde* **(4)**
1.1.3	$\sqrt{x-2} + x = 2$ $(\sqrt{x-2})^2 = (2 - x)^2$ $x - 2 = x^2 - 4x + 4$ $0 = x^2 - 5x + 6$ $0 = (x - 3)(x - 2)$ $x = 3$ *or/of* $x = 2$ ONLY applicable / *SLEGS van toepassing*: $x = 2$	✓ squaring both sides / *kwadreer albei kante* ✓ standard form /*standaardvorm* ✓ factors / *faktore* ✓ choosing $x = 2$ / *kies x=2* **(4)**

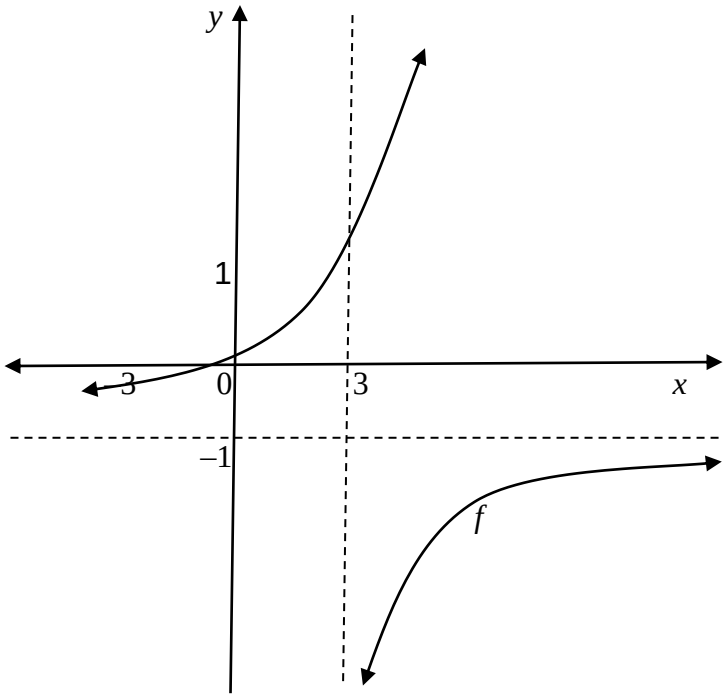
1.1.4	$x^2 + 7x < 0$ $x(x + 7) < 0$ + - + -7 0 $-7 < x < 0$	✓ correct factors / *korrekte faktore* ✓ correct critical values / *korrekte kritieke waardes* ✓ correct inequalities / *korrekte ongelykhede* **(3)**
1.1.5	$3^{x+3} - 3^{x+2} = 486$ $3^x.3^3 - 3^x.3^2 = 486$ $3^x(3^3 - 3^2) = 486$ $3^x = 27$ $3^x = 3^3$ $x = 3$ **OR / *OF*** $3^{x+3} - 3^{x+2} = 486$ $3^{x+2}(3 - 1) = 486$ $3^{x+2} = 243$ $3^{x+2} = 3^5$ $x + 2 = 5$ $x = 3$	✓ factors / *faktore* ✓ simplification / *vereenvoudiging* (27) ✓ $27 = 3^3$ ✓ answer / *antwoord* **OR / *OF*** ✓ factorisation / *faktorisering* ✓ simplification / *vereenvoudiging* (243) ✓ simplification / *vereenvoudiging* ($243 = 3^5$) ✓ answer / *antwoord* **(4)**
1.2.1	$x^2 + 2xy - 8y^2 = 0$ $(x + 4y)(x - 2y) = 0$ $\frac{x}{y} = -4$ or/*of* $\frac{x}{y} = 2$	✓ correct factors / *korrekte faktore* ✓ both ratios correct / *beide verhoudings korrek* **(2)**

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

2.2	$2 = x - 2y \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$ $2 = x^2 - 2xy + 3y^2 - 2$.....(2) from / *van* (1) $x = 2 + 2y$ subst. / *vervang* $x = 2 + 2y$ in (2) $(2 + 2y)^2 - 2y\,(2 + 2y) + 3y^2 - 2 = 2$ $3y^2 + 4y = 0$ $y(3y + 4) = 0$ $y = -\frac{4}{3}$ or / *of* $y = 0$ $x = -\frac{2}{3}$ or / *of* $x = 2$ ANY OTHER VALID ALTERNATIVE METHOD / *ENIGE GELDIGE ALTERNATIEF*	✓ 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* **(6)**
2.3	$\sqrt[4]{\frac{3^x \,.\, 9^{x+1}}{27^{x+2}}}$ $= \sqrt[4]{\frac{3^x \,.\, (3^2)^{x+1}}{(3^3)^{x+2}}}$ $= \sqrt[4]{\frac{3^x \,.3^{2x+2}}{3^{3x+6}}}$ $= \sqrt[4]{\frac{3^{3x+2}}{3^{3x+6}}}$ $= \sqrt[4]{3^{-4}}$ $= 3^{-1}$ $= \frac{1}{3}$ ANY OTHER VALID ALTERNATIVE METHOD / *ENIGE GELDIGE ALTERNATIEWE METODE*	✓ correct prime bases / *korrekte priem grondtal* ✓ simplification / *vereenvoudiging* $(\frac{3^{3x+2}}{3^{3x+6}})$ ✓ simplification(3^{-4}) *vereenvoudiging* ✓ answer / *antwoord* **(4)**
2.4	$2x^2 + mx - 5x - 8 = 0$ $2x^2 + (m - 5)x - 8 = 0$ $m - 5 = 0$ $m = 5$	✓ common factor / *gemene faktor* ✓ equating / *gelykstel*: $b = 0$ ✓ answer / *antwoord* **(3)**

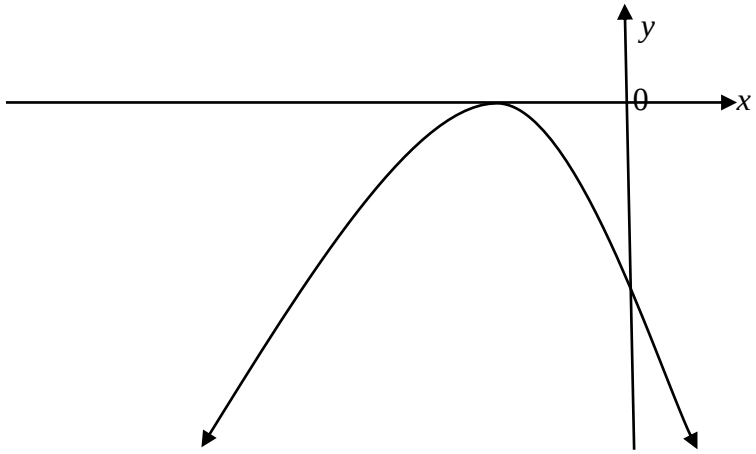
	QUESTION / *VRAAG* 3	MARKS / *PUNTE*: 19
3.1.1	$T_n = -4n + 11$	✓✓ correct answer / *korrekte antwoord* **(2)**
3.1.2	$-237 = -4n + 11$ $-248 = -4n$ $n = 62$	✓ equating correctly / *korrekte gelykstelling* ✓ answer / *antwoord* **(2)**
3.2.1	$p - 0\ ;\ 2 - p\ ;\ 6 - 2$ $(2 - p) - p = (6 - 2) - (2 - p)$ $2 - 2p = 4 - 2 + p$ $-3p = 2 - 2$ $p = 0$	✓ determining 1st difference/ *bepaal 1ste verskil* ✓ equating correctly for 2nd difference / *korrekte gelykstelling vir 2de verskil* ✓ answer / *antwoord* **(3)**
3.2.2	$2a = 2$ $a = 1$ $0 = 3(1) + b$ $-3 = b$ $0 = 1 - 3 + c$ $c = 2$ $T_n = n^2 - 3n + 2$	✓ $a = 1$ ✓ $b = -3$ ✓ $c = 2$ ✓ $T_n = n^2 - 3n + 2$ **(4)**
3.2.3	Min. value at / *min waarde by*: $-\frac{b}{2a} = 1\frac{1}{2}$ 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*.	✓ 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* **(3)**

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

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

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

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

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

TOTAL / *TOTAAL*: 100