



Education and Sports Development

**Department of Education and Sports Development
Department van Onderwys en Sport Ontwikkeling
Lefapha la Thuto le Tlhabololo ya Metshameko
NORTH WEST PROVINCE**

NATIONAL SENIOR CERTIFICATE

GRADE 12

TECHNICAL MATHEMATICS P1/TENIESE WISKUNDE V1

**MARKING GUIDELINE/NASIENRIGLYNE
JUNE/JUNIE 2019**

MARKS: 150

PUNTE: 150

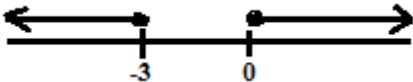
**This Memorandum consists of 12 pages
*Hierdie nasienriglyne bestaan uit 12 bladsye.***

Demo



NW/JUNE/TEC-MATH/ EMIS/6*****

QUESTION/VRAAG 1

1.1.1	$x = -2$ or / of $x = 6$	$\checkmark x = -2$ $\checkmark x = 6$	2
1.1.2	$5x(x - 2) = 3$ $5x^2 - 10x - 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(5)(-3)}}{2(5)}$ $x = \frac{5 \pm 2\sqrt{10}}{5}$ $x = 2,26$ OR/OF $x = -0,26$	\checkmark Standard form/ <i>standaardvorm</i> \checkmark Quadratic formula/ <i>kwadratiese formule</i> \checkmark Substitution/Substitusie CA $\checkmark x = 2,26$ $\checkmark x = -0,26$ CA Correct Rounding/korrekte afronding	5
1.1.3	$x(x + 3) \geq 0$ $x = 0$ or/of $x = -3$ $x \leq -3$ or/of $x \geq 0$ 	Critical values/kritiese waardes $\checkmark x = 0$ $\checkmark x = -3$ Correct Answers/korrekte antwoord $\checkmark x \leq -3$ $\checkmark x \geq 0$ \checkmark Number line/ <i>getallemlyn</i>	5



1.2	$y - x = 2 \dots (1) \quad x^2 + xy = y^2 - 4 \dots (2)$ $y = x + 2 \dots (3)$ $x^2 + x(x + 2) = (x + 2)^2 - 4$ $x^2 + x^2 + 2x = x^2 + 4x + 4 - 4$ $2x^2 - x^2 + 2x - 4x = 0$ $x^2 - 2x = 0$ $x(x - 2) = 0$ $x = 0$ Or/of $x = 2$ $y = 0 + 2$ OR/OF $y = 2 + 2$ $y = 2$ $y = 4$	✓ Equ/vlg...3 ✓ Substitution/substitusie ✓ STD form/vorm ✓ Factors Or Q- Formula used/ faktore of Kwadrt. formule ✓ Both values of/beide waardes van x ✓ y = 4 ✓ y = 2	7
1.3.1	$F = \frac{Gm_1m_2}{r^2}$ $m_1 = \frac{F \times r^2}{Gm_2}$	✓✓ Answer/antwoord	2
1.3.2	$m_1 = \frac{F \times r^2}{Gm_2}$ $= \frac{665 \times (6.38 \times 10^6)^2}{(6.67 \times 10^{-11}) \times (5.98 \times 10^{24})}$ $= 67.86$	CA from/van 1.3.1 ✓ Substitution/substitusie ✓ Answer/antwoord	2
1.4	$98 \rightarrow$ $2^6 \rightarrow 1$ $2^5 \rightarrow 1$ $2^4 \rightarrow 0$ $2^3 \rightarrow 0$ $2^2 \rightarrow 0$ $2^1 \rightarrow 1$ $2^0 \rightarrow 0$ 1100010_2	✓ 1100010 ✓ Base/basis 2	2
			[25]



QUESTION/VRAAG 2

2.1.1	$1 - x = 0$ $1 = x$	$\checkmark \Delta = 0$ \checkmark Answer/antwoord	2
2.1.2	$1 - x \geq 0$ $1 \geq x$	$\checkmark \Delta \geq 0$ \checkmark Substitution/substitusie \checkmark Answer/antwoord $1 \geq x$ or / of $x \leq 1$	3
2.1.3	$1 - x < 0$ $1 < x$	$\checkmark \Delta < 0$ \checkmark Substitution/substitusie \checkmark Answer/antwoord $1 < x$ or / of $x > 1$	3
			[8]

QUESTION/VRAAG 3

3.1.1	$\frac{9^{n-1} \times 27^{3-2n}}{81^{2-n}}$ $= \frac{(3^2)^{n-1} \times (3^3)^{3-2n}}{(3^4)^{2-n}}$ $= \frac{3^{2n-2} \times 3^{9-6n}}{3^{8-4n}}$ $= 3^{2n-6n+4n} \times 3^{-2+9-8}$ $= 3^0 \times 3^{-1}$ $= \frac{1}{3}$	$\checkmark = \frac{(3^2)^{n-1} \times (3^3)^{3-2n}}{(3^4)^{2-n}}$ $\checkmark (3^4)^{2-n}$ \checkmark Removing brackets/ verwyder hakkies \checkmark Simplification/ vereenvoudiging $\checkmark 3^0 \cdot 3^{-1}$ CA \checkmark Answer/antwoord CA	6
3.1.2	$\sqrt{12} + 4\sqrt{75}$ $= 2\sqrt{3} + 20\sqrt{3}$ $= 22\sqrt{3}$	\checkmark Simplify/ vereenvoudig \checkmark Answer/antwoord	2
3.1.3	$\log_3(1) + \log_k k$ $= 0 + 1$ $= 1$	$\checkmark 0 + 1$ \checkmark Answer/antwoord	2



3.1.4	$= 2\log 10 + 4\log 10^2 - \log_3 3^2$ $= 2\log 10 + 8\log 10 - 2\log_3 3$ $= 10\log 10 - 2(1)$ $= 10(1) - 2$ $= 8$ <i>or / of</i> $= 2\log 10 + 4\log 10^2 - \log_3 3^2$ $= 2 + 8 - 2$ $= 8$ <i>or / of</i> $= (2 \times 1) + (4 \times 2) - (2 \times 1)$ $= 8$	✓ Factors / <i>faktore</i> ✓ Simplification/ <i>vereenvoudiging</i> ✓ Answer/ <i>antwoord</i> 2×1 ✓ 4×2 2×1 ✓ Simplification/ <i>vereenvoudiging</i> ✓ Answer/ <i>antwoord</i>	3
3.2	$\log(x+3) + \log(x-6) = 1$ $\log(x+3)(x-6) = 1$ $(x+3)(x-6) = 10^1$ $x^2 - 6x + 3x - 18 - 10 = 0$ $x^2 - 3x - 28 = 0$ $(x-7)(x+4) = 0$ $x = 7$ <i>or / of</i> $x \neq -4$	✓ $(x+3)(x-6)$ ✓ Exponential form/ <i>eksponensiële vorm</i> ✓ Std Form/ <i>vorm</i> ✓ Factors/ <i>faktore</i> ✓ $x = 7$ ✓ $x \neq -4$	6
			[19]

QUESTION/VRAAG 4

4.1.1	$2 - 4i + 2i - 1$ $= 1 - 2i$	✓ ✓ Answer/ <i>antwoord</i>	2
4.1.2	$(2 - 3i)(i - 4)$ $= 2i - 8 - 3i^2 + 12i$ $= 14i - 8 - 3(-1)$ $= 14i - 8 + 3$ $= -5 + 14i$	✓ Removing brackets/ <i>verwyder</i> <i>hakkies</i> ✓ (-1) ✓ Simplification/ <i>vereenvoudiging</i> ✓ Answer/ <i>antwoord</i>	4



4.2	$z = -\sqrt{3} - 2i$ $r = \sqrt{(-\sqrt{3})^2 + (-2)^2}$ $r = \sqrt{7}$ $\theta = \tan^{-1}\left(\frac{2}{\sqrt{3}}\right)$ $\theta = 49.11^\circ \dots (\text{ref } \angle)$ $\theta = 180^\circ + 49.11^\circ$ $= 229.11^\circ$ $\therefore z = \sqrt{7} \text{ cis } (229.11^\circ)$	$\checkmark r = \sqrt{7}$ $\checkmark \tan^{-1}\left(\frac{2}{\sqrt{3}}\right)$ $\checkmark \text{ Ref } \angle$ $\checkmark \angle \text{ in Quadrant/kwadrant}$ $\checkmark \text{ Answer in correct formula/ antwoord in korrekte formule}$	5
4.3	$2x - 12i = 2 + 8yi$ $2x = 2$ $x = 1$ <i>and / en</i> $-12 = 8y$ $-\frac{12}{8} = y$ $-\frac{3}{2} = y$	$\checkmark \text{ Equating Real values/ vergelyk Reële waardes}$ $\checkmark x = 1$ $\checkmark \text{ Equating Imaginary numbers/ vergelyk imaginêre waardes}$ $\checkmark y = -\frac{3}{2}$	4
			[15]

QUESTION/VRAAG 5

5.1.1	$x = 0$ $y = -1$ <i>or / of</i> $VA = 0$ $HA = -1$	$\checkmark \text{ Vertical asymptotes/ vertikale asimptoot}$ $\checkmark \text{ Horizontal asymptotes/ horisontale asimptoot}$	2
5.1.2	$x - \text{intercept / afsnit} :$ $0 = \frac{4}{x} - 1$ $x = 4$ $\therefore (4; 0)$	$\checkmark \text{ Substitution/ substitusie}$ $\checkmark x = \text{Value/waarde}$ $\checkmark \text{ Coordinates/ koördinaat}$	3



5.1.3		<ul style="list-style-type: none"> ✓ Horizontal asymptotes/horizontale asimptoot ✓ Vertical asymptotes/vertikale asimptoot ✓ x-intercept / afsnit ✓ Shape/vorm 	4
5.2.1	$f(x) = -(x+2)(x-4)$ $= -(x^2 - 4x + 2x - 8)$ $= -(x^2 - 2x - 8)$ $= -x^2 + 2x + 8$ <p>or / of</p> $P(1;9) \rightarrow TP$ $f(x) = a(x-1)^2 + 9$ $f(0) = 8$ $\therefore 8 = a(0-1)^2 + 9$ $8 = a + 9$ $a = -1$ $\therefore f(x) = -1(x-1)^2 + 9$ $= -(x^2 - 2x + 1) + 9$ $= -x^2 + 2x - 1 + 9$ $= -x^2 + 2x + 8$	<ul style="list-style-type: none"> ✓ Method/metode (x-coordinates) ✓ Removing brackets/verwyder hakkies ✓ STD form/vorm ✓ STD form in simplified form/STD vorm in vereenvoudigste vorm ✓ Method(Turning point)/Metode(draaipunt) ✓ $f(0) = 0$ ✓ $a = -1$ ✓ STD form in simplified form/STD vorm in vereenvoudigste vorm 	4
5.2.2	$m_{ave} = \frac{f(2) - f(4)}{2 - 4}$ $= \frac{8 - 0}{-2}$ $= -4$ <p>or / of</p> $m_{ave} = \frac{f(4) - f(2)}{4 - 2}$ $= \frac{0 - 8}{2}$ $= -4$	<ul style="list-style-type: none"> ✓ $f(2) = 8$ ✓ $f(4) = 0$ ✓ Substitution/substitusie ✓ Answer/antwoord 	4



5.3.1	$A(0;3)$ $B(-3;0)$ $C(3;0)$	$\checkmark A$ $\checkmark B$ $\checkmark C$	3
5.3.2	$x^2 + y^2 = r^2$ $r^2 = 3^2 + 0^2$ $= 9$ $x^2 + y^2 = 9$	\checkmark Substitution/ <i>substitusie</i> $\checkmark r^2 = 9$ \checkmark Answer/antwoord AO-Full marks/vol punte	3
5.3.3	$y = 2$	\checkmark Answer/antwoord	1
5.3.4	$y = a.b^x + 2$ $A(0;3)$ $3 = a.b^0 + 2$ $1 = a$ $D(1;2.5)$ $\therefore 2.5 = 1.b^1 + 2$ $\frac{1}{2} = b$ $\therefore y = \left(\frac{1}{2}\right)^x + 2$	\checkmark Substituting/ <i>substitusie</i> $\checkmark a = 1$ \checkmark Substitution/ <i>substitusie</i> $\checkmark b = \frac{1}{2}$ \checkmark Equation of/ <i>vergelyking van h</i>	5
			[29]

QUESTION/VRAAG 6

6.1.1	$i_{\text{eff}} = \left(1 + \frac{i^m}{m}\right) - 1$ $= \left(1 + \frac{12}{100}\right)^{12} - 1$ $= 0,126825... \times 100$ $= 12.68\%$	\checkmark Formula/ <i>formule</i> $\checkmark i^m = \left(\frac{0.12}{12}\right)$ $\checkmark m = 1 \times 12$ \checkmark Correct answer..2 deci/ <i>korrekte antwoord 2 desimale</i> <i>plekke</i>	4
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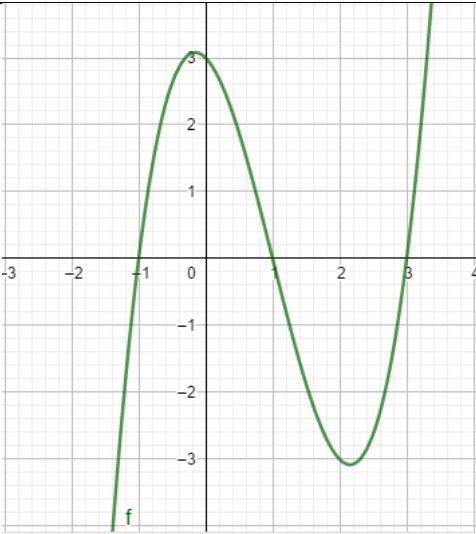


6.1.2	$A = P(1+i)^n$ $A = 8000 \left(1 + \frac{\left(\frac{12.68}{100} \right)}{12} \right)^{3 \times 12}$ $= R11\,679.62$	✓ Formula/formule ✓ Substitution/substitusie CA 6.1.1 ✓ Answer/antwoord CA	3
6.2	$A = 70000 \left(1 + \frac{11.5}{100} \right)^{10 \times 4}$ $+ 30000 \left(1 + \frac{11.5}{100} \right)^{9 \times 4}$ $- 20000 \left(1 + \frac{11.5}{100} \right)^{6 \times 4}$ $= R261\,257.48$	$70000 \left(1 + \frac{0.115}{4} \right)$ ✓ $n = 10 \times 4$ $+ 30000 \left(\frac{0.115}{4} \right)$ ✓ $n = 9 \times 4$ $- 20000 \left(\frac{0.115}{4} \right)$ ✓ 6×4 ✓ Answer/antwoord	7
			[14]

QUESTION/VRAAG 7

7.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{5(x+h) - 3 - (5x - 3)}{h}$ $= \lim_{h \rightarrow 0} \frac{5x + 5h - 3 - 5x + 3}{h}$ $= \lim_{h \rightarrow 0} \frac{5h}{h}$ $= 5$	✓ Formula/formule ✓ Substitution/substitusie ✓ Removing brackets/verwyder Hakkies $\lim_{h \rightarrow 0} \frac{5h}{h}$ ✓ Answer/antwoord Deduct 1mark if Notation $\lim_{h \rightarrow 0}$ is not included/ <i>penaliseer een punt indien</i> <i>notasie $\lim_{h \rightarrow 0}$ nie daar is.</i>	5
7.2.1	$\frac{d}{dx} = -6x^2 + 2x - 3$	$\checkmark -6x^2 \quad \checkmark 2x \quad \checkmark -3$	3



8.3	$1 \frac{1-3-1}{1-2-3}$ $\dots\dots\dots 1-2-3 \quad 0$ $\therefore x^2 - 2x - 3$ $(x-3)(x+1) = 0$ $x = 3 \text{ or / of } x = -1$	$\checkmark x^2 - 2x - 3$ \checkmark Factors/ faktore $\checkmark x = 3$ $\checkmark x = -1$	4
8.4	$f'(x) = 3x^2 - 6x - 1$ $x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(3)(-1)}}{2(3)}$ $= \frac{3 \pm 2\sqrt{3}}{3}$ $x = 2.15 \text{ or / of } x = -0.15$ $f(2.15)$ $= (2.15)^3 - 3(2.15)^2 - (2.15) + 3$ $= -3.08$ $f(-0.15)$ $= (-0.15)^3 - 3(-0.15)^2 - (-0.15) + 3$ $= 3.08$ $(2.15; -3.08) \text{ and / en } (-0.15; 3.08)$	\checkmark Derivative/ afgeleide Breakdown if not using Derivative/ BD as afgeleide nie gebruik word $\checkmark x = 2.15$ $\checkmark x = -0.15$ $\checkmark f(2.15)$ $\checkmark f(-0.15)$	5
8.5		\checkmark x -intercepts / afsnitte CA \checkmark y -intercept / afsnit A $\checkmark \checkmark$ Turning points/ draaipunte CA \checkmark Correct shape/ korrekte vorm	5
			[17]



QUESTION/VRAAG 9

9.1	$\int 5x \, dx = \frac{5x^2}{2} + C$	$\checkmark \frac{5x^2}{2}$ $\checkmark C$	2
9.2	$f(x) = 2x^2 + 1$ $\int_1^3 (2x^2 + 1) dx$ $= \left[\frac{2x^3}{3} + x \right]_1^3$ $f(3) = \frac{2(3)^3}{3} + 3 = 21$ $f(1) = \frac{2(1)^3}{3} + 1 = \frac{5}{3}$ $\therefore A = 21 - \frac{5}{3}$ $= 19\frac{1}{3} \text{ or / of } \frac{58}{3} \text{ or / of } 19.33$	$\checkmark \int_1^3 (2x^2 + 1) dx$ $\checkmark \text{ Correct Integral/ } \textit{korrekte integraal}$ $\checkmark f(3) = 21$ $\checkmark f(1) = \frac{5}{3}$ $\checkmark \text{ Answer/antwoord}$	5
			[7]
TOTAL/TOTAAL:		150	

