

GAUTENG DEPARTMENT OF EDUCATION /
GAUTENGSE DEPARTEMENT VAN ONDERWYS
SENIOR CERTIFICATE EXAMINATION / SENIORSERTIFIKAAT-EKSAMEN

FUNCTIONAL MATHEMATICS SG /
FUNKSIONELE WISKUNDE SG
(First Paper / Eerste Vraestel: Algebra)

POSSIBLE ANSWERS / MOONTLIKE ANTWOORDE SUPP 2007

QUESTION / VRAAG 1

$$\begin{array}{ll}
 1.1 & 1.1.1 \\
 & T_2 = 43 \qquad T_6 = 19 \\
 & \qquad ? \qquad \qquad ? \\
 & a + d = 43 \qquad a + 5d = 19 \\
 & a = 43 - d \qquad a = 19 - 5d \\
 & \qquad \qquad ? \\
 & \therefore 43 - d = 19 - 5d \\
 & 4d = -24 \\
 & d = -6 ? \\
 & \qquad \qquad \text{OR/OF} \\
 & \qquad ? \qquad \qquad ? \\
 & a + d = 43 \dots 1 \qquad a + 5d = 19 \dots 2 \\
 1 - 2: & a + d = 43 \\
 & - (a + 5d = 19) ? \\
 & \quad -4d = 24 \\
 & d = -6 ? \qquad \qquad (4)
 \end{array}$$

$$\begin{array}{ll}
 1.1.2 & a = 43 - (-6) ? \\
 & a = 43 + 6 \\
 & a = 49 ? \qquad \qquad (2)
 \end{array}$$

$$1.1.3 \quad S_n = \frac{n}{2}[2a + (n-1)d] ?$$

$$\begin{aligned} & \quad ? \quad ? \\ S_{10} &= \frac{10}{2} [2(49) + (10-1)(-6)] \\ &= 5[98 + 9(-6)] \\ & \quad ? \\ &= 5[98 - 54] \end{aligned}$$

$$= 220 ? \quad (5)$$

$$1.2 \quad 1.2.1 \quad T_n = 4n + 3$$

$$\begin{aligned} T_1 &= 4(1) + 3 \\ &= 7 ? \end{aligned}$$

$$\begin{aligned} T_2 &= 4(2) + 3 \\ &= 11 ? \end{aligned}$$

$$\begin{aligned} T_3 &= 4(3) + 3 \\ &= 15 ? \end{aligned} \quad (3)$$

$$1.2.2 \quad d = 4 ? \quad (1)$$

$$1.3 \quad T_n = a + (n-1)d ?$$

$$? \quad ? \quad ?$$

$$425 = -7 + (n-1)(6)$$

$$?$$

$$425 = -7 + 6n - 6$$

$$-6n = -13 - 425$$

$$-6n = -438$$

$$n = 73 ? \quad (6)$$

[21]

QUESTION/VRAAG 2

2.1 $T_n = ar^{n-1} ?$

$? \quad ??$

$$192 = 3(2)^{n-1}$$

$$\frac{192}{3} = \frac{3(2)^{n-1}}{3}$$

$$64 = 2^{n-1} ?$$

$$2^6 = 2^{n-1}$$

$$6 = n - 1 \quad n = 7 ?$$

(6)

2.2 $T_2 = 5 \quad T_7 = 160$

$?$

$?$

$$ar = 5 \dots\dots 1 \quad ar^6 = 160 \dots\dots 2$$

$$\underline{2 \div 1}: \quad \underline{ar^6} = \underline{160}$$

$$ar \quad 5 \quad ?$$

$$r^5 = 32 ?$$

$$r = \sqrt[5]{32}$$

$$r = 2 ?$$

(5)

2.3 2.3.1

$$\frac{T_2}{T_1} = \frac{T_3}{T_2} \quad ?$$

$$\frac{m-3}{m-4} = \frac{m-1}{m-3} \quad ?$$

$$(m-3)(m-3) = (m-1)(m-4) \quad ?$$

$$m^2 - 6m + 9 = m^2 - 5m + 4$$

$$-m = -5$$

$$m = 5 \quad ? \quad (5)$$

2.3.2

$$T_1 = 5 - 4 \\ = 1 \quad ?$$

$$T_2 = 5 - 3 \\ = 2 \quad ?$$

$$T_3 = 5 - 1 \\ = 4 \quad ?$$

(3)
[19]**QUESTION/VRAAG 3**

3.1 3.1.1

$$\log_x 625 = 4$$

$$x^4 = 625 \quad ?$$

$$x^4 = 5^4 \quad ?$$

$$x = 5 \quad ?$$

(3)

$$3.1.2 \quad \log_x 108 - \log_x 4 = 3$$

$$?$$

$$\log_x (108 \div 4) = 3$$

$$?$$

$$\log_x 27 = 3$$

$$?$$

$$x^3 = 27$$

$$x^3 = 3^3$$

$$x = 3 \quad ? \quad (4)$$

$$3.2 \quad 3.2.1 \quad 2.7^x = 98$$

$$7^x = 49 \quad ?$$

$$7^x = 7^2 \quad ?$$

$$x = 2 \quad ? \quad (3)$$

$$3.2.2 \quad 6^{x+1} = 56$$

$$\log_6 56 = x + 1 \quad ?$$

$$?$$

$$\frac{\log 56}{\log 6} = x + 1$$

$$?$$

$$x + 1 = 2,246591554$$

$$x = 1,246.....$$

$$x = 1,25 \quad ? \quad (4)$$

$$\begin{aligned}
 3.3 \quad 3.3.1 \quad & 3\log_6 3 + \log_6 80 - \log_6 10 \\
 & \quad ? \\
 & = \log_6 3^3 + \log_6 80 - \log_6 10 \\
 & \quad ? \quad ? \\
 & = \log_6 (27 \times 80 \div 10) \\
 & = \log_6 216 \quad ? \\
 & = \log_6 6^3 \quad ? \\
 & = 3\log_6 6 \\
 & = 3 \quad ?
 \end{aligned}$$

(6)

$$\begin{aligned}
 3.3.2 \quad & \frac{1}{2}\log_5 625 - \log_9 1 + \log_4 32 \\
 & \quad ? \quad ? \\
 & = \log_5 625^{\frac{1}{2}} - 0 + \frac{\log 32}{\log 4} \quad ? \\
 & \quad ? \\
 & = \log_5 (5^4)^{\frac{1}{2}} + \frac{5\log 2}{2\log 2} \quad ? \\
 & = \log_5 25 + \frac{5}{2} \\
 & \quad ? \quad ? \\
 & = 2\log_5 5 + \frac{5}{2} \\
 & = 2 + \frac{5}{2} \\
 & = 4\frac{1}{2} \quad ?
 \end{aligned}$$

(9)

$$3.4 \quad \log 2\,000$$

?

$$= \log(2 \times 1\,000)$$

?

$$= \log 2 + \log 1\,000$$

$$= y + 3\log_{10}10$$

$$= y + 3?$$

(3)

[32]

QUESTION/VRAAG 4

$$4.1 \quad 4.1.1 \quad (81)^{\frac{3}{4}} + \left(\frac{1}{9}\right)^{-2} + 27^0$$

?

$$= (3^4)^{\frac{3}{4}} + (3^{-2})^{-2} + 1$$

$$= 3^3 + 3^4 + 1$$

?

$$= 27 + 81 + 1$$

$$= 109 \quad ?$$

(5)

$$4.1.2 \quad \frac{\sqrt{48} + \sqrt{12}}{\sqrt{12}}$$

$$= \frac{\sqrt{16 \cdot 3} + \sqrt{4 \cdot 3}}{\sqrt{4 \cdot 3}} \cdot$$

$$4.1.2 \quad = \frac{2\sqrt{3} + 2\sqrt{3}}{2\sqrt{3}} \cdot$$

$$= \frac{6\sqrt{3}}{2\sqrt{3}}$$

$$= 3 \cdot$$

(4)

4.1.3

$$\frac{2^{n+2} - 5 \cdot 2^{n+1}}{2^{n+1}}$$

$$= \frac{2^n \cdot 2^2 - 5 \cdot 2^n \cdot 2}{2^n \cdot 2} \quad ?$$

$$= \frac{2^n(2^2 - 5 \cdot 2)}{2^n \cdot 2} \quad ?$$

$$= \frac{4 - 10}{2} \quad ?$$

$$= \frac{-6}{2}$$

$$= -3 \quad ? \quad (4)$$

4.1.4

$$\frac{2^{n+2} \cdot 5 \cdot 2^{n+1}}{4^{n+1}}$$

$$= \frac{2^{2n+3} \cdot 5}{2^{2(n+1)}} \quad ?$$

$$= \frac{2^{2n+3} \cdot 5}{2^{2n+2}} \quad ?$$

$$= 2^{2n+3-2n-2} \cdot 5$$

$$= 2 \cdot 5$$

$$= 10 \quad ? \quad (4)$$

4.2 4.2.1

$$5x^{3/2} = 45$$

$$x^{3/2} = 9 \quad ?$$

$$(x^{1/2})^2 = (9)^2 \quad ?$$

$$x = 81 \quad ? \quad (3)$$

4.2.2 $27^{x+3} = 9^{2-2x}$

?

$3^{3(x+3)} = 3^{2(2-2x)}$

?

$3^{3x+9} = 3^{4-4x}$

?

$3x + 9 = 4 - 4x$

$7x = -5$

$x = -5/7$?

(4)

[24]**QUESTION/VRAAG 5**

5.1 $P(0 ; 1)$? (1)

5.2 $y = 2^x$ (2 ; a)

$a = 2^{(2)}$?

$\therefore a = 4$? (2)

5.3 $g(x) = (1/2)^x$? (1)

5.4 $h(x) = \log_2 x$ (1)

5.5 ? ? (2)

$R(4 ; 2)$

5.6 $S(1 ; 0)$? (1)

5.7 $x = 0$? (1)

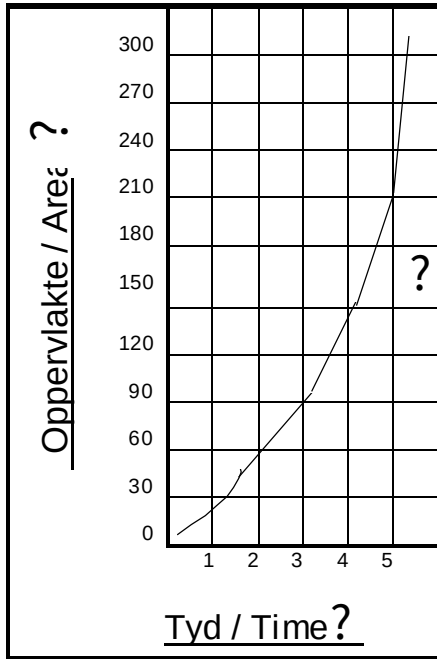
[9]**QUESTION/VRAAG 6**

6.1

T(h)	0	1	2	3	5
A(m ²)	3	7,5	18,75	46,8	292,9

(2)

6.2



(4)

[6]

QUESTION/VRAAG 7

7.1 7.1.1 $s(t) = 2t^2 + 5t + 1$

$$s(2) = 2(2)^2 + 5(2) + 1 \quad ?$$

$$= 8 + 10 + 1$$

$$= 19\text{m} \quad ?$$

(2)

7.1.2 $s(t) = 2t^2 + 5t + 1$
 ? ?

$$s'(t) = 4t + 5$$

(2)

7.1.3 $s'(2) = 4(2) + 5 \quad ?$

$$= 8 + 5$$

$$= 13\text{m/s} \quad ?$$

(2)

$$7.2 \quad \lim_{x \rightarrow -3} \frac{x^2 - 9}{x + 3}$$

$$= \lim_{x \rightarrow -3} \frac{(x + 3)(x - 3)}{x + 3} ?$$

$$= \lim_{x \rightarrow -3} x - 3$$

$$= -3 - 3 ?$$

$$= -6 ? \quad (3)$$

$$7.3 \quad f(x) = 2x - 4$$

$$f(x + h) = 2(x + h) - 4$$

$$= 2x + 2h - 4 ?$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h} ?$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{2x + 2h - 4 - (2x - 4)}{h} ?$$

$$= \lim_{h \rightarrow 0} \frac{2x + 2h - 4 - 2x + 4}{h}$$

$$= \lim_{h \rightarrow 0} \frac{2h}{h} ?$$

$$= 2 ?$$

(5)

7.4 7.4.1 $f(x) = 7$

$$f'(x) = 0 \quad ? \quad (1)$$

7.4.2 $f(x) = 3x^3 - 2x^2 + 4x$
 $\quad \quad ? \quad ? \quad ?$

$$f'(x) = 9x^2 - 4x + 4 \quad (3)$$

7.4.3 $f(x) = -2x(x + 1)$
 $\quad \quad ? \quad ?$

$$f(x) = -2x^2 - 2x$$

$$\quad \quad ? \quad ?$$

$$f'(x) = -4x - 2 \quad (4)$$

[22]

QUESTION/VRAAG 8

8.1 x-afsnitte/x-intercepts: $f(x) = 0$
 $\quad ?$

$$0 = (x - 2)(x + 1)^2$$

$$\therefore x = 2 \text{ of/or } x = -1$$

$$(2 ; 0) ? \quad (-1 ; 0) ? \quad (3)$$

8.2 y-afsnit/y-intercept: $x = 0$

$$f(0) = (0)^3 - 3(0) - 2 ?$$

$$= -2$$

$$(0 ; -2) ? \quad (2)$$

8.3 $f(x) = x^3 - 3x - 2$
 $\quad \quad ? \quad ?$

$$f'(x) = 3x^2 - 3 \quad (2)$$

8.4 $f'(x) = 3x^2 - 3 = 0$
 $\quad \quad \quad ?$
 $\quad \quad \quad 3(x^2 - 1) = 0$
 $\quad \quad \quad ?$
 $\quad \quad \quad 3(x + 1)(x - 1) = 0$
 $\quad \quad \quad ? \quad \quad ?$
 $\quad \quad \quad x = -1 \text{ OR/OF } x = 1$

$$f(-1) = (-1)^3 - 3(-1) - 2$$

$$= -1 + 3 - 2$$

$$= 0 \quad ? \quad (-1; 0)$$

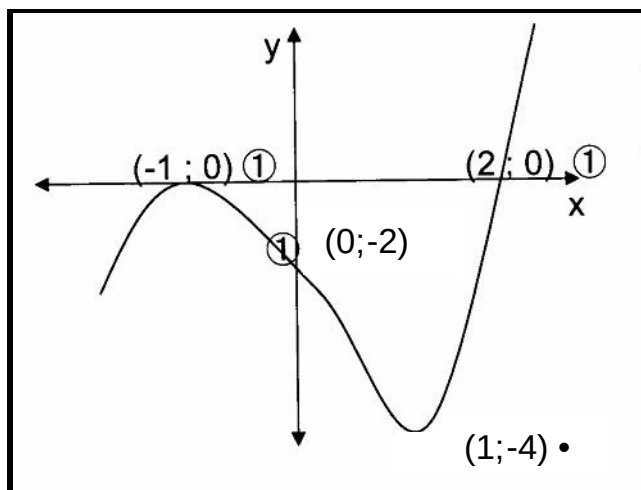
$$f(1) = (1)^3 - 3(1) - 2$$

$$= 1 - 3 - 2$$

$$= -4 \quad ? \quad (1; -4)$$

(6)

8.5

(4)
[17]

TOTAL/TOTAAL: 150