

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

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

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**POSSIBLE ANSWERS OCT / NOV 2006**

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**QUESTION / VRAAG 1**

1.1 1.1.1

$$\begin{aligned} & \frac{2^{x+1} \cdot 8^{x-2}}{16^{x-2}} \\ &= \frac{2^{x+1} \cdot 2^{3(x-2)}}{2^{4(x-2)}} \\ &= \frac{2^{x+1} \cdot 2^{3x-6}}{2^{4x-8}} \\ &= 2^{4x-5-4x+8} \\ &= 2^3 \\ &= 8 \end{aligned}$$

(6)

1.1.2

$$\begin{aligned} & 8^? + 5^0 - 64^? \\ &= (2^3)^? + 1 - (4^3)^? \\ &= 2 + 1 - 16 \\ &= -13 \end{aligned}$$

(5)

$$\begin{aligned}
 1.1.3 \quad & \frac{3^{x+4} - 6 \cdot 3^{x+1}}{3^x \cdot 7} \\
 & = \frac{3^x \cdot 3^4 - 6 \cdot 3^x \cdot 3^1}{3^x \cdot 7} \quad ? \\
 & \quad ? \quad ? \\
 & = \frac{3^x (3^4 - 6 \cdot 3)}{3^x \cdot 7} \\
 & = \frac{81 - 18}{7} \quad ? \\
 & = 9 \quad ? \qquad \qquad \qquad (5)
 \end{aligned}$$

$$\begin{aligned}
 1.1.4 \quad & \frac{2\sqrt{12} + \sqrt{75}}{3\sqrt{3}} \\
 & = \frac{2\sqrt{4 \cdot 3} + \sqrt{25 \cdot 3}}{3\sqrt{3}} \bullet \\
 & \quad \bullet \quad \bullet \\
 1.1.4 \quad & = \frac{4\sqrt{3} + 5\sqrt{3}}{3\sqrt{3}}
 \end{aligned}$$

$$\begin{aligned}
 & = \frac{9\sqrt{3}}{3\sqrt{3}} \bullet \qquad \qquad \qquad (5) \\
 & = 3 \bullet
 \end{aligned}$$

$$\begin{aligned}
 1.2 \quad 1.2.1 \quad & x^4 = 8 \\
 & \quad ? \quad ? \\
 & (x^4)^3 = (2^3)^4 \\
 & x = 2^4 \\
 & x = 16 \quad ? \qquad \qquad \qquad (3)
 \end{aligned}$$

$$1.2.2 \quad 3^{2x+1} = 27$$

$$3^{2x+1} = 3^3 ?$$

?

$$2x + 1 = 3$$

$$2x = 2$$

$$x = 1 ?$$

(3)

[27]

### QUESTION/VRAAG 2

$$2.1 \quad 2.1.1 \quad \log 75 + 3 \log 2 - \log 6$$

?

$$= \log 75 + \log 8 - \log 6$$

$$= \log \frac{75(8)}{6} ?$$

$$= \log 100 ?$$

$$= 2 ?$$

(5)

$$2.1.2 \quad \log_3 81 - \log_6 1 + \log_{25} 5$$

? ?

$$= 4 \log_3 3 - 0 + \frac{\log 5}{\log 25} ?$$

$$= 4 + \frac{\log 5}{2 \log 5} ?$$

?

$$= 4 + \frac{1}{2}$$

$$= 4\frac{1}{2} ?$$

(6)

$$2.2 \quad 2.2.1 \quad \log_6 2x = 1$$

$$6 = 2x \quad ?$$

$$x = 3 \quad ?$$

(2)

$$2.2.2 \quad \log x = \frac{\log 64}{\log 8}$$

$$= \frac{2 \log 8}{\log 8} \quad ?$$

$$\log x = 2 \quad ?$$

$$10^2 = x \quad ?$$

$$x = 100 \quad ?$$

(4)

$$2.3 \quad 25^x = 50$$

?

$$\log_{25} 50 = x$$

$$\frac{\log 50}{\log 25} = x \quad ?$$

$$x = 1,22 \quad ?$$

(3)

$$2.4 \quad \log 75$$

$$= \log (5 \times 5 \times 3) \quad ?$$

$$= \log 5 + \log 5 + \log 3 \quad ?$$

$$= a + 2b \quad ?$$

(3)  
[23]

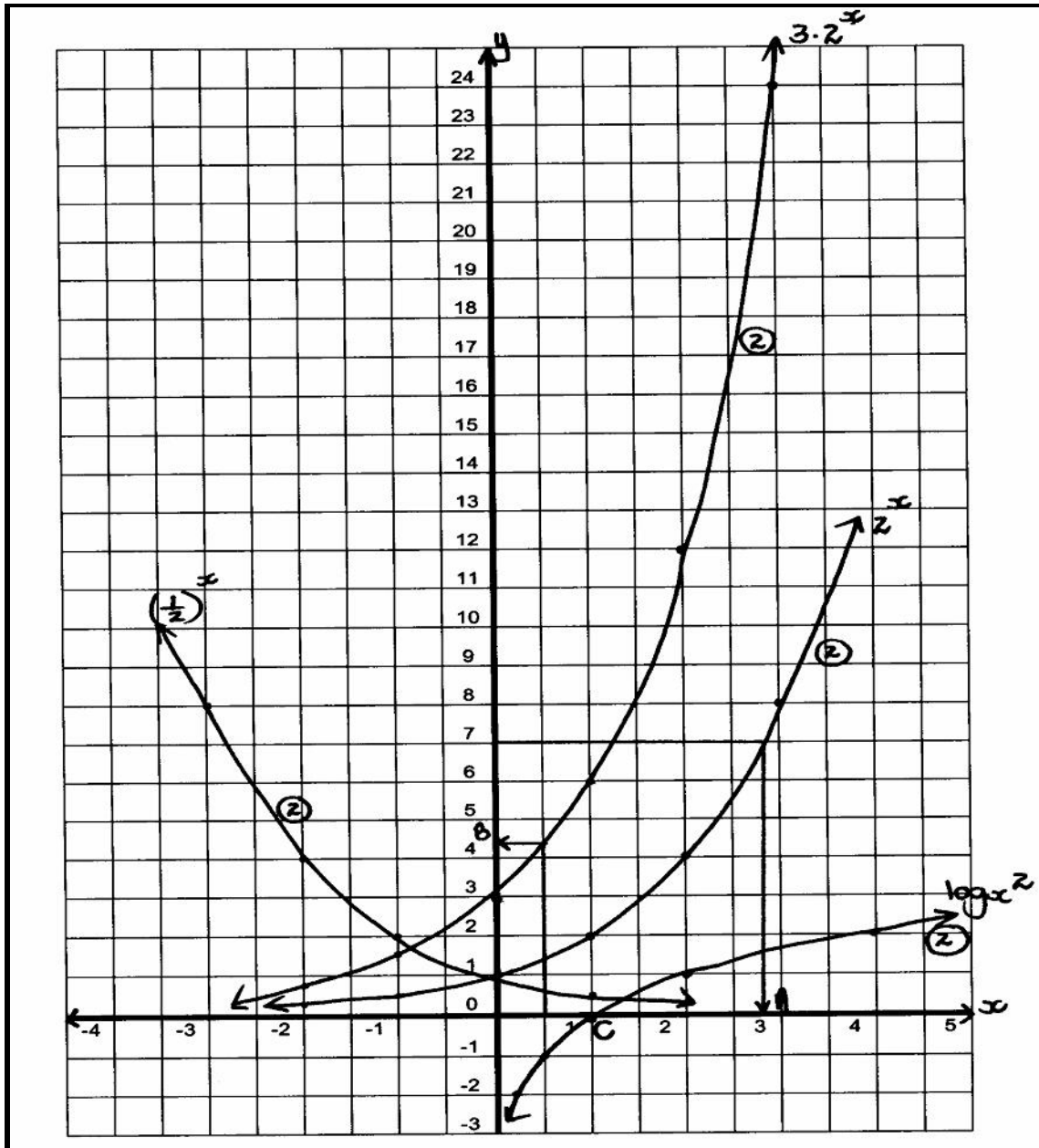
QUESTION/VRAAG3

3.1

x	-1	0	1	2	3
$2^x$	$\frac{1}{2}$	1	2	4	8?
$3 \cdot 2^x$	$\frac{3}{2}$ / 1,5	3	6	12	24?

(2)

3.2 & 3.3



(4) + (4)

- 3.4 3.4.1  $x = 2,7$  (2)
- 3.4.2  $y = 4,2$  (2)
- 3.4.3  $x = 1$  (2)
- 3.5 y-intercept/y-afsnit: (0 ; 3) • (1)
- [17]

## QUESTION/VRAAG 4

- 4.1 4.1.1  $T_{50} = a + 49d$  ?
- $= 2 + 49(3)$  ?
- $= 2 + 147$
- $= 149$  ? (3)
- 4.1.2  $S_n = \frac{n}{2}[2a + (n - 1)d]$  ?
- ? ? ?
- $S_{50} = \frac{50}{2} [2(2) + (50 - 1)(3)]$
- $= 25 [4 + 49(3)]$
- $= 25 [4 + 147]$
- $= 25 [151]$
- $= 3775$  ? (5)

$$4.2 \quad 4.2.1 \quad T_1 = -3 = a ?$$

$$T_3 = 3 ?$$

$$a + 2d = 3$$

?

$$-3 + 2d = 3$$

$$2d = 6$$

$$d = 3 ?$$

(4)

$$4.2.2 \quad T_{25} = a + 24d ?$$

$$= -3 + 24(3) ?$$

$$= -3 + 72$$

$$= 69 ?$$

(3)

$$4.2.3 \quad T_n = a + (n - 1)d ?$$

$$57 = -3 + (n - 1)(3) ?$$

$$57 = -3 + 3n - 3 ?$$

$$-3n = -6 - 57$$

$$-3n = -63$$

$$n = 21 ?$$

(4)

$$4.3 \quad T_1 = -3(1) + 2 = -1 ?$$

$$T_2 = -3(2) + 2 = -4 ?$$

$$T_3 = -3(3) + 2 = -7 ?$$

(3)

**[22]**

## QUESTION/VRAAG5

$$5.1 \quad 5.1.1 \quad T_8 = ar^7 = 640 \quad \dots\dots 1 \quad ?$$

$$T_3 = ar^2 = 20 \quad \dots\dots 2 \quad ?$$

$$\underline{1 \div 2}: \quad \frac{ar^7}{ar^2} = \frac{640}{20} ?$$

$$r^5 = 32 ?$$

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

$$r = 2 ? \quad (5)$$

$$5.1.2 \quad a(2)^2 = 20 ?$$

$$4a = 20$$

$$\underline{a = 5} ? \quad (2)$$

$$5.2 \quad 5.2.1 \quad T_8 = ar^7 ?$$

$$= 1(3)^7 ?$$

$$= 2187 ? \quad (3)$$



$$5.2.2 \quad S_n = \frac{a(r^n - 1)}{r - 1} ?$$

$$S_8 = \frac{1(3^8 - 1)}{3 - 1} ?$$

$$= \frac{6561 - 1}{2}$$

$$= \frac{6560}{2}$$

$$= 3280 ? \quad (4)$$

5.3 5.3.1

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

$$\frac{x+1}{x} = \frac{x+3}{x+1} ?$$

$$(x+1)(x+1) = x(x+3) ?$$

$$x^2 + 2x + 1 = x^2 + 3x$$

$$-x = -1$$

$$\underline{x = 1} ?$$

(5)

$$5.3.2 \quad T_1 = 1$$

$$T_2 = 1 + 1 = 2 ?$$

$$T_3 = 1 + 3 = 4 ?$$

(2)  
[21]

## QUESTION/VRAAG6

$$6.1 \quad 6.1.1 \quad f(1) = 3(1)^2 = 3 \quad ?$$

$$f(4) = 3(4)^2 = 48 \quad ?$$

average gradient/ gemid. gradiënt:

$$= \frac{48 - 3}{4 - 1} \quad ?$$

$$= \frac{45}{3}$$

$$= 15 \quad ?$$

(4)

$$6.1.2 \quad (a) \quad f(x) = 3x^2$$

?

$$f(x + h) = 3(x + h)^2$$

$$= 3(x^2 + 2xh + h^2)$$

?

$$= 3x^2 + 6xh + 3h^2$$

(2)

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

$$= \lim_{h \rightarrow 0} \frac{3x^2 + 6xh + 3h^2 - 3x^2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{6xh + 3h^2}{h} \quad ?$$

$$= \lim_{h \rightarrow 0} \frac{h(6x + h)}{h} \quad ?$$

$$= 6x + 0$$

$$= 6x \quad ?$$

(4)

- 6.2 6.2.1  $f(x) = 3$   
 $f(x) = 0$  ? (1)
- 6.2.2  $f(x) = 3x^6 - 2x$   
 ? ?  
 $f'(x) = 18x^5 - 2$  (2)
- 6.2.3  $f(x) = (x + 1)(3x - 2)$   
 ? ?  
 $= 3x^2 + x - 2$   
 ? ?  
 $f'(x) = 6x + 1$  (4)
- 6.3 6.3.1  $f(x) = 2x^2 - 4x$   
 $f(2) = 2(2)^2 - 4(2)$  ?  
 $= 8 - 8$   
 $= 0$  ? (2)
- 6.3.2  $f(x) = 2x^2 - 4x$   
 ? ?  
 $f'(x) = 4x - 4$  (2)
- 6.3.3  $f'(2) = 4(2) - 4$  ?  
 $= 8 - 4$   
 $= 4$  ? (2)
- 6.3.4  $m = 4$  (2 ; 0):  
 $y - y_1 = m(x - x_1)$   
 ? ? ?  
 $y - 0 = 4(x - 2)$   
 $y = 4x - 8$  ? (4)

$$6.4 \quad \lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$$

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

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

$$= 3 + 3 ?$$

$$= 6 ?$$

(3)

**[30]****QUESTION/VRAAG7**

$$7.1 \quad 7.1.1 \quad A(0; 0)$$

(1)

$$7.1.2 \quad f(x) = x^3 - 6x^2 + 9x$$

?

$$f(x) = 3x^2 - 12x + 9 = 0?$$

?

$$x^2 - 4x + 3 = 0$$

$$(x-3)(x-1) = 0$$

? ?

$$x = 3 \text{ or/of } x = 1$$

$$f(x) = (3)^3 - 6(3)^2 + 9(3)$$

$$= 27 - 54 + 27$$

$$= 0 \quad ? \quad C(3; 0) ?$$

$$f(1) = (1)^3 - 6(1)^2 + 9(1)$$

$$= 1 - 6 + 9$$

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

(9)

**[10]****TOTAL/TOTAAL: 150**

