



Junievraestel 1, 2023 - Memorandum

Vraag 1

1.1 Bewys dat $0,14\dot{2}$ rasionaal is. (4)

$$x = 0,14222222 \dots$$

$$100x = 14,22222 \dots (1) \checkmark$$

$$1000x = 142,2222 \dots (2) \checkmark$$

$$(2)-(1) 900x = 128 \checkmark$$

$$x = \frac{128}{900}$$

$$x = \frac{32}{225} \checkmark$$

1.2 Tussen watter twee opeenvolgende heelgetalle sal $\sqrt[3]{69}$ lê. (2)

$$\sqrt[3]{64} < \sqrt[3]{69} < \sqrt[3]{125} \checkmark$$

$$4 < \sqrt[3]{69} < 5 \checkmark$$

1.3 Vereenvoudig die volgende uitdrukkings volledig :

1.3.1 $-(a^x + b^y)(a^x - b^y)$ (2)

$$= -(a^{2x} - b^{2y}) \checkmark$$

$$= -a^{2x} + b^{2y} \checkmark$$

1.3.2 $-(-\frac{x}{2} - y)^2$ (3)

$$= -(\frac{x^2}{4} + xy + y^2) \checkmark$$

$$= -\frac{x^2}{4} - xy - y^2 \checkmark$$

1.3.3 $(x - 2)^3$ (3)

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

$$= (x - 2)(x^2 - 4x + 4) \checkmark$$

$$= x^3 - 4x^2 + 4x - 2x^2 + 8x - 8$$

$$= x^3 - 6x^2 + 12x - 8 \checkmark$$

1.3.4 $\frac{4 \cdot 16^{x+1} - 64 \cdot 4^{x-2}}{16\sqrt{2^{8x}} - \frac{1}{4^{-x}}}$ (7)

$$= \frac{4 \cdot 4^{2x+2} - 4^3 \cdot 4^{x-2}}{16\sqrt{2^{8x}} - \frac{1}{4^{-x}}}$$

$$= \frac{4^3 \cdot 4^{2x} - 4 \cdot 4^x}{16 \cdot 4^x - 4^x}$$

$$= \frac{16 \cdot 4^{2x} - 4 \cdot 4^x}{4^x(16 \cdot 4^x - 1)} \checkmark$$

$$= \frac{4 \cdot 4^x(4^2 \cdot 4^x - 1)}{4^x(16 \cdot 4^x - 1)} \checkmark$$

$$= 4 \checkmark$$

1.4 Faktoriseer die volgende uitdrukkings volledig :

1.4.1 $2x^2 - 2y - x + 4xy$ (4)

$$= 2x^2 - x - 2y + 4xy$$

$$= x(2x - 1) - 2y(1 - 2x)$$

$$= x(2x - 1) + 2y(2x - 1)$$

$$= (2x - 1)(x + 2y)$$

1.4.2 $\sqrt{16y^4} - \frac{1}{x^4}$ (2)

$$= 4y^2 - \frac{1}{x^4}$$

$$= (2y - \frac{1}{x^2})(2y + \frac{1}{x^2})$$

1.4.3 $12x^2 - 26xy + 12y^2$ (3)

$$= 2(6x^2 - 13xy + 6y^2)$$

$$= 2(2x - 3y)(3x - 2y)$$

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Vraag 2

Los op vir x in elk van die volgende vergelykings/ongelykhede:

2.1 $4x^{-2} - 1 = 0$ (2)

$$4x^{-2} = 1$$

$$4 = x^2$$

$$\therefore x = \pm 2$$

2.2 $2^{2x^2-3x-5} = 1$ (5)

$$2^{2x^2-3x-5} = 2^0$$

$$2x^2 - 3x - 5 = 0$$

$$(2x - 5)(x + 1) = 0$$

$$x = \frac{5}{2} \text{ of } x = -1$$

2.3 $\frac{3x+1}{x-1} = \frac{2}{1-x} + 1\frac{1}{2}$ (4)

$$\frac{3x+1}{x-1} = \frac{-2}{x-1} + \frac{3}{2}$$

$$\times 2(x-1): 6x + 2 = -4 + 3x - 3$$

$$3x = -9$$

$$x = -3$$

2.4 $5^{2x+3} - 25^{x+1} = 5^x \cdot 20$ (5)

$$5^{2x+3} - 5^{2x+2} = 5^x \cdot 20$$

$$5^{2x}(5^3 - 5^2) = 5^x \cdot 20$$

$$5^{2x}(100) = 5^x \cdot 20$$

$$5^{2x} = 5^x \cdot 5^{-1}$$

$$2x = x - 1$$

$$x = -1$$

$$2.5 \quad \frac{1}{4} + 4x \leq 0 \quad (2)$$

$$\frac{1}{4} \leq -4x \checkmark$$

$$-\frac{1}{16} \geq x \checkmark$$

$$2.6 \quad 15 \leq \frac{x}{-2} + 1 \leq 18 \quad (3)$$

$$14 \leq \frac{x}{-2} \leq 17 \checkmark$$

$$-28 \geq x \geq -34 \checkmark$$

$$-34 \leq x \leq -28 \checkmark$$

$$2.7 \quad V\sqrt{x} - R^2 = K \quad (3)$$

$$\sqrt{x} = K + R^2 \checkmark$$

$$\sqrt{x} = \frac{K+R^2}{V} \checkmark$$

$$x = \left(\frac{K+R^2}{V}\right)^2 \checkmark$$

2.8 Los vir x en y gelyktydig op:

$$3^{2x-y} = \frac{1}{3}$$

$$8x + 2y + 4 = 0$$

(5)

$$3^{2x-y} = 3^{-1} \checkmark$$

$$2x - y = -1 \dots \dots (1)$$

$$8x + 2y = -4 \dots \dots (2)$$

$$(1) \times 2: 4x - 2y = -2 \dots (3) \checkmark$$

$$(2) + (3): 12x = -6$$

$$x = -\frac{1}{2} \checkmark$$

$$\text{Stel } x = -\frac{1}{2} \text{ in (1): } 2\left(-\frac{1}{2}\right) - y = -1 \checkmark$$

$$0 = y \checkmark$$

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Vraag 3

3.1.1 Gebruik die dubbel-afsnit metode en skets die funksie van $k(x) = -\frac{x^2}{2} + 1$ op 'n assstelsel en dui duidelik die afsnitte met die ass aan. Toon alle berekeninge. (3)

y - afsnit (stel $x = 0$)

$$y = -\frac{0}{2} + 1$$

$$y = 1$$

x - afsnit (stel $y = 0$)

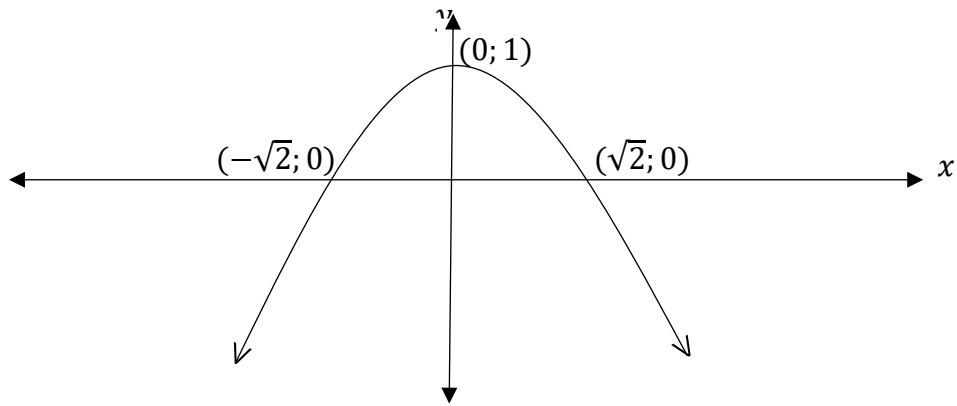
$$0 = -\frac{x^2}{2} + 1$$

$$-1 = -\frac{x^2}{2}$$

$$2 = x^2$$

$$\pm\sqrt{2} = x$$

✓ vorm; ✓ y – afsnit ; ✓ x – afsnitte



3.1.2 Skryf die definisieversameling van k neer. (1)

$$x \in \mathbb{R} \checkmark$$

3.1.3 Skryf die waardeversameling van k neer. (1)

$$y \in (-\infty; 1] \checkmark$$

3.1.4 Bereken:

3.1.4.1 $k(x) = \frac{1}{2}$ (2)

$$\frac{1}{2} = -\frac{x^2}{2} + 1 \checkmark$$

$$-\frac{1}{2} = -\frac{x^2}{2}$$

$$1 = x^2$$

$$\pm 1 = x \checkmark$$

3.1.4.2 $2k\left(\frac{1}{2}\right)$ (2)

$$= 2\left(-\frac{\left(\frac{1}{2}\right)^2}{2} + 1\right) \checkmark$$

$$= 2\left(\frac{1}{4} \times -\frac{1}{2} + 1\right)$$

$$= 2\left(-\frac{1}{8} + 1\right)$$

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

$$= -\frac{1+8}{4}$$

$$= -\frac{7}{4} \checkmark$$

3.1.5 Indien die funksie $m(x)$ gevorm word deur $k(x)$ om die x -as te reflekteer en daarna 5 eenhede op te skuif wat sal die vergelyking van $m(x)$ wees. Gee jou antwoord in die vorm $m(x) = \underline{\hspace{2cm}}$. (2)

$$m(x) = -\left(-\frac{x^2}{2} + 1\right) + 5$$

$$m(x) = \frac{x^2}{2} - 1 \checkmark + 5$$

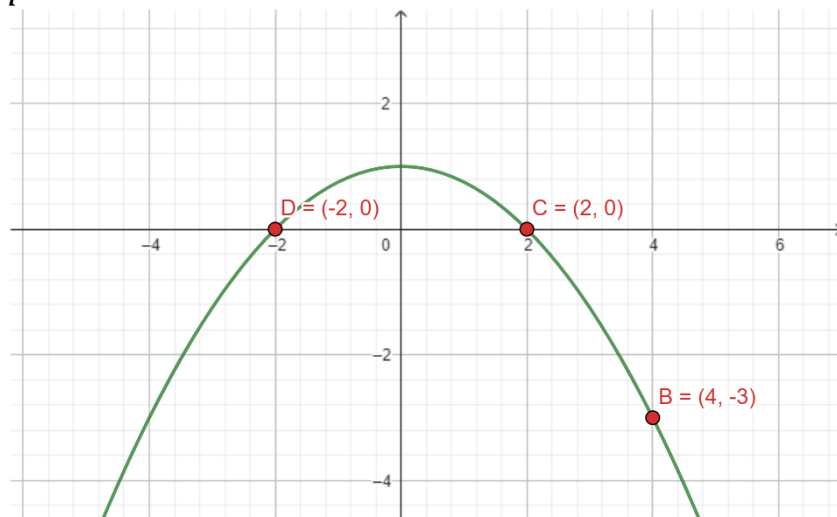
$$m(x) = \frac{x^2}{2} + 4 \checkmark$$

3.2 Bepaal die vergelyking van elkeen van die volgende funksies in die vorm:

$$y = ax^2 + q$$

3.2.1

(4)



$$y = a(x + 2)(x - 2) \checkmark$$

$$-3 = a(4 + 2)(4 - 2)$$

$$-3 = a(6)(2)$$

$$-3 = 12a$$

$$-\frac{1}{4} = a \checkmark$$

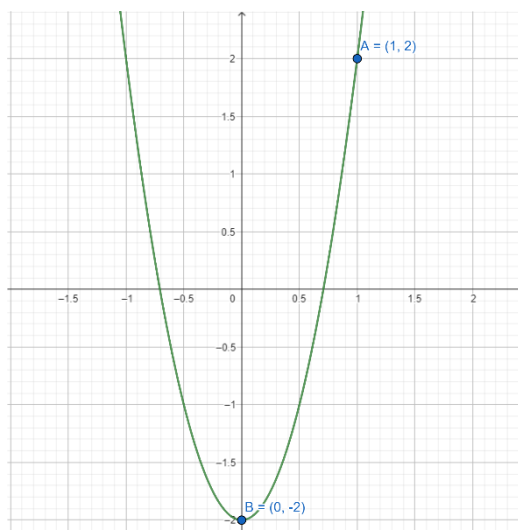
$$y = -\frac{1}{4}(x + 2)(x - 2)$$

$$y = -\frac{1}{4}(x^2 - 4)$$

$$y = -\frac{x^2}{4} \checkmark + 1 \checkmark$$

3.2.2

(2)



$$y = ax^2 - 2 \checkmark$$

Stel in (1; 2)

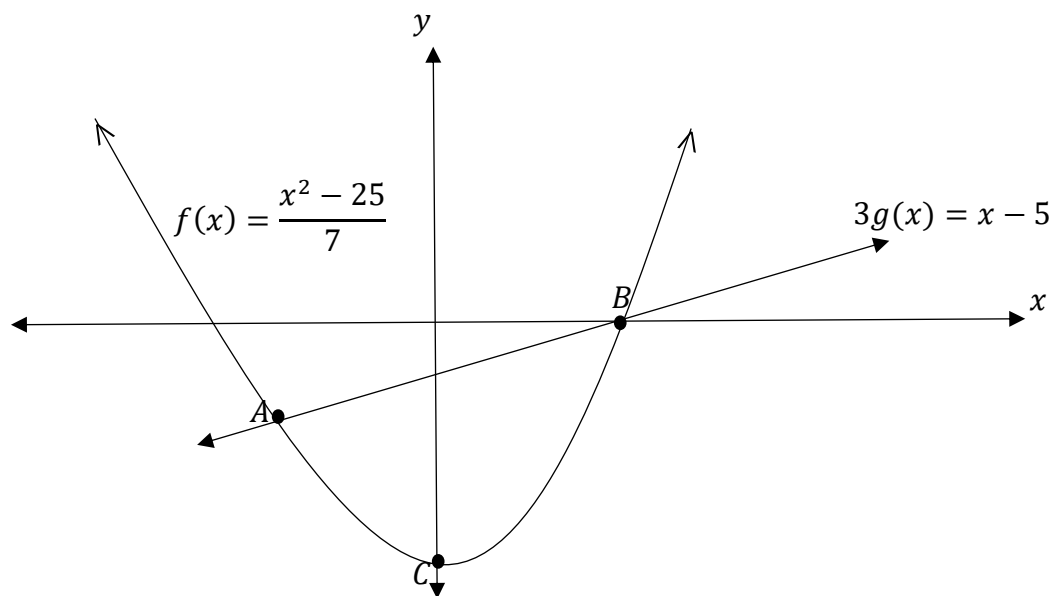
$$2 = a(1)^2 - 2$$

$$4 = a \checkmark$$

$$y = 4x^2 - 2$$

Vraag 4

Beskou die onderstaande skets en beantwoord die vrae wat volg:



4.1 Bereken die koördinate van B. (2)

$$3y = x - 5$$

$$3(0) = x - 5 \checkmark$$

$$5 = x$$

$$B(5; 0) \checkmark$$

4.2 Bereken die koördinate van C. (2)

$$f(x) = \frac{0^2 - 25}{7} \checkmark$$

$$f(x) = \frac{-25}{7}$$

$$C(0; \frac{-25}{7}) \checkmark$$

4.3 Vir watter waardes van x sal :

4.3.1 $f(x) \leq g(x)$ (5)

$$3(\frac{x^2 - 25}{7}) = x - 5$$

$$\frac{x^2 - 25}{7} = \frac{x - 5}{3} \checkmark$$

$$3x^2 - 75 = 7x - 35$$

$$3x^2 - 7x - 40 = 0 \checkmark$$

$$(3x + 8)(x - 5) = 0 \checkmark$$

$$x = -\frac{8}{3} \checkmark \text{ of } x = 5$$

$$y = (-\frac{8}{3} - 5) \div 3$$

$$y = -3$$

$$A(-\frac{8}{3}; -3)$$

$$-\frac{8}{3} \leq x \leq 5 \checkmark$$

