

HOÛRSKOOL HERMANUS HIGH SCHOOL



WISKUNDE TOETS/ MATHEMATICS TEST WORTEL- EN KWADARTIESE VGLS, MAKIMUM- EN MINIMUM WAARDES SURD AND QUADRATIC EQS, MAXIMUM AND MINIMUM VALUES

GRAAD / GRADE: 11
TYD / TIME: 40 min
EKSAMINATOR: M Viljoen

DATUM / DATE: 23 FEBR 2018
PUNTE / MARKS: 35
MODERATOR: G Bellingan

INSTRUKSIES:

1. Toon alle stappe. Sakrekenaars word slegs as hulpmiddel gebruik.
2. Doen jou beste!

INSTRUCTIONS:

1. Show all steps. Calculators may only be used as an aid.
2. Do your best!

VRAAG 1

Los die volgende vergelykings op. Toon alle stappe.

QUESTION 1

Solve die following equations. Show all steps.

1.1 $(x - 3)(x + 2) = 0$ [2]

1.2 $2x(x - 5) = 12$ [3]

1.3 $\frac{x}{x-1} - \frac{2x+4}{3x+1} + 4 = 0$ [5]

1.4 $(x + 1)(x - 4) = 5$ tot twee desimale plekke
to two decimal places [4]

1.5 $3x - 6 = -4x^2$ laat die antwoord in wortelvorm
leave the answer in surd form [3]

1.6 $4 - \sqrt{x+6} = -x$ [6]
[23]

VRAAG 2

2.1 Beskou:

$$2x^2 - 3x - 4$$

- 2.1.1 Herskryf die uitdrukking in die vorm $a(x + p)^2 + q$.
- 2.1.2 Bepaal of die uitdrukking 'n maksimum of minimum het en wat die waarde van die maksimum of minimum waarde is.

Question 2

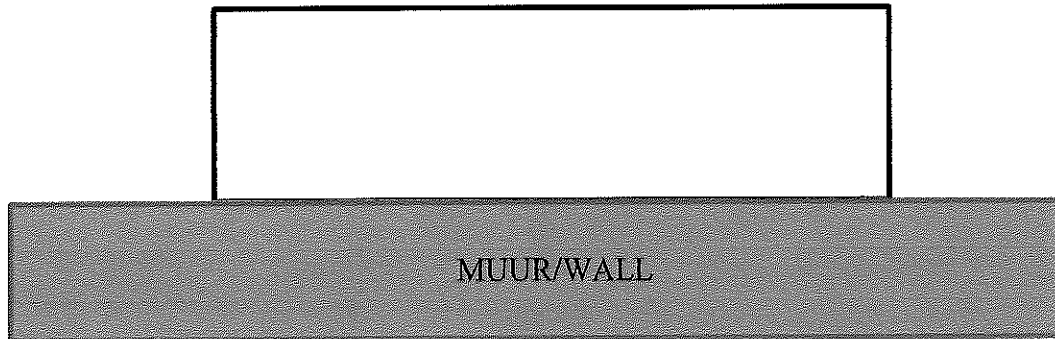
Consider:

$$2x^2 - 3x - 4$$

- 2.1.1 Rewrite the expression in the form $a(x + p)^2 + q$. [4]
- 2.1.2 State whether the expression has a maximum or minimum value and what the maximum or minimum value is. [1]

2.2 Juf Viljoen wil graag 'n kampie vir haar eendjies bou. Sy gebruik een kant van die garage-muur en die orige drie sye van die reghoekige kampie word met 25m heiningdraad toegespan.

2.2 Mrs Viljoen wants to close up an area for her ducklings. She uses the garage wall as one of the sides of the camp and the other three sides of the camp must be fenced in with 25m of fencing.



2.2.1 Indien die breedte x is en die lengte y is, skryf die lengte in terme van x .

2.2.1 If the breadth is x and the length is y , write the length in terms of x . [1]

2.2.2 Skryf 'n formule vir die oppervlakte van die kampie in terme van x .

2.2.2 Write a formula for the area of the camp in terms of x . [2]

2.2.3 Hoe groot gaan die maksimum oppervlakte (afgerond tot die naaste m^2) van die eende se kampie wees?

2.2.3 What will the maximum area of the camp (rounded off to the nearest m^2) for the ducklings be? [4]

[12]

Totaal / Total: [35]

K	R	C	P.
2	16	13	4

1.1. $(x-3)(x+2)=0$

$$x = \underline{3} \quad / \quad x = \underline{-2}$$

K. (2)

✓ $x=3$

✓ $x=-2$

1.2. $2x(x-5) = 12$

$$2x^2 - 10x - 12 = 0$$

$$\div 2: x^2 - 5x - 6 = 0$$

$$(x+1)(x-6) = 0$$

$$x = \underline{-1} \quad / \quad x = \underline{6}$$

R. (3)

✓ st. form

✓ fact

✓ both ans.^s

1.3. $\frac{x}{x-1} - \frac{2x+4}{3x+1} + 4 = 0$

$$\times (x-1)(3x+1): \quad x \neq 1; \quad x \neq -\frac{1}{3}$$

$$x(3x+1) - (2x+4)(x-1) + 4(x-1)(3x+1) = 0$$

$$3x^2 + x - 2x^2 - 2x + 4 + 12x^2 - 8x - 4 = 0$$

$$13x^2 - 9x = 0$$

$$x(13x-9) = 0$$

$$x = 0 \quad / \quad x = \frac{9}{13}$$

R. (5)

✓ $(x-1)(3x+1)$

✓

✓ st. vorm

✓ fakt

✓ alle antw.^e

1.4. $(x+1)(x-4) = 5$

$$x^2 - 3x - 4 - 5 = 0$$

$$x^2 - 3x - 9 = 0$$

$$x = \frac{-(-3) \pm \sqrt{9 - 4(1)(-9)}}{2(1)}$$

$$= \frac{3 \pm \sqrt{45}}{2}$$

$$= \underline{4,85} \quad / \quad x = \underline{-1,85}$$

R. (4)

✓ st. form

✓ subst. into correct form.

✓ $x = 4,85$

✓ $x = -1,85$

1.5. $3x - 6 = -4x^2$

$$4x^2 + 3x - 6 = 0$$

$$x = \frac{-3 \pm \sqrt{9 - 4(4)(-6)}}{2(4)}$$

$$= \frac{-3 \pm \sqrt{105}}{8} \rightarrow$$

R. (3)

✓ st. vorm.

✓ subst in korrekte form

✓ $\sqrt{}$ antw.

$$1.6. \quad 4 - \sqrt{x+6} = -x$$

$$(4+x)^2 = (\sqrt{x+6})^2$$

$$16 + 8x + x^2 = x + 6$$

$$x^2 + 7x + 10 = 0$$

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

$$x = -2 \rightarrow / x \neq -5$$

$$\text{if } x = -2: \text{ LHS} = 4 - \sqrt{-2+6} = 2$$

$$\text{RHS} = -(-2) = 2 \quad \therefore \text{LHS} = \text{RHS}$$

$$\text{as } x = -5: \text{ LK} = 4 - \sqrt{-5+6} = 3$$

$$\text{RK} = -(-5) = 5 \quad \text{LK} \neq \text{RK}$$

C. (6)

$$\checkmark 4+x = \sqrt{x+6}$$

$$\checkmark (\quad)^2 = (\quad)^2$$

✓ st. form

✓ fact

$$\checkmark x = -2$$

$$\checkmark x \neq -5$$

$$2.1.1. \quad 2x^2 - 3x - 4$$

$$= 2 \left[x^2 - \frac{3}{2}x - 2 \right]$$

$$= 2 \left[x^2 - \frac{3}{2}x + \left(\frac{3}{4} \right)^2 - \frac{9}{16} - 2 \right]$$

$$= 2 \left[\left(x - \frac{3}{4} \right)^2 - \frac{41}{16} \right]$$

$$= 2 \left(x - \frac{3}{4} \right)^2 - \frac{41}{8}$$

$$\checkmark 2 \left[\quad \right]$$

$$\checkmark \pm \left(\frac{3}{4} \right)^2$$

$$\checkmark (\quad)^2 \dots$$

✓ simplify

C (4)

R (1) ✓ ans.

$$2.1.2. \quad \text{min} = -\frac{41}{8}$$

$$2.2.1. \quad y = 25 - 2x$$

C. (1)

$$2.2.2. \quad \text{Area} = x(25 - 2x)$$

$$= 25x - 2x^2$$

$$= -2x^2 + 25x$$

✓ lxb

✓ simplify

C (2)

$$2.2.3. \quad -2x^2 + 25x$$

$$= -2 \left[x^2 - \frac{25}{2}x + \left(\frac{25}{4} \right)^2 - \frac{625}{16} \right]$$

$$= -2 \left[\left(x - \frac{25}{4} \right)^2 - \frac{625}{16} \right]$$

$$= -2 \left(x - \frac{25}{4} \right)^2 + \frac{625}{8}$$

$$\therefore \text{max} \approx 78 \text{ m}^2$$

$$\checkmark -2 \left[\dots \right]$$

✓ complete square

$$\checkmark -2 \left[\quad \right]$$

✓ ans rounded

P. (4)