

Diagnostische toets

bladzijde 30

- 1** a $(x - 3)^2 = 6(x + 9)$
 $(x - 3)(x - 3) = 6x + 54$
 $x^2 - 3x - 3x + 9 - 6x - 54 = 0$
 $x^2 - 12x - 45 = 0$
 $(x + 3)(x - 15) = 0$
 $x + 3 = 0$ of $x - 15 = 0$
 $x = -3$ of $x = 15$
- b $3x^2 + 7x = 3x + 20$
 $3x^2 + 7x - 3x - 20 = 0$
 $3x^2 + 4x - 20 = 0$
 $a = 3, b = 4, c = -20$
 $D = b^2 - 4ac = 4^2 - 4 \cdot 3 \cdot -20 = 256$
 $x = \frac{-4 - \sqrt{256}}{6}$ of $x = \frac{-4 + \sqrt{256}}{6}$
 $x = \frac{-4 - 16}{6} = -3\frac{1}{3}$ of $x = \frac{-4 + 16}{6} = 2$
- c $5x^2 = x$
 $5x^2 - x = 0$
 $x(5x - 1) = 0$
 $x = 0$ of $5x - 1 = 0$
 $x = 0$ of $5x = 1$
 $x = 0$ of $x = \frac{1}{5}$
- d $(3x - 1)(2x + 1) = 29 + x$
 $6x^2 + 3x - 2x - 1 - 29 - x = 0$
 $6x^2 - 30 = 0$
 $6x^2 = 30$
 $x^2 = 5$
 $x = \sqrt{5}$ of $x = -\sqrt{5}$

- 2** $f(x) = -5x^2 + 15x + p$
De grafiek ligt geheel onder de x -as, dus $D < 0$.
 $a = -5, b = 15, c = p$
 $D = b^2 - 4ac = 15^2 - 4 \cdot -5 \cdot p = 225 + 20p$
 $D < 0$ geeft $225 + 20p < 0$
 $20p < -225$
 $p < -11,25$

- 3** a $f(x) = -2x^2 + 12x - 7$
 $x_{\text{top}} = -\frac{b}{2a} = -\frac{12}{2 \cdot -2} = 3$
 $y_{\text{top}} = f(3) = -2 \cdot 3^2 + 12 \cdot 3 - 7 = 11$
De grafiek van f is een bergparabool want $a = -2 < 0$.
Het maximum van f is 11 voor $x = 3$.

b $g(x) = (x - 5)(x + 3) = x^2 + 3x - 5x - 15 = x^2 - 2x - 15$

$$x_{\text{top}} = -\frac{b}{2a} = -\frac{-2}{2 \cdot 1} = 1$$

$$y_{\text{top}} = g(1) = 1^2 - 2 \cdot 1 - 15 = -16$$

De grafiek van g is een dalparabool, want $a = 1 > 0$.

Het minimum van g is -16 voor $x = 1$.

4 a $f(x) = g(x)$ geeft $x = -1$ of $x = 6$



$$f(x) < g(x) \text{ geeft } -1 < x < 6$$

b $h(x) = k(x)$ geeft $x = -2$ of $x = 5$



$$h(x) > k(x) \text{ geeft } -2 < x < 5$$

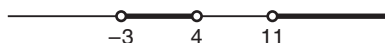
c $h(x) = 5$ geeft $x = -1$ of $x = 3$



$$h(x) > 5 \text{ geeft } -1 < x < 3$$

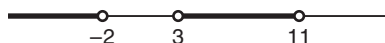
d $h(x) < 5$ geeft $x < -1$ of $x > 3$

5 a $f(x) = g(x)$ geeft $x = -3$ of $x = 4$ of $x = 11$



$$f(x) < g(x) \text{ geeft } -3 < x < 4 \text{ of } x > 11$$

b $f(x) = 0$ geeft $x = -2$ of $x = 3$ of $x = 11$



$$f(x) > 0 \text{ geeft } x < -2 \text{ of } 3 < x < 11$$

bladzijde 31

6 $f(x) = g(x)$ geeft

$$x^2 - 2x - 3 = -3x - 1$$

$$x^2 - 2x + 3x - 3 + 1 = 0$$

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

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

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



$$f(x) < g(x) \text{ geeft } -2 < x < 1$$

7 a $\underbrace{x^2 + 8x - 9}_{f(x)} < 0$

$$f(x) = 0$$

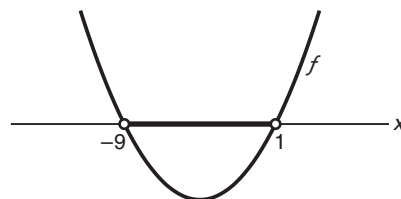
$$x^2 + 8x - 9 = 0$$

$$(x - 1)(x + 9) = 0$$

$$x = 1 \text{ of } x = -9$$

dalparabool

$$f(x) < 0 \text{ geeft } -9 < x < 1$$



b $\underbrace{6x^2 + 5x + 1}_{f(x)} > 0$

$$f(x) = 0$$

$$6x^2 + 5x + 1 = 0$$

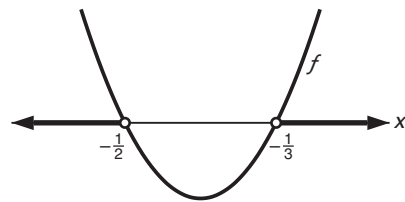
$$D = b^2 - 4ac = 5^2 - 4 \cdot 6 \cdot 1 = 1$$

$$x = \frac{-5 - \sqrt{1}}{12} \text{ of } x = \frac{-5 + \sqrt{1}}{12}$$

$$x = \frac{-5 - 1}{12} = -\frac{1}{2} \text{ of } x = \frac{-5 + 1}{12} = -\frac{1}{3}$$

dalparabool

$$f(x) > 0 \text{ geeft } x < -\frac{1}{2} \text{ of } x > -\frac{1}{3}$$



c $x^2 + 4x > -5$

$$\underbrace{x^2 + 4x + 5}_{f(x)} > 0$$

$$f(x) = 0$$

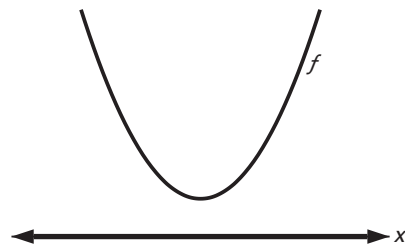
$$x^2 + 4x + 5 = 0$$

$$D = 4^2 - 4 \cdot 1 \cdot 5 = -4$$

$D < 0$, dus $f(x) = 0$ heeft geen oplossingen.

dalparabool

$$f(x) > 0 \text{ voor elke } x$$



d $-0,1x^2 < x$

$$\underbrace{-0,1x^2 - x}_{f(x)} < 0$$

$$f(x) = 0$$

$$-0,1x^2 - x = 0$$

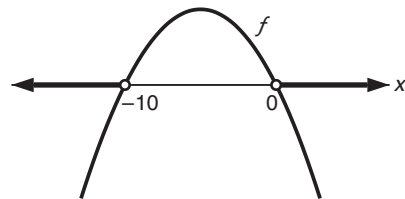
$$x(-0,1x - 1) = 0$$

$$x = 0 \text{ of } -0,1x = 1$$

$$x = 0 \text{ of } x = -10$$

bergparabool

$$f(x) < 0 \text{ geeft } x < -10 \text{ of } x > 0$$



8 a $(3x - 1)(4x + 3) - 4x = 12x^2 + 9x - 4x - 3 - 4x = 12x^2 + x - 3$

b $(3a + 4)^2 - (4a - 3)^2 = 9a^2 + 24a + 16 - (16a^2 - 24a + 9)$
 $= 9a^2 + 24a + 16 - 16a^2 + 24a - 9 = -7a^2 + 48a + 7$

c $2x(x - 6)^2 = 2x(x^2 - 12x + 36) = 2x^3 - 24x^2 + 72x$

d $(5x)^2 - (5x - 1)^2 = 25x^2 - (25x^2 - 10x + 1) = 25x^2 - 25x^2 + 10x - 1 = 10x - 1$

9 a $(x + 4)(x - 3y + 2) = x^2 - 3xy + 2x + 4x - 12y + 8 = x^2 - 3xy + 6x - 12y + 8$

b $(x - 5)^3 = (x - 5)(x - 5)^2 = (x - 5)(x^2 - 10x + 25)$
 $= x^3 - 10x^2 + 25x - 5x^2 + 50x - 125 = x^3 - 15x^2 + 75x - 125$

10 a $W = 2(3q - 1)^2 - (3q)^2$
 $= 2(9q^2 - 6q + 1) - 9q^2$
 $= 18q^2 - 12q + 2 - 9q^2$
 $= 9q^2 - 12q + 2$

b $V = 0,5(a + 6)(2a - 3)$
 $= 0,5(2a^2 - 3a + 12a - 18)$
 $= a^2 - 1,5a + 6a - 9$
 $= a^2 + 4,5a - 9$

11 a $f(x) = -5x^2 + 8x + 3$
 $f(a+5) = -5(a+5)^2 + 8(a+5) + 3$
 $= -5(a^2 + 10a + 25) + 8a + 40 + 3$
 $= -5a^2 - 50a - 125 + 8a + 43$
 $= -5a^2 - 42a - 82$

b $f(5a) = -5(5a)^2 + 8 \cdot 5a + 3$
 $= -5 \cdot 25a^2 + 40a + 3$
 $= -125a^2 + 40a + 3$

12 $f(x) = -x^2 + 6px + 6p$, dus $x_{\text{top}} = -\frac{b}{2a} = -\frac{6p}{2 \cdot -1} = 3p$

$y_{\text{top}} = f(x_{\text{top}}) = f(3p) = -(3p)^2 + 6p \cdot 3p + 6p = -9p^2 + 18p^2 + 6p = 9p^2 + 6p$

Dus $y_{\text{top}} = 9p^2 + 6p$

$y_{\text{top}} = 3$ geeft $9p^2 + 6p = 3$

$9p^2 + 6p - 3 = 0$

$3p^2 + 2p - 1 = 0$

$D = 2^2 - 4 \cdot 3 \cdot -1 = 16$

$p = \frac{-2 - \sqrt{16}}{6}$ of $p = \frac{-2 + \sqrt{16}}{6}$

$p = \frac{-2 - 4}{6} = -1$ of $p = \frac{-2 + 4}{6} = \frac{1}{3}$

13 a $N = \frac{6a + ab}{3a} = \frac{\cancel{a}(6 + b)}{3\cancel{a}} = \frac{6 + b}{3}$

b $K = \frac{t^2 + 7t + 12}{t^2 - t - 12} = \frac{\cancel{t}(t+3)4}{\cancel{t}(t-3)4} = \frac{t+4}{t-4}$

14 a $\frac{6}{p} - \frac{3}{2p} = \frac{12}{2p} - \frac{3}{2p} = \frac{9}{2p}$

b $\frac{7}{q^2} - \frac{6}{q} = \frac{7}{q^2} - \frac{6q}{q^2} = \frac{7-6q}{q^2}$

15 a $5x - \frac{2}{x} = \frac{5x^2}{x} - \frac{2}{x} = \frac{5x^2 - 2}{x}$

b $\frac{3}{x} \cdot \frac{5x}{y} = \frac{15\cancel{x}}{\cancel{x}y} = \frac{15}{y}$

c $\frac{a}{2b} + \frac{b}{a} = \frac{a^2}{2ab} + \frac{2b^2}{2ab} = \frac{a^2 + 2b^2}{2ab}$

d $\frac{a}{2b} \cdot \frac{b}{a} = \frac{\cancel{a}\cancel{b}}{2\cancel{a}\cancel{b}} = \frac{1}{2}$