

Quadratische Funktionen: Scheitelpunktform in Faktorisierte Form umformen

Aufgabe:

Forme die Scheitelpunktform in Faktorisierte Form um.

a) $f(x) = (x + 5)^2 - 16$

Lösung:

$$\begin{aligned} a) \quad & (x + 5)^2 - 16 = 0 \mid + 16 \\ & (x + 5)^2 = 16 \mid \sqrt{} \\ & x + 5 = 4 \mid -5 \quad \text{und} \quad x + 5 = -4 \mid -5 \\ & x = -1 \quad \text{und} \quad x = -9 \\ & f(x) = (x + 1) \cdot (x + 9) \end{aligned}$$

b) $f(x) = (x + 3)^2 - 1$

$$\begin{aligned} b) \quad & (x + 3)^2 - 1 = 0 \mid + 1 \\ & (x + 3)^2 = 1 \mid \sqrt{} \\ & x + 3 = 1 \mid -3 \quad \text{und} \quad x + 3 = -1 \mid -3 \\ & x = -2 \quad \text{und} \quad x = -4 \\ & f(x) = (x + 2) \cdot (x + 4) \end{aligned}$$

c) $f(x) = (x + 4)^2 - 9$

$$\begin{aligned} c) \quad & (x + 4)^2 - 9 = 0 \mid + 9 \\ & (x + 4)^2 = 9 \mid \sqrt{} \\ & x + 4 = 3 \mid -4 \quad \text{und} \quad x + 4 = -3 \mid -4 \\ & x = -1 \quad \text{und} \quad x = -7 \\ & f(x) = (x + 1) \cdot (x + 7) \end{aligned}$$

d) $f(x) = (x - 2)^2 - 1$

$$\begin{aligned} d) \quad & (x - 2)^2 - 1 = 0 \mid + 1 \\ & (x - 2)^2 = 1 \mid \sqrt{} \\ & x - 2 = 1 \mid +2 \quad \text{und} \quad x - 2 = -1 \mid +2 \\ & x = 3 \quad \text{und} \quad x = 1 \\ & f(x) = (x - 3) \cdot (x - 1) \end{aligned}$$

e) $f(x) = (x + 4)^2 - 9$

$$\begin{aligned} e) \quad & (x + 4)^2 - 9 = 0 \mid + 9 \\ & (x + 4)^2 = 9 \mid \sqrt{} \\ & x + 4 = 3 \mid -4 \quad \text{und} \quad x + 4 = -3 \mid -4 \\ & x = -1 \quad \text{und} \quad x = -7 \\ & f(x) = (x + 1) \cdot (x + 7) \end{aligned}$$

f) $f(x) = (x + 2)^2 - 16$

$$\begin{aligned} f) \quad & (x + 2)^2 - 16 = 0 \mid + 16 \\ & (x + 2)^2 = 16 \mid \sqrt{} \\ & x + 2 = 4 \mid -2 \quad \text{und} \quad x + 2 = -4 \mid -2 \\ & x = 2 \quad \text{und} \quad x = -6 \\ & f(x) = (x - 2) \cdot (x + 6) \end{aligned}$$

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

$$\begin{aligned} g) \quad & (x + 3)^2 - 9 = 0 \mid + 9 \\ & (x + 3)^2 = 9 \mid \sqrt{} \\ & x + 3 = 3 \mid -3 \quad \text{und} \quad x + 3 = -3 \mid -3 \\ & x = 0 \quad \text{und} \quad x = -6 \\ & f(x) = x \cdot (x + 6) \end{aligned}$$

h) $f(x) = (x - 3)^2 - 4$

$$\begin{aligned} h) \quad & (x - 3)^2 - 4 = 0 \mid + 4 \\ & (x - 3)^2 = 4 \mid \sqrt{} \\ & x - 3 = 2 \mid +3 \quad \text{und} \quad x - 3 = -2 \mid +3 \\ & x = 5 \quad \text{und} \quad x = 1 \\ & f(x) = (x - 5) \cdot (x - 1) \end{aligned}$$

i) $f(x) = (x - 4)^2 - 25$

$$\begin{aligned} i) \quad & (x - 4)^2 - 25 = 0 \mid + 25 \\ & (x - 4)^2 = 25 \mid \sqrt{} \\ & x - 4 = 5 \mid +4 \quad \text{und} \quad x - 4 = -5 \mid +4 \\ & x = 9 \quad \text{und} \quad x = -1 \\ & f(x) = (x - 9) \cdot (x + 1) \end{aligned}$$