

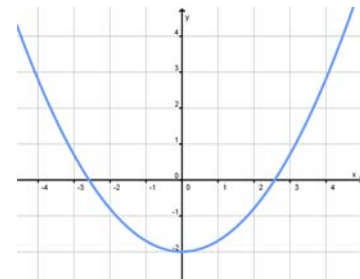
4 Quadratische Gleichungen und quadratische Funktionen

Englische Aufgaben

4.1 Which of the following statements are true?

- A The function f is on \mathbb{R}^+ strictly monotonically increasing.
- B The function f is on \mathbb{R}^+ strictly monotonically decreasing.
- C The function f is on \mathbb{R}^- strictly monotonically increasing.
- D The function f is on \mathbb{R}^- strictly monotonically decreasing.
- E The function f is strictly monotonically increasing.
- F The function f is strictly monotonically decreasing.

[strictly monotonically increasing/decreasing ... streng monoton wachsend/fallend]



4.2 Explain why the graph of the quadratic function $-2x^2 + 4x + 3$ opens downwards.

[to open downwards/upwards ... nach unten/oben öffnen]

4.3 The expression $x^2 + 12x$ can be written in the form $(x - s)^2 + t$ for all values of x . Find the value of s and the value of t .

4.4 Work out the vertex form of the quadratic function f whose standard form is $f(x) = \frac{1}{9}x^2 + 6x + 88$.

[vertex form ... Scheitelform]

4.5 Calculate the x -intercepts of the quadratic function f .

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

[x -intercept, zero ... Nullstelle]

4.6 A rectangular field has a length of $(2x + 5)$ metres and a width of $(x - 3)$ metres. The area of the field is 363 m^2 .

a. Show that the equation $2x^2 - x - 378 = 0$ can be used to solve this problem.

b. Solve the equation to find the length of the field.

4.7 The sum of the square of two consecutive integers is 61. Work out the value of the two integers.

[consecutive ... aufeinanderfolgend]

4.8 Using a quadratic equation find two consecutive integers whose reciprocals add up to $13/42$.

[reciprocal ... Kehrwert]

4.9 The hypotenuse of a right-angled triangle is 5 mm longer than the shortest side. The third side is 2 mm shorter than the hypotenuse. Find a quadratic equation which when solved leads to the length of the shortest side.

[right-angled ... rechtwinklig]

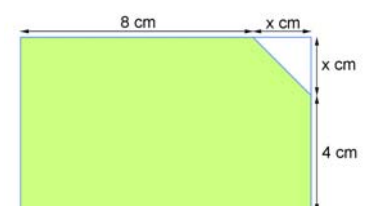
4.10 Ana runs a distance of 30 km at an average speed of y km/h. After training hard for two weeks she can run the same distance at an average speed 2 km/h faster than before. The total time of the first run and the final run is 5.5 hours. Calculate Ana's average speed on her first run.

4.11 A lottery team of r people won 12000 € in the lottery. If the same prize had been won three weeks earlier, when there were $(r - 3)$ people in the lottery team, each person would have received 2000 € more. Calculate the amount of money won by each member of the lottery team.

[lottery team ... Spielgemeinschaft]

4.12 Oliver has \$ 72 to spend on comics. The normal price of a comic is \$ m . During sale, the price of the comic is reduced by 50 Cents. If he spends his \$ 72 on comics at the sale price, he gets 2 more comics than if he spends \$ 72 on comics at the normal price. Work out the sale price of a comic.

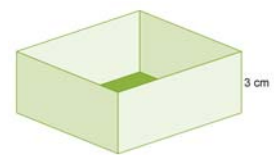
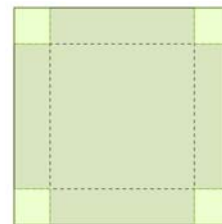
4.13 From the corner of a rectangle a right-angled triangle is cut off. The shaded area is 58 cm^2 . Calculate the value of x .



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- 4.14** A producer of webbings used for slacklining has monthly costs of $C(p) = 2000 - 60x + 0.2x^2$, where $C(p)$ is the total cost in Euros and p is the number of webbings produced. Work out the number of webbings produced every month that will yield a minimum cost.
[webbing ... Gurtband; to yield ... ergeben]
- 4.15** The function S given by $S(t) = 10000 + 800t - 5t^2$ gives the value of Archie's stock portfolio, where S is the value of the portfolio in pounds and t the time in months.
a. Work out with how much money Archie started with.
b. Calculate when the value of Archie's stock portfolio will be at a maximum.
 [stock portfolio ... Aktienbestand]
- 4.16** Joana uses a square (side x cm) of coloured cardboard to make an open box. Therefore she removes squares of side 3 cm from each corner. Calculate the value of x when the box has a volume of 588 cm^3 .
[cardboard ... Pappe]



- 4.17** Mark throws a tennis ball out of his apartment's window (28 m height). He lives on the sixth floor. The ball's height after t seconds is given by the function h defined as $h(t) = h_0 - 0.5g \cdot t^2$, where h_0 is the height of the ball at $t = 0$ and g the gravity of approximately 9.81 m/s^2 .
a. Draw the function's graph.
b. Calculate how many meters from the apartment house the ball hits the ground.
c. How long does it take till the ball is one meter above the ground?
- 4.18** In soil the number of bacteria is given by $B(t) = 10t^2 - 20t + 250$ for $-1 \leq t \leq 15$ and where t is the temperature of the soil in Celsius. Calculate at what temperature the number of bacteria will be minimal.
[soil ... Erde, Erdreich]