

Quadratic Functions and Equations: math practice, Grade 11 – download the PDF

21 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 Reading the coefficients

★ ★ ★

Consider $f(x) = -3x^2 + 12x - 2$.

- Give a , b and c . Does the parabola open up or down?
- Find the axis of symmetry and the vertex.
- Give the y-intercept.

2 Reading the vertex form

★ ★ ★

A function is given by $g(x) = 2(x + 4)^2 - 9$. Find its vertex, its axis of symmetry, whether it has a maximum or a minimum, and its y-intercept.

3 Factoring simple trinomials



Factor each expression, then solve $x^2 + 9x + 20 = 0$.

a. $x^2 + 9x + 20$

b. $x^2 - x - 12$

c. $x^2 - 64$

4 Common factor



Solve $5x^2 - 35x = 0$ by factoring.

5 Square root method



Solve $3(x - 2)^2 = 48$.

6 Using the discriminant



Without solving, tell how many real solutions each equation has.

a. $2x^2 - 3x + 5 = 0$

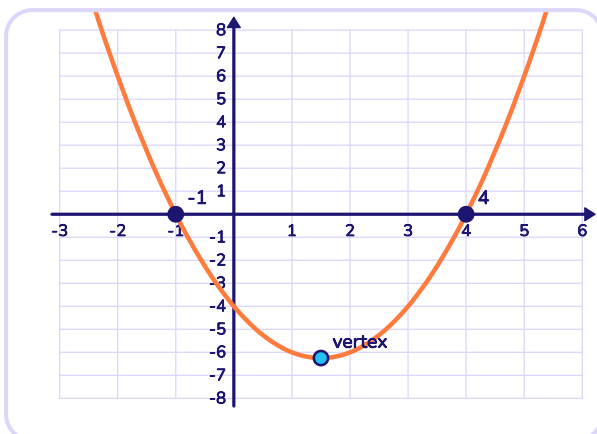
b. $x^2 + 6x + 9 = 0$

c. $2x^2 + 7x - 4 = 0$

7 Reading a graph for an inequality



The graph shows $f(x) = (x + 1)(x - 4)$.



- Where does the graph cross the x-axis?
- Solve $f(x) < 0$.
- Solve $f(x) \geq 0$.

8 Completing the square to get the vertex



Write $y = x^2 + 8x + 3$ in vertex form and give the vertex.

9 Vertex form with a negative leading coefficient



Write $y = -2x^2 + 12x - 7$ in vertex form. What is the maximum value?

10 Factoring by grouping



Solve $2x^2 + 5x - 12 = 0$ by factoring.

11 Quadratic formula with a radical



Solve $x^2 - 4x - 3 = 0$. Give the exact solutions, then round to the nearest hundredth.

12 A double root

For which values of k does $x^2 + kx + 25 = 0$ have exactly one real solution? Find that solution for each value.

13 Building a function from its roots

A parabola crosses the x -axis at $x = 2$ and $x = 7$ and passes through $(0, 28)$. Find its equation in standard form.

14 Two quadratic inequalities

Solve each inequality and write the answer in interval notation.

a. $x^2 - 5x + 4 > 0$

b. $2x^2 + x - 6 \leq 0$

15 The patio

A rectangular patio is 4 feet longer than it is wide. Its area is 252 square feet. Find its dimensions.

16 Complex solutions

Solve $x^2 - 6x + 13 = 0$ over the complex numbers, then check one of the solutions.

17 A rock thrown from a cliff

★★★

A rock is thrown upward from the top of a **40**-foot cliff. Its height in feet after t seconds is $h(t) = -16t^2 + 24t + 40$.

- When does the rock hit the ground?
- What is its maximum height, and when is it reached?

18 Revenue and price

★★★

A school club sells $120 - 4p$ T-shirts per week when the price is p dollars. The weekly revenue is $R(p) = p(120 - 4p)$.

- Which price gives the maximum revenue, and what is that revenue?
- For which prices is the revenue at least **\$800**?

19 A line and a parabola

★★★

Find the points where the parabola $y = x^2 - 2x - 3$ meets the line $y = x + 1$.

20 Roots that differ by 6

★★★

The equation $x^2 - 10x + c = 0$ has two real solutions that differ by **6**. Find c and the solutions.

21 Always positive

★★★

For which values of k is $x^2 - 4x + k > 0$ true for **every** real number x ? Explain with the vertex and with the discriminant.



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