

Quadratic Functions: Mixed Practice

This worksheet covers analyzing quadratic functions in vertex form and standard form, including vertex, intercepts, and domain and range ([Outcome](#), [Outcome](#)), along with factoring and solving quadratic equations ([Outcome](#), [Outcome](#)).

Exercises

1. Vertex form: identify the characteristics

For the function $y = 2(x - 3)^2 - 8$, determine each of the following ([Outcome](#)).

Vertex: _____

Direction of opening: _____

Axis of symmetry: _____

Domain: _____

Range: _____

y-intercept: _____

2. Matching: standard form to vertex form

Match each quadratic function in standard form on the left to its equivalent vertex form on the right by writing the correct letter in the blank ([Outcome](#), [Outcome](#)).

Standard form	Match	Vertex form
1. $y = x^2 - 4x + 1$	_____	A) $y = (x - 2)^2 - 3$
2. $y = x^2 + 6x + 5$	_____	B) $y = (x + 3)^2 - 4$
3. $y = 2x^2 - 8x + 3$	_____	C) $y = 2(x - 2)^2 - 5$

3. Factoring practice

Factor each expression fully ([Outcome](#)).

a) $x^2 + 7x + 12 =$ _____

b) $x^2 - 5x - 14 =$ _____

c) $2x^2 + 5x - 3 =$ _____

4. Solving quadratic equations

Solve each equation for x, showing your method ([Outcome](#), [Outcome](#)).

a) $x^2 - 9x + 20 = 0$

b) $3x^2 - 12 = 0$

5. Multiple choice: intercepts of a standard form quadratic

Given the function $y = x^2 - 2x - 15$, which of the following gives the intercepts of the graph ([Outcome](#))?

A) $x = 3$ and $x = -5$

- B) $x = 5$ and $x = -3$
 C) $x = 5$ and $x = 3$
 D) $x = -5$ and $x = -3$

Circle the correct answer.

6. Applied problem: modelling with a quadratic function

A ball is thrown into the air. Its height, h , in metres, above the ground after t seconds is modelled by the function $h(t) = -5t^2 + 20t + 1$ [Outcome](#), [Outcome](#).

a) What is the initial height of the ball, at $t = 0$?

b) Determine the vertex of this function by completing the square or an equivalent method. State what the vertex represents in this context.

c) After how many seconds does the ball reach its maximum height?

Answer key

- Vertex: $(3, 8)$; Direction of opening: upward; Axis of symmetry: $x = 3$; Domain: all real numbers ($x \in \mathbb{R}$); Range: $y \geq 8$; y-intercept: $y = 10$ (at $x = 0$, $y = 2(-3)^2 - 8 = 10$).
- 1, A, 2, B, 3, C.
- a) $(x + 3)(x + 4)$ b) $(x - 7)(x + 2)$ c) $(2x - 1)(x + 3)$.
- a) $x = 4$ or $x = 5$ (factors as $(x - 4)(x - 5) = 0$). b) $x^2 = 4$, so $x = 2$ or $x = -2$.
- B) $x = 5$ and $x = -3$ (factors as $(x - 5)(x + 3) = 0$).
- a) $h(0) = 1$ m. b) Vertex is $(2, 21)$; this represents a maximum height of 21 m reached at $t = 2$ seconds. c) $t = 2$ seconds.