

 **Key Facts**

- Quadratic form: $f(x) = ax^2 + bx + c$
- If $a > 0$: concave up \cup
- If $a < 0$: concave down \cap
- Axis of symmetry: $x = -\frac{b}{2a}$
- Vertex: substitute axis into $f(x)$
- y-intercept: let $x = 0$, so $y = c$

Section A — Guided Practice (work with a partner)

Question 1. For the quadratic $f(x) = x^2 - 6x + 5$:

3 marks

(a) Find the y-intercept

(c) Find the axis of symmetry

(b) Find the x-intercepts

(d) Find the vertex

(e) Sketch the graph below, labelling all key features

graph space

Question 2. For the quadratic $f(x) = -x^2 + 4x + 12$:

3 marks

(a) State whether the parabola is concave up or down. Explain why.

(b) Find the y-intercept and x-intercepts

(c) Find the axis of symmetry and vertex

(d) Sketch the graph below

graph space

Question 3. Match each equation to the correct description.

2 marks

Equations:

- A: $f(x) = x^2 - 4$
- B: $f(x) = -2x^2 + 1$
- C: $f(x) = (x - 3)^2$
- D: $f(x) = x^2 + 2x - 3$

Descriptions:

- 1: Vertex at the origin shifted right 3 units
- 2: Concave down, y-intercept at 1
- 3: y-intercept at -4, concave up
- 4: x-intercepts at -3 and 1

Answers: A – ___ B – ___ C – ___ D – ___

Section B — Independent Practice

Question 4. Sketch the graph of $f(x) = 2x^2 - 4x - 6$. Label all key features.

3 marks

Show all working:

graph space

Question 5. A quadratic function has x-intercepts at $x = -1$ and $x = 5$, and a y-intercept at $y = -5$.

3 marks

(a) Find the axis of symmetry.

(b) Find the vertex.

(c) Sketch the parabola.

graph space

Question 6. The height h metres of a ball thrown upward is given by $h(t) = -5t^2 + 20t + 2$, where t is time in seconds. 3 marks

(a) What is the initial height of the ball?

(b) At what time does the ball reach its maximum height?

(c) What is the maximum height?

★ Extension

Question 7. The parabola $f(x) = ax^2 + bx + c$ passes through the points $(0, 3)$, $(1, 0)$, and $(3, 0)$. Find the values of a , b , and c . 1 mark

Question 8. Describe the transformations that map $f(x) = x^2$ onto $g(x) = -2(x + 1)^2 + 4$. Sketch both functions on the same axes. 2 marks

