

3.4 Graphing quadratic functions

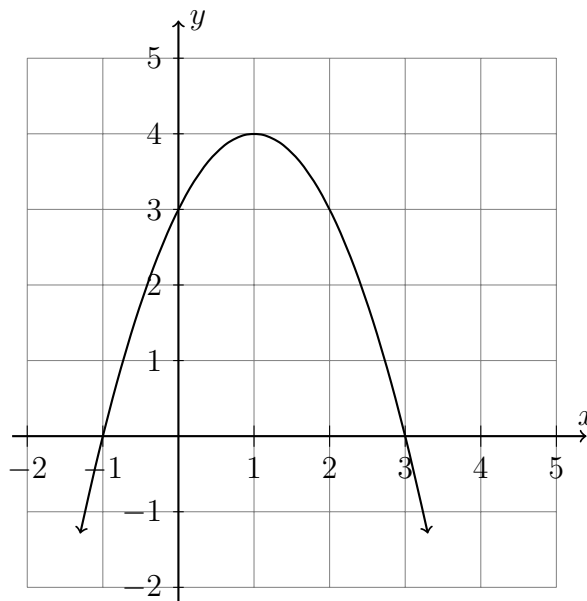
1. The function $f(x) = -x^2 + 2x + 3$ is shown on the graph.

(a) Write down its vertex as an ordered pair.

(b) Write down $f(0)$.

(c) Write down two solutions to $f(x) = 0$.

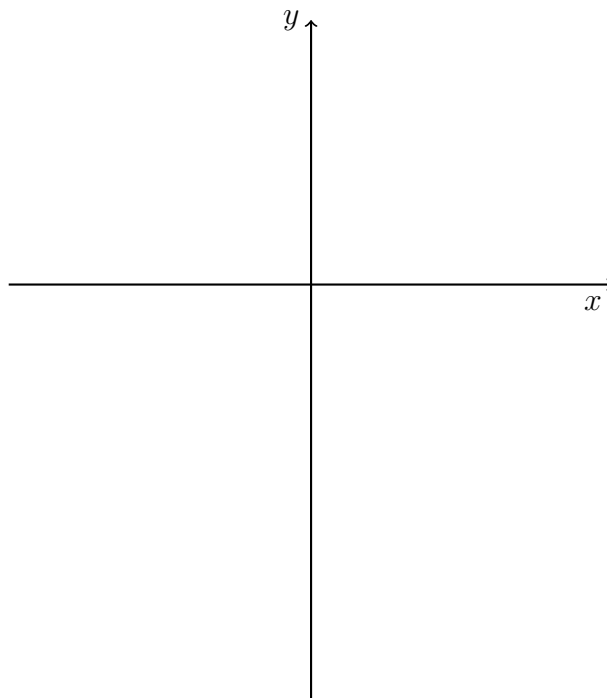
(d) Hence or otherwise, write f in the form
 $f(x) = a(x - p)(x - q)$



2. Given $f(x) = (x + 2)(x - 6)$

(a) Sketch the function. Label the vertex as an ordered pair and mark the intercepts with their values.

(b) Expand the function to standard form,
 $f(x) = ax^2 + bx + c$ where $a, b, c \in \mathbb{R}$.



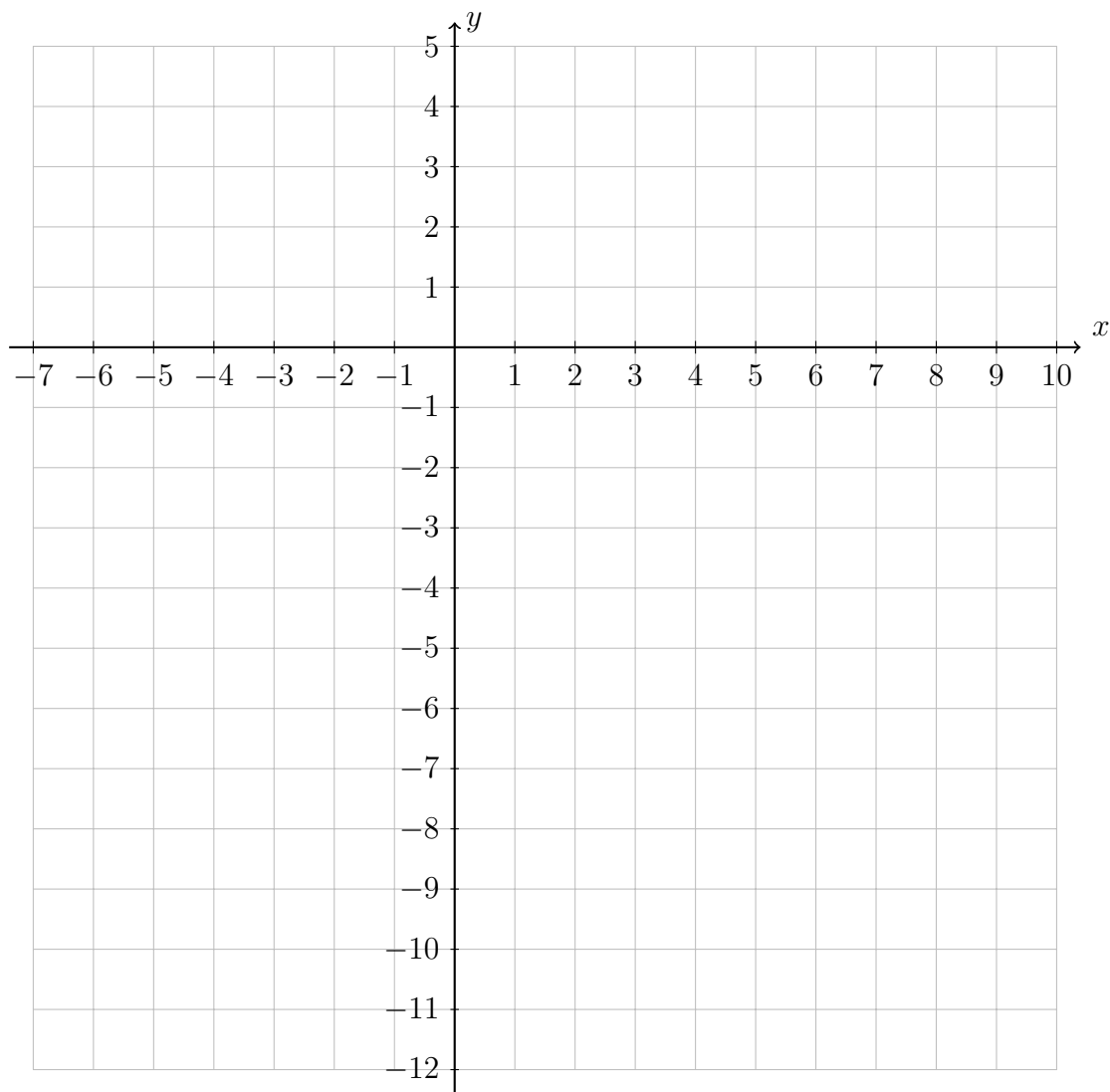
3. Consider the graph given by the equation $y = 0.4x^2 - 2x - 8$.

(a) Find the coordinates where the graph crosses the x -axis.

(b) Find the coordinates of the intercept with the y -axis.

(c) Find the equation of the axis of symmetry of the curve.

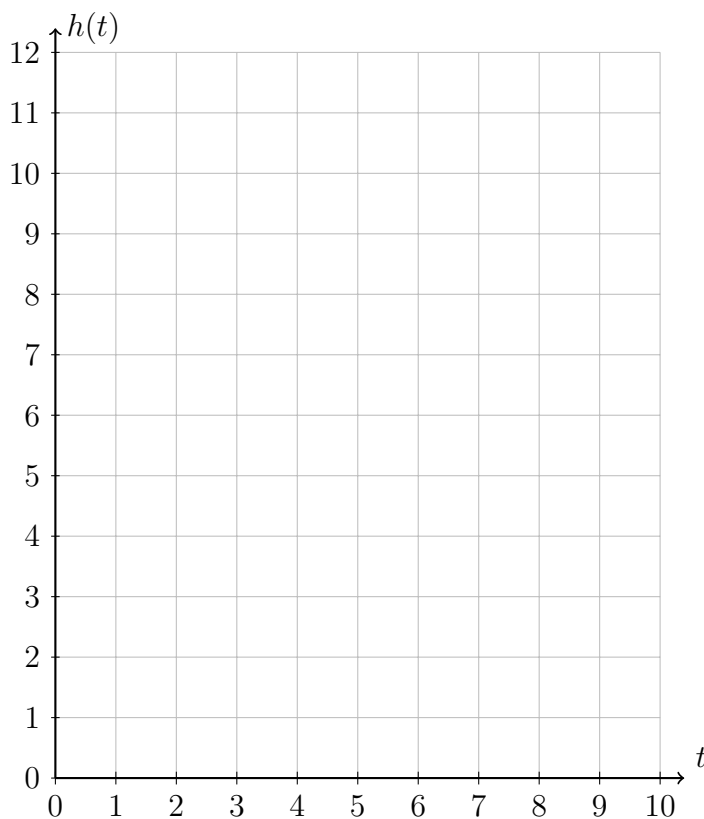
(d) Sketch the graph and the axis of symmetry, marking the intercepts and vertex.



4. A ball is thrown vertically upwards.

The path of the ball can be modelled by the equation $h(t) = 12t - 4t^2$ where $h(t)$ is the height of the ball after t seconds.

- (a) Plot a graph of this equation and hence sketch it below, showing the coordinates of the vertex and axes intercepts.
- (b) Find the t -intercepts and explain what these values represent.
- (c) Find the equation of the axis of symmetry, and state what this tells you in the context of the problem.



5. The path of a football can be modeled by the quadratic equation

$$h(x) = -0.0125x^2 + 0.65x - 3.45$$

where $h(x)$ is the height of the ball in meters, and x is the horizontal distance of the football in meters.

- (a) Sketch the graph below, labeling the coordinates of the vertex and axes intercepts.
- (b) Explain what the vertex represents in context. How high was the ball kicked?
- (c) Find the x -intercepts and explain what these values represent. How far was the ball kicked?

