5.1 Do Now: Function operations, algebra review, graphing quadratics

1. Let $f(x) = 3x - 4$ and $g(x) = 5x$, for $x \in \mathbb{R}$.

   (a) Write down $g(-3)$.

   (b) Find $(f \circ g)(x)$.

   (c) Find $f^{-1}(x)$.

2. Let $f(x) = 3x - 1$ and $g(x) = -2x^2 + 2$

   (a) Find $f^{-1}(x)$.

   (b) Find $(f \circ g)(1)$.

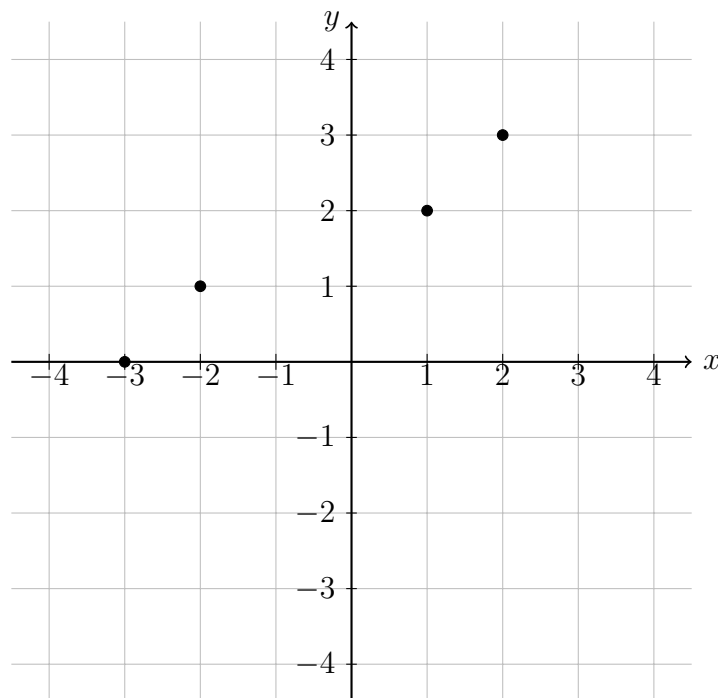3. The diagram below shows the graph of a function f, composed of four points.

   (a) Write down the value of $f(2)$.

   (b) Write down the domain of f.

   (c) Write down the range of f.

   (d) Write down the value of $f^{-1}(1)$.

   (e) Sketch the inverse of f, f^{-1}, on the grid at right.

Quadratics algebra competencies

4. Expand each binomial-squared expression to the form $ax^2 + bx + c$.

   (a) $(x + 3)(x + 3)$

   (c) $(x + 5)^2$

   (b) $(x + 2)^2$

   (d) $(x + 7)^2$

5. Simplify each radical.

   (a) $\sqrt{50}$

   (c) $\sqrt{27}$

   (b) $\sqrt{18}$

   (d) $\sqrt{24}$

6. Solve for the appropriate variable (h and r).

   (a) $Area = \frac{1}{2}(14.8)h = 62.9$

   (b) $Area = \pi r^2 = 483$

Graphing quadratic functions (you may use a calculator)
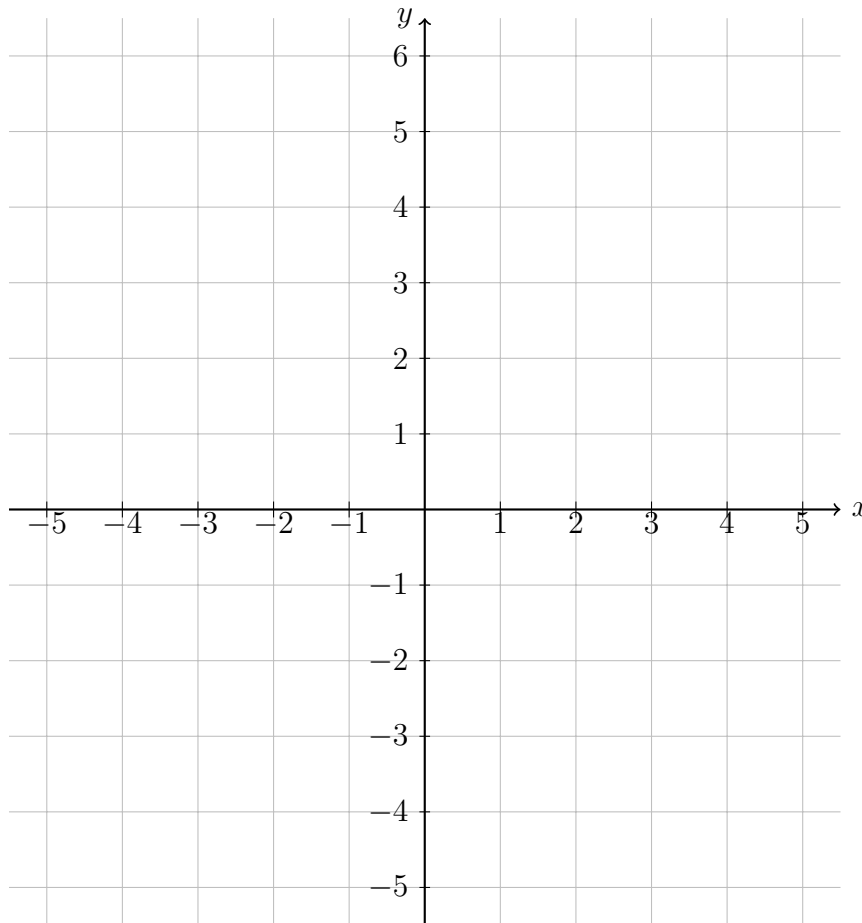
7. Consider the function $f(x) = x^2 + 2x - 3$.

   (a) Sketch the graph of f, for $-4 \leq x \leq 2$. Label the vertex and the intercepts.

   (b) This function can also be written in the form $f(x) = (x - p)^2 - 4$.
       Write down the value of p.

   (c) The graph of f has two solutions for $f(x) = 0$. Write down the solutions (or roots, zeros) of the function.

   (d) Hence, write down the function in factored form, $f(x) = (x - a)(x - b)$.

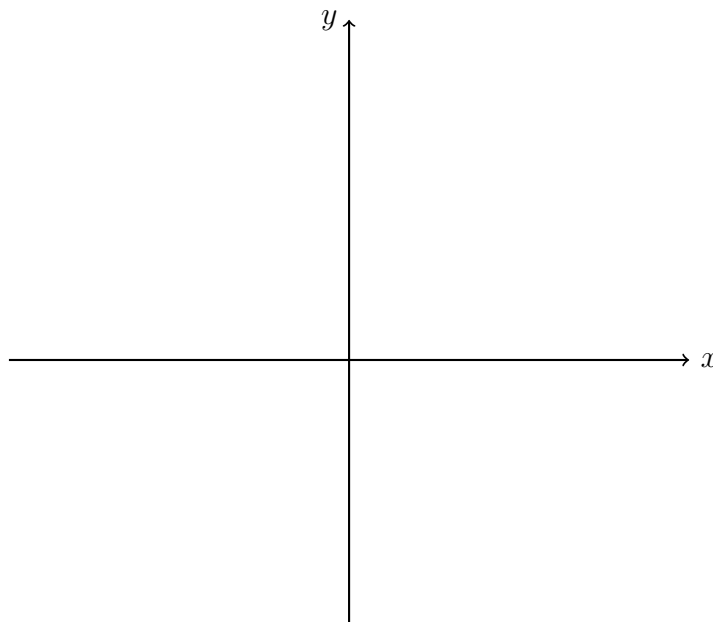## Sketching a quadratic function

8. Given $f(x) = (x-3)^2 - 4$

   (a) Write down the vertex of the function as an ordered pair.

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

   (c) Write down the value of $f(0)$. Explain what this represents on the graph.

   (d) Factor the function. Write down the roots.

   (e) Sketch the function, labeling the intercepts with values and the vertex as an ordered pair. Show the axis of symmetry as a dotted line and label it with its equation.

   (f) Write down the domain and range of the function.

9. Let f be a quadratic function. Part of the graph of f is shown below. The vertex is at $P(2, 1)$ and the y-intercept is at $Q(0, 3)$.
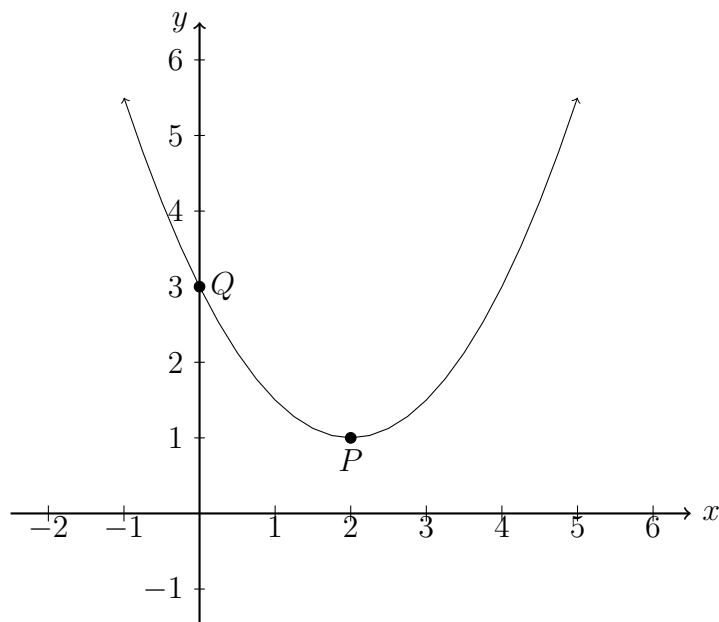
(a) Write down the equation of the axis of symmetry.

(b) The function f can be written in the form $f(x) = a(x - h)^2 + k$. Write down the value of h and of k.

(c) Find a.