## Algebra exam review

**1** The function f is defined as $f(x) = \dfrac{x}{x-1}$.

  **a** Find the value of

    **i** f(3),

        ..........................

    **ii** f(−3).

        ..........................

        (2)

  **b** State which value(s) of $x$ must be excluded from the domain of f.

        ..........................

        (1)

  **c**  **i** Find ff($x$).
     Give your answer in its most simple form.

        ff($x$) = ..........................

    **ii** What does your answer to **c** **i** show about the function f?

    .....................................................................

    .....................................................................

        (4)

        (Total 7 marks)

**2** Three functions are defined as follows:

$f: x \mapsto \cos x°$ for the domain $0 \leqslant x \leqslant 180$
$g: x \mapsto \sin x°$ for the domain $0 \leqslant x \leqslant 90$
$h: x \mapsto \tan x°$ for the domain $p \leqslant x \leqslant q$

**a** Find the range of f.

..........................
(2)

**b** Given that the range of h is the same as the range of g, find a value of $p$ and a value of $q$.

$p =$ ............... $q =$ ...............
(3)

(Total 5 marks)

**3** The diagram shows part of the graph of $y = f(x)$.
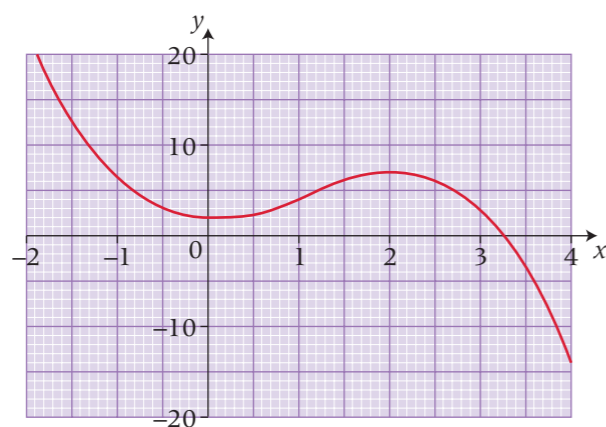


**a** Find f(3).

..........................
(1)

**b** Solve f(x) = 6

..........................
(2)

**c** Find ff(1).

..........................
(2)

**d** Find a estimate for the gradient of the curve at the point where $x = -1$

..........................
(3)

The equation $f(x) = k$, where $k$ is a number, has 3 solutions between $x = -2$ and $x = 4$

**e** Complete the inequalities which $k$ must satisfy.

............... $< k <$ ...........
(2)

(Total 10 marks)

**4**

$f(x) = x^2$
$g(x) = x - 6$

Solve the equation $fg(x) = g^{-1}(x)$

..........................................
(Total 5 marks)

**5** f and g are functions.

$$f : x \mapsto 2x - 3$$

$$g : x \mapsto 1 + \sqrt{x}$$

**a** Calculate f(−4)

........................

(2)

**b** Given that $f(a) = 5$, find the value of $a$.

$a =$ ..................

(2)

**c** Calculate gf(6)

........................

(2)

**d** Which values of $x$ cannot be included in the domain of g?

........................

(1)

**e** Find the inverse function $g^{-1}$ in the form $g^{-1} : x \mapsto \dots$

........................

(3)

(Total 10 marks)