

FUNCTIONS

- 1** $f: x \rightarrow |x - 4|, x \in \mathbb{R}$ $g: x \rightarrow |x| - 4, x \in \mathbb{R}$
Find the value of
a $f(6)$ **b** $f(3)$ **c** $f(-2)$ **d** $g(2)$ **e** $g(-8)$ **f** $g(-1)$
- 2** $f: x \rightarrow x^2 + 2x - 3, x \in \mathbb{R}$ $g: x \rightarrow |2x + 1|, x \in \mathbb{R}$
Find the value of
a $gf(0)$ **b** $fg(0)$ **c** $fg(4)$ **d** $gg(-3)$ **e** $gf(-3)$ **f** $fg(-1)$
- 3** Sketch each of the following graphs, showing the coordinates of any points of intersection with the axes. Where it occurs, a is a positive constant.
- a** $y = |x + 4|$ **b** $y = |2x - 5|$ **c** $y = |2 - 3x|$
d $y = |x^2 - 9|$ **e** $y = |x^3|$ **f** $y = |\sin x|, 0 \leq x \leq 2\pi$
g $y = |x - a|$ **h** $y = |3x + a|$ **i** $y = |a - 2x|$
j $y = |16 - x^2|$ **k** $y = |(x + 3)(2x - 1)|$ **l** $y = \left| \frac{1}{x} \right|, x \neq 0$
m $y = |\ln x|, x > 0$ **n** $y = |10 - 3x - x^2|$ **o** $y = |3x^2 + 5ax - 2a^2|$
- 4** For each of the following,
i sketch $y = f(x)$ and $y = g(x)$ on the same diagram,
ii solve the equation $f(x) = g(x)$.
- The domain of all the functions is $x \in \mathbb{R}$ and a is a positive constant where it occurs.
- a** $f(x) \equiv |2x - 3|, g(x) \equiv 2$ **b** $f(x) \equiv |7 - 3x|, g(x) \equiv 7$
c $f(x) \equiv |4x + 3a|, g(x) \equiv 5a$ **d** $f(x) \equiv |x^2 - 4|, g(x) \equiv 9$
e $f(x) \equiv |x^2 - 4x - 12|, g(x) \equiv 20$ **f** $f(x) \equiv |2a - 5x|, g(x) \equiv x$
- 5** Solve each equation.
a $|x - 5| = 3$ **b** $|x + 1| = 15$ **c** $|2x - 7| = 4$
d $|x - 2| = |x + 4|$ **e** $|x - 5| = |7 - x|$ **f** $|2x + 1| = |9 - 2x|$
g $|x + 3| = |2x|$ **h** $|4x - 1| = |2 - x|$ **i** $|3x - 4| = |2x + 3|$
- 6** Find the set of values of x for which
a $|x - 20| < 2$ **b** $|2x - 11| \leq 5$ **c** $|x - 17| > 12$
d $|5x - 22| < 40$ **e** $|x + 4| \leq |x + 1|$ **f** $|x + 2| > |2x - 5|$
- 7** For each of the following, sketch $y = |f(x)|$ and $y = f(|x|)$ on separate diagrams showing the coordinates of any points of intersection with the axes.
a $f: x \rightarrow 3x - 1, x \in \mathbb{R}$ **b** $f: x \rightarrow 3 - 4x, x \in \mathbb{R}$
c $f: x \rightarrow 4x^2 - 25, x \in \mathbb{R}$ **d** $f: x \rightarrow (1 + x)(5 - x), x \in \mathbb{R}$
e $f: x \rightarrow \tan x, x \in \mathbb{R}, -\frac{\pi}{2} < x < \frac{\pi}{2}$ **f** $f: x \rightarrow e^x, x \in \mathbb{R}$