

- 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 coordinate 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 sketch $y = f(x)$ and $y = g(x)$ on the same axes, and 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 $|x - 3| < 8$ c $|2x - 11| \leq 5$
d $|18 - 3x| < 9$ e $|x + 5| \leq 3$ f $|x - 17| > 12$
g $|5x - 22| < 40$ h $|2^x - 18| \leq 14$ i $|x^3 - 14| < 13$
j $|x + 4| \leq |x + 1|$ k $|x + 2| > |2x - 5|$ l $|2x - 1| < |3x + 2|$
- 7 For each of the following, sketch $y = |f(x)|$ and $y = f(|x|)$ on separate axes showing the coordinates of any points of intersection with the coordinate 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 $f: x \rightarrow e^x, x \in \mathbb{R}$

1 a 2 b 1 c 6 d -2 e 4 f -3

2 a = $g(-3)$ b = $f(1)$ c = $f(9)$ d = $g(5)$ e = $g(0)$ f = $f(1)$
 = 5 = 0 = 96 = 11 = 1 = 0

