Name:

Level 2 Further Maths

Domains and Ranges
Sketching Functions

Corbettmaths

Ensure you have: Pencil or pen

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this topic

www.corbettmaths.com/more/further-maths/

1. A function f(x) is defined as

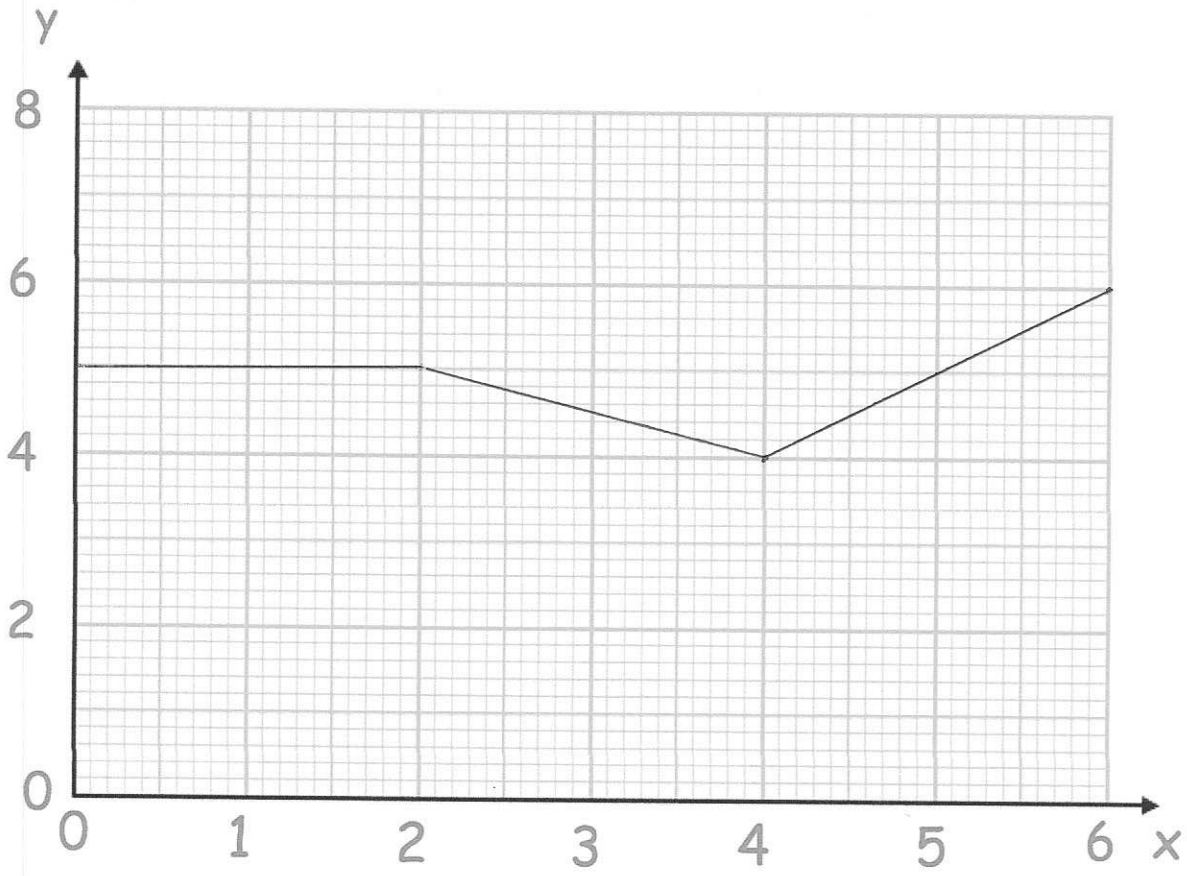
$$f(x) = 5 \qquad 0 \leq x < 2$$

$$= 6 - \frac{1}{2}x \qquad 2 \leq x < 4$$

$$= x \qquad 4 \leq x \leq 6$$

(a) Draw the graph of $y = f(x)$ on the axes below.

(3)



(b) State the range of $f(x)$

$4 \leq f(x) \leq 6$

(2)

2. A function f(x) is defined as

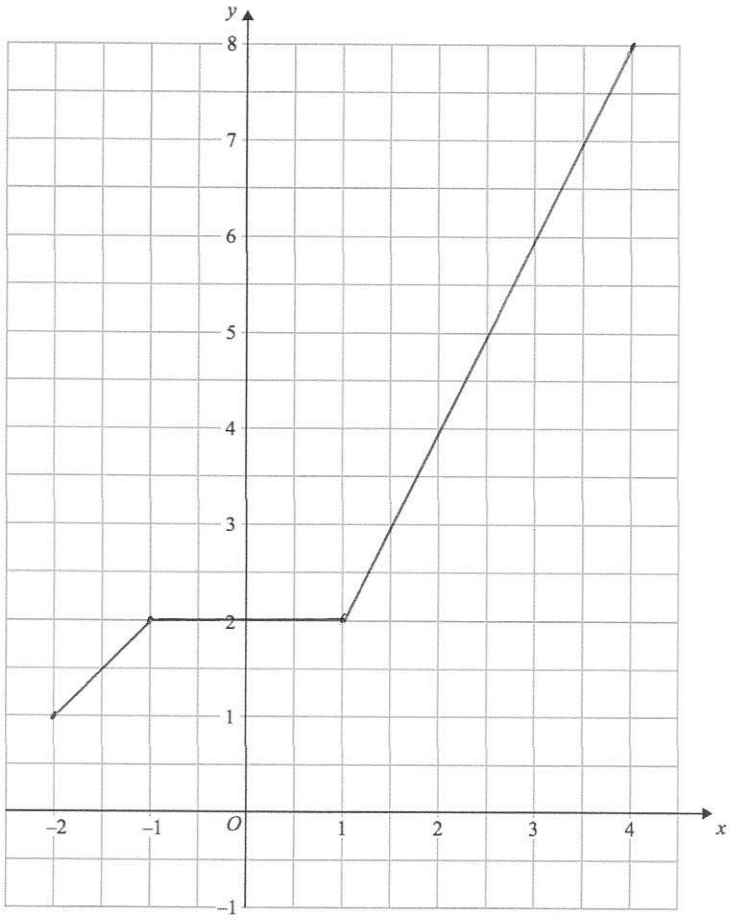
$$f(x) = x + 3 \qquad -2 \leq x < -1$$

$$= 2 \qquad -1 \leq x < 1$$

$$= 2x \qquad 1 \leq x \leq 4$$

(a) Draw the graph of $y = f(x)$ on the axes below.

(3)



(b) State the range of $f(x)$

$1 \leq f(x) \leq 8$

(2)

3. A function f(x) is defined as

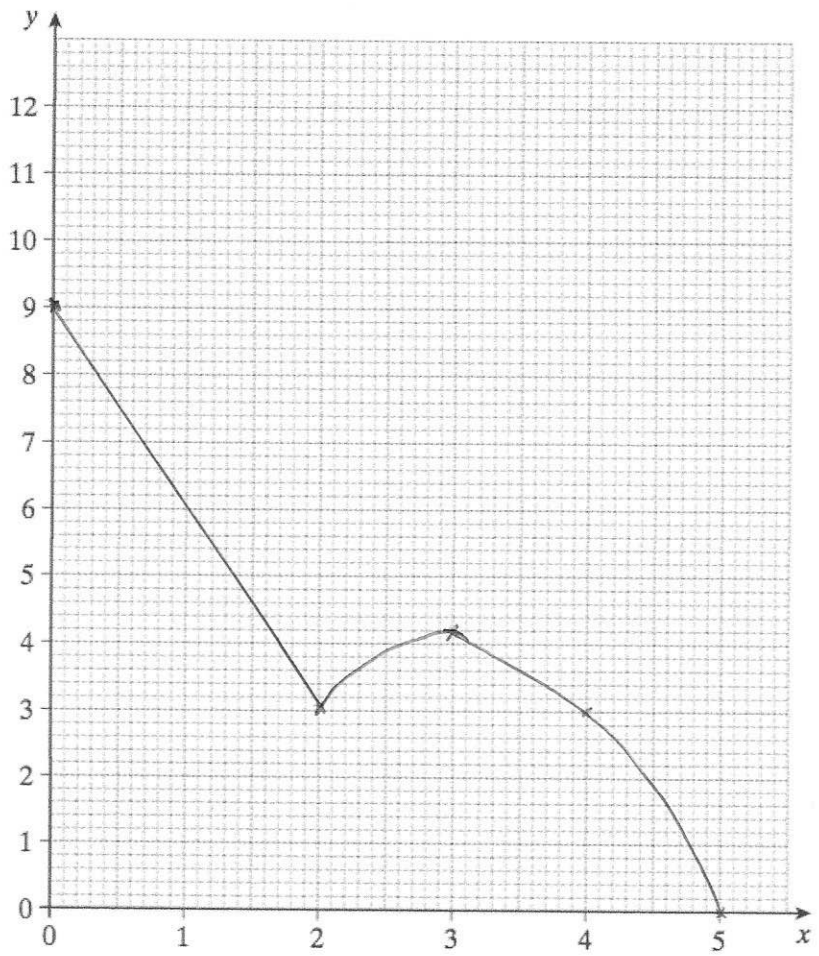
$$f(x) = 9 - 3x \qquad 0 \leq x < 2$$

$$= (5 - x)(x - 1) \qquad 2 \leq x \leq 5$$

$x=2$ $3 \times 1 = 3$
$x=3$ $2 \times 2 = 4$
$x=4$ $1 \times 3 = 3$
$x=5$ $0 \times 4 = 0$

(a) Draw the graph of $y = f(x)$ on the axes below.

(3)



(b) State the range of $f(x)$

$0 \leq f(x) \leq 9$

(2)

4. A function f(x) is defined as

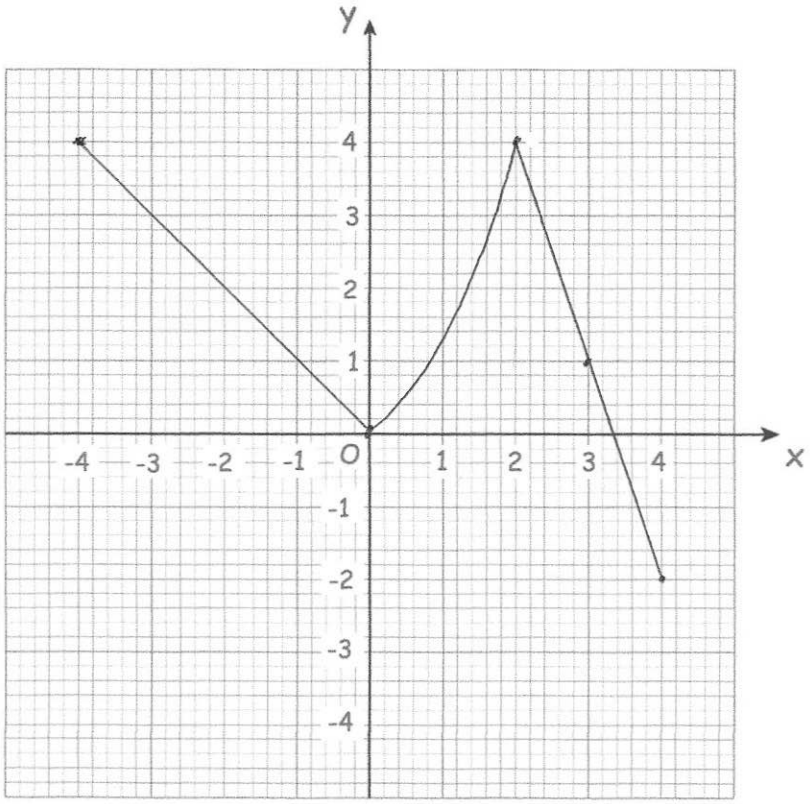
$$f(x) = -x \qquad -4 \leq x < 0$$

$$= x^2 \qquad 0 \leq x < 2$$

$$= 10 - 3x \qquad 2 \leq x \leq 4$$

(a) Draw the graph of $y = f(x)$ on the axes below.

(3)



(b) How many solutions are there to $f(x) = 0$

2

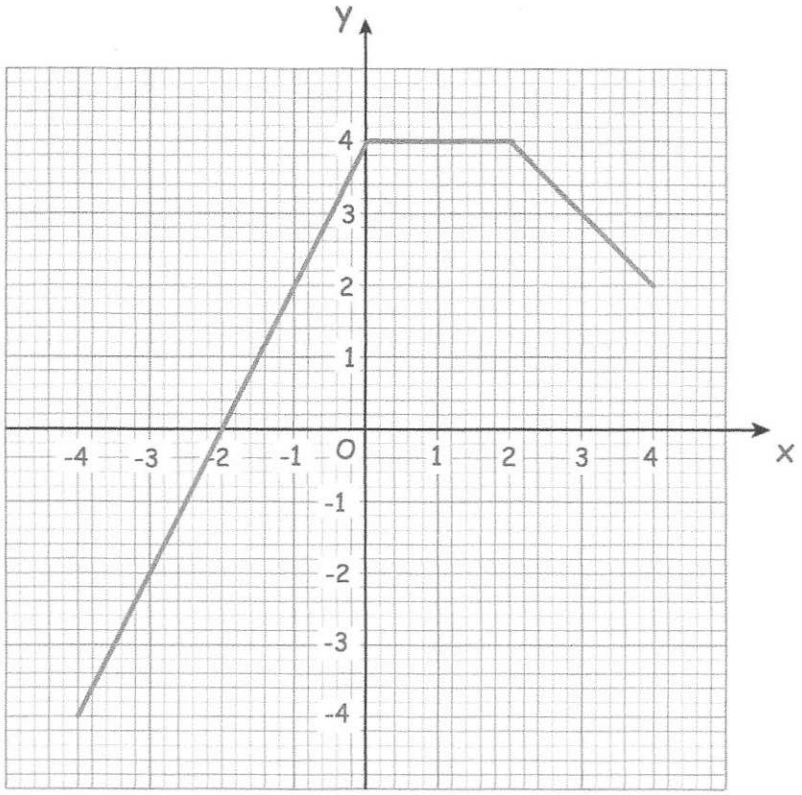
(2)

(c) State the range of $f(x)$

$-2 \leq f(x) \leq 4$

(2)

5. Here is a graph of $y = f(x)$
It consists of three straight lines.



Define $f(x)$, stating clearly the domain for each part.

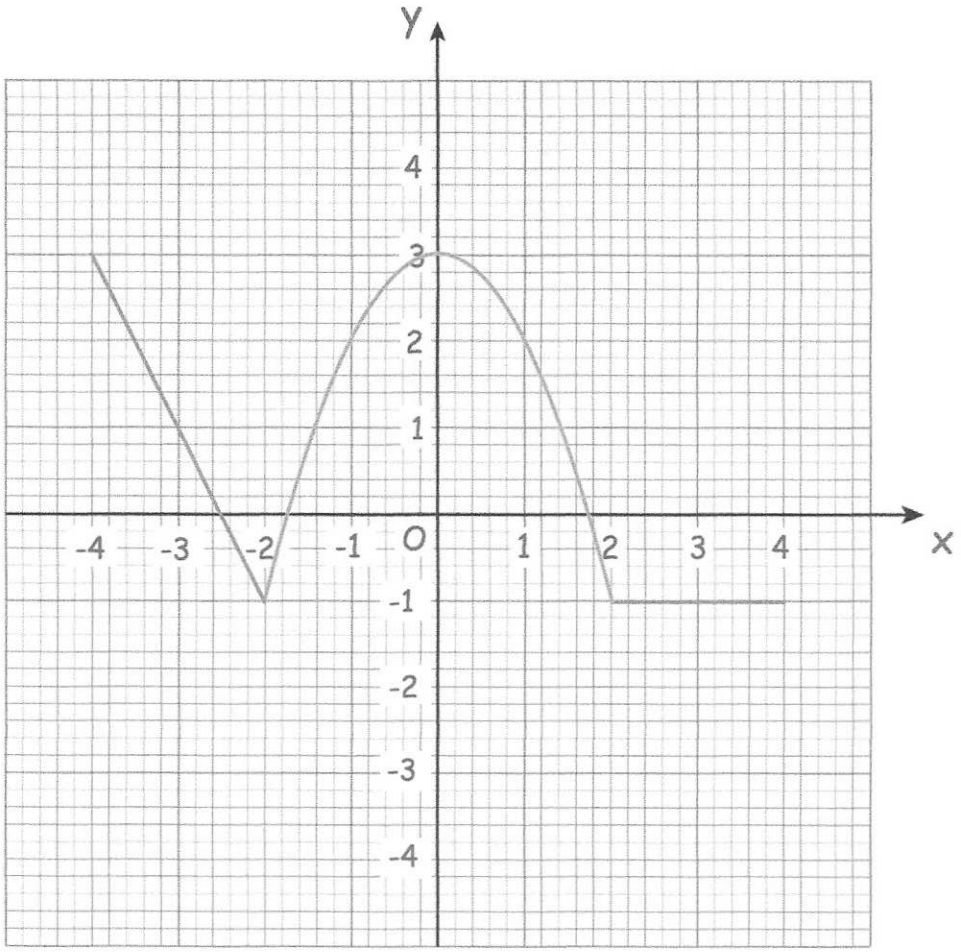
$f(x) =$ $2x + 4$, $-4 \leq x < 0$

4, $0 \leq x \leq 2$

$6 - x$, $2 \leq x \leq 4$

(4)

6. Here is a graph of $y = f(x)$
It consists of a quadratic curve and two straight lines.



Define $f(x)$, stating clearly the domain for each part.

$f(x) =$ $-2x - 5$, $-4 \leq x < -2$

$-x^2 + 3$, $-2 \leq x < 2$

-1, $2 \leq x \leq 4$

(4)

7. A function f(x) is defined as

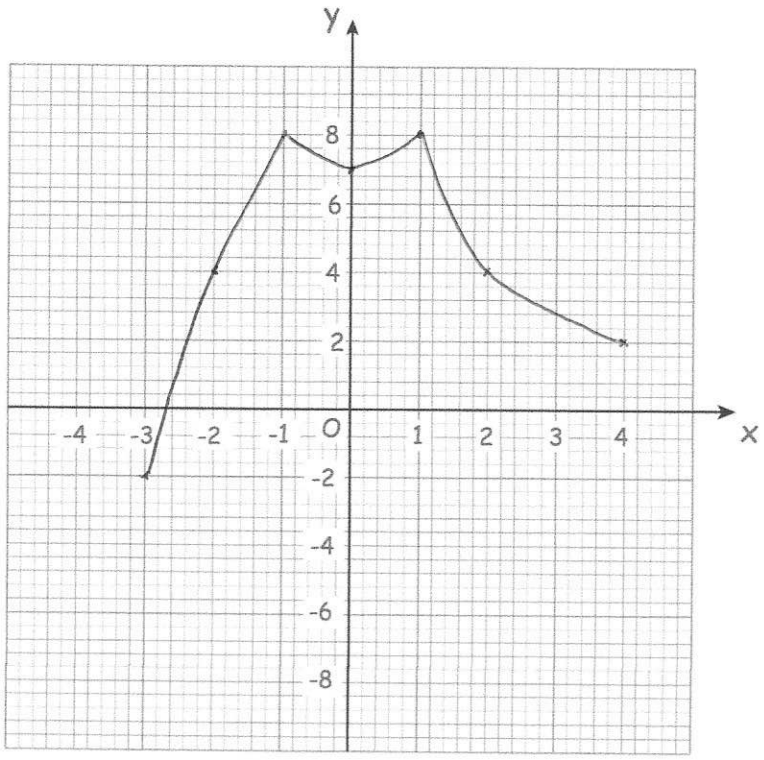
$$f(x) = 10 + x - x^2 \qquad -3 \leq x < -1$$

$$= x^2 + 7 \qquad -1 \leq x < 1$$

$$= \frac{8}{x} \qquad 1 \leq x \leq 4$$

(a) Draw the graph of $y = f(x)$ on the axes below.

(3)



(b) State the range of $f(x)$

$-2.5 f(x) \leq 8$

(2)

8. $f(x) = x^2 - 2$ for all values of x

(a) Find the value of $f(-4)$

$f(-4) = (-4)^2 - 2$

$= 16 - 2$

14

(1)

(b) What is the range of $f(x)$?

$f(x) \geq -2$

(1)

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9. $f(x) = 8 - 2x^2$ for all values of x

Write down the range of $f(x)$

$f(x) \leq 8$

(1)

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10. $f(x) = (x + 1)(x + 3)$ for all values of x

Write down the range of $f(x)$

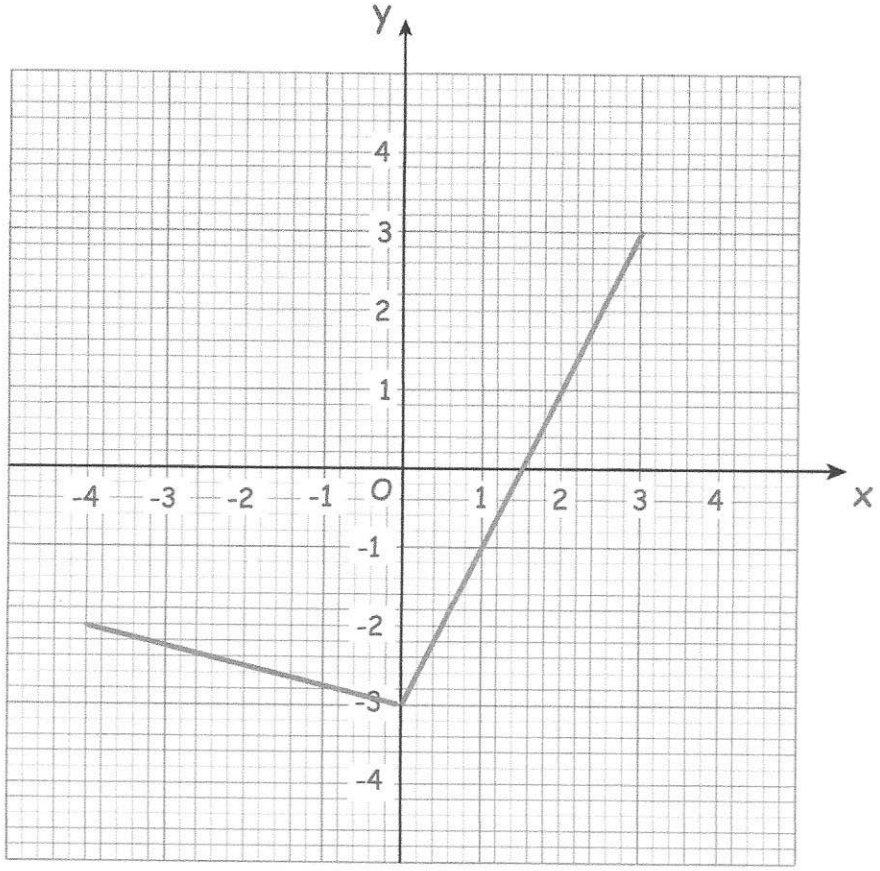
minimum when $x = -2$

$f(-2) = (-1) \times (1) = -1$

$f(x) \geq -1$

(2)

11. The graph of $y = f(x)$ is shown below.



(a) Write down the domain of $f(x)$

$-4 \leq x \leq 3$

(1)

(b) Write down the range of $f(x)$

$-3 \leq f(x) \leq 3$

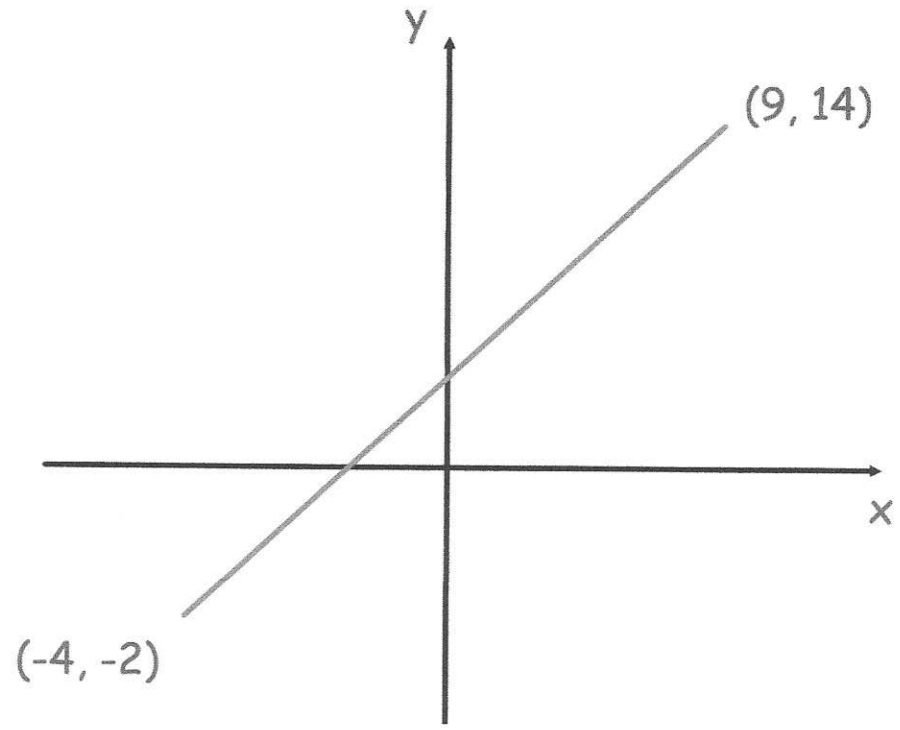
(1)

(c) Solve $f(x) = 1$

$x = 2$

(1)

12. Shown below is the graph of $y = f(x)$



(a) Write down the domain of $f(x)$

$-4 \leq x \leq 9$

(1)

(b) Write down the range of $f(x)$

$-2 \leq f(x) \leq 14$

(1)

13. $f(x) = 5 - 2x$ for $-4 \leq x \leq 3$

Work out the range of $f(x)$

when $x = -4$ $f(x) = 13$

$x = 3$ $f(x) = -1$

$-1 \leq f(x) \leq 13$

(2)

14. $g(x) = x^3 - 5$ for $-2 \leq x \leq 3$

Work out the range of $g(x)$

$x = -2$ $g(x) = -13$

$x = 3$ $g(x) = 22$

$-13 \leq g(x) \leq 22$

(2)

15. $f(x) = 9x - 2$

The range of $f(x)$ is $-38 \leq f(x) \leq 61$

Work out the domain of $f(x)$

$9x - 2 = -38$

$9x = -36$

$x = -4$

$9x - 2 = 61$

$9x = 63$

$x = 7$

$-4 \leq x \leq 7$

(2)

16. $g(x) = 3 - 2x$

The range of $g(x)$ is $-7 \leq g(x) \leq 6$

Work out the domain of $g(x)$

$3 - 2x = -7$

$-2x = -10$

$x = 5$

$3 - 2x = 6$

$-2x = 3$

$2x = -3$

$x = -1.5$

$-1.5 \leq x \leq 5$

.....

(2)

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17. The function $f(x)$ is defined as

$$f(x) = 14 - 3x \qquad p \leq x < 8$$

The range of $f(x)$ is $-10 \leq f(x) \leq 30.5$

Work out the value of p

$14 - 3x$

When $x = 8$

$14 - 24 = -10$

$14 - 3x = 30.5$

$-3x = 16.5$

$x = -5.5$

$p = -5.5$

.....

(2)

18. $f(x) = cosx$ for $90° \leq x \leq 120°$

Work out the range of $f(x)$

$f(90°) = 0$

$f(120°) = -0.5$

$-0.5 \leq f(x) \leq 0$

(2)