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

$$f(x) = \begin{cases} 
5 & 0 \leq x < 2 \\
6 - \frac{1}{2}x & 2 \leq x < 4 \\
x & 4 \leq x \leq 6 
\end{cases}$$

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

(b) State the range of $f(x)$
2. A function $f(x)$ is defined as

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

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

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

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

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

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3. A function \( f(x) \) is defined as

\[
\begin{align*}
f(x) &= 9 - 3x & 0 \leq x < 2 \\
&= (5 - x)(x - 1) & 2 \leq x \leq 5
\end{align*}
\]

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

(b) State the range of \( f(x) \)
4. A function \( f(x) \) is defined as

\[
f(x) = \begin{cases} 
-x & -4 \leq x < 0 \\
-x^2 & 0 \leq x < 2 \\
10 - 3x & 2 \leq x \leq 4 
\end{cases}
\]

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

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

(c) State the range of \( f(x) \)
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.

$$f(x) = \ldots$$

(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.

\[
f(x) = \begin{cases} 
\text{(expression 1)} & \text{if } x \in \text{domain 1} \\
\text{(expression 2)} & \text{if } x \in \text{domain 2} \\
\text{(expression 3)} & \text{if } x \in \text{domain 3}
\end{cases}
\]

(4)
7. A function $f(x)$ is defined as

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

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

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

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

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

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

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

\[ \left( \begin{array}{c} \text{value} \\ \text{of } f(-4) \end{array} \right) \]  

(1)

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

\[ \left( \begin{array}{c} \text{range} \end{array} \right) \]  

(1)

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

Write down the range of \( f(x) \)

\[ \left( \begin{array}{c} \text{range} \end{array} \right) \]  

(1)

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

Write down the range of \( f(x) \)

\[ \left( \begin{array}{c} \text{range} \end{array} \right) \]  

(2)
11. The graph of \( y = f(x) \) is shown below.

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

\[ \text{.................................} \]  

(1)

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

\[ \text{.................................} \]  

(1)

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

\[ \text{.................................} \]  

(1)
12. Shown below is the graph of \( y = f(x) \)

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

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

(1)

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

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

(1)
13. \( f(x) = 5 - 2x \) for \(-4 \leq x \leq 3\)

Work out the range of \( f(x) \)

\[ \text{..........................} \] (2)

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

Work out the range of \( g(x) \)

\[ \text{..........................} \] (2)

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

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

Work out the domain of \( f(x) \)

\[ \text{..........................} \] (2)
16. \( g(x) = 3 - 2x \)
   
   The range of \( g(x) \) is \(-7 \leq g(x) \leq 6\)
   
   Work out the domain of \( g(x) \)

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

   \[
   f(x) = 14 - 3x \quad \quad \quad \quad \quad p \leq x < 8
   \]

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

   Work out the value of \( p \)
18. $f(x) = \cos x$ for $90^\circ \leq x \leq 120^\circ$

Work out the range of $f(x)$