1 Given that $a \times 60 = b$ work out the value of $\frac{4b}{a}$

[2 marks]

Answer _____

2 The nth term of a sequence is $\dfrac{n(n-4)}{\sqrt{n+3}}$

Work out the sum of the 1st and 6th terms.

[3 marks]

Answer _____

3 A curve has the equation $y = x^2 - 6x + 17$

The turning point of the curve is at $(a, 8)$

3 (a) By completing the square, or otherwise, work out the value of a.

[2 marks]

Answer _____

3 (b) The turning point of the curve $y = x^2 + 4x + b$ also has y-coordinate 8

Work out the value of b.

[2 marks]

Answer _____

4 $f(x) = 3x^2 - 4x + 8$ for all values of x

Jenny says,

"f(10) must equal 2 × f(5), because 10 is 2 × 5"

Is Jenny correct?

Show working to support your answer.

[2 marks]

5 $f(x) = 2x - 3$ and $g(x) = x^2$

Show that $f^{-1}(55) = fg(4)$

[4 marks]

6 (a) $f(x) = cx + d$

$f(4) = 7$

$f(10) = 22$

Work out the values of c and d.

[3 marks]

$c =$ _____ $d =$ _____

7 L is directly proportional to D^2

$L = 85$ when $D = 10$

7 (a) Work out an equation connecting L and D.

[3 marks]

Answer _____

7 (b) Work out the value of L when $D = 5$

[2 marks]

Answer _____

8 $\frac{a}{b} = 3c$

$\frac{b}{c} = 2$

Work out the value of a when $c = 8$

[3 marks]

Answer _____

9 The equation of a curve is $y = 16^x$

(a) A different point on the curve has y-coordinate $\frac{1}{16}$

Work out the x-coordinate.

[1 mark]

Answer _____

10 $f(x) = 2x + 5$

Show that $3f(x) - 12f^{-1}(x)$ simplifies to an integer.

[4 marks]

11 Here are two simultaneous equations.

$y = x^2 + 7x - c$

and

$y = 3x + d$

There is a solution when $x = 5$

Work out the value of $c + d$

[3 marks]

Answer _____

12 (a) $f(x) = kx^2$ where k is a constant.

Kai says that $\frac{f(6)}{f(2)}$ is equal to f(3) because $\frac{6}{2} = 3$

Is he correct?

Show working to support your answer.

[2 marks]

13 $f(x) = x^2 + 6x$

$g(x) = 2x + 4$

13 (a) Solve $fg(x) = -5$

[3 marks]

Answer _____

14 $f(x) = \frac{3x + 9}{5}$ and $g(x) = 6x - 1$

14 (a) Show that gf(2) is an integer.

[2 marks]

14 (b) Show that $f^{-1}(8)$ is **not** an integer.

[2 marks]

15 H is inversely proportional to the cube root of L.

$H = 7$ when $L = 64$

15 (a) Work out the value of H when $L = 2744$

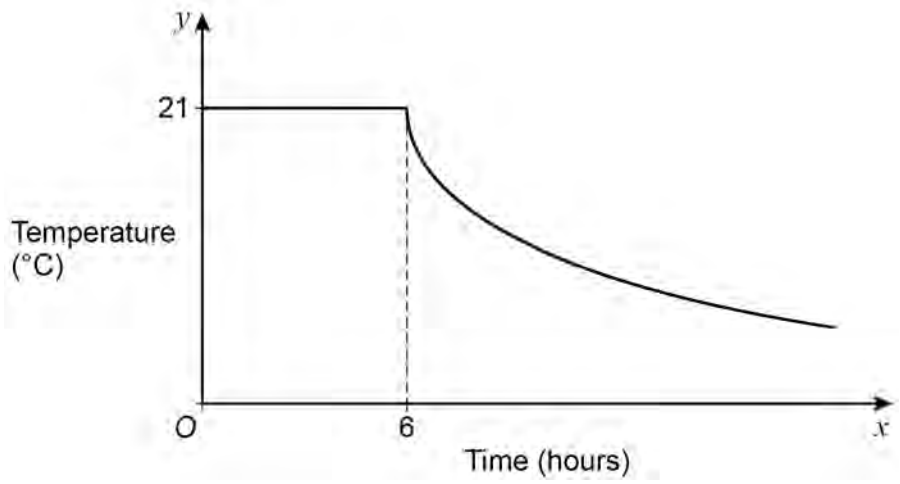
[2 marks]

$H =$ _____

16 A room is kept at a constant temperature of 21° C for 6 hours.

The heating is then turned off and the room begins to cool.

Here is a sketch graph showing the temperature, y°C, of the room at time x hours.



16 (a) Assume the equation of the curved part is $y = \frac{k}{x}$ where k is a constant.

Work out the value of y when $x = 12$

[2 marks]

$y =$ _____

16 (b) In fact,

the equation of the curved part is $y = A \times \left(\frac{1}{3}\right)^{\frac{1}{6}x}$ where A is a **different** constant.

How does this affect the value of y when $x = 12$?

Tick **one** box.

You **must** show working to support your answer.

[2 marks]

☐ The value of y is greater than the answer to part (a).

☐ The value of y is less than the answer to part (a).

☐ The value of y is the same as the answer to part (a).