

## Find unknown coefficients

26 November 2019 09:52

In functions  $f(x)=y$

A point is  $(x,y)$

If the value is given in the bracket sub this value into the  $x$  part in the given function.

If the function is equal to a value put the given function equal to the value and solve for  $x$ .

NOTE: A coefficient is a number in front of a variable (letter)

Eg1)  $f(x) = ax - 6$  is a function  
If  $f(2) = -2$ , Find the value of  $a$ .

$a$  is the coefficient of  $x$ .

$$a(2) - 6 = -2$$

$$\begin{array}{l|l} +6 & 2a - 6 = -2 \\ \div 2 & 2a = 4 \\ & a = 2 \end{array} \quad \begin{array}{l} \text{Solve for } a \\ +6 \\ \div a \end{array} \quad fx = 2x - 6$$

CIW

Pg 464

Q2 - 5



T&T3 16.3



T&T3  
16.3.pptx

**PROJECT MATHS**

# Text & Tests

**Leaving 3 Certificate**

chapter

**16**

**Functions**

**Section 16.3 Finding unknown coefficients**

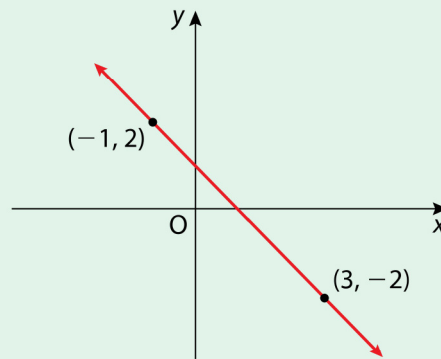
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### Example 1

The given diagram shows part of the graph of the function

$$y = ax + b.$$

Find the values of  $a$  and  $b$ .



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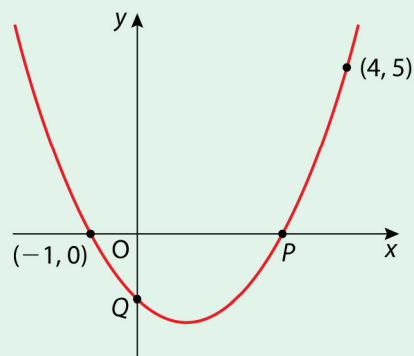
### Example 2

The graph of the quadratic function

$$f(x) = x^2 + bx + c$$
 is shown.

Find the values of  $b$  and  $c$ .

Hence write down the coordinates of  $P$  and  $Q$ .



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### Exercise 16.3

1.  $f(x) = ax - 6$  defines a function.  
If  $f(2) = -2$ , find the value of  $a$ .

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### Exercise 16.3

2. If  $(1, 5)$  is a couple of the function  $f(x) = kx + 4$ , find the value of  $k$ .

$$k(1) + 4 = 5$$

$$k + 4 = 5$$

$$k = 1$$

HW  $\rightarrow$  Q6  
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### Exercise 16.3

3.  $g(x) = 3x + k$  defines a function.  
If  $g(4) = 10$ , find the value of  $k$ .

$$\begin{aligned} 3(4) + k &= 10 \\ 12 + k &= 10 \\ \rightarrow 12 \quad | \quad k &= -2 \quad | \quad -12 \end{aligned}$$

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### Exercise 16.3

4. If  $(-3, 2)$  is a point on the line  $y = kx + 11$ , find the value of  $k$ .

$$\begin{aligned} k(-3) + 11 &= 2 \\ -3k + 11 &= 2 \\ \rightarrow 11 \quad | \quad -3k &= -9 \quad | \quad -11 \\ \div -3 \quad | \quad k &= 3 \quad | \quad \div -3 \end{aligned}$$

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### Exercise 16.3

5.  $f(x) = ax^2 + 3$  is a function.

If  $(-1, -1)$  is a <sup>point</sup> couple of this function, find the value of  $a$ .

$$\begin{aligned} a(-1)^2 + 3 &= -1 & (-1)(-1) &= +1 \\ a + 3 &= -1 \\ \begin{array}{c|c|c} & a = -4 & \\ \hline & & -3 \end{array} \end{aligned}$$

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### Exercise 16.3

6.  $g(x)$  is a function such that  $g(x) = x^2 - 2x + p$ , where  $p \in \mathbb{R}$ .

If  $(1, 2)$  is a couple of this function, find the value of  $p$ .

$$\begin{aligned} \begin{array}{l} x=1 \\ y=2 \end{array} & \quad (1)^2 - 2(1) + p = 2 \\ & \quad 1 - 2 + p = 2 \\ & \quad \Rightarrow 1 + p = 2 \\ \begin{array}{c|c|c} +1 & p = 3 & +1 \end{array} \end{aligned}$$

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### Exercise 16.3

7. The graph of the linear function  $f(x) = ax + b$  is shown.

Find the values of  $a$  and  $b$ .

$$f(x) = ax + b$$

$$\begin{matrix} x & y \\ (0, 4) \end{matrix} \Rightarrow a(0) + b = 4$$

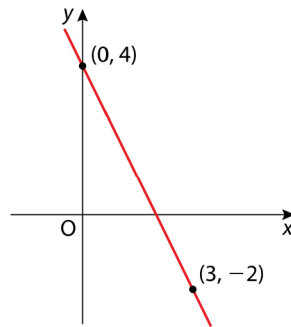
$$b = 4$$

$$\begin{matrix} x & y \\ (3, -2) \end{matrix} \Rightarrow a(3) + b = -2$$

$$b = 4$$

$$3a + 4 = -2$$

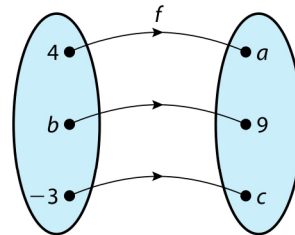
$$\begin{array}{r|l} -4 & 3a = -6 \\ \hline \div 3 & a = -2 \end{array} \quad \begin{array}{r|l} -4 & \\ \hline \div 3 & \end{array}$$



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### Exercise 16.3

8. A function  $f$  is defined as  $f: x \rightarrow 2x - 1$ .  
If the mapping diagram on the right represents  $f$ , find the values of  $a$ ,  $b$  and  $c$ .



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Exercise 16.3

Finding unknown coefficients in Quadratics

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9.  $g: x \rightarrow ax^2 + bx + 1$  is a function defined on  $R$ .

If  $g(1) = 0$  and  $g(2) = 3$ , write down two equations in  $a$  and  $b$ .  $a$  and  $b$  will be Simultaneous in the equations. Solve these equations to find the values of  $a$  and  $b$ .

$$\textcircled{1} \quad g(1) = 0$$

$$a(1)^2 + b(1) + 1 = 0$$

$$\textcircled{2} \quad g(2) = 3$$

$$a(2)^2 + b(2) + 1 = 3$$

$$\begin{array}{r} a + b + 1 = 0 \\ a + b = -1 \end{array} \quad | -1$$

$$\begin{array}{r} 4a + 2b + 1 = 3 \\ 4a + 2b = 2 \end{array} \quad | -1$$

Simultaneous Equations

$$\begin{array}{r} a + b = -1 \\ 4a + 2b = 2 \end{array}$$

cancel b  
=> multiply  
by (-2)

$$\begin{array}{r} -2a - 2b = 2 \\ 4a + 2b = 2 \\ \hline 2a = 4 \\ a = 2 \end{array}$$

To find  $b$

$$a = 2 \Rightarrow a + b = -1 \Rightarrow (2) + b = -1 \Rightarrow b = -3$$

Ans =  $a$   $b$

$$g(x) = 2x^2 - 3x + 1$$

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Exercise 16.3

10. A function is defined by  $f: x \rightarrow ax^2 + bx + 1$ .

If  $f(1) = 0$  and  $f(-1) = 0$ , find the value of  $a$  and the value of  $b$ .

$$\textcircled{1} \quad f(1) = 0$$

$$a(1)^2 + b(1) + 1 = 0$$

$$\textcircled{2} \quad f(-1) = 0$$

$$a(-1)^2 + b(-1) + 1 = 0$$

$$\begin{array}{r} a + b + 1 = 0 \\ a + b = -1 \end{array} \quad | -1$$

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### Exercise 16.3

11.  $f: x \rightarrow x^2 + px + q$  defines a function.

Given that  $f(3) = 4$  and  $f(-1) = 4$ , find the values of  $p$  and  $q$ .

Using these values for  $p$  and  $q$ , solve the equation  $x^2 + px + q = 0$ .

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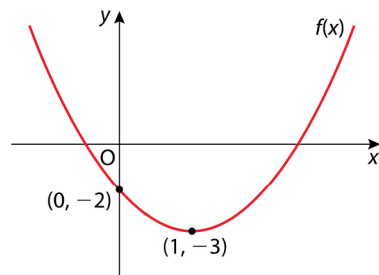
### Exercise 16.3

12. The diagram shows part of the graph of the function

$$f: x \rightarrow x^2 + bx + c.$$

The named couples are elements of the function.

- Find the values of  $b$  and  $c$ .
- If  $(2, y)$  is a point on the graph, find the value of  $y$ .



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### Exercise 16.3

**13.** Functions  $f$  and  $g$  are defined as follows:

$f: x \rightarrow x^2 + 1$  and  $g: x \rightarrow ax + b$ , where  $a$  and  $b$  are constants.

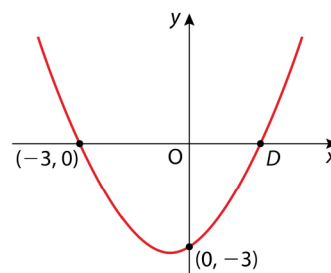
If  $f(0) = g(0)$  and  $g(2) = 15$ , find the values of  $a$  and  $b$ .

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### Exercise 16.3

**14.** The function  $f(x) = x^2 + bx + c$  is graphed on the right.

- Use the graph to find two equations in  $b$  and  $c$ .
- Solve the equations to find the value of  $b$  and the value of  $c$ .
- Using these values for  $b$  and  $c$ , solve the equation  $x^2 + bx + c = 0$  to find the coordinates of the point  $D$ .



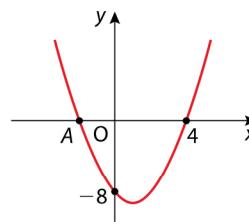
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### Exercise 16.3

15. The graph of the function  $f(x) = x^2 + kx + p$  is shown on the right.

Use the information given to find the values of  $k$  and  $p$ .

Hence find the coordinates of the point A.



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### Answers 16.3

1. 2
2. 1
3. -2
4. 3
5. -4
6. 3
7.  $a = -2, b = 4$
8.  $a = 7, b = 5, c = -7$
9.  $a = 2, b = -3$
10.  $a = -1, b = 0$
11.  $p = -2, q = 1; x = 1$
12. (i)  $b = -2, c = -2$   
(ii)  $y = -2$
13.  $a = 7, b = 1$
14. (ii)  $b = 2, c = -3$   
(iii)  $(1, 0)$
15.  $k = -2, p = -8; (-2, 0)$