

Solve the quadratic

$$x^2 - 2x - 8 = 0$$

$$(x - 4)(x + 2) = 0$$

Factors

Factors = 0 we can find the roots

$$\begin{array}{l} x - 4 = 0 \\ +4 \quad | \quad x = 4 \quad | \quad +4 \end{array} \quad \left\{ \begin{array}{l} x + 2 = 0 \\ -x \quad | \quad x = -2 \quad | \quad -2 \end{array} \right.$$

Roots of the quadratic

Roots are where the line or the curve cuts the x axis. ($y=0$)

Form the equation from the roots 4 and -2

$$x = 4$$

$$-4 \quad | \quad x - 4 = 0 \quad | \quad -4$$

$$x - 4 = 0$$

$$x = -2$$

$$+2 \quad | \quad x + 2 = 0 \quad | \quad +2$$

$$x + 2 = 0$$

roots

roots to = 0

make the factors.

Factors $(x - 4)(x + 2)$

$$x(x + 2) - 4(x + 2)$$

$$x^2 + 2x - 4x - 8$$

$$\text{Ans} = x^2 + 2x - 8$$

Multiply the brackets together

PROJECT MATHS

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Leaving 3 Certificate

Algebra 1

chapter

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Section 2.6 Forming quadratic equations

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Notes

Examine the quadratic equation $x^2 + x - 6 = 0$.

The factors of the left-hand side are $(x + 3)(x - 2)$

$$\Rightarrow (x + 3)(x - 2) = 0$$

$$\Rightarrow x = -3 \quad \text{or} \quad x = 2$$

i.e. -3 and 2 are the roots of the equation.

We can now use the reverse of this method to form a quadratic equation when we are given the roots.

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Example 1

Form the quadratic equation with roots -4 and 5 .

If the roots are -4 and 5 , then

$$(x + 4)(x - 5) = 0$$

$\Rightarrow x^2 - x - 20 = 0$ is the equation

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Notes

If $x = \frac{1}{2}$ is a root of an equation, then

$$x = \frac{1}{2} \Rightarrow 2x = 1 \Rightarrow 2x - 1 = 0$$

$\Rightarrow (2x - 1)$ is the factor which gives this root.

Similarly if $x = -\frac{1}{3}$, then $3x = -1$ and so $(3x + 1)$ is the related factor.

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Example 2

Form the equation whose roots are $-\frac{1}{4}$ and 3 .

$x = -\frac{1}{4} \Rightarrow (4x + 1)$ is the related factor.

Roots = $-\frac{1}{4}, 3 \Rightarrow$ the equation is $(4x + 1)(x - 3) = 0$

$\Rightarrow 4x^2 - 11x - 3 = 0$ is the equation

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

1. 2, 4

$$\begin{array}{l} x = 2 \\ -2 \mid x-2=0 \end{array} \quad \left\{ \quad \begin{array}{l} x = 4 \\ -4 \mid x-4=0 \end{array} \right.$$

$$(x-2)(x-4)$$

$$x(x-4) - 2(x-4)$$

$$x^2 - 4x - 2x + 8$$

$$\text{Ans} = x^2 - 6x + 8$$

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

2. 5, 1

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

3. 3, 2

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

4. $3, -1$

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

5. $4, -2$

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

6. $-3, -4$

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

7. 6, -2

Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

8. 5, 0

Exercise 2.6

Roots with Fractions.

HW
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Form the quadratic equation, given the two roots, in each of the following:

9. $-2, \frac{1}{2}$

$$x = -2 \quad +2 \mid x+2=0 \mid +2$$

$$x = \frac{1}{2} \quad 2x = 1 \quad -1 \mid 2x-1=0 \mid +1$$

LCD = 2

$$\begin{aligned} & (x+2)(2x-1) \\ & \downarrow \quad \downarrow \\ & x(2x-1) + 2(2x-1) \\ & 2x^2 - 1x + 4x - 2 \end{aligned}$$

Ans = $2x^2 + 3x - 2$

Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

10. $-5, -4$

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

11. $-\frac{1}{2}, 4$

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

12. $\frac{1}{4}, 8$

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

13. $0, -4$

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

14. $\frac{1}{2}, -\frac{1}{2}$

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

15. ± 3

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Exercise 2.6

Form the quadratic equation, given the two roots, in each of the following:

16. $0, \frac{1}{4}$

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Exercise 2.6

17. If the roots of the equation $x^2 + ax + b = 0$ are 2 and -1 , find the values of a and b .

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Exercise 2.6 Answers

- | | |
|-------------------------|--------------------------|
| 1. $x^2 - 6x + 8 = 0$ | 2. $x^2 - 6x + 5 = 0$ |
| 3. $x^2 - 5x + 6 = 0$ | 4. $x^2 - 2x - 3 = 0$ |
| 5. $x^2 - 2x - 8 = 0$ | 6. $x^2 + 7x + 12 = 0$ |
| 7. $x^2 - 4x - 12 = 0$ | 8. $x^2 - 5x = 0$ |
| 9. $2x^2 + 3x - 2 = 0$ | 10. $x^2 + 9x + 20 = 0$ |
| 11. $2x^2 - 7x - 4 = 0$ | 12. $4x^2 - 33x + 8 = 0$ |
| 13. $x^2 + 4x = 0$ | 14. $4x^2 - 1 = 0$ |
| 15. $x^2 - 9 = 0$ | 16. $4x^2 - x = 0$ |
| 17. $a = -1, b = -2$ | |

Answers