

Factorising Quadratics: Harder

ANSWERS

1

Factorise $2x^2 + 7x + 3$

the first number times the last

$$2 \times 3 = 6$$

multiply to make that, add to make 7

$$6 \text{ and } 1$$

split the middle term in the grid, then find the headings

×	x	$+3$
$2x$	$2x^2$	$+6x$
$+1$	$+x$	$+3$

Answer $(2x + 1)(x + 3)$

2

Factorise $3x^2 + 7x + 2$

the first number times the last

$$3 \times 2 = 6$$

multiply to make that, add to make 7

$$6 \text{ and } 1$$

split the middle term in the grid, then find the headings

×	x	$+2$
$3x$	$3x^2$	$+6x$
$+1$	$+x$	$+2$

Answer $(3x + 1)(x + 2)$

3

Factorise $2x^2 + 5x + 3$

the first number times the last

$$2 \times 3 = 6$$

multiply to make that, add to make 5

$$2 \text{ and } 3$$

split the middle term in the grid, then find the headings

×	x	$+1$
$2x$	$2x^2$	$+2x$
$+3$	$+3x$	$+3$

Answer $(2x + 3)(x + 1)$

4

Factorise $5x^2 + 7x + 2$

the first number times the last

$$5 \times 2 = 10$$

multiply to make that, add to make 7

$$5 \text{ and } 2$$

split the middle term in the grid, then find the headings

×	x	$+1$
$5x$	$5x^2$	$+5x$
$+2$	$+2x$	$+2$

Answer $(5x + 2)(x + 1)$

5

Factorise $2x^2 - 5x - 3$

the first number times the last

$$2 \times -3 = -6$$

multiply to make that, add to make -5

$$-6 \text{ and } 1$$

split the middle term in the grid, then find the headings

×	x	-3
$2x$	$2x^2$	$-6x$
$+1$	$+x$	-3

Answer $(2x + 1)(x - 3)$

6

Factorise $6x^2 - x - 2$

$$6 \times -2 = -12$$

$$3 \text{ and } -4$$

×	$2x$	$+1$
$3x$	$6x^2$	$+3x$
-2	$-4x$	-2

Answer $(3x - 2)(2x + 1)$

7

Factorise fully $6x^2 + 14x + 4$

$$2(3x^2 + 7x + 2)$$

Answer $2(3x + 1)(x + 2)$

8

Solve $2x^2 + 5x - 3 = 0$

$$(2x - 1)(x + 3) = 0$$

Answer $x = \frac{1}{2} \text{ or } x = -3$

Factorising Quadratics: Harder *further practice*

ANSWERS

9

Factorise $6x^2 - 7x - 3$

$$6 \times -3 = -18: 2 \text{ and } -9$$

Answer $(3x + 1)(2x - 3)$

10

Factorise $5 + 3x - 2x^2$

$$-(2x^2 - 3x - 5)$$

$$= -(2x - 5)(x + 1)$$

Answer $(5 - 2x)(x + 1)$

11

Given that

$(3x + p)(qx + 3) = 6x^2 + 5x - 6$, find p and q .

$$3q = 6 \text{ and } 3p = -6$$

$$\text{check: } 2x - 4x = 5x$$

Answer $p = -2, q = 2$

12

A rectangle has an area of $(6x^2 + 11x + 4) \text{ cm}^2$. Its width is $(2x + 1) \text{ cm}$. Find its perimeter.

$$(2x + 1)(3x + 4), \text{ so length } (3x + 4)$$

$$2(2x + 1) + 2(3x + 4)$$

Answer $(10x + 10) \text{ cm}$

13

A diver's height above the water h seconds after she leaves the board is $h = 6 + 5t - 6t^2$ metres. After how many seconds does she reach the water?

$$6t^2 - 5t - 6 = 0$$

$$(3t + 2)(2t - 3) = 0, t > 0$$

Answer 1.5 seconds

14

Factorise $6(x + 1)^2 - (x + 1) - 2$

$$y = x + 1: (3y - 2)(2y + 1)$$

$$(3x + 3 - 2)(2x + 2 + 1)$$

Answer $(3x + 1)(2x + 3)$

15

Factorise $6x^2 + 11x + 3$.

Use your answer with $x = 10$ to write 713 as the product of two prime numbers.

$$6x^2 + 11x + 3 = (2x + 3)(3x + 1)$$

$$x = 10: 6 \times 100 + 110 + 3 = 23 \times 31$$

Answer $713 = 23 \times 31$

16

Tom factorises $4x^2 - 10x - 6$ as $(2x + 1)(2x - 6)$. Is his answer fully factorised? Explain.

his brackets multiply out correctly

but $2x - 6$ has a common factor of 2

Answer $\text{No, it is } 2(2x + 1)(x - 3)$