Solving Harder Quadratics by Factorising

ANSWERS

1 split the middle term, then find the headings

Solve $3x^2 + 7x + 2 = 0$

the first number times the last

$3 \times 2 =$ 6

multiply to make that, add to make 7

6 and 1

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

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

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

2

Solve $2x^2 + 11x + 5 = 0$

the first number times the last

$2 \times 5 =$ 10

multiply to make that, add to make 11

10 and 1

×	x	$+5$
$2x$	$2x^2$	$+10x$
$+1$	$+x$	$+5$

$(2x + 1)(x + 5) = 0$

$x =$ $-\frac{1}{2}$ or $x =$ -5

3

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

$2 \times -3 =$ -6

6 and -1

×	x	$+3$
$2x$	$2x^2$	$+6x$
-1	$-x$	-3

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

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

4 Notice the change!

Solve $3x^2 - 10x + 8 = 0$

$3 \times 8 =$ 24

-6 and -4

×	x	-2
$3x$	$3x^2$	$-6x$
-4	$-4x$	$+8$

$(3x - 4)(x - 2) = 0$

$x =$ $\frac{4}{3}$ or $x =$ 2

5

Solve $5x^2 + 13x - 6 = 0$

$5 \times -6 =$ -30

15 and -2

×	x	$+3$
$5x$	$5x^2$	$+15x$
-2	$-2x$	-6

$(5x - 2)(x + 3) = 0$

$x =$ $\frac{2}{5}$ or $x =$ -3

6 make it = 0 first

Solve $2x^2 = 3x + 9$

$2x^2 - 3x - 9 = 0$

$2 \times -9 =$ -18

-6 and 3

×	x	-3
$2x$	$2x^2$	$-6x$
$+3$	$+3x$	-9

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

$x =$ $-\frac{3}{2}$ or $x =$ 3

7

Sam solves $(3x - 2)(x + 4) = 0$.

He writes $x = 2$ or $x = -4$.

Explain his mistake. Then write the right answers.

$3x - 2 = 0$ gives $3x = 2$, not $x = 2$

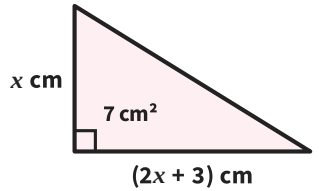
he forgot to divide both sides by 3

Answer $x = \frac{2}{3}$ or $x = -4$

8

The triangle has an area of 7 cm².

Find x.



$\frac{1}{2} \times x(2x + 3) = 7$, so $2x^2 + 3x - 14 = 0$

$(2x + 7)(x - 2) = 0$, and a length is positive

Answer $x = 2$

Solving Harder Quadratics by Factorising *further practice*

ANSWERS

9

Solve $3x^2 + 11x + 6 = 0$

$3 \times 6 = 18$: 9 and 2

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

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

10

Solve $4x^2 + 4x - 3 = 0$

$4 \times -3 = -12$: 6 and -2

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

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

11

Solve $6x^2 = 7x + 3$

$6x^2 - 7x - 3 = 0$

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

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

12

Show that $x = -4$ is a solution of $2x^2 + 5x - 12 = 0$. Then find the other solution.

$2 \times 16 - 20 - 12 = 0$

$(2x - 3)(x + 4) = 0$

Answer $x = \frac{3}{2}$

13

Solve $(x + 2)(2x - 1) = 7$

$2x^2 + 3x - 2 = 7$, so $2x^2 + 3x - 9 = 0$

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

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

14

Three times the square of a number is equal to 11 times the number, plus 4. Find both possible values of the number.

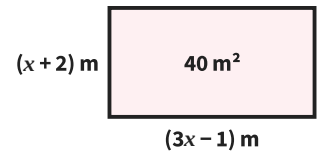
$3x^2 = 11x + 4$, so $3x^2 - 11x - 4 = 0$

$(3x + 1)(x - 4) = 0$

Answer 4 or $-\frac{1}{3}$

15

A rectangular patio has an area of 40 m^2. Find x, then the perimeter of the patio.



$3x^2 + 5x - 42 = 0$

$(3x + 14)(x - 3) = 0$, so $x = 3$

Answer 26 m

16

Explain why $2x^2 + 5x + 4 = 0$ cannot be solved by factorising.

$2 \times 4 = 8$: 1 and 8, 2 and 4

they add to 9 or 6 (-9 or -6), not 5

Answer No pair adds to 5