

SOLVING EQUATIONS (QUADRATIC)

[CONTENTS](#)

Worked example

Solve:

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

$$(x + 5)(x - 6) = 0$$

$$(x - 7)(x - 8) = 0$$

Your turn

Solve:

$$(x + 2)(x - 9) = 0$$

$$x = -2, x = 9$$

Worked example

Solve:

$$(2x + 3)(5x + 4) = 0$$

$$(3x + 5)(4x - 6) = 0$$

$$(5x - 7)(6x - 8) = 0$$

Your turn

Solve:

$$(7x + 2)(3x - 12) = 0$$

$$x = -\frac{2}{7}, x = 4$$

Worked example

Solve by factorising:

$$x^2 + 7x + 12 = 0$$

$$x^2 + 9x + 20 = 0$$

$$x^2 + 8x + 12 = 0$$

Your turn

Solve by factorising:

$$x^2 + 11x + 30 = 0$$

$$x = -5, x = -6$$

Worked example

Solve by factorising:

$$x^2 - 7x + 12 = 0$$

$$x^2 - 9x + 20 = 0$$

$$x^2 - 8x + 12 = 0$$

Your turn

Solve by factorising:

$$x^2 - 11x + 30 = 0$$

$$x = 5, x = 6$$

Worked example

Solve by factorising:

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

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

$$x^2 - x - 12 = 0$$

Your turn

Solve by factorising:

$$x^2 + x - 20 = 0$$

$$x = -5, x = 4$$

Worked example

Solve by factorising:

$$x^2 + 2x = 0$$

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

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

Your turn

Solve by factorising:

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

$$x = 0, x = 9$$

Worked example

Solve by factorising:

$$x^2 + 6x + 9 = 0$$

$$x^2 + 8x + 16 = 0$$

$$x^2 + 10x + 25 = 0$$

$$x^2 + 2x + 1 = 0$$

Your turn

Solve by factorising:

$$x^2 + 12x + 36 = 0$$

$$x = -6$$

Worked example

Solve by factorising:

$$x^2 - 6x + 9 = 0$$

$$x^2 - 8x + 16 = 0$$

$$x^2 - 10x + 25 = 0$$

$$x^2 - 2x + 1 = 0$$

Your turn

Solve by factorising:

$$x^2 - 12x + 36 = 0$$

$$x = 6$$

Worked example

Solve by factorising:

$$x^2 + 17x + 16 = 0$$

$$x^2 + 10x + 16 = 0$$

$$x^2 + 8x + 16 = 0$$

$$x^2 - 8x + 16 = 0$$

Your turn

Solve by factorising:

$$x^2 + 37x + 36 = 0$$

$$x = -36, x = -1$$

$$x^2 + 20x + 36 = 0$$

$$x = -18, x = -2$$

$$x^2 + 15x + 36 = 0$$

$$x = -12, x = -3$$

$$x^2 + 13x + 36 = 0$$

$$x = -9, x = -4$$

$$x^2 + 12x + 36 = 0$$

$$x = -6$$

Worked example

Solve by factorising:

$$x^2 + 10x + 9 = 0$$

$$x^2 + 10x + 16 = 0$$

$$x^2 + 10x + 25 = 0$$

$$x^2 + 10x = 0$$

Your turn

Solve by factorising:

$$x^2 + 12x + 11 = 0$$

$$x = -11, x = -1$$

$$x^2 + 12x + 27 = 0$$

$$x = -9, x = -3$$

$$x^2 + 12x + 36 = 0$$

$$x = -6$$

$$x^2 + 12x = 0$$

$$x = 0, x = -12$$

Worked example

Solve by factorising:

$$3x^2 + 10x + 3 = 0$$

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

$$3x^2 + 14x + 8 = 0$$

Your turn

Solve by factorising:

$$5x^2 + 8x + 3 = 0$$

$$x = -\frac{3}{5}, x = -1$$

$$5x^2 + 16x + 12 = 0$$

$$x = -\frac{6}{5}, x = -2$$

$$5x^2 + 32x + 12 = 0$$

$$x = -\frac{2}{5}, x = -6$$

Worked example

Solve by factorising:

$$2x^2 + 8x + 6 = 0$$

$$3x^2 + 21x + 30 = 0$$

$$5x^2 + 5x - 30 = 0$$

Your turn

Solve by factorising:

$$3x^2 + 15x - 42 = 0$$

$$x = -7, x = 2$$

Worked example

Solve by factorising:

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

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

Your turn

Solve by factorising:

$$12 - x - x^2 = 0$$

$$x = 3, x = -4$$

Worked example

Solve with the quadratic formula:

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

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

Your turn

Solve with the quadratic formula:

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

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

Worked example

Solve with the quadratic formula:

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

$$3x^2 + x - 11 = 0$$

Your turn

Solve with the quadratic formula:

$$5x^2 + 13x - 7 = 0$$

$$x = \frac{-13 + \sqrt{309}}{10}, x = \frac{-13 - \sqrt{309}}{10}$$

Worked example

Solve with the quadratic formula:

$$x^2 + x - 11 = 0$$

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

Your turn

Solve with the quadratic formula:

$$-x^2 + 13x - 7 = 0$$

$$x = \frac{13 + \sqrt{141}}{2}, x = \frac{13 - \sqrt{141}}{2}$$

Worked example

Calculate the discriminant of:

$$x^2 + 5x + 6 = 0$$

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

Your turn

Solve with the quadratic formula:

$$x^2 - 7x + 12 = 0$$

$$x = 3, x = 4$$

Worked example

How many real roots are there to:

$$x^2 + 6x + 8 = 0$$

$$x^2 + 6x + 9 = 0$$

$$x^2 + 6x + 10 = 0$$

Your turn

How many real roots are there to:

$$x^2 + 8x + 12 = 0$$

Two: $x = -6, x = -2$

$$x^2 + 8x + 16 = 0$$

One: $x = -4$

$$x^2 + 8x + 17 = 0$$

No real roots

Worked example

Solve:

$$x^2 = 3x$$

$$x^2 = -4x$$

$$2x^2 = -10x$$

Your turn

Solve:

$$3x^2 = 18x$$

$$x = 0, x = 6$$

Worked example

Solve:

$$7 - 8x = 3x^2$$

Your turn

Solve:

$$8 - 7x = 5x^2$$

$$x = \frac{-7 + \sqrt{209}}{10}, x = \frac{-7 - \sqrt{209}}{10}$$

Worked example

Solve:

$$x^2 - x - 31 = 4x - 7$$

Your turn

Solve:

$$x^2 - 2x - 32 = 3x + 4$$

$$x = 9, x = -4$$

Worked example

Solve:

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

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

Your turn

Solve:

$$x + \frac{4}{x} = 5$$

$$x = 4, x = 1$$

Worked example

Solve:

$$\frac{3}{x^2} + \frac{2}{x} = 1$$

$$\frac{2}{x^2} - \frac{7}{x} = 3$$

Your turn

Solve:

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

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

Worked example

Solve by completing the square:

$$x^2 + 8x + 3 = 0$$

$$x^2 + 10x - 4 = 0$$

Your turn

Solve by completing the square:

$$x^2 + 6x + 4 = 0$$

$$x = -3 + \sqrt{5}, x = -3 - \sqrt{5}$$

Worked example

Solve by completing the square:

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

$$3x^2 - 10x - 4 = 0$$

Your turn

Solve by completing the square:

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

$$x = \frac{3 + \sqrt{19}}{5}, x = \frac{3 - \sqrt{19}}{5}$$

Worked example

Solve using three methods:

$$x^2 + 6x + 8 = 0$$

$$x^2 + 6x + 8 = 0$$

$$x^2 + 6x + 8 = 0$$

Your turn

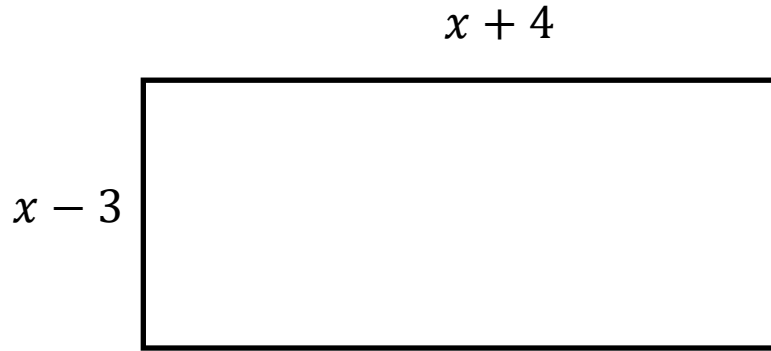
Solve using three methods:

$$x^2 + 6x + 5 = 0$$

$$x = -5, x = -1$$

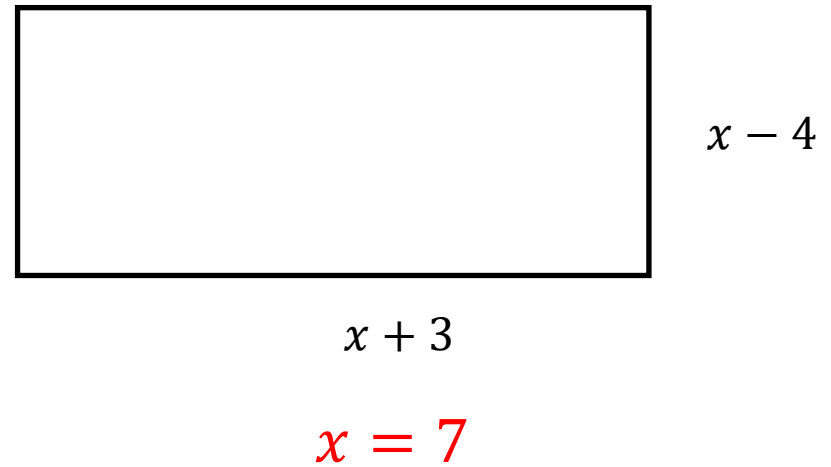
Worked example

The area of the rectangle is equal to 18 square units. Find x



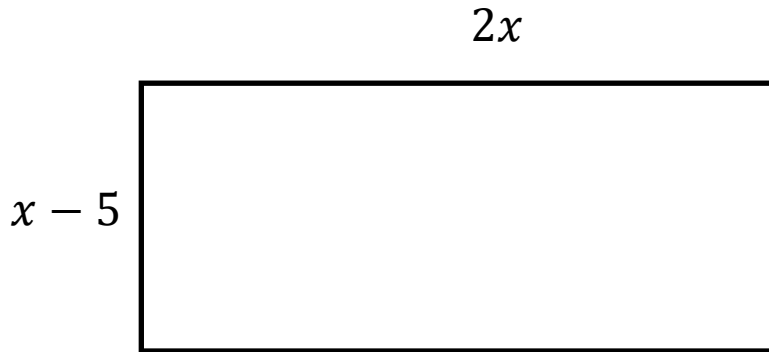
Your turn

The area of the rectangle is equal to 30 square units. Find x



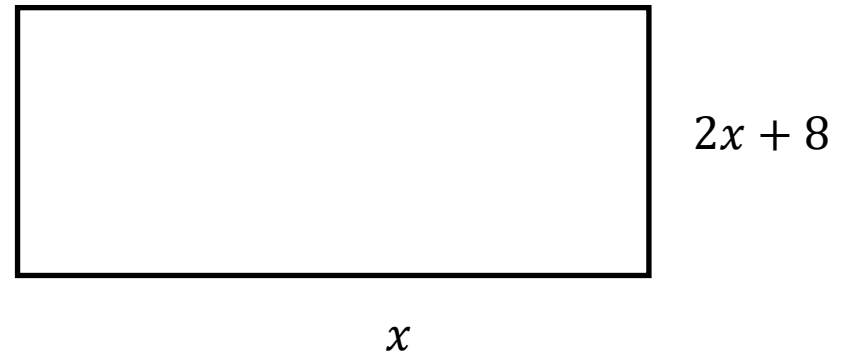
Worked example

The area of the rectangle is equal to 28 square units. Find x



Your turn

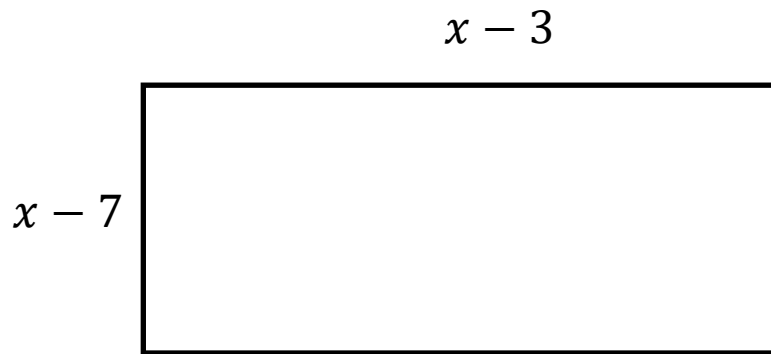
The area of the rectangle is equal to 10 square units. Find x



$$x = 1$$

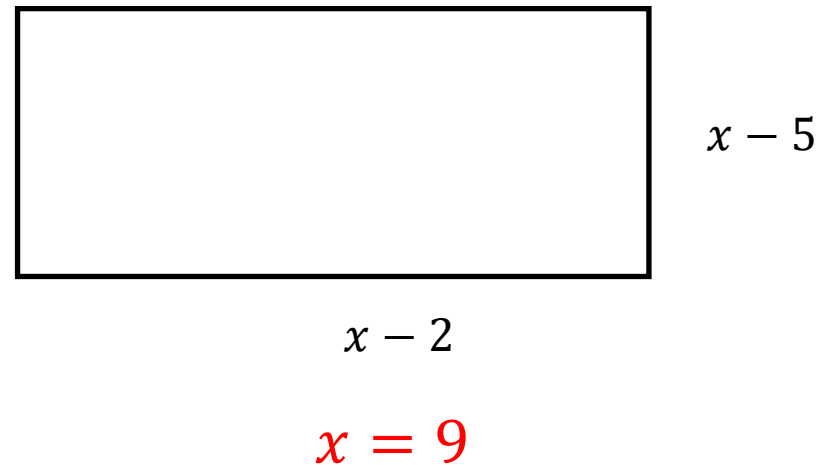
Worked example

The area of the rectangle is equal to 32 square units. Find x



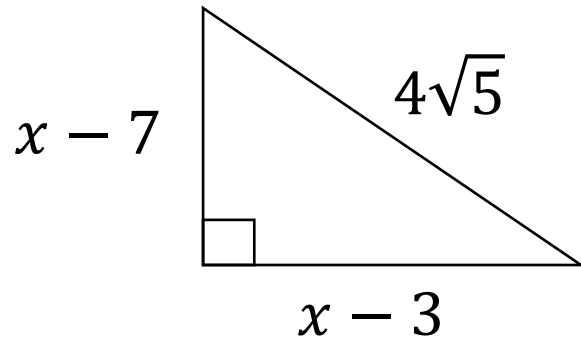
Your turn

The area of the rectangle is equal to 28 square units. Find x



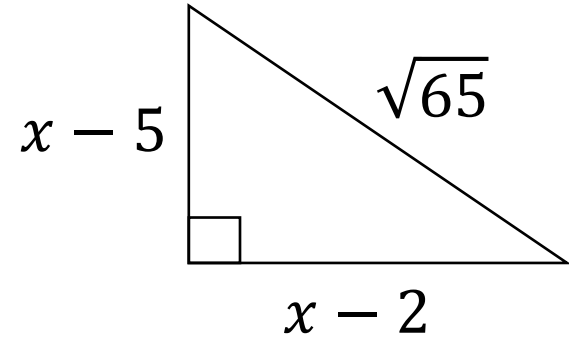
Worked example

The area of the triangle is equal to 16 square units. Find x



Your turn

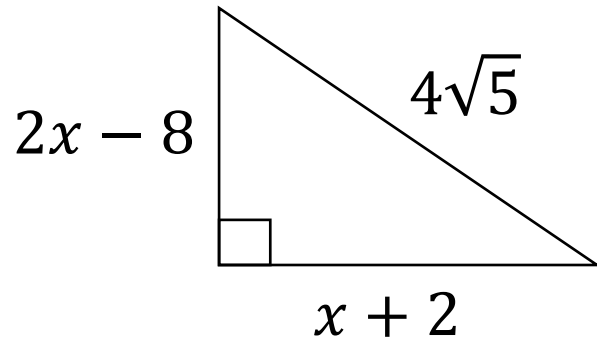
The area of the triangle is equal to 14 square units. Find x



$$x = 7$$

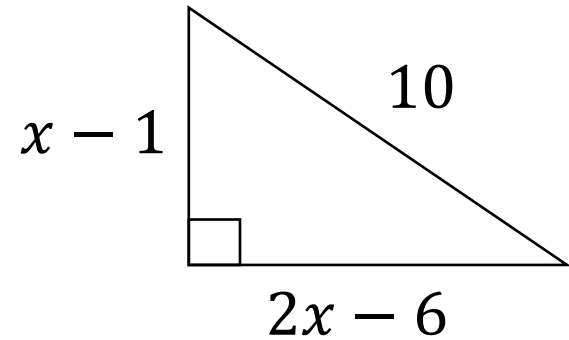
Worked example

The area of the triangle is equal to 16 square units. Find x



Your turn

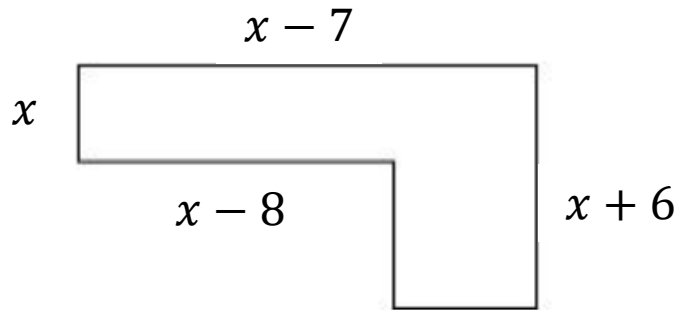
The area of the triangle is equal to 24 square units. Find x



$$x = 7$$

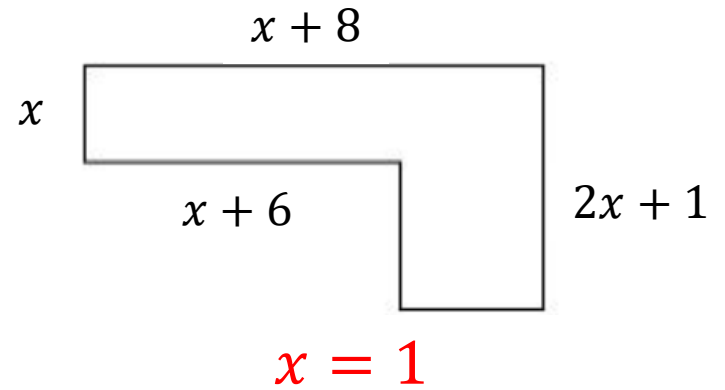
Worked example

The area of the compound shape is 24. Find x



Your turn

The area of the compound shape is 13. Find x



Worked example

Two numbers have a difference of 3 and a product of 88. Find the two numbers.

Two numbers have a difference of 5 and a product of 14. Find the two numbers.

Your turn

Two numbers have a difference of 4 and a product of 12. Find the two numbers.

$$x = 6, y = 2$$
$$x = -2, y = -6$$