2.1) Solving quadratic equations

Worked example	Your turn
Solve: $(2x-3)^2 = 4$	Solve: $(3x-5)^2 = 9$ $x = \frac{2}{3}, x = \frac{8}{3}$

Worked example	Your turn
Solve: $x - 8\sqrt{x} + 15 = 0$	Solve: $x - 6\sqrt{x} + 8 = 0$ $x = 4, x = 16$

Worked example	Your turn
Solve: $3x + 2\sqrt{x} - 8 = 0$	Solve: $2x + \sqrt{x} - 1 = 0$ $x = \frac{1}{4}$

Worked example	Your turn
Solve: $\sqrt{x+6} = x-6$	Solve: $\sqrt{x+3} = x-3$ $x = 6$ only

Worked example	Your turn
Solve: $(2x-3)^2 = 4$	Solve: $(3x-5)^2 = 9$ $x = \frac{2}{3}, x = \frac{8}{3}$

Worked example	Your turn
Solve: $2x^2 - 1 = 17$	Solve: $3x^2 + 49 = 7x^2 + 13$
$45 + 2x^2 = 5x^2 - 3$	$x = \pm 3$
$1 - x^2 = -6x^2 + 6$	

Worked example	Your turn
Solve:	Solve:
$2x^2 = 18$	$3x^2 = 48$
	$x = \pm 4$
$(2x)^2 = 4$	$(3x)^2 = 36$
	$x = \pm 2$

Worked example	Your turn
Solve: $2x^2 = \frac{32}{25}$	Solve: $5x^2 = \frac{45}{121}$ $x = \pm\frac{3}{11}$
$3x^2 = \frac{27}{49}$	

Worked example	Your turn
Solve: $4^x - 12(2^x) + 32 = 0$	Solve: $9^x - 10(3^x) + 9 = 0$
	$x = 2, x = 0$
$16^x - 5(4^x) + 4 = 0$	

Worked example	Your turn
Solve: $x^4 - 5x^2 + 4 = 0$	Solve: $x^4 - 17x^2 + 16 = 0$
$x^4 - 13x^2 + 36 = 0$	$x = \pm 4, x = \pm 1$

Worked example	Your turn
Solve: $x^6 - 35x^3 + 215 = 0$	Solve: $x^6 - 9x^3 + 8 = 0$ $x = 2, x = 1$

Worked example	Your turn
Solve $6x^{\frac{2}{3}} + 5x^{\frac{1}{3}} - 4 = 0$	Solve $3y^{\frac{2}{3}} + 2y^{\frac{1}{3}} - 1 = 0$
	$y = \frac{1}{27}, y = -1$

Worked example	Your turn
Solve: $x + \frac{2}{x} = 3$	Solve: $x + \frac{4}{x} = 5$
	$x = 4, x = 1$
$x - \frac{3}{x} = 5$	

Worked example	Your turn
Solve: $\frac{3}{x^2}+\frac{2}{x}=1$	Solve: $\frac{2}{x^2}-\frac{5}{x}=3$
$\frac{2}{x^2}-\frac{7}{x}=3$	$x=\frac{1}{3}, x=-2$

Worked example	Your turn
Solve: $x^3 + 2x^2 - 8x = 0$	Solve: $x^3 - 3x^2 - 10x = 0$ $x = 0, x = 5, x = -2$

Worked example	Your turn
Solve by factorising: $x^2 + 6x + 9 = 0$ $x^2 + 8x + 16 = 0$ $x^2 + 10x + 25 = 0$ $x^2 + 2x + 1 = 0$	Solve by factorising: $x^2 + 12x + 36 = 0$ $x = -6$

Worked example	Your turn
Solve by factorising:	Solve by factorising:
$x^2 - 6x + 9 = 0$	$x^2 - 12x + 36 = 0$
	$x = 6$
$x^2 - 8x + 16 = 0$	
$x^2 - 10x + 25 = 0$	
$x^2 - 2x + 1 = 0$	

Worked example	Your turn
Solve by factorising:	Solve by factorising:
$x^2 + 17x + 16 = 0$	$x^2 + 37x + 36 = 0$ $x = -36, x = -1$
$x^2 + 10x + 16 = 0$	$x^2 + 20x + 36 = 0$ $x = -18, x = -2$
$x^2 + 8x + 16 = 0$	$x^2 + 15x + 36 = 0$ $x = -12, x = -3$
$x^2 - 8x + 16 = 0$	$x^2 + 13x + 36 = 0$ $x = -9, x = -4$
	$x^2 + 12x + 36 = 0$ $x = -6$

Worked example	Your turn
Solve by factorising:	Solve by factorising:
$x^2 + 10x + 9 = 0$	$x^2 + 12x + 11 = 0$
	$x = -11, x = -1$
$x^2 + 10x + 16 = 0$	$x^2 + 12x + 27 = 0$
	$x = -9, x = -3$
$x^2 + 10x + 25 = 0$	$x^2 + 12x + 36 = 0$
	$x = -6$
$x^2 + 10x = 0$	$x^2 + 12x = 0$
	$x = 0, x = -12$

Worked example	Your turn
Solve by factorising:	Solve by factorising:
$3x^2 + 10x + 3 = 0$	$5x^2 + 8x + 3 = 0$
	$x = -\frac{3}{5}, x = -1$
$3x^2 + 10x + 8 = 0$	$5x^2 + 16x + 12 = 0$
	$x = -\frac{6}{5}, x = -2$
$3x^2 + 14x + 8 = 0$	$5x^2 + 32x + 12 = 0$
	$x = -\frac{2}{5}, x = -6$

Worked example	Your turn
Solve by factorising: $2x^2 + 8x + 6 = 0$ $3x^2 + 21x + 30 = 0$ $5x^2 + 5x - 30 = 0$	Solve by factorising: $3x^2 + 15x - 42 = 0$ $x = -7, x = 2$

Worked example	Your turn
Solve by factorising: $6 + 5x - x^2 = 0$ $3 - 2x - x^2 = 0$	Solve by factorising: $12 - x - x^2 = 0$ $x = 3, x = -4$

Worked example	Your turn
Solve: $6 + 5x - x^2 = 0$	Solve: $6 - 5x - x^2 = 0$
$-6 + 5x - x^2 = 0$	$x = -6, x = 1$

Worked example	Your turn
Solve with the quadratic formula: $2x^2 + x - 3 = 0$	Solve with the quadratic formula: $5x^2 + 13x - 6 = 0$
	$x = \frac{2}{5}, x = -3$
$3x^2 + x - 10 = 0$	

Worked example	Your turn
Solve with the quadratic formula: $2x^2 + x - 4 = 0$	Solve with the quadratic formula: $5x^2 + 13x - 7 = 0$
	$x = \frac{-13 + \sqrt{309}}{10}, x = \frac{-13 - \sqrt{309}}{10}$
$3x^2 + x - 11 = 0$	

Worked example	Your turn
Solve with the quadratic formula: $x^2 + x - 11 = 0$	Solve with the quadratic formula: $-x^2 + 13x - 7 = 0$
$-2x^2 + x + 3 = 0$	$x = \frac{13 + \sqrt{141}}{2}, x = \frac{13 - \sqrt{141}}{2}$

Worked example	Your turn
The solutions to a quadratic equation are $x = \frac{5 \pm \sqrt{25+24}}{6}$ What is the quadratic equation?	The solutions to a quadratic equation are $x = \frac{6 \pm \sqrt{36+8}}{2}$ What is the quadratic equation? $x^2 - 6x - 2 = 0$

Worked example	Your turn
How many real roots are there to: $x^2 + 6x + 8 = 0$	How many real roots are there to: $x^2 + 8x + 12 = 0$ Two: $x = -6, x = -2$
$x^2 + 6x + 9 = 0$	$x^2 + 8x + 16 = 0$ One: $x = -4$
$x^2 + 6x + 10 = 0$	$x^2 + 8x + 17 = 0$ No real roots

Worked example	Your turn
Solve: $x + \frac{2}{x} = 3$	Solve: $x + \frac{4}{x} = 5$
	$x = 4, x = 1$
$x - \frac{3}{x} = 5$	

Worked example	Your turn
Solve: $\frac{3}{x^2}+\frac{2}{x}=1$	Solve: $\frac{2}{x^2}-\frac{5}{x}=3$
$\frac{2}{x^2}-\frac{7}{x}=3$	$x=\frac{1}{3}, x=-2$

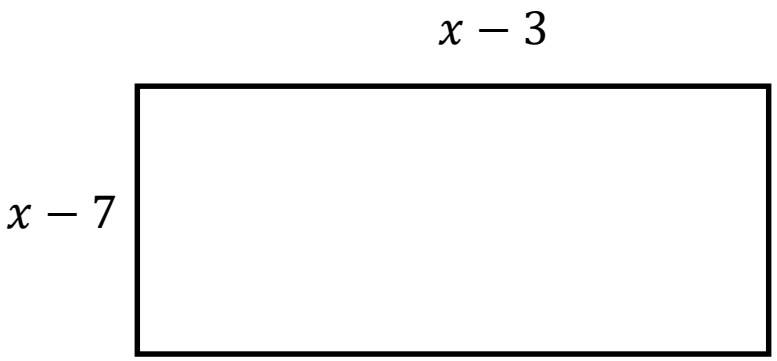
Worked example	Your turn
Solve by completing the square: $x^2 + 8x + 3 = 0$	Solve by completing the square: $x^2 + 6x + 4 = 0$
	$x = -3 + \sqrt{5}, x = -3 - \sqrt{5}$
$x^2 + 10x - 4 = 0$	

Worked example	Your turn
Solve by completing the square: $2x^2 - 8x + 3 = 0$	Solve by completing the square: $5x^2 - 6x - 2 = 0$ $x = \frac{3 + \sqrt{19}}{5}, x = \frac{3 - \sqrt{19}}{5}$
$3x^2 - 10x - 4 = 0$	

Worked example	Your turn
Solve using three methods: $x^2 + 6x + 8 = 0$ $x^2 + 6x + 8 = 0$ $x^2 + 6x + 8 = 0$	Solve using three methods: $x^2 + 6x + 5 = 0$ $x = -5, x = -1$

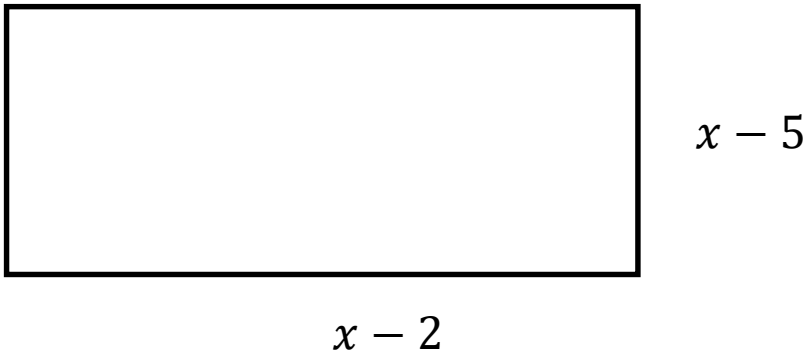
Worked example

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

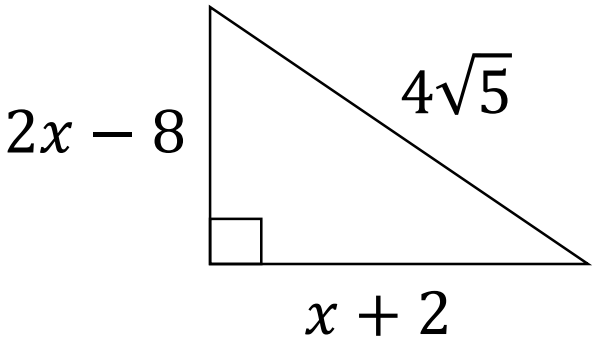
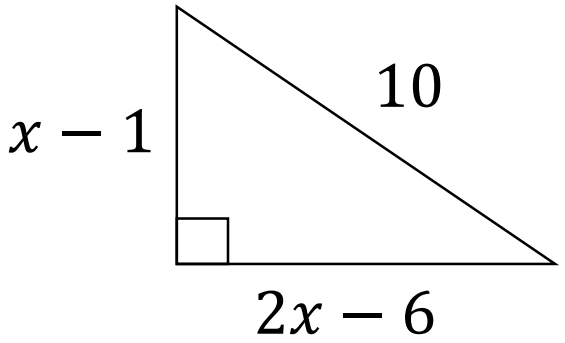


Your turn

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



$x = 9$

Worked example	Your turn
The area of the triangle is equal to 16 square units. Find x	The area of the triangle is equal to 24 square units. Find x
	
	$x = 7$

Worked example	Your turn
Two numbers have a difference of 3 and a product of 88. Find the two numbers.	Two numbers have a difference of 4 and a product of 12. Find the two numbers. $x = 6, y = 2$ $x = -2, y = -6$
Two numbers have a difference of 5 and a product of 14. Find the two numbers.	