

# Factorising Quadratics with a coeff

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# 1) Factorising Quadratics with a coefficient greater than 1: Easier

1) Solve  $(4x + 2)(x - 1) = 0$

$$\begin{aligned} 4x + 2 &= 0 & x - 1 &= 0 \\ 4x &= -2 & x &= 1 \\ x &= \frac{-2}{4} = \frac{-1}{2} \end{aligned}$$

$x = -\frac{1}{2}$  and  $1$

(2 Marks)

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

A/C  $x \rightarrow 6, + \rightarrow 7$

$$\begin{aligned} 3x^2 + 6x + x + 2 &= 0 \\ 3x(x + 2) + 1(x + 2) &= 0 \\ (3x + 1)(x + 2) &= 0 \end{aligned}$$

$$\begin{aligned} 3x + 1 &= 0 & x + 2 &= 0 \\ 3x &= -1 & x &= -2 \\ x &= -\frac{1}{3} \end{aligned}$$

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

(2 Marks)

3) Solve  $2a^2 + 7a + 5 = 0$

$x \rightarrow 10, + \rightarrow 7$

$$\begin{aligned} 2a^2 + 2a + 5a + 5 &= 0 \\ 2a(a + 1) + 5(a + 1) &= 0 \\ (2a + 5)(a + 1) &= 0 \\ 2a + 5 &= 0 & a + 1 &= 0 \\ 2a &= -5 & a &= -1 \\ a &= -\frac{5}{2} \end{aligned}$$

$a = -\frac{5}{2}$  and  $-1$

(2 Marks)

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

$x \rightarrow -6, + \rightarrow 5$

$$\begin{aligned} 2x^2 + 6x - x - 3 &= 0 \\ 2x(x + 3) - 1(x + 3) &= 0 \\ (2x - 1)(x + 3) &= 0 \end{aligned}$$

$$\begin{aligned} 2x - 1 &= 0 & x + 3 &= 0 \\ 2x &= 1 & x &= -3 \\ x &= \frac{1}{2} \end{aligned}$$

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

(2 Marks)

# 1) Factorising Quadratics with a coefficient greater than 1: Medium

5) Solve  $6x^2 - x - 15 = 0$

$6x^2 + 9x - 10x - 15 = 0$   $x - 90, + \rightarrow -1$

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

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

$3x-5=0$

$3x=5$

$x = 5/3$

$2x+3=0$

$2x = -3$

$x = -3/2$

$x = 5/3$  and  $-3/2$

(2 Marks)

6) Solve, by factorising, the equation  $8x^2 - 30x - 27 = 0$

$x \rightarrow -216, + -30$

$8x^2 - 36x + 6x - 27 = 0$

$4x(2x-9) + 3(2x-9) = 0$

$(4x+3)(2x-9) = 0$

$4x+3=0$

$4x = -3$

$x = -3/4$

$2x-9=0$

$2x = 9$

$x = 9/2$

$x = -3/4$  and  $9/2$

(2 Marks)

7) Simplify

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

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

$x \rightarrow 6, + \rightarrow -5$

$2x^2 - 2x - 3x + 3$

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

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

Factorise  $2x^2 - x - 3$

$x \rightarrow -6, +, -1$

$2x^2 + 2x - 3x - 3$

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

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

$\frac{(2x-3)(x-1)}{(2x-3)(x+1)}$

$\frac{x-1}{x+1}$

(2 Marks)

1) Factorising Quadratics with a coefficient greater than 1: Harder

8) Simplify

Factorising  $5x^2 + x - 6$   $\frac{5x^2 + x - 6}{5x^2 - 9x - 18}$  factorising  $5x^2 - 9x - 18$

$x \rightarrow -30 \quad + \rightarrow +1$   $x \rightarrow -90, \quad + \rightarrow -9$

$5x^2 = 5x + 6x - 6$   $5x^2 - 15x + 6x - 18$

$5x(x-1) + 6(x-1)$   $5x(x-3) + 6(x-3)$

$(5x+6)(x-1)$   $(5x+6)(x-3)$   $(5x+6)(x-3)$

~~$(5x+6)(x-1)$~~

$x-1$   $x-3$

(2 Marks)

9) The two rectangles have the same area



a) Write an equation showing this.

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

$4x^2 - x = 3x^2 + 6x - 2x - 4$

$4x^2 - 3x^2 - x - 6x + 2x + 4 = 0$

$x^2 - 5x + 4 = 0$   $x^2 - 5x + 4 = 0$

b) Solve the equation. These are two possible solutions for the areas of these rectangles. Find them both.

$x^2 - 5x + 4 = 0$

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

$x-4 = 0 \quad x-1 = 0$

$x = 4 \quad x = 1$

Area 1 =  $(4x-1)(x)$

$(4(4)-1)(4)$

$15 \times 4 = 60$

Area 2 =  $(4x-1)(x)$

$(4(1)-1)(1)$

$3 \times 1 = 3$

60 and 3