

Section 2.3 Solving quadratic and linear equations

Solve: 12. $x^2 + y^2 + 2x - 4y + 3 = 0$
 $x - y + 3 = 0$ Step 1: Rewrite linear $\Rightarrow x = y - 3$

Step 2: Sub into quadratic & solve

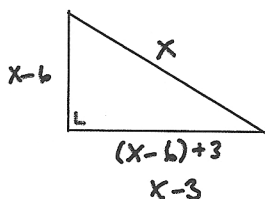
$$\begin{aligned} (y-3)^2 + y^2 + 2(y-3) - 4y + 3 &= 0 \\ y^2 - 6y + 9 + y^2 + 2y - 6 - 4y + 3 &= 0 \\ 2y^2 - 8y + 6 &= 0 \\ y - 4y + 3 &= 0 \\ (y-1)(y-3) &= 0 \\ y = 1 \quad | \quad y = 3 \end{aligned}$$

Step 3: Sub values into linear to find points

$$\begin{aligned} x &= y - 3 \\ x &= 1 - 3 = -2 \\ (-2, 1) \\ x &= 3 - 3 = 0 \\ (0, 3) \end{aligned}$$

Section 2.4 Quadratic and linear equations in context

10. The hypotenuse of a right-angled triangle is 6 cm longer than the shortest side.
 The third side is 3 cm longer than the shortest side. Find the length of the shortest side.



Remember...

Pythagoras

$$a^2 = b^2 + c^2$$

$$\begin{aligned} x^2 &= (x-6)^2 + (x-3)^2 \\ x^2 &= x^2 - 12x + 36 + x^2 - 6x + 9 \end{aligned}$$

$$x^2 - 18x + 45 = 0$$

$$(x-3)(x-15) = 0$$

$x = 15$ | $x = 3$ this answer implies one side is 0 so it doesn't make sense.

\Rightarrow hypotenuse = 15 cm

Shortest side = $15 - 6 = 9$ cm

or

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

