

**Solve where $x^2 + y^2 = r$ and $x + y = 3$
(substituting)**

Maths

Mrs Dennett



Solve where $x^2 + y^2 = r$ and $x + y = 3$ (substituting)

1. Kaia is solving these simultaneous equations.

$$\begin{aligned}y - x &= 3 \\ x^2 + y^2 &= 25\end{aligned}$$

Kaia substitutes $y = x + 3$ into the second equation.

$$x^2 + (x + 3)^2 = 25$$

She then simplifies to this

$$x^2 + x^2 + 9 = 25$$

What has Kaia done wrong?

2. Solve these equations using substitution.

$$\begin{aligned}x + y &= 10 \\ x^2 + y^2 &= 100\end{aligned}$$

Use your results to predict the solutions of this pair of equations.

$$\begin{aligned}x + y &= 5 \\ x^2 + y^2 &= 25\end{aligned}$$

Solve to see if your prediction was correct.



Solve where $x^2 + y^2 = r$ and $x + y = 3$ (substituting)

3. Solve these equations giving your answers as mixed numbers where appropriate.

$$x^2 + y^2 = 36$$

$$x + 2y = 6$$

4. Solve these equations leaving your answer in simplified surd form.

$$x^2 + y^2 = 25$$

$$y - x = 3$$

HINT: You may need to use the quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



Answers



Solve where $x^2 + y^2 = r$ and $x + y = 3$ (substituting)

1. Kaia is these solving simultaneous equations.

$$y - x = 3$$

$$x^2 + y^2 = 25$$

Kaia substitutes $y = x + 3$ into the second equation.

$$x^2 + (x + 3)^2 = 25$$

She then simplifies to this

$$x^2 + x^2 + 9 = 25$$

What has Kaia done wrong?

$$x^2 + x^2 + 6x + 9 = 25$$

2. Solve these equations using substitution.

$$x + y = 10 \quad x = 10, y = 0$$

$$x^2 + y^2 = 100 \quad x = 0, y = 10$$

Use your results to predict the solutions of this pair of equations.

$$x + y = 5 \quad x = 5, y = 0$$

$$x^2 + y^2 = 25 \quad x = 0, y = 5$$

Solve to see if your prediction was correct.



Solve where $x^2 + y^2 = r$ and $x + y = 3$ (substituting)

3. Solve these equations giving your answers as mixed numbers where appropriate.

$$x^2 + y^2 = 36$$

$$x - 2y = 6$$

$$x = 6, y = 0$$

$$x = -3\frac{3}{5}, y = -4\frac{4}{5}$$

4. Solve these equations leaving your answer in simplified surd form.

$$x^2 + y^2 = 25$$

$$y - x = 3 \rightarrow y = x + 3$$

$$x^2 + (x + 3)^2 = 25$$

$$x^2 + x^2 + 6x + 9 = 25$$

$$2x^2 + 6x - 16 = 0$$

$$x = \frac{-6 \pm \sqrt{6^2 - 4 \times 2 \times -16}}{2 \times 2}$$

$$x = \frac{-3 \pm \sqrt{41}}{2}, y = 3 - \frac{3 \mp \sqrt{41}}{2}$$

