

Mathematics

# **Eliminating a variable: add or subtract?**

## Downloadable Resource

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# Try this

$$\begin{aligned}2x + 3y &= 20 \\4x + 3y &= 30\end{aligned}$$

$$\begin{aligned}2x + 3y &= 20 \\4x - 3y &= 30\end{aligned}$$

Look at the pairs of simultaneous equations.

What happens if I add the equations?

What happens if I subtract them?

What's the same and what's different?



# Connect

$$4x + 3y = 30$$

$$2x + 3y = 20$$

$$4x - 3y = 30$$

$$2x + 3y = 20$$



# Independent task

Decide which variable can be eliminated and sort the pairs of simultaneous equations into two categories.

A: an unknown can be eliminated by ADDING the equations.

B: an unknown can be eliminated by SUBTRACTING the equations.

$$\begin{aligned}3x + 5y &= 70 \\2x + 5y &= 40\end{aligned}$$

$$\begin{aligned}5x + 3y &= 20 \\9x - 3y &= 35\end{aligned}$$

$$\begin{aligned}2x - 3y &= 20 \\32 &= 4x - 3y\end{aligned}$$

$$\begin{aligned}-3x + 3y &= 30 \\20 &= -3x + 5y\end{aligned}$$

$$\begin{aligned}-2x + 3y &= 20 \\30 &= 3y + 4x\end{aligned}$$

$$\begin{aligned}20 + 2x &= 3y \\3y - 4x &= 30\end{aligned}$$



# Explore

$$\begin{array}{c} \text{A} \\ 2x - 5y = 10 \end{array}$$

$$\begin{array}{c} \text{B} \\ x + y = 4 \end{array}$$

$$\begin{array}{c} \text{C} \\ 3x + 2y = 7 \end{array}$$

If I subtract B from A twice, I can eliminate  $x$ .

What other combinations can you find to eliminate either  $x$  or  $y$ ?

$$\begin{array}{r} 2x - 5y = 10 \\ x + y = 4 \\ x + y = 4 \\ \hline -7y = 4 \end{array}$$

