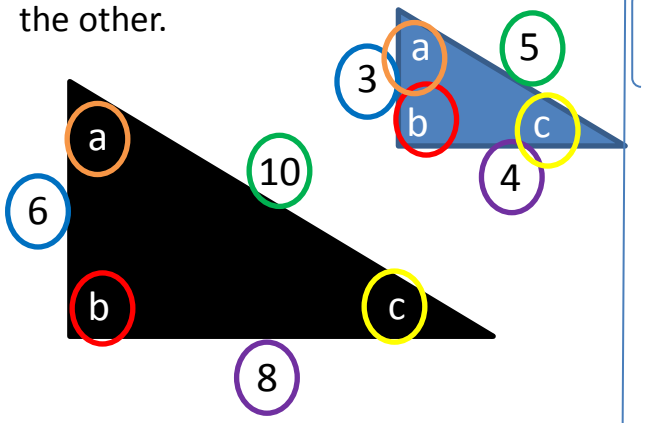
SIMILARITY

When shapes look the same but are different sizes, they are mathematically ***similar***. This means their *corresponding* ("matching") **angles** are **equal**, and their *corresponding* **sides** are in the **same ratio**. One shape is an *enlargement* of the other.



Congruence & Similarity definitions

How to find missing sides

VECTORS

Column vectors describe horizontal and vertical "movement", a bit like how co-ordinates describe position. They look similar, but they're arranged in a column (hence the name), as shown below:

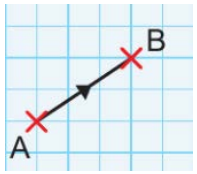
Column vectors

$\begin{pmatrix} x \\ y \end{pmatrix}$ horizontal movement / vertical movement

To get from A to B, you go 3 right, 2 up:

$\overrightarrow{AB} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ (**a**)

Reverse: $\overrightarrow{BA} = \begin{pmatrix} -3 \\ -2 \end{pmatrix}$ (**-a**)



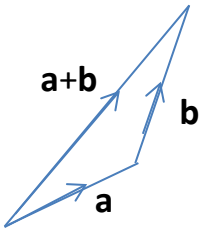
Vectors are labelled with a lower case letter, either **bold** or underlined.

You can combine vectors by adding their x and y values to give a *resultant* vector:

$\mathbf{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$ $\mathbf{a+b} = \begin{pmatrix} 3+4 \\ 2+1 \end{pmatrix} \begin{pmatrix} 7 \\ 3 \end{pmatrix}$

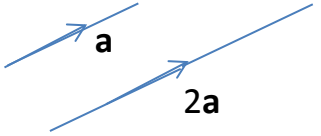
It would look like this:

We do this to move between points that don't have a vector between them – you can only go the way you know!



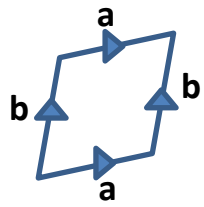
Vectors can also be multiplied:

$2\mathbf{a} = \begin{pmatrix} 3x2 \\ 2x2 \end{pmatrix} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}$



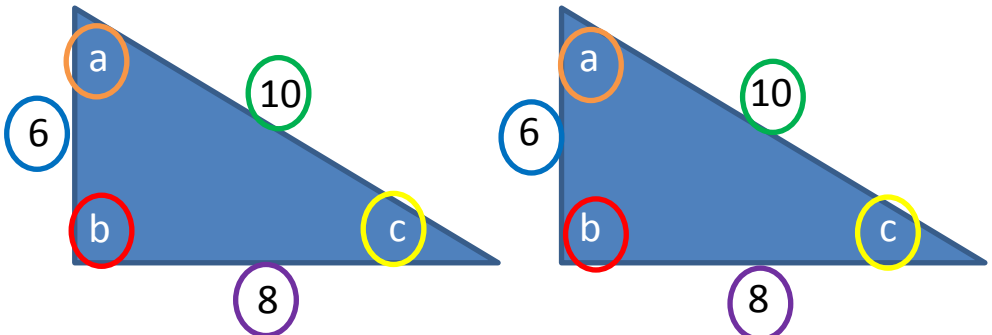
Parallel vectors can be represented using the same letter:

Algebraic vectors



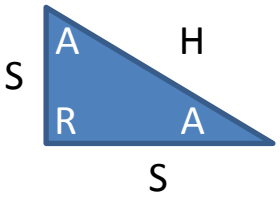
CONGRUENCE

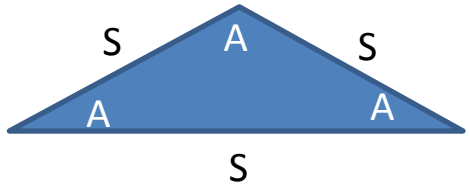
When shapes are identical, they are ***congruent***. All *corresponding* lengths and angles are **equal** – you could fit one perfectly on top of the other.



You can prove two triangles are congruent by showing that any of these combinations are matching (video here):

SSS (all three sides)
SAS (two sides and the angle between them)
ASA (two angles and the side which connects them)
AAS (two angles and the side after the second angle)
RHS (right angle, hypotenuse and one other side)*





*only applies to right-angled triangles