Developing similarity

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We are learning about the properties of similar triangles

Prior knowledge:

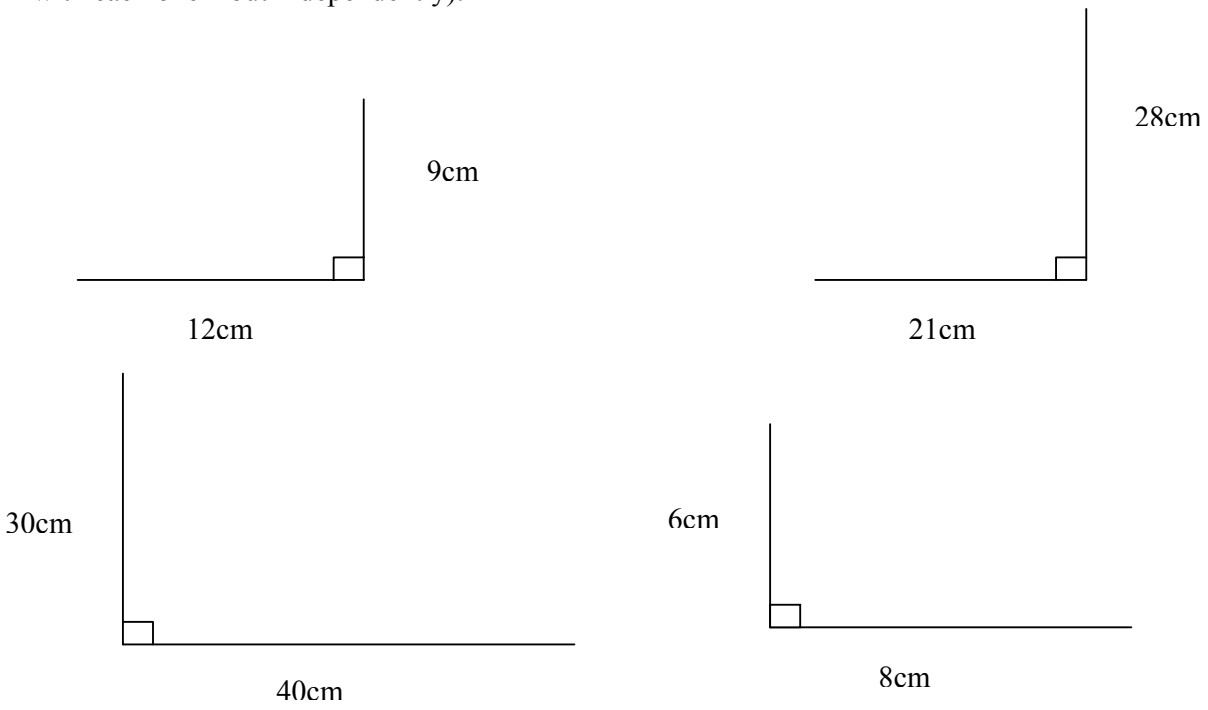
- Using a ruler accurately
- Using a protractor accurately
- Simplifying ratios
- The concept of enlargement and calculating the scale factor of enlargement

Equipment

Ruler, protractor, squared paper

Using Materials/Representations

Give each student one of the following diagrams to draw accurately. (Several students should work with each one – but independently).



Once this stage has been completed, get students to join the ends of the arms to form a triangle, and use a protractor to measure the angle between the shortest side and the hypotenuse. Record the results in a table like the one below

Triangle	Angle size
9 & 12cm	
21 & 28cm	
30 & 40cm	

Once the table is completed discuss the following:

- Discrepancies between answers for the same triangle…
  (to highlight the issues around measurement error. This may involve students double-checking their results or checking someone else's triangle – and results.)
- Why the different triangles all produce the same answer…

At this stage ask "is there is anything that you notice that the triangles have in common?" If nothing is discovered, leave this, but challenge students to predict what would happen if the other angle of each triangle were to be measured.

Get students to work on another set of similar right angled triangles. This time use sides with lengths of 5, 12cm, 10 and 24cm, etc. If students did not identify that the triangles are all enlargements of each other when working with the first set (or that the sides are in the same ratio to each other) pose the question outlined earlier again. If they did manage to get this idea – get the students to predict what they will discover this time.

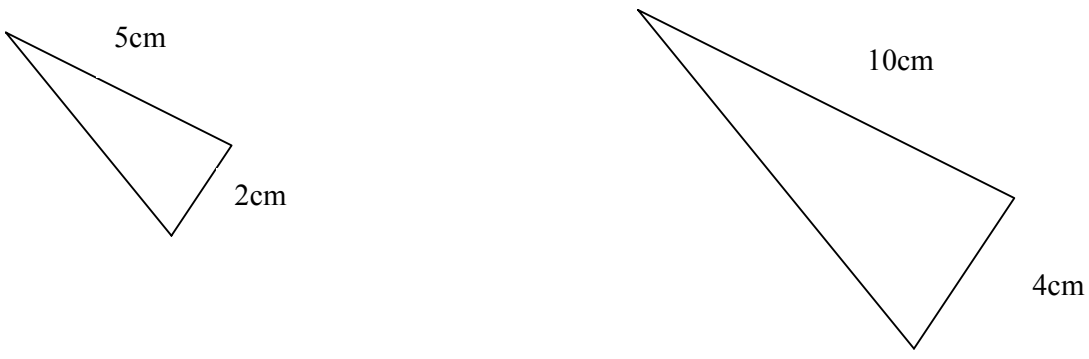
Using Imaging

Use a third set (maybe multiples of 4 & 5cm) and a fourth set (maybe multiples of 1, 1) to reinforce/develop the idea that similar triangles always have the angles of the same size in similar positions. Before starting, get them to predict what they will find. Also get students to work on sets of similar triangles that are placed in a variety of orientations on the page.

The word 'similar' should be introduced to mean triangles that are enlargements of each other.

Using Number Properties

Give students a single right angled triangle, with side lengths marked, to work on. Ask "what other triangles would have angles the same size as this one?" Once a number of possibilities have been described and recorded on the board, ask "how did you work out that these were enlargements?" If no fractional scale factors have been given, then draw and label a triangle that has been enlarged by 50% and ask "is this is an enlargement?", and "how can you tell?" Aim to establish that each side was multiplied by the same number (the scale factor of enlargement) and that this can be a whole number, fraction or decimal. Next give students two right angled triangles, where one is an enlargement of the other. Ask "how can we tell if the right hand one is an enlargement of the other?"



Finish by getting students to make up a right angled triangle of their own, and explain how to make other triangles (both bigger and smaller) that have the same sized angles, and how to tell if two drawn triangles are similar by looking at the length of the sides.