Leaving Certificate Ordinary Level

Theorem 13- Teacher Guide

Theorem 13: If two triangles are similar, then their sides are proportional, in order.

Introduction: The word 'similar' (or 'equiangular') should not be used to introduce this theorem. Begin by saying that "We are going to look at triangles." Demonstrate two triangles using geostrips as shown in **Figure 1** below.

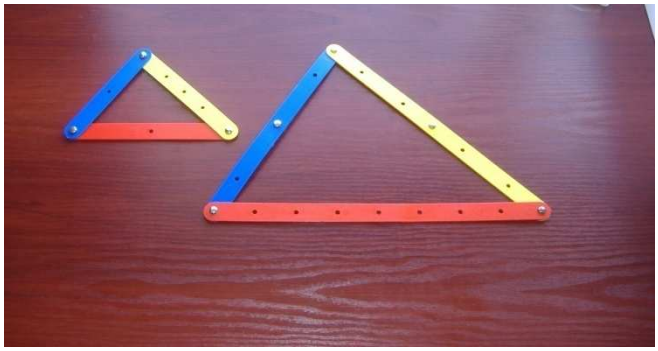


Figure 1

Teacher's Task: Place the corresponding angles on top of each other and get the class to verify that the angles are all the same, but the sides are different. See **Figures 2, 3 and 4** below.

Figure 2

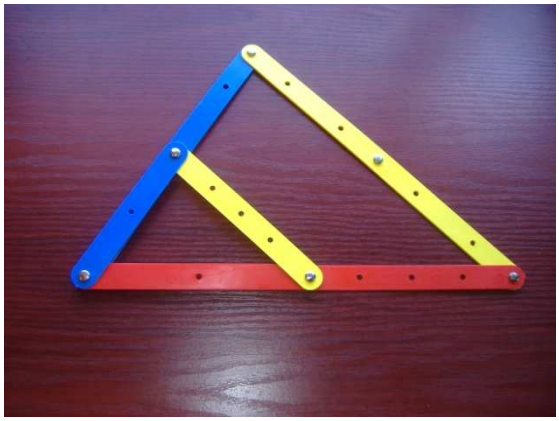


Figure 3

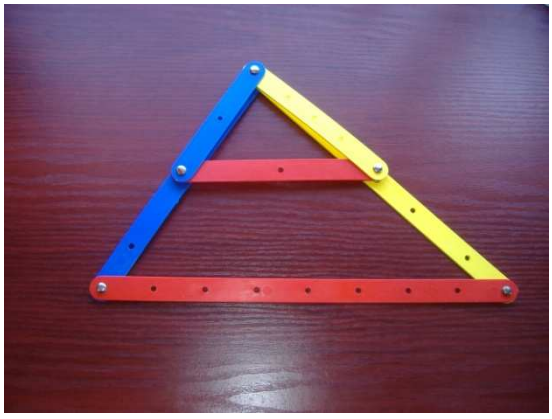
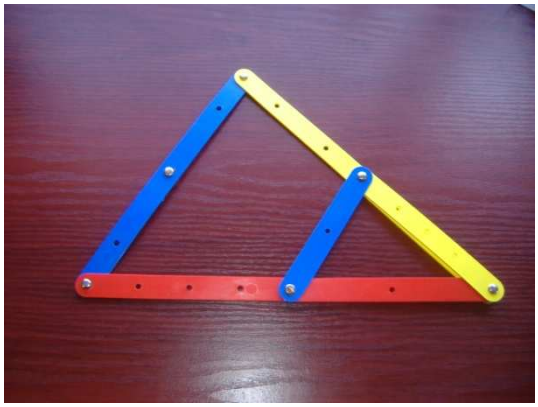


Figure 4

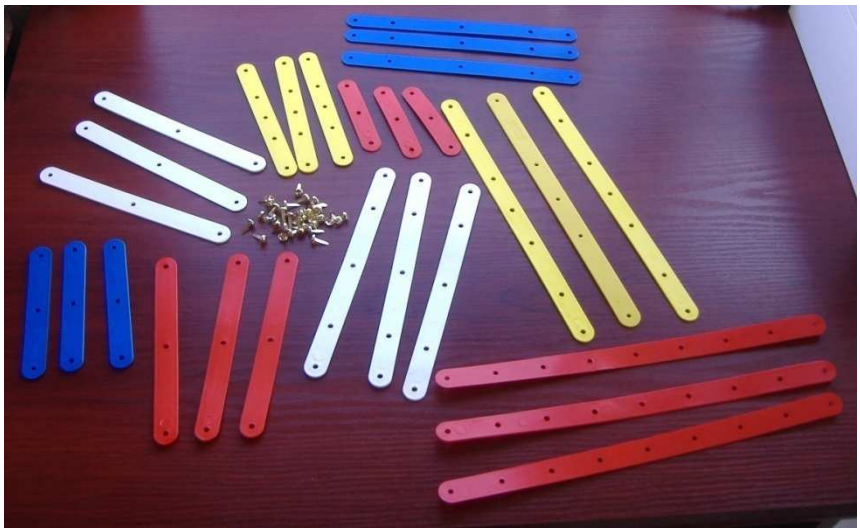


Establish the common properties of these triangles and establish the differences (sides). At this stage the word ‘similar’ may be used to relate to the two triangles.

Draw attention to the colour coding of the sides. This can be used to identify pairs of corresponding sides. i.e. The large yellow side corresponds to the small yellow side etc

Pupils’ Task 1: Using various sizes of geostrips get pupils to make up a pair of similar triangles and verify as above.

Figure 5



At this stage some pupils may not be able to create pairs of similar triangles. This is fine and should be used by the teacher to differentiate between triangles which are similar and those which are not.

Pupils' Task 2: Get class to construct the following triangle ABC, where |AB| = some distance between 4cm and 9cm. Make it a whole number.
$|\angle CAB| = 50°$ and $|\angle ABC| = 70°$.

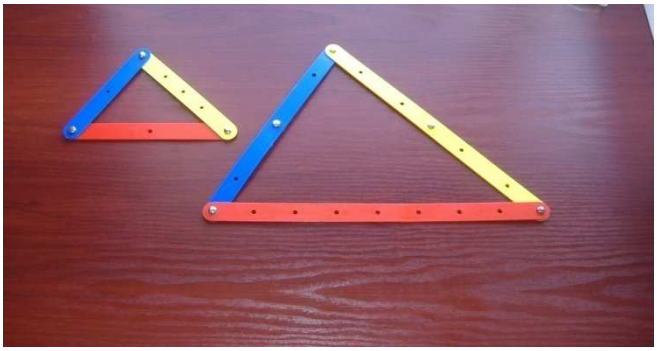
Then get class to construct the triangle DEF, where |DE| = 1½ times the distance ,
$|\angle FDE| = 50°$ and $|\angle DEF| = 70°$.

1. The pupils should measure $|\angle ACB|$ and $|\angle DFE|$ to verify that they have indeed constructed similar triangles
2. Get the class to measure and calculate each of the following:

$$(i)\ \frac{|DF|}{|AC|} \quad (ii)\ \frac{|EF|}{|BC|} \quad (iii)\ \frac{|AB|}{|DE|}$$

3. What do you notice ?

Pupils' Task 3: Teacher to measure the length of the blue, yellow and red sides on each of the triangles used during the teacher's task and investigate if the sides are in ratio.



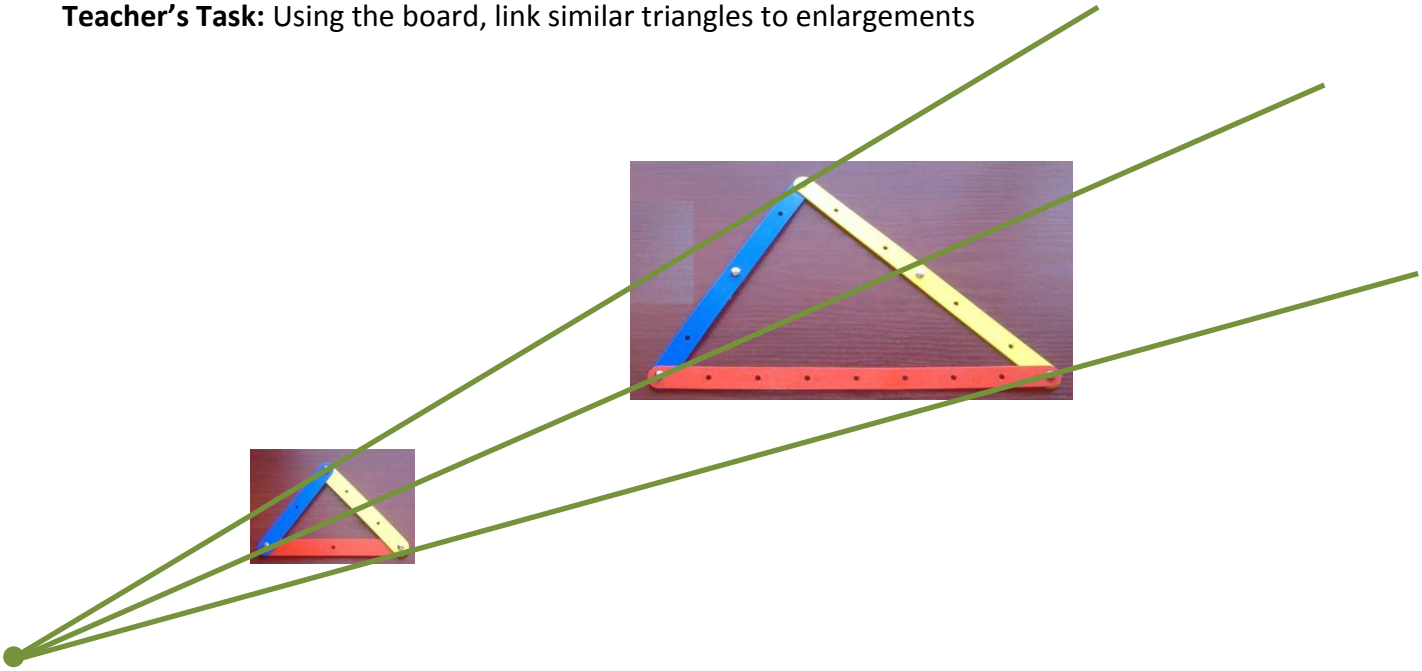
Pupils' Task 4: Introduce the idea of a 'converse'

Statement	True/False	Converse	True/False
If I have visited Rome then I have been to Italy.			
A square is a quadrilateral with 4 sides.			
If an angle is less than 90^0 it is an acute angle.			
If 3 points are not collinear, then they can be joined to make a triangle.			
If a quadrilateral has 4 right angles then it is a rectangle.			
If two triangles are similar, then their sides are proportional, in order.			

Pupils' Task 5: Then test the converse of theorem 13.

1. Get pupils to construct two triangles whose sides are in ratio. E.g. small triangle with sides 6cm, 9cm and 12cm. Larger triangle with sides 8cm, 12cm and 16cm.
2. Using a protractor verify that the two triangles are similar.
3. Ask pupils to construct two more triangles which whose sides are in ratio. Suggest a ratio of 1: 1¼ . Then check these triangles to see if they are similar.

Teacher's Task: Using the board, link similar triangles to enlargements



Emphasise the idea that there is an infinite number of similar triangles possible using this method.

Pupils' Task 6: The 'Guidelines for Teachers' (shown on the right) has a short lesson idea, which illustrates the differences between similar triangles and congruent triangles.

The lesson is titled "SIMILARITY V CONGRUENCE AND RATIO" and is "**Geometry Lesson Idea 12**" in the Guidelines.