

## **SIMILAR SHAPES**

### **Teacher Notes**

#### **References**

Foundation	G5.4: Enlargements
Foundation Plus	G4.6 Enlargement, G4.7 Similarity
Higher	G4.4 Similar shapes
Higher Plus	G2.1: Similar shapes

#### **Introduction**

In this activity students experience enlargement and similarity dynamically: they drag objects and/or the centre of enlargement around the screen, they change the scale factor and they immediately see the transformed image.

Students are also able to explore the similarity of triangles on a unit grid and to investigate the areas and perimeters of similar pentagons.

#### **Resources:**

Students start this activity with a blank document, building up the enlargement step by step through sections 1 to 5. For sections 6 and 7 there is a prepared TI-Nspire document entitled ***SimilarShapes.tns***.

There are six pages of notes for students. Pages 1 to 4 provide very detailed instructions that guide them through the initial exploration of enlargements. Pages 5 and 6 provide suggestions for using the TI-Nspire document.

#### **TI-Nspire skills students will need**

- Transferring a document to the handheld.
- Opening a document on the handheld.

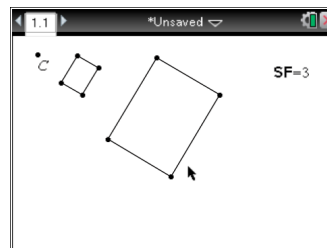
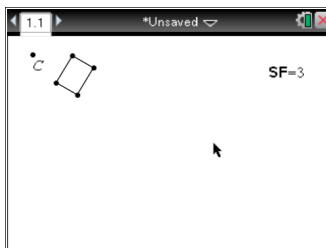
#### **The activity**

You may wish to demonstrate the use of some or all of this activity using the TI-Nspire Teacher software projected onto a screen, but it is recommended that students also complete it individually on handhelds. There is nothing quite like the experience of making one's own changes to the basic shape or centre of enlargement in order to get a real feel for how enlargement works.

The notes below correspond to the 7 sections of the student handout.

#### **1. Enlarge a rectangle**

In parts a) to d) an object, the centre of enlargement and the scale factor are created. In part e) the Enlargement tool is used to produce the enlargement.



## 2. Explore the enlargement

Students are encouraged to investigate the effect of changing

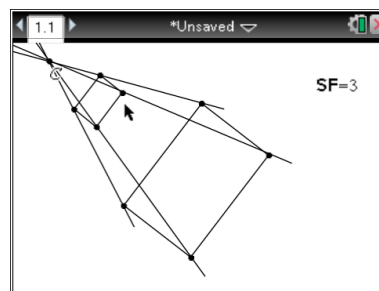
- the object's shape,
- the object's position,
- the position of the centre of enlargement,
- the scale factor.

It is good to encourage students not to hurry this part of the activity—time spent “playing around” here will contribute to a deeper understanding of how enlargement works.

## 3. Construction lines

Adding these lines strengthens an understanding of how the object, image and centre of enlargement are related.

In part b) ideas of perspective could usefully be discussed.

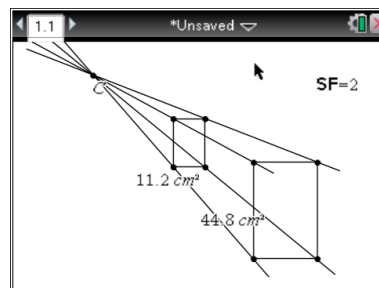
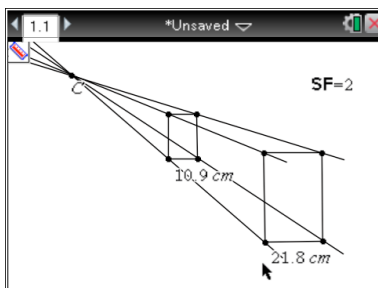


## 4. Making measurements

The emphasis here changes from a purely spatial appreciation of enlargement to a more analytical one.

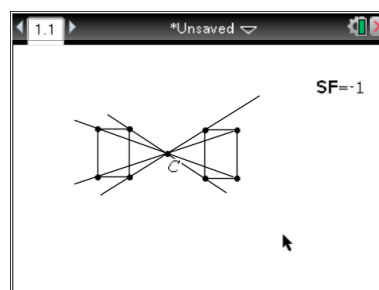
- This section compares distances of the object and image from the centre of enlargement.
- Now the actual dimensions of the object and image can be compared.

c) In this section students can compare areas and this can lead to a classroom discussion about why the area scale factor is the square of the (linear) scale factor.



## 5. Negative scale factors

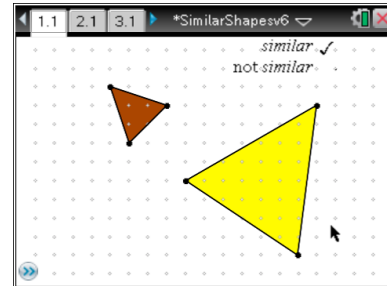
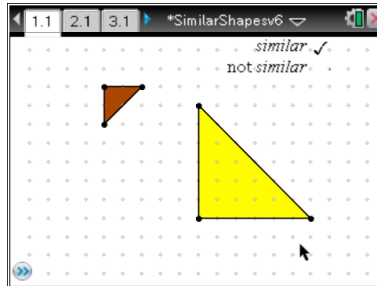
The abstract notion of negative scale factors can be introduced and developed for more able students.



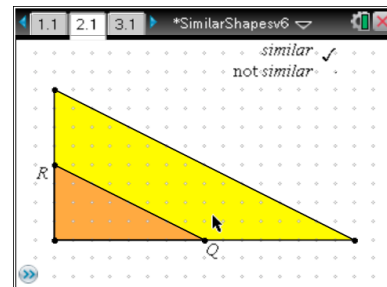
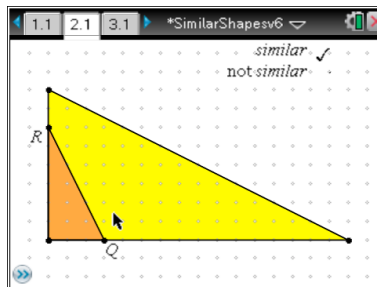
### 6. Similarity Detector

For this section and section 7 students will need to use the pre-prepared TI-Nspire document, **SimilarShapes.tns**. Before loading this document you may want students to save their work so far: press **doc** **1** **5** and enter a suitable file name.

a) All of the six points can be moved, but only to other grid points. There are, of course, many possibilities. This is the first time that the word similar is used and you may wish to stress it in a class discussion.

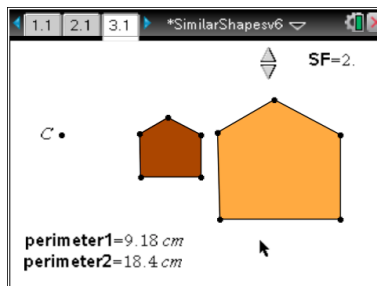


b) The two triangles here appear on top of each other. Moving just points Q and R allows for several possibilities and brings out the point that shapes can be similar even when a reflection is involved.



### 7. Perimeters and areas

In this section the up/down arrows in the top right hand corner allow students to vary the scale factor of the enlargement, exploring the relationship between it and the two perimeters and areas.



scalefactor	pentagon1	pentagon2
2.00	9.18	18.36
2.00	10.75	21.49
2.50	10.75	26.87
3.00	10.75	32.24
4.00	10.75	42.99

A1 = 2.

Pressing **ctrl** **.** on page 3.1 (or 4.1) automatically saves the current values on page 3.2 (or 4.2).

Should you wish to clear the data in the columns of the spreadsheet it is necessary to move to a shaded cell at the head of the column and choose Clear Data from the Data menu: press **menu** **3** **4**.

