

REFLECTION

Teacher Notes

References

Foundations	G4.1: Reflections, G5.1 More reflections. G4.4 Tessellations.
Foundations Plus	G4.1: Reflections, G5.3 Tessellations
Higher	G3.1: Reflections, G3.4 Describing transformations
Higher Plus	—

Introduction

This activity allows students to experience reflection dynamically. Dragging objects around the screen gives immediate visual feedback to students to help them to understand the relationships between the object, the image and the position and orientation of the mirror line.

Resources:

A handout for students guides them through the simple steps to set up and explore reflections on their handhelds, starting with a blank page of a TI-Nspire document.

There is also a TI-Nspire document entitled ***Reflector.tns*** for use in the second half of the activity.

TI-Nspire skills students will need

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

The activity

This activity is designed for use by students working individually on TI-Nspire handhelds, It can also be demonstrated on a screen using the TI-Nspire Navigator System, which also makes it easy to compare and discuss students' different results.

There are six sections in the student notes. Sections 1 to 3 comprise the basic activity, starting with a new TI-Nspire document and sections 4-6, which use the document entitled ***Reflector.tns***, provide extension material.

Section 1. Start reflecting

Starting with a new blank TI-Nspire document, students create a triangle and a mirror line. The mirror line is defined by means of two points so that subsequent movement of either point changes the position and orientation of the mirror. Students then reflect the triangle in the mirror line. If you are demonstrating this using the software projected onto a screen, ask your students to predict the position of the image in advance: *Can you see it in your mind's eye before I reflect it? Where will it be?*

Section 2. An object lesson

Students are encouraged to investigate the effect of:

- a) changing the object's shape,

b) moving the entire object.

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 on how reflection works.

Section 3. Mirror, mirror

In part a) students move the mirror line without changing its orientation. The key thing to notice is that the image will only move in one dimension: even if the mirror is moved “up”: the image will only move “left or right”.

In part b) students change the angle of the mirror line to explore the effect on the orientation of the image. You may wish to discuss angles here.

If the mirror line is rotated 180°, what happens to the image?

The three challenges in part c) are quite tricky: the third one is impossible.

Section 4. Lost mirror line

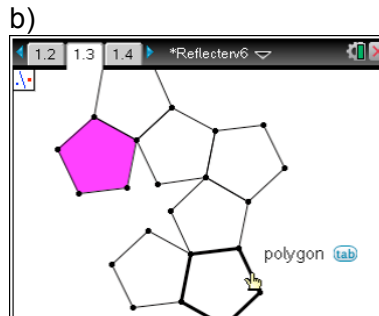
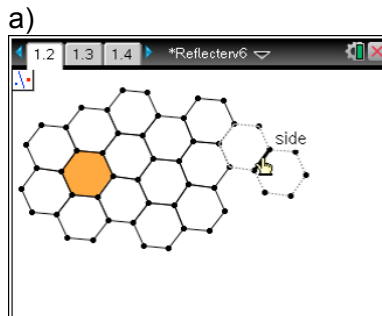
Having loaded the document **Reflector.tns**, students predict the location of a hidden mirror line. In part a) they draw a line where they think the mirror line should be. The actual mirror line is hidden on the screen and can, if you wish, be revealed using option 3: Hide/Show in the Actions menu.

In part b) there is the opportunity to join corresponding points and use perpendicular bisectors to construct the missing mirror line.

Section 5. Tessellating polygons

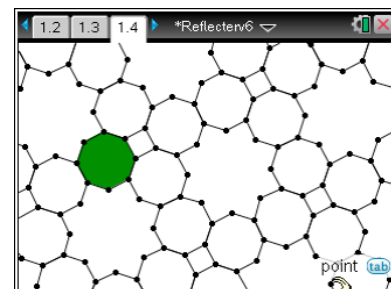
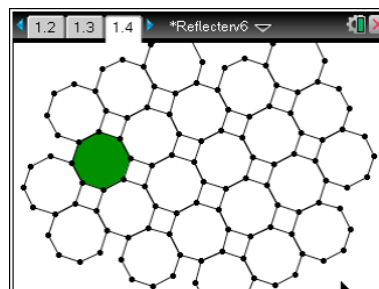
In this activity students use reflection to create tessellating patterns of polygons.

You may choose to ask students to start this activity with a blank page. Alternatively, the document called **Reflector.tns** avoids the slightly tricky business of creating the regular polygons.



It is not possible to form a regular tessellation made up entirely of regular pentagons. However, some students may wish to try patterns that include stars and other shapes.

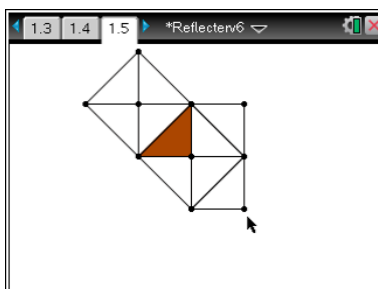
c) It is possible to produce a tessellation using the octagon and squares. More complex patterns are also possible as illustrated here.



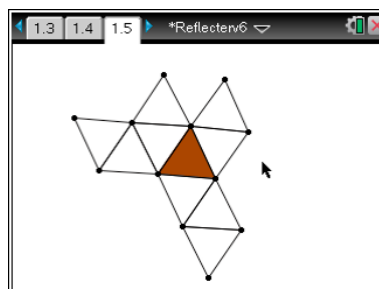
Section 6. Tessellating triangles.

a) While it is possible to produce a tessellation pattern with any triangle, it cannot usually be done using reflection alone. A rotation is also necessary.

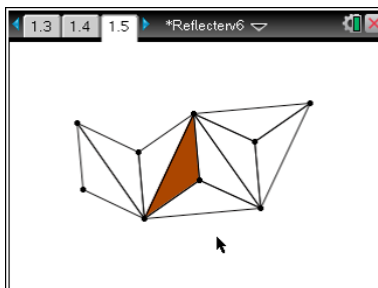
b) There are several possible special triangles as shown here.



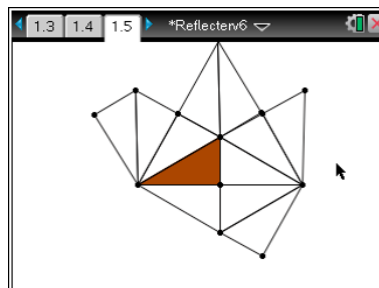
Isosceles triangle with angles of 45°, 45° and 90°



Equilateral triangle



Isosceles triangle with angles of 30°, 30° and 120°



Scalene triangle with angles of 30°, 60° and 90°