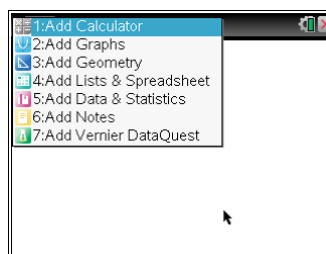# TI-nspire™

## *REFLECTION*
## *Student Notes*

This TI-Nspire activity will help you to:

- understand the transformation of reflection;
- see how changing the position of an object changes the position of the image;
- see how changing the position of a mirror changes the position of the image;
- produce tessellation patterns by repeated reflecting objects.
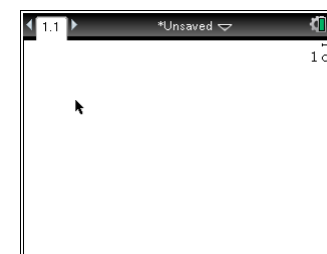
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### 1. Start reflecting

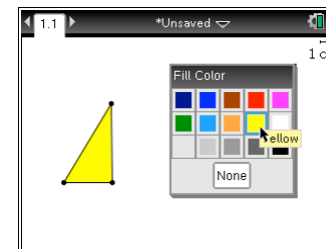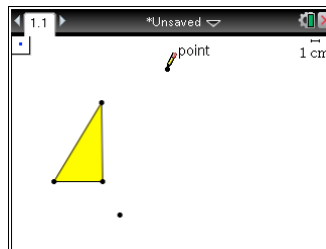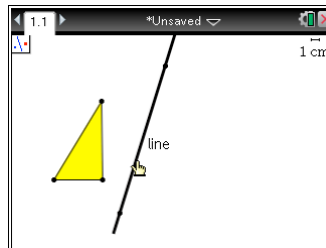| | | | | |
|---|---|---|---|---|
| a) *Getting the TI-Nspire ready for geometry.* | Press ⌂on 1 to open a new document. |  | Press 3 to choose a Geometry page. |  |
| b) *Creating an object* | To draw a triangle first press menu 9 2. | Move to fix the first corner and press ✋. Fix the other corners and press esc. |  | To shade the triangle, point at it, press ctrl menu B 2, choose a colour and press ✋. |
| c) *Drawing a mirror line* | First create two points by pressing menu 7 1, moving to fix each point and pressing ✋. |  | To draw a mirror line through the points press menu 7 4, move to point the finger at each point and press ✋. |  |

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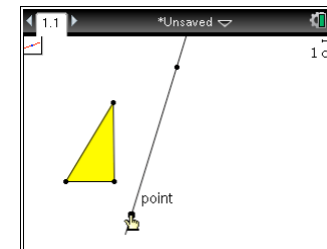
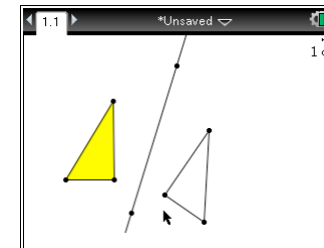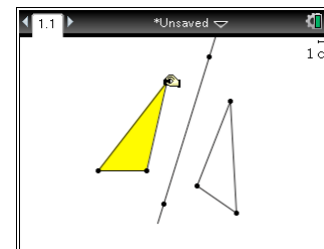| d) *Reflecting the object in the mirror line to create an image* | Press menu B 2.<br><br>Move to select the line and press ⓧ. |  | Now move to select the triangle and see its image.<br><br>Press ⓧ esc. |  |
|---|---|---|---|---|

## 2. An object lesson

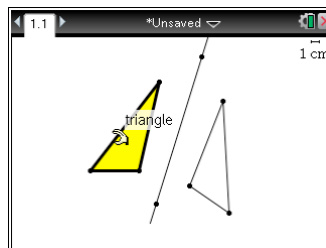| a) *Changing the shape of the object.* | Move to a corner of the coloured triangle and grab it by pressing ctrl ⓧ | Now move that corner and watch the image. |  | What happens to the image? Is that what you expected?<br><br>Press esc. |
|---|---|---|---|---|
| b) *Moving the complete object.* | Move to one the sides of the coloured triangle. |  | Press ctrl ⓧ and move the object around. | Describe the effect on the image.<br><br>What if you drag the triangle across the mirror line?<br><br>Press esc. |

## 3. Mirror, mirror

| a) *Sliding the mirror.* | Go to the mirror line and grab it by pressing ctrl ⓧ. | Move the mirror left and right, up and down. How does the image move? | Press esc. | |
|---|---|---|---|---|
| b) *Turning the mirror.* | Grab and drag one of the points on the mirror. | This changes the angle of the mirror. | Describe the effect on the image. | |
| c) *Three challenges.*<br>By moving the mirror line can you… | … make any parts of the image turn 90° from the object? | … make the image cover the object as much as possible | … turn the image upside down and alongside the object? | |

**4) Lost mirror line**

a) Load the tns file called **Reflecter** and go to page 1.1
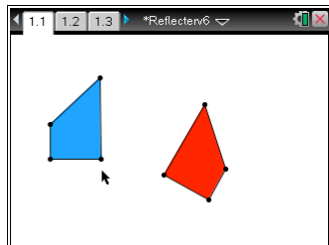


Move the blue object and check the red reflected image.

But where is the mirror line?

Draw a line where the mirror should be (see Act. 1c).

Use your line to reflect the object (see Act. 1d).

Were you right?

If not undo your last steps using ⌈ctrl⌉⌈Z⌉ and try again.

b) Here is a way to draw the lost mirror line very accurately.

Press ⌈menu⌉⌈A⌉⌈3⌉ to choose "Perpendicular Bisector".

Move to a corner of the object, press ⌈🖰⌉ and repeat for the corresponding corner of the image.

Press ⌈esc⌉ and check by reflecting in this line.

*Why does this work?*

**5) Tessellating polygons**

a) Go to page 1.2 of the **Reflecter** document. You will see a regular hexagon.
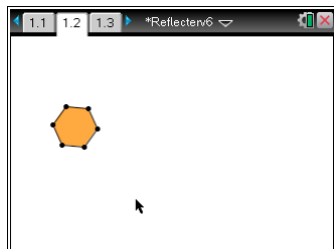


To reflect the hexagon in one of its sides press ⌈menu⌉⌈B⌉⌈2⌉, move to one of the sides and press ⌈🖰⌉⌈🖰⌉.
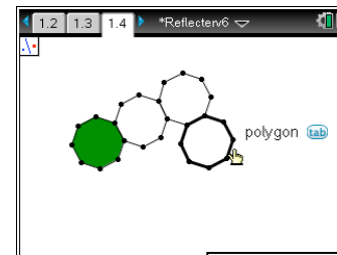
Move and press ⌈🖰⌉⌈🖰⌉ again.

Repeat many times. Can you fill the whole screen?

**A tessellation pattern can be made from regular hexagons**

b) On page 1.3 there is a regular pentagon.

Repeatedly reflect this shape in its sides.

Can you fill the whole screen?
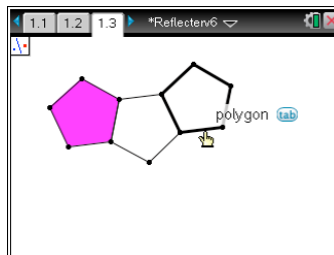


c) Repeat with the regular octagon on page 1.4.

You can't fill the whole screen … but…
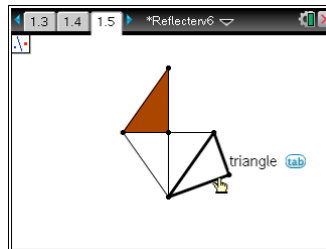


*What other regular shapes can be reflected to form patterns like this?*

*Why do some shapes tessellate and others not?*
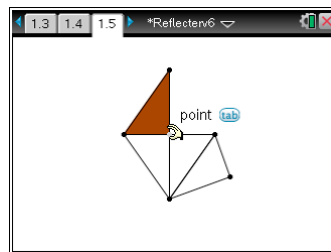
**6) Tessellating triangles**

a) On page 1.5 of the *Reflecter* document there is a brown triangle.

Reflect the object triangle in one of its sides. Reflect the image triangle in one of its sides and repeat this several more times.

| **Why is it impossible to fill the screen and form a tessellation?** |
| :---: |

b) Press [esc] to stop reflecting. Now grab one of the corners of the shaded triangle – you may have to use the [tab] key until you see the open-hand icon.

Drag the point around until you find a situation where a tessellation looks possible. Add extra reflections in the sides of triangles to make sure.

What is special about the new shaded triangle?

Describe its sides and angles carefully

You should be able to find several different special triangles that form tessellation patterns.