





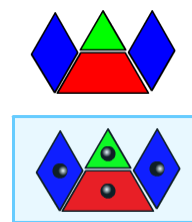


## Working Effectively With Virtual Manipulatives

Rotate	Pre-image	Reflection	Duplicate	Glue	Erase
					

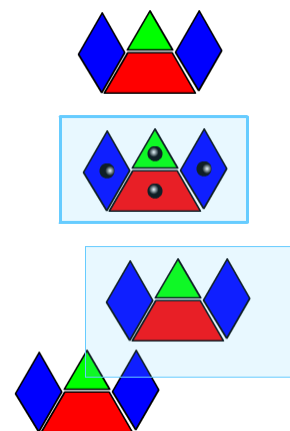
### Glue Example

1. Suppose you have an interesting shape you wish to join together.
2. Select (click) the Glue Tool and then drag a selection box around the shape, each piece will show a dot in the center and your pieces are glued together.



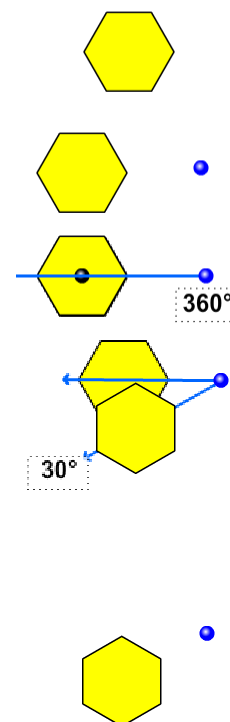
### Duplicate Example

1. Suppose you have an interesting shape you wish to duplicate.
2. Select (click) the Duplicate Tool and drag a selection box around the shape, each piece will show a dot in the center.
3. Move the mouse and arrow in any direction and your duplicate shape will show. Let go and you will have duplicate shape you can use.



### Rotation Example

1. Place a shape on the workspace. For more than one piece, glue the shapes together.
2. Select the rotate tool, click outside of the shape. That point will be the point of rotation.
3. Click inside the shape.
4. Without letting go, rotate to the angle you wish to use. (clockwise works too; the angles show as  $360^\circ$  - angle of rotation).
5. Click the pre-image tool and the original shape and rotation marks **disappear**.



**Important!** Any time you use a shape to rotate; it becomes the pre-image and will no longer function usefully.

**Recommended:** For any shape you wish to keep, **BEFORE YOU ROTATE IT**, duplicate the shape first and “store” you duplicate shape in a corner to use later.

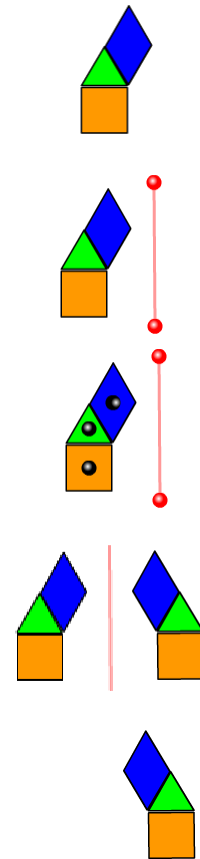
## Reflection Example

1. Place the shape you wish to reflect on the workspace. For more than one piece, glue the shapes together.
2. Select the Reflection tool. To draw a line of reflection, click once on the workspace (do not hold down mouse button), drag your mouse to draw the line of reflection, click to end the line. Move endpoints, as needed, to reposition the line.
3. Click on the shape to reflect across your line.
4. Your reflected shape now shows.

**Important!** Any time you use a shape to reflect; it becomes the pre-image and will no longer function usefully.

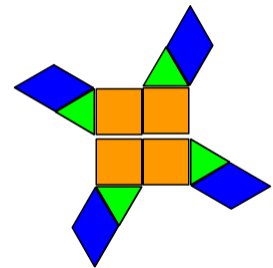
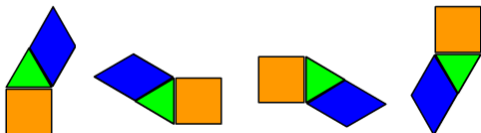
5. Click the pre-image tool and the original shape disappears

**Recommended:** For any shape you wish to keep, **BEFORE YOU REFLECT IT**, duplicate the shape first and “store” you duplicate shape in a corner to use later.



## Multiple Rotations

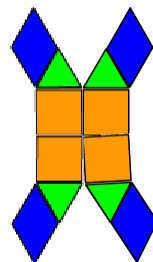
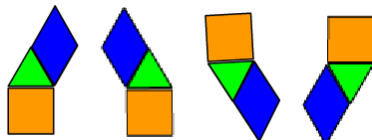
By duplicating each new shape before rotating it, I can have a “bank” of four rotated pieces that function properly.



Now that I have these pieces, I can easily arrange them in a fun pattern with rotational symmetry.

## Multiple Reflections

By duplicating each shape before reflecting it, I can have a “bank” of four reflected pieces that function properly.



Now that I have these pieces, I can easily arrange them in a fun pattern with reflection symmetry.