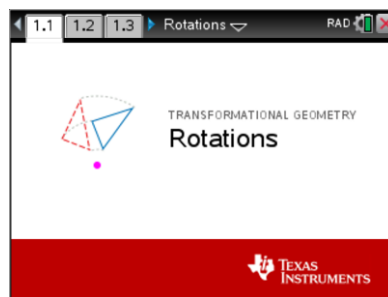


In this activity, you will investigate the defining properties of the transformation known as a rotation. You will also learn how to easily and quickly maneuver within all the Rotations activities using shortcut keys or the tab key.

Open the document: *Rotations.tns*.

PLAY INVESTIGATE EXPLORE DISCOVER



Move to page 1.2. (**ctrl** ►)

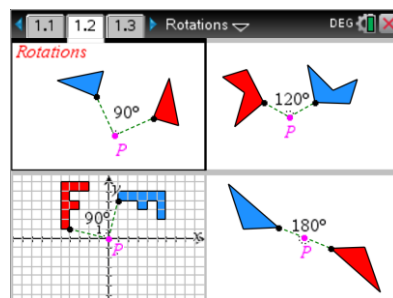
On the handheld, press **ctrl** ► and **ctrl** ◀ to navigate through the pages of the lesson.

(On the iPad®, select the page thumbnail in the page sorter panel.)

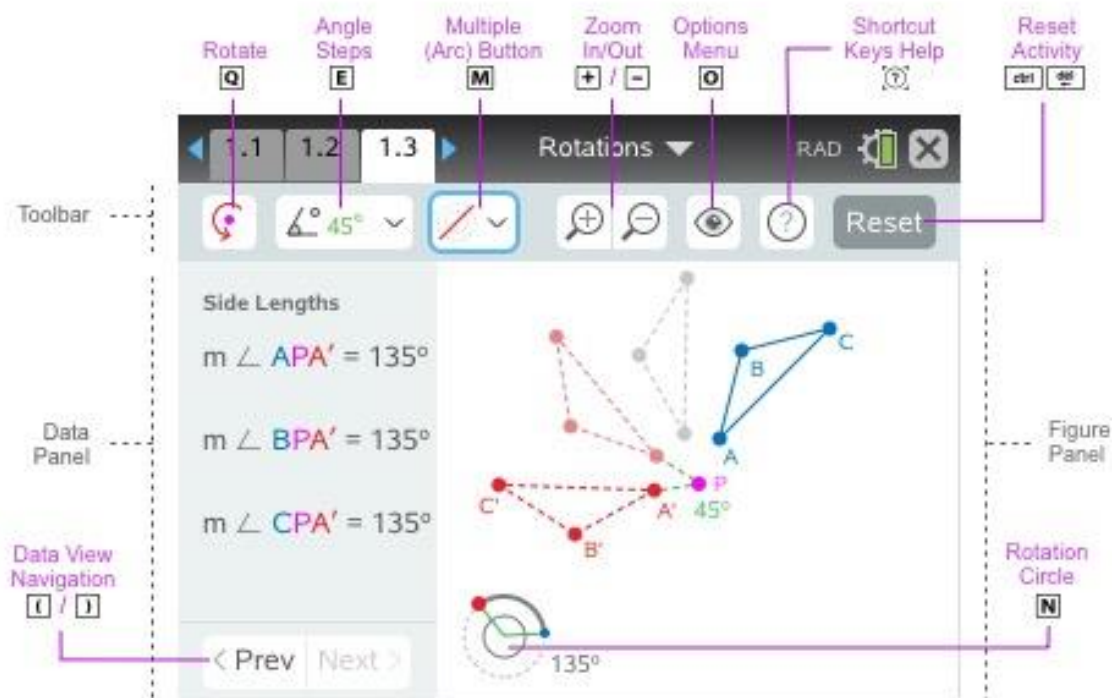
1. What do the 4 parts of the screen have in common?

Make two conjectures.

A **conjecture** is an opinion or conclusion based upon what is observed. Quickly discuss with your group.



Move to page 1.3. (**ctrl** ►) Look at the figure below of an overview of the main rotations page and shortcut keys. ***Especially notice what the shortcut keys Q, +, and – represent.***






Navigating to and Selecting Screen Options or Objects


Handheld Tech Tip:

To choose an option or object, use any of the following 3 methods:

- Use the touchpad to move the pointer over the option or object and press the center of the touchpad () to select (**click**) it.



- Use  to move to the next option or object on the screen and use  to go to the previous option or object.














- Use a **shortcut key** (ex:  for vertex A,  to Rotate, etc.). Letters , ,  are located at the bottom of the handheld.






Use the method that works best for you: **click**, **tab** or **shortcut key**.



iPad Tech Tip:

To choose a command or object, tap the icon or the object.

- On the handheld, press the tab key () multiple times and notice each of the icons and points as they are highlighted. To go in the opposite direction, press . Investigate.
- Shortcut keys provide a fast way to perform actions and/or select objects on the screen on the handheld. A list of all shortcuts can be found in the Shortcut Keys Help menu (click on  or press  ). **Look at this list now.** Use as needed. Press  or  to close the Shortcut Keys Help menu.
- Start by rotating $\triangle ABC$ about point P through an angle of 45° .
To rotate $\triangle ABC$, press the Rotate key (click on  or press ).
Zoom   in () or out () as needed. Observe what happens on the screen.

Blue $\triangle ABC$ is called the pre-image and **red** $\triangle A'B'C'$ is called the image.
 $\triangle A'B'C'$ is read "triangle A prime, B prime, C prime."
- To move and grab a vertex, press the letter key that corresponds to the vertex such as A (), and use the directional arrows (   ) on the touchpad to move vertex A.
Grab and move point A to play, explore, and discover ideas and investigate patterns.



Note: You can also use the **tab** key or **click** on the vertex that is needed.


(On the iPad®, tap the desired point and move it.)


- What appears to be the relationship between $\triangle ABC$ and $\triangle A'B'C'$? Discuss in your groups.
- Grab and move vertex B (**[B]**). Grab and move vertex C (**[C]**). Observe.
- Discuss with your partner or group: what appears to be true about the pre-image and its image? Write your conjecture below. A **conjecture** is an opinion or conclusion based upon what is observed.



- Press **[menu]** to open the menu.

(On the iPad®, tap on the wrench icon  to open the menu.)

Press **[1]** (1: Templates), **[1]** (1: Tour).

Rotate $\triangle ABC$ about point P through an angle of 45° (click on  or press **[Q]**).

Zoom  in (**[+]**) or out (**[-]**) as needed.


- Notice the **blue pre-image triangle** and the **red image triangle**.
Observe the 45° angle at point P and on the Rotation Circle at the bottom of the screen.
 - Rotate $\triangle ABC$ about point P an additional 45° (click on  or press **[Q]**).
Notice the new “ghosted” pre-image, the 45° angle at point P, and the measure on the Rotation Circle. Write that measure here: _____
 - Continue to rotate $\triangle ABC$ about point P in steps of 45° . Observe what you see on the screen, particularly the location of the triangles and the measures displayed on the Rotation Circle.
Stop when the measure displayed is 360° .
- Reset the page. Press **Reset** (**[ctrl]** **[del]**).
Change the angle of rotation and discover another way to rotate the triangle.
To change the stEp size of the angle of rotation, click on  or press **[E]**.
Use the directional arrows (**[↑]** **[↓]** **[←]** **[→]**) to move to the stEp size that you want, in this case 60° .
Press the space bar (**[]**) to select that measure and close the menu.



- a. Another way to rotate the figure about point P is to either click on the red point on the Rotation Circle or just press the letter **[N]**. Use the directional arrows (**▲ ▼ ◀ ▶**): the up and right arrows rotate one direction, while the left and down arrows rotate the other direction.

Play – Investigate – Explore – Discover.

Rotate in both directions several times. Observe the pre-image and image triangles.


Each person in the group should select a different angle for the stEp size (click  or press **[E]**). i) 30° ii) -30° iii) -60° iv) 15°

Use the directional arrows (**▲ ▼ ◀ ▶**) to move to the box of the angle measure desired.

Press the space bar (**[]**) to select that measure and to close the menu.

Select the red point on the Rotation Circle (click on the red point or press the letter **[N]**). Use the directional arrows (**▲ ▼ ◀ ▶**) to rotate the triangle through several angles. The up and right arrows rotate one direction, the left and down arrows rotate the other direction. Explore and investigate further by grabbing and moving each of the three vertices (**[A]**, **[B]**, **[C]**) and notice how that affects the pre-image and image triangles.

Discuss in your groups what you observe.

- b. Reset the page. Press **Reset** (**[ctrl]** **[del]**).
Open the Options menu (press  or **[O]**).

Use the directional arrows (**▲ ▼ ◀ ▶**) to move to the box next to “Historical Images”.

Press the space bar key (**[]**) to put a check mark in the box. Press **[enter]** or **[esc]**.

Rotate $\triangle ABC$ about point P through an angle of 45° , using the Rotation Circle (**[N]**) or (**[Q]**).

Continue to rotate $\triangle ABC$ until the Rotation Circle shows 360° .

Discuss in your groups what you observe.

8. a. In a rotation $\triangle ABC$ is typically called the _____ triangle and $\triangle A'B'C'$ is typically called the _____ triangle.
- b. How is $\triangle A'B'C'$ read? _____
- c. Explain what happens when a triangle is rotated about a point through an angle of 45° .