Rotations: Lesson 1 Rotation Point
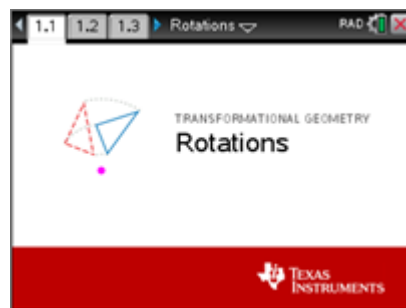
Student Activity

Name _____

Class _____

In this lesson, you will investigate the point of rotation and discover how to rotate a triangle about a point by hand (paper and pencil, without technology).

Open the document: *Rotations.tns.*

It is important that the Rotations Tour be done before any Rotations lessons.
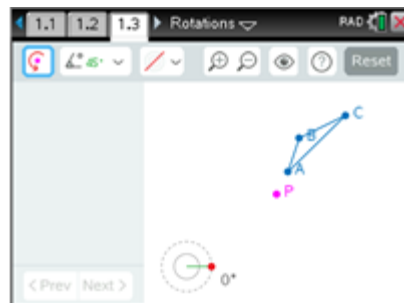
PLAY   INVESTIGATE   EXPLORE   DISCOVER

Move to page 1.3. (ctrl ▶ two times)

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.   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).

2.   Rotate △ABC 45° about point P (click on [icon] or press Q).

Zoom [icon] in (+) or out (−) as needed.

a.   Think about how you might rotate a triangle about a point 45° by hand.
Discuss in your groups.

b.   Rotate △ABC about point P another 45° (click on [icon] or press Q).

Rotate △ABC about point P a third 45° (click on [icon] or press Q).

How many degrees has the pre-image △ABC been rotated about point P? _____
Think about how you might rotate a triangle about a point 135° by hand.
Discuss in your groups.

c. To help visualize this better, click on the Multiple Icon [icon] or press **M**.

Press the space bar ([⎵]) to select the first choice in the dropdown menu.

Look at what is displayed on the screen.

Rotate $\triangle$ABC about point P another 45° (click on [icon] or press **Q**).

Discuss in your groups what you notice.

d. Click on the Multiple Icon [icon] or press **M**. Press the down arrow (▼) once and press the space bar ([⎵]) to select the second choice in the dropdown menu.

Look at what is displayed on the screen.

Rotate $\triangle$ABC about point P another 45° (click on [icon] or press **Q**).

Discuss in your groups what you notice.

e. Click on the Multiple Icon [icon] or press **M**. Press the down arrow (▼) once and press the space bar ([⎵]) to select the third choice in the dropdown menu.

Look at what is displayed on the screen.

Rotate $\triangle$ABC about point P another 45° (click on [icon] or press **Q**).

Continue to rotate $\triangle$ABC about point P several more times.

Discuss in your groups what you notice.

f. Discuss in your groups how you might rotate a triangle about a point 45° by hand?

3. Reset the page. Press [Reset] ([ctrl] [del]).

Now explore how moving the point of rotation affects the result of the rotation.

a. Rotate $\triangle$ABC 45° about point P (click on [icon] or press **Q**).

Zoom [icon] in ([+]) or out ([–]) as needed.

b.   Move point P to many places on the screen (press $\boxed{P}$ and use the directional arrows(▲ ▼ ◀ ▶)).

As the point of rotation, P, moves about the screen, look at what happens to pre-image $\triangle$ ABC and image $\triangle$ A'B'C'.

Discuss in your groups what you observe.

4.   Reset the page. Press $\boxed{\text{Reset}}$ ($\boxed{\text{ctrl}}$ $\boxed{\text{del}}$).

Let's now explore what happens when the point of rotation coincides with a vertex of the triangle.

a.   Change the angle of rotation to be 60°: Click on $\boxed{\angle° \ 45° \ \vee}$ or press $\boxed{E}$.

Use the directional arrows (▲ ▼ ◀ ▶) to move to 60°.

Press the space bar ($\boxed{\ \ }$) to select that measure and to close the menu.

Move point P to coincide with point A (press $\boxed{P}$ and use the directional arrows (▲ ▼ ◀ ▶).

Rotate $\triangle$ ABC 60° about point P (click on $\boxed{\mathcal{C}}$ or press $\boxed{Q}$).

Observe what is on the screen.

b.   Continue to rotate $\triangle$ ABC 60° about point P (click on $\boxed{\mathcal{C}}$ or press $\boxed{Q}$) until the total number of degrees rotated is 360°. Observe the screen as you rotate.

c.   Reset the page. Press $\boxed{\text{Reset}}$ ($\boxed{\text{ctrl}}$ $\boxed{\text{del}}$).

Press $\boxed{\text{menu}}$ to open the menu.

(On the iPad®, tap on the wrench icon $\boxed{\mathcal{F}}$ to open the menu.

Press $\boxed{1}$ (1: Templates), $\boxed{7}$ (7: Point P).

Move point P to coincide with point A (press $\boxed{P}$ and use the directional arrows (▲ ▼ ◀ ▶).

Rotate $\triangle$ ABC 45° about point P (click on $\boxed{\mathcal{C}}$ or press $\boxed{Q}$).
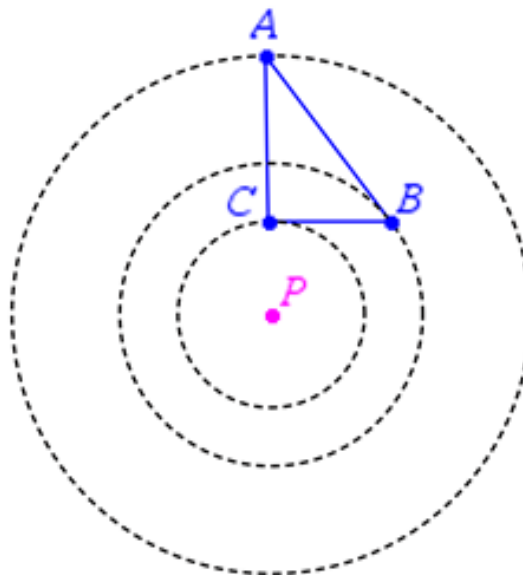
Continue to rotate $\triangle$ ABC 45° about point P (click on $\boxed{\mathcal{C}}$ or press $\boxed{Q}$) until the total number of degrees rotated is 360°. Observe the screen while you do so.

Discuss what you observe in your groups.

5. Using only a straightedge or ruler, do the following:

    a. Rotate $\triangle$ ABC about point P 90°.
        Label this image $\triangle$ A'B'C'.

    b. Rotate $\triangle$ ABC about point P 180°.
        Label this image $\triangle$ A"B"C".

    c. Rotate $\triangle$ ABC about point P 270°.
        Label this image $\triangle$ A'''B'''C'''.

6. Use a compass and protractor to do the following:

    a. Rotate $\triangle$ ABC about point P 60°.
        Label this image $\triangle$ A'B'C'.

    b. Rotate $\triangle$ ABC about point P 120°.
        Label this image $\triangle$ A"B"C".

    c. Rotate $\triangle$ ABC about point P 180°.
        Label this image $\triangle$ A'''B'''C'''.

    d. Rotate $\triangle$ ABC about point P 300°.
        Label this image $\triangle$ A$^{(4)}$B$^{(4)}$C$^{(4)}$.