



Rotations: Lesson 3 Perimeters & Areas

Name _____

Student Activity



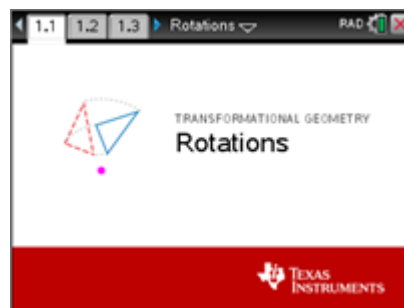
Class _____

In this lesson, you will investigate the perimeters and areas of triangles that have been rotated in different ways.

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)

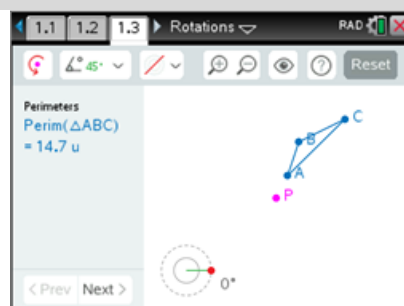
On the handheld, press **ctrl** ► and **ctrl** ◀ to navigate through the pages of the lesson.

(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), **3** (3: Perimeters & Areas).



2. Rotate $\triangle ABC$ 45° about point P (click on  or press **Q**).

- a. Record the Original perimeters (first measures displayed) in the appropriate places of the **Rotate 45°** section in the table below.


- b. Investigate and mentally make note of the perimeters by grabbing and moving each of the three vertices of $\triangle ABC$ (**A**, **B**, **C**) to create different shaped triangles. Record a set of data observed in row "Figure 1" in the following table.

Rotate 45°	Perimeter $\triangle ABC$	Perimeter $\triangle A'B'C'$		Rotate 60°	Perimeter $\triangle ABC$	Perimeter $\triangle A'B'C'$
Original				Original		
Figure 1				Figure 1		

- c. Reset the page. Press **Reset** (**ctrl** **del**).

Change the angle of rotation to 60° : click on  or press **E** to open the menu, and press the space bar (**␣**) to select that measure and to close the menu.



Click on  or press **Q** to rotate $\triangle ABC$ 60° about point P.

Record the Original perimeters in the appropriate places of the **Rotate 60°** section in the previous table.

- d. Investigate and mentally make note of the perimeters by grabbing and moving each of the three vertices of $\triangle ABC$ (**A**, **B**, **C**) to create different shaped triangles. Record a set of data observed in row "Figure 1" in the previous table.


- e. Reset the page. Press **Reset** (**ctrl** **del**).

Repeat what was done in parts a – d, but with each person in the group choosing a different rotation. Each person in the group should choose one from the following:

- i) Rotate $\triangle ABC$ 30° about point P.
- iii) Rotate $\triangle ABC$ -60° about point P.
- ii) Rotate $\triangle ABC$ 90° about point P.
- iv) Rotate $\triangle ABC$ -45° about point P.

(Note: to change the angle of rotation, click on  or press **E** to open the menu, and press the space bar (**␣**) to select that measure and to close the menu.)



Click on  or press **Q** to rotate $\triangle ABC$ about point P.

Record the Original perimeters in the appropriate places in the following table.

Circle: i ii iii iv	Perimeter $\triangle ABC$	Perimeter $\triangle A'B'C'$
Original		
Figure 1		

- f. Investigate and mentally make note of the perimeters by grabbing and moving each of the three vertices of $\triangle ABC$ (**A**, **B**, **C**) to create different shaped triangles. Record a set of data observed in row "Figure 1" in the previous table.

- g. Many different triangles were rotated in several different directions.

Make a conjecture about the perimeters of rotated triangles.

A **conjecture** is an opinion or conclusion based upon what is observed.




- h. Based on explorations of rotated triangles in previous lessons, explain why this conjecture is true.

3. Do a similar exploration about the areas of rotated triangles in several directions.

- a. Reset the page. Press  ( ).

Change the angle of rotation to 60° : click on  or press **[E]** to open the menu, and press the space bar () to select that measure and to close the menu.

Click on  or press **[Q]** to rotate $\triangle ABC$ 60° about point P.

Click on  or press **[J]** to explore the areas of the triangles.


Record the Original areas (first measures displayed) in the appropriate places of the **Rotate 60°** section in the table below.


Rotate 60°	Area $\triangle ABC$	Area $\triangle A'B'C'$	Rotate -45°	Area $\triangle ABC$	Area $\triangle A'B'C'$
Original			Original		
Figure 1			Figure 1		

- b. Investigate and mentally make note of the areas by grabbing and moving each of the three vertices of $\triangle ABC$ (**[A]**, **[B]**, **[C]**) to create different shaped triangles. Record a set of data observed in row "Figure 1" in the previous table.

- c. Reset the page. Press  ( ).

Change the angle of rotation to -45° : Click on  or press **[E]** to open the menu, and press the space bar () to select that measure and to close the menu.

Click on  or press **[Q]** to rotate $\triangle ABC$ -45° about point P.

Click on  or press **[J]** to explore the areas of the triangles.

Record the Original areas in the appropriate places of the **Rotate -45°** section in the previous table.



- d. Investigate and mentally make note of the areas by grabbing and moving each of the three vertices of $\triangle ABC$ (**[A]**, **[B]**, **[C]**) to create different shaped triangles.
Record a set of data observed in row "Figure 1" in the previous table.



- e. Reset the page. Press  ( ).

Repeat what was done in parts a – d, but each person in the group choosing a different rotation. Record the Original areas in the appropriate place in the following table. Each person in the group should choose one from the following:




- i) Rotate $\triangle ABC$ 30° about point P. iii) Rotate $\triangle ABC$ -90° about point P.
 ii) Rotate $\triangle ABC$ 90° about point P. iv) Rotate $\triangle ABC$ -60° about point P.

Click on  or press  to rotate $\triangle ABC$ about point P.

Click on  or press  to explore the areas of the triangles.

Record the Original areas in the appropriate place in the following table.

Circle: i ii iii iv	Area $\triangle ABC$	Area $\triangle A'B'C'$
Original		
Figure 1		

- f. Investigate and mentally make note of the areas by grabbing and moving each of the three vertices of $\triangle ABC$ (, , ) to create different shaped triangles. Record a set of data observed in row “Figure 1” in the previous table.

- g. Many different triangles were rotated in several different directions.

Make a conjecture about the areas of rotated triangles.

A **conjecture** is an opinion or conclusion based upon what is observed.

- h. Based on explorations of rotated triangles in previous lessons, explain why this conjecture is true.

4. $\triangle JKL$ is rotated 120° about a point. The perimeter of $\triangle JKL$ is 40 cm and its area is 60 sq cm.

- a. What is the perimeter of $\triangle J'K'L'$? _____

- b. What is the area of $\triangle J'K'L'$? _____