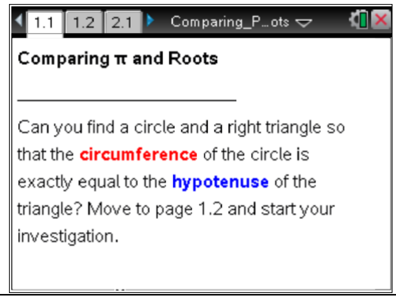
Comparing π and Roots
Student Activity

Name ______________

Class ______________

Open the TI-Nspire document *Comparing_Pi_and_Roots.tns.*

In this activity, you will manipulate the radius of a circle, and the sides of a right triangle to attempt to set the circumference of the circle equal to the hypotenuse of the right triangle.



Move to page 1.2.

Press ctrl ▶ and ctrl ◀ to navigate through the lesson.

1. Grab and drag the center of the circle to “unwrap” the circle. In order to change the values of a and b, move the cursor over the number, and double-click while the number is highlighted. Then type the new number.
   a. Can you find integer values for a and b for the sides of the right triangle so that the length of the hypotenuse appears to be nearly the same as the length of the circumference of the circle with the radius, $r = 2$? What are some possible values for a and b?

   b. To better see how close the two lengths are, use the Measurement Tool to measure the circumference and the length of the hypotenuse and adjust the values of a and b until the measured lengths appear to be the same. Choose integer values for a and b. What values did you choose for a and b?

2. When we measure the length of a segment, do we measure it approximately or exactly?

3. When the measurements of the lengths of the circumference and hypotenuse are equal, does that mean that the two lengths are exactly the same? Explain.

4. What types of numbers can be written for the measured lengths of the circumference and hypotenuse?

5. What is the formula for the circumference of a circle with a given radius? Use letter *C* for the circumference and *r* for the radius when writing the formula.

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6. What is the formula that relates the length of the hypotenuse and the lengths of the legs of a right triangle? Use letter *h* for the hypotenuse and a and b for the legs when writing the formula.

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7. Enter the values you found for r, a, and b onto Page 2.1. Record the computed values of the circumference and the hypotenuse displayed at the bottom of the page.

8. Compare computed values of the length of the circumference and the length of the hypotenuse. Do they appear to be the same? Explain your findings.

9. Explore further by changing the values of r, a, and b.
   - In order to keep the segments within the screen, keep the radius of the circle $r \le 5$.
   - Unwrap the circle to compare the lengths visually and then try to adjust values of r, a, and b to make the circumference and hypotenuse appear to be the same length.
   - Record your findings in the table below.

Radius, r	Side, a	Side, b	Computed circumference	Computed hypotenuse

10. When the computed values for the lengths of the circumference and hypotenuse are equal, does it mean that the two lengths are exactly the same? Explain.

11. What types of numbers are the computed values of the lengths of the circumference and hypotenuse?

12. What types of numbers are the exact values of the lengths of the circumference and hypotenuse?

13. Is it possible to find a circle and a right triangle so that the circumference and hypotenuse have *exactly* the same lengths? Why?