



Style By STEM

Student Activity

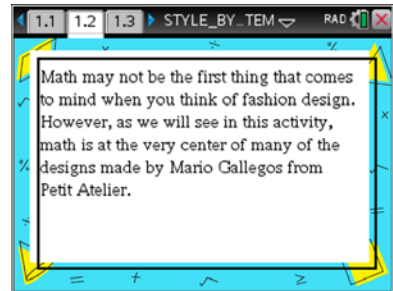
Name _____

Class _____

Integration of Algebra, Geometry and Fashion

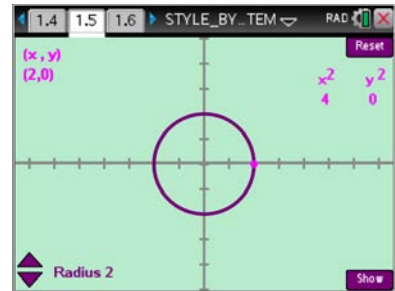
In this activity, you will investigate how the points on a circle can lead to some mathematics that is useful when designing a particular type of skirt for a special client.

1. Open the document: STYLE_BY_STEM.tns
2. Read the opening screen and move to page 1.2.
3. Read pages 1.2 to 1.4 and make notes as needed.



4. Navigate to page 1.5. Use the right and left arrow keys to move the red point around the circle. Right moves clockwise and left moves counter clockwise.

As you move the point around the circle what patterns do you notice? What values are X and Y always between?





5. For the original circle, move the point to nine different positions and fill out the table below.

X	Y	X^2	Y^2	$X^2 + Y^2$

Use your work in the table to answer the questions below.

a. Between what two values is X^2 always between?

b. What is the maximum value for Y^2 ?

c. What do you notice about the sum of X^2 and Y^2 ?

d. Why do you suppose this happens?

6. Press the + key to show a right triangle.

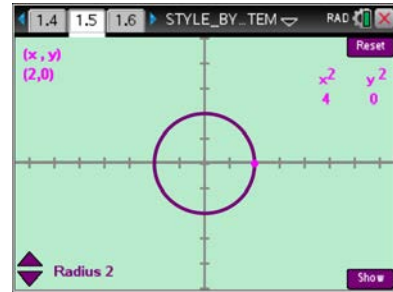
a. As you move the point around now, what coordinate value corresponds to the length of the horizontal leg of the triangle? The length of the vertical leg?

b. What part of the triangle represents the radius of the circle?

c. Write an equation showing how the lengths of the legs are related to the length of the hypotenuse of the triangle.

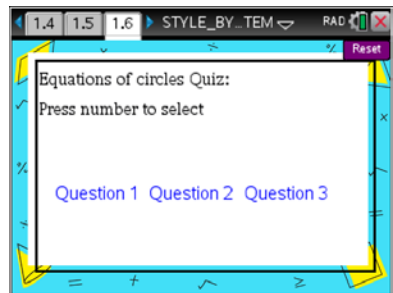


7. Press the up and down arrow keys or type a number 1 – 4 to change the radius. Does the pattern you noticed in part 6c. hold true for any circle centered at (0, 0)? Explain



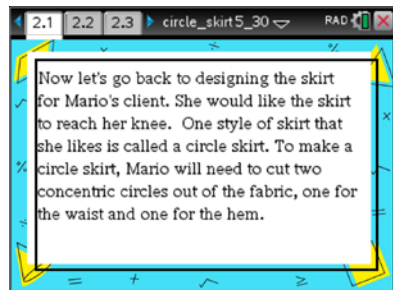
8. Based on your exploration, what is the equation of a circle centered at (0, 0) with radius r ?

9. Move to page 1.6. Use the number keys to select an item for the Equations of a Circle Quiz. Write your answers to all three questions below. Show the necessary work. (Hint: the equals sign is under the test menu on your calculator)



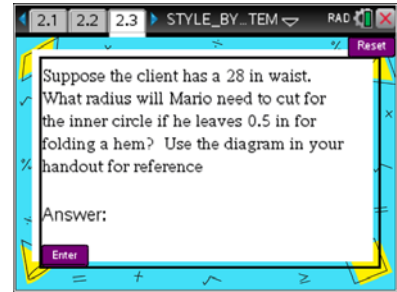
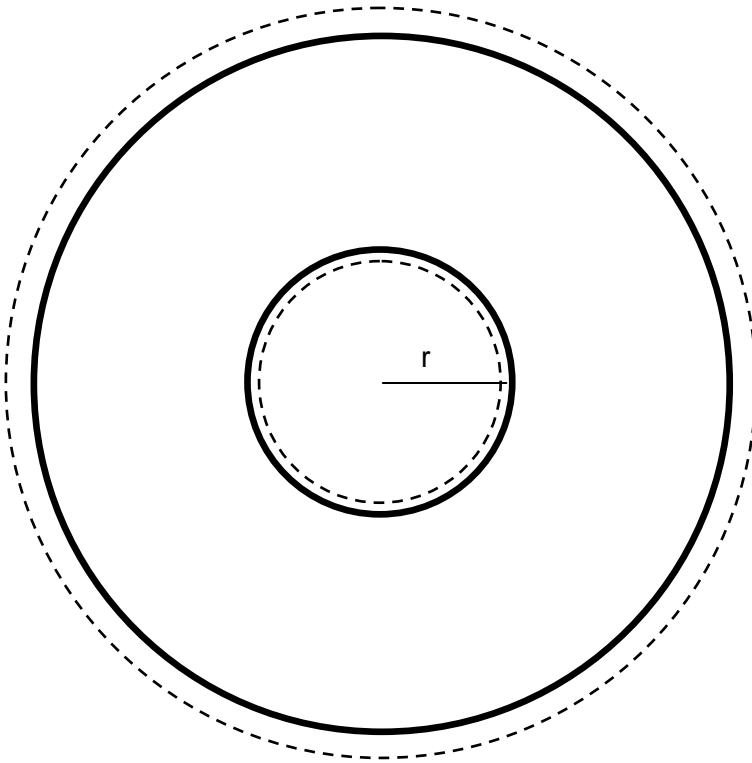
- a. Question 1: What is the equation of a circle with radius 5, centered at (0, 0)?
- b. Question 2: What is the radius of a circle that is defined by the equation, $X^2 + Y^2 = 144$?
- c. Question 3: What is the equation of the circle with radius $\sqrt{24}$, centered at (0, 0)?

10. Now that you've generalized the equation for a circle at (0, 0), we are ready to get back to designing the circle skirt with Mario. Proceed to page 2.1. Read pages 2.1 and 2.2 making notes if necessary.





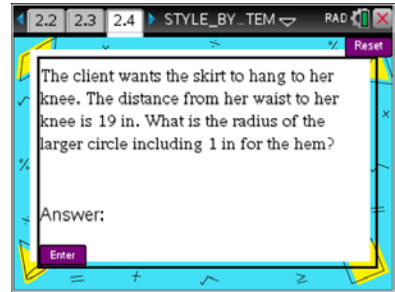
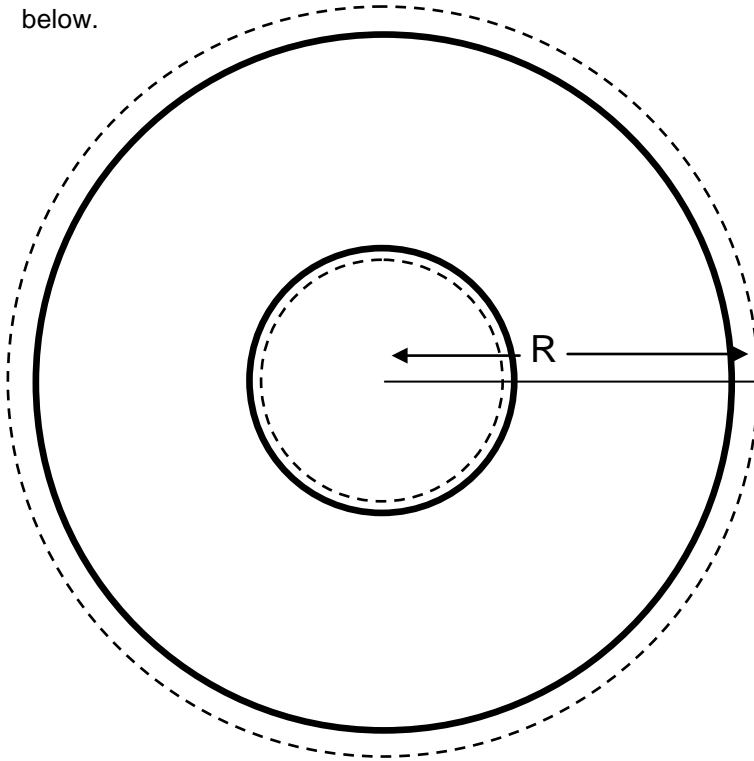
11. Answer the question on page 2.3 using the diagram of the pattern below. The dashed lines are the cuts and the solid lines represent where the hems will be folded.



Round your answer to the nearest half inch.

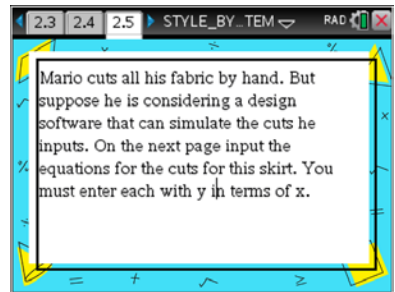


12. Answer the question on page 2.4 using the diagram of the pattern below.



Round your answer to the nearest half inch.

13. Read page 2.5. Write the equations for the circles of each cut Mario will have to make. Assume that the center of the skirt is at $(0, 0)$.



14. On page 2.6 make sure to solve your equations from part 14 for Y in terms of X , then enter the positive portion of the equations into the appropriate prompts. The outer hem equation goes in the top box and the inner hem equation goes in the bottom box.

