

**Exploring Circle Equations**

ID: 12555

**Time Required**

20 minutes




**Activity Overview**

Students will discover the equation of circles of the form  $(x - h)^2 + (y - k)^2 = r^2$ , where  $(h, k)$  is the center of the circle and  $r$  is the radius of the circle.

**Topic: Circles**

- Equations of circles

**Teacher Preparation and Notes**

- To complete this activity, students will need to know how to move between pages, and how to grab and drag points.
- The multiple-choice items are self-check. Students can check their answers by pressing  and selecting **Check Answer** (or by pressing  ). If desired, by using the TI-Nspire Teacher Edition software, teachers can change the self-check questions to exam mode so students cannot check their answers. To change the question mode, move to any question. Then, in the Document Tools, click the Teacher Tool Palette and select Question Properties. Change the Document Type from Self-Check to Exam.
- To download the student TI-Nspire document (.tns file) and student worksheet, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter “12555” in the keyword search box.

**Associated Materials**

- ExploringCircleEquations\_Student.doc
- ExploringCircleEquations.tns

**Suggested Related Activities**

To download any activity listed, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter the number in the keyword search box.

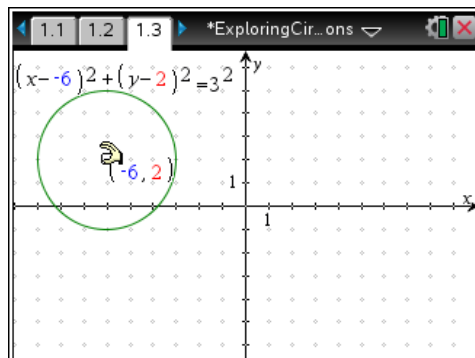
- Equations of a Circle (TI-Nspire technology) — 12312
- Exploring the Equation of a Circle (TI-84 Plus Family) — 6624
- Circles: Exploring the Equation (TI-84 Plus Family) — 10515

### Problem 1 – Equations of Circles

Students will begin this activity by investigating the equation of a circle by moving the center of the circle. Students will then change the radius of the circle and determine what role the radius plays in the equation of the circle.

When students move the center of the circle or change the radius, the equation will change automatically.

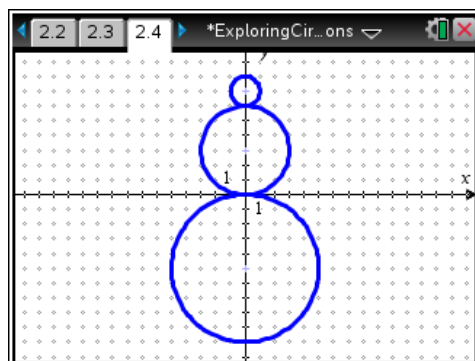
Students will be asked several questions about the equations of circles.



### Problem 2 – Circular Designs

Students will apply what they have learned in Problem 1 to find the equations of circles in various designs. For example, the students will find the equations of the three circles shown to the right.

Students can check their answers by pressing **menu** > **Analyze Graph** > **Analyze Conics**, choosing **Center** or **Radius** and then clicking on the circle.



*NOTE: Some image ideas are from “Exploring the Equation of a Circle using Cabri Jr.” by Karen Swan (<http://stlawcostempartnership.org/wp-content/uploads/lesson-plans/9-exploring-the-equation-key.pdf>).*

### Problem 3 – Extension

As an extension, students are asked to create their own circular designs and find the equation of each circle used to create their designs.

#### Student Solutions

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| <p>1. The coordinates of the center <math>(h, k)</math> are of the form <math>(x - h)^2 + (y - k)^2</math> in the equation of the circle.</p> <p>2. If the radius of the circle is <math>r</math>, then the equation of the circle is equal to <math>r^2</math>.</p> <p>3. <math>(x - 1)^2 + (y + 2)^2 = 25</math></p> <p>4. <math>(4, 5)</math></p> <p>5. 6</p> <p>6. <math>(x + 2)^2 + (y - 3)^2 = 1</math><br/> <math>(x - 2)^2 + (y - 3)^2 = 1</math><br/> <math>x^2 + y^2 = 25</math></p> | <p>7. <math>x^2 + (y - 2)^2 = 4</math><br/> <math>x^2 + (y - 3)^2 = 9</math><br/> <math>x^2 + (y - 4)^2 = 16</math><br/> <math>x^2 + (y - 5)^2 = 25</math></p> <p>8. <math>x^2 + (y - 7)^2 = 1</math><br/> <math>x^2 + (y - 3)^2 = 9</math><br/> <math>x^2 + (y + 5)^2 = 25</math></p> <p>9. <math>(x - 1)^2 + (y - 2)^2 = 4</math><br/> <math>(x - 1)^2 + (y - 2)^2 = 16</math><br/> <math>(x - 1)^2 + (y - 2)^2 = 36</math><br/> <math>(x - 1)^2 + (y - 2)^2 = 64</math></p> |
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