

**Section 5.1 Learning Objectives:**

- Video 1: The Pythagorean Theorem and the Distance Formula (9:26)
  - State the Pythagorean theorem.
  - State the distance formula.
  - Apply the Pythagorean theorem to derive the distance formula.
- Video 2: The Equation of a Circle (6:47)
  - State the standard form of the equation of a circle.
  - Apply the distance formula to derive the standard form of the equation of a circle.
  - Determine an equation of a circle from a description.
- Video 3: The Intersection of a Circle and a Line (9:48)
  - Determine the points of intersection between a circle and a line, including the coordinate axes.

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**Individual Learning Objective Binder Check:** Before class, you should have completed the Learning Objective Worksheet for each of the learning objectives in the video. These should have been placed in a binder in an organized manner so that it can be quickly checked by the instructor. If you have specific questions, this is a good time to ask the professor about them. While you are waiting for the professor to make their way around the room, you can work on the rest of the activities.

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**Group Practice Problems:** In a group of no more than 3 students, work on the following problems. While everyone in the group should work together, each student should write out their work for themselves. This work can prove to be helpful when working on the homework assignment. If questions arise as you're working on these problems, feel free to seek help from the instructor or other groups of students.

*Group Practice Problems #1 - The Pythagorean Theorem:* Sketch the right triangle that satisfies the given conditions. Then calculate the length of the remaining side. Simplify the radicals, if possible.

- One leg has length 12 and the other leg has length 6
- One leg has length 13 and the hypotenuse has length 20

*Group Practice Problems #2 - The Distance Formula:* Plot each pair of points and draw the right triangle whose hypotenuse is the line segment connecting them. Then compute the distance between the points. Simplify the radicals, if possible.

- (1, 3) and (4, -2)
- (2, 6) and (-3, 1)

*Group Practice Problems #3 - Equations and Graphs of Circles:* Determine the equations of the following circles. Then draw a sketch of the graph. Be sure that the graph intersects the coordinate axes appropriately.

- The circle of radius 4 centered at the point (1, -2).
- The circle of diameter 6 centered at the point (4, 1).
- The circle whose diameter is the line segment from the point (-2, 1) to the point (4, 3).

*Group Practice Problems #4 - Circles and the Coordinate Axes:* Determine the  $x$ -intercepts and  $y$ -intercepts of the following circles. Then sketch a graph of the circle.

- The circle whose equation is  $(x - 1)^2 + (y + 2)^2 = 9$ .
- The circle of diameter 8 centered at the point  $(5, 2)$ .

*Group Practice Problems #5 - Circles and Lines:* Determine the points of intersection (if any) of the following circles and lines. Then sketch a graph of the circle and line, and label the points of intersection.

- The circle whose equation is  $(x - 2)^2 + (y - 5)^2 = 40$  and the line  $y = x + 1$ .

*Group Practice Problems #6 - Challenge Problem:* Draw a diagram and create a mathematical model of the problem. Then answer the question.

- A small radio transmitter broadcasts in a 50 mile radius. If you drive along a straight line from a city 60 miles north of the transmitter to a second city 70 miles to the east of the transmitter, during how much of the drive (in miles) will you pick up a signal from the transmitter?

**Group Work Check:** Present your work for the practice problems to the instructor for approval. The work will not be graded deeply, but simply graded on whether it appears that you have put in a good faith effort to do the work. If you are not confident about particular problems, this is a good time to ask about them.

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### Section 5.1 Homework:

- 5.1 (General Problems): #1, 3, 5, 7, 9, 11, 13, 15
- 5.1 (Write-Up): #18, 19