2.2 Circles

**Individually:** Graph the following circles on the coordinate plane:

\[(x - 3)^2 + (y + 1)^2 = 4\]
\[x^2 + (y - 1)^2 = 20\]

**Whole class:** Discuss the problem above.

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**In pairs:** Each person should solve, give the radius and center, for one of the following, and present it to their partner.

\[4x^2 + 4y^2 + 4x - 16y - 19 = 0\]
\[9x^2 + 9y^2 + 12x - 18y - 23 = 0\]

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**In fours:** Solve one of the following problems on the board:

Find all values of \(y\) such that the distance between \((2,y)\) and \((-3,6)\) is 13.

\[13^2 = (-3 - 2)^2 + (6 - y)^2\]
\[169 = 25 + 36 - 12y + y^2\]
\[0 = -108 - 12y + y^2\]
\[0 = (y - 18)(y + 6)\]

So, \(y=18\) in order for the distance between the points to be 13.

Joe Bob also likes to travel. One time he went to Nothing, Arizona. In Nothing there is a sign that indicates that Nothing is 50mi. north-east from Wickenburg, 75mi. west from Kingman, 105mi. north-west from Phoenix, and 180mi. south-west from Las Vegas. Discuss how the concepts from this section could be used to determine where Nothing is located. (a drawing may be helpful)

Set Nothing as \((0,0)\) then draw the four circles with the different radii then place the other cites locations on those circles based on the direction.

Find the center-radius form of the equation of a circle with center \((4,3)\) and tangent to the
First draw a picture, since you know that the circle touches the y-axis once you also know the circle contains the point (0,3) and has a radius of 4.

So the center-radius formula is

$$4^2 = (x - 4)^2 + (y - 3)^2$$