Review:

Robots need to find their position on a map relative to landmarks. They must:
1. Identify at least 3 landmarks whose position is known on the map
2. Determine range to the landmark
3. Calculate the intersection point of the range circles

To find the intersection of 3 circles:
1. Use the equation for a circle:
   a. $(x - a)^2 + (y - b)^2 = r^2$
   b. for landmarks located at (a,b) and at a range of r
2. Find the radical line by subtracting the two circle equations
3. Substitute back into one of the circle equations to get a quadratic formula in terms of one variable
4. Solve the quadratic equation to find the two value for that single variable
5. Substitute back into the radical line equation to get the two values for the other variable
6. Substitute these two points into the third circle equation to determine which point the robot is at

Terms:

Localization = finding its position on a map (the process of getting located)

Flow Chart = a diagram of a sequence of (math/computer) steps that help to understand a complex problem

Formulas:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(Quadratic)

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Challenge Question:

Imagine that you had to explain the third step in the process of localization to someone who was two grades below you. Think about what the steps are to finding an object's position. You don't need to use real numbers, but draw a flowchart to explain what steps must be done to complete this process. Add notes to the side of your diagram boxes, if necessary.

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