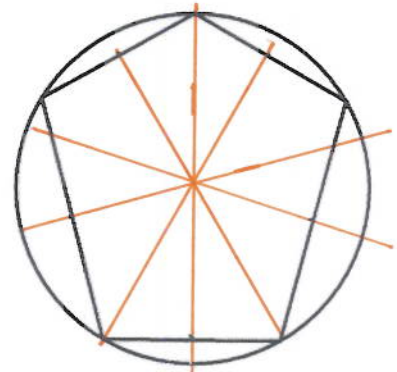
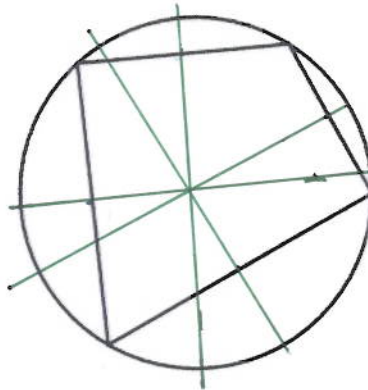
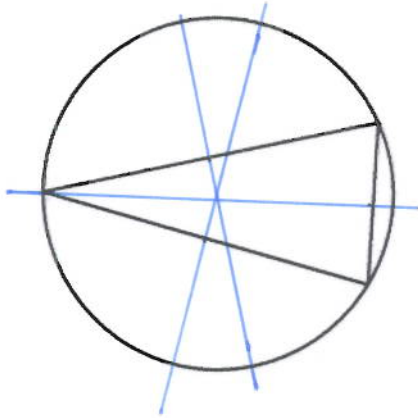


**Activity 1: Perpendicular Bisectors of an Inscribed Polygon**

You will need a ruler and right-angle-maker (corner of a piece of paper) for this activity.

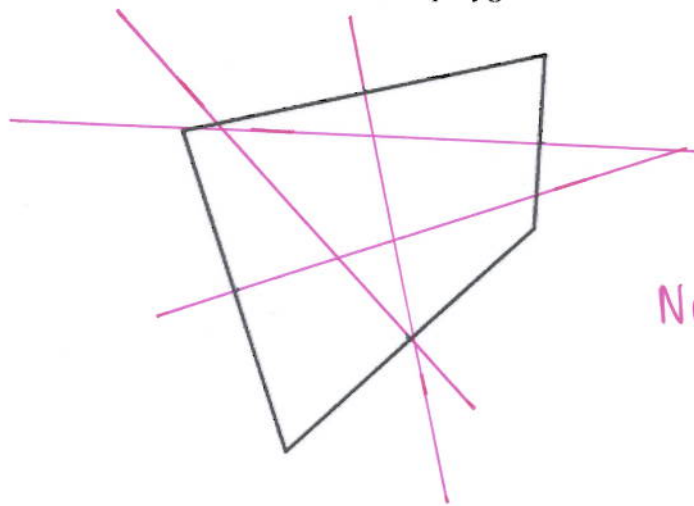
1. Construct the perpendicular bisectors of each side of the polygons inscribed in the following circles.



2. Are the perpendicular bisectors concurrent? If so, what is their point of concurrency?

Yes! The point of concurrency is the center of the circle.

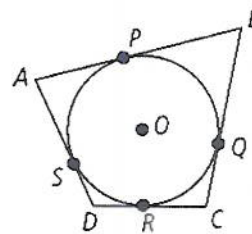
3. Do you think that this is true for every polygon, or just polygons inscribed in a circle? To check, construct the perpendicular bisectors of the not-inscribed polygon below.



Not concurrent.

**Activity 2: Complete the Proof**

**Given:** Quadrilateral  $ABCD$  is circumscribed about  $\odot O$ .



**Prove:**  $AB + DC = BC + AD$

Statements	Reasons
1. Quadrilateral $ABCD$ is circumscribed about $\odot O$ .	Given
2. $\overline{AP} \cong \overline{AS}, \overline{BP} \cong \overline{BQ},$ $\overline{CQ} \cong \overline{CR}, \overline{DR} \cong \overline{DS}$	Congruent Tangent segments Thm.
3. $AP = AS, BP = BQ,$ $CQ = CR, DR = DS$	Defn of congruent segments
4. $AP + BP + CR + DR$ $= AS + BQ + CQ + DS$	Addition Property of Equality
5. $(AP + PB) + (CR + RD)$ $= (BQ + QC) + (AS + SD)$	Associative Property of Equality
6. $AB + DC = BC + AD$	Segment Addition Postulate

**Activity 3: Battleship!**

You will need a sheet of graphing paper and 3 colored pencils to complete this activity.

You are the commander of the Naval Station shown on the graphing paper. An enemy submarine is approaching.

The submarine has a cloaking device that hides its exact location from your radar system. However, you are still able to determine how far away the submarine is from the station.

The submarine is 5 miles away from the station.

1. Do you have enough information to tell the exact location of the submarine? If not, what is the shape described by all of the possible locations of the submarine? (This is sometimes called a *locus*, as in, what is the locus of possible locations of the submarine?)

No, a circle

2. Draw the locus of possible submarine locations on your graph in one of your three colors, and give its equation below.

$$(x-4)^2 + (y-3)^2 = 25$$

3. Naval Station B, located at  $(7, -8)$ , reports that it has detected the submarine at a distance of 7 miles. Draw this information on your graph using the second of your colors, and give the equation of the new locus of submarine locations below.

$$(x-7)^2 + (y+8)^2 = 49$$

4. Has the information from Naval Station B given you what you need to find the exact location of the submarine?

No. There are 2 possible locations.

5. Naval Station C, located at  $(-5, 4)$ , reports that it has detected the submarine at a distance of 13 miles. Draw this information on your graph using the third of your colors, and give the equation of the new locus of submarine locations below.

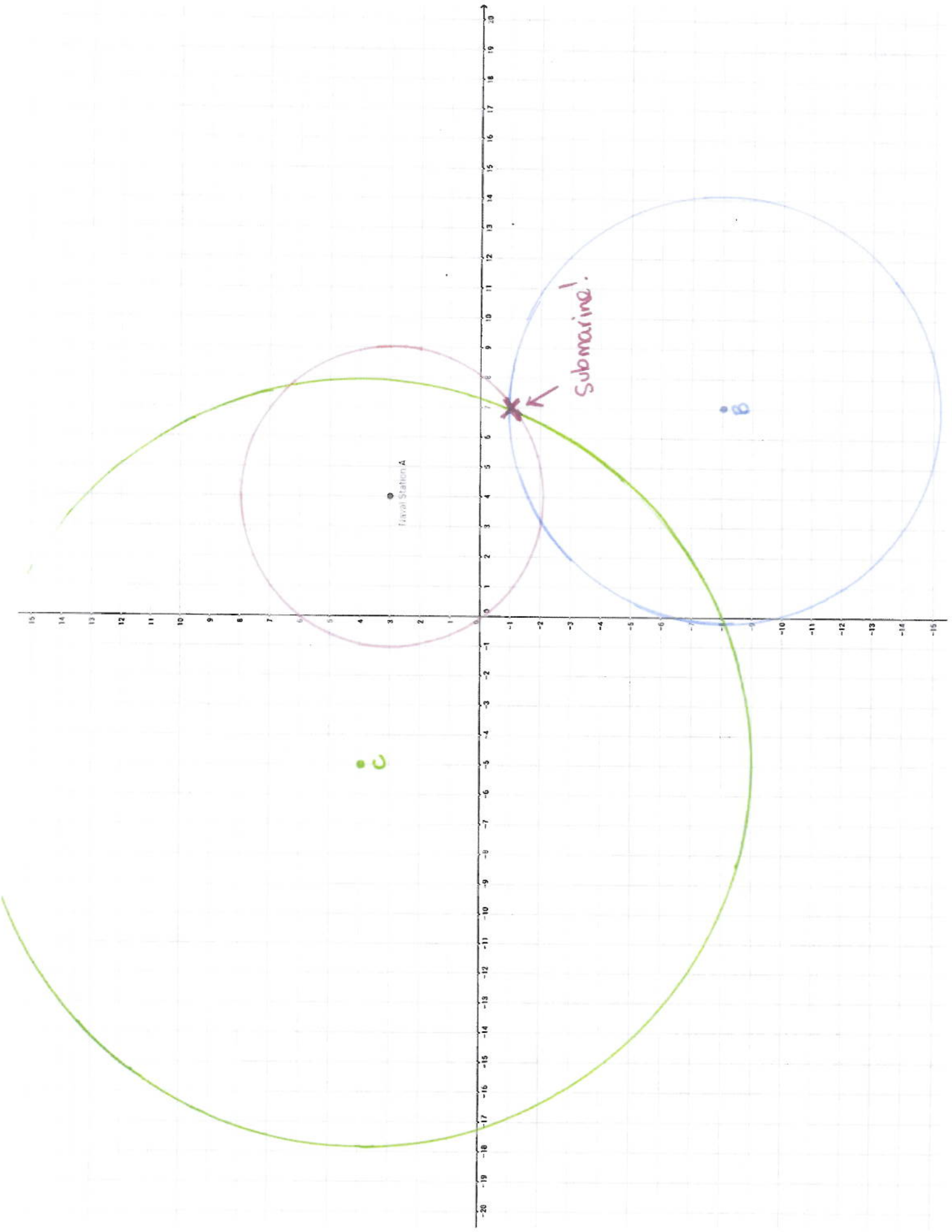
$$(x+5)^2 + (y-4)^2 = 169$$

6. Has the information from Naval Station C given you what you need to find the exact location of the submarine? If so, give the location of the submarine below, and check that your equations are correct by substituting (plugging in) the values you have found.

Submarine is at  $(7, -1)$ :  $(7-4)^2 + (-1-3)^2 = 9+16 = 25 \checkmark$

$$(7-7)^2 + (-1+8)^2 = 49 \quad \checkmark$$

$$(7+5)^2 + (-1-4)^2 = 144+25 = 169 \checkmark$$



Travel Station A

Submarine!

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