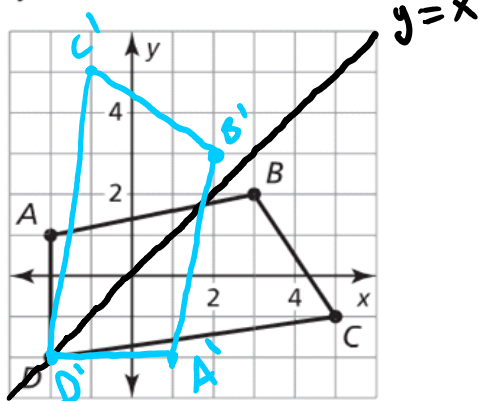


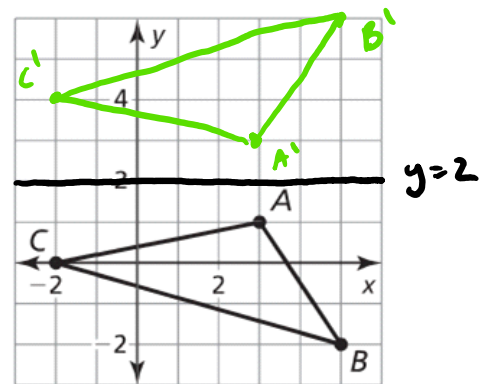
WARM UP

Graph the polygon and its image after a reflection in the given line.

1. $y = x$



2. $y = 2$



ESSENTIAL QUESTION

What are the properties of the perpendicular bisectors in a triangle? What are the properties of the angle bisectors in a triangle?

NEEDED VOCAB:

- ▶ **Circumcenter**
- ▶ **Circumscribed**
- ▶ **Concurrent**
- ▶ **Incenter**
- ▶ **Inscribed**
- ▶ **Point of Concurrency**

GOAL: "I CAN..."

Use triangle bisectors to solve problems."

Where do the perpendicular bisectors of a triangle cross? (Inside, outside, on)

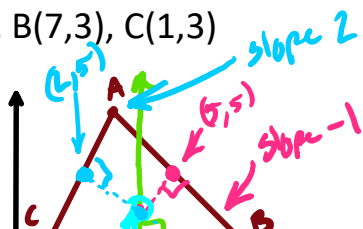
<http://www.mathopenref.com/common/appletframe.html?applet=circumcenter&wid=600&ht=300>

The Perpendicular Bisectors intersect at the **circumcenter** which is either inside, outside, or on depending on the type of triangle it is. If the triangle is obtuse, the circumcenter is on the outside. (The obtuse angle opens up towards it.) If the triangle is acute the circumcenter is on the inside. If the triangle is a right triangle the circumcenter is at the midpoint of the hypotenuse. The circumcenter is equidistant to all the vertices of the triangle, this is the center of a circumscribed circle.

EXAMPLE 1

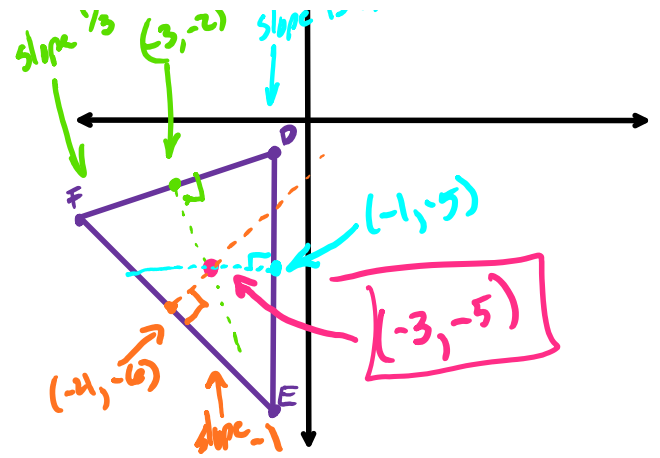
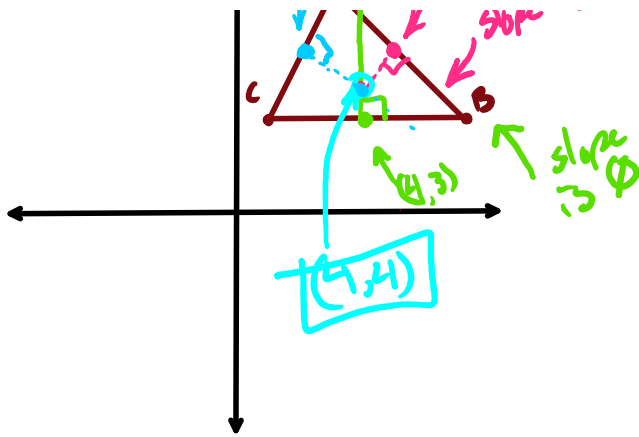
Find the Coordinates of the circumcenters of the following triangles, with the following vertices:

1) $\triangle ABC$; A(3,7), B(7,3), C(1,3)



2) $\triangle DEF$; D(-1,-1), E(-1,-9), F(-7,-3)

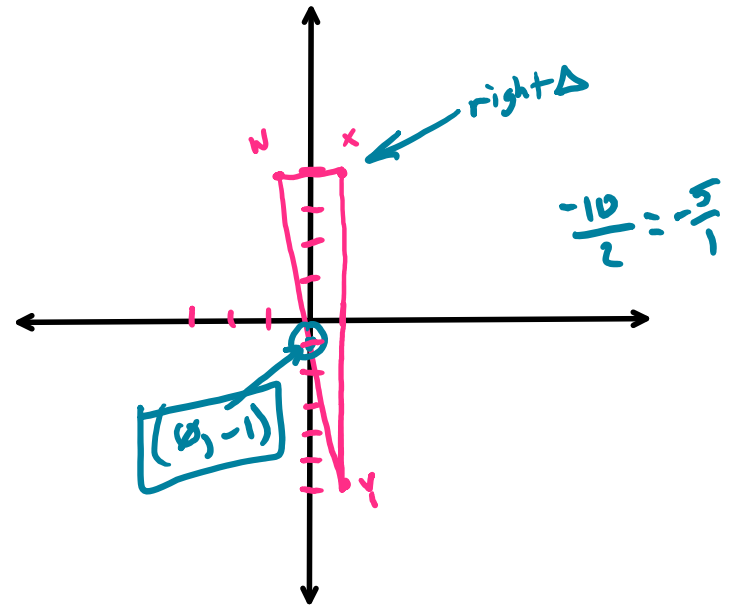
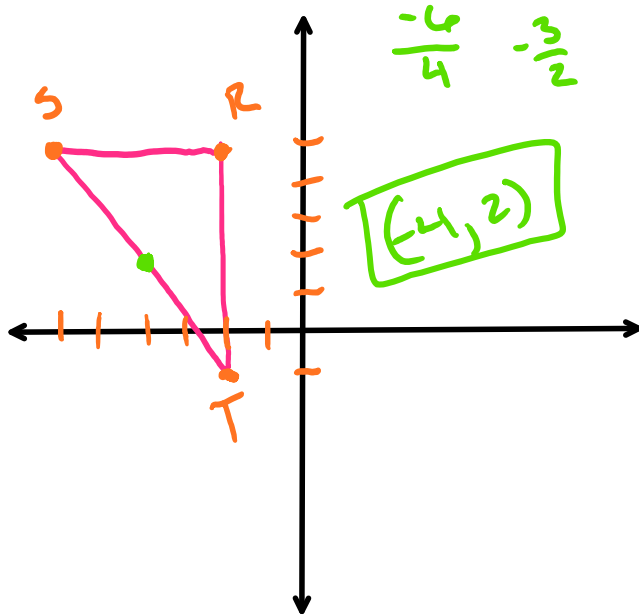




Find the coordinates of the circumcenter of the triangle with the given vertices.

2. $R(-2, 5), S(-6, 5), T(-2, -1)$

3. $W(-1, 4), X(1, 4), Y(1, -6)$



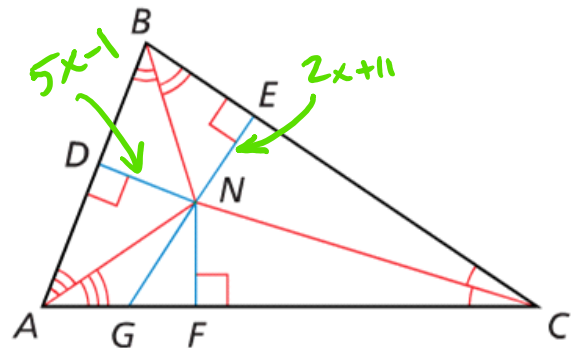
Where do the angle bisectors of a triangle cross?

The Angle Bisectors intersect at the **incenter** which is inside no matter the type of triangle. The incenter is equidistant to all the sides of the triangle, this is the center of an inscribed circle.

In the figure shown, $ND = 5x - 1$ and $NE = 2x + 11$.

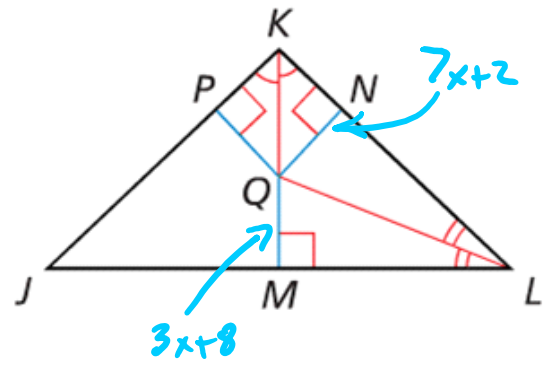
- a. Find NF . 19
- b. Can NG be equal to 18? Explain your reasoning.

NO, \perp has to be the shortest distance to side AC , which is 19. So can't be 18.



$$\begin{aligned} 5x - 1 &= 2x + 11 \\ 3x &= 12 \\ x &= 4 \end{aligned}$$

In the figure shown, $QM = 3x + 8$
and $QN = 7x + 2$. Find QP .



$$3\left(\frac{3}{2}\right) + 8$$

$$\frac{9}{2} + 8$$

$$4.5 + 8$$

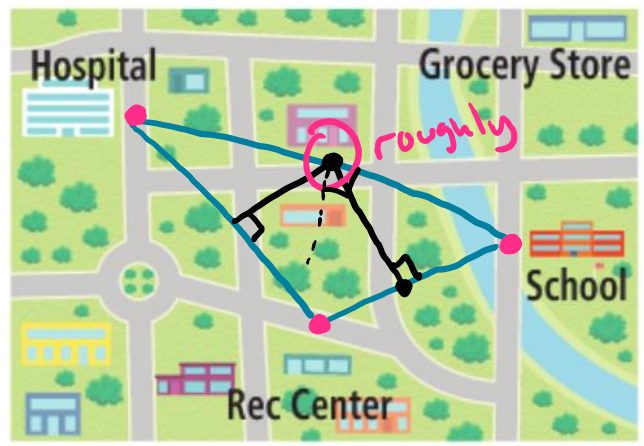
$$12.5$$

$$3x + 8 = 7x + 2$$

$$6 = 4x$$

$$\frac{3}{2} = x$$

A city manager wants to place a new emergency siren so that it is the same distance from the school, hospital, and recreation center. Where should the emergency siren be placed? Let's say that the hospital is at coordinate $(0,3)$, the school is at $(7,0)$ and the rec center is at $(3,-2)$.



HOMEWORK

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