
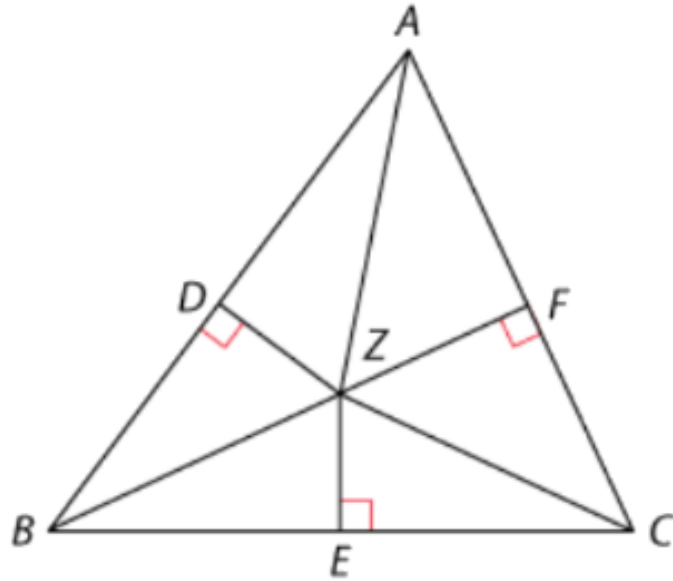


Personal Math Trainer 

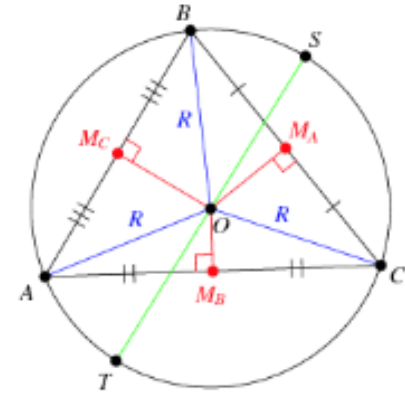
15.4 Perpendicular Bisectors of Triangles - Class & Homework



1. How can you write an algebraic expression for the radius of the circumcircle of ABC ?
Complete the explanation.

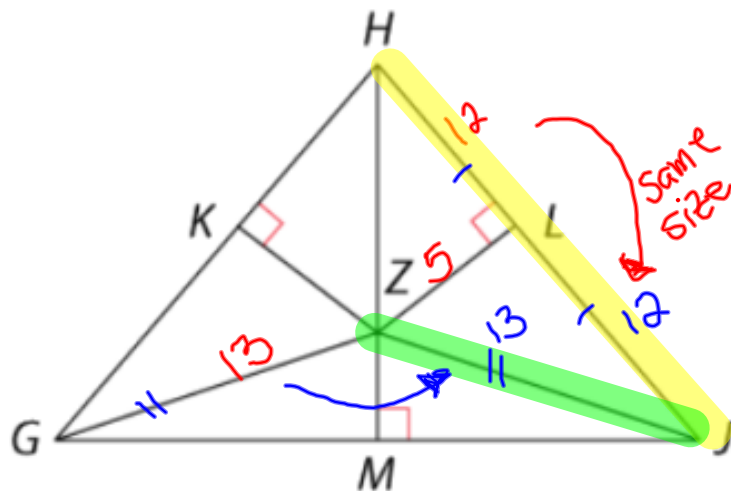


Note: The circumcircle is a triangle's circumscribed circle, i.e., the unique circle that passes through each of the triangle's three vertices. The center of the circumcircle is called the circumcenter, and the circle's radius is called the circumradius.



ZA , ZB , or ; the radius of the circumcircle is the distance from to a vertex of the triangle.

2. \overline{KZ} , \overline{LZ} , and \overline{MZ} are the perpendicular bisectors of $\triangle GHJ$. Use that information to find the length of each segment. Note that the figure is not drawn to scale.



Given: $ZG = 13$, $HL = 12$, $ZL = 5$

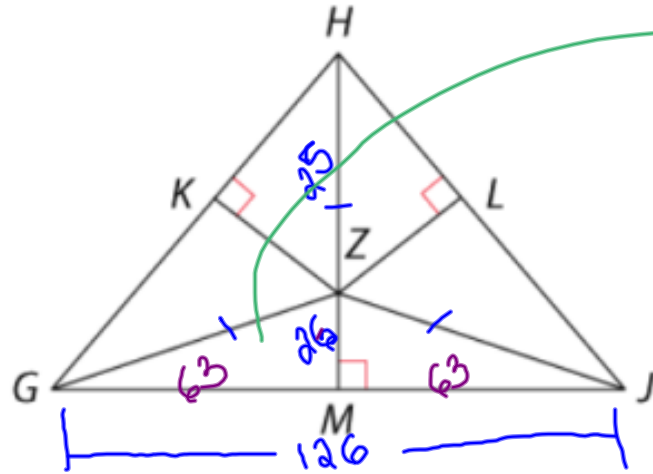
Find: HJ and ZJ

The line segment \overline{HJ} has length .

The line segment \overline{ZJ} has length .

3

\overline{KZ} , \overline{LZ} , and \overline{MZ} are the perpendicular bisectors of $\triangle GHJ$. Use that information to find the length of each segment. Note that the figure is not drawn to scale.



Given: $ZM = 26, ZH = 25, GJ = 126$

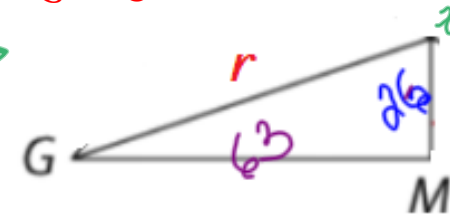
Find: GM and ZG

The line segment \overline{GM} has length .

The line segment \overline{ZG} has length .

Half of GJ

Pythagorean Theorem

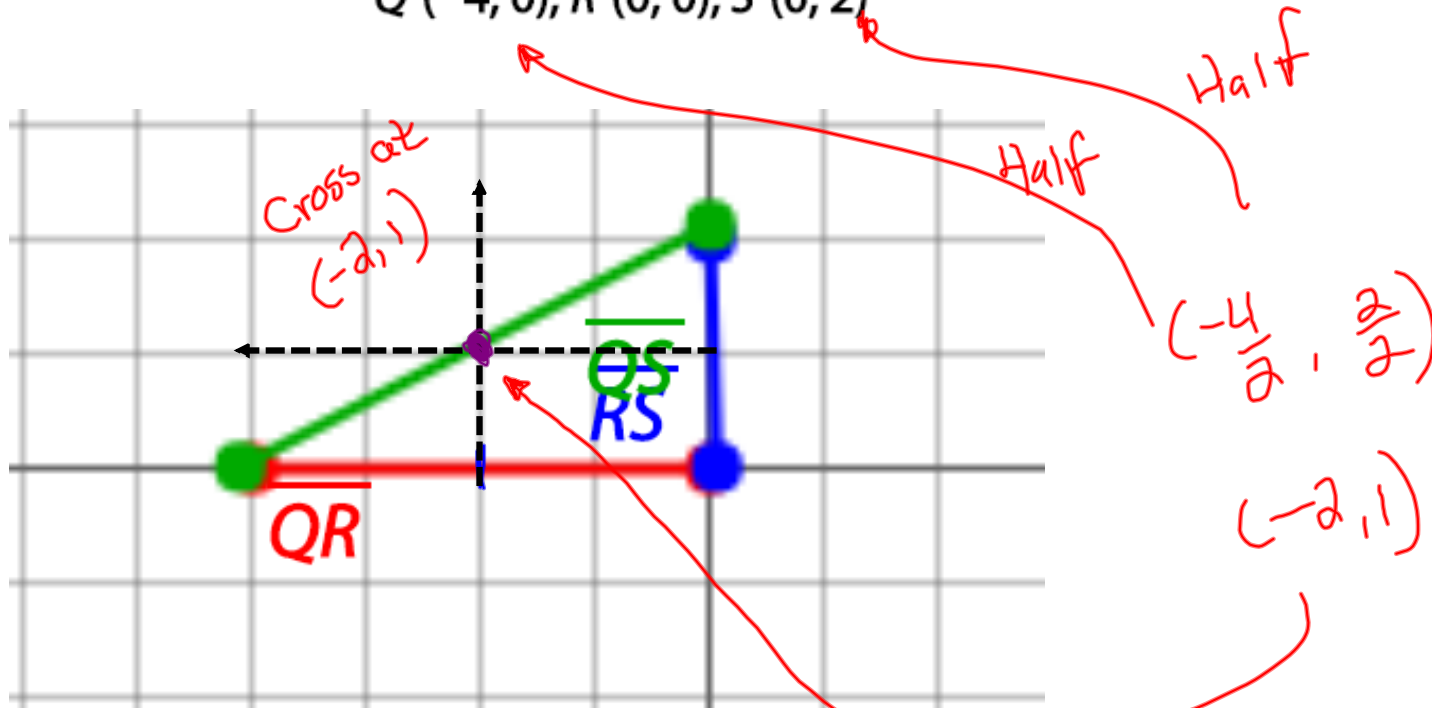


OR

$$ZH = ZG$$

4. Graph the triangle with the given vertices and find the circumcenter of the triangle.

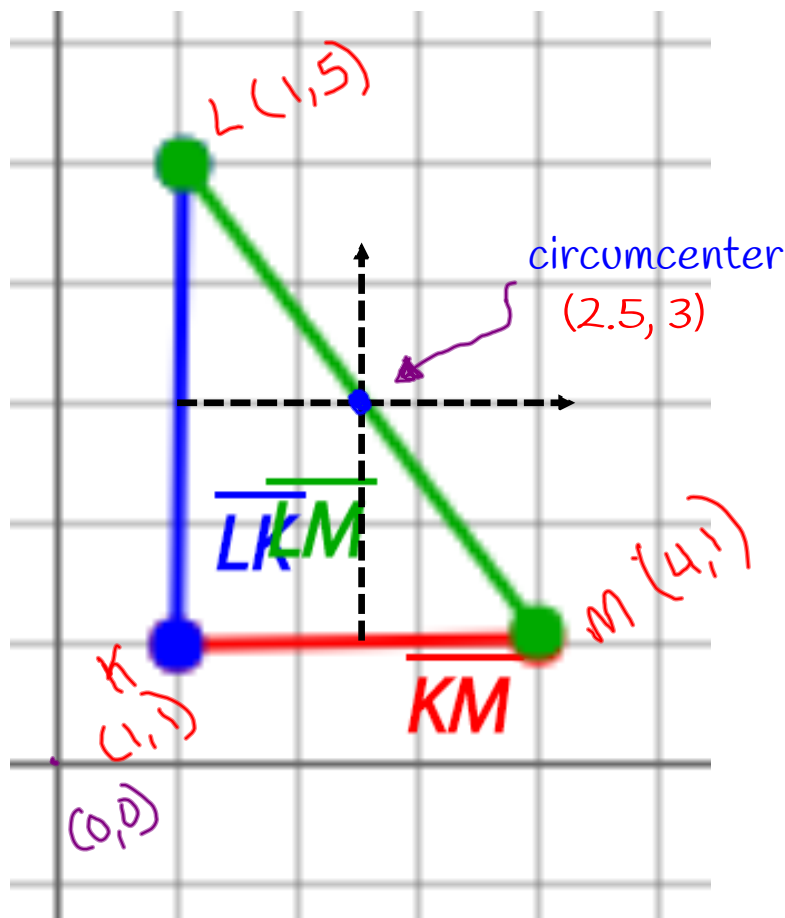
$Q(-4, 0), R(0, 0), S(0, 2)$



The circumcenter of $\triangle QRS$ is $(-2, 1)$.

5. Graph the triangle with the given vertices and find the circumcenter of the triangle.

$K(1, 1), L(1, 5), M(4, 1)$



Use L and M
 $(1, 5)$ $(4, 1)$
 x_1, y_1 x_2, y_2

Midpoint: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

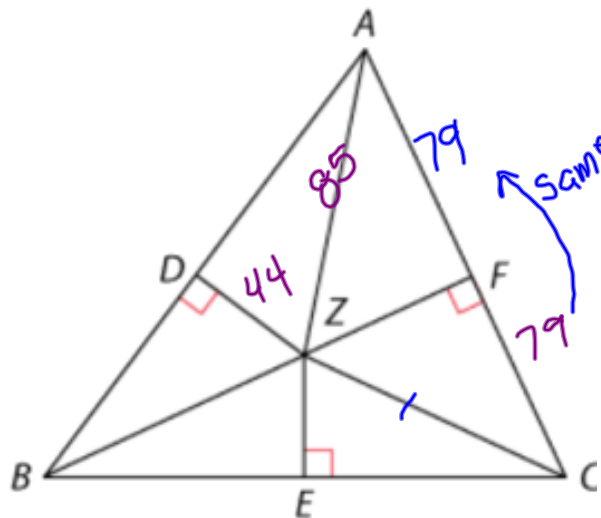
$$\left(\frac{1+4}{2}, \frac{5+1}{2}\right)$$

$$\left(\frac{5}{2}, \frac{6}{2}\right)$$

$$(2.5, 3)$$

The circumcenter of $\triangle KLM$ is $(2.5, 3)$.

6. \overline{ZD} , \overline{ZE} , and \overline{ZF} are the perpendicular bisectors of $\triangle ABC$. Use that information to find the length of each segment. Note that the figure is not drawn to scale.



Given: $ZD = 44$, $ZA = 85$, $FC = 79$ Find: ZC and AC

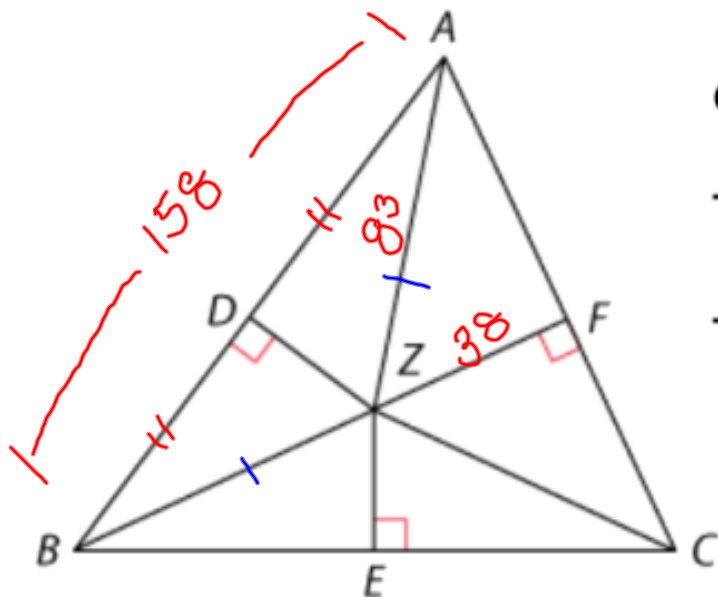
The line segment \overline{ZC} has length = AZ

The line segment \overline{AC} has length .

$$2 \cdot FC =$$

$$2 \cdot 79 =$$

7. \overline{ZD} , \overline{ZE} , and \overline{ZF} are the perpendicular bisectors of ABC . Use that information to find the length of each segment. Note that the figure is not drawn to scale.

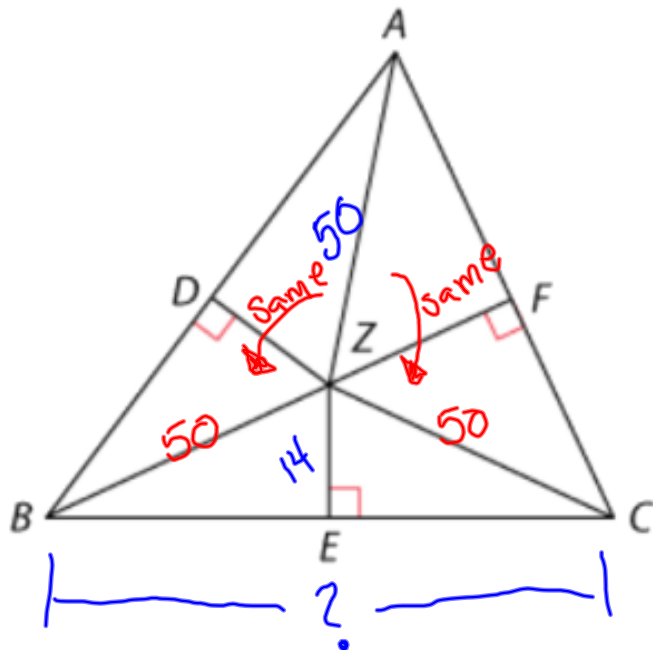


Given: $ZF = 38$, $ZA = 83$, $AB = 158$ Find: AD and ZB

The line segment \overline{AD} has length = $\frac{AB}{2}$

The line segment \overline{ZB} has length = ZA

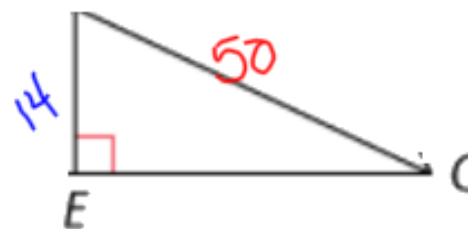
8. \overline{ZD} , \overline{ZE} , and \overline{ZF} are the perpendicular bisectors of ABC . Use that information to find the length of each segment. Note that the figure is not drawn to scale.



Given: $ZA = 50$, $ZE = 14$ Find: BC

(Hint: Use the Pythagorean Theorem.)

The line segment \overline{BC} has length .



By the Pythagorean Theorem,

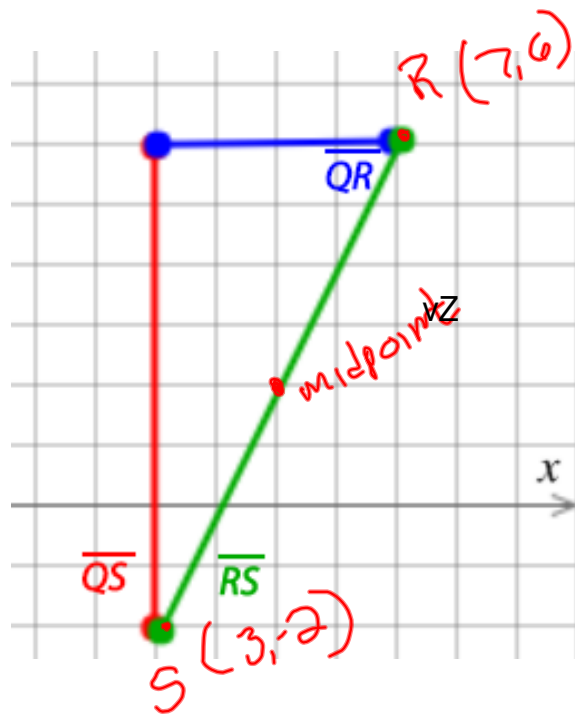
$$\begin{aligned} EC^2 &= ZC^2 - ZE^2 \\ &= (50)^2 - (14)^2 \\ &= 2,304. \end{aligned}$$

Then $EC = \sqrt{2,304} = 48$.

So, $BC = 2 \cdot 48 = 96$.

9. Graph the triangle with the given vertices and find the circumcenter of the triangle.

$Q(3, 6), R(7, 6), S(3, -2)$



$$\text{mid point } \left(\frac{7+3}{2}, \frac{6-2}{2} \right)$$

$$\left(\frac{10}{2}, \frac{4}{2} \right)$$

$$(5, 2)$$

The circumcenter of $\triangle QRS$ is $(5, 2)$.

Mid point

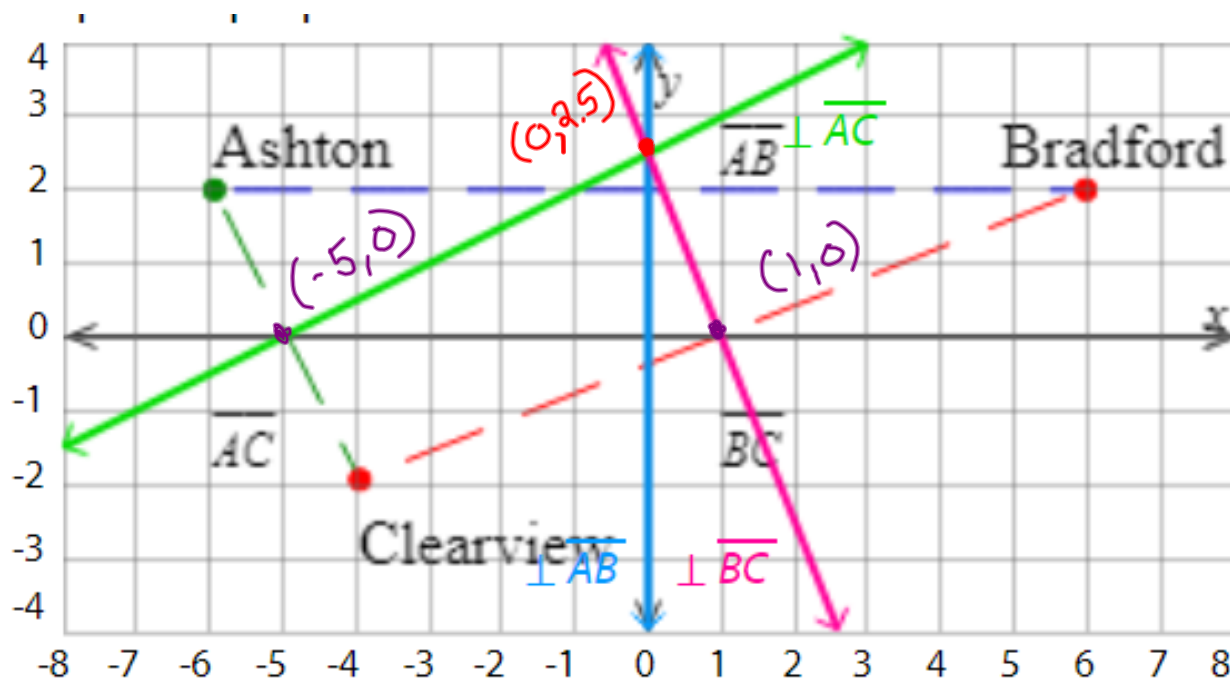
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Examples

15.4 Perpendicular Bisectors of Triangles

10. For the next Fourth of July, the towns of Ashton, Bradford, and Clearview will launch a fireworks display from a boat in the lake.

Graph the perpendicular bisectors and enter the coordinates to show where the boat should be positioned so that it is the same distance from all three towns. Round to the nearest tenth. Complete the justification for your graph.



The boat should be positioned at location .

Let the three towns be vertices of a triangle. By the Circumcenter Theorem, the circumcenter of the triangle is from the vertices. To find the circumcenter, find the perpendicular bisectors of each side. The position of the boat is the circumcenter.