

12. **What If?** Suppose you are given the vertices of a triangle PQR . You plot the points in a coordinate plane and notice that \overline{PQ} is horizontal but neither of the other sides is vertical. How can you identify the circumcenter of the triangle? Justify your reasoning.

13. **Essential Question Check-In** How is the point that is equidistant from the three vertices of a triangle related to the circumcircle of the triangle?

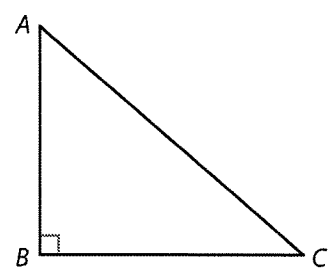
 **Evaluate: Homework and Practice**



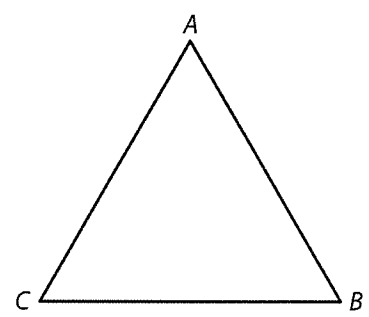
- Online Homework
- Hints and Help
- Extra Practice

Construct the circumcircle of each triangle. Label the circumcenter P .

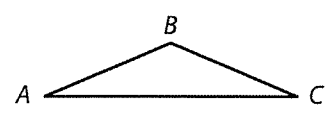
1.



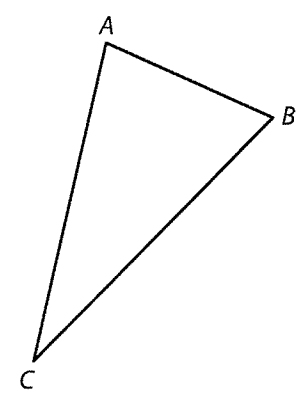
2.



3.

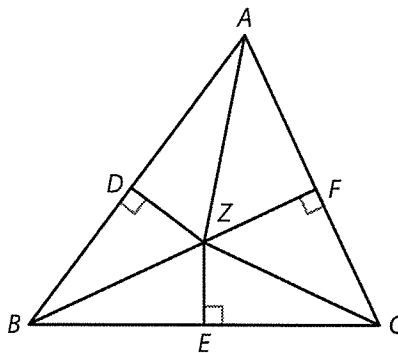


4.



Complete the proof of the Circumcenter Theorem.

Use the diagram for Exercise 5–8. \overline{ZD} , \overline{ZE} , and \overline{ZF} are the perpendicular bisectors of $\triangle ABC$. Use the given information to find the length of each segment. Note that the figure is not drawn to scale.



5. Given: $DZ = 40$, $ZA = 85$, $FC = 77$

Find: ZC and AC

6. Given: $FZ = 36$, $ZA = 85$, $AB = 150$

Find: AD and ZB

7. Given: $AZ = 85$, $ZE = 51$

Find: BC

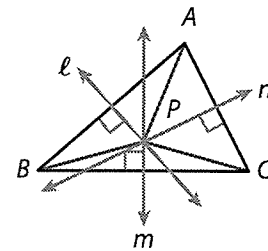
(Hint: Use the Pythagorean Theorem.)

8. **Analyze Relationships** How can you write an algebraic expression for the radius of the circumcircle of $\triangle ABC$ in Exercises 5–7? Explain.

Complete the proof of the Circumcenter Theorem.

9. **Given:** Lines ℓ , m , and n are the perpendicular bisectors of \overline{AB} , \overline{BC} , and \overline{AC} , respectively. P is the intersection of ℓ , m , and n .

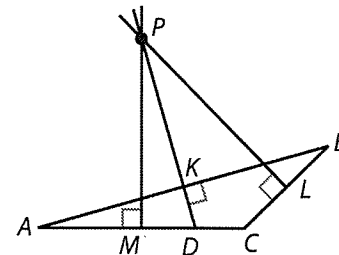
Prove: $PA = PB = PC$



Statements	Reasons
1. Lines ℓ , m , and n are the perpendicular bisectors of \overline{AB} , \overline{BC} , and \overline{AC} .	1.
2. P is the intersection of ℓ , m , and n .	2.
3. $PA = \underline{\hspace{2cm}}$	3. P lies on the perpendicular bisector of \overline{AB} .
4. $\underline{\hspace{2cm}} = PC$	4. P lies on the perpendicular bisector of \overline{BC} .
5. $PA = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$	5.

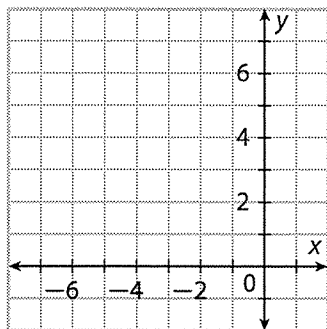
10. \overline{PK} , \overline{PL} , and \overline{PM} are the perpendicular bisectors of sides \overline{AB} , \overline{BC} , and \overline{AC} . Tell whether the given statement is justified by the figure. Select the correct answer for each lettered part.

- a. $AK = KB$ Justified Not Justified
 b. $PA = PB$ Justified Not Justified
 c. $PM = PL$ Justified Not Justified
 d. $BL = \frac{1}{2}BC$ Justified Not Justified
 e. $PK = KD$ Justified Not Justified

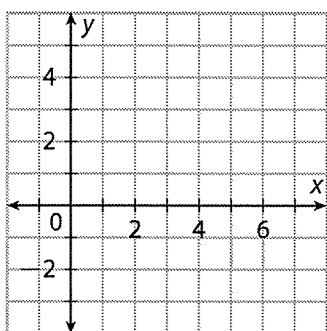


Graph the triangle with the given vertices and find the circumcenter of the triangle.

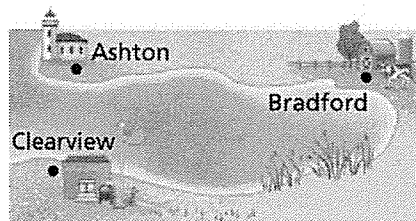
11. $D(-5, 0)$, $E(0, 0)$, $F(0, 7)$



12. $Q(3, 4)$, $R(7, 4)$, $S(3, -2)$



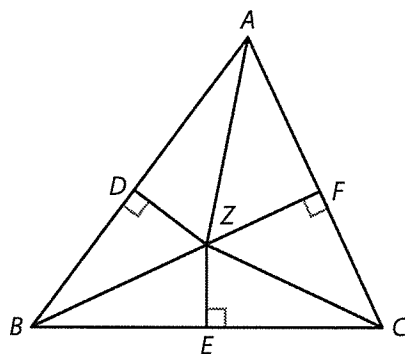
13. **Represent Real-World Problems** For the next Fourth of July, the towns of Ashton, Bradford, and Clearview will launch a fireworks display from a boat in the lake. Draw a sketch to show where the boat should be positioned so that it is the same distance from all three towns. Justify your sketch.



H.O.T. Focus on Higher Order Thinking

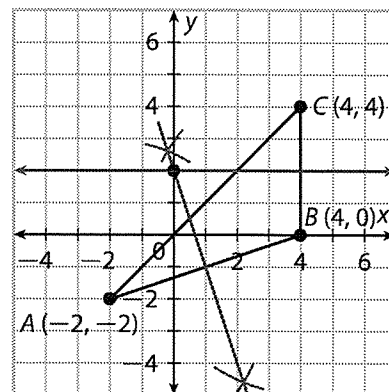
14. **Analyze Relationships** Explain how can you draw a triangle JKL whose circumcircle has a radius of 8 centimeters.

15. **Persevere in Problem Solving** \overline{ZD} , \overline{ZE} and \overline{ZF} are the perpendicular bisectors of $\triangle ABC$, which is not drawn to scale.



- a. Suppose that $ZB = 145$, $ZD = 100$, and $ZF = 17$. How can you find AB and AC ?
- b. Find AB and AC .
- c. Can you find BC ? If so, explain how and find BC . If not, explain why not.

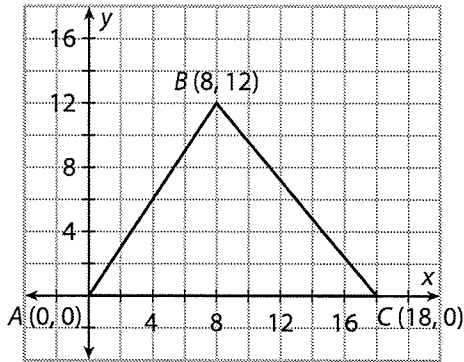
16. **Multiple Representations** Given the vertices $A(-2, -2)$, $B(4, 0)$, and $C(4, 4)$ of a triangle, the graph shows how you can use a graph and construction to locate the circumcenter P of the triangle. You can draw the perpendicular bisector of \overline{CB} and construct the perpendicular bisector of \overline{AB} . Consider how you could identify P algebraically.



- a. The perpendicular bisector of \overline{AB} passes through its midpoint. Use the Midpoint Formula to find the midpoint of \overline{AB} .
- b. What is the slope m of the perpendicular bisector of \overline{AB} ? Explain how you found it.
- c. Write an equation of the perpendicular bisector of \overline{AB} and explain how you can use it to find P .

Lesson Performance Task

A landscape architect wants to plant a circle of flowers around a triangular garden. She has sketched the triangle on a coordinate grid with vertices at $A(0, 0)$, $B(8, 12)$, and $C(18, 0)$.



Explain how the architect can find the center of the circle that will circumscribe triangle ABC . Then find the radius of the circumscribed circle.