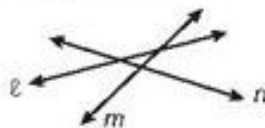


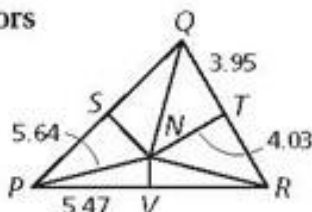
**Vocabulary** Apply the vocabulary from this lesson to answer each question.

1. Explain why lines  $\ell$ ,  $m$ , and  $n$  are NOT concurrent.
2. A circle that contains all the vertices of a polygon is \_\_\_\_\_ the polygon. (*circumscribed about* or *inscribed in*)



$\overline{SN}$ ,  $\overline{TN}$ , and  $\overline{VN}$  are the perpendicular bisectors of  $\triangle PQR$ . Find each length.

3.  $NR$
4.  $RV$
5.  $TR$
6.  $QN$

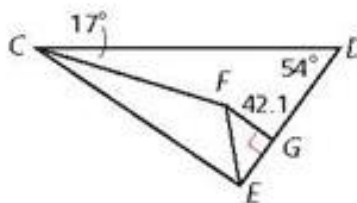


**Multi-Step** Find the circumcenter of a triangle with the given vertices.

7.  $O(0, 0)$ ,  $K(0, 12)$ ,  $L(4, 0)$
8.  $A(-7, 0)$ ,  $O(0, 0)$ ,  $B(0, -10)$

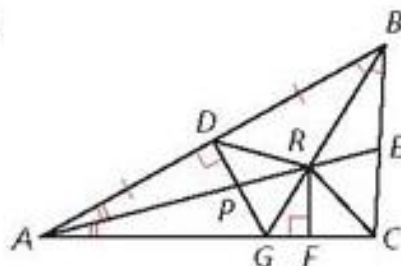
$\overline{CF}$  and  $\overline{EF}$  are angle bisectors of  $\triangle CDE$ . Find each measure.

9. the distance from  $F$  to  $\overline{CD}$
10.  $m\angle FED$



Tell whether each segment lies on a perpendicular bisector, an angle bisector, or neither. Justify your answer.

22.  $\overline{AE}$
23.  $\overline{DG}$
24.  $\overline{BG}$
25.  $\overline{CR}$
26.  $\overline{FR}$
27.  $\overline{DR}$



Tell whether each statement is sometimes, always, or never true. Support your answer with a sketch.

28. The angle bisectors of a triangle intersect at a point outside the triangle.
29. An angle bisector of a triangle bisects the opposite side.
30. A perpendicular bisector of a triangle passes through the opposite vertex.
31. The incenter of a right triangle is on the triangle.
32. The circumcenter of a scalene triangle is inside the triangle.

**Multi-Step** Find the orthocenter of a triangle with the given vertices.

8.  $K(2, -2)$ ,  $L(4, 6)$ ,  $M(8, -2)$
9.  $U(-4, -9)$ ,  $V(-4, 6)$ ,  $W(5, -3)$

**Tell whether each statement is sometimes, always, or never true. Support your answer with a sketch.**

- 34.** A median of a triangle bisects one of the angles.
- 35.** If one altitude of a triangle is in the triangle's exterior, then a second altitude is also in the triangle's exterior.
- 36.** The centroid of a triangle lies in its exterior.
- 37.** In an isosceles triangle, the altitude and median from the vertex angle are the same line as the bisector of the vertex angle.