Name_____ Date_____

Bisectors of Triangles
**For use with Exploration 6.2**

Essential Question   What conjectures can you make about the
perpendicular bisectors and the angle bisectors of a triangle?

1   EXPLORATION: Properties of the Perpendicular Bisectors of a Triangle

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Use dynamic geometry software. Draw any $\triangle ABC$.

   a. Construct the perpendicular bisectors of all three sides of $\triangle ABC$. Then drag
   the vertices to change $\triangle ABC$. What do you notice about the perpendicular
   bisectors?

   b. Label a point D at the intersection of the perpendicular bisectors.

   c. Draw the circle with center D through vertex A of $\triangle ABC$. Then drag the
   vertices to change $\triangle ABC$. What do you notice?
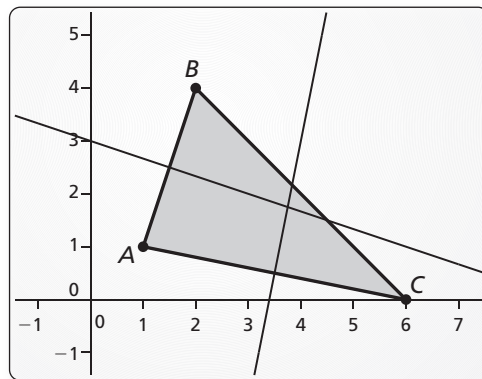
Sample
Points
$A(1, 1)$
$B(2, 4)$
$C(6, 0)$
Segments
$BC = 5.66$
$AC = 5.10$
$AB = 3.16$
Lines
$x + 3y = 9$
$-5x + y = -17$

2   EXPLORATION: Properties of the Angle Bisectors of a Triangle

**Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.**

Work with a partner. Use dynamic geometry software. Draw any $\triangle ABC$.

   a. Construct the angle bisectors of all three angles of $\triangle ABC$. Then drag the
   vertices to change $\triangle ABC$. What do you notice about the angle bisectors?

6.2 **Bisectors of Triangles (continued)**

2 **EXPLORATION:** Properties of the Angle Bisectors of a Triangle (continued)

b. Label a point D at the intersection of the angle bisectors.

c. Find the distance between D and $\overline{AB}$. Draw the circle with center D and this distance as a radius. Then drag the vertices to change $\triangle ABC$. What do you notice?
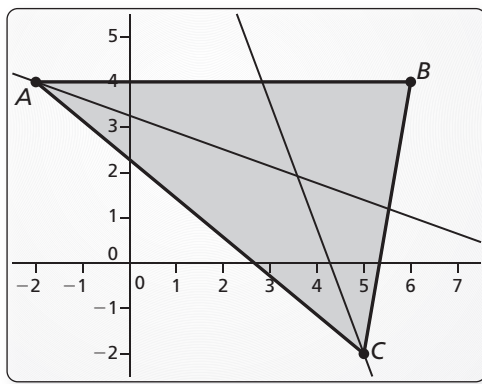
Sample
Points
$A(-2, 4)$

$B(6, 4)$

$C(5, -2)$

Segments
$BC = 6.08$
$AC = 9.22$
$AB = 8$
Lines
$0.35x + 0.94y = 3.06$
$-0.94x - 0.34y = -4.02$

Communicate Your Answer

3. What conjectures can you make about the perpendicular bisectors and the angle bisectors of a triangle?

6.2 Notetaking with Vocabulary
For use after Lesson 6.2

In your own words, write the meaning of each vocabulary term.
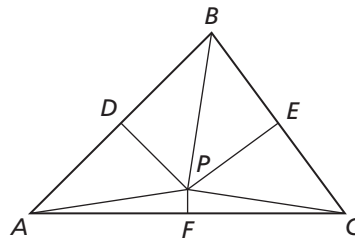
concurrent

point of concurrency

circumcenter

incenter

Theorems

Theorem 6.5 Circumcenter Theorem

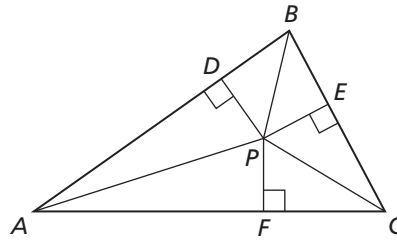The circumcenter of a triangle is equidistant from the vertices of the triangle.

If $\overline{PD}$, $\overline{PE}$, and $\overline{PF}$ are perpendicular bisectors, then $PA = PB = PC$.

Notes:

6.2   **Notetaking with Vocabulary** (continued)

Theorem 6.6   Incenter Theorem

The incenter of a triangle is equidistant
from the sides of the triangle.

If $\overline{AP}$, $\overline{BP}$, and $\overline{CP}$ are angle bisectors of $\triangle ABC$,
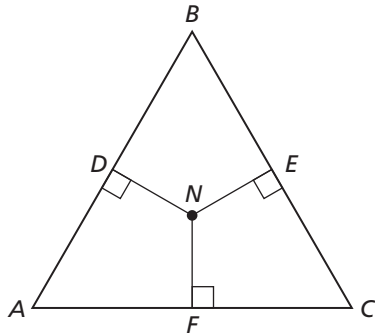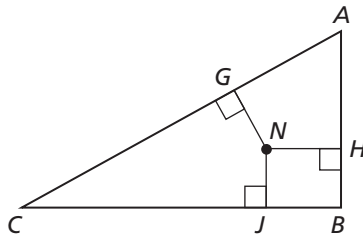then $PD = PE = PF$.

Notes:

Extra Practice

In Exercises 1–3, *N* is the incenter of $\triangle ABC$. Use the given information to find the
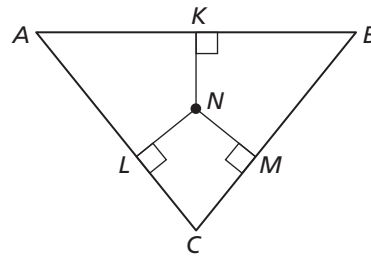indicated measure.

1. $ND = 2x - 5$
    $NE = -2x + 7$
    Find NF.

2. $NG = x - 1$
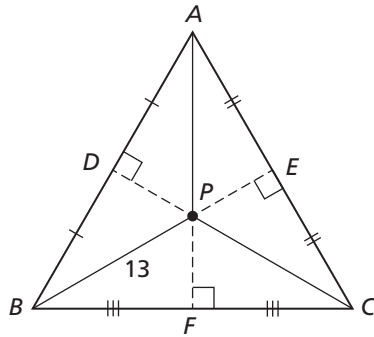 $NH = 2x - 6$
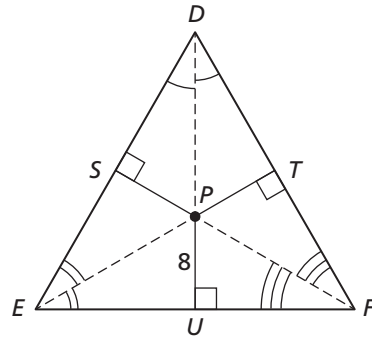   Find NJ.

3. $NK = x + 10$
    $NL = -2x + 1$
    Find NM.

6.2 **Notetaking with Vocabulary** (continued)

In Exercises 4–7, find the indicated measure.

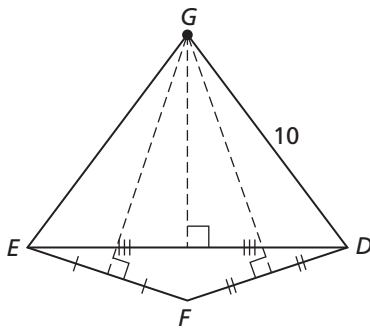**4.** *PA*
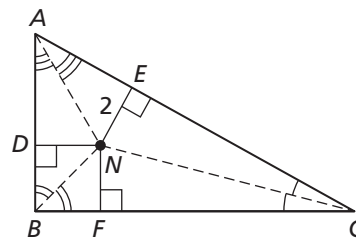

5. *PS*

6. *GE*

7. *NF*

In Exercises 8–10, find the coordinates of the circumcenter of the triangle with the given vertices.

8. $A(-2, -2), B(-2, 4), C(6, 4)$ **9.** $D(3, 5), E(3, 1), F(9, 5)$ **10.** $J(4, -7), K(4, -3), L(-6, -3)$