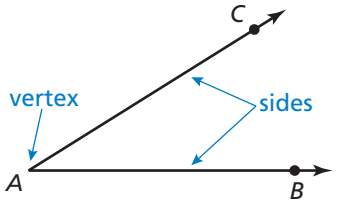
Name _____ Date _____

Naming and Bisecting Angles

You can name an angle by its vertex, such as $\angle A$, or by a point on each ray and the vertex, such as $\angle BAC$ or $\angle CAB$.



When a point is the vertex of more than one angle, you cannot use the vertex alone to name the angles, as shown in the following example.

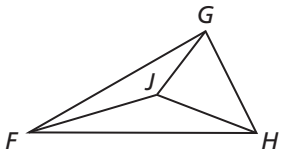
Example 1 **Name the included angle between each given pair of sides.**

a. $\overline{FJ}$ and $\overline{FH}$

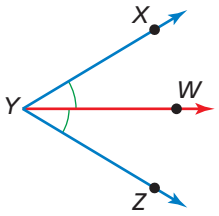
▶ $\angle JFH$ or $\angle HFJ$

b. $\overline{JH}$ and $\overline{GH}$

▶ $\angle JHG$ or $\angle GHJ$



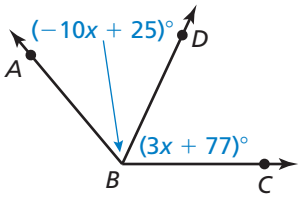
An **angle bisector** is a ray that divides an angle into two angles that are congruent. In the figure, $\overrightarrow{YW}$ bisects $\angle XYZ$, so $\angle XYW \cong \angle ZYW$.



Example 2 $\overrightarrow{BD}$ **bisects** $\angle ABC$. **Find** $m\angle ABC$.

First write and solve an equation. Use the fact that $m\angle ABD = m\angle CBD$.

$m\angle ABD = m\angle CBD$	Write the equation.
$-10x + 25 = 3x + 77$	Substitute.
$-4 = x$	Solve for x.



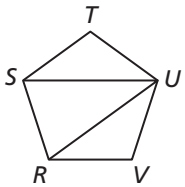
Then evaluate the expression for $m\angle ABD$ when $x = -4$ to obtain $m\angle ABD = 65°$. By the Angle Addition Postulate and the definition of angle bisector, $m\angle ABC = m\angle ABD + m\angle CBD = 65° + 65° = 130°$.

▶ So, the measure of $\angle ABC$ is 130°.

Practice

Check your answers at BigIdeasMath.com.

In Exercises 1–4, use the figure to name the included angle between the given pair of sides.



1. $\overline{ST}$ and $\overline{UT}$ $\angle T$, $\angle STU$, or $\angle UTS$
2. $\overline{SU}$ and $\overline{VU}$ $\angle SUV$ or $\angle VUS$
3. $\overline{UR}$ and $\overline{UT}$ $\angle RUT$ or $\angle TUR$
4. $\overline{RV}$ and $\overline{RS}$ $\angle SRV$ or $\angle VRS$
5. $\overrightarrow{QS}$ bisects $\angle PQR$ such that $m\angle PQS = (5x + 9)°$ and $m\angle RQS = (9x - 3)°$. Find the value of x and $m\angle PQR$.
   $x = 3$, $m\angle PQR = 48°$
6. $\overrightarrow{KM}$ bisects $\angle JKL$ such that $m\angle JKM = (6x + 33)°$ and $m\angle LKM = (13x - 2)°$. Find the value of x and $m\angle JKL$.
   $x = 5$, $m\angle JKL = 126°$