

Lesson 12.1

Adjacent and Vertical Angles

Essential Question

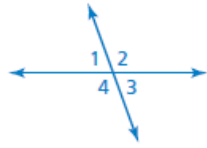
What can you conclude about the angles formed by two intersecting lines?

Key Ideas

Adjacent Angles

Words Two angles are **adjacent angles** when they share a common side and have the same vertex.

Examples



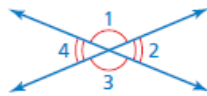
$\angle 1$ and $\angle 2$ are adjacent.

$\angle 2$ and $\angle 4$ are not adjacent.

Vertical Angles

Words Two angles are **vertical angles** when they are opposite angles formed by the intersection of two lines. Vertical angles are **congruent angles**, meaning they have the same measure.

Examples



$\angle 1$ and $\angle 3$ are vertical angles.

$\angle 2$ and $\angle 4$ are vertical angles.

Use the figure shown.

a. Name a pair of adjacent angles.

$\angle ABC \hat{=} \angle CBD$

$\angle FBE \hat{=} \angle FBC$

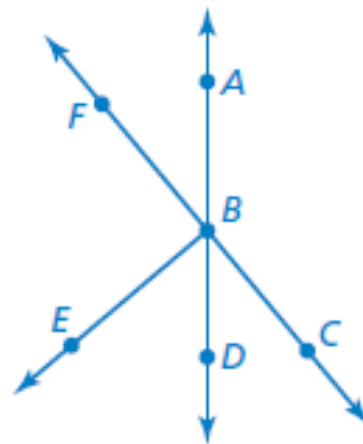
There are many others

b. Name a pair of vertical angles.

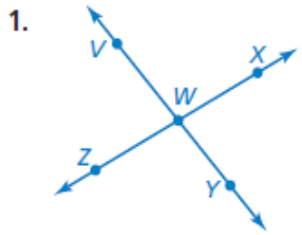
$\angle ABF \hat{=} \angle CBD$

$\angle FBD \hat{=} \angle ABC$

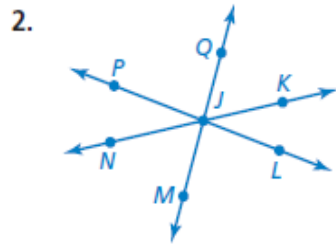
No other pairs



Name two pairs of adjacent angles and two pairs of vertical angles in the figure.

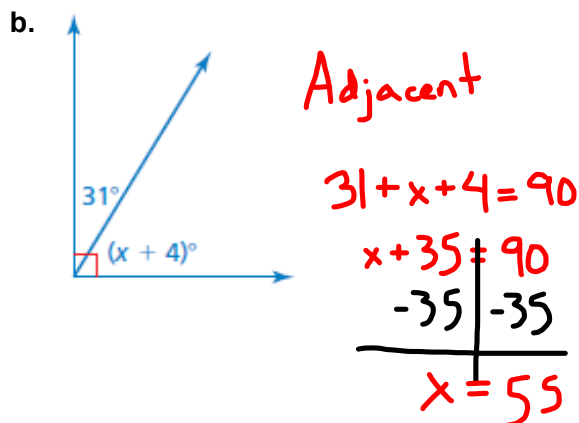
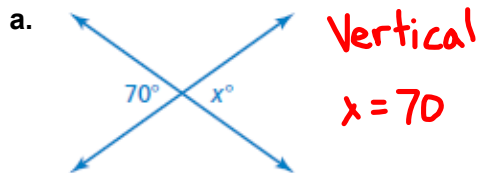


$\angle VWX \hat{=} \angle XWY$
 $\angle ZWY \hat{=} \angle VWY$
 etc...
 $\angle VWX \hat{=} \angle ZWY$
 $\angle VWZ \hat{=} \angle XWY$
 No more

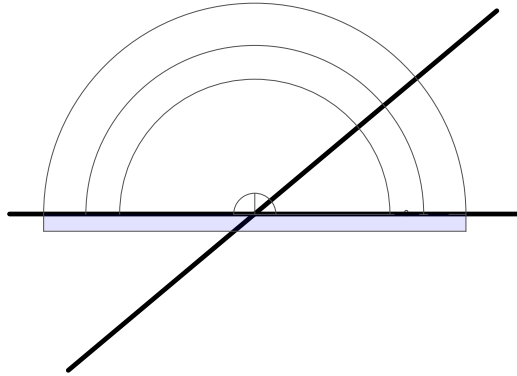


$\angle PJK \hat{=} \angle KJL$
 $\angle MJN \hat{=} \angle NJP$
 etc...
 $\angle PJQ \hat{=} \angle LJM$
 $\angle NJM \hat{=} \angle KJQ$
 $\angle QJN \hat{=} \angle KJM$
 etc...

Tell whether the angles are *adjacent* or *vertical*. Then find the value of x .

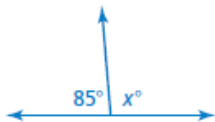


Draw a pair of vertical angles with a measure of 40° .



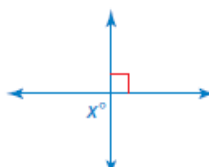
Draw a line, measure 40° , draw through the first line

Tell whether the angles are *adjacent* or *vertical*. Then find the value of x .

3. 

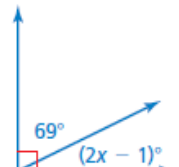
Adjacent

$$\begin{array}{r} 85 + x = 180 \\ -85 \quad -85 \\ \hline x = 95^\circ \end{array}$$

4. 

Vertical

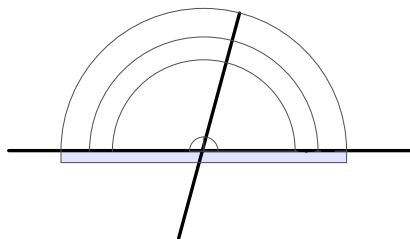
$$x = 90^\circ$$

5. 

Adjacent

$$\begin{array}{r} 69 + 2x - 1 = 90 \\ 2x + 68 = 90 \\ -68 \quad -68 \\ \hline 2x = 22 \\ \frac{2x}{2} = \frac{22}{2} \\ x = 11^\circ \end{array}$$

6. Draw a pair of vertical angles with a measure of 75° .



True or False?

1. Vertical angles are always acute.

F

2. Adjacent angles could be acute.

T

3. Adjacent angles could be obtuse.

T

4. Vertical angles are congruent.

T

5. Adjacent angles could be congruent.

T