## More Geometry Examples

## Example 1: Identify Angle Parts

Name an angle pair that satisfies each condition.
a. two obtuse vertical angles
$\angle D F B$ and $\angle A F E$ are vertical angles.
They each have measures greater than 90, so they are obtuse.
b. Name a segment that is perpendicular to $\overline{F C}$.

$\overline{A D}$ is perpendicular to $\overline{F C}$.
The intersection has a right angle symbol so they are perpendicular.

Example 2: Angle Measure
ALGEBRA - The measure of the supplement of an angle is 60 less than three times the measure of the complement of the angle. Find the measure of the angle.

Explore Let $x$ represent the measure of the angle. Then $90-x$ is the measure of its complement, and $180-x$ is the measure of its supplement. "Boxer Method" below:

| The Angle | $\mathbf{x}$ |  |
| :--- | :---: | :--- |
| Complement | $\mathbf{9 0}-\mathbf{x}$ |  |
| Supplement | $\mathbf{1 8 0}-\mathbf{x}$ |  |

Plan Write an equation using expressions from table above.


Solve

$$
\begin{array}{rlrl}
180-x & =3(90-x)-60 & & \text { Original equation } \\
180-x & =270-3 x-60 & & \text { Distributive Property } \\
180-x & =210-3 x & & \text { Simplify. } \\
-x & =30-3 x & & \text { Subtract } 180 \text { from each side. } \\
2 x & =30 & & \text { Add } 3 x \text { to each side. } \\
x & =\mathbf{1 5} & & \text { Divide each side by } 2 . \\
& \text { Now fill in the measures in table }
\end{array} \begin{array}{ll|c|}
\hline \text { Angle } & \mathrm{x} & 15 \\
\hline & \text { Comp } & 90-15 \\
\hline & \text { Supp } & 180-15 \\
\hline
\end{array}
$$

Examine If the measure of the angle is 15, then:

| The supplement | is | 60 less than three times the complement |
| :---: | :--- | :--- |
| $(165)$ | $=$ | $[3(75)-60] \leftarrow$ go straight to this, or |
| $180-15$ | $=$ | $3(90-15)-60 \leftarrow$ substitute 15 for x into original equation |
| 165 | $=$ | $3(75)-60$ |
| 165 | $=$ | $225-60$ |
| 165 | $=$ | 165 (check!) |

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Example 3: Perpendicular Lines

ALGEBRA - Find $x$ and $y$ so that $D G$ and $B E$ are perpendicular.

If $\overrightarrow{D G} \perp \overrightarrow{B E}$, then $m \angle D F B=90$ and $m \angle G F E=90$.
To find $x$, use $\angle B F C$ and $\angle D F C$.

$$
\begin{array}{rlrl}
m \angle B F C+m \angle D F C & =90 & & \text { Sum of parts }=\text { whole } \\
2 x+4 x & =90 & & \text { Substitution } \\
6 x & =90 & \text { Add. } \\
x=15 & & \text { Divide each side by } 6 .
\end{array}
$$



To find $y$, use $\angle G F E$.

$$
\begin{array}{rlrl}
m \angle G F E & =90 & & \text { Given } \\
5 y+20 & =90 & & \text { Substitution } \\
5 y & =70 & \text { Subtract } 20 \text { from each side. } \\
y & =14 & & \text { Divide each side by } 5 .
\end{array}
$$

## Example 4: Interpret Figures

Determine whether each statement can be assumed from the figure.
a. $\angle B F C$ and $\angle A F G$ are complementary. No; they are congruent, but we do not know anything about their exact measurements.
b. $\angle D F A$ and $\angle A F G$ are a linear pair.

Yes; they are adjacent angles whose noncommon sides are opposite rays.
c. $\angle D F C$ and $\angle B F C$ are complementary.

Yes; there is a right angle symbol showing the adjacent angles form a right angle.


