

Practice with Examples

For use with pages 109–116

GOAL

Use angle congruence properties and prove properties about special pairs of angles

VOCABULARY**Theorem 2.2** Properties of Angle Congruence

Angle congruence is reflexive, symmetric, and transitive.

Theorem 2.3 Right Angle Congruence Theorem

All right angles are congruent.

Theorem 2.4 Congruent Supplements Theorem

If two angles are supplementary to the same angle (or to congruent angles) then they are congruent.

Theorem 2.5 Congruent Complements Theorem

If two angles are complementary to the same angle (or to congruent angles) then the two angles are congruent.

Postulate 12 Linear Pair Postulate

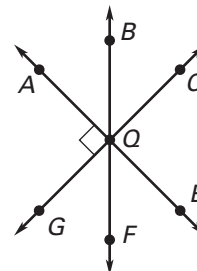
If two angles form a linear pair, then they are supplementary.

Theorem 2.6 Vertical Angles Theorem

Vertical angles are congruent.

EXAMPLE 1**Finding Angles**Complete the statement given that $m\angle AQG = 90^\circ$.

- $m\angle CQE = ?$
- If $m\angle BQG = 113^\circ$, then $m\angle EQF = ?$
- $m\angle AQG + m\angle EQF + m\angle BQC = ?$

**SOLUTION**

- $\angle CQE$ and $\angle AQC$ are vertical angles. By Theorem 2.6, they are congruent. By the definition of congruence, $m\angle CQE = m\angle AQC$, so $m\angle CQE = 90^\circ$.
- By the Angle Sum Theorem, $m\angle BQG = m\angle AQG + m\angle AQB$. Substituting, you get $113^\circ = 90^\circ + m\angle AQB$, so $m\angle AQB = 23^\circ$ by subtracting. Finally, $\angle EQF \cong \angle AQB$ because they are vertical angles. So, $m\angle EQF = 23^\circ$.
- $m\angle AQG + m\angle AQB + m\angle BQC = 180^\circ$. $\angle EQF \cong \angle AQB$ because they are vertical angles. So, $m\angle AQG + m\angle EQF + m\angle BQC = 180^\circ$.

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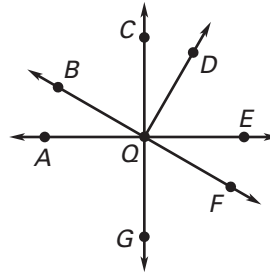
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Exercises for Example 1

Complete the statement given that $m\angle BQD = m\angle CQE = 90^\circ$.

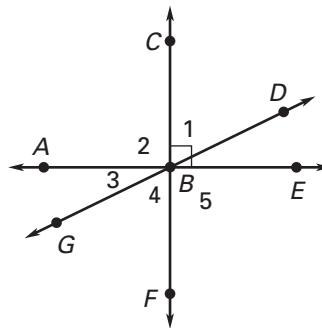
Explain your reasoning.

- $m\angle AQG = ?$
- $m\angle CQA = ?$
- If $m\angle CQD = 31^\circ$, then $m\angle EQF = ?$
- If $m\angle BQG = 125^\circ$, then $m\angle CQF = ?$
- $m\angle AQB + m\angle GQF + m\angle EQG = ?$
- If $m\angle EQF = 38^\circ$, then $m\angle BQC = ?$



EXAMPLE 2 Finding Angles

Find the measure of each numbered angle, given that $m\angle DBE = 26^\circ$.



SOLUTION

$\angle CBD$ and $\angle DBE$ are complementary. So, $m\angle 1 = 90^\circ - 26^\circ = 64^\circ$.

$\angle ABC$ and $\angle CBE$ are supplementary. So, $m\angle 2 = 180^\circ - 90^\circ = 90^\circ$.

$\angle ABG$ and $\angle DBE$ are vertical angles. So, $m\angle 3 = 26^\circ$.

$\angle GBF$ and $\angle CBD$ are vertical angles. So, $m\angle 4 = 64^\circ$.

$\angle EBF$ and $\angle CBE$ are supplementary. So, $m\angle 5 = 180^\circ - 90^\circ = 90^\circ$.

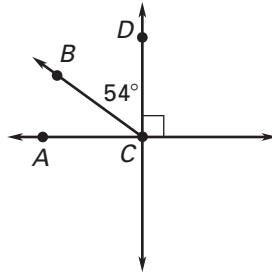
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Exercises for Example 2

Find the measure of each indicated angle.

7. $\angle ACD$ and $\angle ACB$



8. $\angle QRT$ and $\angle QRU$

