

2.6 Start Thinking

As you learned in Section 1.5, there are four types of angles: acute, obtuse, right, and straight.

Make a flowchart that can be used to classify any angle between 0° and 180° . Give one other example of a math concept where a flowchart may prove useful.

2.6 Warm Up

Solve.

1. $9x + 6 = 10x - 3$

2. $6y = 5y + 35$

3. $9x + 5 = 5(x - 3)$

4. $17y + 18 = 15y$

5. $14x - 44 = 20x - 2$

6. $7x - 1 = 13x + 41$

2.6 Cumulative Review Warm Up

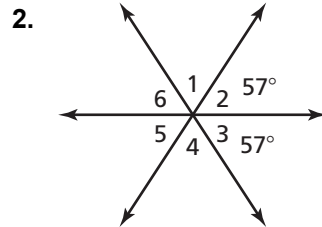
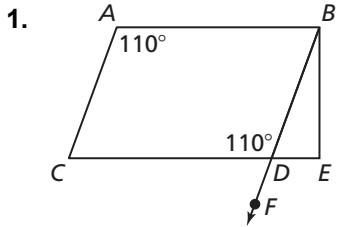
Sketch the figure described.

1. Plane N and line ℓ intersecting at one point
2. \overline{CD} and \overline{CE}
3. Plane P and \overline{QF} intersecting at point F
4. Plane C and plane D not intersecting
5. Plane L and segment \overline{MN} intersecting at all points on segment \overline{MN}
6. \overline{MN} and \overline{PQ}

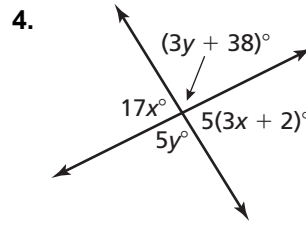
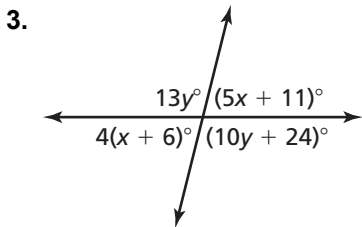
2.6

Practice A

In Exercises 1 and 2, identify the pairs of congruent angles in the figures. Explain how you know they are congruent.



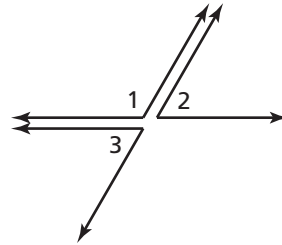
In Exercises 3 and 4, find the values of x and y .



5. Copy and complete the two-column proof. Then write a paragraph proof.

Given: $\angle 1$ and $\angle 2$ are supplementary.
 $\angle 1$ and $\angle 3$ are supplementary.

Prove: $\angle 2 \cong \angle 3$

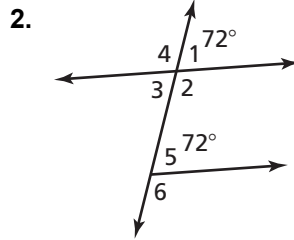
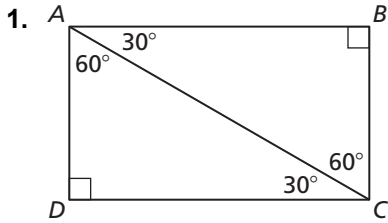


| STATEMENTS | REASONS |
|---|-----------------------------------|
| 1. $\angle 1$ and $\angle 2$ are supplementary. $\angle 1$ and $\angle 3$ are supplementary. | 1. Given |
| 2. $m\angle 1 + m\angle 2 = 180^\circ$ $m\angle 1 + m\angle 3 = 180^\circ$ | 2. _____ |
| 3. _____ | 3. Transitive Property |
| 4. $m\angle 2 = m\angle 3$ | 4. _____ |
| 5. _____ | 5. Definition of congruent angles |

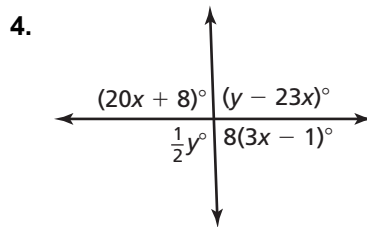
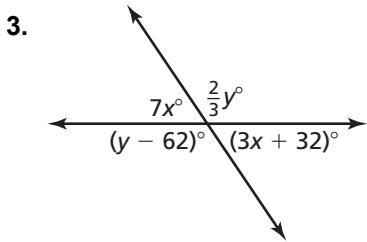
2.6

Practice B

In Exercises 1 and 2, identify the pairs of congruent angles in the figures. Explain how you know they are congruent.



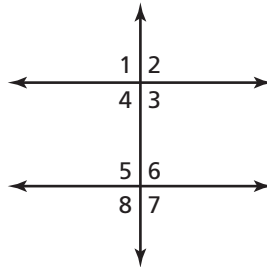
In Exercises 3 and 4, find the values of x and y .



5. Copy and complete the flowchart proof. Then write a paragraph proof.

- Given:** $\angle 1$ is a right angle.
 $\angle 5$ is a right angle.
 $\angle 5$ and $\angle 8$ are supplementary.

Prove: $\angle 3 \cong \angle 8$



| | | | | | | | | |
|--|---|---|---|---|---|--|---|---|
| <div style="border: 1px solid black; border-radius: 10px; width: 100px; height: 30px; margin: 0 auto;"></div> <p style="text-align: center;">Given</p> | → | <div style="border: 1px solid black; border-radius: 10px; width: 100px; height: 30px; margin: 0 auto;"></div> <p style="text-align: center;">Vertical Angles Congruence Theorem (Theorem 2.6)</p> | → | <div style="border: 1px solid black; border-radius: 10px; width: 100px; height: 30px; margin: 0 auto;"></div> <p style="text-align: center;">Right Angle Congruence Theorem (Theorem 2.3)</p> | ↘ | | <div style="border: 1px solid black; border-radius: 10px; width: 100px; height: 30px; margin: 0 auto;"></div> | |
| <div style="border: 1px solid black; border-radius: 10px; width: 100px; height: 30px; margin: 0 auto;"></div> <p style="text-align: center;">Given</p> | → | <div style="border: 1px solid black; border-radius: 10px; width: 100px; height: 30px; margin: 0 auto;"></div> <p style="text-align: center;">Definition of a right angle</p> | ↘ | <div style="border: 1px solid black; border-radius: 10px; width: 100px; height: 30px; margin: 0 auto;"></div> <p style="text-align: center;">Subtraction Property of Equality</p> | → | <div style="border: 1px solid black; border-radius: 10px; width: 100px; height: 30px; margin: 0 auto;"></div> <p style="text-align: center;">Definition of a right angle</p> | ↗ | <div style="border: 1px solid black; border-radius: 10px; width: 100px; height: 30px; margin: 0 auto;"></div> <p style="text-align: center;">Right Angle Congruence Theorem (Theorem 2.3)</p> |
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2.6

Enrichment and Extension

Proving Geometric Relationships

In Exercises 1–6, use the information below.

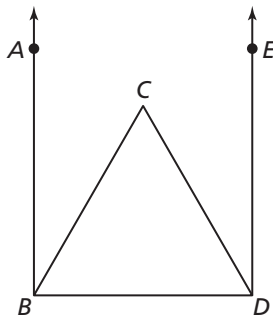
Two lines that are not perpendicular intersect such that $\angle 1$ and $\angle 2$ are a linear pair, $\angle 1$ and $\angle 4$ are a linear pair, and $\angle 1$ and $\angle 3$ are vertical angles. Tell whether the statement is true or false.

- | | | |
|------------------------------|------------------------------|--|
| 1. $\angle 1 \cong \angle 2$ | 2. $\angle 1 \cong \angle 3$ | 3. $\angle 1 \cong \angle 4$ |
| 4. $\angle 3 \cong \angle 2$ | 5. $\angle 2 \cong \angle 4$ | 6. $m\angle 3 + m\angle 4 = 180^\circ$ |

In Exercises 7–9, refer to the diagram to write a two-column proof.

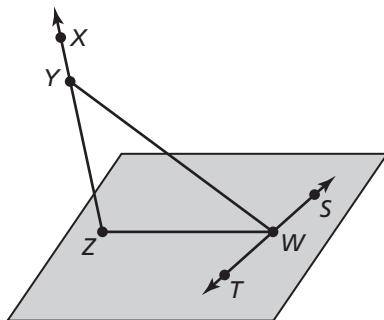
7. **Given:** $\overline{AB} \perp \overline{BD}$, $\overline{ED} \perp \overline{BD}$, $\angle ABC \cong \angle EDC$

Prove: $\angle CBD \cong \angle CDB$



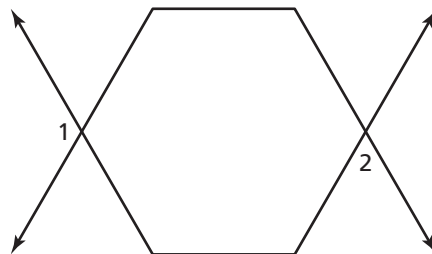
8. **Given:** $m\angle WYZ = m\angle TWZ = 45^\circ$

Prove: $\angle SWZ \cong \angle XYW$



9. **Given:** The hexagon is regular.

Prove: $m\angle 1 + m\angle 2 = 180^\circ$





Puzzle Time

How Can You Make Sure To Start A Fire With Two Sticks?

| | | | | | |
|---|---|---|---|---|---|
| A | B | C | D | E | F |
| G | H | | | | |

Complete each exercise. Find the answer in the answer column. Write the word under the answer in the box containing the exercise letter.

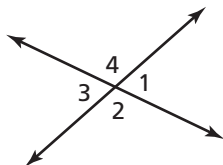
| |
|-------------------|
| 77° WOOD |
| 20 AND |
| congruent MAKE |
| 113° THEM |
| 23° HOT |
| 80 TREE |
| 40 A |
| vertical OF |

Complete these sentences.

- A. All right angles are _____ .
- B. _____ angles form a straight line.
- C. If two angles form a _____ , then they are supplementary.
- D. When two lines intersect, the _____ angles are congruent.

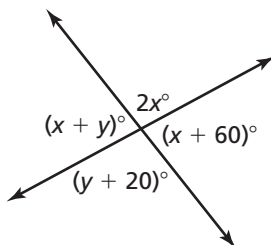
Determine the measure of $\angle 2$ and $\angle 3$ given that $m\angle 1 = 67^\circ$.

- E. $m\angle 2 =$
- F. $m\angle 3 =$



Find the values of x and y .

- G. $x =$
- H. $y =$



| |
|-----------------------|
| 67° IS |
| congruence RUB |
| 60 MATCH |
| transitive THE |
| supplementary SURE |
| inverse USE |
| linear pair ONE |
| horizontal ARE |