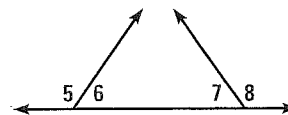


EXAMPLE 5 Using Linear Pairs

In the diagram, $m\angle 8 = m\angle 5$ and $m\angle 5 = 125^\circ$. Explain how to show $m\angle 7 = 55^\circ$.



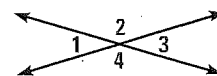
SOLUTION

Using the transitive property of equality, $m\angle 8 = 125^\circ$. The diagram shows $m\angle 7 + m\angle 8 = 180^\circ$. Substitute 125° for $m\angle 8$ to show $m\angle 7 = 55^\circ$.

THEOREM

THEOREM 2.6 Vertical Angles Theorem

Vertical angles are congruent.



$\angle 1 \cong \angle 3, \angle 2 \cong \angle 4$

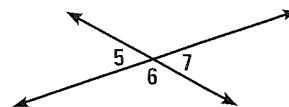
STUDENT HELP

Study Tip
Remember that previously proven theorems can be used as reasons in a proof, as in **Step 3** of the proof at the right.

EXAMPLE 6 Proving Theorem 2.6

GIVEN $\angle 5$ and $\angle 6$ are a linear pair,
 $\angle 6$ and $\angle 7$ are a linear pair

PROVE $\angle 5 \cong \angle 7$



Statements	Reasons
1. $\angle 5$ and $\angle 6$ are a linear pair, $\angle 6$ and $\angle 7$ are a linear pair	1. Given
2. $\angle 5$ and $\angle 6$ are supplementary, $\angle 6$ and $\angle 7$ are supplementary	2. Linear Pair Postulate
3. $\angle 5 \cong \angle 7$	3. Congruent Supplements Theorem

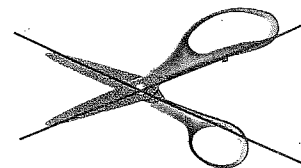
GUIDED PRACTICE

Vocabulary Check ✓

1. "If $\angle CDE \cong \underline{\quad? \quad}$ and $\angle QRS \cong \angle XYZ$, then $\angle CDE \cong \angle XYZ$," is an example of the $\underline{\quad? \quad}$ Property of Angle Congruence.

Concept Check ✓

2. To close the blades of the scissors, you close the handles. Will the angle formed by the blades be the same as the angle formed by the handles? Explain.



Skill Check ✓

3. By the Transitive Property of Congruence, if $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then $\underline{\quad? \quad} \cong \angle C$.

In Exercises 4–9, $\angle 1$ and $\angle 3$ are a linear pair, $\angle 1$ and $\angle 4$ are a linear pair, and $\angle 1$ and $\angle 2$ are vertical angles. Is the statement true?

4. $\angle 1 \cong \angle 3$

5. $\angle 1 \cong \angle 2$

6. $\angle 1 \cong \angle 4$

7. $\angle 3 \cong \angle 2$

8. $\angle 3 \cong \angle 4$

9. $m\angle 2 + m\angle 3 = 180^\circ$

PRACTICE AND APPLICATIONS

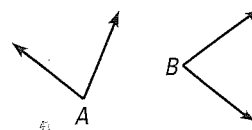
STUDENT HELP

→ **Extra Practice**
to help you master
skills is on p. 806.

10. **PROVING THEOREM 2.2** Copy and complete the proof of the Symmetric Property of Congruence for angles.

GIVEN $\angle A \cong \angle B$

PROVE $\angle B \cong \angle A$

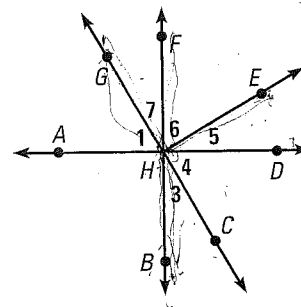


Statements	Reasons
1. $\angle A \cong \angle B$	1. <u>?</u>
2. <u>?</u>	2. Definition of congruent angles
3. $m\angle B = m\angle A$	3. <u>?</u>
4. $\angle B \cong \angle A$	4. <u>?</u>

11. **PROVING THEOREM 2.2** Write a two-column proof for the Reflexive Property of Congruence for angles.

FINDING ANGLES In Exercises 12–17, complete the statement given that $m\angle EHC = m\angle DHB = m\angle AHB = 90^\circ$

12. If $m\angle 7 = 28^\circ$, then $m\angle 3 = \underline{\quad?}$.
13. If $m\angle EHB = 121^\circ$, then $m\angle 7 = \underline{\quad?}$.
14. If $m\angle 3 = 34^\circ$, then $m\angle 5 = \underline{\quad?}$.
15. If $m\angle GHB = 158^\circ$, then $m\angle FHC = \underline{\quad?}$.
16. If $m\angle 7 = 31^\circ$, then $m\angle 6 = \underline{\quad?}$.
17. If $m\angle GHD = 119^\circ$, then $m\angle 4 = \underline{\quad?}$.



18. **PROVING THEOREM 2.5** Copy and complete the proof of the Congruent Complements Theorem.

GIVEN $\angle 1$ and $\angle 2$ are complements,
 $\angle 3$ and $\angle 4$ are complements,
 $\angle 2 \cong \angle 4$

PROVE $\angle 1 \cong \angle 3$



Statements	Reasons
1. $\angle 1$ and $\angle 2$ are complements, $\angle 3$ and $\angle 4$ are complements, $\angle 2 \cong \angle 4$	1. <u>?</u>
2. <u>?</u> , <u>?</u>	2. Def. of complementary angles
3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	3. Transitive property of equality
4. $m\angle 2 = m\angle 4$	4. <u>?</u>
5. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	5. <u>?</u>
6. $m\angle 1 = m\angle 3$	6. <u>?</u>
7. <u>?</u>	7. Definition of congruent angles

STUDENT HELP


HOMESCHOOL HELP

- Example 1:** Exs. 10, 11
Example 2: Exs. 12–17
Example 3: Exs. 12–17
Example 4: Exs. 19–22
Example 5: Exs. 23–28
Example 6: Exs. 23–28

FINDING CONGRUENT ANGLES Make a sketch using the given information. Then, state all of the pairs of congruent angles.

19. $\angle 1$ and $\angle 2$ are a linear pair. $\angle 2$ and $\angle 3$ are a linear pair. $\angle 3$ and $\angle 4$ are a linear pair.
20. $\angle XYZ$ and $\angle VYW$ are vertical angles. $\angle XYZ$ and $\angle ZYW$ are supplementary. $\angle VYW$ and $\angle XYV$ are supplementary.
21. $\angle 1$ and $\angle 3$ are complementary. $\angle 4$ and $\angle 2$ are complementary. $\angle 1$ and $\angle 2$ are vertical angles.
22. $\angle ABC$ and $\angle CBD$ are adjacent, complementary angles. $\angle CBD$ and $\angle DBF$ are adjacent, complementary angles.

STUDENT HELP

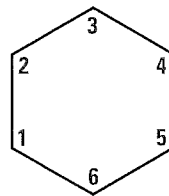
INTERNET
 **HOMWORK HELP**
 Visit our Web site
www.mcdougallittell.com
 for help with Exs. 23–26.

WRITING PROOFS Write a two-column proof.

23. **GIVEN** $\triangleright m\angle 3 = 120^\circ, \angle 1 \cong \angle 4,$
 $\angle 3 \cong \angle 4$

PROVE $\triangleright m\angle 1 = 120^\circ$

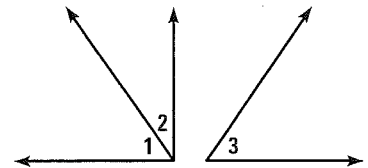
Plan for Proof First show that $\angle 1 \cong \angle 3$. Then use transitivity to show that $m\angle 1 = 120^\circ$.



24. **GIVEN** $\triangleright \angle 3$ and $\angle 2$ are complementary,
 $m\angle 1 + m\angle 2 = 90^\circ$

PROVE $\triangleright \angle 3 \cong \angle 1$

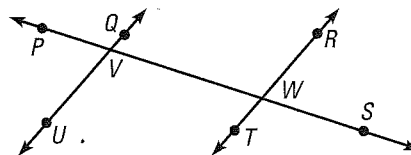
Plan for Proof First show that $\angle 1$ and $\angle 2$ are complementary. Then show that $\angle 3 \cong \angle 1$.



25. **GIVEN** $\triangleright \angle QVW$ and $\angle RWV$ are supplementary

PROVE $\triangleright \angle QVP \cong \angle RWV$

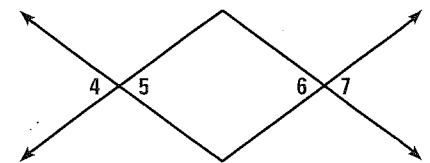
Plan for Proof First show that $\angle QVP$ and $\angle QVW$ are supplementary. Then show that $\angle QVP \cong \angle RWV$.



26. **GIVEN** $\triangleright \angle 5 \cong \angle 6$

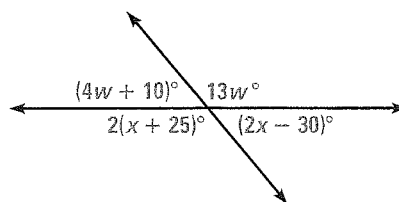
PROVE $\triangleright \angle 4 \cong \angle 7$

Plan for Proof First show that $\angle 4 \cong \angle 5$ and $\angle 6 \cong \angle 7$. Then use transitivity to show that $\angle 4 \cong \angle 7$.



USING ALGEBRA In Exercises 27 and 28, solve for each variable. Explain your reasoning.

27.



28.

