Name _____ Date _____

LESSON 2.6

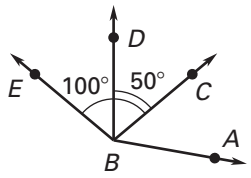
Practice C

For use with the lesson "Prove Statements about Segments and Angles"

In Exercises 1 and 2, complete the proof.

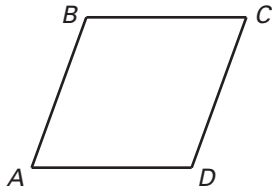
1. **GIVEN:** $\angle ABC \cong \angle CBD$, $m\angle CBD = 50°$, $m\angle CBE = 100°$

PROVE: $\angle ABC \cong \angle DBE$



Statements	Reasons
1. $\angle ABC \cong \angle CBD$, $m\angle CBD = 50°$, $m\angle CBE = 100°$	**1.** ?
2. ? $= m\angle CBE$	**2.** Angle Addition Postulate
3. $50° + m\angle DBE = 100°$	**3.** ?
4. $m\angle DBE = 50°$	**4.** ?
5. $m\angle CBD =$?	**5.** Substitution Property of Equality
6. ?	**6.** Definition of congruent angles
7. $\angle ABC \cong \angle DBE$	**7.** ?

2. The lengths of the sides of quadrilateral $ABCD$ are equal. Prove that the perimeter of $ABCD$ is equal to $4AB$.



GIVEN: $\overline{AB} \cong \overline{BC}$, $\overline{BC} \cong \overline{CD}$, $\overline{CD} \cong \overline{AD}$

PROVE: Perimeter of $ABCD = 4AB$

Statements	Reasons
1. $\overline{AB} \cong \overline{BC}$, $\overline{BC} \cong \overline{CD}$, $\overline{CD} \cong \overline{AD}$	**1.** ?
2. $AB = BC$, $BC = CD$, $CD = AD$	**2.** ?
3. $AB = CD$, $AB = AD$, $BC = AD$	**3.** ?
4. Perimeter of $ABCD = AB + BC + CD + AD$	**4.** ?
5. ?	**5.** Substitution Property of Equality
6. ?	**6.** Simplify.

Use the property to complete the statement.

3. Transitive Property of Congruence: If $\angle 1 \cong \angle 5$ and ? , then $\angle 1 \cong \angle 7$.

4. Symmetric Property of Congruence: If $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$, then ?.

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LESSON 2.6

Practice C *continued*

For use with the lesson "Prove Statements about Segments and Angles"

Name the property illustrated by the statement.

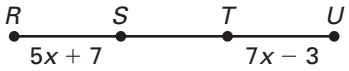
5. $\angle ABC \cong \angle CBA$

6. If $\angle RST \cong \angle 5$, then $\angle 5 \cong \angle RST$.

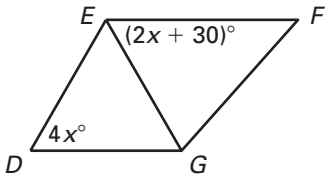
7. If $\overline{QS} \cong \overline{XR}$ and $\overline{RX} \cong \overline{SX}$, then $\overline{QS} \cong \overline{SX}$.

Solve for *x* using the given information. *Explain* your steps.

8. **GIVEN:** S is the midpoint of $\overline{RT}$.
T is the midpoint of $\overline{SU}$.



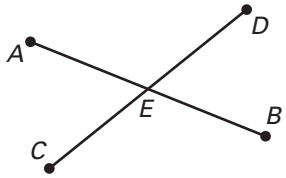
9. **GIVEN:** $\angle D \cong \angle DEG$, $\overrightarrow{EG}$ bisects $\angle DEF$.



10. Write a two-column proof.

GIVEN: $\overline{AE} \cong \overline{CE}$
$\overline{AB}$ and $\overline{CD}$ bisect each other.

PROVE: $\overline{EB} \cong \overline{ED}$



Statements	Reasons

11. **Marching Band** A marching band forms a *company front,* with all of the musicians in a straight line facing the audience. In this formation, Leon is halfway between Marge and Clay, Jade is halfway between Marge and Leon, and Ariel is halfway between Leon and Clay. Use the following steps to prove that the distance between Marge and Jade is the same as the distance between Ariel and Clay.

a. Draw a diagram that represents the five musicians mentioned.

b. Draw separate diagrams to show mathematical relationships.

c. State what is given and what is to be proved.

d. Write a two-column proof.

Lesson 2.6 Prove Statements about Segments and Angles, continued

congruent to $\angle Z$. Both angles have a measure of 75°. **8.** If $\angle X \cong \angle Y$ and $\angle Y \cong \angle Z$, then $\angle X \cong \angle Z$.

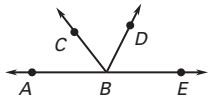
Practice Level A

1. Transitive Property of Equality; $\angle A \cong \angle C$

2. Given; $DE = DF$; Symmetric Property of Equality; $\overline{DF} \cong \overline{DE}$ **3.** $\angle 1$ and $\angle 2$ are a linear pair; $\angle 1$ and $\angle 2$ are supplementary; Definition of Supplementary Angles; $m\angle 1 = 180° - m\angle 2$

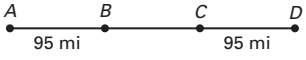
4. $\angle 4$ **5.** $\overline{DX}$; $\overline{CD}$ **6.** Transitive Property of Congruence **7.** Reflexive Property of Congruence **8.** Symmetric Property of Congruence **9.** Symmetric Property of Congruence

10. *Sample sketch:*



11. 1. $2m\angle ABC = m\angle ABD$ (Given)
2. $m\angle ABC + m\angle CBD = m\angle ABD$ (Angle Addition Postulate)
3. $2m\angle ABC = m\angle ABC + m\angle CBD$ (Transitive Property of Equality)
4. $m\angle ABC = m\angle CBD$ (Subtraction Property of Equality)
5. $\angle ABC \cong \angle CBD$ (Definition of congruent angles)

12. *Sample answer:* **a.**



b. Given: $AB = 95$, $CD = 95$ Prove: $AC = BD$

c. 1. $AB = 95$, $CD = 95$ (Given)
2. $AB + BC = AC$, $CD + BC = BD$ (Segment Addition Postulate) **3.** $95 + BC = AC$, $95 + BC = BD$ (Substitution Property of Equality) **4.** $AC = 95 + BC$ (Symmetric Property of Equality) **5.** $AC = BD$ (Transitive Property of Equality)

Practice Level B

1. 1. Given **2.** Given **3.** Substitution Property of Equality **4.** $\overline{HI} \cong \overline{IJ}$ **5.** Given **6.** Transitive Property of Congruence

2. 1. Given **2.** Given **3.** Definition of complementary angles **4.** Transitive Property of Equality **5.** Subtraction Property of Equality **6.** Definition of congruent angles

3. 1. Given **2.** Reflexive Property of Equality **3.** Addition Property of Equality **4.** Segment Addition Postulate **5.** Segment Addition Postulate **6.** Substitution Property of Equality

4. 1. Given **2.** Transitive Property of Angle Congruence **3.** $m\angle 2 = m\angle 4$ **4.** Substitution Property of Equality **5.** $x = 6$; Because the angles are congruent, the measures of the angles are congruent by the definition of congruent angles. Set the measure of the angles equal to each other to find x. **6.** $x = 3$; By the transitive property, $\overline{FG} \cong \overline{JH}$. Set the lengths of the segments equal to each other to find x.

7. $x = 5$; By the transitive property, $\angle ABD \cong \angle EBC$. Because the angles are congruent, the measures of the angles are congruent by the definition of congruent angles. Set the measures of the angles equal to each other to find x. **8.** $x = 4$; Because the segments are congruent, the lengths of the segments are congruent by the definition of congruent segments. Set the lengths of the segments equal to each other to find x.

9. $\overline{UV} \cong \overline{ZY}$, $\overline{UW} \cong \overline{ZX}$ (Given)
$UV = ZY$, $UW = ZX$ (Def. of $\cong$)
$VW = UW - UV$ (Segment Addition Postulate)
$YX = ZX - ZY$ (Segment Addition Postulate)
$YX = UW - UV$ (Substitution Property of Equality)
$VW = YX$ (Transitive Property of Equality)
$\overline{VW} \cong \overline{YX}$ (Def. of $\cong$)

Practice Level C

1. Given; $m\angle CBD + m\angle DBE$; Substitution Property of Equality; Subtraction Property of Equality; $m\angle DBE$; $\angle CBD \cong \angle DBE$; Transitive Property of Equality **2**. Given; definition of congruent segments; Transitive Property of Equality; definition of perimeter; $P(ABCD) = AB + AB + AB + AB$; $P(ABCD) = 4AB$

3. $\angle 5 \cong \angle 7$ **4.** $\angle 2 \cong \angle 1$ and $\angle 4 \cong \angle 3$

5. Reflexive Property of Congruence

6. Symmetric Property of Congruence

7. Transitive Property of Congruence

8. $\overline{RS} \cong \overline{ST}$ and $\overline{ST} \cong \overline{TU}$ by the definition of midpoint. Then $\overline{RS} \cong \overline{TU}$ by the Transitive Property of Congruence, so $\overline{RS} = \overline{RT}$. Then $5x + 7 = 7x - 3$ by the Substitution Property of

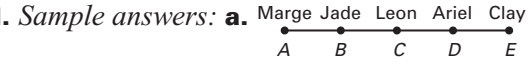
Lesson 2.6 Prove Statements about Segments and Angles, continued

Equality, $10 = 2x$ by the Subtraction Property of Equality, and $5 = x$ by the Division Property of Equality.

9. Because $\overrightarrow{EG}$ bisects $\angle DEF$, $\angle DEG \cong \angle FEG$. It is given that $\angle D \cong \angle DEG$, so $\angle D \cong \angle FEG$ by the Transitive Property of Congruence. Then $m\angle D = m\angle FEG$, $4x = 2x + 30$ by the Substitution Property of Equality, $2x = 30$ by the Subtraction Property of Equality and $x = 15$ by the Division Property of Equality.

10.
1. $\overline{AE} \cong \overline{CE}$, $\overline{AB}$ and $\overline{CD}$ bisect each other (Given)
2. E is the midpoint of $\overline{AB}$ and of $\overline{CD}$. (Definition of segment bisector)
3. $\overline{EB} \cong \overline{AE}$, $\overline{CE} \cong \overline{ED}$ (Definition of midpoint)
4. $\overline{AE} \cong \overline{ED}$ (Transitive Property of Equality)
5. $\overline{EB} \cong \overline{ED}$ (Transitive Property of Equality)

11. *Sample answers:* **a.**



b.

c. Given: C is the midpoint of $\overline{AE}$, B is the midpoint of $\overline{AC}$, D is the midpoint of $\overline{CE}$
Prove: $AB = DE$ **d. 1.** C is the midpoint of $\overline{AE}$, B is the midpoint of $\overline{AC}$, D is the midpoint of $\overline{CE}$ (Given) **2.** $\overline{AC} \cong \overline{CE}$, $\overline{AB} \cong \overline{BC}$, $\overline{CD} \cong \overline{DE}$ (Definition of midpoint) **3.** $AC = CE$, $AB = BC$, $CD = DE$ (Definition of congruent segments)
4. $AC = AB + BC$, $CE = CD + DE$ (Segment Addition Postulate)
5. $AC = AB + AB$, $CE = DE + DE$ (Substitution Property of Equality)
6. $AB + AB = DE + DE$ (Substitution Property of Equality) **7.** $2AB = 2DE$ (Simplify.)
8. $AB = DE$ (Division Property of Equality)

Study Guide

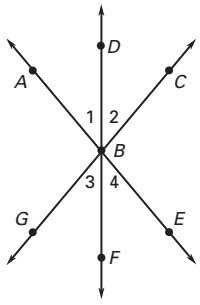
1. $AD = 12$, $AB = 12$ (Given); $\overline{AD} \cong \overline{AB}$ (Definition of congruent segments); $\overline{BC} \cong \overline{CD}$, $\overline{AD} \cong \overline{CD}$ (Given); $\overline{CD} \cong \overline{BA}$(Transitive Property of Segment Congruence) $\overline{BC} \cong \overline{BA}$ (Transitive Property of Segment Congruence)
2. Reflexive Property of Angle Congruence
3. Symmetric Property of Segment Congruence
4. Reflexive Property of Segment Congruence
5. Transitive Property of Angle Congruence
6. $\overline{AB} \cong \overline{BC}$, $\overline{BC} \cong \overline{CD}$, (Given); $AB = BC$ (Definition of congruent segments); $BC = CD$ (Definition of congruent segments); $AB = CD$ (Transitive Property of Equality); $\overline{AB} \cong \overline{CD}$ (Definition of congruent segments)

Real-Life Application

1. 16 rods **2.** Transitive Property of Segment Congruence **3.** 6 cuts **4.** 150 in.
5. 14 rods; including the 5 that were already cut
6. 14 in. **7.** 3 **8.** Yes; two pieces; one is 1 inch in length and the other is 2 inches in length.

Challenge Practice

1. $YZ = 11$, $VZ = 27.5$ **2.** $VW = 1$, $VZ = 5$
3. The coordinate of X is 4, the coordinate of Y is 6, and the coordinate of Z is 10.
4. The coordinate of V is 12, the coordinate of X is 0, and the coordinate of Y is -6.
5. The coordinate of M is $\frac{a+b}{2}$, the coordinate of P is $\frac{3a+b}{4}$, and the coordinate of Q is $\frac{5a+3b}{8}$.
6. $x = 10$, $y = 2$ **7.** $x = 18$, $y = 8$
8.



Statements	Reasons
1. $\overrightarrow{BD}$ bisects $\angle ABC$.	**1.** Given
2. $\angle 1 \cong \angle 2$	**2.** Definition of angle bisector
3. $m\angle 1 = m\angle 2$	**3.** Definition of congruent angles
4. $m\angle 2 = m\angle 3$	**4.** Measures of vertical angles are equal.
5. $m\angle 1 = m\angle 3$	**5.** Transitive Property of Equality
6. $m\angle 1 = m\angle 4$	**6.** Measures of vertical angles are equal.
7. $m\angle 3 = m\angle 4$	**7.** Substitution Property of Equality
8. $\overrightarrow{BF}$ bisects $\angle EBG$.	**8.** Definition of angle bisector