

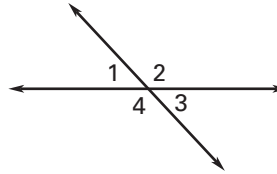
**LESSON**  
**2.7**

**Practice B**

For use with pages 123–133

Use the diagram to decide whether the statement is *true* or *false*.

1. If  $m\angle 1 = 47^\circ$ , then  $m\angle 2 = 43^\circ$ .
2. If  $m\angle 1 = 47^\circ$ , then  $m\angle 3 = 47^\circ$ .
3.  $m\angle 1 + m\angle 3 = m\angle 2 + m\angle 4$ .
4.  $m\angle 1 + m\angle 4 = m\angle 2 + m\angle 3$ .

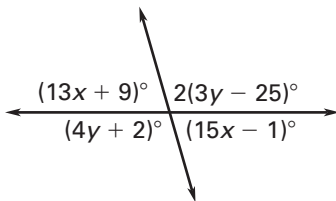


Make a sketch of the given information. Label all angles which can be determined.

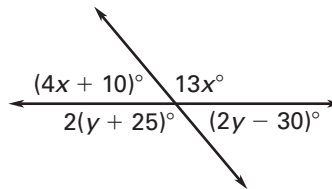
5. Adjacent complementary angles where one angle measures  $42^\circ$
6. Nonadjacent supplementary angles where one angle measures  $42^\circ$
7. Congruent linear pairs
8. Vertical angles which measure  $42^\circ$
9.  $\angle ABC$  and  $\angle CBD$  are adjacent complementary angles.  $\angle CBD$  and  $\angle DBF$  are adjacent complementary angles.
10.  $\angle 1$  and  $\angle 2$  are complementary.  $\angle 3$  and  $\angle 4$  are complementary.  $\angle 1$  and  $\angle 3$  are vertical angles.

Find the value of the variables. Explain why your answer is reasonable.

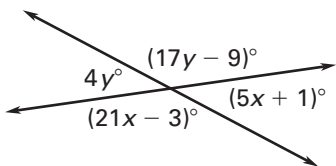
11.



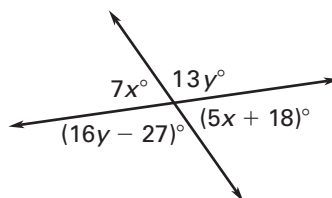
12.



13.



14.

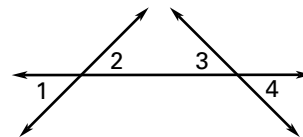


**LESSON 2.7** **Practice B** *continued*  
For use with pages 123–133

**Give a reason for each step of the proof.**

**15. GIVEN:**  $\angle 2 \cong \angle 3$

**PROVE:**  $\angle 1 \cong \angle 4$

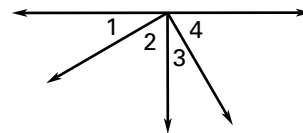


Statements	Reasons
1. $\angle 2 \cong \angle 3$	1. ?
2. $\angle 3 \cong \angle 4$	2. ?
3. $\angle 2 \cong \angle 4$	3. ?
4. $\angle 1 \cong \angle 2$	4. ?
5. $\angle 1 \cong \angle 4$	5. ?

**16.** Tell whether the proof is logically valid. If it is not, explain how to change the proof so it is valid.

**GIVEN:**  $\angle 1$  and  $\angle 2$  are complementary.  
 $\angle 1 \cong \angle 3, \angle 2 \cong \angle 4$

**PROVE:**  $\angle 3$  and  $\angle 4$  are complementary.



Statements	Reasons
1. $\angle 1$ and $\angle 2$ are complementary.	1. Given
2. $m\angle 1 + m\angle 2 = 90^\circ$	2. Definition of complementary angles
3. $\angle 1 \cong \angle 3, \angle 2 \cong \angle 4$	3. Given
4. $m\angle 3 + m\angle 4 = 90^\circ$	4. Substitution Property of Equality
5. $\angle 3$ and $\angle 4$ are complementary.	5. Definition of complementary angles

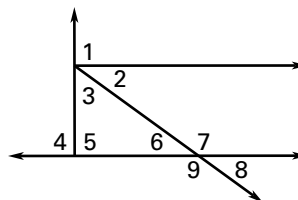
**In the diagram,  $\angle 1$  is a right angle and  $m\angle 6 = 36^\circ$ . Complete the statement with  $<$ ,  $>$ , or  $=$ .**

**17.**  $m\angle 6 + m\angle 7$  ?  $m\angle 4 + m\angle 5$

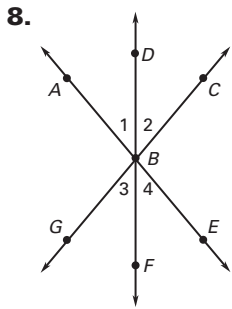
**18.**  $m\angle 6 + m\angle 8$  ?  $m\angle 2 + m\angle 3$

**19.**  $m\angle 9$  ?  $3(m\angle 6)$

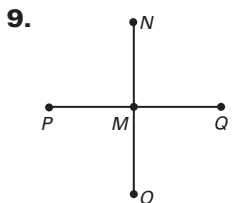
**20.**  $m\angle 2 + m\angle 3$  ?  $m\angle 1$



### Lesson 2.6, continued



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



Statements	Reasons
1. $\overline{NO} \cong \overline{PQ}$ , $M$ is the midpoint of $\overline{NO}$ , $M$ is the midpoint of $\overline{PQ}$ .	1. Given
2. $NO = PQ$	2. Definition of congruent segments
3. $NM = MO$ , $PM = MQ$	3. Definition of midpoint
4. $NO = NM + MO$ , $PQ = PM + MQ$	4. Segment Addition Postulate
5. $NM + MO = PM + MQ$	5. Substitution Property of Equality
6. $NM + NM = PM + PM$	6. Substitution Property of Equality
7. $2NM = 2PM$	7. Simplify.
8. $NM = PM$	8. Division Property of Equality

Statements	Reasons
9. $\overline{NM} \cong \overline{PM}$	9. Definition of congruent segments

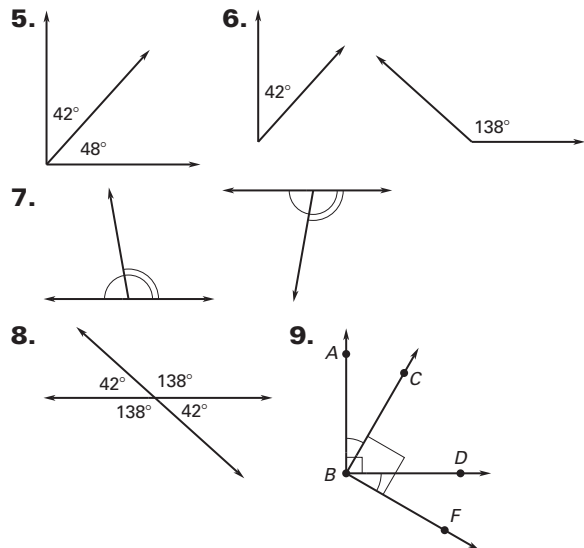
### Lesson 2.7

#### Practice Level A

- $\angle A$ ,  $\angle B$ ,  $\angle C$ , and  $\angle D$  are all congruent by the Right Angles Congruence Theorem.
- $\angle QRS$ ,  $\angle PVQ$ , and  $\angle TVU$  are all congruent by the Right Angles Congruence Theorem.
- $\angle 1 \cong \angle 3$  by the Congruent Supplements Theorem, because both angles are supplementary to  $\angle 2$ .
- $\angle 1 \cong \angle 3$  by the Congruent Complements Theorem, because both angles are complementary to  $\angle 2$ .
- $65^\circ$ ,  $115^\circ$ ,  $65^\circ$
- $116^\circ$ ,  $116^\circ$ ,  $64^\circ$
- $112^\circ$ ,  $68^\circ$ ,  $68^\circ$
- $113^\circ$ ,  $67^\circ$ ,  $113^\circ$
- 44
- 60
- 14
- 10
- 13
- 15
- $38^\circ$
- $98^\circ$
- $136^\circ$
- $44^\circ$
- $142^\circ$
- The gap shows that the right angle of the carpenter's square is not congruent to the corner of the door frame. The Right Angle Congruence Theorem states that all right angles are congruent, so the corner of the door frame is not a right angle.
- Given;  $\angle 2$ ;  $\angle 4$ ; Definition of linear pair;  $\angle 1$  and  $\angle 2$  are supplementary;  $\angle 3$  and  $\angle 4$  are supplementary; Congruent Supplements Theorem

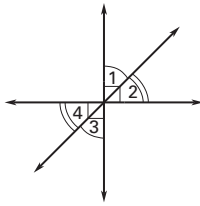
#### Practice Level B

- false
  - true
  - false
  - true
- 5–10. Sample sketches are given.



## Lesson 2.7, continued

10.



11.  $x = 5$ ,  $y = 26$ ; Vertical angles are congruent and  $74^\circ + 106^\circ = 180^\circ$

12.  $x = 10$ ,  $y = 40$ ; Vertical angles are congruent and  $50^\circ + 130^\circ = 180^\circ$

13.  $x = 7$ ,  $y = 9$ ; Vertical angles are congruent and  $36^\circ + 144^\circ = 180^\circ$

14.  $x = 9$ ,  $y = 9$ ; Vertical angles are congruent and  $63^\circ + 117^\circ = 180^\circ$

15. 1. Given 2. Vertical angles are congruent.

3. Transitive Property of Congruence

4. Vertical angles are congruent. 5. Transitive Property of Congruence 16. Not logically valid; the Substitution Property of Equality cannot be applied without first stating that  $m\angle 1 = m\angle 3$  and  $m\angle 2 = m\angle 4$  by the definition of congruent angles. A complete valid proof is shown.

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are complementary.	1. Given
2. $m\angle 1 + m\angle 2 = 90^\circ$	2. Definition of complementary angles
3. $\angle 1 \cong \angle 3$ , $\angle 2 \cong \angle 4$	3. Given
4. $m\angle 1 = m\angle 3$ , $m\angle 2 = m\angle 4$	4. Definition of congruent angles
5. $m\angle 3 + m\angle 2 = 90^\circ$	5. Substitution Property of Equality
6. $m\angle 3 + m\angle 4 = 90^\circ$	6. Substitution Property of Equality
7. $\angle 3$ and $\angle 4$ are complementary.	7. Definition of complementary angles

17. = 18. < 19. > 20. =

### Practice Level C

1. The Linear Pair Post. and Vertical Angles Congruence Thm. can be used to deduce that  $\angle 5$ ,  $\angle 6$ , and  $\angle 7$  are right angles. So,  $\angle 5$ ,  $\angle 6$ ,  $\angle 7$ ,

and  $\angle 8$  are all congruent by the Right Angles Congruence Thm.  $\angle 1 \cong \angle 3$  and  $\angle 4 \cong \angle 2$  by the Congruent Complements Thm.

2. By the Linear Pair Post., the following are supplementary:  $\angle 1$  and  $\angle 2$ ,  $\angle 3$  and  $\angle 4$ ,  $\angle 5$  and  $\angle 6$ ,  $\angle 7$  and  $\angle 9$ ,  $\angle 8$  and  $\angle 10$ . You can deduce that  $\angle 4$  is a right angle, so  $\angle 3 \cong \angle 4$  by the Right Angles Congruence Thm. By the Congruent Supplements Thm.,  $\angle 1$ ,  $\angle 6$ ,  $\angle 9$ , and  $\angle 10$  are congruent and  $\angle 2$ ,  $\angle 5$ ,  $\angle 7$ , and  $\angle 8$  are congruent. 3.  $37^\circ$ ,  $90^\circ$ ,  $53^\circ$ ,  $37^\circ$  4.  $56^\circ$ ,  $90^\circ$ ,  $56^\circ$ ,  $34^\circ$  5.  $51^\circ$ ,  $39^\circ$ ,  $90^\circ$ ,  $51^\circ$  6.  $54^\circ$ ,  $36^\circ$ ,  $36^\circ$

7.  $x = 25$ ,  $y = 14$  8.  $x = 13$ ,  $y = 16$

9.  $x = 50$ ,  $y = 53$ ,  $z = 127$

10.  $x = 4$ ,  $y = 21$ ,  $z = 71$  11.  $118^\circ$  12.  $96^\circ$

13.  $84^\circ$  14.  $62^\circ$  15.  $28^\circ$  16.  $56^\circ$  17. yes

18. no 19. no 20. no 21. yes 22. yes

23. Not logically valid; The Right Angles Congruence Theorem cannot be applied without first stating that  $m\angle STU = 90^\circ$  by simplification and stating that  $\angle STU$  is a right angle by the definition of a right angle.

24. Sample answer:

1.  $\angle 1$  and  $\angle 4$  are comp.  $\angle 4$  and  $\angle 5$  are comp.  $\angle 1$  and  $\angle 2$  are supp.  $\angle 5$  and  $\angle 6$  are supp.

$m\angle 1 = 52^\circ$  (Given)

2.  $\angle 1 \cong \angle 5$  (Congruent Complements Theorem)

3.  $\angle 2 \cong \angle 6$  (Congruent Supplements Theorem)

4.  $m\angle 1 + m\angle 2 = 180^\circ$

(Def. of supplementary angles)

5.  $52^\circ + m\angle 2 = 180^\circ$  (Subst. Prop. of Equality)

6.  $m\angle 2 = 128^\circ$  (Subtraction Prop. of Equality)

7.  $m\angle 2 = m\angle 6$  (Def. of congruent angles)

8.  $m\angle 6 = 128^\circ$  (Subst. Prop. of Equality)

### Review for Mastery

1.  $90^\circ$  2.  $90^\circ$  3.  $31^\circ$  4.  $125^\circ$  5.  $52^\circ$  6.  $64^\circ$

7.  $90^\circ$  8. 147 9. 44

### Problem Solving Workshop:

#### Mixed Problem Solving

1. a.  $m\angle YWX = m\angle YWZ$  (Given)

$m\angle XWZ = m\angle YWX + m\angle YWZ$  (Angle Addition Postulate)

$m\angle XWZ = m\angle YWX + m\angle YWX$   
(Substitution Prop. of Eq.)

$m\angle XWZ = 2(m\angle YWX)$  (Simplify.)

b.  $28^\circ$