



## Vocabulary

### Review

Complete each statement with *always*, *sometimes* or *never*.

1. A transversal   ? intersects at least two lines.
2. A transversal   ? intersects two lines at more than two points.
3. A transversal   ? intersects two parallel lines.
4. A transversal   ? forms angles with two other lines.

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### Vocabulary Builder

**transitive** (adjective) TRAN si tiv

**Related Words:** transition, transit, transitivity

**Main Idea:** You use the **Transitive** Property in proofs when what you know implies a statement that, in turn, implies what you want to prove.

**Definition:** **Transitive** describes the property where one element in relation to a second element and the second in relation to the third implies the first element is in relation to the third element.

#### Transitive

If  $A \rightarrow B$   
and  $B \rightarrow C$   
then  $A \rightarrow C$ .

### Use Your Vocabulary

Complete each example of the *Transitive Property*.

5. If  $a > b$   
and  $b > c$ ,  
then   .
6. If Joe is younger than Ann  
and Ann is younger than  
Sam, then  

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.
7. If you travel from  
Station 2 to Station 3  
and you travel from  

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,  
then you travel from  
Station 2 to Station 4.

**Theorem 3-7 Transitive Property of Parallel Lines and Theorem 3-8**

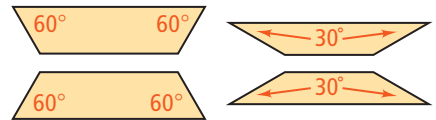
8. Complete the table below.

	Theorem 3-7 Transitive Property of Parallel Lines	Theorem 3-8
	If two lines are parallel to the same line, then they are parallel to each other.	In a plane, if two line are perpendicular to the same line, then they are parallel to each other.
<b>if</b>	$a \parallel b$	$m \perp t$
<b>and</b>		$n \perp t$
<b>then</b>	$a \parallel c$	$m \parallel n$



**Problem 1 Solving a Problem With Parallel Lines**

**Got It?** Can you assemble the pieces at the right to form a picture frame with opposite sides parallel? Explain.



9. Circle the correct phrase to complete the sentence.

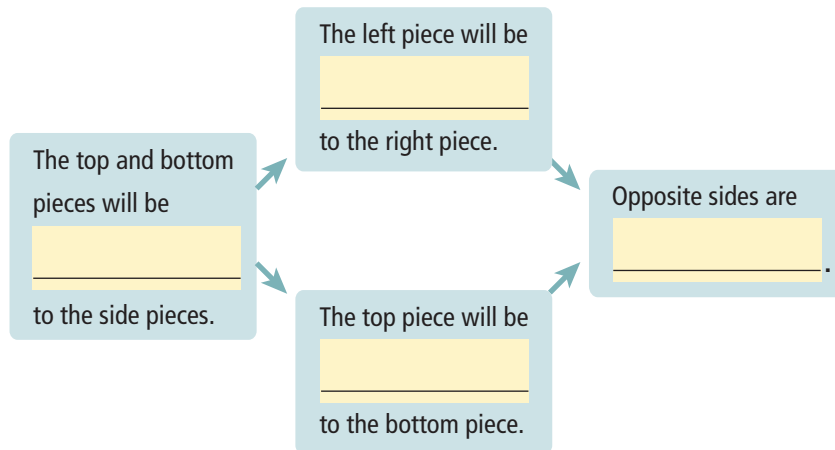
To make the picture frame, you will glue   ?  .

- the same angle to the same angle      two different angles together

10. The angles at each connecting end measure     ° and     °.

11. When the pieces are glued together, each angle of the frame will measure     °.

12. Complete the flow chart below with *parallel* or *perpendicular*.



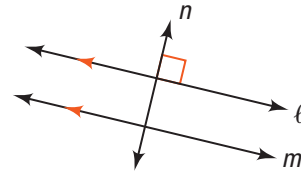
13. Underline the correct words to complete the sentence.

Yes / No, I can assemble the pieces to form a picture frame with opposite sides parallel.

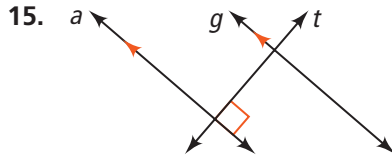
### Theorem 3-9 Perpendicular Transversal Theorem

In a plane, if a line is perpendicular to one of two parallel lines, then it is also perpendicular to the other.

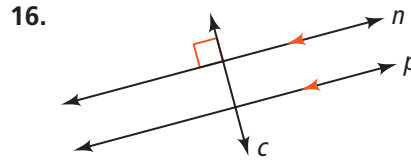
14. Place a right angle symbol in the diagram at the right to illustrate Theorem 3-9.



Use the information in each diagram to complete each statement.



$a \parallel$   and  $a \perp$  , so   $\perp$  .



$c \perp$   and  $n \parallel$  , so   $\perp$  .

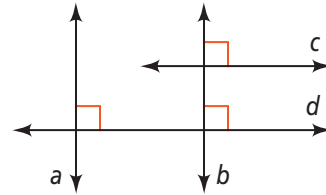


### Problem 2 Proving a Relationship Between Two Lines

**Got It?** Use the diagram at the right. In a plane,  $c \perp b$ ,  $b \perp d$ , and  $d \perp a$ . Can you conclude that  $a \parallel b$ ? Explain.

17. Circle the line(s) perpendicular to  $a$ . Underline the line(s) perpendicular to  $b$ .

$a$        $b$        $c$        $d$



18. Lines that are perpendicular to the same line are parallel / perpendicular.

19. Can you conclude that  $a \parallel b$ ? Explain.

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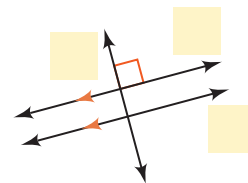
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### Lesson Check • Do you know HOW?

In one town, Avenue A is parallel to Avenue B. Avenue A is also perpendicular to Main Street. How are Avenue B and Main Street related? Explain.

20. Label the streets in the diagram A for Avenue A, B for Avenue B, and M for Main Street.



21. Underline the correct word(s) to complete each sentence.

The Perpendicular Transversal Theorem states that, in a plane, if a line is parallel / perpendicular to one of two parallel / perpendicular lines, then it is also parallel / perpendicular to the other.

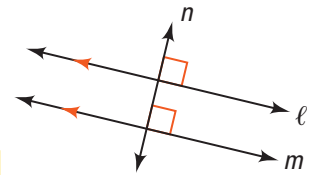
Avenue B and Main Street are parallel / perpendicular streets.



## Lesson Check • Do you UNDERSTAND?

Which theorem or postulate from earlier in the chapter supports the conclusion in Theorem 3-8? In the Perpendicular Transversal Theorem? Explain.

Use the diagram at the right for Exercises 22 and 23.



22. Complete the conclusion to Theorem 3-8.

In a plane, if two lines are perpendicular to the same line, then ?.

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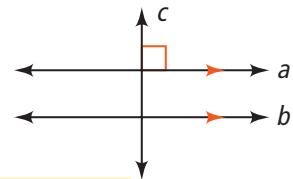
23. Complete the statement of Postulate 3-2.

If two lines and a transversal form ? angles that are congruent, then the lines are parallel.

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Use the diagram at the right for Exercises 24 and 25.

24. Complete the conclusion to the Perpendicular Transversal Theorem.



In a plane, if a line is perpendicular to one of two parallel lines, then it is also ?.

\_\_\_\_\_

25. Explain how any congruent angle pairs formed by parallel lines support the conclusion to the Perpendicular Transversal Theorem.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## Math Success

Check off the vocabulary words that you understand.

parallel

perpendicular

Rate how well you can *understand parallel and perpendicular lines*.

