Name Key Class _____ Date _____

3-2 Reteaching

Properties of Parallel Lines

When a transversal intersects parallel lines, special congruent and supplementary angle pairs are formed.

Congruent angles formed by a transversal intersecting parallel lines:

- corresponding angles (Postulate 3-1)

  $\angle 1 \cong \angle 5$ $\angle 2 \cong \angle 6$

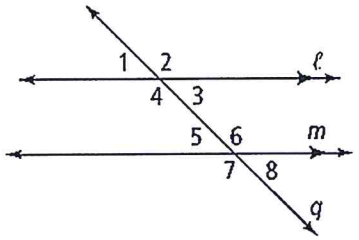
  $\angle 4 \cong \angle 7$ $\angle 3 \cong \angle 8$

- alternate interior angles (Theorem 3-1)

  $\angle 4 \cong \angle 6$ $\angle 3 \cong \angle 5$

- alternate exterior angles (Theorem 3-3)

  $\angle 1 \cong \angle 8$ $\angle 2 \cong \angle 7$



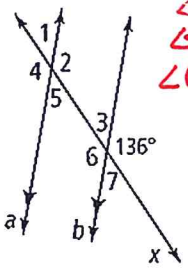
Supplementary angles formed by a transversal intersecting parallel lines:

- same-side interior angles (Theorem 3-2)

  $m\angle 4 + m\angle 5 = 180$ $m\angle 3 + m\angle 6 = 180$

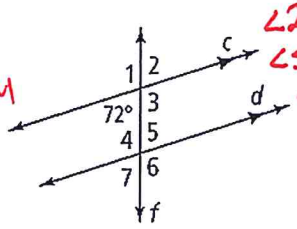
Identify all the numbered angles congruent to the given angle. Explain.

1.



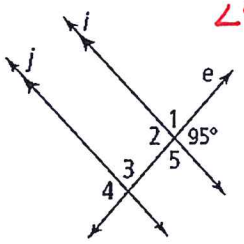
∠4 alt ext
∠2 corr
∠6 vertical

2.



∠2 vert
∠5 alt int
∠7 corr

3.

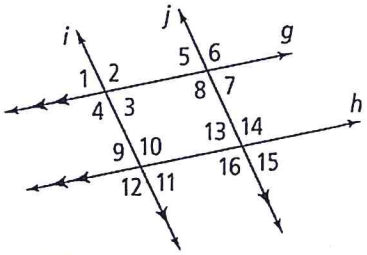


∠2 vert
∠4 alt ext

4. Supply the missing reasons in the two-column proof.

Given: $g \parallel h$, $i \parallel j$

Prove: $\angle 1$ is supplementary to $\angle 16$.



Statements	Reasons
1) $\angle 1 \cong \angle 3$	1) ? vertical ∠s
2) $g \parallel h$; $i \parallel j$	2) Given
3) $\angle 3 \cong \angle 11$	3) ? corresponding
4) $\angle 11$ and $\angle 16$ are supplementary.	4) ? SSI – Same side interior are sup.
5) $\angle 1$ and $\angle 16$ are supplementary.	5) ? ~~CST~~ Congruent Supplements Theorem

Copyright © by Pearson Education, Inc., or its affiliates. All Rights Reserved.

Name _____ Class _____ Date _____

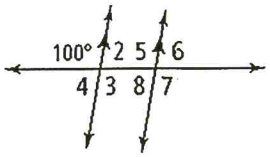
3-2 Reteaching (continued)

Properties of Parallel Lines

You can use the special angle pairs formed by parallel lines and a transversal to find missing angle measures.

Problem

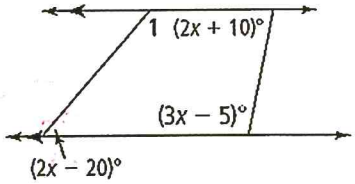
If $m\angle 1 = 100$, what are the measures of $\angle 2$ through $\angle 8$?



Supplementary angles:	$m\angle 2 = 180 - 100$	$m\angle 2 = 80$
	$m\angle 4 = 180 - 100$	$m\angle 4 = 80$
Vertical angles:	$m\angle 1 = m\angle 3$	$m\angle 3 = 100$
Alternate exterior angles:	$m\angle 1 = m\angle 7$	$m\angle 7 = 100$
Alternate interior angles:	$m\angle 3 = m\angle 5$	$m\angle 5 = 100$
Corresponding angles:	$m\angle 2 = m\angle 6$	$m\angle 6 = 80$
Same-side interior angles:	$m\angle 3 + m\angle 8 = 180$	$m\angle 8 = 80$

Problem

What are the measures of the angles in the figure?



$(2x + 10) + (3x - 5) = 180$	Same-Side Interior Angles Theorem
$5x + 5 = 180$	Combine like terms.
$5x = 175$	Subtract 5 from each side.
$x = 35$	Divide each side by 5.

Find the measure of these angles by substitution.

$2x + 10 = 2(35) + 10 = 80$ $\qquad$ $3x - 5 = 3(35) - 5 = 100$

$2x - 20 = 2(35) - 20 = 50$

To find $m\angle 1$, use the Same-Side Interior Angles Theorem:

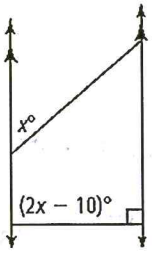
$50 + m\angle 1 = 180$, so $m\angle 1 = 130$

3x-20+2x=180
5x-20=180
5x=200
x=40

Exercises

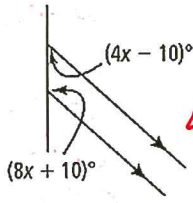
Find the value of x. Then find the measure of each labeled angle.

5.



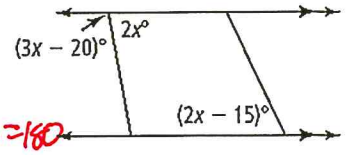
2x-10=90
2x=100
x=50

6.



4x-10+8x+10=180
12x=180
12
x=90/6=45/3=15

7.



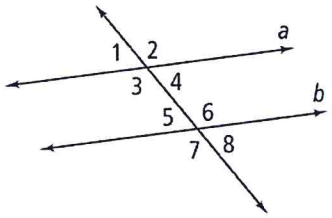
Copyright © by Pearson Education, Inc., or its affiliates. All Rights Reserved.

Name Key Class Date

3-3 Reteaching

Proving Lines Parallel

Special angle pairs result when a set of parallel lines is intersected by a transversal. The converses of the theorems and postulates in Lesson 3-2 can be used to prove that lines are parallel.



Postulate 3-2: Converse of Corresponding Angles Postulate

If $\angle 1 \cong \angle 5$, then $a \parallel b$.

Theorem 3-4: Converse of the Alternate Interior Angles

Theorem If $\angle 3 \cong \angle 6$, then $a \parallel b$.

Theorem 3-5: Converse of the Same-Side Interior Angles Theorem

If $\angle 3$ is supplementary to $\angle 5$, then $a \parallel b$.

Theorem 3-6: Converse of the Alternate Exterior Angles Theorem

If $\angle 2 \cong \angle 7$, then $a \parallel b$.

Problem

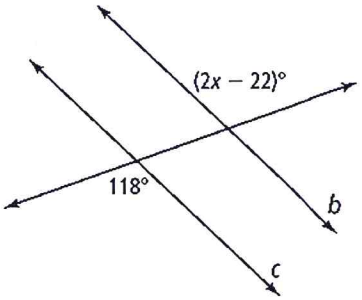
For what value of x is $b \parallel c$?

The given angles are alternate exterior angles. If they are congruent, then $b \parallel c$.

$2x - 22 = 118$

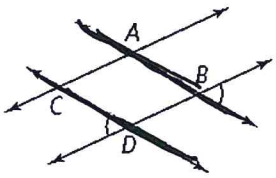
$2x = 140$

$x = 70$

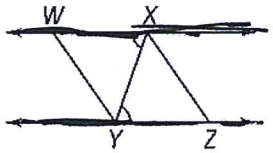


Exercises

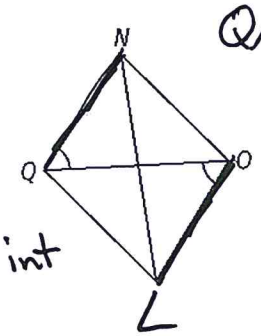
Which lines or line segments are parallel? Justify your answers.

1. 

CD // AB, by Alt ext.

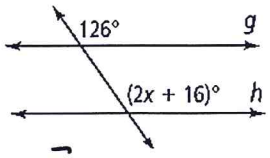
2. 

WX // YZ by Alt int

3. 

QN // LO by Alt in

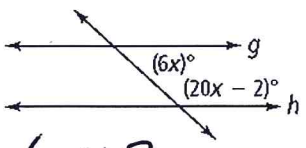
Find the value of x for which $g \parallel h$. Then find the measure of each labeled angle.

4. 

$126 = 2x + 16$

$110 = 2x$

$55 = x$

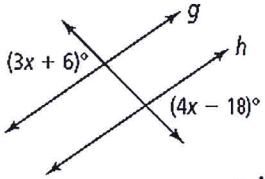
5. 

$6x + 20x - 2 = 180$

$26x - 2 = 180$

$26x = 182$

$x = 7$

6. 

$3x + 6 = 4x - 18$

$-3x + 18 \quad -3x + 18$

$24 = x$

Copyright © by Pearson Education, Inc., or its affiliates. All Rights Reserved.