

L1.2

Study Guide and Intervention

Angles and Parallel Lines

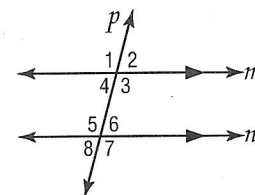
Parallel Lines and Angle Pairs When two parallel lines are cut by a transversal, the following pairs of angles are congruent.

- corresponding angles
- alternate interior angles
- alternate exterior angles

Also, consecutive interior angles are supplementary.

Example In the figure, $m\angle 2 = 75$. Find the measures of the remaining angles.

- | | |
|-------------------|----------------------------------------------------------|
| $m\angle 1 = 105$ | $\angle 1$ and $\angle 2$ form a linear pair. |
| $m\angle 3 = 105$ | $\angle 3$ and $\angle 2$ form a linear pair. |
| $m\angle 4 = 75$ | $\angle 4$ and $\angle 2$ are vertical angles. |
| $m\angle 5 = 105$ | $\angle 5$ and $\angle 3$ are alternate interior angles. |
| $m\angle 6 = 75$ | $\angle 6$ and $\angle 2$ are corresponding angles. |
| $m\angle 7 = 105$ | $\angle 7$ and $\angle 3$ are corresponding angles. |
| $m\angle 8 = 75$ | $\angle 8$ and $\angle 6$ are vertical angles. |

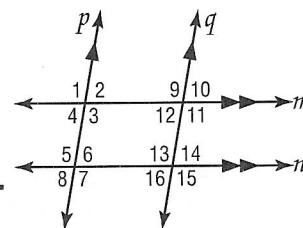


Exercises

In the figure, $m\angle 3 = 102$. Find the measure of each angle. Tell which postulate(s) or theorem(s) you used.

Use a two-column proof.

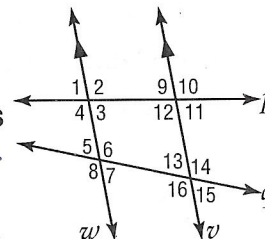
- | | |
|------------------------------------------------|-------------------------------------------------------------------|
| 1. $\angle 5$ <u>102; Alt. Int. Angles Th.</u> | 2. $\angle 6$ <u>78; Cons. Int. Angles Th.</u> |
| 3. $\angle 11$ <u>102; Corre. Angles Th.</u> | 4. $\angle 7$ <u>102; Corre. Angles Th.</u> |
| 5. $\angle 15$ <u>102; Corre. Angles Th.</u> | 6. $\angle 14$ <u>78; Cons. Int. Angles Th; Corre. Angles Th.</u> |



In the figure, $m\angle 9 = 80$ and $m\angle 5 = 68$. Find the measure of each angle. Tell which postulate(s) or theorem(s) you used.

Use a two-column proof.

- | | |
|------------------------------------------------|---------------------------------------------------------------------------|
| 7. $\angle 12$ <u>100; Supp. Angles</u> | 8. $\angle 1$ <u>80; Corr. Angles Th.</u> |
| 9. $\angle 4$ <u>100; Cons Int. Angles Th.</u> | 10. $\angle 3$ <u>80; Att. Int. Angles Th.</u> |
| 11. $\angle 7$ <u>68; Vertical Angles Th.</u> | 12. $\angle 16$ <u>112; Vertical Angles Th; Cons. Interior Angles Th.</u> |



I provided an outline - Refer to notes for layout.

Example #8

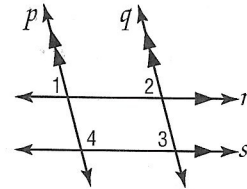
Statement	Reason
$m\angle 9 = 80$	Given
$\angle 9 \cong \angle 1$	Corresponding Angles
$m\angle 9 = m\angle 1$	Def. of congruent angles
$m\angle 1 = 80$	Substitution.

LT.2 Study Guide and Intervention *(continued)*

Angles and Parallel Lines

Algebra and Angle Measures Algebra can be used to find unknown values in angles formed by a transversal and parallel lines.

Example If $m\angle 1 = 3x + 15$, $m\angle 2 = 4x - 5$, and $m\angle 3 = 5y$, find the value of x and y .



$p \parallel q$, so $m\angle 1 = m\angle 2$

because they are corresponding angles.

$$m\angle 1 = m\angle 2$$

$$3x + 15 = 4x - 5$$

$$3x + 15 - 3x = 4x - 5 - 3x$$

$$15 = x - 5$$

$$15 + 5 = x - 5 + 5$$

$$20 = x$$

$r \parallel s$, so $m\angle 2 = m\angle 3$

because they are corresponding angles.

$$m\angle 2 = m\angle 3$$

$$75 = 5y$$

$$\frac{75}{5} = \frac{5y}{5}$$

$$15 = y$$

Exercises

Find the value of the variable(s) in each figure. Explain your reasoning.

1. *supplementary*

 $5x - 5 + 4x + 10 = 180$
 $9x + 5 = 180$
 $9x = 175$
 $x = 19.4$
 $5(19.4) - 5 = 92$
 $6y - 4 = 92$
 $6y = 96$
 $y = 16$
 $x = 15$; $y = 19$; use corresponding and supplementary angles

2. *consecutive*

 $90 + 10x + 3y + 18 = 180$
 $10x + 3y = 72$
 $15x + 30 + 10x = 180$
 $25x = 150$
 $x = 6$
 $90 + 3y + 18 = 180$
 $3y = 72$
 $y = 24$
 $x = 6$; $y = 24$; Use consecutive interior angles

3. *consecutive interior*

 $11x + 4 + 5y + 5 = 180$
 $11x + 5y = 171$
 $5x + 13y - 5 = 180$
 $5x + 13y = 185$
 $5y + 5 + 13y - 5 = 180$
 $18y = 180$
 $y = 10$
 $11x + 4 + 5(10) = 180$
 $11x + 54 = 180$
 $11x = 126$
 $x = 11.4$
 $x = 11$; $y = 10$; use consecutive interior angles

4. *Refer to notes*

 $3x + 2y + 4y + 5x - 20 = 180$
 $8x + 6y = 200$
 $3x + 2y = 90$
 $5x - 20 = 90$
 $5x = 110$
 $x = 22$
 $3(22) + 2y = 90$
 $66 + 2y = 90$
 $2y = 24$
 $y = 12$
 $x = 10$; $y = 25$; Use consecutive interior and alternate interior angles

Find the value of the variable(s) in each figure. Explain your reasoning.

5. *consecutive interior, corresponding, and supplementary*

 $x + 106 = 180$
 $x = 74$
 $4z + 6 + x = 180$
 $4z + 6 + 74 = 180$
 $4z + 80 = 180$
 $4z = 100$
 $z = 25$
 $2y + 106 = 180$
 $2y = 74$
 $y = 37$
 $x = 74$; $y = 37$; $z = 25$; use consecutive interior, corresponding, and supplementary angles

6. *supplementary, alternate interior, and consecutive interior*

 $2x + 90 + x = 180$
 $3x = 90$
 $x = 30$
 $2y + 90 = 180$
 $2y = 90$
 $y = 45$
 $x + z = 180$
 $30 + z = 180$
 $z = 150$
 $x = 30$; $y = 15$; $z = 150$ use supplementary, alternate interior, and consecutive interior angles

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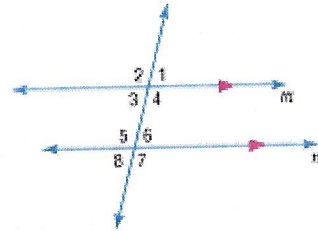
LT 1.2 Angles and Parallel Lines

Example 1: Use Corresponding Angles Postulate

In the figure, $m\angle 8 = 121$. Find the measure of each angle. Tell which postulates (or theorems) you used. Use a two column proof.

a.

Statement	Reason
$\angle 3 \cong \angle 8$	Corresponding Angles Postulate
$m\angle 3 = m\angle 8$	Definition of congruent angles
$m\angle 3 = 121$	Substitution



b.

Statement	Reason
$\angle 1 \cong \angle 3$	Vertical Angles Theorem
$\angle 3 \cong \angle 8$	Corresponding Angles Postulate
$\angle 1 \cong \angle 8$	Transitive Property of Congruence
$m\angle 1 = m\angle 8$	Definition of congruent angles
$m\angle 1 = 121$	Substitution

Handwritten notes: "2 step" with a bracket around the first two rows, and an arrow pointing to the third row.

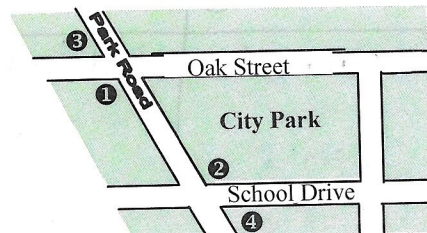
Real-World Example 2: Use Theorems about Parallel Lines

MAPS School Drive and Oak Street are parallel streets that intersect Park Road along the west side of City Park.

Given $m\angle 1 = 122$
Prove $m\angle 2 = 122$

If $m\angle 1 = 122$, find $m\angle 2$. Use a two column proof.

$\angle 2 \cong \angle 1$	Alternate Interior Angles Postulate
$m\angle 2 = m\angle 1$	Definition of congruent angles
$m\angle 2 = 122$	Substitution



Example 3: Find Values of Variables

ALGEBRA Use the figure at the right to find the indicated variable. Explain your reasoning (Justify your answer)

If $m\angle 1 = 16x - 8$, $m\angle 2 = 4(y + 8)$, and $m\angle 3 = 14x + 2$, find x and y .

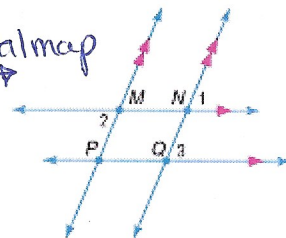
a. If $m\angle 1 = 16x - 8$, $m\angle 2 = 4(y + 8)$, and $m\angle 3 = 14x + 2$, find x .

what we know

"Proof"

$\angle 1 \cong \angle 3$	Corresponding Angles Postulate.
$m\angle 1 = m\angle 3$	Definition of congruent angles
$16x - 8 = 14x + 2$	Corresponding Angle Postulate
$2x - 8 = 2$	
$2x = 10$	
$x = 5$	
Simplify	
Statement	Justification

mental map



b. If $m\angle 1 = 16x - 8$, $m\angle 2 = 4(y + 8)$, and $m\angle 3 = 14x + 2$, find y

what we know

"Proof"

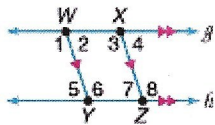
$\angle 1 \cong \angle 2$	Alternate Exterior Angles Theorem.
$m\angle 1 = m\angle 2$	Definition of congruent angles
$16x - 8 = 4(y + 8)$	Alternate Exterior Angle Theorem
$16(5) - 8 = 4(y + 8)$	
$72 = 4y + 32$	
$40 = 4y$	
$10 = y$	Simplify.
Statement	Justification

mental map

Self-Check Quizzes

LT 1.2 Angles and Parallel Lines

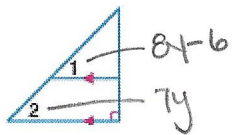
1. Find the measure of $\angle 2$ if $g \parallel h$, $\overline{WY} \parallel \overline{XZ}$, and $m\angle 5 = 70$.



- 60
- 70
- 110
- 65

statement	Reason
$m\angle 5 = 70$	Given
$\angle 5 \cong \angle 2$	Alt. Int. \angle s
$m\angle 5 = m\angle 2$	Def. of Cong. \angle s
$m\angle 2 = 70$	Substitution

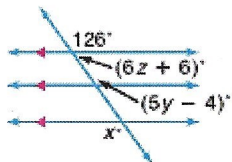
2. Find the measure of $\angle 2$ if $m\angle 1 = 8y - 6$ and $m\angle 2 = 7y$.



- 56
- 35
- 42
- 49

statement	Justification
$8y - 6 = 7y$	Corresponding \angle s
$y = 6$	Simplify
$m\angle 2 = 7y$	Given
$m\angle 2 = 7 \cdot 6 = 42$	Substitute

3. What is the value of y ?

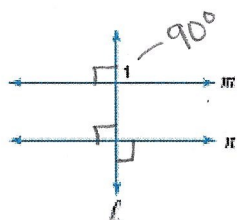


- 24
- 26
- 30
- 28

$$\begin{aligned}
 126 + 6z + 6 &= 180 \\
 6z + 132 &= 180 \\
 6z &= 48 \\
 z &= 8
 \end{aligned}$$

Statement	Justify
$126 + 6z + 6 = 180$	Supplementary
$z = 8$	Simplify
$6z + 6 + 5y - 4 = 180$	Corresponding
$6(8) + 6 + 5y - 4 = 180$	Substitute
$y = 26$	Simplify

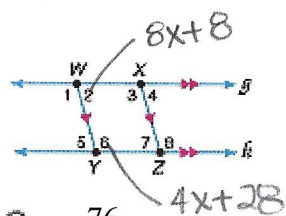
4. If line m and n are parallel and l is perpendicular to m , then _____.



- l and n are skew lines.
- m is parallel to n .
- l is parallel to n .
- l is perpendicular to n .

↓
90 degrees

5. In the picture, if $m\angle 2 = 8x + 8$ and $m\angle 6 = 4x + 28$, what is $m\angle 2$?



76

96

90

104

$$8x + 8 + 4x + 28 = 180$$

$$12x + 36 = 180$$

$$x = 12$$

$$m\angle 2 = 8x + 8$$

$$m\angle 2 = 8(12) + 8$$

$$m\angle 2 = 104$$

Consecutive Interior \angle s

Simplify

Given

Substitute

Simplify