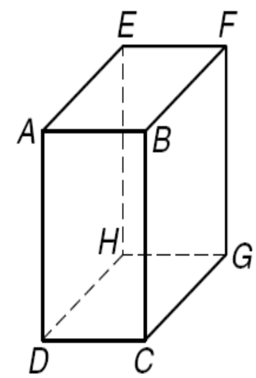
3.1 Parallel Lines and Transversals

Targets

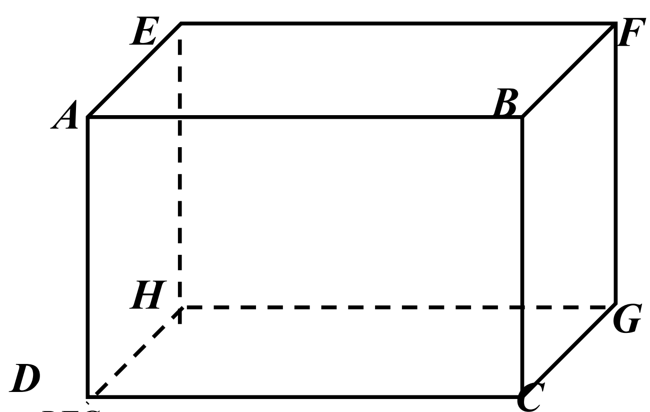
- I can identify the relationships between two lines or two planes
- I can name angles formed by a pair of lines and a transversal.

Vocabulary

Term	Definition	Picture
Parallel Lines		
Skew Lines		
Parallel Planes		

Instruction

Example 1:
Refer to the rectangular prism at the right.



a. How many planes are in the prism? _________

b. Name a plane parallel to plane *ABE*.

c. Name a plane parallel to plane *BCG*.

d. Name the intersection of plane *ABC* and plane *BFG*. ________

e. Name the intersection of plane *EHD* and plane *ADC*. ________

f. Name the intersection of plane *HDC* and plane *BCG*. ________

g. Name all the segments that intersect $\overline{AB}$.

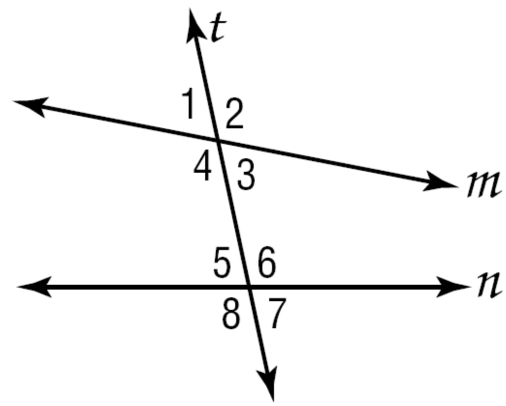
h. Name all the segments parallel to $\overline{AB}$.

i. Name all the segments skew to $\overline{AB}$.

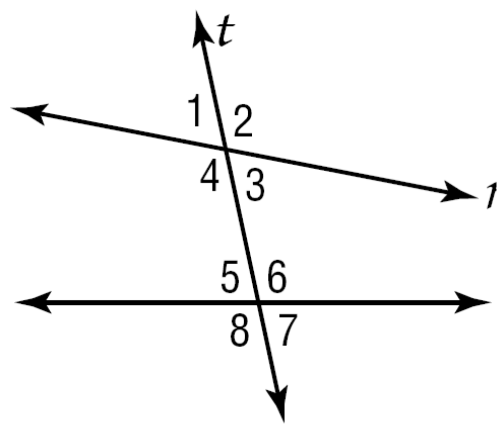
Vocabulary	Term	Definition	Picture
	Transversal		

TRANSVERSALS and ANGLES

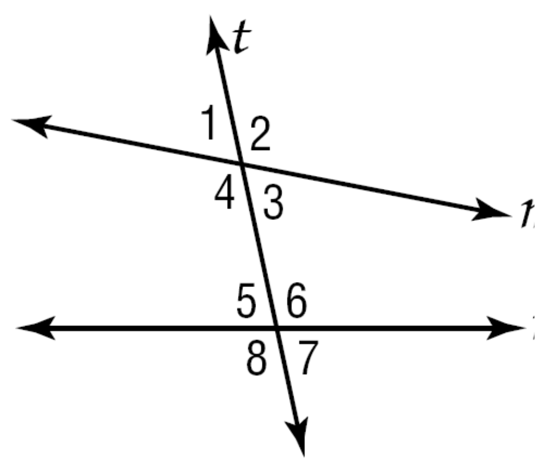
Vocabulary	Name	Angles in the Figure
	Interior Angles	
	Exterior Angles	



Vocabulary	Name	Angles in the Figure
	Consecutive Interior Angles ("Same Side" Interior Angles)	
	Consecutive Exterior Angles ("Same Side" Exterior Angles)	

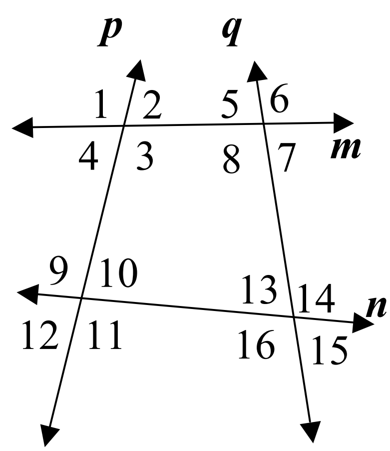


Vocabulary	Name	Angles in the Figure
	Alternate Interior Angles	
	Alternate Exterior Angles	
	Corresponding Angles	



Instruction

Example 2:
Refer to the figure below. Identify each pair of angles as ***alternate interior***, ***alternate exterior***, ***corresponding***, or ***consecutive interior*** angles.



a. $\angle 3$ and $\angle 10$

b. $\angle 2$ and $\angle 12$

c. $\angle 8$ and $\angle 14$

d. $\angle 8$ and $\angle 13$

e. $\angle 1$ and $\angle 9$

f. $\angle 8$ and $\angle 16$

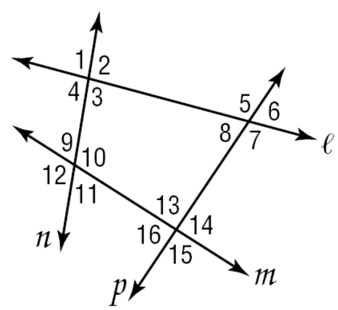
g. $\angle 6$ and $\angle 16$

h. $\angle 3$ and $\angle 11$

i. $\angle 7$ and $\angle 13$

Instruction

Your Turn:
1. Identify each pair of angles as ***alternate interior***, ***alternate exterior***, ***corresponding***, or ***consecutive interior*** angles.



a. $\angle 11$ and $\angle 13$

b. $\angle 2$ and $\angle 10$

c. $\angle 4$ and $\angle 6$

d. $\angle 2$ and $\angle 5$

e. $\angle 5$ and $\angle 15$

f. $\angle 10$ and $\angle 16$

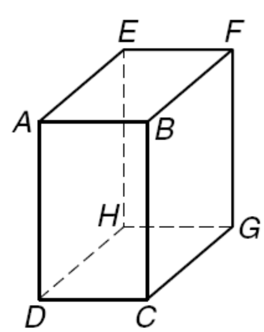
g. $\angle 9$ and $\angle 13$

2. a. Name the intersection of plane *HEF* and plane *FBC*. ________

b. Name all the segments that intersect $\overline{CG}$.

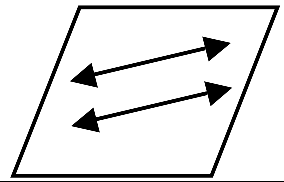
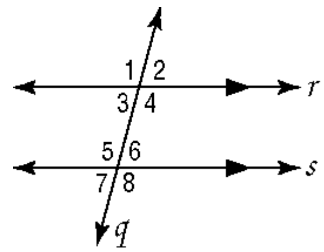
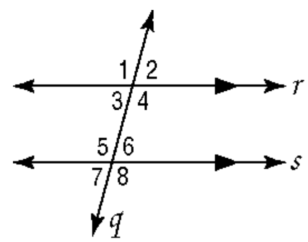
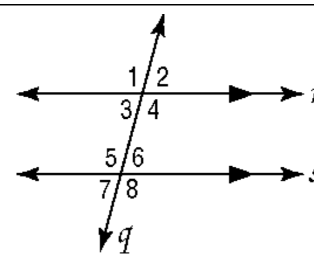
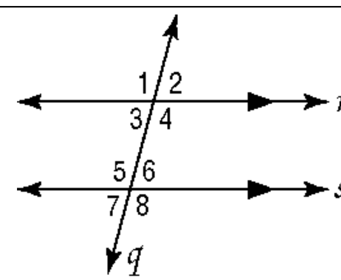
c. Name all the segments parallel to $\overline{CG}$.

d. Name all the segments skew to $\overline{CG}$.



3.2 Angles and Parallel Lines

Targets	○ I can use the properties of parallel lines to determine if angles are congruent. ○ I can use algebra to find angle measures.

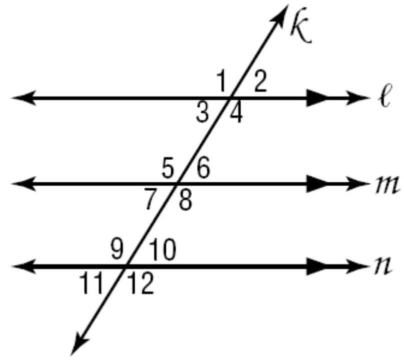
	Term	Definition	Picture
Vocabulary	**Parallel Lines**	• Coplanar (on the same plane) lines that do not intersect	
Instruction	**Parallel Lines Postulates and Theorems for Angle Pairs**		
	Corresponding Angles Postulate	• If two **parallel lines** are cut by a transversal, then each pair of **corresponding angles** is ____________________.	
	Alternate Interior Angles Theorem	• If two **parallel lines** are cut by a transversal, then each pair of **alternate interior angles** is ____________________.	
Instruction	**Parallel Lines Postulates and Theorems for Angle Pairs**		
	Alternate Exterior Angles Theorem	• If two **parallel lines** are cut by a transversal, then each pair of **alternate exterior angles** is ____________________.	
	Consecutive Interior Angles Theorem	• If two **parallel lines** are cut by a transversal, then each pair of **consecutive interior angles** is ____________________.	

Instruction

Example 1:

Suppose $\ell \parallel m$ and $m \parallel n$.

If $m\angle 1 = 125^\circ$, find the following angle measures.



a. $m\angle 2$ = ______ e. $m\angle 8$ = ______ i. $m\angle 7$ = ______

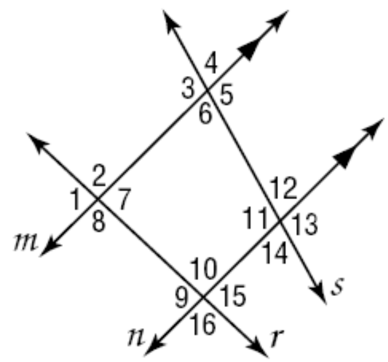
b. $m\angle 3$ = ______ f. $m\angle 9$ = ______ j. $m\angle 12$ = ______

c. $m\angle 4$ = ______ g. $m\angle 10$ = ______ k. $m\angle 6$ = ______

d. $m\angle 5$ = ______ h. $m\angle 11$ = ______

Example 2:

If $m\angle 2 = 92^\circ$ and $m\angle 12 = 74^\circ$, find the following angle measures.



a. $m\angle 10$ = ______ e. $m\angle 11$ = ______

b. $m\angle 8$ = ______ f. $m\angle 13$ = ______

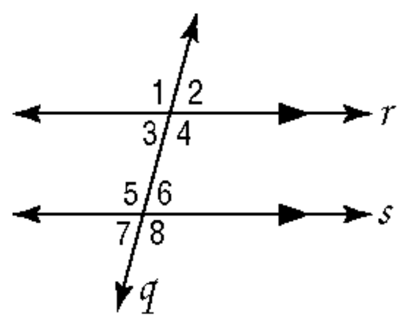
c. $m\angle 9$ = ______ g. $m\angle 14$ = ______

d. $m\angle 5$ = ______

Instruction

Your Turn:

If $m\angle 2 = 78^\circ$, find the following angle measures.



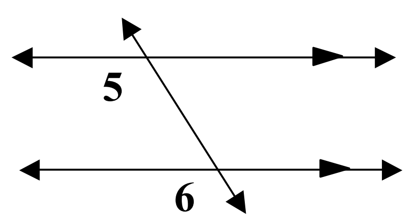
a. $m\angle 1$ = ______ d. $m\angle 6$ = ______ g. $m\angle 5$ = ______

b. $m\angle 3$ = ______ e. $m\angle 7$ = ______

c. $m\angle 4$ = ______ f. $m\angle 8$ = ______

Example 3:

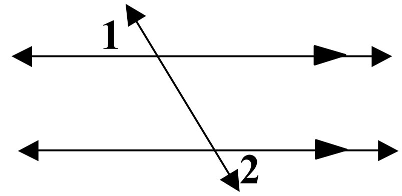
If $m\angle 5 = 2x - 10$ and $m\angle 6 = x + 15$, find the value of x. Then find $m\angle 5$ and $m\angle 6$.



Example 4:

If $m\angle 1 = 9x + 12$ and $m\angle 2 = 42°$, find the value of *x*.

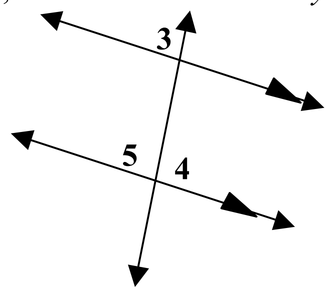
Then find $m\angle 1$.



Instruction

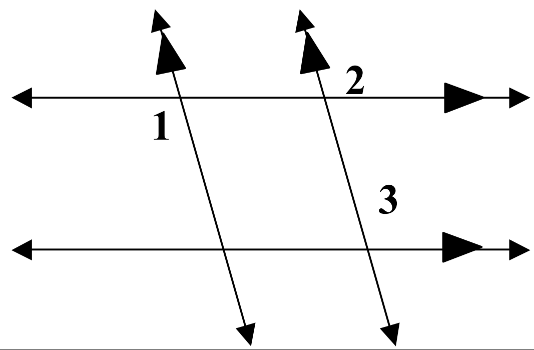
Example 5:

If $m\angle 3 = 8x - 6$, $m\angle 4 = 6x + 46$, and $m\angle 5 = 9y - 7$, find the value of *x* and *y*.



Example 6:

If $m\angle 1 = 9a + 6$, $m\angle 2 = 10a - 6$, and $m\angle 3 = 5b + 14$, find the value of *a* and *b*.



Instruction

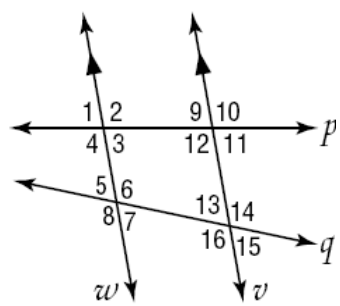
Your Turn:

If $m\angle 9 = 80^{o}$ and $m\angle 5 = 68^{o}$,
find the following angle measures.

a. $m\angle 12$ = ______ d. $m\angle 3$ = ______

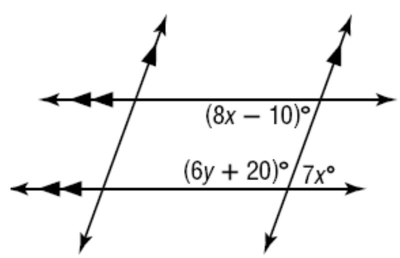
b. $m\angle 1$ = ______ e. $m\angle 7$ = ______

c. $m\angle 4$ = ______ f. $m\angle 16$ = ______



Your Turn:

Find the values of *x* and *y* in the figure at the right.



3.3 Slopes of Lines

Targets

- I can find slopes of lines.
- I can use slope to identify parallel lines.
- I can use slope to identify perpendicular lines.

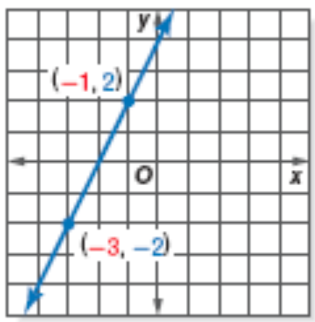
Vocabulary

Term	Definition	Picture
Slope		

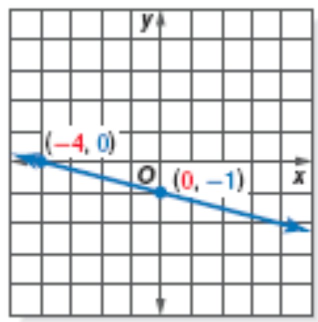
Instruction

Example1:
Find the slope of each line.

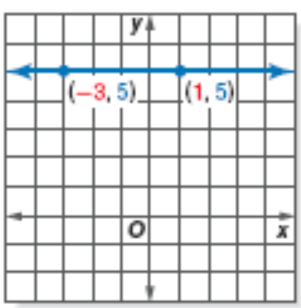
a.



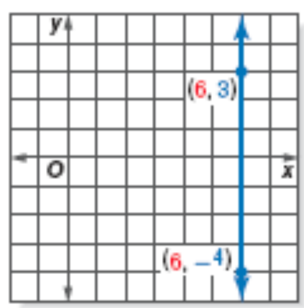
b.



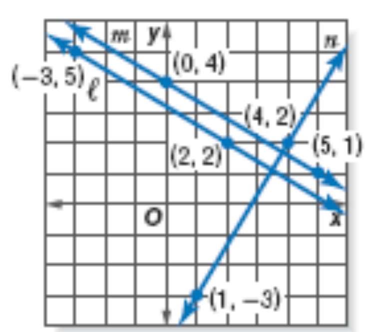
c.



d.



Vocabulary

Term	Definition	Picture
Parallel Lines		
Perpendicular Lines		

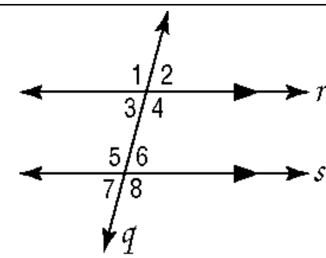
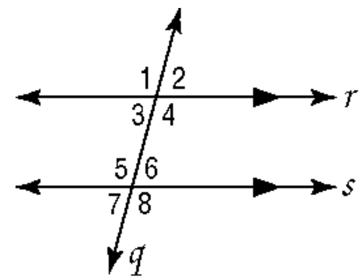
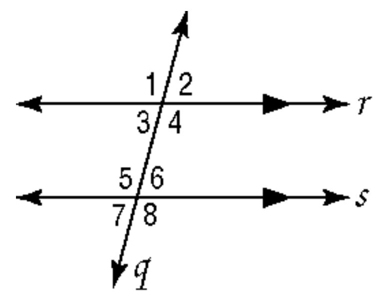
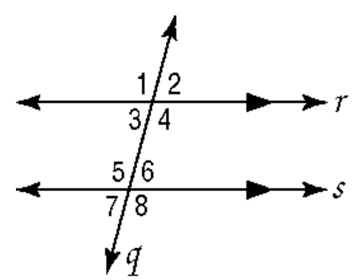
Instruction	*Example 3:* Determine whether line $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are parallel, perpendicular, or neither. A(-2, -5) B(4, 7) C(0, 2) D(8, -2)
	Your Turn: Given that AB = 1/3, CD = -1/3, EF = 2/6, and GH = 3, determine whether the following pairs are parallel, perpendicular, or neither. a) AB and CD ______________________ b) AB and EF _______________________ c) GH and EF _______________________ d) CD and GH _______________________

3.4 Proving Lines Parallel

Targets

- I can recognize special pairs of angles formed by parallel lines and transversals.
- I can prove that two lines are parallel based on given angle relationships.

Vocabulary

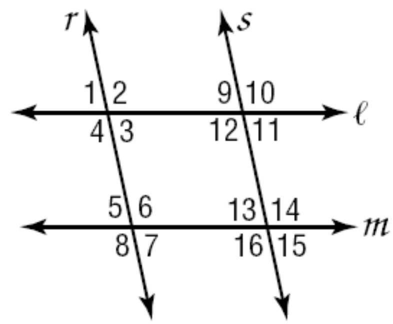
Postulates and Theorems Used to State that a Pair of Lines is Parallel		
Corresponding Angles	• If two lines in a plane are cut by a transversal so that a pair of **corresponding angles** are ____________, then the lines are ______________.	
Alternate Interior Angles	• If two lines in a plane are cut by a transversal so that a pair of **alternate interior angles** are ____________, then the lines are ______________.	
Alternate Exterior Angles	• If two lines in a plane are cut by a transversal so that a pair of **alternate exterior angles** are ____________, then the lines are ______________.	
Consecutive Interior Angles	• If two lines in a plane are cut by a transversal so that a pair of **consecutive interior angles** are _________________, then the lines are ______________.	

Instruction

Example 1:

a. Determine which lines are parallel or choose "not enough information"

b. Justify your answer.



1. $\angle 12 \cong \angle 14$

   a. $r \parallel s$

   $\ell \parallel m$

   not enough information

   b. Justification:

2. $\angle 5 \cong \angle 13$

   a. $r \parallel s$

   $\ell \parallel m$

   not enough information

   b. Justification:

3. $m\angle 11 + m\angle 14 = 180$

   a. $r \parallel s$

   $\ell \parallel m$

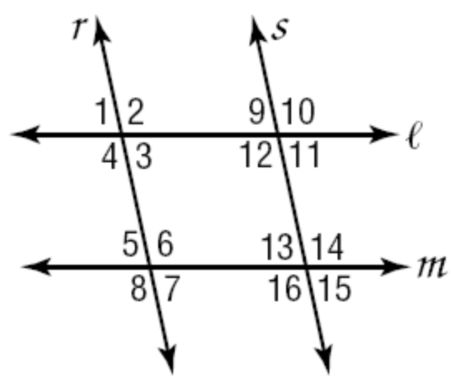
   not enough information

   b. Justification:

Instruction

a. Determine which lines are parallel or choose "not enough information"

b. Justify your answer.



4. $\angle 4 \cong \angle 10$

   a. $r \parallel s$

   $\ell \parallel m$

   not enough information

   b. Justification:

5. $\angle 2 \cong \angle 14$

   a. $r \parallel s$

   $\ell \parallel m$

   not enough information

   b. Justification:

6. $\angle 3 \cong \angle 9$

   a. $r \parallel s$

   $\ell \parallel m$

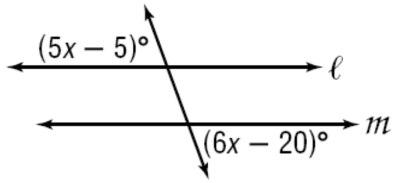
   not enough information

   b. Justification:

Instruction

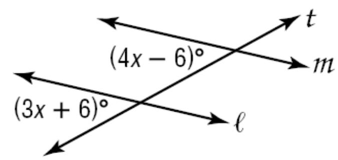
Example 2:

Find the value of x so that $\ell \parallel m$.



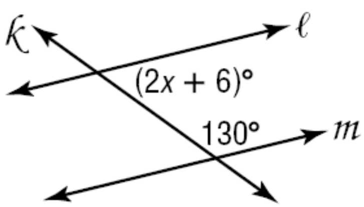
Example 3:

Find the value of x so that $\ell \parallel m$.



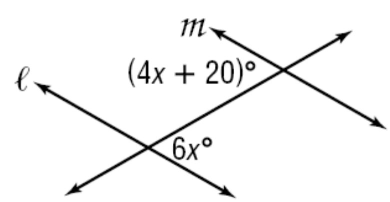
Example 4:

Find the value of x so that $\ell \parallel m$.



Example 5:

Find the value of x so that $\ell \parallel m$.



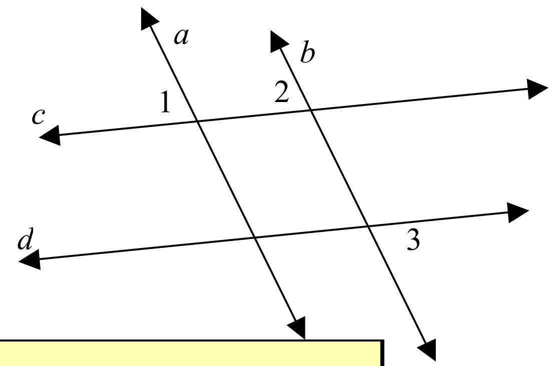
If	then
• corresponding angles are congruent, • alternate exterior angles are congruent, • consecutive interior angles are supplementary, • alternate interior angles are congruent, or • two lines are perpendicular to the same line,	the lines are parallel.

Instruction

Example 6:

Given: $\angle 3 \cong \angle 1$ and $a \parallel b$

Prove: $c \parallel d$



Statements	Reasons
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

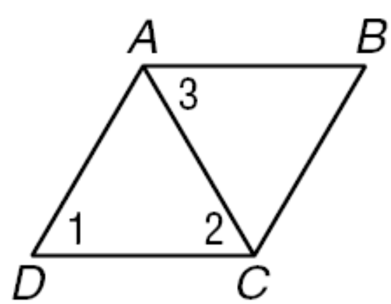
Instruction

Example 7:

Given: $\angle 1 \cong \angle 2$

$\angle 1 \cong \angle 3$

Prove: $\overline{AB} \parallel \overline{DC}$



Statements	Reasons
1. $\angle 1 \cong \angle 2$	1.
2. $\angle 1 \cong \angle 3$	2.
3. $\angle 2 \cong \angle 3$	3.
4. $\overline{AB} \parallel \overline{DC}$	4.