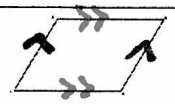
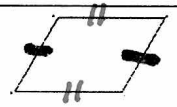
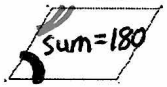
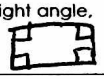
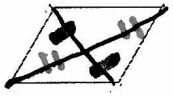
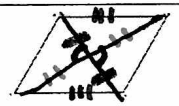
Math 3

6.3 Parallelograms

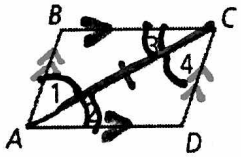
Unit 6

SWBAT prove a figure to be a parallelogram and solve for variables in a parallelogram.

Properties of Parallelograms

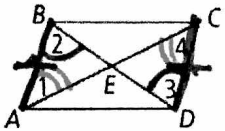
Sides	closed 4-sided figure A **parallelogram** is a quadrilateral with both pairs of opposite sides parallel.	
	If a quadrilateral is a parallelogram, the 2 pairs of opposite sides are congruent.	
Angles	If a quadrilateral is a parallelogram, the 2 pairs of opposite angles are congruent.	
	If a quadrilateral is a parallelogram, the consecutive angles are supplementary.	
	If a quadrilateral is a parallelogram and one angle is a right angle, then all angles are right angles. 	
Diagonals	If a quadrilateral is a parallelogram, the diagonals bisect each other.	
	If a quadrilateral is a parallelogram, the diagonals form two congruent triangles.	

Example 1: Given: ▱ABCD is a parallelogram.
Prove: $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DA}$.



Statement	Reason
1. ABCD is a parallelogram	1. Given
2. $\overline{BC} \parallel \overline{AD}$ + $\overline{AB} \parallel \overline{CD}$	2. Definition of a parallelogram
3. $\angle 1 = \angle 4$, $\angle 3 = \angle 2$	3. alt. int angles
4. $\overline{AC} \cong \overline{AC}$	4. reflexive
5. $\triangle ABC \cong \triangle CDA$	5. ASA
6. $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DA}$	6. CPCTC

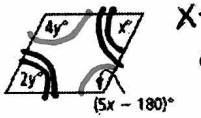
Example 2: Given: ▱ABCD is a parallelogram.
Prove: $\overline{AC}$ and $\overline{BD}$ bisect each other at E.



Statement	Reason
1. ABCD is a parallelogram	1. Given
2. $\overline{AB} \parallel \overline{DC}$ and $\overline{BC} \parallel \overline{AD}$	2. defn' of parallelogram
3. $\angle 1 \cong \angle 4$, $\angle 2 \cong \angle 3$	3. alt. int. angles
4. $\overline{AB} \cong \overline{DC}$	4. defn of parallelogram
5. $\triangle BAE \cong \triangle CDE$	5. ASA
6. $\overline{AE} \cong \overline{CE}$, $\overline{BE} \cong \overline{DE}$	6. CPCTC
7. $\overline{AC}$ and $\overline{BD}$ bisect @ E	7. Definition of bisector

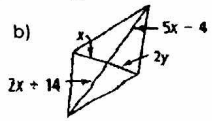
Example 3: For what values of x and y must each figure be a parallelogram?

a)

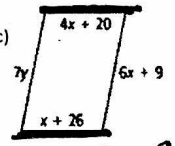


$x + (5x - 180) = 180$
$6x = 360$
$\boxed{x = 60}$
$4y + 2y = 180$
$6y = 180$
$\boxed{y = 30}$

b)

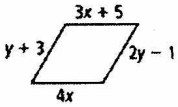


c)

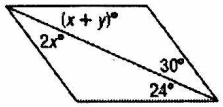


$4x + 20 = x + 26$
$3x = 6$
$\boxed{x = 2}$
$7y = 6x + 9$
$7y = 6(2) + 9$
$7y = 21$
$\boxed{y = 3}$

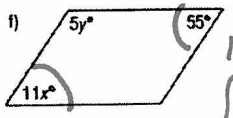
d)



e)



f)



$11x = 55$
$\boxed{x = 5}$