Worksheet Quadrilaterals Day 1 - Parallelograms   Name ______________________

1. Given the coordinates A(-5,0), B(3,2), C(5,6) and D(-3,4), show that ABCD is a parallelogram by three different methods.

a) Show that 2 pairs of opposite sides are congruent.

$AB = \sqrt{(3+5)^2+(2-0)^2} = \sqrt{8^2+2^2} = \sqrt{68} = 2\sqrt{17}$

$DC = \sqrt{(5+3)^2+(6-4)^2} = \sqrt{8^2+2^2} = \sqrt{68} = 2\sqrt{17}$

$\overline{AB} \cong \overline{DC}$

$AD = \sqrt{(4-0)^2+(-3+5)^2} = \sqrt{4^2+2^2} = \sqrt{20} = 2\sqrt{5}$

$BC = \sqrt{(6-2)^2+(5-3)^2} = \sqrt{4^2+2^2} = \sqrt{20} = 2\sqrt{5}$

$\overline{AD} \cong \overline{BC}$

b) Show that 1 pair of opposite sides are both congruent and parallel.

$AB = \sqrt{(3+5)^2+(2-0)^2} = \sqrt{8^2+2^2} = \sqrt{68} = 2\sqrt{17}$

$DC = \sqrt{(5+3)^2+(6-4)^2} = \sqrt{8^2+2^2} = \sqrt{68} = 2\sqrt{17}$

$\overline{AB} \cong \overline{DC}$; $\overline{AB} \parallel \overline{DC}$ (slopes =)

Slope of $\overline{AB} = \frac{2-0}{3+5} = \boxed{\frac{1}{4}}$ Slope of $\overline{DC} = \frac{4-6}{-3-5} = \boxed{\frac{1}{4}}$

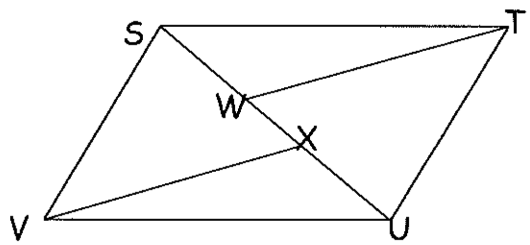
c) Show that the diagonals bisect each other.

Midpt. of $\overline{AC}$: $\left(\frac{-5+5}{2}, \frac{0+6}{2}\right) = (0,3)$

Midpt. of $\overline{BD}$: $\left(\frac{3-3}{2}, \frac{2+4}{2}\right) = (0,3)$

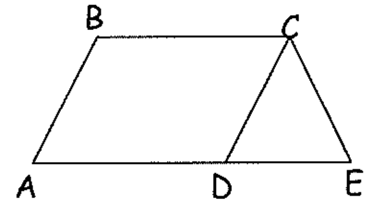
Since diag. have the same midpt., they bisect each other.

2. Given: STUV is a parallelogram; $\measuredangle STW \cong \measuredangle UVX$
Prove: $\overline{SW} \cong \overline{XU}$



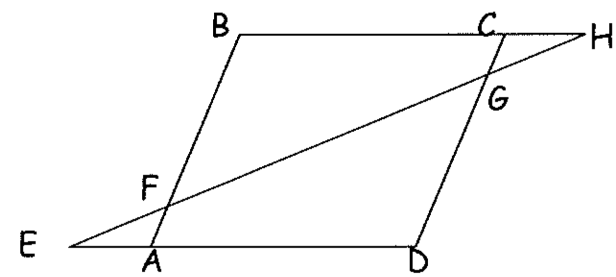
Statement	Reason
1. STUV is a ▱; $\measuredangle STW \cong \measuredangle UVX$	1. given
2. $\overline{VU} \cong \overline{ST}$	2. If ▱, then opp. sides ≅.
3. $\overline{ST} \parallel \overline{VU}$	3. If ▱, then opp. sides ∥.
4. $\measuredangle TSW \cong \measuredangle VUX$	4. If lines ∥, then alt. int. ∡'s ≅.
5. $\triangle TSW \cong \triangle VUX$	5. ASA
6. $\overline{SW} \cong \overline{XU}$	6. CPCTC

3. Given: ABCD is a parallelogram; $\angle A \cong \angle E$
Prove: $\overline{AB} \cong \overline{CE}$



Statement	Reason
1. ABCD is a ▱; $\angle A \cong \angle E$	1. given
2. $\overline{AB} \cong \overline{CD}$	2. If ▱, then opp. sides $\cong$.
3. $\overline{AB} \parallel \overline{CD}$	3. If ▱, then opp. sides $\parallel$.
4. $\angle A \cong \angle CDE$	4. If lines $\parallel$, then corres. $\angle$'s $\cong$.
5. $\angle E \cong \angle CDE$	5. Trans.
6. $\overline{CD} \cong \overline{CE}$	6. If 2 $\angle$'s of a Δ $\cong$, then sides opp. them $\cong$.
7. $\overline{AB} \cong \overline{CE}$	7. Trans.

4. Given: Parallelogram ABCD; $\overline{EF} \cong \overline{HG}$
Prove: $\overline{AF} \cong \overline{CG}$



Statement	Reason
1. ▱ABCD; $\overline{EF} \cong \overline{HG}$	1. given
2. $\overline{AB} \parallel \overline{CD}$	2. If ▱, then opp. sides $\parallel$.
3. $\angle HGC \cong \angle EFA$	3. If lines $\parallel$, then alt. ext. $\angle$'s $\cong$.
4. $\overline{BC} \parallel \overline{AD}$	4. If ▱, then opp. sides $\parallel$.
5. $\angle E \cong \angle H$	5. If lines $\parallel$, then alt. int. $\angle$'s $\cong$.
6. $\Delta EAF \cong \Delta HCG$	6. ASA
7. $\overline{AF} \cong \overline{CG}$	7. CPCTC