Name: Key Geometry

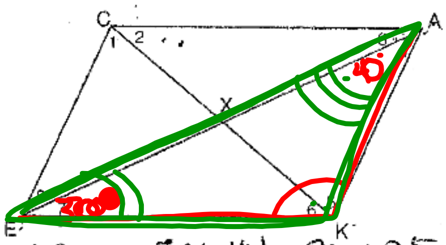
HW 11-1: Quadrilaterals and Parallelograms

Properties of Parallelograms

Parallelograms have all of these properties:
- —both pairs of opposite sides parallel
- —both pairs of opposite sides congruent
- —both pairs of opposite angles congruent
- —diagonals bisect each other

Shade the answers below to discover the corporation whose success is based on the invention of Chester Carlson.

1. If CA = 10, EK = 10
2. If CK = 18, CX = 9
3. If ∠CEK = 85°, ∠CAK = 85°
4. If ∠ECA = 130°, ∠CAK = 50°
5. If ∠1 = 40° and ∠2 = 65°, ∠EKA = 105
6. If EX = 15, EA = 30
7. If CE = 12, KA = 12
8. If ∠8 = 25° and ∠7 = 35°, ∠EKA = 120°
9. If CX = 5x – 44 and XK = 2x + 25, then x = 23
10. If ∠7 = 30° and ∠4 = 40°, ∠EKA = 110
11. If CE = 3x + 5 and AK = 7x – 15, then x = 5
12. If ∠ECA = 6x – 20 and ∠EKA = 2x + 80, then x = 25
13. If ∠CAE = 35°, ∠AEK = 35
14. If ∠2 = 100° and ∠3 = 20°, ∠CXA = 60
15. If ∠CEK = 80°, ∠EKA = 100
16. ∠1 + ∠2 + ∠3 + ∠4 + ∠5 + ∠6 + ∠7 + ∠8 = 360



$5x-44=2x+25$

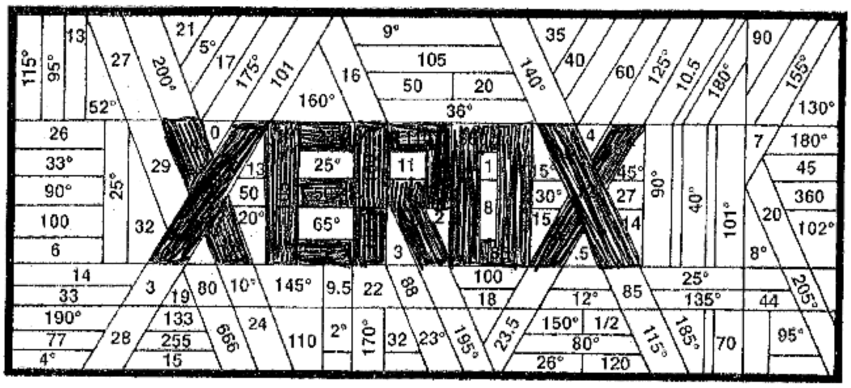
$3x=69$

$3x+5=7x-15$

$-7x-5 \quad -7x-5$

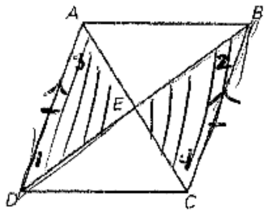
$-4x=-20$

$x=5$



17. **Given:** ▱$ABCD$

Prove: $\triangle AED \cong \triangle CEB$



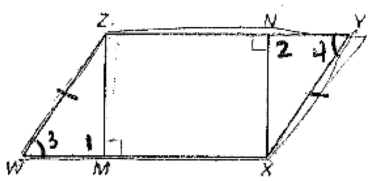
both pairs

Statements	Reasons
1. ▱ABCD	1. Given
2. $\overline{AD} \cong \overline{CB}$ (S)	2. ▱ → both pairs opposite sides ≅
3. $\overline{AD} \parallel \overline{CB}$	3. ▱ → both pairs opposite sides //
4. ∠1 ≅ ∠2 (A)	4. ∥ → ≅ alt. int ∠'s
5. ∠3 ≅ ∠4 (A)	5. ∥ → ≅ alt. int ∠'s
6. $\triangle AED \cong \triangle CEB$	6. ASA

18. **Given:** ▱$WXYZ$

$\overline{ZM} \perp \overline{WX}$, $\overline{XN} \perp \overline{ZY}$

Prove: $\triangle ZMW \cong \triangle XNY$



Statements	Reasons
1. ▱WXYZ, $\overline{ZM} \perp \overline{WX}$, $\overline{XN} \perp \overline{ZY}$	1. Given
2. ∠1 & ∠2 Rt ∠'s	2. ⊥ → Rt. ∠'s
3. ∠1 ≅ ∠2 (A)	3. Rt ∠'s → ≅ ∠'s
4. ∠3 ≅ ∠4 (A)	4. ▱ → opp ∠'s ≅
5. $\overline{ZW} \cong \overline{XY}$ (S)	5. ▱ → opp. sides ≅
6. $\triangle ZMW \cong \triangle XNY$	6. AAS

Lesson 2: Parallelogram Proofs

Parallelogram Theorems

parallel

1) If both pairs of opposite sides of a quadrilateral are ~~congruent~~, then the quadrilateral is a parallelogram.

2) If one pair of opposite sides of a quadrilateral is both congruent and parallel, then the quadrilateral is a parallelogram.

3) If both pairs of opposite angles of a quadrilateral are congruent, then the quadrilateral is a parallelogram.

4) If the diagonals of a quadrilateral bisect each other, then the quadrilateral is a parallelogram.

▱ → Both pairs of opp. sides are $\parallel$

▱ → Both opp. sides $\cong$

▱ → opp. $\measuredangle$'s $\cong$

▱ → diagonals bisect

▱ → consecutive $\measuredangle$'s are supplementary

To prove that a quadrilateral is a parallelogram, prove that any one of the following statements is true:

- Both pairs of opposite sides are parallel.
- Both pairs of opposite sides are congruent.
- One pair of opposite sides is both congruent and parallel.
- Both pairs of opposite angles are congruent.
- The diagonals bisect each other.

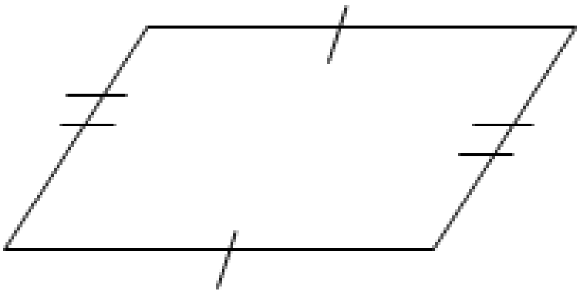
7)	**both** pairs opposite sides // → ▱
8)	**both** pairs opposite sides ≅ → ▱
9)	one pair opposite sides // **and** ≅ → ▱
10)	**both** pairs opposite ∠'s ≅ → ▱
11)	diagonals bisect each other → ▱

to prove ▱

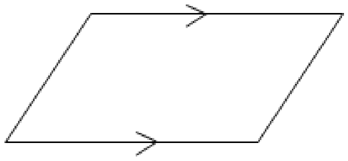
Based on the given information and diagram, determine whether or not we are able to conclude that the quadrilateral is a parallelogram. There may be multiple reasons for some examples.

(a)

yes #8

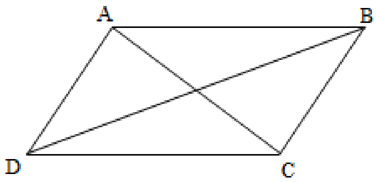


(b)



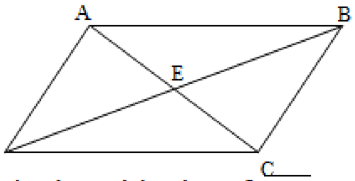
No. Both pairs of sides are NOT ||

(c)



$\Delta ABC \cong \Delta CDA$

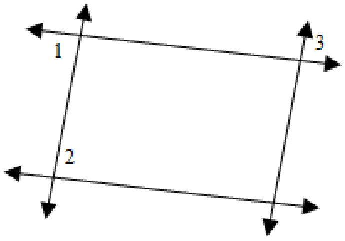
(d)



E is the midpoint of $\overline{AC}$.

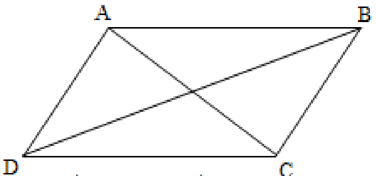
$\overline{DE} \cong \overline{BE}$

(e)



$\angle 1 \cong \angle 2$ $\angle 1 \cong \angle 3$

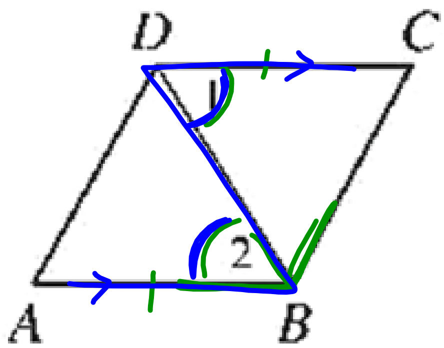
(f)



$\angle BAD \cong \angle CDA$

<u>Ex 1</u>: Given: $\overline{AB} \cong \overline{CD}$, $\angle 1 \cong \angle 2$

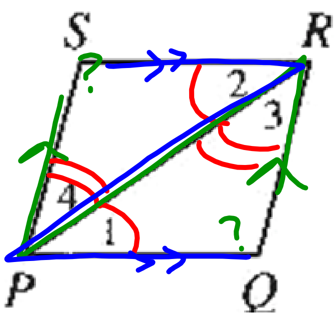
Prove: *ABCD* is a parallelogram



Statements	Reasons
1. $\overline{AB} \cong \overline{CD}$, $\angle 1 \cong \angle 2$	1. Given
2. $\overline{CD} \parallel \overline{AB}$	2. $\cong$ alt. int. $\angle$'s $\rightarrow \parallel$
3. ABCD is a $\square$	3. one pair opp. sides both $\parallel$ & $\cong$ $\rightarrow \square$

<u>Ex 2</u> : Given: $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$

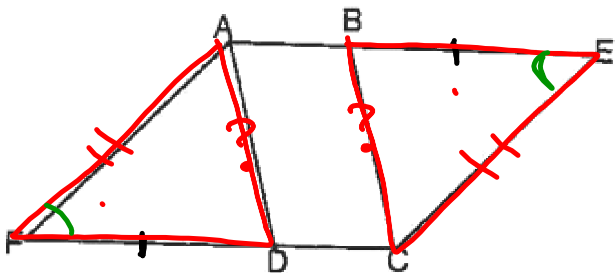
Prove: *PQRS* is a parallelogram



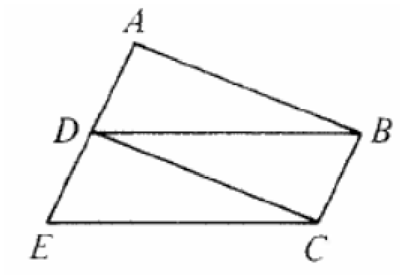
Statements	Reasons
1. $\angle 1 \cong \angle 2$ $\angle 3 \cong \angle 4$	1. Given
2. $\overline{SR} \parallel \overline{QP}$ $\overline{SP} \parallel \overline{QR}$	2 $\cong$ alt. int. $\angle$'s $\rightarrow \parallel$
3. PQRS is a $\square$	3. both pairs of opp sides $\parallel \rightarrow \square$

Ex 3: Given: $AECF$ is a parallelogram; $\overline{FD} \cong \overline{BE}$

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



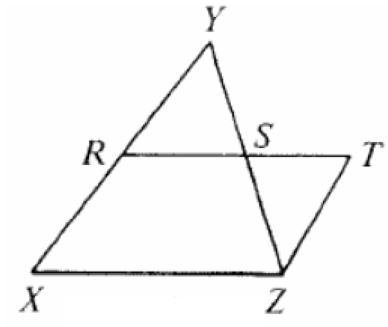
Statements	Reasons
1. AECF is a ▱ $\overline{FD} \cong \overline{BE}$ (S)	1. Given
2. $\overline{AF} \cong \overline{CE}$ (S)	2. ▱ → opp. sides ≅
3. ∠E ≅ ∠F (A)	3. ▱ → opp. ∠'s ≅
4. △AFD ≅ △CEB	4. SAS
5. $\overline{AD} \cong \overline{BC}$	5. CPCTC



Ex 4: Given: $ABCD$ is a parallelogram.
$\overline{AD} \cong \overline{DE}$

Prove: $DBCE$ is a parallelogram.

Statements	Reasons



Ex 5: Given: $\overline{RX} \cong \overline{RY}$
$\Delta RYS \cong \Delta TZS$

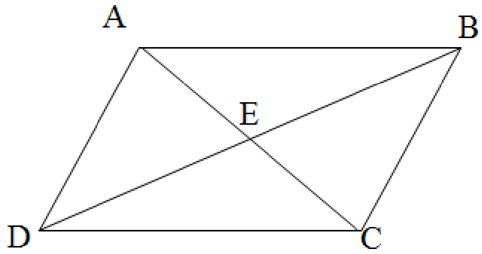
Prove: *RTZX* is a parallelogram.

Statements	Reasons

Ex 6:

Given: E is not the midpoint of $\overline{AC}$

Prove: *ABCD* is not a parallelogram



Statements	Reasons

HW 11-2

Homework Packet 11-2