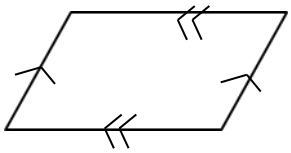
Geometry (G.CO.11) Name: _____

Unit One B - Proving a Quadrilateral is a Parallelogram #1 (IC42) Date: _____Period:_____

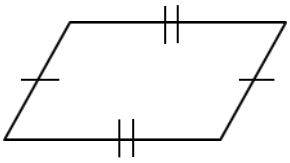
For each diagram below, write the statement that describes the parallelogram property as well as the converse of that statement. The first statement was written to give you an example to follow.

1. 

Statement: parallelogram → both pairs of opposite sides are parallel

Converse: both pairs of opp. sides are // → // gram

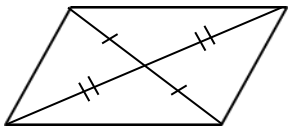
True

2. 

Statement: // gram → both pairs of opp. sides are ≅

Converse: both pairs of opp. sides are ≅ → // gram

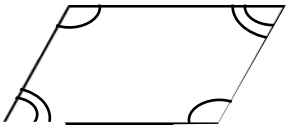
True

3. 

Statement: // gram → diagonals bisect each other

Converse: both diagonals bisect each other → // gram

True

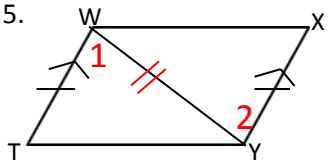
4. 

Statement: // gram → both pairs of opp. ∠'s ≅

Converse: If both pairs of opp. ∠'s ≅ → // gram

True

Now, consider the information in the diagram below. Would it be true if you knew the shape was a parallelogram?

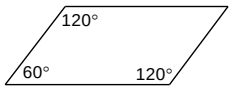
5. 

Given: $\overline{TW} \parallel \overline{YX}$; $\overline{TW} \cong \overline{YX}$

Prove: TWXY is a parallelogram

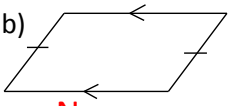
Statements	Reasons
1) $\overline{TW} \parallel \overline{YX}$	1) Given
2) $\angle 1 \cong \angle 2$	2) ∥ lines →Alt Int ∠'s ≅
3) $\overline{WY} \cong \overline{YW}$	3) Reflexive Prop
4) $\overline{WT} \cong \overline{XY}$	4) Given
5) $\Delta TWY \cong \Delta XYW$	5) SAS
6) $\overline{WX} \cong \overline{TY}$	6) CPCTC
7) TWXY is a parallelogram	7) If both pairs of opp. Sides are ≅, then // gram

Example 1: Use the given information to determine which must be a parallelogram. Write the converse that justifies your answer.

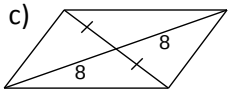
a) 

Yes

If both pairs of opp. ∠'s ≅ → // gram

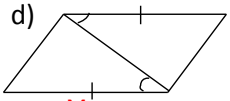
b) 

No

c) 

Yes

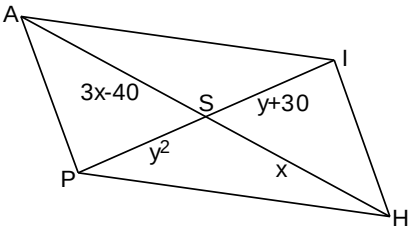
If both diagonals bisect each other → // gram

d) 

Yes

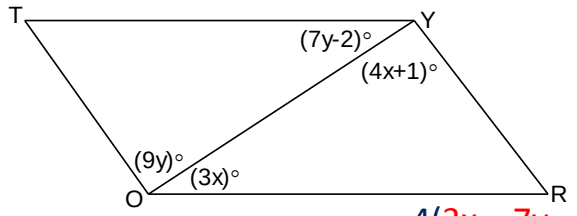
If one pair of opp. sides are ≅ and //, then // gram

Example 2: Find the values of x and y that make each quadrilateral a parallelogram.

a) 

3x -40 = x
2x = 40
x = 20

$y^2 = y + 30$
$y^2 - y - 30 = 0$
$(y - 6)(y + 5) = 0$
$y = 6, -5$
{plug back in to make sure they both work}

b) 

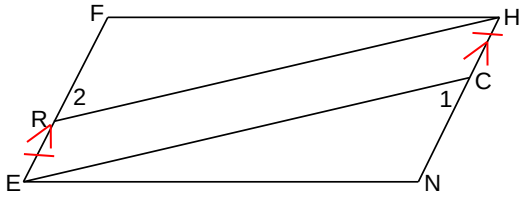
3x = 7y – 2 → 3x – 7y = -2
9y = 4x + 1 → -4x + 9y = 1

3x = 7(5) - 2
3x = 33
x = 11

4(3x – 7y = -2)
3(-4x + 9y = 1)
12x – 28y = -8
-12x + 27y = 3
-y = -5
y = 5

Example 3: Given: Parallelogram FENH; $\overline{ER} \cong \overline{HC}$

Prove: RECH is a parallelogram



Statements	Reasons
1) $\overline{ER} \cong \overline{HC}$	1) Given
2) Parallelogram FENH	2) Given
3) $\overline{RE} \parallel \overline{HC}$	3) def of //gram
4) RECH is a parallelogram	4) One pair of opp. sides // and ≅, then // gram

If one pair of sides is **BOTH** parallel and ≅, then // gram.