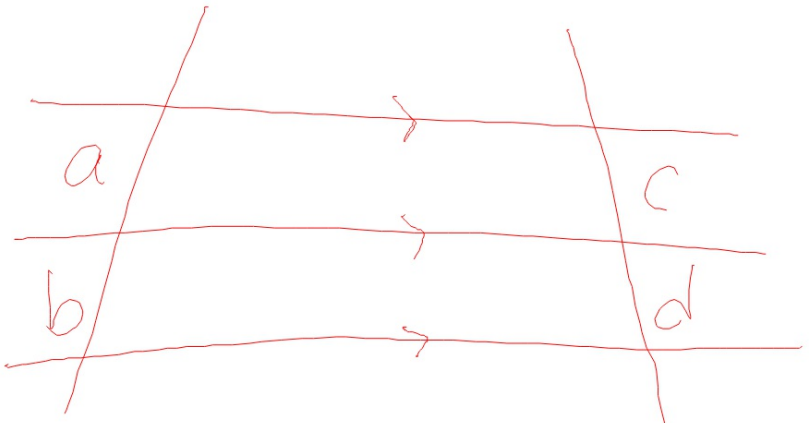
Theorem: If three (or more) parallel lines cut off congruent segments on one transversal, then they cut off $\cong$ segments on every transversal.



If $a=b$, then $c=d$.

Summary:

Parallelograms:

- 4 sides
- $\angle$s add to 360
- Opp sides $\cong$, $\parallel$
- Consec. $\angle$s supp
- Opp $\angle$s $\cong$
- diagonals bisect $\angle$s
- diagonals bisect each other

Questions 5.3 Essential Question: HOW DO YOU PROVE A QUAD IS A ||-GRAM?

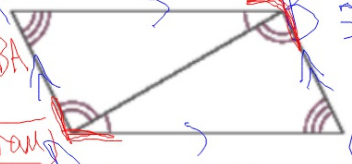
In order to conclude that a figure is a parallelogram, we can use one of the following theorems:

1) If the diagonals of a quadrilateral bisect each other, then the quadrilateral is a parallelogram.
2) If one pair of opposite sides of a quadrilateral is both $\cong$ and $\parallel$, then the quadrilateral is a parallelogram.
3) If both pairs of opposite sides of a quadrilateral are $\cong$, then the quadrilateral is a parallelogram.
4) If both pairs of opposite sides of a quadrilateral are $\parallel$, then the quadrilateral is a parallelogram.
5) If both pairs of opposite $\angle$s of a quadrilateral are $\cong$, then the quadrilateral is a parallelogram.

1. Determine whether the following figures MUST be parallelograms.

a)

b)



If AI Ls ≅ then lines ||

∠ADC ≅ ∠CBA

Opp Ls ≅ ⇒ ||-gram

∠A ≅ ∠C ∠ADB ≅ ∠CBD

∠ABD ≅ ∠CDB

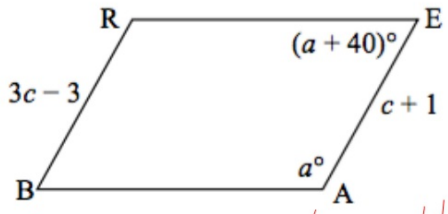
One pair || opp sides

One pair opp ≅ sides

One pair opp sides || and ≅ ⇒ parallelogram

opp sides || ⇒ parallelogram

2. Find the values of a and c for which BREA must be a parallelogram.



SSI Ls supp ⇒ lines ||

$a = 70$ $c = 2$

$a + 40 + a = 180$

$2a + 40 = 180$

$-40 \quad -40$

$\frac{2a}{2} = \frac{140}{2}$

$a = 70$

$3c - 3 = c + 1$

$+3 \quad +3$

$3c = c + 4$

$-c \quad -c$

$\frac{2c}{2} = \frac{4}{2}$

$c = 2$

Summary: