Agenda- 6-11

More Quadrilateral Proofs in the Coordinate Plane

- Check HW 6.10
- Guided Notes 6-11

HW
- Problem Set 6-11
- Midterm remediation Worksheets - Due 2/10
- Quiz Friday
- Test Tuesday

TAKE out Lesson Summary

Geometry Lab Name: _____ Section: _____ Due: _____
Lesson 6-11: Quadrilateral Proofs in the Coordinate Plane – Special Parallelograms and Trapezoids

- Slope: prove two sides/segments are parallel or perpendicular. Remember, you need to connect perpendicular to a RIGHT Δ for a rectangle or right triangle.
- Distance: prove two sides/segments are congruent.
- Midpoint: locate or prove a point is the midpoint of a segment (→ segment bisector).

Fill in Lesson Summary

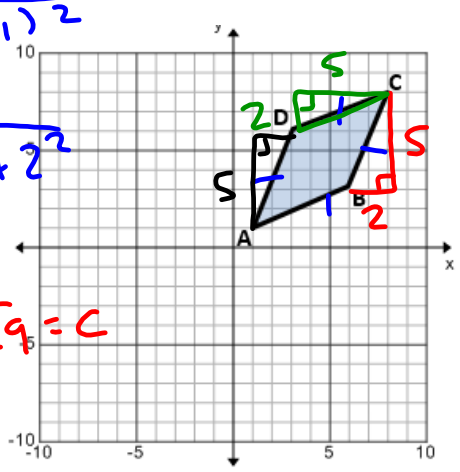
Ways to prove a quadrilateral is a rectangle:		
Show it's a parallelogram w/ One Right Angle	P + ▱ → Rectangle	P CHOICE + 2 SLOPES *RT∠
Show it's a parallelogram w/ Congruent Diagonals	P + ✕ → Rectangle	P CHOICE + 2 DISTANCES
Ways to prove a quadrilateral is a rhombus:		
Show it has 4 Congruent Sides	P + ◇ → Rhombus (ONLY 1 TIME)	4 DISTANCES
Show it's a parallelogram w/ 1 Pair of Consecutive Congruent Sides	P + ◇ → Rhombus	P CHOICE + 2 DISTANCES
Show it's a parallelogram w/ Perpendicular diagonals	P + ✕ → Rhombus	P CHOICE + 2 SLOPES
Ways to prove a quadrilateral is a square:		
Show it is a parallelogram that is both A Rectangle + A Rhombus	P + Rect + Rhom → Square	P + RECT + RHOM CHOICES

Isosceles trapezoid: prove a trapezoid + congruent diagonals, congruent legs, or 1 pair of congruent base angles.

2 SLOPES 2 DISTANCES

$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

1) Prove ABCD is a rhombus where $A(1,1)\,B(6,3)\,C(8,8)\,D(3,6)$ using coordinate geometry. We'll model using the distance formula.



$AB = \sqrt{(6-1)^2+(3-1)^2} = \sqrt{5^2+2^2}$

$BC = \sqrt{25+4} = \sqrt{29}$

$a^2+b^2=c^2 \quad \pm\sqrt{29}=c$

$2^2+5^2=c^2$

$CD = \sqrt{29}$

$DA = \sqrt{29}$

Since AB=BC=CD=DA=$\sqrt{29}$, then $\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{DA}$. Since quadrilateral ABCD has four congruent sides, then ABCD is a RHOMBUS.

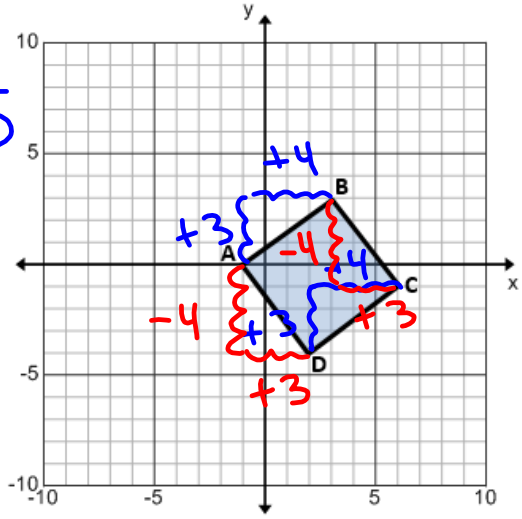
2) Quadrilateral ABCD has vertices A(-1, 0), B(3, 3), C(6, -1), and D(2, -4). Prove that quadrilateral ABCD is a square using coordinate geometry. We'll model using slopes:

$m_{\overline{AB}} = \frac{3}{4}$ } $\overline{AB} \parallel \overline{CD}$

$m_{\overline{CD}} = \frac{3}{4}$

$m_{\overline{AD}} = -\frac{4}{3} = m_{\overline{BC}}$

$\overline{AD} \parallel \overline{BC}$



✓ Parallelogram

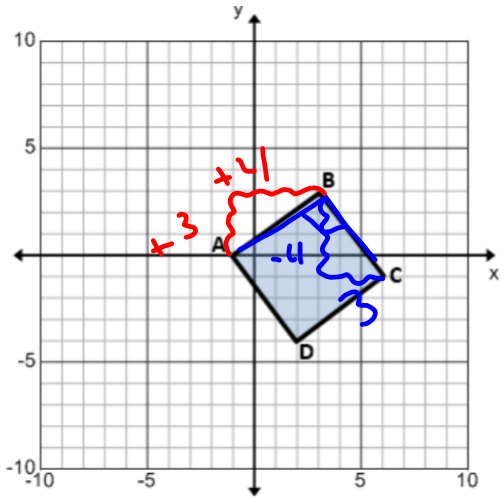
Since $m\overline{AB}$ = $\frac{3}{4}$ = $m\overline{CD}$, then $\overline{AB} \parallel \overline{CD}$

Since $m\overline{BC}$ = $-\frac{4}{3}$ = $m\overline{AD}$, then $\overline{BC} \parallel \overline{AD}$

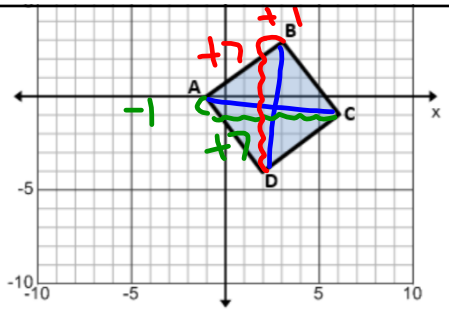
Since quadrilateral ABCD has BOTH PAIRS of opposite sides parallel, then ABCD is a PARALLELOGRAM.

✓ Rectangle

Since $m\overline{AB}$ = $\frac{3}{4}$ and $m\overline{BC}$ = $-\frac{4}{3}$ are OPPOSITE RECIP, then $\overline{AB} \perp \overline{BC}$. Therefore $\angle B$ is a RIGHT $\angle$ by DEFN OF $\perp$ LINES. Since parallelogram ABCD has a right angle, then ABCD is a RECTANGLE



✓ Rhombus



$m_{\overline{AC}} = -\frac{1}{7}$

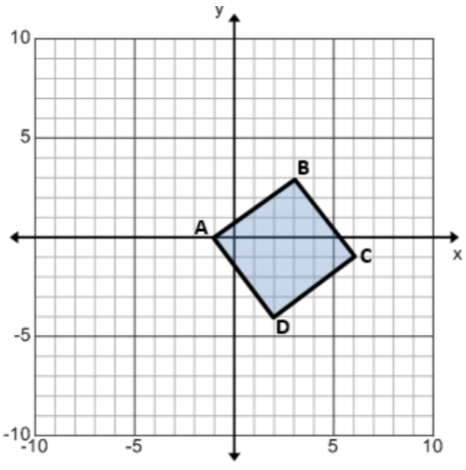
$m_{\overline{BD}} = \frac{7}{1}$

Since $m\overline{AC}$ = $-\frac{1}{7}$ and $m\overline{BD}$ = $\frac{7}{1}$ are OPPOSITE RECIP, then $\overline{AC} \perp \overline{BD}$.

Since parallelogram ABCD has perpendicular diagonals, then ABCD is a RHOMBUS.

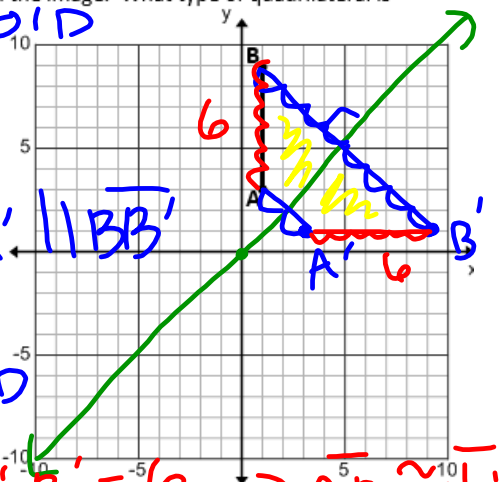
✓ Square

Since parallelogram ABCD is both a RECT and a Rhom, then ABCD is a SQUARE



⊥ IN & OUT SAME AMOUNT

3) Reflect $\overline{AB}$ into the line y=x where A(1,3) and B(1,9). Graph and label the image. What type of quadrilateral is formed by ABB'A'? ISOS TRAPEZOID
Prove it using coordinate geometry:

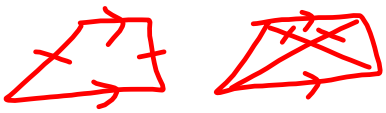


$m = \frac{1}{1} \perp -\frac{1}{1}$

$m\overline{AA'} = -\frac{1}{1}$ } $\overline{AA'} \parallel \overline{BB'}$

$m\overline{BB'} = -\frac{1}{1}$

TRAPEZOID

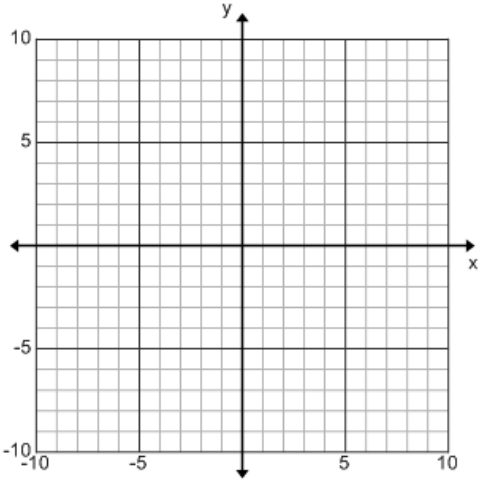


$AB = A'B' = 6 \Rightarrow \overline{AB} \cong \overline{A'B'}$

≅LEGS ABB'A' IS ISOS TRAP

PROBLEM SET 6-11 LAB

1. The vertices of quadrilateral JANE are J(1, 2), A(10, 5), N(9, 8), and E(0, 5). Using coordinate geometry, show that **parallelogram** JANE is a rectangle.



2. The vertices of quadrilateral PQRS are P(0,2), Q(3,6), R(8,6), and S(5,2). Using coordinate geometry, show that **parallelogram** PQRS is a rhombus.