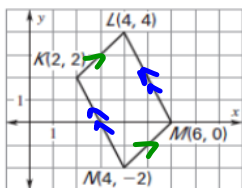Geometry 1.2
Class-Notes D2

Name_____

Date_____Period_____

8.3 Show that a Quadrilateral is a Parallelogram

Goal: Use properties to identify parallelograms.

1. Show the quadrilateral is a parallelogram by using the SLOPE of the sides.

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \frac{\text{rise}}{\text{run}}$$

$$m_{\overline{KL}} = \frac{2}{2} = 1 \qquad m_{\overline{KN}} = -\frac{4}{2} = -2$$

$$m_{\overline{NM}} = \frac{2}{2} = 1 \qquad m_{\overline{LM}} = -\frac{4}{2} = -2$$

PARALLEL   PARALLEL

Which theorem is demonstrated in example 1?

2 PAIR OF PARALLEL OPPOSITE SIDES → Parallelogram

2. Show the quadrilateral is a parallelogram by using the LENGTH of the sides.
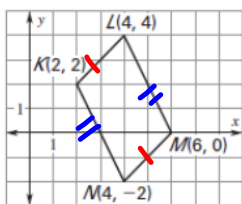
$$KL = \sqrt{2^2 + 2^2} = \sqrt{8}$$

$$NM = \sqrt{2^2 + 2^2} = \sqrt{8}$$

$$LM = \sqrt{4^2 + 2^2} = \sqrt{20}$$

$$KN = \sqrt{4^2 + 2^2} = \sqrt{20}$$
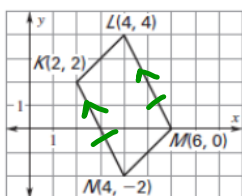
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

or

$$d = \sqrt{x^2 + y^2}$$

Which theorem is demonstrated in example 2?

2 PAIR OF OPPOSITE SIDES ≅ ⟹ PA------

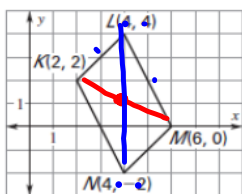**3.** Show the quadrilateral is a parallelogram by using the SLOPE and LENGTH of one pair of opposite sides.

$$m_{\overline{KN}} = -\frac{4}{2} = -2 \qquad m_{\overline{LM}} = -\frac{4}{2} = -2$$

$$KN = \sqrt{4^2 + 2^2} = \sqrt{20} \qquad LM = \sqrt{4^2 + 2^2} = \sqrt{20}$$

Which theorem is demonstrated in example 3?

ONE PAIR OF OPPOSITE SIDES IS BOTH ≅ AND // → PARALLELOGRAM

4. Show the quadrilateral is a parallelogram by using the DIAGONALS MIDPOINT.

MIDPOINT OF $\overline{KM}$:

$$\left(\frac{2+6}{2}, \frac{2+0}{2}\right) = (4, 1)$$

MIDPOINT OF $\overline{LN}$:

$$\left(\frac{4+4}{2}, \frac{4+(-2)}{2}\right) = (4, 1)$$

Which theorem is demonstrated in example 4?

DIAGONALS BISECT EACH OTHER ∴ PARALLELOGRAM