March 21

GUIDED NOTES: Properties of Trapezoids and Kites

A **trapezoid** is a quadrilateral with exactly one pair of parallel sides, called *bases*, and two nonparallel sides, called *legs*.

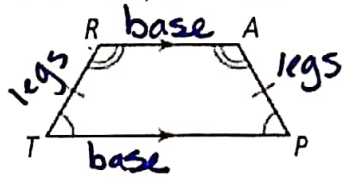
Isosceles Trapezoids

An **isosceles trapezoid** is a trapezoid with congruent legs.

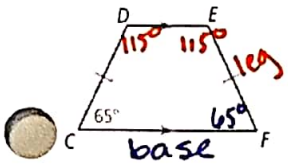
A trapezoid is isosceles if there is only:

- One set of parallel sides (bases)
- Base angles are congruent
- Legs are congruent
- Diagonals are congruent
- Opposite angles are supplementary (leg angles)

$\angle T \cong \angle P, \angle R \cong \angle A$



EX1: CDEP is an isosceles trapezoid and m∠C = 65. What are m∠D, m∠E, and m∠F?



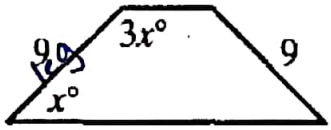
∠D = 115°

∠E = 115°

∠F = 65°

180 − 65 = 115°

EX2: The following is an isosceles trapezoid. What is the value of x?



$x + 3x = 180$

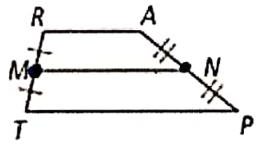
$\frac{4x}{4} = \frac{180}{4}$

$x = 45$

Trapezoid Midsegment

The **median** (also called the midsegment) of a trapezoid is a segment that connects the midpoint of one leg to the midpoint of the other leg.

Theorem: If a quadrilateral is a trapezoid, then a) the midsegment is parallel to the bases and b) the length of the midsegment is half the sum of the lengths of the bases

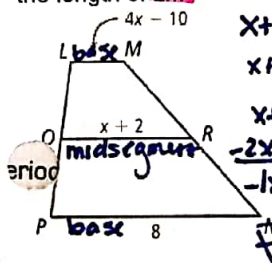


(1) $\overline{MN} \parallel \overline{TP}, \overline{MN} \parallel \overline{RA}$, and

(2) $MN = \frac{1}{2}(TP + RA)$

midsegment = .5(base + other base)

EX3: QR is the midsegment of trapezoid LMNP. What is x and the length of LM?



$x + 2 = .5(4x - 10 + 8)$

$x + 2 = .5(4x - 2)$

$x + 2 = 2x - 1$

$-2x \quad -2x$

$-1x + 2 = -1$

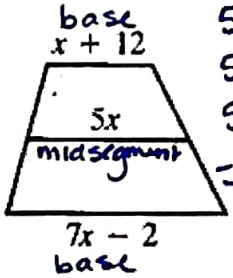
$-2 \quad -2$

$\frac{-1x}{-1} = \frac{-3}{-1}$

$x = 3$

$LM = 4(3) - 10 = 2$

EX4: Find the length of the midsegment.



$5x = .5(x + 12 + 7x - 2)$

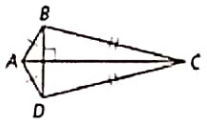
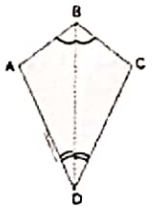
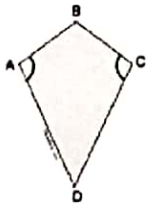
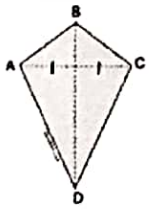
$5x = .5(8x + 10)$

$5x = 4x + 5$

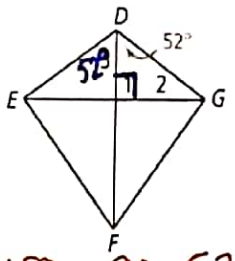
$-4x \quad -4x$

$x = 5$

$5(5) = 25$

Kite	A kite is a quadrilateral with two pairs of adjacent, congruent sides.	If a quadrilateral is a kite, then:			
		Its diagonals are perpendicular.	~~its~~ one diagonal bisect the opposite angles.	One pair of opposite angles are congruent.	One diagonal bisects the other.
		$\overline{AC} \perp \overline{BD}$ 			

EX 5: Quadrilateral DEFG is a kite. What are m∠1, m∠2, and m∠3?



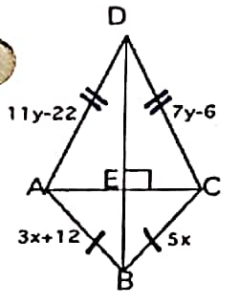
$\angle 1 = 90^\circ$

$\angle 2 = 38^\circ$

$\angle 3 = 52^\circ$

$180 - 90 - 52 = 38^\circ$

EX6: Quadrilateral ABCD is a kite. Solve for x and y.



$3x + 12 = 5x$

$-3x \quad -3x$

$\frac{12}{2} = \frac{2x}{2}$

$6 = x$

$11y - 22 = 7y - 6$

$-7y \quad -7y$

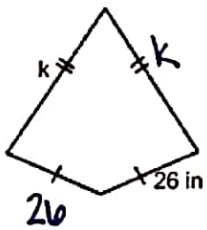
$4y - 22 = -6$

$+22 \quad +22$

$\frac{4y}{4} = \frac{16}{4}$

$y = 4$

EX7: Find k if the perimeter of the kite is 118 inches



$k + k + 26 + 26 = 118$

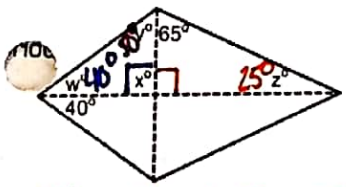
$2k + 52 = 118$

$-52 \quad -52$

$\frac{2k}{2} = \frac{66}{2}$

$k = 33$

EX8: Find the missing information for the following kite.



$w = 40^\circ$

$x = 90^\circ$

$y = 50^\circ$

$z = 25^\circ$

$180 - 90 - 65 = 25^\circ$

$180 - 90 - 40 = 50^\circ$