Types of Quadrilaterals and their Characteristics
Describe a polygon...
What is a diagonal?
Describe the difference between **convex** and **concave** polygons.
What is a quadrilateral?
Parallelogram: a quad. whose opposite sides are parallel.

Facts:
- opposite sides are $\cong$
- opposite angles are $\cong$
- consecutive angles $= 180^\circ$
- diagonals bisect each other
Rectangle: a parallelogram whose interior angles are congruent.

- an equiangular parallelogram
- same facts as parallelogram PLUS
- all angles are congruent (90°)
- diagonals are congruent
Rhombus: a parallelogram whose sides are congruent. • an equilateral parallelogram
• same facts as parallelogram PLUS
• all sides are congruent
• diagonals are perpendicular
• diagonals bisect angles
Square: a parallelogram whose sides AND angles are congruent.

- a regular parallelogram
- an equilateral rectangle
- an equiangular rhombus
- same facts as parallelogram, rectangle, and rhombus
Kite: a quadrilateral that has 2 pairs of $\cong$ consecutive sides, but opposite sides are NOT $\cong$.

- 2 pairs of consecutive sides $\cong$
- one pair of opposite angles are $\cong$
- diagonals are perpendicular
Trapezoid: a quadrilateral with exactly one pair of opposite sides parallel.

- parallel sides are called the bases
- non-parallel sides are called legs
- angles along the bases are called base angles
Isosceles Trapezoid: a trapezoid with congruent legs

- characteristics of trapezoid
- legs are $\cong$
- base angles are $\cong$
- diagonals are $\cong$
Midsegment Theorem:
the midsegment of a trapezoid is parallel to each base and its length is half the sum of the lengths of its bases.

$$AD \parallel MN \parallel BC$$

midsegment = \( \frac{b_1 + b_2}{2} \)
Examples:
Find the missing angles.

\[
\begin{align*}
37^\circ + 143^\circ + z + 37^\circ &= 360^\circ \\
143^\circ + 37^\circ &= 180^\circ \\
143^\circ + z &= 180^\circ \\
z &= 37^\circ
\end{align*}
\]
Ex 1:

Name the ....
a) bases $\overline{CS \, \overline{AT}}$
b) legs $\overline{CA \, \overline{ST}}$
c) base $\angle$s $\angle C < \angle S < \angle A < \angle T$
d) diagonals $\overline{CT \, \overline{AS}}$
c) opposite $\angle$s $\angle C + \angle T$
$\angle A + \angle S$
Ex 2:

Find ....

a) $m \angle LI = 120$

b) $m \angle LC = 90$

c) $TL = 17$

\[
\frac{23 + 11}{2} = \frac{34}{2} = 17
\]
Ex 3:

Find ....

a) \( x \) \( \frac{13}{3} \)

b) all \( \text{Ls} \)

\[
\frac{117}{x} = \frac{5}{3}\varphi \quad \text{base angles} = \frac{63}{126}
\]
Ex 4: The following is a rectangle. Find the variables.

\[ 6y - 18 = 90 \]
\[ 6y = 108 \]
\[ y = 18 \]

\[ 3x + 5 = 26 \]
\[ 3x = 21 \]
\[ x = 7 \]
Ex 5: The following is a rhombus. Find the variables.

\[ y = 28.5^\circ \]

\[ \frac{7x - 11}{4x + 25} \]

\[ \frac{3x - 11}{25} = \frac{11}{3} \quad x = 12 \]

\[ \frac{123 + 123}{246} = \frac{360 - 246}{114} = \frac{57}{114} = \frac{28.5}{57.0} \]
Ex 6: Find all the angles if the $m\angle TOP = 110^\circ$ and $m\angle OPM = 85^\circ$
Quadrilateral SRPQ is a rhombus. Quadrilateral LSPM is a rectangle.

Find all the angles.
HW

pg 319 #5 - 19

pg 325 #3 - 10