Quadrilaterals & Triangles Review

Know the properties of all 7 quadrilaterals

- Kite

- Trapezoid

- Isosceles Trapezoid

- Parallelogram

- Rhombus

- Rectangle

- Square

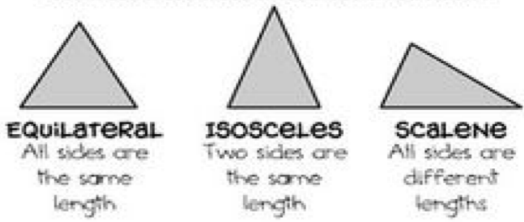**4 sides

**360 degrees total in a quadrilateral

Quadrilaterals Graphic Organizer

5.3 Kite and Trapezoid Properties, 5.5 Properties of Parallelograms, 5.6 Properties of Special Quads
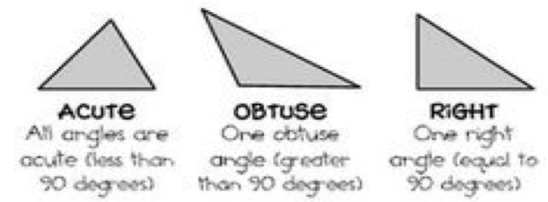
| Quadrilateral Name	Side Properties	Angle Properties	Diagonals Properties
Kite A quadrilateral with two distinct pairs of congruent consecutive sides.	- In a kite there are two pair of congruent sides	- Non-vertex angles are congruent - Vertex angles are bisected by a diagonal	- Diagonals are $\perp$ - Diagonal connecting vertex angles is the $\perp$ bisector of the other diagonal
Trapezoid A quadrilateral with exactly one pair of parallel sides.	- The two parallel sides of the trapezoid are called the bases	- The consecutive angles between the bases of the trapezoid are supplementary	
Isosceles Trapezoid A trapezoid with two congruent legs.	- In an isosceles trapezoid the non-parallel sides are congruent	- The bases angles of an isosceles trapezoid are congruent	- The diagonal of an isosceles trapezoid are congruent
Parallelogram A quadrilateral with two pairs of parallel sides.	- Opposite sides are congruent	- Opposite angles are congruent - Consecutive angles are supplementary	- The diagonals bisect each other
Rhombus An equilateral parallelogram.	All of the same properties of a parallelogram - Opposite sides are congruent	All of the same properties of a parallelogram - Opposite angles are congruent - Consecutive angles are supplementary	All of the same properties of a parallelogram and… - The diagonals of a rhombus are $\perp$ bisectors of one another - The diagonals of a rhombus are angle bisectors
Rectangles An equiangular parallelogram.	All of the same properties of a parallelogram - Opposite sides are congruent	All of the same properties of a parallelogram - Opposite angles are congruent - Consecutive angles are supplementary	All the same properties of a parallelogram and… - The diagonals of a rectangle are congruent - The diagonals of a rectangle bisect one another
Squares An equiangular and equilateral parallelogram. A regular quadrilateral.	All of the same properties of a parallelogram - Opposite sides are congruent	All of the same properties of a parallelogram - Opposite angles are congruent - Consecutive angles are supplementary	All of the same properties of a parallelogram and… - The diagonals of a square are congruent, $\perp$, bisect one another

Triangles

CLASSIFYING TRIANGLES BY THEIR SIDES

EQUILATERAL
All sides are the same length

ISOSCELES
Two sides are the same length

SCALENE
All sides are different lengths

CLASSIFYING TRIANGLES BY THEIR ANGLES

ACUTE
All angles are acute (less than 90 degrees)

OBTUSE
One obtuse angle (greater than 90 degrees)

RIGHT
One right angle (equal to 90 degrees)

Exterior Angle Theorem

The Exterior angle, <D, equals the sum of the 2 remote interior angles:
m<D = m<A + m<B

<A
+
<B
<C
<D

Ex.

40

40 + 70 = 110

70   110
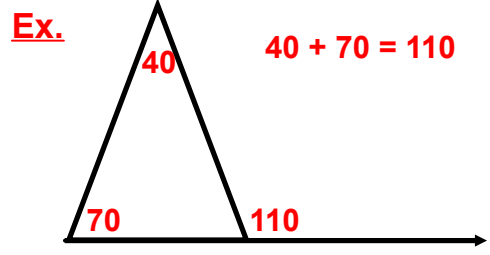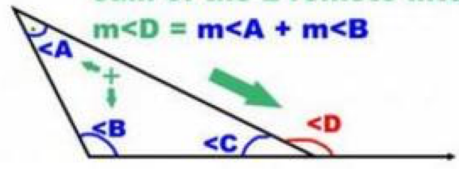
**180 degrees total in a triangle

Triangle Inequality

- The smallest side is across from the smallest angle.
  $\angle A$ is the smallest angle, $\therefore \overline{BC}$ is the smallest side.
- The largest angle is across from the largest side.
  $\angle B$ is the largest angle, $\therefore \overline{AC}$ is the largest side.

B
AB = 4.3 cm
89°
BC = 3.2 cm
54°
C
37°
AC = 5.3 cm
A
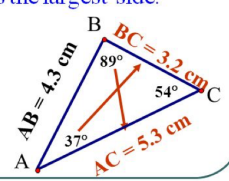
Triangles

**The sum of the lengths of two sides of a Triangle must be greater than the third side.

Ex. {3, 4, 5} yes, this is a triangle
   {3, 3, 6} NO, not a triangle (3 + 3 = 6)
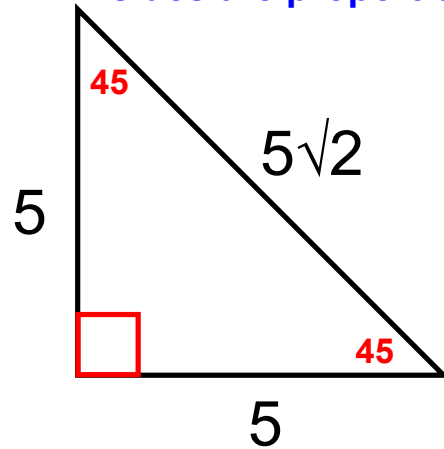   **{3, 2, 6} NO, not a triangle (3+2 < 6)**

**An unknown side of a triangle must be greater than the difference but less than the sum of the two known sides.

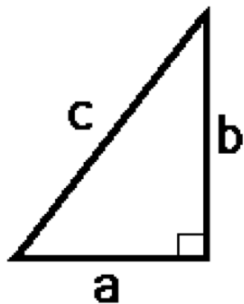**Ex. If you know sides 7 and 11 of a triangle, the third side, x, must be:**
   11 - 7 < x < 11 + 7
   4 < x < 18

45 - 45 - 90 Triangle

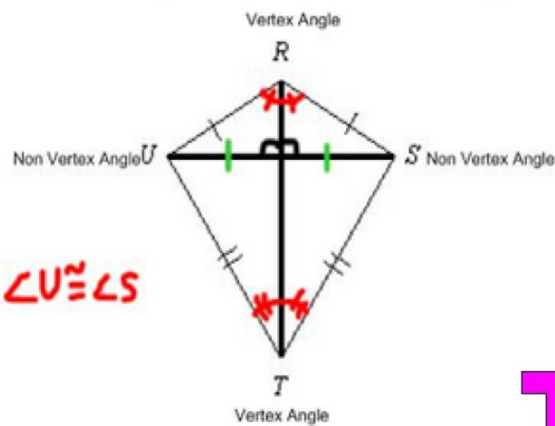***sides are proportional**

45

$5\sqrt{2}$

5

5

45

Pythagorean Theorem

c

b

a

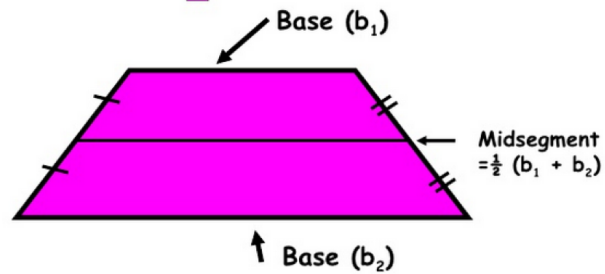$$a^2 + b^2 = c^2$$

Watch for in kites, rhombuses, rectangles, and squares! (right triangles)

1) Diagonals are perpendicular.
2) 2 pairs of consecutive congruent sides.
3) The non-vertex angles are congruent.
4) Diagonal between non-vertex angles is bisected by other diagonal.
5) Vertex angles are bisected by diagonal.

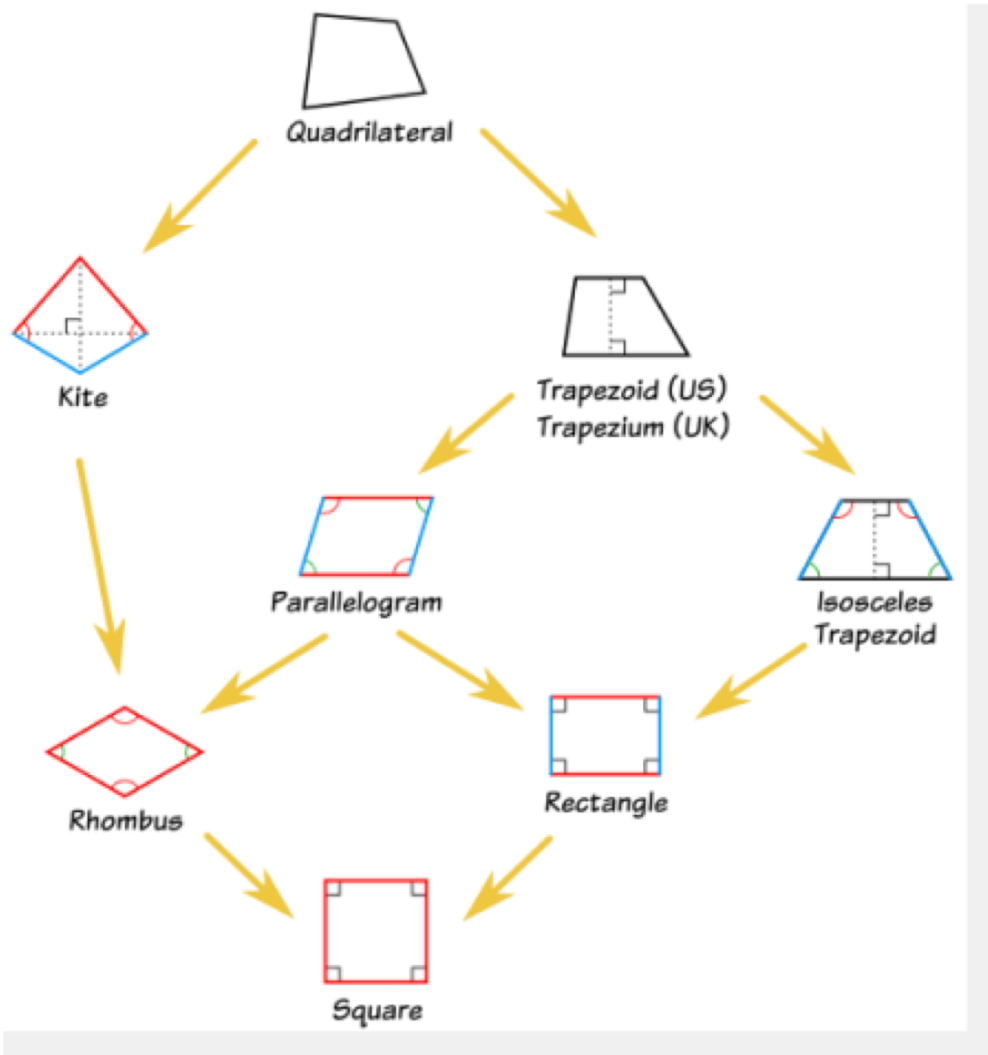Vertex Angle
R

Non Vertex Angle U

S Non Vertex Angle

$\angle U \cong \angle S$

T
Vertex Angle

Trapezoid

Base (b_1)

Midsegment
$= \frac{1}{2} (b_1 + b_2)$

↑ Base (b_2)

In a trapezoid, the midsegment connects the midpoints of the two legs

Quadrilateral Family Tree

To Prove a Quadrilateral is a Parallelogram

1. *Prove both pairs of opposite sides are parallel.*
2. *Prove both pairs of opposite sides are congruent.*
3. Prove both pairs of opposite angles are congruent.
4. Prove the diagonals bisect each other.
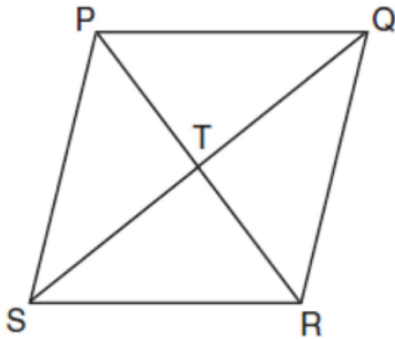5. **Prove one pair of opposite sides is both congruent and parallel.**
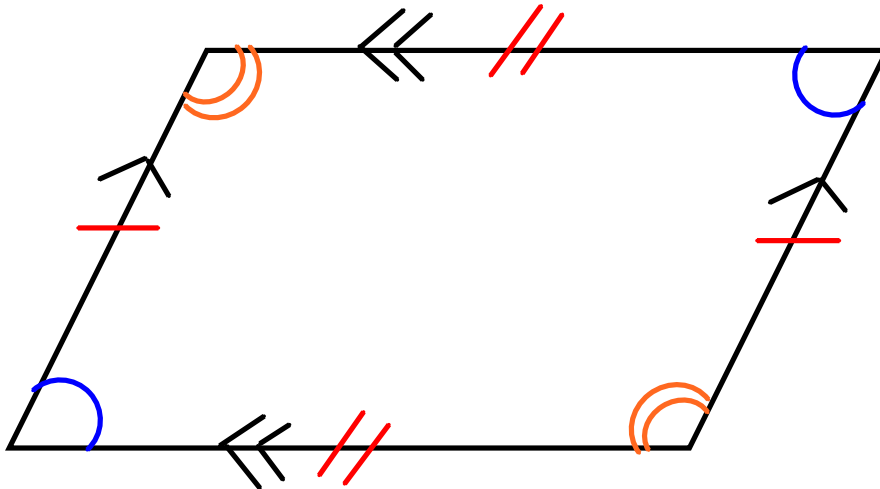
≅ Diagonals

- Rectangle, Square, Isosceles Trapezoid
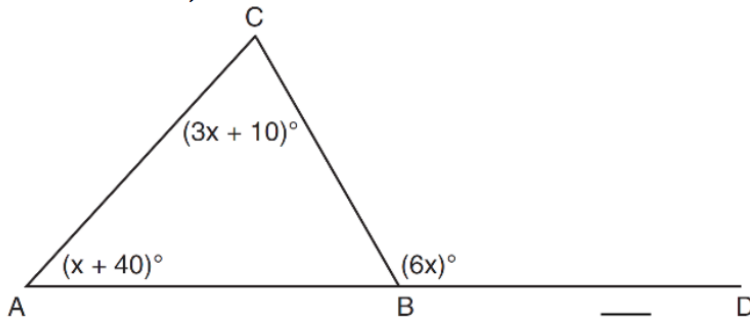
⊥ Diagonals

- Kite, Rhombus, Square

In the diagram of rhombus *PQRS* below, the
diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point T, $PR = 16$,
and $QS = 30$. Determine and state the perimeter of
PQRS.

In the diagram of $\triangle ABC$ below, $\overline{AB}$ is extended to
point D. If $m\angle CAB = x + 40$, $m\angle ACB = 3x + 10$,
$m\angle CBD = 6x$, what is $m\angle CAB$?

. Which statement is *not* always true about a
  parallelogram?
  1) The diagonals are congruent.
  2) The opposite sides are congruent.
  3) The opposite angles are congruent.
  4) The opposite sides are parallel.

. Which statement is true about every
  parallelogram?
  1) All four sides are congruent.
  2) The interior angles are all congruent.
  3) Two pairs of opposite sides are congruent.
  4) The diagonals are perpendicular to each
     other.

. In quadrilateral *ABCD*, the diagonals bisect its
  angles. If the diagonals are *not* congruent,
  quadrilateral *ABCD* must be a
  1) square
  2) rectangle
  3) rhombus
  4) Trapezoid

. Which quadrilateral does *not* always have
  congruent diagonals?
  1) isosceles trapezoid
  2) rectangle
  3) rhombus
  4) square