

8-6 Trapezoids

Trapezoid:

*A quadrilateral with exactly one pair of parallel sides.

Bases:

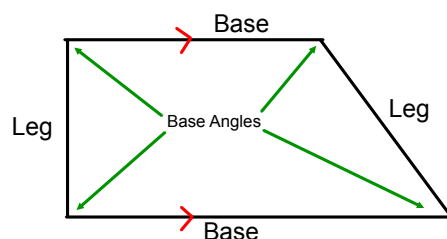
*The parallel sides of the trapezoid.

Legs:

*Nonparallel sides of the trapezoid.

Base angles:

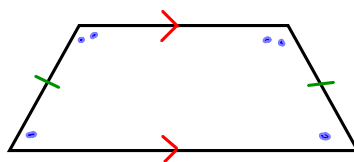
*Angles formed by a base



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Isosceles Trapezoid:

*A trapezoid with congruent legs.

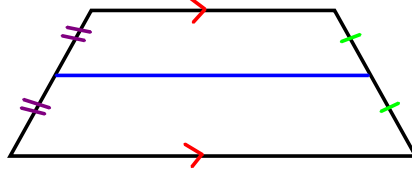


*Both pair of base angles are congruent.

*Diagonals are congruent.

Median (Midsegment):

*The segment that joins the midpoints of the legs of the trapezoid



*Parallel to the bases.

**Median is one-half the sum of the bases.
(add the bases together and divide by 2)**

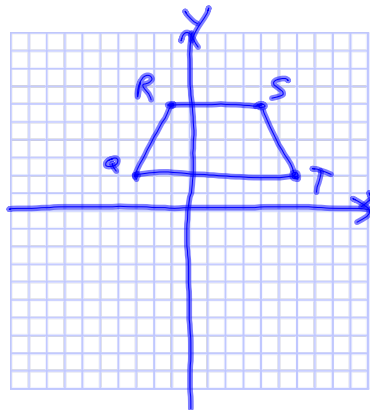
$$\frac{1}{2}(\text{Base 1} + \text{Base 2}) \quad \text{OR} \quad \frac{(\text{Base 1} + \text{Base 2})}{2}$$

Example 1:

QRST is a quadrilateral with vertices
Q(-3,2), R(-1,6), S(4,6) T(6,2).

- a. Verify that QRST is a trapezoid.

*RS and QT are Parallel
Both have slope of zero.*



- b. Determine whether QRST is an isosceles trapezoid.
EXPLAIN.

Distance Formula

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

$$QR = \sqrt{2^2 + 4^2}$$

$$QR = \sqrt{4 + 16} = \sqrt{20}$$

$$ST = \sqrt{(6 - 4)^2 + (2 - 6)^2}$$

$$ST = \sqrt{2^2 + (-4)^2}$$

$$ST = \sqrt{4 + 16} = \sqrt{20}$$

*legs are equal,
So it is a isosceles trapezoid.*

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Example 2:

DEFG is an isosceles trapezoid with median-segment MN.

a. Find DG if EF = 20 and MN = 30. *DG = 40*

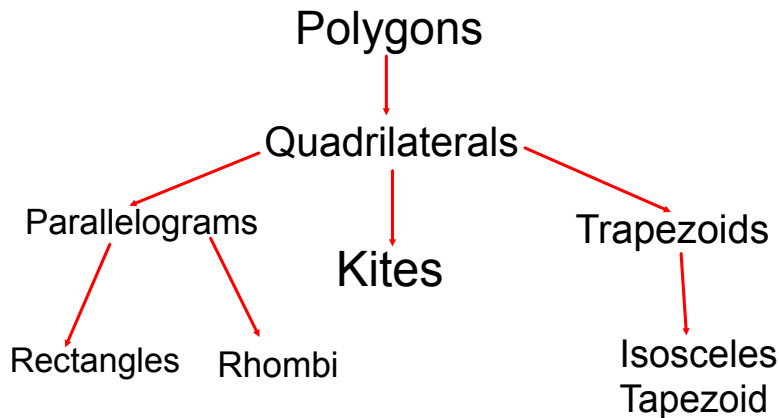
b. Find the measures of angles 1, 2, 3, and 4, if $m\angle 1 = 3x + 5$ and $m\angle 3 = 6x - 5$.

Handwritten calculations:

A.) $\frac{b_1 + b_2}{2} = MN$
 $\frac{20 + b_2}{2} = 30$
 $b_2 + 20 = 2(30)$
 $b_2 + 20 = 60$
 $-20 \quad -20$
 $b_2 = 40$

$3x + 5 + 6x - 5 = 180$
 $9x = 180$
 $x = 20$
 $m\angle 1 = 3(20) + 5$
 $m\angle 1 \text{ and } m\angle 2 = 65^\circ$
 $m\angle 3 = 6(20) - 5$
 $m\angle 3 \text{ and } m\angle 4 = 115^\circ$

Hierarchy of Polygons



Kite
 **A quadrilateral with exactly two distinct pairs of adjacent congruent sides