Geometry CC – Mr. Valentino
**Unit 9 Lesson 4: Properties of Trapezoids**

Name: _____

Date: _____    Per: _____

Aim: What are the properties of trapezoids?

Do Now: Mark the box with a **check mark** of the quadrilateral for which the property is **always** true.

| Special Properties | Rectangle | Rhombus | Square |
|---|---|---|---|
| All ∠'s are ≅ | ✓ |  | ✓ |
| All sides are ≅. |  | ✓ | ✓ |
| Diagonals are ≅. | ✓ |  | ✓ |
| Diagonals are ⊥. |  | ✓ | ✓ |
| Diagonals bisect the vertex angles. |  | ✓ | ✓ |
| Both pairs of opposite sides are ≅. | ✓ | ✓ | ✓ |
| Both pairs of opposite ∠'s are ≅ | ✓ | ✓ | ✓ |
| Any two consecutive vertex ∠'s are supplementary. | ✓ | ✓ | ✓ |
| Diagonals bisect each other. | ✓ | ✓ | ✓ |

∡A and ∡D ⎫ supp.
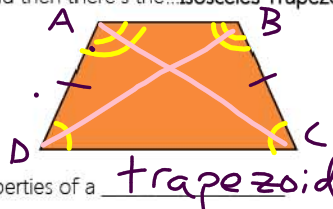∡B and ∡C ⎭

AB // DC

Properties of a Trapezoid



★ 1. A trapezoid has __at least one pair of parallel sides__

    -We call the parallel sides the __bases__
    -We call the non-parallel sides the __legs__

★ 2. Consecutive angles from different bases are __supplementary__

And then there's the...**Isosceles Trapezoid!**

$AD \cong BC$

$\angle D \cong \angle C$

$\angle A \cong \angle B$

$AC \cong BD$

1. An isosceles trapezoid has all the properties of a __trapezoid__

2. The legs are __congruent__

3. The angles on the same base are __congruent__

4. The diagonals are __congruent__

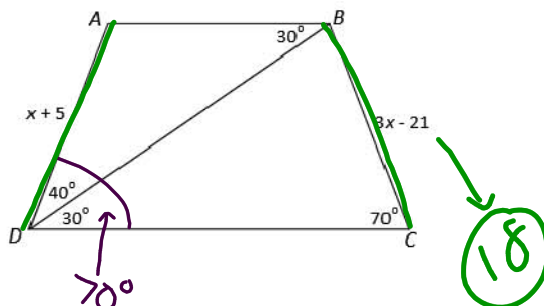★ to be isosceles, you must have **one** pair of NON-parallel, congruent sides ★

1) *ABCD* is an isosceles trapezoid, with $\overline{AB} \parallel \overline{DC}$. If $AD = 2x + y$, $BC = 7y - 2x$, and $x = 3$, find *AD*.

2) Refer to the diagram to the right:

a] Explain why *ABCD* is an isosceles trapezoid.

★ base ∠'s are ≅

b] Find *AD* and *BC*.

$$X + 5 = 3x - 21$$
$$\underline{-x \quad +21} \quad \underline{-x \quad +21}$$
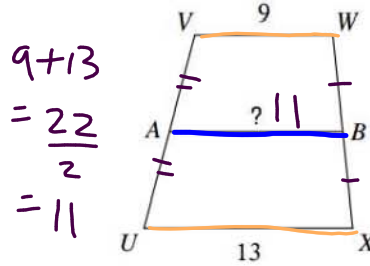$$\frac{26}{2} = \frac{2x}{2}$$
$$x = 13$$

$x + 5$

$13 + 5$

⑱

$x + 5$

$13 + 5$

⑱

(diagram labels: A, B, 30°, $x+5$, $3x-21$, 40°, 30°, D, 70°, C, 70°)

## Median of a Trapezoid

Find the lengths of the indicated segment if the segment drawn in the trapezoid is a median.

$9+13$
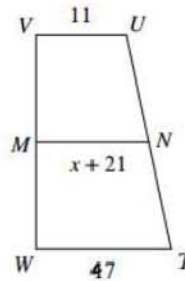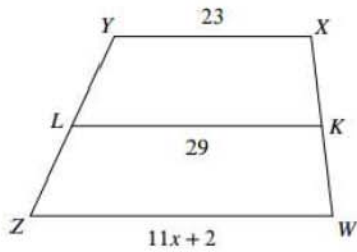$= 22$
$\dfrac{}{2}$
$= 11$

(Trapezoid VWXU with $VW = 9$, median $AB = ?$, $UX = 13$)

★ median - a segment that joins the midpoints of the nonparallel sides

★ its length is half the sum of the bases

(Trapezoid EFGD with $EF = 13$, median $ST = 19$, $DG = ?$)

★ HW: ★
this ★ # 3 - # 7 ★
★

Find the value of x:

(Trapezoid YXWZ with $YX = 23$, median $LK = 29$, $ZW = 11x+2$)

(Trapezoid VUTW with $VU = 11$, median $MN = x+21$, $WT = 47$)
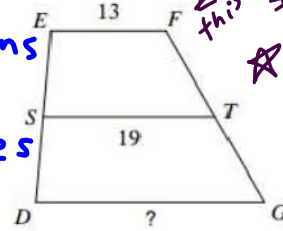
### Practice Problems

3) $ABCD$ is an isosceles trapezoid, with $\overline{AB} \parallel \overline{DC}$. If $m\angle ADC = 80$, find the following:

   a] $m\angle BCD$

   b] $m\angle DAB$

4) $ABCD$ is an isosceles trapezoid, with $\overline{AB} \parallel \overline{DC}$. If $AD = 3x+4$, and $BC = 22$, what is $x$?

5) $ABCD$ is an isosceles trapezoid, with $\overline{AB} \,//\, \overline{DC}$. If $AD = 2y - 7$, and $BC = y + 5$, find $AD$.

6) $ABCD$ is an isosceles trapezoid, with $\overline{AB} \,//\, \overline{DC}$. If $m\angle ADC = 4x - 5$ and $m\angle BCD = 3x + 15$, find the value of $x$.

7) $ABCD$ is an isosceles trapezoid, with $\overline{AB} \,//\, \overline{DC}$. If $m\angle ADC = 4x + 20$ and $m\angle DAB = 8x - 20$, find the measures of **all four** angles in the trapezoid.

8) $ABCD$ is a trapezoid, with $\overline{AB} \,//\, \overline{DC}$. Diagonal $BD$ is drawn. $m\angle ABD = 30$ and $m\angle ABC = 100$.

   a] Find $m\angle BDC$

   b] Find $m\angle BCD$

9) $ABCD$ is a trapezoid, with $\overline{AB} \,//\, \overline{DC}$. Diagonal $BD$ is drawn. $m\angle ADB = 60$ and $m\angle ADC = 80$.

   a] Find $m\angle DAB$

   b] Find $m\angle ABD$