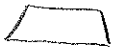
11.3 Area of Trapezoids

Objectives:

- Find the areas of trapezoids
- Use the measure of a trapezoid's median to find its area

Review of the properties of trapezoids



- 2 parallel bases
- 2 non-parallel legs

If it is an isosceles trapezoid it also has:

- $\cong$ lower base $\angle$'s
- $\cong$ upper base $\angle$'s
- $\cong$ diagonals

$$\text{Area}_{Trap} = \frac{1}{2} h (b_1 + b_2)$$

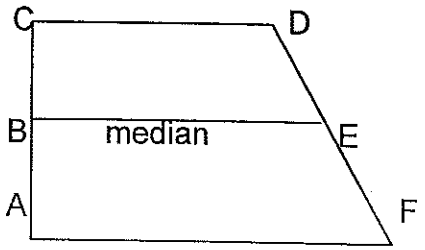
$$\text{Area}_{Trap} = Mh$$

M = median h = height

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

Medians of Trapezoids:

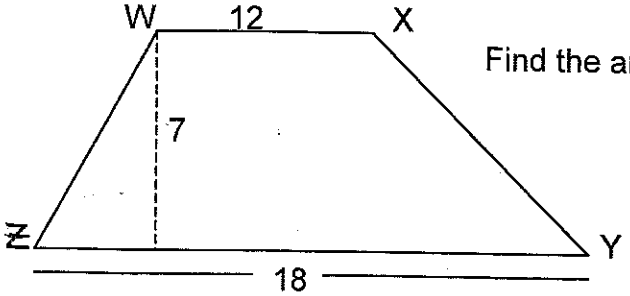
- The median is the line segment joining the midpoints of the nonparallel sides of a trapezoid



The measure of the median of a trapezoid equals the average of the measures of the bases

$M = \frac{1}{2}(b_1 + b_2)$ (b_1 & b_2 are bases)

Examples:



Find the area of the trapezoid.

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

$= \frac{1}{2}(7)(12+18)$

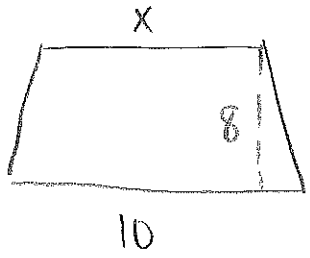
$= \frac{1}{2}(7)(30)$

$= \frac{1}{2}(210)$

$= \boxed{105}$

2. Find the shorter base of the trapezoid if the trapezoid's area is 52, its altitude is 8, and its longer base is 10.

$A = 52 \quad h = 8$



$52 = \frac{1}{2}(8)(b_1 + 10)$

$52 = 4(b_1 + 10)$

$52 = 4b_1 + 40$

$-40 \qquad -40$

$\frac{12}{4} = \frac{4b_1}{4}$

$\boxed{3 = b_1}$

3. The height of the trapezoid is 12. The bases are 6 and 14. Find the median and the area.

$h = 12 \quad b_1 = 6 \quad b_2 = 14 \quad M = ? \quad A = ?$

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

$A = \frac{1}{2}(12)(20)$

$= 6(20)$

$= \boxed{120}$

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

$= \frac{1}{2}(20)$

$= \boxed{10}$

$A = Mh$

$= 12(10)$

$= 120$ ✓