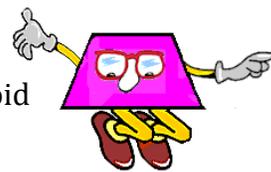




10.1 Day 2 - Area of Trapezoids



10.1.c: Develop and apply the formula for the area of a trapezoid

Investigation #1

- 1st Please go to: <https://ggbm.at/NR6gkNck> Drag the vertices (corners) of the trapezoid around to make a trapezoid of your choice. Then drag the black slider at the bottom of the page.
- 2nd How does the area of the BIG triangle compare with the area of the original trapezoid? *The areas are the same!*
- 3rd What do you have to do with base 1 and base 2 in order to find the base in the BIG triangle? *add them!
base of Δ = base 1 + base 2*
- 4th What is the formula for this BIG triangle (using your answer from step 3)?
$$A_{\text{BIG } \Delta} = \frac{(\text{base}_1 + \text{base}_2) \cdot h}{2}$$
- 5th What is the formula for the original trapezoid based off of your answers to steps 3 and 4?
$$A_{\text{Trap}} = \frac{(\text{base}_1 + \text{base}_2) \cdot h}{2}$$

Investigation #2

- 1st Please go to: <https://ggbm.at/WbyfjVCJ> Use the rotation slider to transform the trapezoid by rotation into a rectangle.
- 2nd Adjust the width of the trapezoid by dragging on the corners. Adjust the height of the trapezoid by using the slider.
- 3rd How does the area of the trapezoid compare to the area of the rectangle? *The areas are the same!*
- 4th What do you think the median is if base 1 is 3 and base 2 is 5?
$$\frac{3+5}{2} = 4$$
- 5th What do you think the equation of the median is using base 1 and base 2? *Median = $\frac{\text{base}_1 + \text{base}_2}{2}$*
- 6th What other equation (besides the one you came up with in the first investigation) could be used to find the area of a trapezoid?
$$A_{\text{Trap}} = M \cdot h$$

Area of a Trapezoid

$$A_{\text{Trap}} = \frac{(b_1 + b_2) \cdot h}{2} \text{ or } A_{\text{Trap}} = M \cdot h$$

Median of a Trapezoid

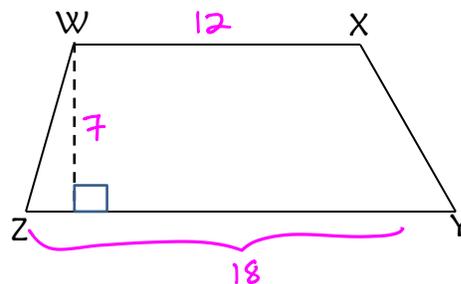
$$M = \frac{b_1 + b_2}{2} \text{ (average of bases)}$$

1) Given: Trapezoid WXYZ, with height 7, lower base 18, and upper base 12.

Find: The area of WXYZ.

opt 1: $A = \frac{(12+18) \cdot 7}{2}$
 $A = 105 \text{ u}^2$

opt 2: $M = \frac{12+18}{2} = 15$
 $A = 15 \cdot 7$
 $A = 105 \text{ u}^2$



2) Given the height of a trapezoid is 12, and the bases are 6 and 14, find the median of the trapezoid.

$$h = 12$$

$$b_1 = 6$$

$$b_2 = 14$$

$$M = ?$$

$$M = \frac{b_1 + b_2}{2}$$

$$M = 10 \text{ units}$$

3) Find the area of a trapezoid that has a median of length 10 cm and a height of 7 cm.

$$M = 10$$

$$h = 7$$

$$A = M \cdot h$$

$$A = 10 \cdot 7$$

$$A = 70 \text{ cm}^2$$

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

$$b_1 = ?$$

$$b_2 = 10$$

$$A = 52$$

$$h = 8$$

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

$$52 = \frac{(x + 10) \cdot 8}{2}$$

$$52 = 4(x + 10)$$

$$13 = x + 10$$

$$x = 3 \text{ units}$$

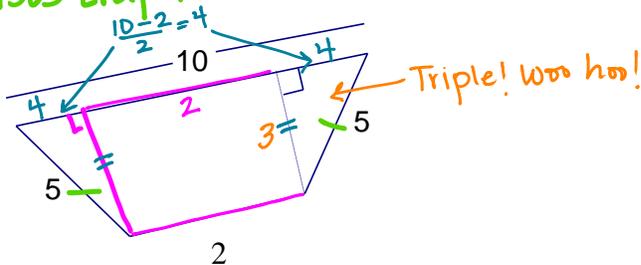
✓ Does 52 equal $\frac{(3+10) \cdot 8}{2}$

$$52 \stackrel{?}{=} 6.5 \cdot 8$$

$$52 \stackrel{?}{=} 52$$

5) Find the area of the trapezoid below.

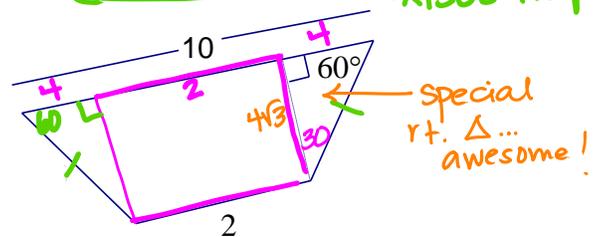
* ISOS trap * so Δ 's are \cong



$$\begin{aligned} A_{\text{Trap}} &= \frac{b_1 + b_2}{2} \cdot h \\ &= \frac{2 + 10}{2} \cdot 3 \\ &= 6 \cdot 3 = 18 \text{ u}^2 \end{aligned}$$

6) Find the exact area of the isosceles trapezoid below.

* ISOS trap



$$\begin{aligned} A_{\text{Trap}} &= \frac{b_1 + b_2}{2} \cdot h \\ &= \frac{2 + 10}{2} \cdot 4\sqrt{3} \\ &= 6 \cdot 4\sqrt{3} = 24\sqrt{3} \text{ u}^2 \end{aligned}$$

7) Find b_1 of the trapezoid in which $A = 4x^2 \text{ in}^2$, $b_2 = 3x \text{ in.}$, and $h = 2x \text{ in.}$

$$b_1 = ?$$

$$b_2 = 3x$$

$$A = 4x^2$$

$$h = 2x$$

$$A_{\text{Trap}} = \frac{b_1 + b_2}{2} \cdot h$$

$$4x^2 = \frac{(b_1 + 3x) \cdot 2x}{2}$$

$$4x^2 = x(b_1 + 3x)$$

$$4x = b_1 + 3x$$

$$x = b_1$$

$$\text{base 1} = x \text{ in}$$

check:

Does $4x^2$ equal $\frac{(x+3x) \cdot 2x}{2}$

$$4x^2 \stackrel{?}{=} \frac{4x}{2} \cdot 2x$$

$$4x^2 \stackrel{?}{=} 2x \cdot 2x$$

$$4x^2 = 4x^2 \checkmark$$