Module 13d: Trapezoids

Math Practice(s):

-Model with mathematics.

-Attend to precision.

Learning Target(s):

-Derive & apply the formula for the area of trapezoids.

Homework:

HW#17: 13d #1-4

Nov 20-12:32 PM

Warm-up

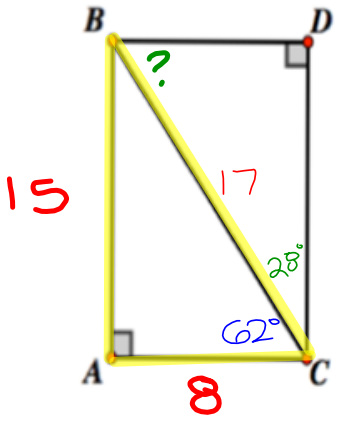
1. In rectangle ABCD (shown to the right), $AC = 8$ and $AB = 15$.

A. Determine the lengths of both diagonals of rectangle ABCD.

$8^2+15^2=c^2$

$BC = 17$ units

$DA = 17$ units



B. Determine the $m\angle ACB$.

$\tan^{-1}\left(\frac{15}{8}\right) = m\angle ACB$

$m\angle ACB = 62°$

C. Determine the $m\angle DCB$ and $m\angle DBC$.

$62+m\angle DCB=90°$

$m\angle DCB = 28°$

$28+90+m\angle DBC=180$

$m\angle DBC = 62°$

(alt. int. $\angle$s $\cong$)

D. Determine the area of ΔBCD and the area of rectangle ABCD.

ΔBCD $\frac{1}{2}bh$

$\frac{1}{2}(8)(15)$

60 units^2

Rectangle ABCD: bh

$8(15)$

120 units^2

E. If rectangle ABCD was dilated about point D by scale factor of $\frac{1}{2}$, what would be the area of the resulting rectangle?

Areas $\left(\frac{1}{2}\right)^2 \rightarrow \frac{1}{4}$

$\frac{1}{4}(120)$

30units^2

Image

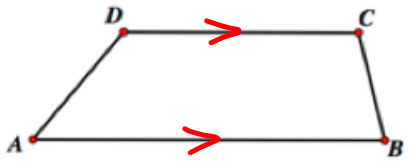
$b=4$ $h=7.5$

$A=4(7.5)$

$=30$units^2

erase to show

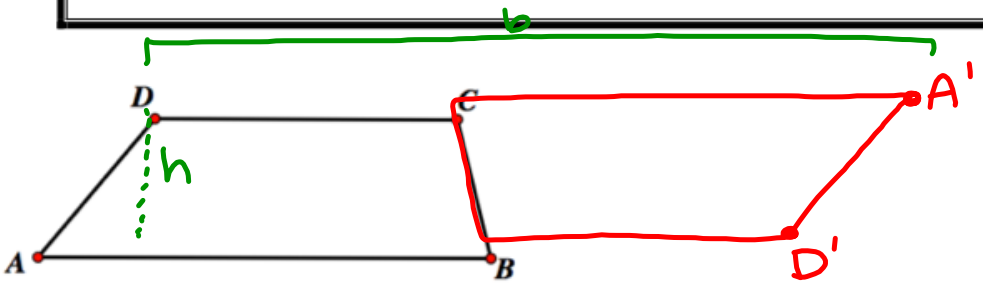
Trapezoid



A quadrilateral

with exactly 1 pair of

opposite || sides.



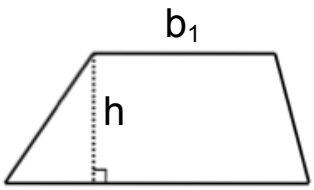
Copy and rotate trapezoid ABCD above to create a familiar shape. What shape does this combined figure make?

A Parallelogram!!! :)

How can we use the above combination to find the formula for the area of a trapezoid?

$\frac{1}{2}h(DC+AB)$

Area of a Trapezoid



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

Example 1: Find the area of trapezoid ABCD. Write your answer in both simplest radical form and a decimal rounded to the nearest tenths place.

$A=\frac{1}{2}(7)(10+15)$

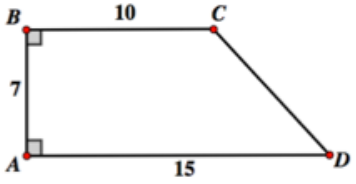
$=3.5\ (25)$

$=87.5\ units^2$

$h=7$

$b_1=10$

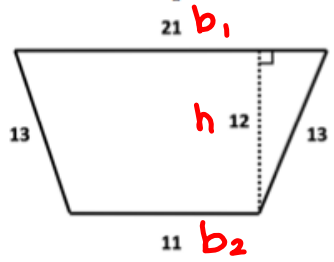
$b_2=15$



Practice

1. Determine the perimeter **AND** the area of each of the following figures.

A.



$P = 21+13+11+13$

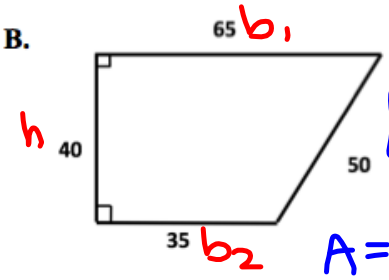
$P = 58 \text{ units}$

$A = \frac{1}{2}(12)(21+11)$

$A = 6(32)$

$A = 192 \text{ units}^2$

B.



$P = 65+50+35+40$

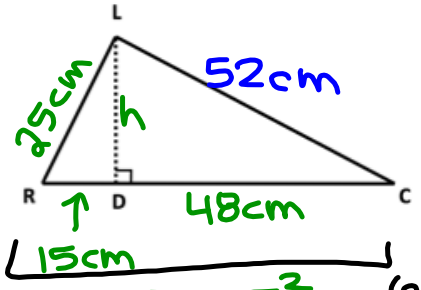
$P = 190 \text{ units}$

$A = \frac{1}{2}(40)(65+35)$

$A = 20(100)$

$A = 2000 \text{ units}^2$

C. In ΔRLC, $RL = 25$ cm, $RD = 15$ cm, $DC = 48$ cm.



$P = 25+15+48+52$

$P = 140 \text{ cm}$

$20^2+48^2 = LC^2$

$LC = 52 \text{ cm}$

$A = 63(20)\frac{1}{2}$

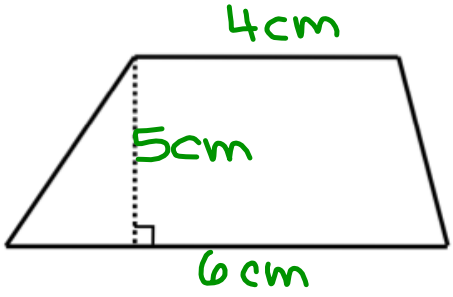
$A = 630 \text{ cm}^2$

$15^2+h^2 = 25^2$

$h = 20 \text{ cm}$

$(DL = 20 \text{ cm})$

2. If the trapezoid to the right has an area of 25 cm.^{2}, what could its dimensions possibly be? Label the dimensions of the figure so that it has an area of 25 cm.^{2}



$25 = \frac{1}{2}h(b_1+b_2)$

$50 = h(b_1+b_2)$