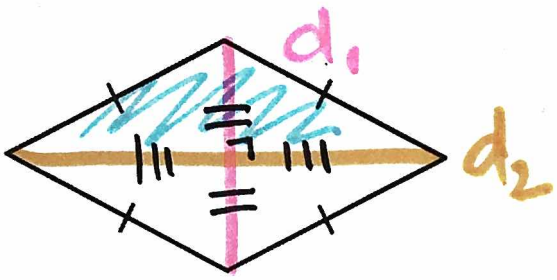
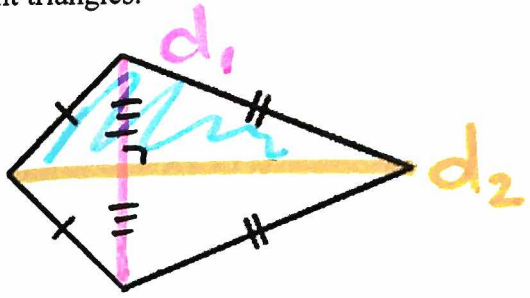
Name: Date: Period: 4

Areas of Quadrilaterals

Learning Objective SWBAT derive & apply formulas for area of quadrilaterals and triangles.

You can divide a rhombus or kite with diagonals d_1 and d_2 into two congruent triangles.





The area of one of those triangles is:

$$\frac{1}{2}bh = \frac{1}{2}(d_2)\left(\frac{1}{2}d_1\right) = \frac{1}{4}d_1d_2$$

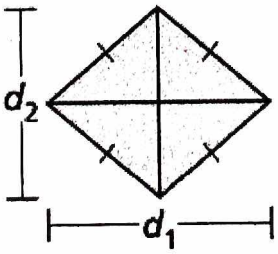
Thus, the area of the rhombus or kite is:

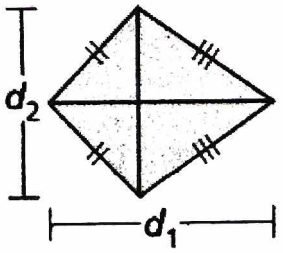
$$2\left(\frac{1}{4}d_1d_2\right) = \frac{1}{2}d_1d_2$$

Area of a Rhombus or Kite

The area of a rhombus or kite with diagonals d_1 and d_2 is:

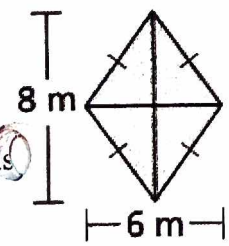
$$A = \frac{1}{2}d_1d_2$$





Examples:

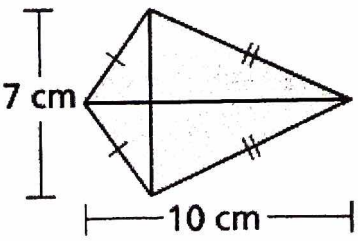
1. Find the area of the rhombus.



$A = \frac{1}{2}(8)(6)$

$A = 24\ m^2$

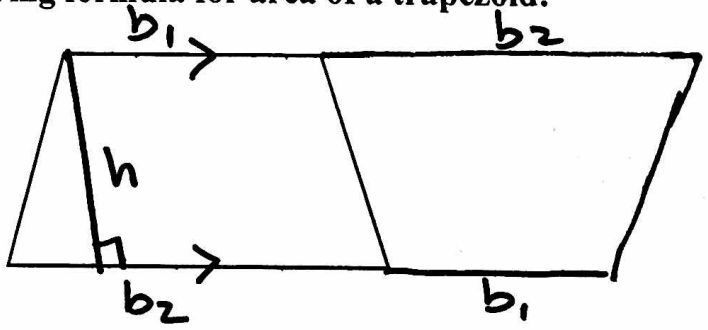
2. Find the area of the kite.



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

$A = 35\ cm^2$

Deriving formula for area of a trapezoid:



① take another ≅ trap. + place it next to orig.

② this creates a ll-gram!
area = $(b_1+b_2)(h)$

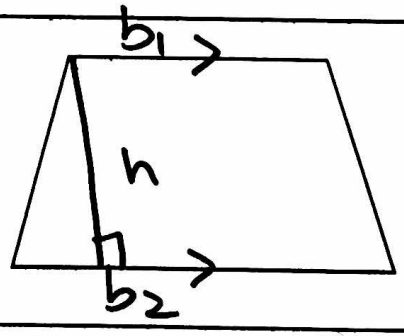
③ ÷ by 2 to get area of trap.

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

Area of a Trapezoid

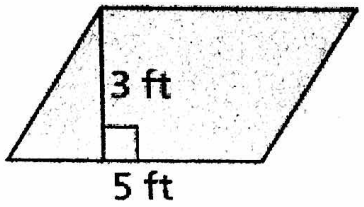
The area of a trapezoid with bases b_1 and b_2 is:

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



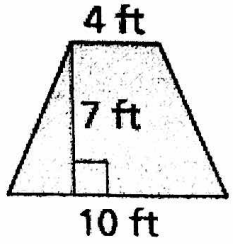
Examples:

3. Find the area of the parallelogram.



$A = (5)(3) = 15 \text{ ft}^2$

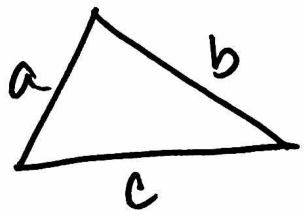
4. Find the area of the trapezoid.



$A = \frac{(4+10)(7)}{2}$

$A = 49 \text{ ft}^2$

ron's Formula for Area of a Triangle



$A = \sqrt{s(s-a)(s-b)(s-c)}$

where $s = \frac{1}{2}(a+b+c)$

Example:

5. Find the area of a triangle with side lengths 6, 9, and 13.

$s = \frac{1}{2}(6+9+13)$

$= 14$

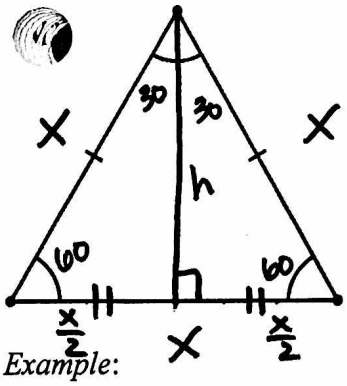
$A = \sqrt{14(14-6)(14-9)(14-13)}$

$A = \sqrt{14 \cdot 8 \cdot 5 \cdot 1}$

$A = \sqrt{7 \cdot 2 \cdot 4 \cdot 2 \cdot 5}$

$\boxed{A = 4\sqrt{35}}$

Area of an Equilateral Triangle $A = \frac{1}{2}bh$



$LL = SL\sqrt{3}$

$h = \frac{x}{2}\sqrt{3}$

$A = \frac{1}{2}(x)\left(\frac{x\sqrt{3}}{2}\right)$

$\boxed{A = \frac{x^2\sqrt{3}}{4}}$

* "x" is a side length

Example:

1. Find the area of an equilateral triangle with side length $7\sqrt{2}$

$A = \frac{(7\sqrt{2})^2\sqrt{3}}{4} = \frac{49 \cdot 2 \cdot \sqrt{3}}{4\ 2} = \boxed{\frac{49\sqrt{3}}{2}}$