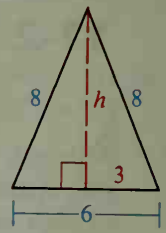
Example 2 Find the area of a triangle with sides 8, 8, and 6.

Solution Draw the altitude to the base shown. Since the triangle is isosceles, this altitude bisects the base.

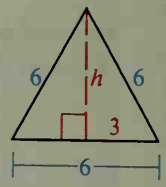
$h^2 + 3^2 = 8^2$ (Pythagorean Theorem)
$h^2 = 64 - 9 = 55$
$h = \sqrt{55}$
$A = \frac{1}{2}bh = \frac{1}{2} \cdot 6 \cdot \sqrt{55} = 3\sqrt{55}$



Example 3 Find the area of an equilateral triangle with side 6.

Solution Draw an altitude. Two 30°-60°-90° triangles are formed.

$h = 3\sqrt{3}$
$A = \frac{1}{2}bh = \frac{1}{2} \cdot 6 \cdot 3\sqrt{3} = 9\sqrt{3}$

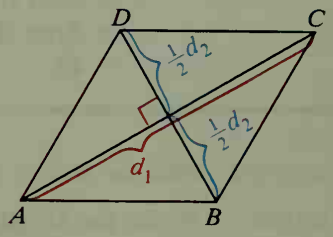


Theorem 11-4

The area of a rhombus equals half the product of its diagonals.
($A = \frac{1}{2}d_1d_2$)

Given: Rhombus $ABCD$ with diagonals d_1 and d_2

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

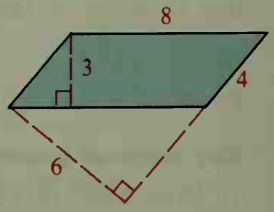


Key steps of proof:

1. $\triangle ADC \cong \triangle ABC$ (SSS)
2. Since $\overline{DB} \perp \overline{AC}$, the area of $\triangle ADC = \frac{1}{2}bh = \frac{1}{2} \cdot d_1 \cdot \frac{1}{2}d_2 = \frac{1}{4}d_1d_2$.
3. Area of rhombus $ABCD = 2 \cdot \frac{1}{4}d_1d_2 = \frac{1}{2}d_1d_2$

Classroom Exercises

1. The area of the parallelogram can be found in two ways:
   a. $A = 8 \cdot \underline{?} = \underline{?}$
   b. $A = 4 \cdot \underline{?} = \underline{?}$



2. Find the areas of $\triangle ABC$, $\triangle DBC$, and $\triangle EBC$.
3. Give two formulas that can be used to find the area of a rhombus. (*Hint*: Every rhombus is also a $\underline{?}$.)