GEOMETRY

11

Name: _____Key_____   Date:_____   Period:_____

SECTION 11.4 THE PYTHAGOREAN THEOREM

VOCABULARY

DEFINITION	EXAMPLE
Base: one side of a figure, sometimes considered the "bottom"	base base
Legs: The two shorter sides of a right triangle (next to the right angle)	leg 2 leg 1
Hypotenuse: The longest side of a right triangle (accross from the right angle)	
Pythagorean Theorem: If a and b are legs of a right triangle and c is the hypotenuse, $a^2 + b^2 = c^2$	$3^2 + 4^2 = 5^2$ $9 + 16 = 25$ ✓ 3 4 5

**Big Idea:** What is the Pythagorean Theorem?

EXPLORATION 1
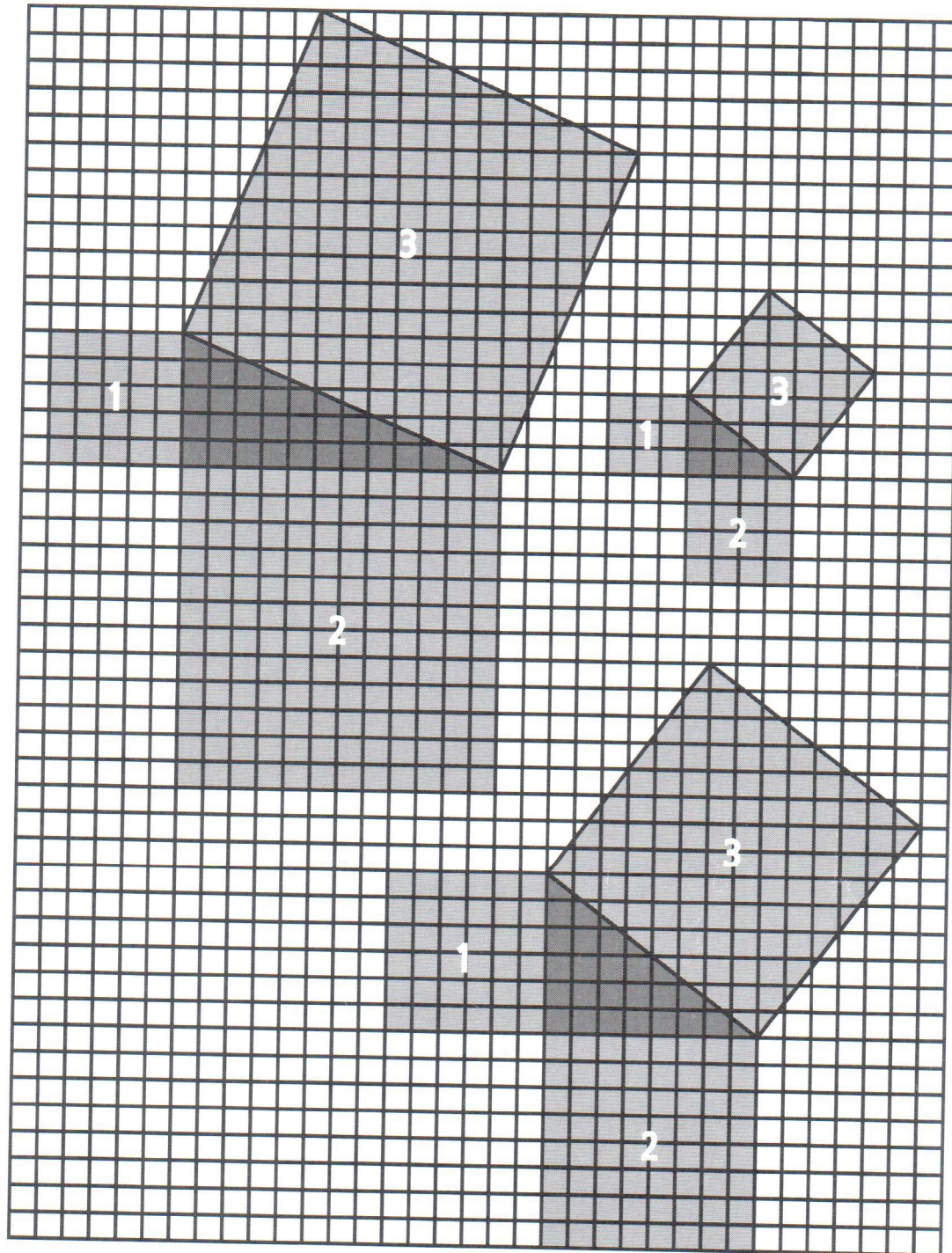
Copy and fill out the table below to record the lengths of the sides and the areas of squares attached to the triangles in the picture.

| Length of Vertical Leg	Length of Horizontal Leg	Length of Hypotenuse	Area of Square 1	Area of Square 2	Area of Square 3
3	4	5	9 +	16 =	25
5	12	13	25 +	144 =	169
6	8	10	36 +	64 =	100

EXPLORATION 2

On the floor, table or board, draw a square with sides 1 meter long. Next, draw a diagonal line from one corner to the opposite corner. Your challenge is to find the length of the diagonal by estimation, checking with a ruler, and then using the Pythagorean theorem.
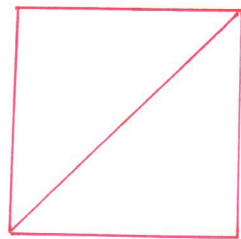
≈ 1.41 m

PRACTICE EXERCISES

1. A right triangle has legs that are 6 inches and 8 inches long. Find the length of the hypotenuse and the area of the triangle.

height
b = 8

C

a = 6
base
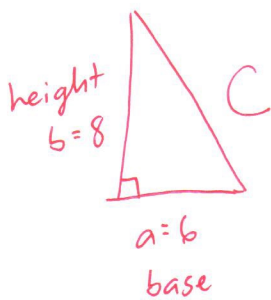
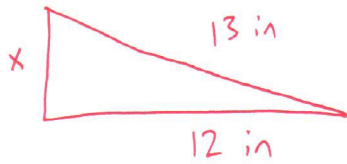$a^2 + b^2 = c^2$

$6^2 + 8^2 = c^2$

$36 + 64 = c^2$

$100 = c^2$

$10^2 = 100$

so

$C = 10_{in}$

$Area = \frac{1}{2} b \cdot h$

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

$= 24 \; in^2$

2. A right triangle has a hypotenuse that is 13 inches long, and one leg that is 12 inches long. Find the length of the other leg. What are the area and perimeter of the triangle?

$$a^2 + b^2 = c^2$$

$$x^2 + 12^2 = 13^2$$

$$x^2 + 144 = 169$$

$$x^2 + 144 - 144 = 169 - 144$$

$$x^2 = 25$$

$$5^2 = 25$$

so $\boxed{x = 5 \text{ in}}$

$$\text{Area} = \frac{1}{2}(12)(5)$$

$$= \boxed{30 \text{ in}^2}$$

$$\text{Perimeter} = 5 + 12 + 13$$

$$= \boxed{30 \text{ in}}$$

SUMMARY (What I learned today)