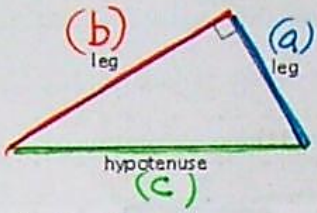
~~ Unit 6, Page 28 ~~

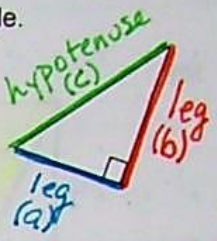
Objectives: I can use patterns to discover the Pythagorean Theorem.

Finding Patterns with the side lengths of Right Triangles

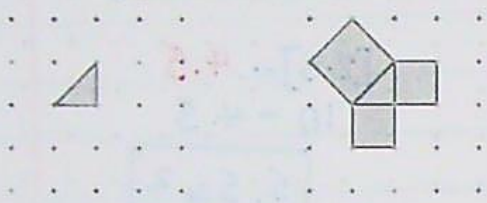
Recall that a right triangle is a triangle with a right, or 90°, angle. The longest side of a right triangle is the side opposite the right angle. We call this side the **hypotenuse** of the triangle. The other two sides are called the **legs**. The right angle of a right triangle is often marked with a square.



Label the legs and the hypotenuse of this right triangle.



Each leg of the right triangle on the left below has a length of 1 unit. Suppose you draw squares on the hypotenuse and legs of the triangle, as shown on the right.



How are the areas of the three squares related?

In this problem, you will look for a relationship among the areas of squares drawn on the sides of right triangles.

Complete the right triangle with the given leg lengths on dot paper. Draw a square on each side of the triangle. Find the areas of the squares and record these results in the table.

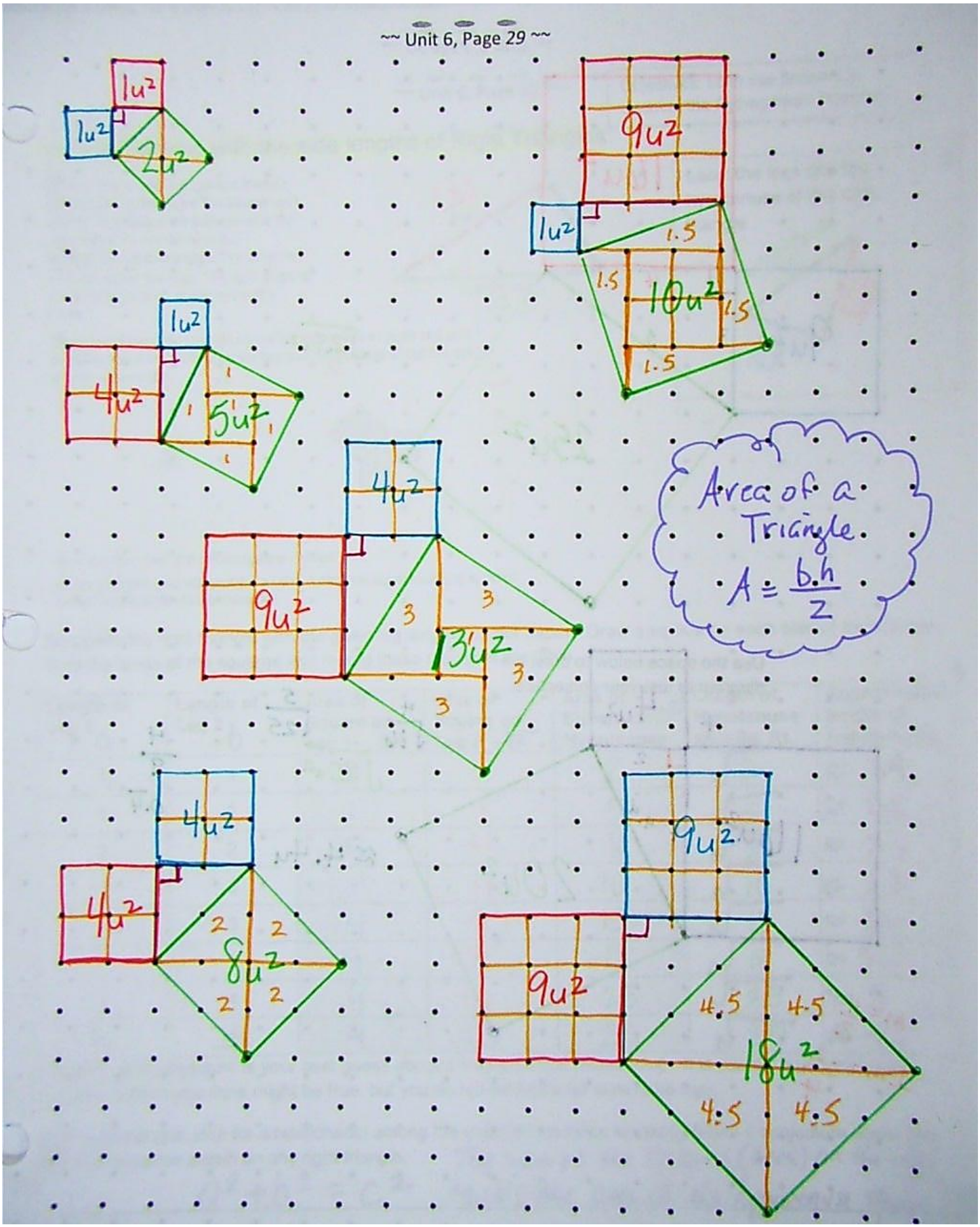
Length of Leg 1 a	Length of Leg 2 b	Area of Square on Leg 1 a^2	+ Area of Square on Leg 2 b^2	= Area of Square on Hypotenuse c^2	Length of Hypotenuse as a Sq. Rt.	Approximate length of Hypotenuse
1	1	1	1	2	$\sqrt{2}$	≈ 1.4
1	2	1	4	5	$\sqrt{5}$	≈ 2.2
2	2	4	4	8	$\sqrt{8}$	≈ 2.8
1	3	1	9	10	$\sqrt{10}$	≈ 3.2
2	3	4	9	13	$\sqrt{13}$	≈ 3.6
3	3	9	9	18	$\sqrt{18}$	≈ 4.2
3	4	9	16	25	$\sqrt{25}$	$= 5$
2	4	4	16	20	$\sqrt{20}$	≈ 4.5

Recall that a conjecture is your best guess about a mathematical relationship. It is usually a generalization about a pattern you think might be true, but you do not yet know for sure to be true.

For each triangle, look for a relationship among the areas of the three squares. Make a conjecture about the areas of squares drawn on any right triangle. The sum of the squares (area) on the legs equals the area of the hypotenuse square.

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

Draw a right triangle with side lengths to test your conjecture. Record these results in the table.


1u²
1u²
2u²
9u²
1u²
1.5
1.5
10u²
1.5
1.5
1u²
4u²
1
1
5u²
1
1
4u²
9u²
3
3
13u²
3
3
Area of a Triangle
A = bh/2
4u²
4u²
2
2
8u²
2
2
9u²
9u²
4.5
4.5
18u²
4.5
4.5