**Right Triangle Investigation**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_

Label each side of the right triangle below using the words *leg* and *hypotenuse.*

 **\_\_\_\_: a \_\_\_\_\_\_\_\_\_\_: c**

**\_\_\_\_: b**

1) Assign each student in your group a different triangle from Table 1 to work with; write each group member’s name in the appropriate box in the “Student Name” column in Table 1.

2) On the graph paper provided, draw your assigned *right triangle* using the given dimensions for the two *legs* (a and b). Connect the two legs to make the *hypotenuse*.

3) Estimate the length of the *hypotenuse* and write that in the table. Why can you not find the *exact* length of the *hypotenuse*, without using a ruler?

4) Using the given length of *leg a*, draw a square off of *leg a* that has a side length equal to the length of *leg a*. Find the area of the square and record this in the appropriate box in the “Square of leg a” column.

5) Repeat the procedure for *leg b* drawing a square off *leg b* that has a side length equal to the length of *leg b*. Record the area of the square in the appropriate box in the “Square of leg b” column.

6) Color each new square using a different colored pencil for each square. **Carefully** cut out *square a* (*a*2), and *square b (b2)*.

7) Place the larger of your two squares along the edge of the hypotenuse and glue or tape it down.

(See diagram to the right.)

8) Using the **least amount of cuts**, cut your smaller square and glue it around the larger square, so that you form a new square off of the hypotenuse (*square c*). (See diagram below.)



9) Count the area of *square c* and record this in the “Area of Square c:” column.

10) Count the length of one side of your new square (*square c*). Record this in the “Actual length of hypotenuse: c” column.

11) Share your results with the rest of your group, and record your group member’s results in the table.

12) Look at the numbers in the 3 columns, “Area of Square a,” “Area of Square b,” and “Area of Square c” for all four triangles and describe the pattern you see.

When you add \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_ it is equal to \_\_\_\_\_\_\_\_\_\_\_.

13) Try out the math for your triangle: the new square (*square c*) is the sum of the two squares of the legs. Write this as an equation below:

 \_\_\_\_\_\_\_\_ square units +\_\_\_\_\_\_\_ square units = \_\_\_\_\_\_\_ square units

 (area of square a) (area of square b) (area of square c)

14) Looking at Table 1, and your partner’s triangles, how does the length of the *hypotenuse* (*c*) relate to $c∙c=c^{2}$? **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

15) Complete Table 2 with your group, using the patterns you found.

16) Summarize the mathematics to find the hypotenuse of a right triangle in the sentence frame below.

 (\_\_\_\_\_\_\_\_)2 + (\_\_\_\_\_\_\_\_)2 = (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)2

Write a letter to a friend who was absent today about how you would find the length of the *hypotenuse* if you were given the length of two *legs* of a right triangle. Use drawings and examples such as the problems you did in Table 1 and/or Table 2 to help you write the letter.

Dear \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,

Today in math class we learned \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Your Friend,

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Student Name** | **leg: a** |  **leg: b** |  **Estimate of hypotenuse: c** | **Area of Square a:**$$a∙a=a^{2}$$ | **Area of Square b:** $ b∙b=b^{2}$ | **Area of Square c:** $ c∙c=c^{2}$ | **Actual length of hypotenuse: c**  |
| $$△1: $$ | 4 | 3 |  |  |  |  |  |
| $$△2:$$ | 6 | 8 |  |  |  |  |  |
| $$△3:$$ | 5 | 12 |  |  |  |  |  |
| $$△4:$$ | 15 | 8 |  |  |  |  |  |

**Table 1**

**Table 2: Practice**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Triangle** | **leg: a** |  **leg: b** | **Area of Square a:**$$a∙a=a^{2}$$ | **Area of Square b:** $ b∙b=b^{2}$ | **Area of Square c:** $ c∙c=c^{2}$ | **Actual length of hypotenuse: c**  |
| $$△1 $$ | 7 | 24 |  |  |  |  |
| $$△2$$ | 12 | 9 |  |  |  |  |
| $$△3$$ | 10 | 24 |  |  |  |  |