

Exploring the Pythagorean Theorem

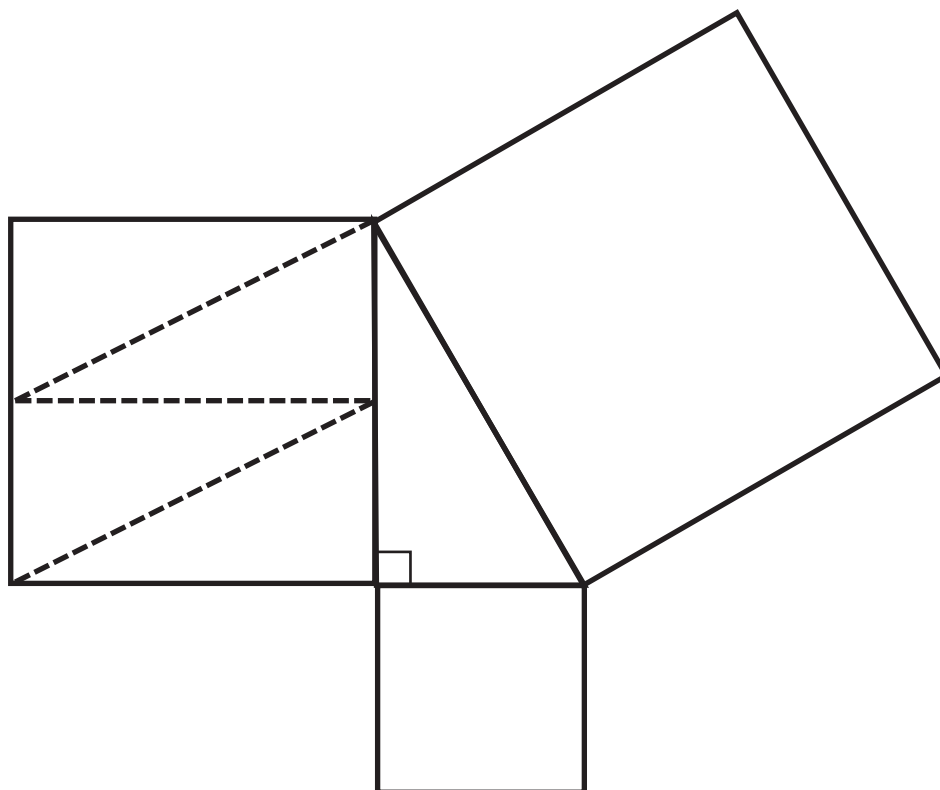
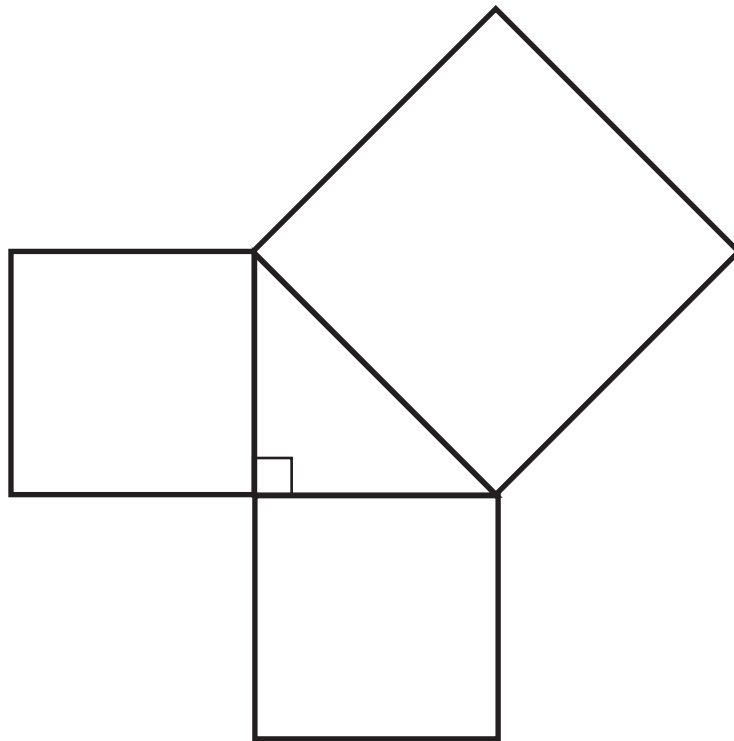
Materials Needed: Communicators
Discovering the Pythagorean Theorem Template
Pythagorean Theorem Template
30-60 Right Triangles Template

Procedures:

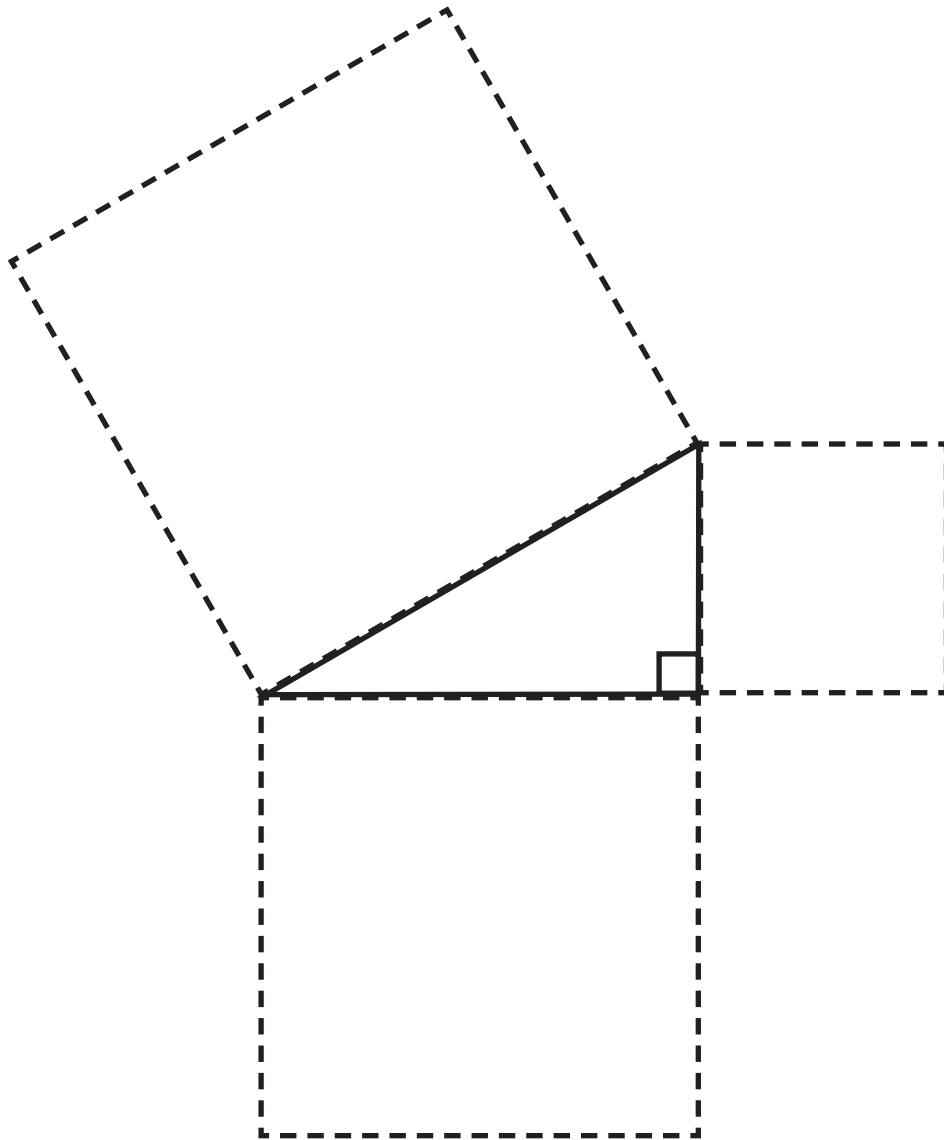
1. Have students notice that an isosceles right triangle has been drawn with a square placed on each side of the triangle. Have students draw the two diagonals in the two smallest squares. Have students place their Communicators ® on top of the Discovering the Pythagorean Theorem template. Ask students to retrace the eight small right triangles from inside the small squares into the square on the hypotenuse. Do they fit? What does this tell you? (The area of the two smallest squares adds up to the area of the largest square.)
2. Have students assign the value of 1 to the two legs. Have students find the length of the hypotenuse by using the area concept developed in question 1.
3. Have students continue to extend the pattern in question 2 by assigning other integer values to the legs of the isosceles triangle. What pattern do you see?
4. Have students look at the second picture on Discovering the Pythagorean Theorem template. Challenge students to find a way to fit the area of the two squares on the legs into the area of the square on the hypotenuse. If the length of the shorter leg is a , the longer leg is b and the hypotenuse is c , what is the area of each of the squares attached to each side? (a^2 , b^2 , and c^2) Write an equation that connects the three areas. ($a^2 + b^2 = c^2$)
5. Using the Pythagorean Theorem Template, use the concept of area to have students solve several problems with right triangles. Students should develop the concept that when the hypotenuse is missing the area of the two smaller squares are added together. If one of the legs is missing then the students must subtract the area of the smaller square from the area of the hypotenuse.
6. Develop the general rule for working with 30-60 right triangles using the 30-60 Right Triangle Template. Assign the side of the triangle to

be 2. From the properties of an equilateral triangle, have students find the measurement of the two missing sides. (1 and $\sqrt{3}$). Continue to use other even numbers (2a) for the hypotenuse and find the measure of the two other sides. Students should develop the concept that the shorter leg is a and the longer leg is $a\sqrt{3}$. Extend this last concept to any number for the side of the equilateral triangle (A). Have students find the measure of the other two sides. ($\frac{A}{2}$ and $\frac{A}{2}\sqrt{3}$)

Discovering the Pythagorean Theorem

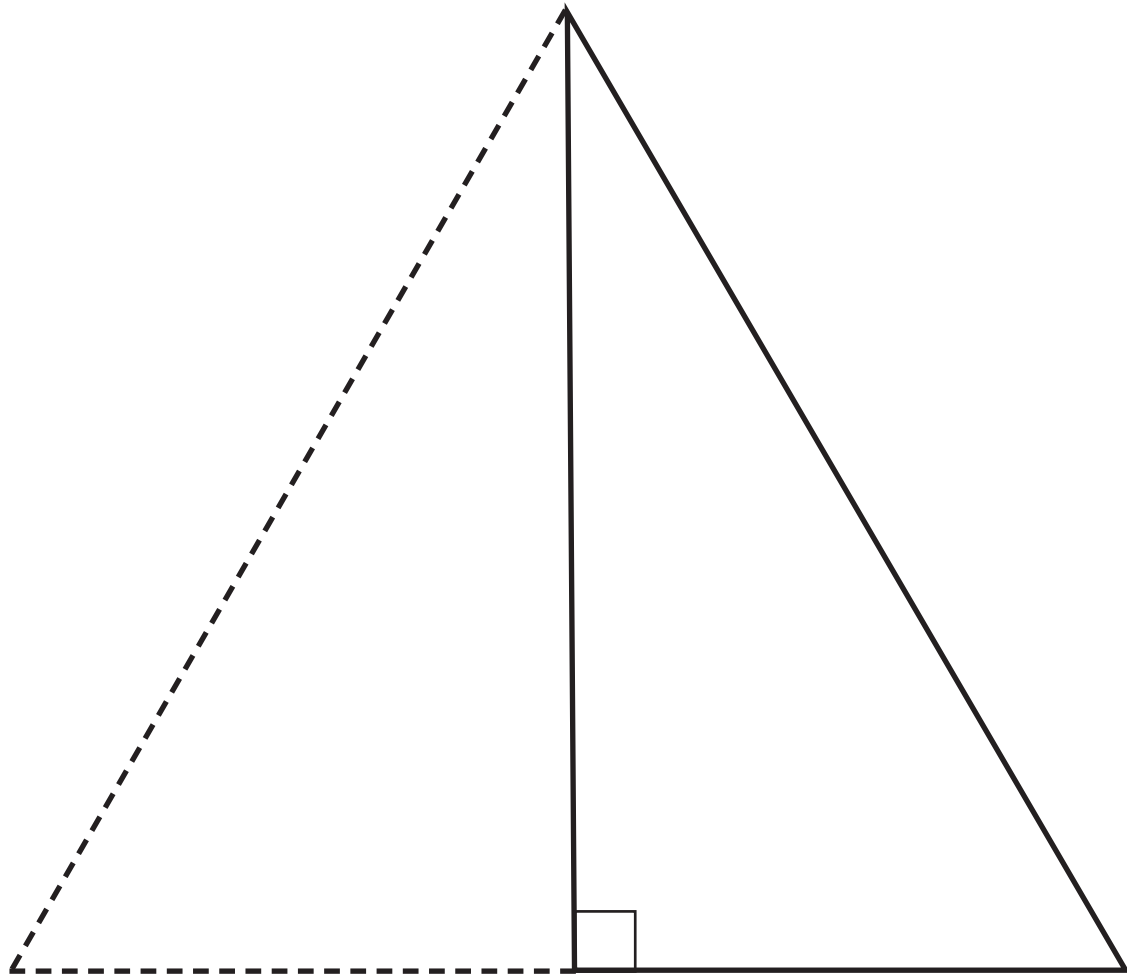


Pythagorean Theorem



| a | b | c |
|---|---|---|
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Creating a 30°-60° Right Triangle



| Experiment Number | Hypotenuse Length | Shorter Leg Length | Longer Leg Length |
|-------------------|-------------------|--------------------|-------------------|
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