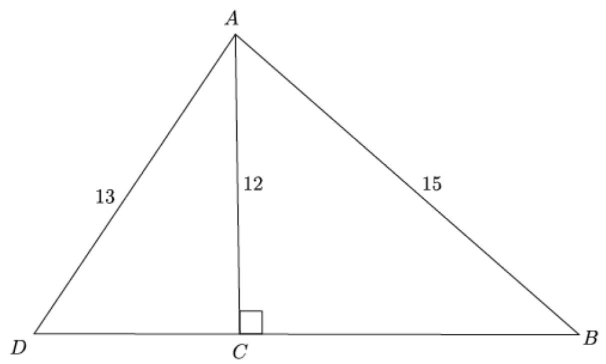
Name ____ Date__________________

Proof of the Pythagorean Theorem

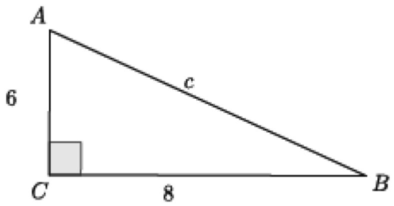
Determine the length of side BD in the triangle below.



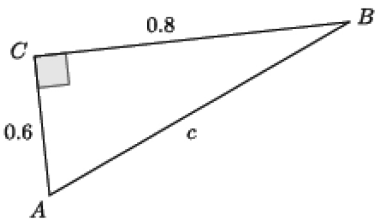
Use the Pythagorean Theorem to determine the unknown length of the right triangle.

1. Determine the length of side c in each of the triangles below.

a.

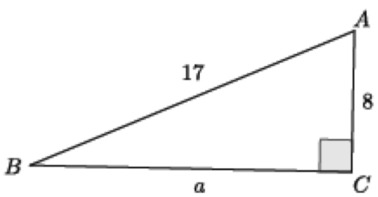


b.

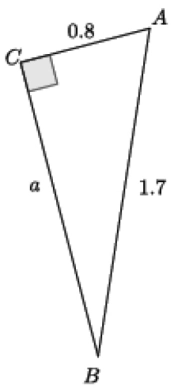


2. Determine the length of side a in each of the triangles below.

a.

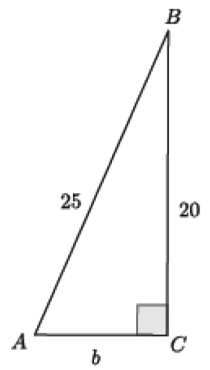


b.

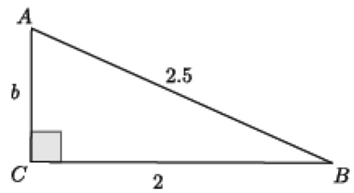


3. Determine the length of side b in each of the triangles below.

a.

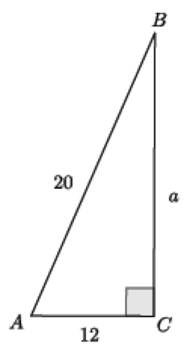


b.

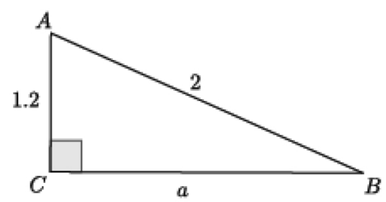


4. Determine the length of side a in each of the triangles below.

a.

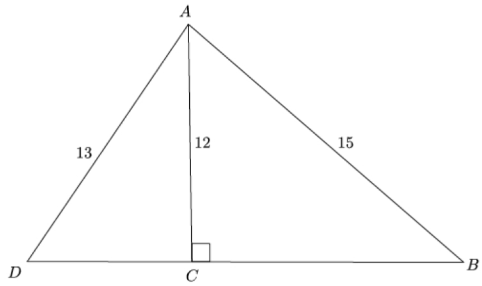


b.



5. What did you notice in each of the pairs of Problems 1–4? How might what you noticed be helpful in solving problems like these?

Determine the length of side BD in the triangle below.



First determine the length of side BC.

$$12^2 + BC^2 = 15^2$$
$$144 + BC^2 = 225$$
$$BC^2 = 225 - 144$$
$$BC^2 = 81$$
$$BC = 9$$

Then determine the length of side CD.

$$12^2 + CD^2 = 13^2$$
$$144 + CD^2 = 169$$
$$CD^2 = 169 - 144$$
$$CD^2 = 25$$
$$CD = 5$$

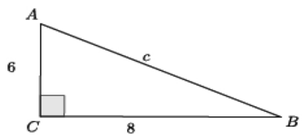
Adding the lengths of sides BC and CD will determine the length of side BD; therefore, $5 + 9 = 14$. BD has a length of 14.

Students practice using the Pythagorean Theorem to find unknown lengths of right triangles.

Use the Pythagorean Theorem to determine the unknown length of the right triangle.

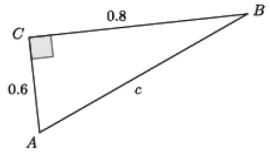
1. **Determine the length of side c in each of the triangles below.**

   a.



$$6^2 + 8^2 = c^2$$
$$36 + 64 = c^2$$
$$100 = c^2$$
$$10 = c$$

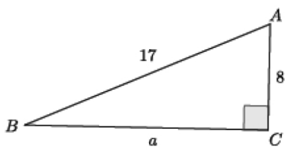
b.



$$0.6^2 + 0.8^2 = c^2$$
$$0.36 + 0.64 = c^2$$
$$1 = c^2$$
$$1 = c$$

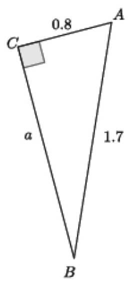
2. Determine the length of side a in each of the triangles below.

a.



$$a^2 + 8^2 = 17^2$$
$$a^2 + 64 = 289$$
$$a^2 + 64 - 64 = 289 - 64$$
$$a^2 = 225$$
$$a = 15$$

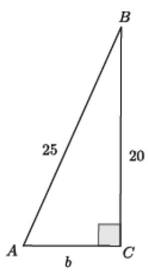
b.



$$a^2 + 0.8^2 = 1.7^2$$
$$a^2 + 0.64 = 2.89$$
$$a^2 + 0.64 - 0.64 = 2.89 - 0.64$$
$$a^2 = 2.25$$
$$a = 1.5$$

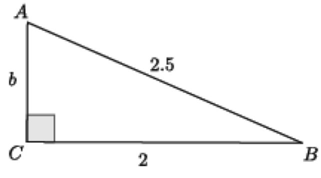
3. Determine the length of side b in each of the triangles below.

a.



$$20^2 + b^2 = 25^2$$
$$400 + b^2 = 625$$
$$400 - 400 + b^2 = 625 - 400$$
$$b^2 = 225$$
$$b = 15$$

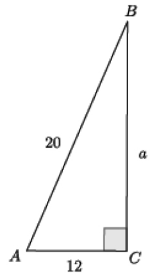
b.



$$2^2 + b^2 = 2.5^2$$
$$4 + b^2 = 6.25$$
$$4 - 4 + b^2 = 6.25 - 4$$
$$b^2 = 2.25$$
$$b = 1.5$$

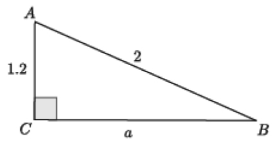
4. **Determine the length of side a in each of the triangles below.**

a.



$$\mathbf{a^2 + 12^2 = 20^2}$$
$$\mathbf{a^2 + 144 = 400}$$
$$\mathbf{a^2 + 144 - 144 = 400 - 144}$$
$$\mathbf{a^2 = 256}$$
$$\mathbf{a = 16}$$

b.



$$\mathbf{a^2 + 1.2^2 = 2^2}$$
$$\mathbf{a^2 + 1.44 = 4}$$
$$\mathbf{a^2 + 1.44 - 1.44 = 4 - 1.44}$$
$$\mathbf{a^2 = 2.56}$$
$$\mathbf{a = 1.6}$$

5. **What did you notice in each of the pairs of Problems 1–4? How might what you noticed be helpful in solving problems like these?**

In each pair of problems, the problems and solutions were similar. For example, in Problem 1, part (a) showed the sides of the triangle were 6, 8, and 10, and in part (b), they were 0.6, 0.8, and 1. The side lengths in part (b) were a tenth of the value of the lengths in part (a). The same could be said about parts (a) and (b) of Problems 2–4. This might be helpful for solving problems in the future. If I am given sides lengths that are decimals, then I could multiply them by a factor of 10 to make whole numbers, which are easier to work with. Also, if I know common numbers that satisfy the Pythagorean Theorem, like side lengths of 3, 4, and 5, then I will recognize them more easily in their decimal forms, i.e., 0.3, 0.4, and 0.5.