Five Triangle Puzzle

In this puzzle, all five pieces are to be used to form one large triangle. There are three $30°-60°-90°$ triangles of one size and two of another size. Note that the hypotenuse of the smaller triangle is equal in measure to the longer leg of the larger triangle.

*There are two unique solutions to this puzzle.*

# Questions to consider

The answers to the following questions will help you to solve the 5-triangle puzzle. Write all numbers in simplest radical form.

1. When all of the 5 triangles are combined to make one large triangle, what are the possible angle measures of the new triangle? Think about the different ways to combine the angles $30°,60°, and 90°$.

1

$$30°$$

$$30°$$

$$60°$$

$$60°$$

1. If the short leg of the smallest triangle is 1 unit, find the measure of each side of the two triangles.
2. Find the area of the two triangles:

$A\left(Small Triangle\right)=$

$A\left(Large Triangle\right)=$
3. When we combine all five triangles, what will the area of the complete triangle be?
(*Hint: The whole is the sum of its parts.*)
4. Is it possible to make one large $30°-60°-90°$ triangle?
If so, what would $x$ have to be below?

$$60°$$

$$60°$$

$$x°$$

$$(x\sqrt{3})°$$

$$60°$$

$$30°$$

$$x°$$

$$\left(x\sqrt{3}\right)°$$

1. Is it possible to make one large $60°-60°-60°$ triangle?
If so, what would $x$ have to be below?
How long is the base?
2. Is it possible to make one large $30°-150°-30°$ triangle?
If so, what would $x$ have to be below?
How long is the base?

$$30°$$

$$30°$$

$$x°$$

$$\left(x\sqrt{3}\right)°$$