**Things to Look for:**

1. If you know the lengths of the sides of a triangle, how can you decide whether it is acute, right, or obtuse?

2. What kind of triangle has squares on two of its sides that have a total area equal to the area of the square on the third side?

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**Now that you’ve finished the activity, let’s talk about what you learned.**

**Well, mostly what we did was use squares to build triangles.**

**This is one of the triangles you made, right?**

**Yeah, for that triangle the areas of the two smallest squares add up to be the same as the area of the biggest one.**

**And when those two areas are equal, it makes a right triangle. We found two others like that.**

**Okay, and what happens when the sum of the areas of the two smallest squares is less than the largest one?**

**Then the triangle is obtuse. There were two like that.**

**And when the two smallest ones add up to be more than the biggest one, the triangle is acute.**

**And the other two had sides of 3, 4, 5 and 5, 12, 13.**

**That’s the triangle with sides that are 6, 8, and 10.**

**Good job. That’s exactly what I wanted you to discover in the first part of this activity.**
There was a second part to the activity. You were given a new set of five squares to look at, and you were asked to pick three of them that you could use to make a certain kind of a triangle.

What we learned from the first part is that if the areas of the two smallest squares together is less than the biggest one, then the triangle will be obtuse.

So, I used the 8 square, the 9 square, and the 15 square.

I picked the same ones, I cut out the squares and put them together. I know it works. It's obtuse.

But I didn't cut out the squares to check it. I just know that 8 squared plus 8 squared is 100 and that's bigger than 81.

So, doesn't it have to be acute? That's the way it is in the chart with the other triangles we built.

To make the acute triangle, I picked the 6 square, the 8 square, and the 9 square.

And when you add the areas of the two 8 squares you get 128, and that's a lot bigger than 81.

I used two of the 8 squares. Is that okay? That triangle looks like it's acute for sure.

It is okay to use two squares that are the same, mark. In fact, what would happen if all three were the same?

What we learned from the first part is that if the areas of the two smallest squares together is less than the biggest one, then the triangle will be obtuse.

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Three!? Is that even possible?

How could you find three of these squares that would make an obtuse triangle? How did you figure that out?

That's right, Vanessa, and if you had built that triangle, it would look something like this.
Sure it is. The triangle would have to be acute, because all the sides and all the angles would be the same: 60 degrees.

Yeah, duh.

Look, if you add up the areas of two of the squares, it’s twice as much as the third one.

Okay, and how about right triangles? Did you find three squares to use to build a right triangle?

Okay, class, this table shows us one way that you could have picked the squares to make the triangles. There were actually several ways you could make the acute and the obtuse triangles, but only one way to make a right triangle.

81 + 144 = 225

Don’t be so sure. Use what you’ve just learned. Don’t depend on how the drawing looks.

Interesting. Can you explain what you mean by that, Shuttle?

I did, Mr. David. I used the 15 square, a 12 square, and a 9 square, and it works.

So far we have been looking at triangles that were built using the sides of squares.

So, you could, but you don’t need to.

Sure it is. The triangle would have to be acute, because all the sides and all the angles would be the same: 60 degrees.

Yeah, duh. Look at it. You can just see that it’s a right triangle.

9 squared plus 12 squared is equal to 15 squared. So it’s a right triangle.

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Interesting. Can you explain what you mean by that, Shuttle?
That's a very good summary of what we've done in this activity, shuttle.

Okay, shuttle. Now let me ask another question.

Look at this triangle. The lengths of the shortest sides are \( a \) and \( b \).

What if \( a^2 \) plus \( b^2 \) is equal to \( c^2 \)? What do you know about the triangle? What kind is it?

Well, I guess it's got to be a right triangle, because they're equal. I see letters! Is this like a formula?

Yes, Vanessa, it is like a formula. We call this an equation.

Let me see if I have this right.

If \( a^2 \) plus \( b^2 \) is equal to \( c^2 \), then it's a right triangle.

If \( a^2 \) plus \( b^2 \) is greater than \( c^2 \), then it's an acute triangle.

If \( a^2 \) and \( b^2 \) is less than \( c^2 \), then it's an obtuse triangle.

That's a very good summary of what we've done in this activity, shuttle.

Okay, that's good, shuttle. Now let me ask another question.

Class, as we go forward...

What's going to be most important is the connection between right triangles and \( a^2 + b^2 = c^2 \).