It is possible to construct a triangle?

- **Can you draw a triangle whose sides have lengths of 6cm, 7cm and 8cm?**

Remember **Triangular Inequality**

> The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

We have,

The sum of 6 and 7 is 13 and 13 is greater than 8.

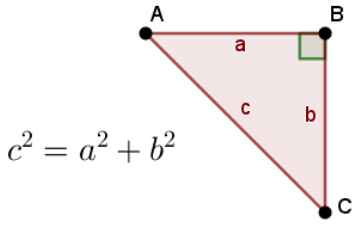
The sum of 7 and 8 is 15 and 12 is greater than 6.

The sum of 6 and 8 is 14 and 14 is greater than 7.

The set $\{6,7,8\}$ of side lengths satisfies the Triangle Inequality, so **it is possible to construct a triangle**.

- **And with the same lengths, it is possible to construct a right triangle?**

In that case, we must verify the **Pythagoras' Theorem**.

> The area of the square whose side is the hypotenuse (opposite the right angle) is equal to the sum of the areas of the squares on the other two sides (see the picture).
>
> $c^2 = a^2 + b^2$
>
> 
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If we can build a right triangle the hypotenuse would be the side with length 8cm. So, we must have $8^2 = 6^2 + 7^2$, that is, $64 = 85$. This is a false proposition.

Concluding, **it is not possible to construct a right triangle** with that side lengths.

Note: **We can have a right triangle if the length of hypotenuse is $\sqrt{85}$ cm**.

To think: Investigate what happens if you consider sides with other lengths!