Triangle numbers

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Triangle numbers

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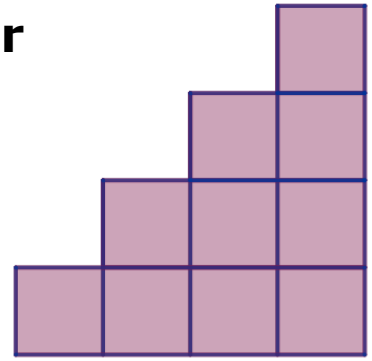
Triangular numbers can be represented by a triangular array of squares.

Imagine two copies of a triangular array of squares. Can you picture how to fit them together to make a rectangle? What is special about the dimensions of your rectangle?



$T_4 = 4$

1 Start by drawing a triangle number. Can you draw the same triangle number so the two fit together to make a rectangle? Unsure? Click

2 Write down the dimensions of your rectangle.

3 Try this a few more times with different triangles. Keep labelling the dimensions.

4 What do you notice about the dimensions of the rectangles?

5 Find the area of one of your rectangles.

6 What is the connection between the area of the triangle and the rectangle?

Answers

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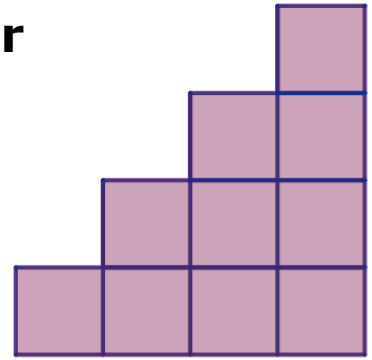

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4 What do you notice about the dimensions of the rectangles?

The length is 1 more that the width.

5 Find the area of one of your rectangles. E.g. 4 x 5 = **20 cm²**

6 What is the connection between the area of the triangle and the rectangle?

The area of the triangle is **half the area** of the rectangle.

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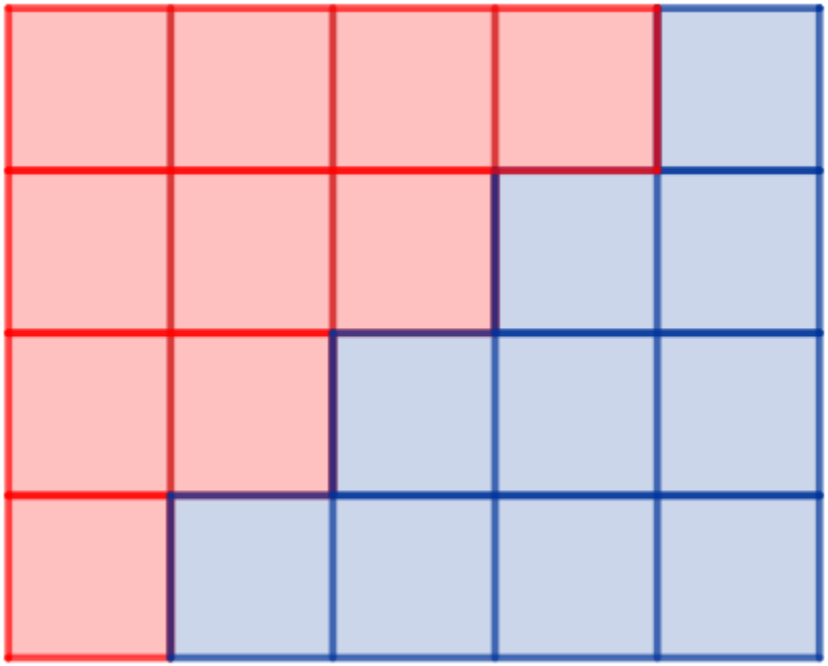

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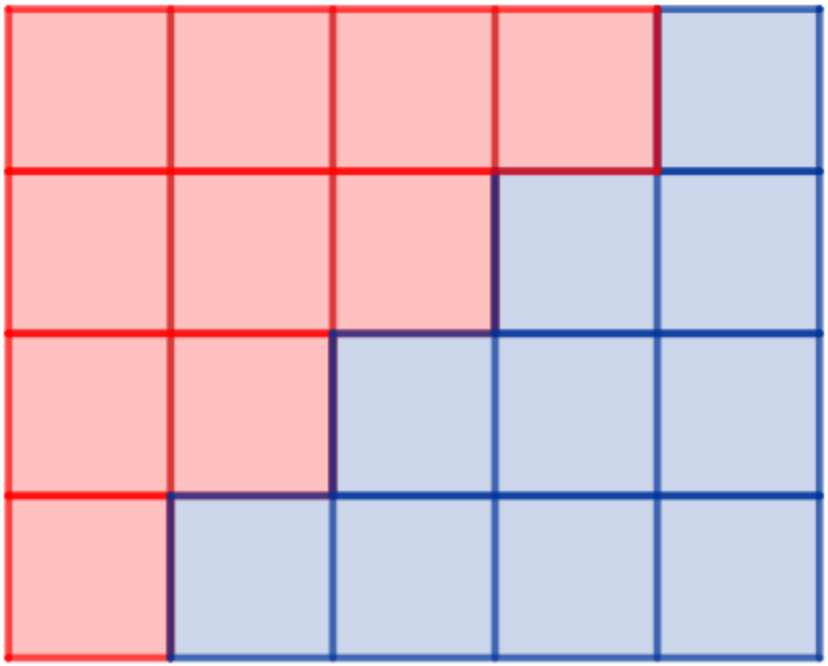

The length is one more than the width.
This should be the case for all your other examples too.

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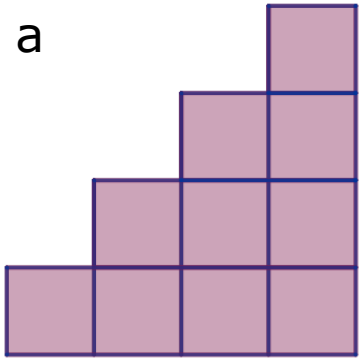
The pattern on the right is the fourth triangle number. It has a base of 4 units. **It can be expressed as T_4**



Lets use algebra to explain this.

1 Lets say the base of a triangle array of squares is **n** units across. What are the dimensions of the rectangle now?

$T_n = n$

2 What would be the area of the rectangle?

3 What would the area of the triangle be?

Answers

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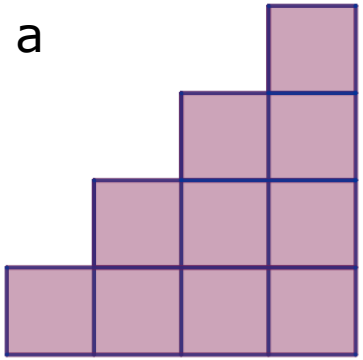

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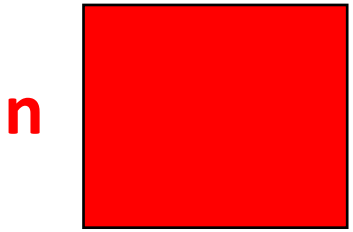

2 What would be the area of the rectangle?

$$n \times (n + 1)$$ ← You need brackets

3 What would the area of the triangle be?

$$\frac{n \times (n + 1)}{2}$$ ← The triangle is half the area of the rectangle

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Lets test this formula!

$$T_n = \frac{n \times (n+1)}{2}$$

1 Find the 10^{th} triangle number by substituting n = 10 into the formula.

2 Can this number be arranged into a triangle?

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Lets test this formula!

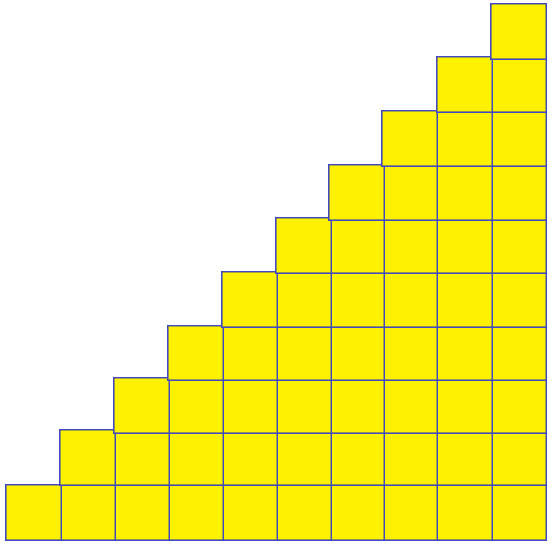
$$T_n = \frac{n \times (n+1)}{2}$$

1 Find the 10th triangle number by substituting n = 10 into the formula.

$$T_{10} = \frac{10 \times (10+1)}{2} = 55$$

2 Can this number be arranged into a triangle?

$$T_{10} = 55$$



End of the lesson

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Well done for completing the lesson.

Reflections