

## More about Pi

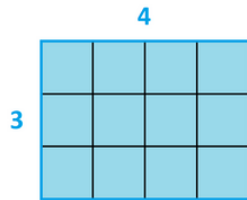
G'Day!

This is your math friend James. Today I am answering a question from Terrys and Zebadiah. They ask:

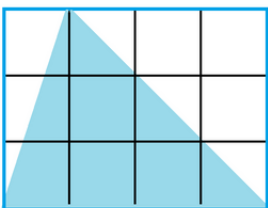
**Why did the number Pi begin?  
Who started searching for it,  
identifying it, and why?**

This is a great question, and I am not sure if anyone really knows the answer! It seems that humans have been thinking about pi for thousands of years. I can make a good guess as to why.

In everyday life, one often wants to know the area of things: the area of a field, the area of a foundation for a building, and so on. And we have a very natural way to measure areas for rectangles, at least. For example, a three-by-four rectangle naturally chops up into 12 little squares and so we say it has area equal to 12 "square units."

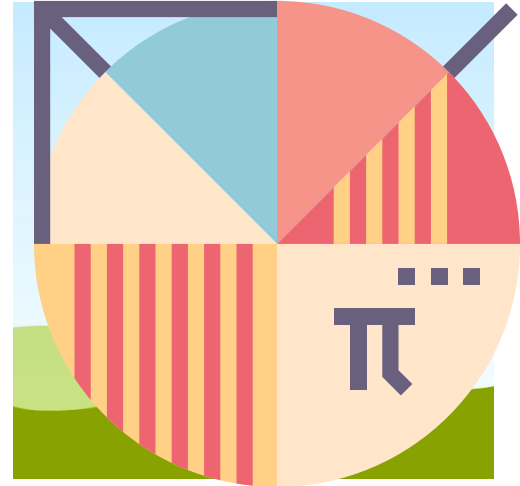
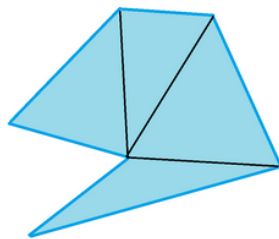


We can work out the areas of triangles by thinking of them as half rectangles.



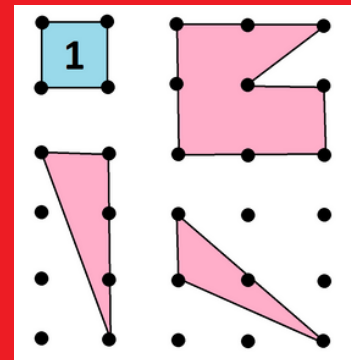
Do you see that the area of the triangle in this picture must be half of 12?

And by chopping up a polygon into triangles, we can now work out the area of any shape made with straight sides: just add up the areas of all the triangles.



## puzzle #1

**If the area of the blue square is 1 square unit, what are the areas of the other three shapes?**

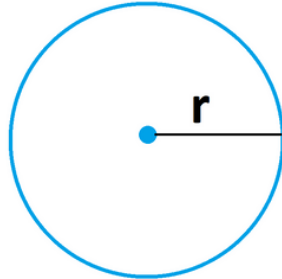


**(This puzzle is fun! Draw your own square grid of dots and draw a crazy polygon made of edges that connect dots. Can you work out the area of your crazy polygon?)**

Of course, the natural question that then follows is: **What about the area of a shape with no straight sides? What's the area of a circle?** And this is what humans wondered about for a very long time.

Some of the oldest written records we have from a human society, from the Babylonians some 4000 years ago, suggest that people at that time calculated the area of a circle by measuring its radius, multiplying that value by itself, and then multiplying that answer by 3. That is, they were saying that the area of a circle is close to equaling  $3r^2$ .

A Babylonian clay tablet dated from somewhere around the year 1800 B.C.E. shows that they later realized that  $3.125r^2$  is a more accurate formula to use.



An Egyptian papyrus-leaf scroll from the year 1650 B.C.E. or so shows that scholars also used the formula  $3.1605r^2$  for the area of the circle. And mathematicians and astronomers and scientists from all over the world--China, India, Europe--kept trying to improve the number that goes in the front of this formula. And, of course, we know that number as ... pi!

Check out [MATHICAL](#) for award-winning math books for middle-schoolers and teens, the YouTube channel [NUMBERPHILE](#) for math videos galore, and [MORE MATH!](#) for even more resources. Wowza!

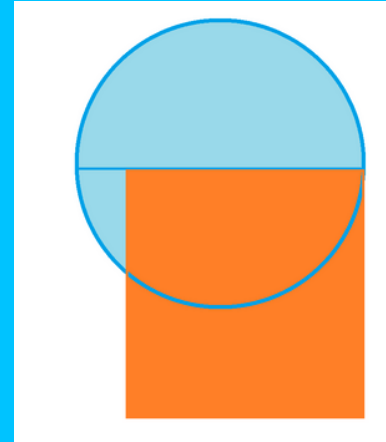
Here's a video from NumberPhile all about pi!

**Do you have a math question for me to answer, or try to answer?**

**Write to me at the website. Each week I'll pick a new question and give my thoughts on it!**

## puzzle #2

The Egyptians from ancient times said that you can approximate the area of a circle by drawing a square along its diameter, but with side only eight-ninths the length of the diameter. Then the area of the square is close to being the area of the circle.



The diameter of a circle is twice its radius.

We know the area of a circle to be  $\pi r^2$ .

What is a formula for the area of the square the Egyptians describe? What approximate value for pi does their method suggest?

### About the Author: Dr. James Tanton

The NMF Weekly is written by mathematician Dr. James Tanton as a resource for friends and fans of the 2021 National Math Festival.

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