

Circles Investigation

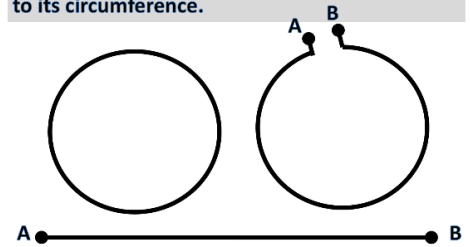
(You do not need to print this sheet – just draw your own table on a piece of paper at home and read the questions on the next page)

I would like you to explore the relationship between the circumference of a circle and its diameter.

To do this you will need:

- 6 different sized circular objects (*e.g plates, jar lids, saucepan lids etc*)
 - a flexible tape measure for sewing
- or**
- a long piece of string/wool and a builders style tape measure
- paper and pen to record your results
 - a calculator (*remember most phones have a calculator app on them*)

The circumference of a circle is its perimeter or the distance around its edge. If we 'break' a circle and straighten it, the length will be equal to its circumference.



Method:

1. Measure directly across the centre of the circle to find the diameter
2. If using a sewing or flexible tape measure then hold the tape tightly around the edge of the circle to find the circumference. If you are using string you then need to do exactly the same, clearly marking the length of the circumference on the string. Then hold this against the measuring tape to record the length in centimetre etc.
3. Record the diameter and circumference and then divide C by D – writing your answer to three decimal places where possible.

Item	Diameter (D)	Circumference (C)	D divided by C (to 3 decimal places)

What do you notice about your results? Is there any pattern? Do you already know what this pattern is?

If you cannot see a pattern, do you think there are any of your measurements that you might need to check again?

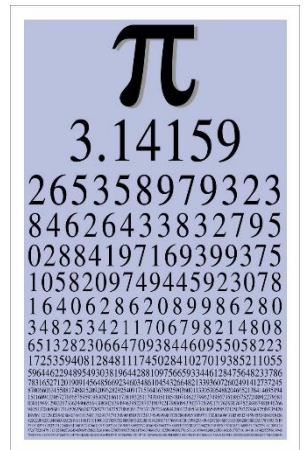
(See over for an explanation of what you should have discovered)

Did you guess what you would find?

You may have already heard of a mathematical term called pi – the symbol for which is π .

You may even know that although it was the Egyptians who were first fascinated by the mathematical properties of circles, it was the Greek mathematician Archimedes who first found the relationship between the diameter and the circumference of a circle.

What you might not know is that the Greek letter π was first used to represent this constant mathematical number by a British mathematician called William Jones in 1706.



Hopefully, your results found that the circumference divided by the diameter is approximately 3.14 (which is the value that is used within school rather than the 31.4 trillion decimal places which mathematicians have calculated π to so far)

Q1 What is your average measurement for C divide by D =

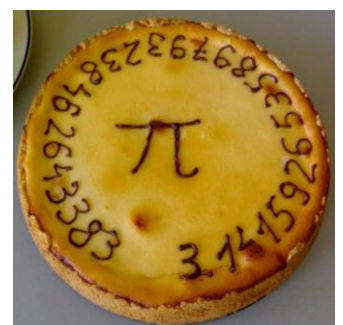
(Remember to find an average you need to add together all of the results and then divide by the number of pieces of data you had. In this case, this means add up all of the numbers in the end column and divide by 6)

Q2. How does your average compare to mathematical value of π ?

This means that providing we know the diameter of a circle we can find the diameter because...

$$\text{Circumference} = \pi \times \text{diameter}$$

Q3. Can you work out what the equation would be if you knew the radius?



Q4. What about if we knew the circumference, what would we be able to find? What would the formula look like?