Introduction: What is Pi?

If you've done almost any math involving circles, odds are you've used the number pi. Also written as π, pi is a very special number when it comes to circles. To find the area of a circle you use the equation $A = \pi r^2$ and to find the circumference of a circle, you use the equation $C = 2\pi r$ where r is the radius of the circle. With just the measurement of the radius, you are able to find these important values all because of pi, but what is pi? Pi is simply the ratio between the circumference of a circle and its diameter, which is exactly what this demonstration will show.

Pi is an extremely significant number that has been known for nearly 4000 years. We normally just use the value 3.14, but pi is actually an irrational number, meaning the decimal never ends and never repeats. Mathematicians, with the help of computers have been able to find 10 trillion digits of pi. Long before computers, over 4000 years ago, ancient Egyptians and Babylonians were able to get rough guesses of pi, calculating it to be 3.16 and 3.12. If people could do it 4000 years ago, you can do it know, so lets get started on understanding and calculating pi! If you look at the equation $C = 2\pi r$ and use a little bit of algebra to move some variables around, the relationship between diameter and circumference becomes clear.

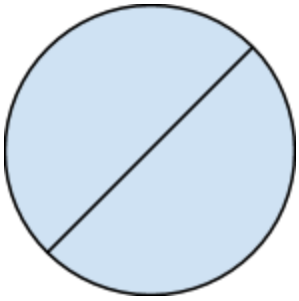
$C = 2\pi r$ This equation tells us the circumference of a circle is equal to the circle's radius times 2 multiplied by pi. Let's simplify that.

$C = \pi d$ Because a circle's radius is one half the length of its diameter, $2r$ can become d for diameter because it takes 2 radii to make 1 diameter.

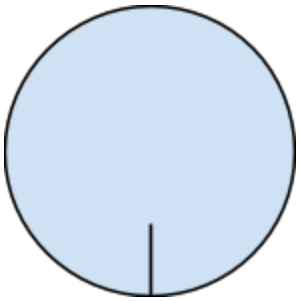
$\frac{C}{d} = \pi$ By dividing both sides by d, now we have the relationship between circumference and diameter

Let's Take Some Measurements!

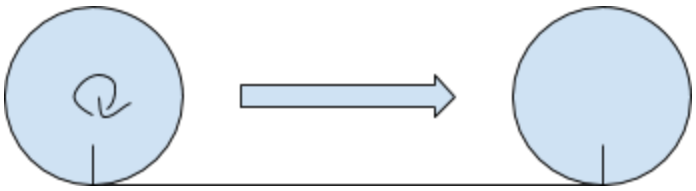
If you have already built your two wheeled race car robot, then great! If not, you can still find pi just as easily. Here is what you need to do to find pi.



1. Cut out (if it isn't already) and measure the diameter of the circle you are using. Make sure you measure from one side of the circle to the opposite side, going through the center of the circle as shown.The cool thing about pi is that it doesn't matter what size circle you use. It also doesn't matter if you measure in inches, centimeters, or any other unit as long as you use the same one for all your measurements. Write down your value for the diameter on the calculations page.



2. Make a small mark on the circle at any point along the edge
3. If you have not made the two wheeled race car, put the wheel on a paper clip. Lay a piece of paper on the table and rotate the wheel so the mark you just made is touching the paper. Mark this point on the paper. If you have the two wheeled race car, drive it forward until the mark on the wheel touches the paper again, the wheel has now gone one full revolution. Mark this point on the paper. If you are using a paperclip, do exactly the same, but by roll the wheel forward using the paperclip (Roll the wheel in as straight of a line as possible). Measure the distance between the two points on the paper. This distance is the circumference of the circle, write down the value on the calculations page



Let's Calculate Pi!

Write down your found values for diameter and circumference here (Don't forget your units!)

Diameter: _____

Circumference: _____

Divide your found circumference by the diameter. What did you get as your value for pi?

Pi: _____

How close were you to the actual value? Did you do better than the ancient Egyptians and Babylonians? If not, Why? What could be done to make your value more accurate?

Try this again with a different sizes of circles. If you used your two wheeled race car robot before, use a paperclip instead so you don't have to change the wheels.

What this trial more accurate of less accurate than the one before? Why do you think that is?

What could be done in future trials to improve your result?