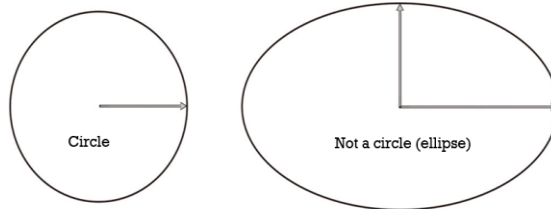# Finding Pi

Introduction

Geometric shapes can be seen everywhere in sports: fields and courts are made up of many specific geometric shapes, often of a specified size; sports equipment from balls to helmets to bicycles are engineered using very specific geometric shapes, sizes and angles in order to maximise performance.

Characteristics of a Circle

A shape often used in sports is a circle, most courts and fields have circles or semi circles on them and of course what would cycling or car racing be without circular wheels! The specific characteristics of a circle allow wheels to rotate, so let's explore these characteristics.
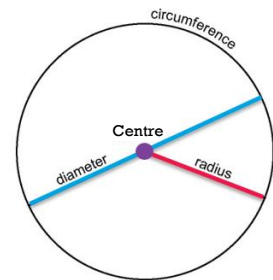
A circle is:

- A two dimensional shape that has one continuous curved edge.
- Every part of the curved edge is the same distance from the centre of the circle.

Circle Vocabulary:

Use the labelled diagram of a circle to help you match the following words to their correct definition in the table:

Centre, Radius, Diameter, Circumference.

Part of the circle	Definition
	The distance around the edge (perimeter) of a circle.
	The distance from the centre of a circle to the outer edge.
	The length of a line through the centre of a circle, from one edge to another.
	The exact middle of a circle.

Task

Aim:

You will be using circles around your house to investigate the relationship between the length of diameter and the length of the circumference of a circle.

Materials:

- Ruler
- Piece of string, ribbon, shoelace or cotton
- Loose piece of paper
- Pen and pencil
- Calculator

Investigation:

1. **Find 5 different sized circular objects in your house** (e.g. glass, glue stick, canister**) and trace the circles onto a piece of paper.**
   a. Label your circles Circle A through to Circle E.
   b. Label the diameter of each circle:
      o Hold your paper up to the light and fold the circle in half exactly.
      o The fold line represents the diameter, use your ruler to draw the diameter on the fold line.
2. **Without measuring, compare the length of each circle circumference to its diameter and complete the following:**
   a. The circumference of a circle is **longer/shorter** than the diameter.
   b. Make a conjecture (a mathematical hypothesis) by completing the following sentence:
      I think the circumference of a circle is about _____ times **longer/shorter** than the diameter of the circle.
3. **Measure and record the diameter and circumference of each circle:**
   - Use your ruler to measure the **diameter**. Record this measurement (rounded to two decimal places also called hundredths) in the table on the next page.
   - To measure the **circumference**, place your piece of string all the way around the edge of the same circle and make a mark on the string for the length of the circumference.
     Measure the piece of string with your ruler and record the circumference rounded to the nearest hundredth in the table on the next page.

4. Calculate **how many times longer than the diameter the circumference is** by using your calculator to complete the final column (shaded blue) in the table for each circle.

Circle	Object	Circumference	Diameter	Circumference ÷ Diameter
Example	Canister lid	31.42	10.00	31.42 ÷10.00 = 3.14
A				
B				
C				
D				
E				

What Did You Find Out?

1. Describe any patterns you see in the table?

   _____

   _____

2. Calculate the average for the last column of the table by adding all of the values together, then dividing the answer by 6.

   _____

3. Complete the following sentences:

   My results show that on average, the circumference of a circle is approximately _____ times longer than the diameter.

   Therefore,

   To estimate the circumference of any circle, you multiply the diameter by _____.

Did you find Pi?
- The circumference of a circle is actually 3.14159265358979323846 times its diameter!
- If you wanted to accurately figure out the exact circumference of a circle from its diameter it would take a very long time to input this number into a calculator!
- That's why the number 3.14159265358979323846 is known as Pi with the symbol π and is a button on many calculators.

Reflection Questions:

1. How close was your average to Pi?

   _____

   _____

   a. Were any of your measurements far from Pi?

      _____

      _____

   b. Why might that be?

      _____

      _____

2. Why is it important to use circles of different sizes?

   _____

   _____

   _____

3. Can you attempt to write a formula (a rule) for finding the circumference of a circle using the variables:

   C = circumference, **d**= diameter, *π = 3.14?*

   _____