

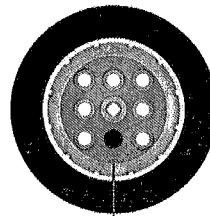
Wheel Turns

How far is one wheel turn?

Use your VEX IQ wheels and a ruler to measure how far a wheel travels each time it turns.

Step by Step

1. Set-up a new entry in your VEX notebook. Add the title (Wheel Turns) and page number in your table of contents. On the notebook page, write the date and the title.
2. Create a table to record your results. (See the back page for details.)
3. Take out a wheel from your VEX IQ Kit, and place a pin or standoff in the wheel as shown in the image. Complete steps A-D for each wheel. Record your values in the tables.



- A. Lay a ruler on the table. Line up the wheel on the ruler, so the pin lines up with the '0' on the ruler, as shown to the right.
 - B. Roll the wheel along the ruler until the pin ends up back in its original position, and mark the distance on the ruler, measuring in **both** inches or millimeters (mm). How far did it go? This distance is the measure of the outside of the wheel, which is also called the **circumference**.
 - C. Check your work - Cut the VEX Ruler (or a piece of paper) to the exact distance you just measured. Wrap it around the wheel. It should go exactly around the wheel, showing the measurement of one wheel turn in both inches and mm. If your values do not match, complete steps A-C again.
 - D. Measure the distance across the wheel. This is called the **diameter**.
4. The circumference and diameter have a special relationship. This relationship is a ratio. To find this relationship, divide the distance around the wheel by the diameter of the wheel. Round your answer to two decimal places.
 5. Explain why you think the ratio of the circumference and diameter is always the same.

6. Conduct a Google search about the number “pi.” Choose one site and summarize the key points concerning the circumference, diameter, and pi. Describe the relationship between them.

Millimeters (mm)

Wheel	Distance Rolling (mm)	Distance Wrapped (mm)	Diameter of the Wheel (mm)	Ratio of Circumference and Diameter

Inches (in)

Wheel	Distance Rolling (in)	Distance Wrapped (in)	Diameter of the Wheel (in)	Ratio of Circumference and Diameter

'LEVEL UP'

- **What else has a *circumference*?** - Use the same methods to figure out the measurements of other circular pieces in your VEX IQ Kit.
- **Chart it** - Make a new table showing the distance of 1, 2, 3, 4, and 5 wheel turns in a row. Write the number of turns in one column, the inch measurement in a second column, and the mm measurement in the third.
- Based on what you know about gear ratios and the size of tires, what combination of two gears (motor gear and axle gear) and a tire would produce the fastest speed. Why?

Pro Tips

Be careful when measuring

- Remember to start your wheel with the pin inserted and lined up *exactly* with the '0' of the ruler.
- Do not stop rolling until the pin is in the *exact* position it started in.

Standards: CCSS.MATH.CONTENT.7.G.B.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.