

Wheels and Distance

Opening Activity

We can make our robot move forward with the program below.



Opening Activity

Many things affected how far your robot travels.

- The number of degrees your Wait For block is set to wait for
- The size of your tires



A screenshot of a LEGO Mindstorms software block. The block is titled "Sensor" and is set to "Rotation Sensor". The "Control:" field is set to "Sensor". The "Port:" field has radio buttons for "A", "B", and "C", with "C" selected. The "Action:" field has radio buttons for "Read" and "Reset", with "Read" selected. The "Until:" field has radio buttons for "Up" and "Down", with "Up" selected. The "Until:" field also has a dropdown menu set to "Degrees" and a text input field containing "360". An orange arrow points to the "360" text input field.

Wheels and Distance

In this activity we're going to program our robot to move an exact distance.

To do so we must understand a few things about circles.



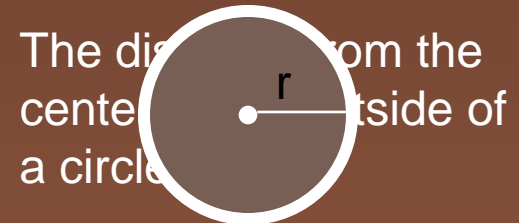
START

FINISH

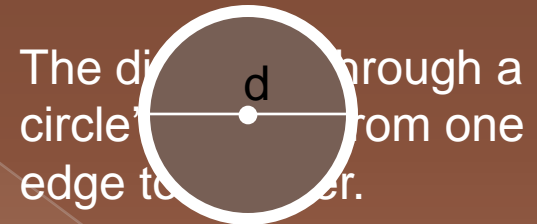
Review

Let's start with the basics.
Answer the following:

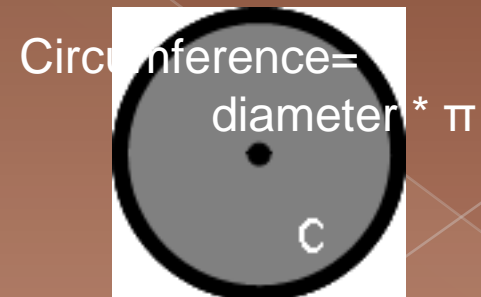
1. What is a radius of a circle?



2. What is a diameter of a circle?

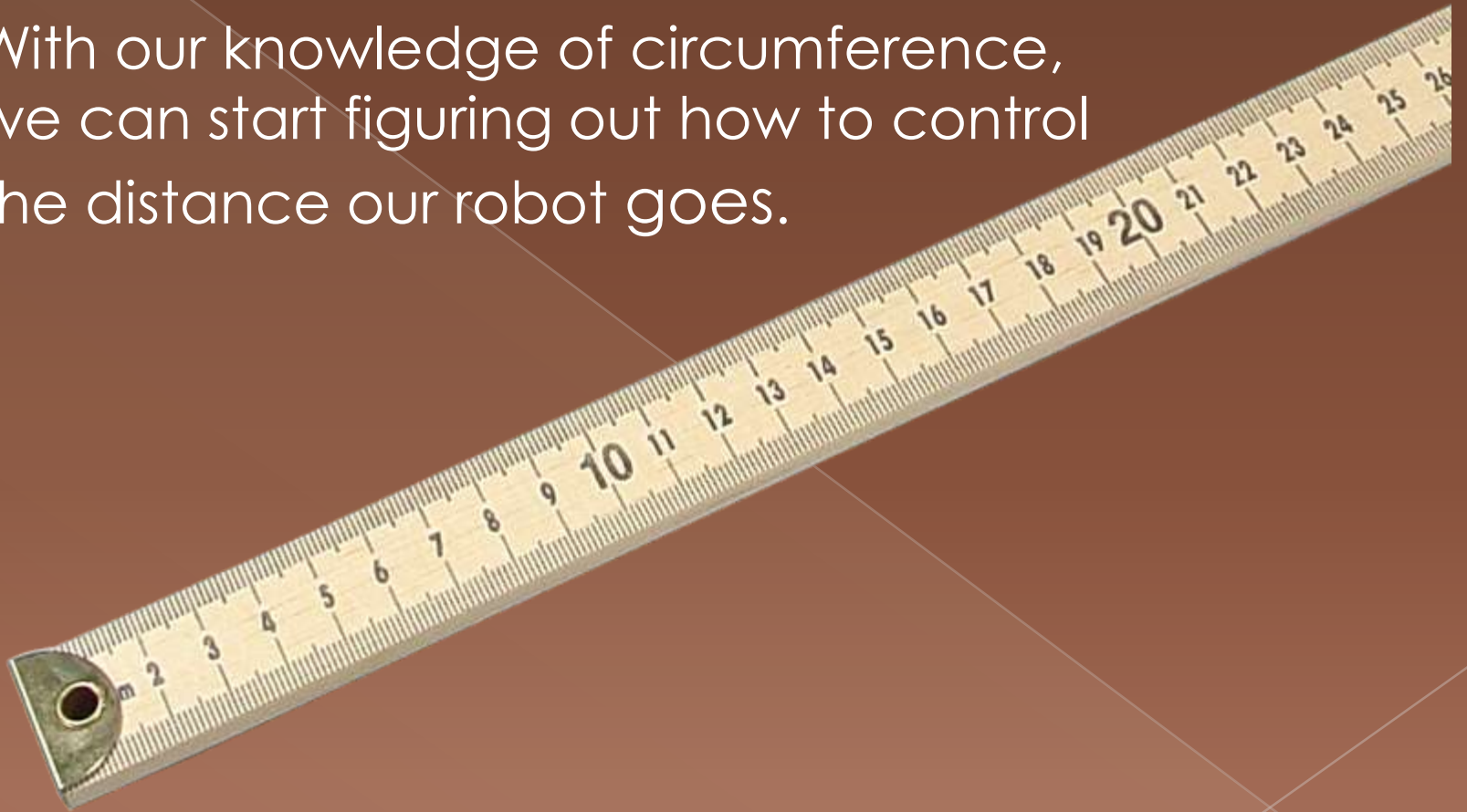


3. What is the formula for the circumference of a circle?



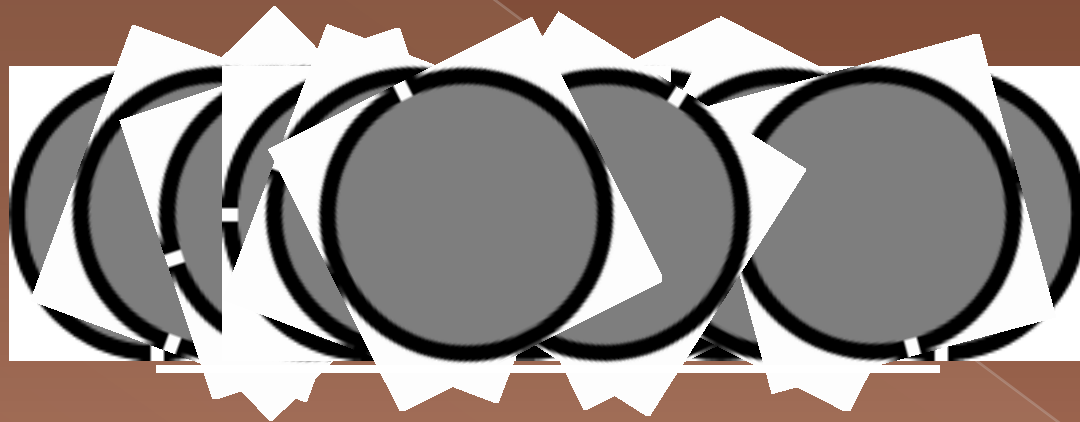
Preview

With our knowledge of circumference, we can start figuring out how to control the distance our robot goes.



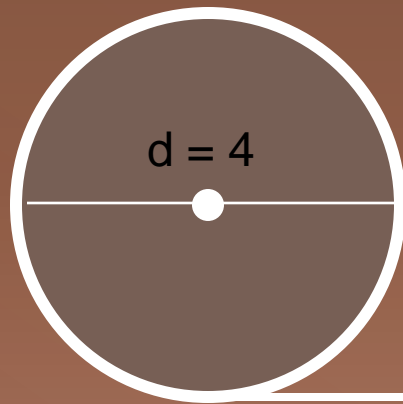
Preview

First, we need to understand that the circumference of a circle is really just a line curled around a center point.



Review

From this, we know that the circumference of a circle and the length of the line it rolls out are equal in length. Finish the following:



$$\text{Circumference} = 4 * \pi$$

So we know that...

$$\text{Length of Line} = \underline{4 * \pi}$$

Preview

Let's try a few more. Finish this chart:

Circumference =	Length of line =
1 meter	1 meter
2 meters	2 meters
7 meters	7 meters

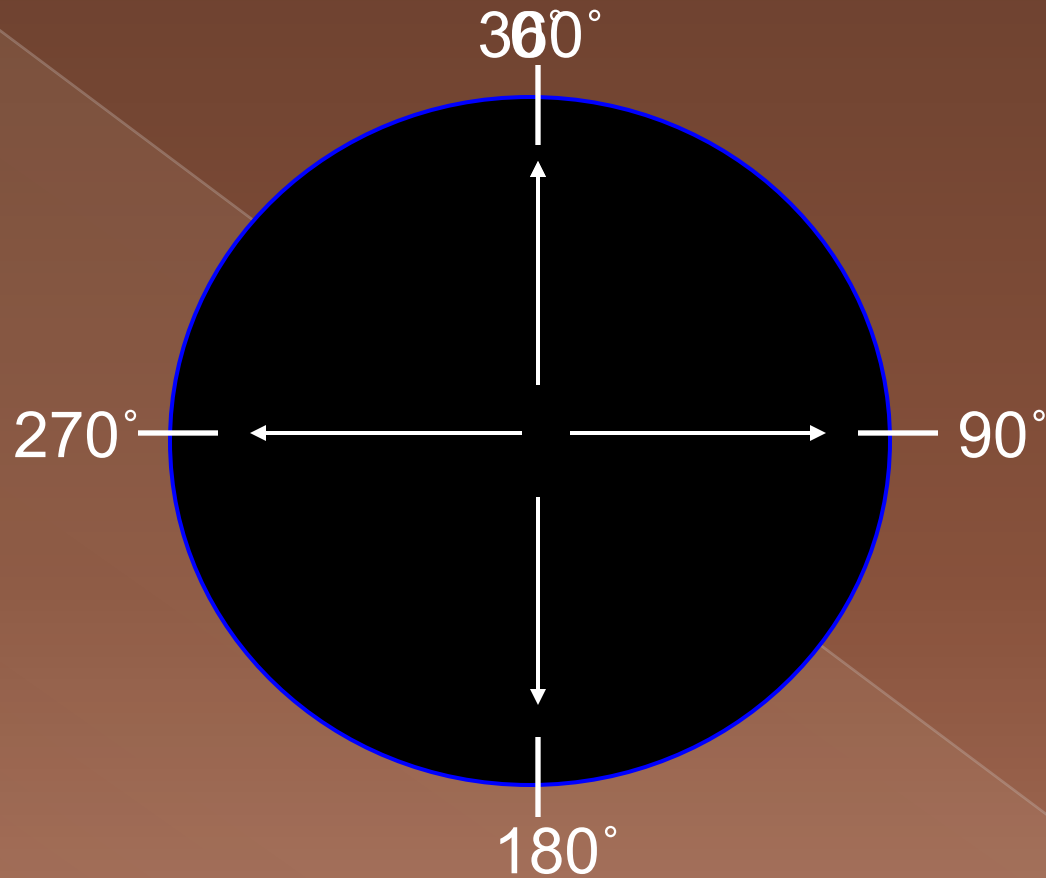
Preview

Predict what would happen if we were to change the number of rotations that the wheel makes?
Or change the diameter of the wheel?



Once you have completed the activity check your prediction

Review: Degrees



There are 360° in one full rotation of a wheel

Review: Degrees

If there are 360° in one rotation of a wheel, how many degrees are there in two rotations?

Answer: 720°

$$720^\circ = 2 \text{ rotations} * 360^\circ$$

Go to the next page for more practice!

Review: Degrees

Complete the following chart to get some practice:

# Of Rotations	# of Degrees
1 rot.	360°
3 rot.	1080°
1.5 rot.	540°

Review

Keep the following in mind as you complete the Wheels and Distance Investigation:

- Circumference - the length of line a circle rolls out
- Circumference = diameter * π
- There are 360° in one rotation of a circle