Module 1: Thinking Proportionally

TOPIC 1: CIRCLES AND RATIO

In this topic, students learn formulas for the circumference and area of circles and use those formulas to solve mathematical and real-world problems. To fully understand the formulas, students develop an understanding of the irrational number pi (π) as the ratio of a circle's circumference to its diameter. Throughout the topic, students practice applying the formulas for the circumference and area of a circle, often selecting the appropriate formula. Finally, students practice applying the formulas by using them to solve a variety of problems, including calculating the area of composite figures.

Where have we been?

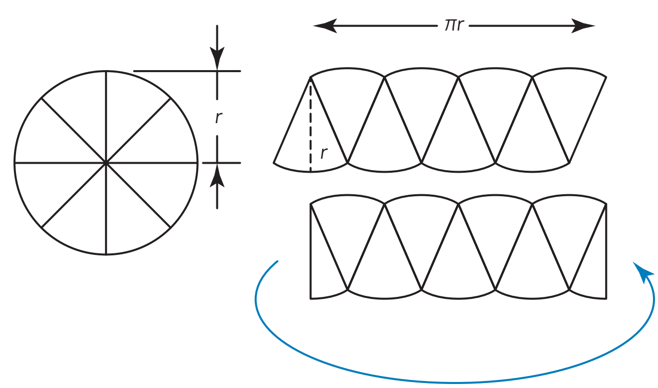
Throughout elementary school, students used and labeled circles and determined the perimeters of shapes formed with straight lines. In grade 6, students worked extensively with ratios and ratio reasoning. To begin this topic, students draw on these experiences as they use physical tools to investigate a constant ratio, pi.

Where are we going?

This early review of and experience with ratios prepares students for future lessons where they will move from concrete representations and reasoning about ratios and proportions to more abstract and symbolic work with solving proportions and representing proportional relationships. In future grades, students will use the circumference and area formulas of a circle to calculate surface areas and volumes of cylinders and composite three-dimensional shapes that include circles.

Modeling the Area of a Circle Using Wedges

Divide a circle into a large number of equal-sized wedges. Laying these wedges as shown, you can see that they approximate a rectangle with a length of πr (which is half the circumference) and a width of r. The more wedges that are added, the closer the figure will be to an exact rectangle. So, the area of the rectangle of wedges is $l \times w = \pi r \times r = \pi r^2$. Thus, the circle has an area of πr^2.



Myth: “I don’t have the math gene.”

Let’s be clear about something. There isn’t ***a*** gene that controls the development of mathematical thinking. Instead, there are probably ***hundreds*** of genes that contribute to our ability to reason mathematically. Moreover, a recent study suggests that mathematical thinking arises from the ability to learn a language. Given the right input from the environment, children learn to speak without any formal instruction. They can learn number sense and pattern recognition the same way.

To further nurture your child’s mathematical growth, attend to the learning environment. You can think of it as providing a nutritious mathematical diet that includes discussing math in the real world, offering the right kind of encouragement, being available to answer questions, allowing your student to struggle with difficult concepts, and giving them space for plenty of practice.

#mathmythbusted

Talking Points

You can further support your student’s learning by asking questions about the work they do in class or at home. Your student is learning to think flexibly about mathematical relationships involving multiplication, area, and number properties.

Questions to Ask

- How does this problem look like something you did in class?
- Can you show me the strategy you used to solve this problem? Do you know another way to solve it?
- Does your answer make sense? How do you know?
- Is there anything you don’t understand? How can you use today’s lesson to help?

Key Terms

radius

The radius of a circle is a line segment formed by connecting a point on the circle and the center of the circle.

diameter

The diameter of a circle is a line segment formed by connecting two points on the circle such that the line segment passes through the center point.

circumference

The circumference of a circle is the distance around the circle. The circumference is calculated using the formula $C = \pi d$.

pi

The number pi (π) is the ratio of the circumference of a circle to its diameter.