Eureka Math Parent Guide

A GUIDE TO SUPPORT PARENTS AS THEY WORK WITH THEIR STUDENTS IN MATH.

GRADE FOCUS

Eighth grade mathematics is about (1) formulating and reasoning about expressions and equations, with a special focus on linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

- Module 1: Integer Exponents and Scientific Notation
- Module 2: The Concept of Congruence
- Module 3: Similarity
- Module 4: Linear Equations
- Module 5: Examples of Functions from Geometry
- Module 6: Linear Functions
- » **Module 7: Introduction to Irrational Numbers Using Geometry**

LET'S CHECK IT OUT!

MODULE 7 FOCUS

In this 23-lesson module, students will begin this module with work related to the Pythagorean Theorem. Students also learn the notation related to roots and learn that in order to get the decimal expansion of a number, they must develop a deeper understanding of the long division algorithm learned in Grade 6 and Grade 7. In addition, students learn that radical expressions arise naturally in geometry and apply the Pythagorean Theorem to three-dimensional figures.

MORE SPECIFICALLY, CHILDREN WILL LEARN HOW TO:

- Know that there are numbers that are not rational, and approximate them by rational numbers.

  - » Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion, which repeats eventually into a rational number.

  - » Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions.

- Use square root and cube root symbols to represent solutions to the equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number.

- Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

- Understand and apply the Pythagorean Theorem.

  - » Explain a proof of the Pythagorean Theorem and its converse.

  - » Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

  - » Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

- Know the volumes of cones, cylinders, and spheres and use them to solve real world and mathematical problems.

TOPIC OVERVIEW

Topics are the lessons within a module that help children master the skills above. Here are the lessons that will guide your child through Module 7:

- Topic A: Square and Cube Roots
- Topic B: Decimal Expansions of Numbers
- Topic C: They Pythagorean Theorem

WORDS TO KNOW

- **Perfect Square**: A *perfect square* is the square of an integer.

- **Square Root**: The *square root* of a number a is equal to if a^2 = . It is denoted by $\sqrt{b}$.

- **Cube Root**: The cube root of a number b is equal to a if a^3 = . It is denoted by $\sqrt[3]{b}$.

- **Irrational Number**: *Irrational numbers* are numbers that are not rational.

- **Infinite Decimals**: *Infinite decimals* are decimals that do not repeat nor terminate.

- **Rational Approximation**: *Rational approximation* is the method for determining the approximated rational form of an irrational number.

- **Truncated Cone**: A *truncated cone* is a solid obtained from a cone by removing the top portion above a plane parallel to the base.

SAMPLE PROBLEMS

SAMPLE 1

Determine the exact volume of thecone shown below.
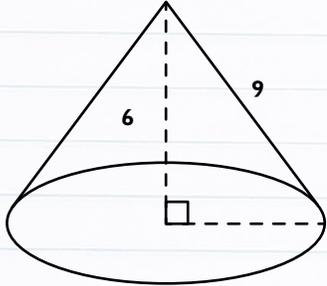
Let r be the radius of the base.
$$6^2 - r^2 = 9^2$$
$$36 + r^2 = 81$$
$$r^2 = 45$$
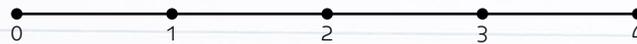The area of the base is 45π.
$$V = 1/3 \ Bh$$
$$V = 1/3 \ 45π(6)$$
$$V = 90π$$
The volume fo the cone is 90π units³.

SAMPLE 2

*This is an example from Lesson 2: Square Roots

1. Place the numbers √1 , √4 , √9 , and √16 on the number line. Be prepared to explain your reasoning.

2. Place the numbers √2 and √3 on the number line. Be prepared to explain your reasoning.

Solutions are shown below in red. Students should reason that the numbers √2 and √3 belong on the number line between √1 and √4. They could be more specific by saing that if you divide the segment between intgers 1 and 2 into three equal parts, then √2 would be at the first division and √3 would be at the second division and √4 is already at the third division, 2 on the number line. Given that reasoning, students should be able to estimate the value of √4 ≈ 11/3.

Solution Part 1:

Solution Part 1 and 2:
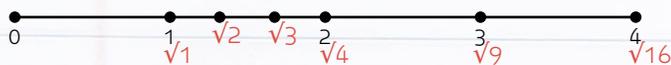
HOW YOU CAN HELP AT HOME

- Every day, ask your child what they learned in school and ask them to show you an example.

- Ask your child to estimate the value of √5 and explain their answer.

  » Solution: The value of √5 is between √4 which equals 2 and √9 which equals 3. On a number line, if you separate the space between √4 and √9 into five sections, √5 is right next to √4 so we can estimate √5 to be about 2.2.

- Ask your child to use long division to determine the decimal expansion for 54/20