Unit Ten - Irrational Numbers and Nonlinear Functions

Content Area: **Mathematics**
Course(s): **Pre-Algebra 6**
Time Period: **June**
Length: **3 weeks**
Status: **Published**

Transfer

Big Idea: Irrational Numbers and Non-Linear Functions

Enduring Understandings

All real numbers include rational and irrational numbers.

Reasoning and/or proof can be used to verify or refute conjectures relating to the Pythagorean Theorem.

A problem solver understands what

has been done, knows why the process

was appropriate, and can support it

with reasons and evidence.

Essential Questions

What are the characteristic of rational and irrational numbers?

How can we prove and apply the Pythagorean Theorem in a real-world situation?

How can we use the properties of exponents?

What is the relationship between solving problems and computation?

Critical Knowledge and Skills

Vocabulary

Vocabulary

Rational number

Terminating decimal

Repeating decimal

Ratio

Similar figures

Slope

Square root

Perfect square

Radical expression

Leg

Hypotenuse

Real number

Midpoint

Irrational number

Simplest form

Learning Objectives

Find and approximate square roots of numbers.

Simplify radical expressions

Use the Pythagorean theorem to solve problems.

Compare and order real numbers.

Use rational approximations to approximate and compare rational numbers.

Use the distance, midpoint, and slope formulas.

Use special right triangles to solve problems.

Resources

Prior Knowledge

*Used ratios and proportions

*Solved problems using similar triangles

*Found the slope of a line through two points

Standards

MA.8.G.A	Understand congruence and similarity using physical models, transparencies, or geometry software.
MA.8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
MA.8.G.B	Understand and apply the Pythagorean Theorem.
MA.8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.
MA.8.G.B.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
MA.8.G.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

MA.8.G.C	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.
MA.8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
MA.8.EE.A	Work with radicals and integer exponents.
MA.8.EE.A.2	Use square root and cube root symbols to represent solutions to 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.
MA.8.NS.A	Know that there are numbers that are not rational, and approximate them by rational numbers.
MA.8.NS.A.1	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.
MA.8.NS.A.2	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 (e.g., π^2).
MA.K-12.2	Reason abstractly and quantitatively.
	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.