06 Real Numbers and the Coordinate Plane

Content Area: **Mathematics**
Course(s):
Time Period: **Week1**
Length: **1 Week**
Status: **Published**

Stage 1: Desired Results

Unit Overview/ Rationale

In this chapter, students will distinguish between rational and irrational numbers. They will estimate the value of expressions. They will find square roots of perfect squares and cube roots of perfect cubes. They will use the Pythagorean Theorem to calculate distances.

Standards & Indicators

Common Core: Mathematics, Common Core: Grade 8 Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

1. Make sense of problems and persevere in solving them.

2. Reason abstractly and quantitatively.

3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.

5. Use appropriate tools strategically.

6. Attend to precision.

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

| MA.8.8.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 √2 is irrational.

MA.8.8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse.
MA.8.8.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.8.8.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.8.8.G.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
MA.8.8.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).

Big Ideas - Students will understand that...

-Every rational number has a decimal expansion. You can write the decimal expansion of a fraction by dividing the numerator and the denominator.

-Terminating decimals and repeating decimals are rational numbers.

-A square number is a power with an exponent of 2. A cube number has an exponent of 3.

-Squares and square roots, and cubes and cube roots, are inverse operations.

-The square root of a negative number is undefined in the real number system.

-The decimal expansions of irrational numbers do not terminate or repeat.

-The Pythagorean Theorem describes the relationship among the sides of a right triangle. You can find the length of any side of a right triangle if you are given the lengths of the other two sides.

-In a right triangle, the hypotenuse is the longest side and lies opposite the right angle.

-The Triangle Inequality Theorem relates the sides of any triangle. It is used to determine if the lengths of three segments can be used to form a triangle.

-The Converse of the Pythagorean Theorem relates the sides of a right triangle. It is used to determine if the lengths of the sides of a triangle form a right triangle.

-You can name any point in the Cartesian coordinate plane by an ordered pair, and you can graph any ordered pair as a point on the coordinate plane.

-You can use the Pythagorean Theorem to find the distance between two points on the coordinate plane.

Essential Questions - What provocative questions will foster inquiry and transfer of learning

-How do you convert a rational number into a decimal?

-How are squares and square roots related?

-How are cubes and cube roots related?

-What makes a number rational or irrational?

-What is the Pythagorean Theorem?

-How can you use the Pythagorean Theorem to find missing a missing leg or hypotenuse of a right triangle?

-How can you use the Pythagorean Theorem to find the distance between points on the coordinate plane?

-How would you apply the Pythagorean Theorem to a real world situation?

Content - Students will know...

Skills - Students will be able to...

Stage 2: Assessment Evidence

Assessment

Stage 3: Learning Plan

Learning Activities

Activities:

Students will write equivalent fractions and decimals.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to write the decimal expansion of a fraction and tell whether it is a terminating or repeating decimal.

Example:

Write the decimal expansion of 3/8 and tell whether it is a terminating or repeating decimal.

Sample Solution:

0.375, terminating

Activities:

Students will find and estimate square roots, classify numbers as rational or irrational, and find cube roots to solve cube root equations.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to find and estimate square roots, classify numbers as rational or irrational, and find cube roots to solve cube root equations.

Example:

Solve $x^3 = \sqrt[3]{-8/27}$

Sample Solution:

-2/3

Activities:

Students will use the Pythagorean Theorem to find the length of the hypotenuse of a right triangle and to find the missing measurements of triangles.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to use the Pythagorean Theorem to find the length of the hypotenuse of a right triangle and to find the missing measurements of triangles.

Example:

The base of a 24 ft. ladder is 6 ft. from the base of a house. To the nearest tenth, how far up the house does the ladder reach?

Sample Solution:

23.2 ft.

Activities:

Students will solve problems using the Triangle Inequality Theorem and the Converse of the Pythagorean Theorem.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to solve problems using the Triangle Inequality Theorem and the Converse of the Pythagorean Theorem.

Example:

Is it possible to construct a triangle with the sides whose lengths are 8m, 10m, and 15m?

Sample Solution:

Yes, 8 + 10 > 15

Activities:

Students will graph points and use the Pythagorean Theorem to find distances in the coordinate plane.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to graph points and use the Pythagorean Theorem to find distances in the coordinate plane.

Example:

Find the distance between (-3,-2) and (3,0)

Sample Solution:

6.3

Resources

Prentice Hall Course 3 Mathematics Common Core

c.2013

Chapter 1