8 Math Unit 9: Real Numbers and Pythagorean Theorem

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 3**
Length: **16 days**
Status: **Published**

Unit Overview

To develop each new volume formula, students explore a connection to a formula they already know. Connecting the similarity of structure of the solids helps students understand how the formulas are related.

Standards

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

Materials

Big Ideas Math

- 9.1 Finding Square Roots
- 9.2 The Pythagorean Theorem
- 9.3 Finding Cube Roots
- 9.4 Rational Numbers
- 9.5 Irrational Numbers
- 9.6 The Converse of the Pythagorean Theorem

Desmos

Unit 8 -Pythagorean Theorem and Irrational Numbers

- ST Math
- Delta Math
- 3 Act Lessons
- Brainingcamp Manipulatives
- Nearpod Lessons
- Brainpop Resources
- Online Resources

Technology

8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.
8.1.8.AP.6	Refine a solution that meets users' needs by incorporating feedback from team members and users.

Assessment

Formative Assessment

- Teacher Observation
- Daily Quick Check
- Quizzes
- Exit Tickets

Summative Assessment

- Topic Tests
- Benchmark Tests
- Alternative Assessments: Performance Tasks & Projects
- NWEA Grade 8 Math Assessment

Accommodations & Modifications

Special Education

- Follow IEP Plan which may contain some of the following examples…
- In class/pull out support with special ed teacher
- Additional time during intervention time

- Preferred seating
- Questions read aloud
- Extended time for completing tasks
- Graphic organizers
- Vocabulary support
- Mnemonic devices
- Songs/videos to reinforce concepts
- Limit number of questions
- Scribe
- Manipulatives
- Calculators
- Reteach pages
- Leveled homework
- Lesson intervention activities
- Math Diagnosis & Intervention System
- Another look homework video
- Practice buddy

504

- In class/pull out support with special ed teacher Additional time during intervention time
- Preferred seating
- Questions read aloud
- Extended time for completing tasks Graphic organizers
- Vocabulary support Mnemonic devices
- Songs/videos to reinforce concepts Limit number of questions
- Scribe Manipulatives Calculators Reteach pages Leveled homework
- Lesson intervention activities
- Math Diagnosis & Intervention System Another look homework video
- Practice buddy

ELL

- Translation device/dictionary
- In class/pull out support with ESL teacher
- Preferred seating
- Questions read aloud
- Extended time for completing tasks
- Graphic organizers
- Vocabulary support
- Mnemonic devices
- Songs/videos to reinforce concepts
- Manipulatives
- Math Diagnosis & Intervention System

At-risk of Failure

- Additional time during intervention time
- Questions read aloud
- Graphic organizers
- Vocabulary support
- Mnemonic devices

- Songs/videos to reinforce concepts
- Manipulatives
- Calculators
- Reteach pages
- Leveled homework
- Lesson intervention activities
- Math Diagnosis & Intervention System
- Another look homework video
- Practice buddy

Gifted & Talented

- Independent projects
- Enrichment pages
- Online games
- Leveled Homework
- Extension Activities
- Today's Challenge

Interdisciplinary Connections

Chapter 9 Performance Task (STEAM)

Identify and Correct the Error!

How can you use your knowledge of evaluating expressions involving square roots to identify and correct an error in calculating the period of a pendulum?

The period of a pendulum is the time (in seconds) it takes the pendulum to swing back *and* forth once. The period T is represented by $T = 8 \text{ sec}$ where L is the length of the pendulum (in feet).

1. Complete the table to find the period of each pendulum.



2. Your friend found the period of a 64-foot long pendulum to be 8 seconds. His work is shown below.

$T = 8 \text{ sec} T = 8 \text{ sec}$

$T = 8 \text{ sec}$

   a. Find the error and explain what your friend did wrong.

b. Find the correct period for the 64-foot long pendulum.

Identify and Correct the Error!

3. Your friend found the period of a 100-foot long pendulum to be 9.5 seconds. His work is shown below.

$T = 8 \text{ sec} T = 8 \text{ sec}$
$T = 8 \text{ sec}$
$T = 8 \text{ sec}$

a. Find the error and explain what your friend did wrong.

b. Find the correct period for the 100-foot long pendulum.

4. Some pendulums, such as those used in grandfather clocks, sometimes need to be adjusted to keep accurate time. The formula $T = 8 \text{ sec}$ is used when tuning, or adjusting, these pendulums, and includes the acceleration due to gravity *g* (in feet per second squared).

The acceleration due to gravity on Earth is 32 feet per second squared. Design a pendulum with a period of less than 10 seconds. Use 3.14 for π. Justify your answer.

Career Readiness, Life Literacies & Key Skills

9.4.8.CI.2	Repurpose an existing resource in an innovative way (e.g., 8.2.8.NT.3).
9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).
9.1.8.CP.1	Compare prices for the same goods or services.
9.1.8.EG.1	Explain how taxes affect disposable income and the difference between net and gross

	income.
9.1.8.FI.4	Analyze the interest rates and fees associated with financial products.
9.4.8.IML.9	Distinguish between ethical and unethical uses of information and media (e.g., 1.5.8.CR3b, 8.2.8.EC.2).
9.4.8.TL.1	Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.
9.4.8.TL.2	Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).
9.4.8.TL.3	Select appropriate tools to organize and present information digitally.
9.4.8.TL.4	Synthesize and publish information about a local or global issue or event (e.g., MSLS4-5, 6.1.8.CivicsPI.3).

Career Ready Practices

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP12. Work productively in teams while using cultural global competence.