











Trimester:	Unit Title:	Recommended Instructional Days:
3	Real Numbers and the Pythagorean Theorem	14-18 days
Domain		
<p><i>Strand:</i></p> <p> 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.</p> <p> 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). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.</p> <p> 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.</p> <p> 8.G.B.6 Explain a proof of the Pythagorean Theorem and its converse.</p> <p> 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.</p> <p> 8.G.B.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.</p> <p>Key:</p> <p>  Major Cluster  Supporting Cluster  Additional Cluster  Climate Change Opportunity </p>		
<p>Progress Indicators: ♦ Tests ♦ Homework / Classwork ♦ Projects ♦ Formative Assessments ♦ Summative Assessments</p>		

Mathematical Practices:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reason 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.

Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSL-CLKS within Unit

Essential Questions:

- How do you rewrite rational numbers and decimals?
How do you take square roots and cube roots?
How can the value of an irrational number be approximated?
How are sets of real numbers related?
Where do you see irrational values in the real-world?
How can you describe relationships between sets of real numbers?
How do you order a set of real numbers?
What are two different ways to determine which side in a right triangle is the hypotenuse?
How are the side lengths of right triangles related?
How can you prove the Pythagorean Theorem and use it to solve problems?
How can you visualize or draw a representation to explain the Pythagorean theorem?
How can you determine whether a triangle is a right triangle?
How can you test the converse of the Pythagorean Theorem and use it to solve problems?
How can you use the Pythagorean Theorem to find the distance between two points on a coordinate plane?

Essential Understandings:

- All real numbers can be organized based on their characteristics.
All real numbers are either rational or irrational, and irrational values can be approximated.
The side lengths of all right triangles are related in such a way that the sum of the squares of the two shorter sides equals the square of the longest side.
The Pythagorean theorem helps us find missing lengths of right triangles and can also be used to determine if a triangle is a right triangle.

Vocabulary:

- square root

- perfect square
- cube root
- perfect cube
- irrational number


**Encourage students to practice using the unit vocabulary as they talk and write about mathematics. Understanding vocabulary will aid their understanding of the concepts. When students encounter a new definition, encourage them to write in their Big Ideas Student Journals. They will revisit these definitions during the Chapter Review.*

Suggested Activity Descriptions:

- STEAM Video *Metronome Design* and Performance Task *Identify and Correct the Error*
- Getting Ready for Chapter 9 Chapter Exploration TB page 372
- Chapter Explorations TB page 373 Finding Side Lengths and Finding Solutions of Equations
- Chapter Exploration TB page 381 Discovering the Pythagorean Theorem
- Chapter Explorations TB page 389 Finding Edge Lengths and Finding Solutions of Equations
- Chapter Exploration TB page 395 Writing Repeating Decimals as Fractions
- Chapter Exploration TB page 401 Approximating Square Roots
- Chapter Explorations TB page 409 Analyzing the Converse of a Statement and The Converse of the Pythagorean Theorem
- Puzzle Time for each section (teacher resources)
- Enrichment and Extension Worksheets

Interdisciplinary Connections:

Science:

1. Question # 26 TB page 377 *Dig Deeper*: The speed (in meters per second) of a tsunami can be modeled by the function ... 
2. Question # 51 TB page 380 *Problem Solving*: The kinetic energy K (in joules) of a falling apple is represented by ...
3. Question # 54 TB page 380 *Dig Deeper*: Albert Einstein's most famous equation $E = mc^2$, where E is the energy of an object...
4. Example 3 TB page 398 *Modeling Real Life*: The weight of an object on the moon is about 0.16 times its weight on Earth...
5. Question # 23 TB page 399 *Structure*: A forecast cone defines the probable path of a tropical cyclone...

Physical Education:

1. Question # 26 TB page 387 *Modeling Real Life*: The figure shows the location of a golf ball after a tee shot...
2. Question # 27 TB page 387 *Modeling Real Life*: A tennis player asks the referee a question...
3. Question # 30 TB page 400 *Dig Deeper*: The probability that an athlete makes a half-court basketball shot is 22 times the probability...
4. Example 3 TB page 412 *Modeling Real Life*: You design a football play in which a player runs down the field, makes a 90 degree turn...

Financial Literacy:

1. Question # 29 TB page 400 *Problem Solving*: The table shows the principal and interest earned per year for each of three savings accounts...

Language Arts:

1. Writing Question #56 TB page 380: Can you find the square root of a negative number? Explain.
2. Vocabulary Question # 9 TB page 397: How can you identify a rational number?
3. Vocabulary Question # 15 TB page 404: How are rational numbers and irrational numbers different?
4. Writing Question # 5 TB page 411: Explain the converse of the Pythagorean Theorem.

Spot Light on: Diversity and Inclusion

Essential Questions: What is respect and how can we, as an individual/community express respect for ourselves and others at home or in the classroom?

Objective: Students will learn how to appreciate diversity, respect others and their differences and build relationships with mutual respect in school, at home and within the community. EOD artwork and quotes along with other educational sources, will be used.

Social and Emotional Learning: <i>Competencies</i>	Social and Emotional Learning: <i>Sub-Competencies</i>
SEL Competencies: • Self-Awareness • Social Awareness • Self-Management • Relationship Skills • Responsible Decision-Making	<ul style="list-style-type: none"> • Recognizing the importance of self-confidence in handling daily tasks and challenges. • Demonstrate an awareness of the expectations for social interactions in a variety of ways. • Demonstrate an understanding of the need for mutual respect when viewpoints differ. • Identify and apply ways to persevere through alternative methods to achieve goals. • Utilize positive communication and social skills to interact effectively with others. • Develop, implement, and model effective problem solving and critical thinking skills.
<p style="text-align: center;">Assessments (Formative) <i>To show evidence of meeting the standard/s, students will successfully engage within:</i></p>	<p style="text-align: center;">Assessments (Summative) <i>To show evidence of meeting the standard/s, students will successfully complete:</i></p>
<p>Formative Assessments: • Teacher Observations • Exit Tickets • Quizzes • Self Assessments • Big Ideas Student Journals • Homework/Classwork • Teacher Created</p>	<p>Benchmarks & Summative Assessments: • Chapter/Unit Assessments • Standardized Tests • Project-based Assessments • Benchmark Tests</p>

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 August 2024

Assessments • Progress Monitoring Items • Formative Assessment Tips in Big Ideas Teacher Edition			
Differentiated Student Access to Content: Teaching and Learning <u>Resources/Materials</u>			
Core Resources	Alternate Core Resources <i>IEP/504/At-Risk/ESL</i>	ELL Core Resources	Gifted & Talented Core Resources
Big Ideas Student Journal, Dynamic Assessment System, iReady, Khan Academy, Illustrative Mathematics, Learn360, TeacherTube, BrainPOP, Freckle, LearnZillion, MobyMax, 60 minutes of weekly ST Math, Edulastic, Achieve the Core, Desmos	Reteach worksheets, Extra Practice worksheets, Math manipulatives, Scaffolding Instructions in each section of textbook, Tutorial Videos, Skills Review Handbook, Skills Trainer	Dictionary for native language, Video tutorial in native language, ELL Support in each section of Big Ideas Teacher’s Edition	ST Math Challenge Objectives, G&T tasks, Enrichment and Extension worksheets, Art of Problem Solving, Leveled assessments
Supplemental Resources			
Technology: • Chromebooks • Scientific Calculators • Online math manipulatives Other: • Google Classroom, Google Meets, Schoology, Interactive Workbooks • Illustrative Mathematics • insidemathematics.org • National Library of Virtual Manipulatives			
Differentiated Student Access to Content: Recommended <u>Strategies & Techniques</u>			
Core Resources	Alternate Core Resources <i>IEP/504/At-Risk/ESL</i>	ELL Core Resources	Gifted & Talented Core
Deliver instruction utilizing varied learning styles including audio, visual, and tactile/kinesthetic, provide individual instruction as needed, modify assessments and/or rubrics.	Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations, additional examples, modeling,	Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of an online bilingual	Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities,

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	etc.), modify test content and/or format, allow students to retake test for additional credit, provide additional times and preferential seating as needed, review, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks.	dictionary, and modified assessment and/or rubric.	and connect students to related content.
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NJSLS CAREER READINESS, LIFE LITERACIES & KEY SKILLS	Disciplinary Concept(s): Planning and Budgeting	
	Core Ideas:	A budget aligned with an individual’s financial goals can help prepare for life events.
	Performance Expectation/s:	9.1.8.PB.1: Predict future expenses or opportunities that should be included in the budget planning process.
	Career Readiness, Life Literacies, & Key Skills Practices	
	Act as a responsible and contributing community member and employee. Attend to financial well-being. Consider the environmental, social and economic impacts of decisions. Demonstrate creativity and innovation. Utilize critical thinking to make sense of problems and persevere in solving them. Model integrity, ethical leadership and effective management. Plan education and career paths aligned to personal goals. Use technology to enhance productivity, increase collaboration and communicate effectively. Work productively in teams while using cultural/global competence.	

New Jersey Legislative Statutes and Administrative Code (place an “X” before each law/statute if/when present within the curriculum map)						
Amistad Law: <i>N.J.S.A. 18A 52:16A-88</i>		Holocaust Law: <i>N.J.S.A. 18A:35-28</i>		LGBT and Disabilities Law: <i>N.J.S.A. 18A:35-4.35</i>	X	Diversity & Inclusion: <i>N.J.S.A. 18A:35-4.36a</i>
						Standards in Action: <i>Climate Change</i>