Trimester:	Unit Title:	Recommended Instructional Days:
3	**Exponents and Scientific Notation**	**15-20 days**

Domain

Strand:

8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 x\, 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$

8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 × 10^8 and the population of the world as 7 × 10^9, and determine that the world population is more than 20 times larger.*

8.EE.A.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Key:

Major Cluster **Supporting Cluster** **Additional Cluster** **Climate Change Opportunity**

Progress Indicators: ◊ Tests ◊ Homework / Classwork ◊ Projects ◊ Formative Assessments ◊ Summative Assessments

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 NJSLS-CLKS within Unit

Essential Questions:
How can you develop and use the properties of integer exponents?
How can expressions with integer exponents be simplified?
What do the Zero Exponent and Negative Exponent Properties mean?
How can you use scientific notation to express very large quantities?
How can you use scientific notation to express very small quantities?
In what kinds of situations would it be useful to express a value using scientific notation?
How do you add, subtract, multiply, and divide using scientific notation?
What are some advantages to performing operations with numbers in scientific notation rather than standard notation? Disadvantages?

Essential Understandings:
Expressions can be simplified based on exponent rules.
Scientific notation can be used to express, estimate, and calculate values.

Vocabulary:
- power
- base of a power
- exponent of a power
- scientific notation

**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 *Carbon Atoms* and Performance Task *Elements in the Universe*
- Getting Ready for Chapter 8 Chapter Exploration TB page 318
- Chapter Explorations TB page 319 Using Exponent Notation (1 and 2)
- Chapter Explorations TB page 325 Finding Products of Powers (1 and 2)

- Chapter Exploration TB page 331 Finding Quotients of Powers
- Chapter Explorations TB page 337 Understanding Zero Exponents and Understanding Negative Exponents
- Chapter Explorations TB page 343 Using Powers of 10 and Approximating Numbers
- Chapter Exploration TB page 349 Using a Graphing Calculator
- Chapter Explorations TB page 355 Adding and Subtracting in Scientific Notation and Multiplying and Dividing in Scientific Notation
- Puzzle Time for each section (teacher resources)
- Enrichment and Extension Worksheets

Interdisciplinary Connections:

Science:

1. Question # 18 TB page 322 *Dig Deeper:* Consider the diameters of three planets..
2. Question # 19 TB page 322: A fish jumps out of the water at a speed of 12 feet per second…
3. Question # 39 TB page 324 *Modeling Real Life:* Scientists use carbon-14 dating to determine the age of a sample of organic material..
4. Question # 40 TB page 324 *Dig Deeper:* The frequency (in vibrations per second) of a note on a piano is represented by …
5. Question # 18 TB page 328: A newborn blue whale weighs 3^7kilograms…
6. Question # 33 TB page 330 *Modeling Real Life:* The lowest altitude of an altocumulus cloud is about 3^8feet…
7. Question # 19 TB page 334 *Dig Deeper:* An earthquake of magnitude 3.0 is 10^2times stronger than an earthquake of magnitude 1.0..
8. Question # 24 TB page 336 *Modeline Real Life:* The sound intensity of a normal conversation …
9. Question # 18 TB page 340: A one-celled, aquatic organism called a dinoflagellate is 1000 micrometers long…
10. Example 3 TB page 345 *Approximating a Quantity:* The distance from Saturn to Neptune is about 1,911,674,960 miles…
11. Question # 20 TB page 352 *Dig Deeper:* The epidermis, dermis, and hypodermis are layers of your skin…

Financial Literacy:

1. Example 4 TB page 322 *Modeling Real Life:* The annual profit P (in thousands of dollars) earned by a technology company x years after opening is represented …
2. Question # 19 TB page 358 *Dig Deeper:* In one week, about 4100 movie theaters each sold an average of 2200 tickets for Movie A…

Technology:

1. Example 4 TB page 328 *Modeling Real Life:* One gigabyte (GB) of computer storage space is $2^{30} bytes$…
2. Question # 19 TB page 328: One megabyte of cell phone storage space is 2^{20}bytes…

Language Arts:

1. Writing Question # 11 TB page 357: Describe how to add or subtract two numbers written in scientific notation with the same power

of 10.

Spot Light On: Sally Ride

Social and Emotional Learning: *Competencies*	**Social and Emotional Learning: *Sub-Competencies***
SEL Competencies: • Self-Awareness • Social Awareness • Self-Management • Relationship Skills • Responsible Decision-Making	• 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.
Assessments (Formative) ***To show evidence of meeting the standard/s, students will successfully engage within:***	**Assessments (Summative)** ***To show evidence of meeting the standard/s, students will successfully complete:***
<u>Formative Assessments:</u> • Teacher Observations • Exit Tickets • Quizzes • Self Assessments • Big Ideas Student Journals • Homework/Classwork • Teacher Created Assessments • Progress Monitoring Items • Formative Assessment Tips in Big Ideas Teacher Edition	**<u>Benchmarks & Summative Assessments:</u>** • Chapter/Unit Assessments • Standardized Tests • Project-based Assessments • Benchmark Tests

Differentiated Student Access to Content:
Teaching and Learning *<u>Resources/Materials</u>*

Core Resources	**Alternate Core Resources *IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core Resources**
Big Ideas Student Journal, Dynamic Assessment System, iReady, Khan Academy, Illustrative Mathematics,	Reteach worksheets, Extra Practice worksheets, Math manipulatives, Scaffolding Instructions in each	Dictionary for native language, Video tutorial in native language, ELL Support in each section of Big Ideas	ST Math Challenge Objectives, G&T tasks, Enrichment and Extension worksheets, Art of

Learn360, TeacherTube, BrainPOP, Freckle, LearnZillion, MobyMax, 60 minutes of weekly ST Math, Edulastic, Achieve the Core, Desmos	section of textbook, Tutorial Videos, Skills Review Handbook, Skills Trainer	Teacher's Edition	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 *Strategies & Techniques*

Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**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, 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.	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 dictionary, and modified assessment and/or rubric.	Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect students to related content.

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: *N.J.S.A. 18A 52:16A-88*		Holocaust Law: *N.J.S.A. 18A:35-28*	**X**	LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*	**X**	Diversity & Inclusion: *N.J.S.A. 18A:35-4.36a*	**X**	Standards in Action: *Climate Change*