Unit 04: Fractions, Factors, and Exponents

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 10**
Length: **3 Weeks**
Status: **Published**

Unit Overview

In this chapter, students find factors, including the GCF, of numbers and monomials. Students simplify fractions and compare fractions using the LCD. Students use the product of powers and quotient of powers properties to simplify expressions. Students rewrite expressions containing negative or zero exponents using only positive exponents. Finally, students write and evaluate numbers in scientific notation

Standards

MA.8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.
MA.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.
MA.6.NS.B.4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

Essential Questions

- Why are there different types of numbers?
- What can we learn from studying patterns?
- How does finding the common characteristics among similar problems and numbers help to become a more efficient problem solver?
- How does comparing quantities describe the relationship between them?

Application of Knowledge and Skills...

Students will know that...

- A composite number is a whole number that is greater than 1 and has more than two whole number factors.
- A fraction is in simplest form when its numerator and its denominator are relatively prime.
- A number is written in scientific notation if it has the form of c x 10n where c is greater than or equal to 1 and less than 10, and n is a whole number
- A prime number is a whole number that is greater than 1 and has exactly two whole number factors, 1 and itself.
- Equivalent fractions are two fractions that represent the same numbers.
- For any nonzero number a and any integer n, a-n= 1/an
- For any nonzero number a, a0=1.
- The greatest common factor is the largest factor shared by two or more numbers.
- The least common denominator of two or more fractions is the least common multiple of the denominators.
- The least common multiple is the smallest multiple shared by two or more numbers.
- The Product of Powers Property states that to multiply powers with the same base, add their exponents.
- The Quotient of Powers Property states that to divide powers with the same base, subtract the exponent of the denominator from the exponent of the numerator.
- Writing a number in its prime factorization is writing a number as a product of prime numbers.

Students will be skilled at...

Students will be able to:

- Calculate the prime factorization of a number using a factor tree.
- Determine the least common denominator to organize fractions.
- Find multiples and least common multiples of numbers and monomials.
- Find the GCF of two or more whole numbers and monomials.
- Find the product and quotient of powers.
- Identify equivalent fractions.
- Identify prime and composite numbers.
- List the factors a monomial (numbers and variables.)
- Multiply powers.
- Simplify powers of integers and monomials.
- Simplify products with scientific notation.
- Simplify zero exponents.
- Use the properties of exponents to perform operations on numbers written in scientific notation.
- Write fractions in simplest form.
- Write negative exponents in fraction form.
- Write numbers in scientific notation with positive and negative exponents.
- Write prime factorizations of a number using exponents.

Assessments

Digits Readiness Assessments:

The readiness assessment screens students on their understanding of the prerequisite content of a unit. Students are then assigned invidualized intervention lessons to address specific needs.

- Daily Assessment Instructional/Assessment Focus Formative assessments, such as: Do Now Assignments, Homework Assignments, Tickets to Leave, and Communicators, will provide daily data for teachers.
- Factors, Fractions and Exponents Quiz Formative: Written Test
- Factors, Fractions and Exponents Test Summative: Written Test Teacher-constructed test in which students will demonstrate their knowledge of all objectives in the unit.
- Fractions Pre Assessment Diagnostic: Written Test Have students complete a pre-test on operations with fractions to determine their strengths and weaknesses for the following unit.
- My Special Number Formative: Personal Project My Special Number Chapter Project: students will make a poster with a partner based on the mathetical properties of their special number.
- Traffic Light Formative: Self Assessment Students will self assess their needs based on a unit study guide. They will color code the guide (red= not confident; yellow= could use a little more help; green= understand). Based on the sections they struggle with, the teacher will group the students to work on extra practice and provide help.

Activities

- **Investigation of Prime and Composite Numbers:** use visual chart of numbers 1-100 and determine if a number is prime or composite (numbers 1-100). Cross our composite numbers and circle prime numbers. Do you see any patterns?

- **Fraction Scramble:** rearrange the numerators and denominators in 5 fractions to make 5 new fractions. Textbook page 192.
- **GCF VENN DIAGRAM:** On the SmartBoard, display a Venn Diagram with two numbesr or monomials in each. Have students go to the board to display the common and non-common factors and variables.
- **Slide Method for GCF:** Instead of having students list the factors of each number, a more efficient method is the Slide Method. Demonstrate each method to students, and have them pick the one they find the most useful.
- **Finding Rules of Exponents:** Have students complete a chart to determine the pattern/rules for multiplying and dividing exponents. Textbook page 193
- **My Special Number Chapter Project:** students will make a poster with a partner based on the mathematical properties of their special number.
- **Scientific Notation:** Have students complete a chart of examples demonstrating the relationship between standard form, product form, and scientific notation.
- **Calculators:** Utilize calculators to demonstrate the process of entering exponents. Also, show students the practicality of Scientific Notation (some numbers are too long for calculators to display or interpret).

- **Digits cd grade 6:**

  Launch Activity

Multiply Fractions: r-5 Math in Music: In this activity students will solve problems concerning music to review multiplication of whole numbers and adding fractions.

Divide Fractions: r-6 Making Pizzas: In this activity students will solve problems concerning pizza to review simplifying, multiplying, and adding fractions. Students will also divide whole numbers.

Activities to Differentiate Instruction

- **Error Analysis (Advanced Activity)**: describe and correct the error in finding the LCM of two numbers. Example: 16 and 30. (16 = 2x2x2x2 and 30= 2x3x5. so the LCM = 2x2x2x2x2x3x5)
- **Human Number Line Activity:** give each students a note card with a fraction (multiples of 4. Using their knowledge of equivalent fractions and LCD, have them order themselves from least to greatest. Challenge certain students by providing them with more complex numbers. This activity can be accommodated for less-advanced students by providing them with more common fractions with one or two digit bases.
- **Equivalent Fractions/Ordering Fractions:**

-Below/On-Level: Have students use area models to visualize and to demonstrate equivalent fractions and to order fractions from least to greatest.

-Above Level: Have students list the activities they complete during the day as a fraction of 24 hours. Then have the students order the fractions and covert to decimals.

- **TRAFFIC LIGHT: Students will self assess Unit Study Guide:** Students will self assess their needs based off of a unit study guide. They will color code the guide (red= not confident, yellow= could use a little more help, green= understand). Based on the sections they struggle with, the teacher will group the students to work on extra practice and provide help.

Homework will be modified as needed.

- **Digits Supported Materials**:
  - Math XL Printables
  - Leveled Homework G and K
  - Help Me Solve This: This function scaffolds math problems by asking prompting question at each individual step.
  - View An Example: This function provides a fully worked out step-by-step solution of a similar problem.
  - Readiness Assessment: After a student completes the readiness assessment intervention lessons are individually assigned to address prerequisite skills .
  - Tools: On line manipulatives

**Teacher walks around and observes groups to make sure they are on task an receiving correct answer.

Integrated/Cross-Disciplinary Instruction

- **Instrumentals:** When performing in the choir or band, the instructor/conductor must decide how to arrange the band/choir members on the stage or risers so that their placement is visually pleasing to the audience. The use of factors is critical to determining such possible arrangements. Provide the students with the number of students in our choir or band. Have them create different ways to arrange the students. Are there any other factors to keep in mind when arranging students? (ex: 1 x n arrangement will be too wide)

Resources

Kuta software

Digits teacher materials and support: www.pearsonrealize.com

SMART Exchange - SMART Exchange

Digits student access and support: www.MyMathUniverse.com

21st Century Skills

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology

	applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.