7th Grade Math

ELG 7.2: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Vertical Progression:

5th Grade	**5.NBT.C Perform operations with multi-digit whole numbers and with decimals to hundredths.** o **5.NBT.C.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. o **5.NBT.C.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
6th Grade	**ELG 6.2 Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.** o **6.NS.A.1** Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. **ELG 6.3 Compute fluently with multi-digit numbers and find common factors and multiples** o **6.NS.B.2** Fluently divide multi-digit numbers using the standard algorithm. o **6.NS.B.3** Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. **ELG 6.4 Apply and extend previous understandings of numbers to the system of rational numbers.** o **6.NS.C.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values o **6.NS.C.6** Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. o **6.NS.C.6a** Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. o **6.NS.C.6c** Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. o **6.NS.C.7** Understand ordering and absolute value of rational numbers. o **6.NS.C.7a** Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. o **6.NS.C.7b** Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 °C > –7 °C to express the fact that –3 °C is warmer than –7 °C.* o **6.NS.C.7c** Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
7th Grade	**ELG 7.2 Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.** o **7.NS.A.1** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. o **7.NS.A.1a** Solve real-world and mathematical problems involving the four operations with rational numbers. o **7.NS.A.1b** Apply and extend previous understandings of multiplication and division and of fractions to

	multiply and divide rational numbers. o **7.NS.A.1c** Solve real-world and mathematical problems involving the four operations with rational numbers. o **7.NS.A.1d** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. o **7.NS.A.2** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. o **7.NS.A.2a** Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (−1)(−1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. o **7.NS.A.2b** Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If *p* and *q* are integers, then −(*p*/*q*) = (−*p*)/*q* = *p*/(−*q*). Interpret quotients of rational numbers by describing real-world contexts. o **7.NS.A.2c** Apply properties of operations as strategies to multiply and divide rational numbers. o **7.NS.A.2d** Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. o **7.NS.A.3** Solve real-world and mathematical problems involving the four operations with rational numbers.
8th Grade	**ELG 8.1 Know that there are numbers that are not rational, and approximate them by rational numbers.** o **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. o **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 √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

Students will demonstrate command of the ELG by:

- Representing addition and subtraction of rational numbers on a horizontal or vertical number line.
- Interpreting sums of rational numbers by describing real-world contexts.
- Showing that the distance between two rational numbers on the number line is the sum of their absolute values.
- Applying properties of operations to add and subtract rational numbers.
- Interpreting products and quotients of rational numbers by describing real-world contexts.
- Using the distributive property to write equivalent expressions with rational numbers.
- Using division to convert a fraction to a terminating or repeating decimal.
- Solving problems involving the four operations with rational numbers.
- Simplifying complex fractions.
- Applying properties of operations to multiply and divide rational numbers

Vocabulary:

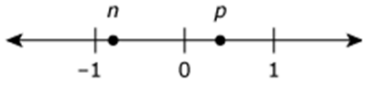
- absolute value
- additive inverse
- distributive property
- integer
- opposite quantities
- positive and negative numbers
- properties of operations
- repeating decimal
- signed number
- terminating decimal

Sample Instructional/Assessment Tasks:

1) **Standard(s): 7.NS.A.1**

Source: Adapted from sample PARCC assessment item

Item Prompt:
Two numbers, n and p, are plotted on the number line as shown.



The numbers $\boldsymbol{n-p, n+p, p-n}$ will be plotted on the number line.

Circle the expression which makes each statement true:

The number with the least value is [Choose ... / $n-p$ / $n+p$ / $p-n$] **, and the number with the greatest value is** [Choose ... / $n-p$ / $n+p$ / $p-n$]

Explain your reasoning.

Correct Answer:

The number with the least value is [Choose ... / **($n-p$)** / $n+p$ / $p-n$] **, and the number with the greatest value is** [Choose ... / $n-p$ / $n+p$ / **($p-n$)**]

n-p would be less than -1 since you would move p units to the left of n.

n+p would be between n and 0 since you would move p units to the right of n and p is less than n.

p-n would be greater than 1 since you are taking away a negative which will add p to n.

2) Standard(s): 7.NS.A.2

Source: https://www.illustrativemathematics.org/content-standards/7/NS/A/3/tasks/1602

Item Prompt:
A water well drilling rig has dug to a height of -60 feet after one full day of continuous use.

a. Assuming the rig drilled at a constant rate, what was the height of the drill after 15 hours? Show your work.

b. If the rig has been running constantly and is currently at a height of -143.6 feet, for how long has the rig been running? Show your work.

Correct Answer

a. 5/8 of a day

b. Approximately 2.4 days or 57.44 hours