Core Content

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

Standard 1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

- a) Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.
- b) Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
- c) Understand subtraction of rational numbers as adding the additive inverse, p q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
- d) Apply properties of operations as strategies to add and subtract rational numbers.

Concepts and Skills to Master

- Understand, apply, and explain the additive inverse property.
- Model addition and subtraction of rational numbers, including integers, decimals, and fractions, on a vertical or horizontal number line.
- Add and subtract rational numbers, including integers, decimals, and fractions.

Supports for Teachers

Critical Background Knowledge			
Fluency with addition and subtraction of positive fractions and decimals.			
Academic Vocabulary			
Integer, rational number, additive inverse, commutative property, associative property			
Suggested Instructional Strategies		Resources	
• Use a number line to model operations with rational numbers.		Illuminations (NCTM)	
Sample Formative Assessment Tasks			
Skill-based Task	Problem Task		
Compute:	Write a story that would result in the problem:		
3 1 -3 + 7	(-3)+6+5.7-8		
$-\frac{-}{4}+\frac{-}{2}$ $3+7$ $1.35+(-3.57)$	Model the solut	tion in two different ways.	
-3-7 $4.5-(-7.9)$			
$-8\frac{-}{8}-(-3\frac{-}{6})$ $-3-7+(-5)$			

Core Content

Cluster Title: Apply and extend previous understanding of operations with fractions to add, subtract, multiply, and divide rational numbers.

Standard 2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

- a) 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.
- b) 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.
- c) Apply properties of operations as strategies to multiply and divide rational numbers.
- d) 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.

Concepts and Skills to Master

- Multiply and divide rational numbers, including integers, decimals, and fractions, and use properties of arithmetic to model multiplication and division of rational numbers.
- Explain why division by zero is undefined.
- Use long division to change a fraction into a terminating or repeating decimal.
- Interpret products and quotients of rational numbers, including integers, decimals, and fractions, in real-world contexts.

Supports for Teachers

Critical Background Knowledge

• Fluency with multiplication and division of positive fractions and decimals.

Academic Vocabulary

Distributive property, integer, terminating decimal, rational number, commutative property, associative property

Suggested Instructional Strategies

Explore real world contexts that result in multiplication or division of rational numbers

Sample Formative Assessment Tasks

Skill-based Task	Problem Task
Compute: $\frac{2}{3} \times \left(-\frac{1}{4}\right)$	Write a story that would result in the problem: $-1.25 \div 2$
Convert $\frac{2}{3}$ to a decimal using long division.	

Resources

Core Content

Cluster Title: Apply and extend previous understanding of operations with fractions to add, subtract, multiply, and divide rational numbers.

Standard 3: Solve real-world and mathematical problems involving the four operations with rational numbers.

Concepts and Skills to Master

- Model and solve real world problems using numbers and operations.
- Explain the solution to a real-world problem in context.

Supports for Teachers

Critical Background Knowledge • Set up a number sentence to model a real-life situation. Order of operations (6.EE.2c) Compute fluently the four operations using rational numbers. **Academic Vocabulary** Sum, difference, product, quotient, difference **Suggested Instructional Strategies** Resources • Embed problems with credit card examples, sports scores and statistics, Illuminations (NCTM) submarine depth examples, helicopter height examples, time-lines and other real world situations. • Talk about situations where solely identifying key words (e.g. sum) may lead to incorrect answers. **Sample Formative Assessment Tasks** Skill-based Task **Problem Task** Create three word problems arising from situations at home A hot air balloon rises 2,150.825 feet then falls $583\frac{1}{2}$ feet. that require negative numbers to solve. Write the stories What is the final height of the balloon? and the math problems and find the solutions. Explain what the solution means in context. Write a story problem that uses the word "sum", but does • not require addition to solve.