7.NS.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.
What temperature would be 15° F more than the temperature shown on the thermometer above?

A. -20° F  
B. -10° F  
C. 10° F  
D. 15° F  
E. 20° F

Source: National Assessment of Educational Progress, 2005, Grade 8 Mathematics Assessment.

The lowest point of the St. Lawrence River is 294 feet below sea level. The top of Mt. Jacques Cartier is 1,277 feet above sea level. How many feet higher is the top of Mt. Jacques Cartier than the lowest point of the St. Lawrence River? Show your work.

Source: National Assessment of Educational Progress, 1996, Grade 8 Mathematics Assessment.

+5 + -5 =


Add: +8 + (−16)

A. -24  
B. -8  
C. +8  
D. +24

Source: National Assessment of Educational Progress, 2008, Age 13 and Age 17 Mathematics Assessments.
7.NS.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.

\((-5)(-7) = \)

A. -35  
B. -12  
C. -2  
D. 12  
E. 35

Source: National Assessment of Educational Progress, 1996, Grade 8 Mathematics Assessment.

Change the following decimal to a fraction.

\(0.3\bar{3}\)

Divide: \(-36 \div (+4)\)

A. -9  
B. +9  
C. \(-\frac{1}{9}\)  
D. \(+\frac{1}{9}\)  
E. -32

Source: National Assessment of Educational Progress, 2008, Age 17 Mathematics Assessment.

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

The manager of a company has to order new engines for its delivery trucks after the trucks have been driven 150,000 miles. One of the delivery trucks currently has 119,866 miles on it. This truck has the same delivery route each week and is driven an average of 40,000 miles each year. At this rate, the manager should expect this truck to reach 150,000 miles in approximately how many months?

A. Less than 4 months  
B. Between 4 and 6 months  
C. Between 6 and 8 months  
D. Between 8 and 10 months  
E. More than 10 months

Source: National Assessment of Educational Progress, 2009, Grade 12 Mathematics Assessment.

The cost to mail a first-class letter is 33 cents for the first ounce. Each additional ounce costs 22 cents. (Fractions of an ounce are rounded up to the next whole ounce.)

How much would it cost to mail a letter that weighs 2.7 ounces?

A. 55 cents  
B. 66 cents  
C. 77 cents  
D. 88 cents  
E. 99 cents

Source: National Assessment of Educational Progress, 2009, Grade 12 Mathematics Assessment.
In 2005, the cost to mail a first-class letter was 33 cents for the first ounce. Each additional ounce cost 22 cents. (Fractions of an ounce are rounded up to the next whole ounce.)

What is a possible weight for a first-class letter that costs $1.21 to mail? Show your work.

Source: National Assessment of Educational Progress, 2005, Grade 12 Mathematics Assessment.

The population of the United States is approximately 250 million, and the national debt is approximately 4 trillion dollars. If this debt were divided equally among the population, what would be the debt, in dollars, per person?

A. 16
B. 1,600
C. 16,000
D. 1,600,000
E. 16,000,000

Source: National Assessment of Educational Progress, 1996, Grade 12 Mathematics Assessment.

In 1990, the postal rate was 25 cents for the first ounce and 20 cents for each additional ounce or part of an ounce. What did it cost to mail a package that weighed 6.8 ounces?

A. $1.25
B. $1.40
C. $1.45
D. $1.70
E. $1.75

Source: National Assessment of Educational Progress, 1990, Grade 12 Mathematics Assessment.
How many more people were living in Los Angeles in 1960 than 1940?

A. 100,000
B. 500,000
C. 800,000
D. 1,000,000
E. 2,500,000

What was the first year listed in which the population of Los Angeles was greater than the population of Detroit?

A. 1920
B. 1930
C. 1940
D. 1950
E. 1960
F. 1970

According to the table, what is the total amount of protein contained in two boiled eggs and one-half cup of whole milk?


<table>
<thead>
<tr>
<th>Measure</th>
<th>Calories</th>
<th>Protein (grams)</th>
<th>Carbohydrates (grams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana, raw</td>
<td>100</td>
<td>1</td>
<td>26</td>
</tr>
<tr>
<td>Beef hamburger</td>
<td>245</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>Whole milk</td>
<td>160</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Doughnut</td>
<td>125</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Eggs, boiled</td>
<td>160</td>
<td>13</td>
<td>1</td>
</tr>
</tbody>
</table>