



TABE

MATH - D

Unit - 1

Lesson - 7

Rational Numbers

Any number that can be written as a Fraction:

$R = \frac{a}{b}$ where (a) and (b) are integers and $b \neq \text{zero}$

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Lesson 7

Add Rational Numbers

7.NS.1.a – High, 7.NS.1.b – Hi

A rational number is any number that can be expressed as a fraction. Rational numbers include whole numbers, fractions, and decimals. To add rational numbers, use the absolute value of the addends. (An addend is a number that is added to another number). Opposite numbers, when added, always result in a sum of 0.

Same Sign

$$(-5) + (-6)$$

Find the absolute value of each number.

$$|-5| = 5 \quad |-6| = 6$$

Add the absolute values.

$$5 + 6 = 11$$

Use the sign of the addends for the sum.

$$(-5) + (-6) = -11$$

Different Signs

$$-9 + 3$$

Find the absolute value of each number.

$$|-9| = 9 \quad |3| = 3$$

Subtract the lesser absolute value from the greater absolute value

$$9 - 3 = 6$$

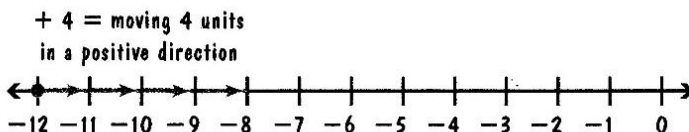
Use the sign of the addend with the greater absolute value.

$$-9 + 3 = -6$$

You can also use a number line to add rational numbers. When adding a positive number, move in a positive direction (to the right). When adding a negative number, move in a negative direction (to the left).

Example What is the location of the sum of $-12 + 4$ on a number line?

- 1) Plot the first number on the number line. Plot a point at -12 .
- 2) Move 4 units in a positive direction (to the right).
- 3) $-12 + 4 = -8$.



1. On a number line, which of the following expressions would result in moving in a negative direction?

A. $-8 + 1$

B. $4 + (-2)$

C. $-3 + 4$

D. $6 + 3$

1. B Adding a negative number would result in moving in a negative direction. In this case, you start at 4 and move 2 units to the left. All the other answers are moving in a positive direction.

Practice

Read each question. Select the correct answer.

1 A helium balloon was released from a height of 0 feet and rose $97\frac{1}{2}$ feet in 10 minutes. It then descended $97\frac{1}{2}$ feet in the next 45 minutes. What was the balloon's final height?

A. 0 feet

B. $48\frac{3}{4}$ feet

C. $97\frac{1}{2}$ feet

D. 195 feet

2 Which expression has a sum of 9?

A. $-9 + 9$

B. $16.2 + (-25.2)$

C. $17.8 + (-8.8)$

D. $-9 + 0$

3 The balance on Keith's credit card is \$173.95. If he makes a payment of \$50, what will be the new balance?

A. \$223.95

B. \$173.95

C. \$123.95

D. \$73.95

4 Which situation results in a total of 0?

A. A submarine starts at 0 feet below sea level, travels down 215 feet, and then travels up 205 feet.

B. Logan makes 3 gallons of lemonade and then sells 3 gallons of lemonade.

C. Kevin deposits \$169.75 in his checking account and then uses his debit card to purchase groceries for \$109.75.

D. An airplane flies at an altitude of 30,000 feet and changes altitude by 0 feet.

5 Jasmine walks 1,225 feet from the store to her friend's house. She then walks 1,225 feet back to the store. How many feet did Jasmine end up from where she started?

A. 0 feet

B. $-1,225$ feet

C. 1,225 feet

D. 2,550 feet

6 Jessica goes for a walk. She walks $\frac{2}{3}$ mile away from home. Then she walks $\frac{1}{4}$ back toward her house and stops at the post office. Which expression describes this situation?

A. $-\frac{2}{3} + \left(-\frac{1}{4}\right)$

B. $\frac{2}{3} + \frac{1}{4}$

C. $\frac{2}{3} + \left(-\frac{1}{4}\right)$

D. $-\frac{2}{3} + \frac{1}{4}$

7 An earned run average (ERA) in baseball is the number of earned runs a pitcher gives up per 9 innings. Last year, Sara had an ERA of 3.21. Her ERA this year was 0.65 points lower than last year. What is her new ERA?

A. 0.65

B. 2.56

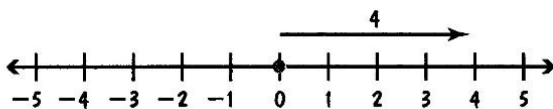
C. 3.21

D. 3.86

8 What is the location of the sum of $-9 + (-3)$ in respect to -9 on a number line?

- A. 3 units in the negative direction
- B. 3 units in the positive direction
- C. 12 units in the negative direction
- D. 12 units in the positive direction

9 Which sum does the number line represent?



- A. $0 + (-4)$
- B. $-4 + 0$
- C. $0 + 4$
- D. $4 + 0$

10 Which of the following situations involve opposite quantities combining to make 0?

- A. Kevin is writing a novel. He writes 4 pages. When he reviews the pages, he discards them and writes 6 new pages.
- B. Sam opens a new checking account with deposit of \$25. Then, he paid a \$25 bill online.
- C. Ezra collects 10 recyclable bottles. Then he collects 10 more bottles.
- D. Russell hikes 125 feet up a mountain. Then he hikes up another 125 feet.

11 In an atom of an element, each electron has a charge of -1 , and each proton has a charge of $+1$. Which of the following isotopes has a total charge of 0?

- A. 4 protons and 3 electrons
- B. 7 protons and 8 electrons
- C. 9 protons and 9 electrons
- D. 6 protons and 5 electrons

12 On a number line, which of the following expressions would result in moving in a positive direction?

- A. $5 + (-1)$
- B. $-4 + (-3)$
- C. $3 + (-4)$
- D. $-6 + 3$

13 Which expression has a sum of -12 ?

- A. $-8 + (-4)$
- B. $-8 + 4$
- C. $8 + 4$
- D. $8 + (-4)$

14 Marcus started walking at mile marker 5. He ended at mile marker 1. Which of the following expressions represents the situation?

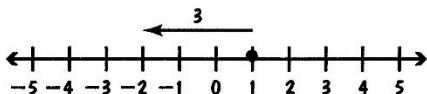
- A. $-5 + 1$
- B. $5 + 1$
- C. $5 + (-1)$
- D. $5 + (-4)$

Practice 7

Add Rational Numbers

7.NS.1.a – High, 7.NS.1.b – High

- 1 Sarah owes her sister \$37.75. She borrows \$30 more. Which expression describes this situation?
 A. $-37.75 + (-30)$ B. $-37.75 + 30$
 C. $37.75 + (-30)$ D. $37.75 + 30$
- 2 Which expression has a sum of seven?
 A. $-1 + 8$ B. $0 + (-7)$
 C. $-12 + 5$ D. $-9 + 2$
- 3 Todd drives seven miles EAST on Main St. to school. After class, Todd drives two miles WEST on Main St. and stops to eat. Then he drives another three miles WEST on Main St. before stopping again. How close is Todd to his starting point?
 A. 0 mi B. 2 mi
 C. 3 mi D. 12 mi
- 4 Which expression does NOT have a sum of zero?
 A. $-75.6 + (-75.6)$
 B. $-17.85 + 17.85$
 C. $-652.7 + 652.7$
 D. $101\frac{7}{8} + (-101\frac{7}{8})$
- 5 Which sum does the number line represent?



- A. $1 + 3$ B. $1 + (-2)$
 C. $1 + (-3)$ D. $-3 + -1$
- 6 When Maria wakes up at 6 AM, the temperature outside is -2°F . By 10 AM, the temperature rises eight degrees. What is the temperature outside at 10 AM?
 A. 10°F B. 6°F
 C. 4°F D. -6°F

- 7 Which expression has a sum of -11 ?
 A. $-6 + 5$ B. $-6 + (-5)$
 C. $7 + 4$ D. $-7 + 4$
- 8 On a number line, which of the following expressions will result in moving in a positive direction?
 A. $-16 + (-12)$ B. $-9 + (-9)$
 C. $8 + (-13)$ D. $-2 + 3$
- 9 Shirley needs exactly $\frac{7}{8}$ inch of tape to begin a craft. Later, she will need an additional $\frac{5}{12}$ inch of tape. Which expression describes this situation?
 A. $-\frac{7}{8} + (-\frac{5}{12})$
 B. $\frac{7}{8} + \frac{5}{12}$
 C. $-\frac{7}{8} + \frac{5}{12}$
 D. $\frac{7}{8} + (-\frac{5}{12})$
- 10 A football team gets the ball at the 40-yard line. The quarterback throws a complete pass and gains 24 yards. On the next play, the team loses 24 yards. On what yard line is the football?
 A. 64-yd line B. 48-yd line
 C. 40-yd line D. 16-yd line
- 11 On a number line, which of the following expressions will result in moving in a negative direction?
 A. $-23 + 19$ B. $14 + 0$
 C. $10 + (-1)$ D. $-6 + 8$
- 12 Kathy receives a \$25 gift card. When she finishes shopping, she has \$7 remaining on the gift card. Which of the following expressions represents the situation?
 A. $-25 + (-7)$ B. $25 + 7$
 C. $25 + (-18)$ D. $25 + 18$

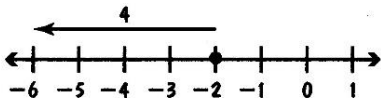
13 Which of the following situations results in a sum of zero?

- A. Jerry digs a hole one foot deep to plant a shrub. He realizes the hole is too shallow and digs another one foot.
- B. Bill's mom turns up the thermostat three degrees. When Bill's dad arrives home two hours later, he turns down the thermostat three degrees.
- C. Dave owes \$1,803 on his 36-month car loan. He makes a payment of \$803.
- D. A wrestler weighs 145.2 lb before practice. At the end of practice, he weighs 142.5 lb.

14 What is the location of the sum of $2 + (-5)$ with respect to two on a number line?

- A. 3 units in a positive direction
- B. 3 units in a negative direction
- C. 5 units in a positive direction
- D. 5 units in a negative direction
- E. 7 units in a positive direction
- F. 7 units in a negative direction

15 Which sum does the number line represent?



- A. $-2 + (-6)$
- B. $-2 + 4$
- C. $2 + 6$
- D. $-2 + (-4)$

16 Josh opens a 32-ounce bag of flour. When he finishes baking, he has 23 ounces of flour left. Which of the following expressions represents the situation?

- A. $32 + (-23)$
- B. $32 + (-9)$
- C. $23 + 32$
- D. $23 + (-9)$

17 Vera's water softener uses 40 pounds of salt in one month. Vera adds another seven-pound bag of salt. Which expression represents the situation?

- A. $-40 + 7$
- B. $40 + 7$
- C. $40 + (-7)$
- D. $-40 + (-7)$

18 Electrons have a charge of -1 . Protons have a charge of $+1$. An isotope has 62 electrons and 87 protons. Which of the following describes the charge of the isotope?

- A. a negative charge
- B. a positive charge
- C. both a positive and a negative charge
- D. neither a positive nor a negative charge

19 In swimming, a faster time will decrease a swimmer's personal best time. Brooke's previous personal best time in the 50-yard freestyle was 25.37 seconds. During a swim meet, she swims the 50-yard freestyle 0.48 second faster. What is her new personal best time?

- A. 24.89 s
- B. 24.91 s
- C. 25.11 s
- D. 25.37 s

20 A hot air balloon launches from an elevation of zero feet. The balloon descends 39.5 feet toward a ravine. Then the balloon ascends 40.5 feet into the air. Which of the following statements is true?

- A. The elevation of the balloon is equal to the launch point.
- B. The elevation of the balloon is below the launch point.
- C. The elevation of the balloon is above the launch point.
- D. The elevation of the balloon is 40.5 ft from the launch point.

Math-D Lesson-7 Key

Lesson 7

Add Rational Numbers

(7.NS.1.a, 7.NS.1.b)

1. A. An increase in height is represented by a positive number while a decrease in height is represented by a negative number. $97\frac{1}{2} + (-97\frac{1}{2}) = 0$.
2. C. Find the sum of each expression to identify the expression whose sum is 9. $17.8 + (-8.8) = 9$.
3. C. In this item, Keith's balance is represented by a positive number. Keith's payment is represented by a negative number because it decreases the amount he owes. $\$173.95 + (-\$50.00) = \$123.95$.
4. B. Making lemonade is represented by a positive number, while selling lemonade is represented by a negative number. $3 + (-3) = 0$.
5. A. Walking to her friend's house is an increase in distance, represented by a positive number. Walking back to the store is a decrease in distance, represented by a negative number. $225 + (-225) = 0$.
6. C. Walking away from home is an increase in distance from home, represented by a positive number. Walking back towards home is a decrease in distance, represented by a negative number.
7. B. A decrease in Sara's ERA is represented by a negative number. $3.21 - 0.65 = 2.56$.
8. A. Adding a negative 3 results in moving 3 units in a negative direction.
9. C. The first addend is represented by the starting point of the ray above the number line. The length of the ray represents the number being added.
10. B. A deposit represents an increase in the account balance, while a bill payment represents a decrease in the account balance. $25 + (-25) = 0$.
11. C. Because protons and electrons have opposite charges, in order for an isotope to have a total charge of 0, it must have the same number of protons as electrons.
12. D. Adding a positive number results in moving in a positive direction.
13. A. Find the sum of each expression to identify the expression whose sum is -12. $-8 + (-4) = -12$
14. D. Marcus walked in the opposite direction of the mile markers. To get from marker 5 to marker 1, he walked 4 miles in the opposite direction.

Math-D Practice-7 Key

Practice 7

Add Rational Numbers

pp. 14–15

(7.NS.1.a, 7.NS.1.b)

- A. Borrowing money is a decrease in funds, represented by a negative number. Sarah borrowed twice which is represented by $-37.75 + (-30)$.
- A. Find the sum of each expression to identify the expression whose sum is 7: $-1 + 8 = 7$.
- B. If 0 represents Todd's starting point, driving east would be represented by a positive number while driving west would be represented by a negative number. Todd drives $7 + (-2) + (-3) = 2$.
- A. Each expression combines opposite quantities except $-75.6 + (-75.6)$, which combines two negative quantities.
- C. The ray starts at 1 and points 3 units in a negative direction, which is $1 + (-3)$.
- B. The sum of the starting temperature and the increase in temperature is represented by $-2 + 8 = 6$.
- B. Find the sum of each expression to identify the expression whose sum is -11 : $-6 + (-5) = -11$.
- D. Adding a positive number results in moving in a positive direction.
- B. Measuring length is represented by positive numbers. The tape Shirley uses is represented by $\frac{7}{8} + \frac{5}{12}$.
- C. A gain in yardage is represented by a positive number while a loss in yardage is represented by a negative number. So, $24 - 24 = 0$ means that the football is at its starting point on the 40-yd line.
- C. Adding a negative number results in moving in a negative direction.
- C. A balance on a gift card is a positive number. Spending money decreases the balance, which is represented by a negative number: $25 + (-18) = 7$.
- B. Lowering the thermostat is represented by a negative number while raising the thermostat is represented by a positive number: $-3 + 3 = 0$.
- D. Adding negative 5 results in moving 5 units in a negative direction.
- D. The ray starts at -2 and points 4 units in a negative direction, which is $-2 + (-4)$.
- B. To identify the quantity of flour used, find the starting amount and subtract the remaining amount: $32 - 23 = 9$. Therefore, $32 + (-9)$ represents the original amount of flour and the amount used while baking.
- A. A decrease in salt is represented by a negative number while an increase in salt is represented by a positive number: $-40 + 7$.
- B. Electrons are represented by negative numbers and protons are represented by positive numbers. In the equation $-62 + 87 = 25$, the sum of 25 represents a positive charge.
- A. A decrease in Brooke's time is represented by a negative number: $25.37 - 0.48 = 24.89$.
- C. An increase in elevation is represented by a positive number while a decrease in elevation is represented by a negative number: $-39.5 + 40.5 = 1$. This means that the balloon is above the launch elevation of 0 ft.