



TABE

MATH - D

Unit - 1

Lesson - 9

Rational Numbers
Multiply and Divide

Revised: March 10, 2024

Nolan Tombouliau

Lesson 9

Multiply and Divide Rational Numbers

7.NS.2.a – Medium, 7.NS.2.b – Medium, 7.NS.2.c – Medium

To multiply or divide rational numbers, find the product or quotient of their absolute values. Then, use the following rules to determine the sign of the answer.

- If the signs of the two numbers are alike, the answer is positive.

$$3 \times 4 = 12 \quad 24 \div 6 = 4 \quad -5 \times -6 = 30 \quad -36 \div -4 = 9$$

- If the signs of the two numbers are different, the answer is negative.

$$-2 \times 7 = -14 \quad -21 \div 3 = -7 \quad 9 \times -8 = -72 \quad 18 \div -3 = -6$$

In word problems, look for clues that indicate negative or positive numbers.

Clue words for negative numbers	Clue words for positive numbers
below, debit, decrease, descend, down, withdraw	above, deposit, increase, rise, up

Example An airplane descends at a rate of 440 feet in $\frac{2}{3}$ minute. What is the speed, in feet per minute, at which the plane descends?

- 1) Model this problem with a division equation. Because the plane is descending, the rate is negative.

$$-440 \div \frac{2}{3} = ?$$

- 2) Divide the absolute values of each number.

$$440 \div \frac{2}{3} = 440 \times \frac{3}{2} = \frac{1,320}{2} = 660$$

- 3) Determine the sign of the quotient. Because the numbers have different signs, the quotient is negative, -660 . The airplane changes elevation at -660 feet per minute.

Hint

When dividing by a fraction, you multiply by the reciprocal. The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$.

1. Carlos has \$65 automatically withdrawn from his checking account each month to pay his electric bill. After one year, what is the change in his account from paying his electric bill?
A. \$650
B. \$5.42
C. $-\$5.42$
D. $-\$780$

Strategy

To find the change in a year, multiply the decrease in his account each month by 12 months.

1. **D** A withdrawal is represented by a negative number. $-65 \times 12 = -780$. The answer is negative because the numbers have different signs.

Practice

Read each question. Select the correct answer.

- 1 Carol's bank account is automatically debited \$15.87 each month for her gym membership. What is the change in her account after 5 months of paying her gym membership?
- A. -\$79.35
B. -\$15.87
C. -\$10.87
D. \$79.35
- 2 A scuba diver descends at the rate of $26\frac{2}{3}$ feet per minute. What will her change in elevation be after 4 minutes?
- A. -148 feet
B. $-106\frac{2}{3}$ feet
C. $106\frac{2}{3}$ feet
D. 148 feet
- 3 $-27 \times 9 =$
- A. 243
B. 3
C. -3
D. -243
- 4 Dawn takes out a loan for \$720, payable in equal installments over 12 months. Her monthly payment is deducted automatically from her account. What is the change in her checking account balance each month due to her loan payment?
- A. -\$120
B. -\$60
C. \$60
D. \$120
- 5 $\frac{4}{3} \times \frac{7}{9} =$
- A. $-2\frac{1}{3}$
B. $-1\frac{1}{27}$
C. $1\frac{1}{27}$
D. $2\frac{1}{3}$
- 6 $0.5 \times 1.48 =$
- A. -7.4
B. -0.74
C. 0.74
D. 7.4
- 7 A cold front comes in and the temperature decreases 4°F every hour. What is the change in temperature after 7 hours?
- A. 28°F
B. 3°F
C. -3°F
D. -28°F
- 8 $-\frac{3}{4} \div \frac{-2}{5} =$
- A. $-1\frac{7}{8}$
B. $-\frac{3}{10}$
C. $\frac{3}{10}$
D. $1\frac{7}{8}$

9 The stock exchange used to report changes in stock prices in fractions. One company's change in price was recorded as $-\frac{11}{16}$. To find the change to the nearest penny divide -11 by 16 , and round to the nearest hundredth. What is the change in the stock price to the nearest penny?

- A. $-\$1.45$
- B. $-\$0.69$
- C. $\$0.69$
- D. $\$1.45$

10 $-16 \times 4.1 =$

- A. 65.6
- B. 6.56
- C. -6.56
- D. -65.6

11 Jacob is running a marathon which is 26.2 miles. He has run 0.75 of the race. How many miles has he run?

- A. -19.65
- B. -6.55
- C. 6.55
- D. 19.65

12 $\frac{2}{3} \div -\frac{1}{6} =$

- A. -4
- B. $-\frac{1}{9}$
- C. $\frac{1}{9}$
- D. 4

13 $143 \div 11 =$

- A. 14.3
- B. 13
- C. -13
- D. -14.3

14 A parachutist descends at a rate of 56 feet per minute. How long will it take her elevation to change -392 feet?

- A. -8 minutes
- B. -7 minutes
- C. 7 minutes
- D. 8 minutes

15 A water tank is draining at a rate of 24 gallons per hour. What is the change in the volume of water after 12 hours?

- A. -288 gallons
- B. -2 gallons
- C. 2 gallons
- D. 288 gallons

16 $-3.6 \div 1.2 =$

- A. -4.32
- B. -3
- C. 3
- D. 4.32

Practice 9

Multiply and Divide Rational Numbers

7.NS.2.a – Medium, 7.NS.2.b – Medium, 7.NS.2.c – Medium

- 1 A hurricane is currently 105 miles offshore and moving toward land at 15 miles per hour. How long until the hurricane makes landfall?
- A. 1,575 hours
B. 7 hours
C. -7 hours
D. -1,575 hours
- 2 A female rabbit can give birth to eight rabbits at a time and have up to nine litters per year. How many rabbits can one female rabbit have in a year?
- A. 72 rabbits
B. 71 rabbits
C. 27 rabbits
D. 17 rabbits
- 3 Every second, 16 tons of water flow over a waterfall. How many tons of water will flow over the falls in 60 seconds?
- A. -960 tons
B. -3.75 tons
C. 3.75 tons
D. 960 tons
- 4 A squirrel runs at a rate of 20 feet per second. How far does the squirrel run in 15 seconds?
- A. 0.75 ft
B. 0.82 ft
C. 210 ft
D. 300 ft
- 5 A football player runs 36 yards in 4.5 seconds. What is the speed, in yards per second, at which the player runs?
- A. 162 yards per second
B. 8 yards per second
C. -8 yards per second
D. -162 yards per second
- 6 A balloon is released from a child's hand. After 60 seconds, the balloon reaches an altitude of 240 feet. What is the rate, in feet per second, at which the balloon is rising?
- A. -4 feet per second
B. -0.25 foot per second
C. 0.25 foot per second
D. 4 feet per second
- 7 Solve. $0.75 \times -9.81 =$
- A. -13.08 B. -7.3575
C. 7.3575 D. 13.08
- 8 Solve. $\frac{2}{3} \div \frac{4}{5} =$
- A. $-\frac{5}{6}$
B. $-\frac{8}{15}$
C. $\frac{5}{6}$
D. $\frac{8}{15}$
- 9 Solve. $-(-3.14) \times -(-5) =$
- A. 15.7 B. 1.57
C. -1.57 D. -15.7
- 10 Solve. $-45 \div -3 =$
- A. -15 B. -12
C. 12 D. 15
- 11 The gas tank in a dump truck can hold 60 gallons. The truck consumes gas at a rate of 12 miles per gallon. How far can the truck travel on one tank of gas?
- A. 720 mi
B. 5 mi
C. -5 mi
D. -720 mi

- 12** An apple pie is cooling at a rate of two degrees per minute. What is the change in the temperature of the apple pie after 35 minutes?

A. 70° B. 17.5°
C. -17.5° D. -70°

- 13** A ship's anchor descends to the seafloor at a rate of three meters per second. How long will it take the anchor's elevation to change -42 meters?

A. 126 s
B. 14 s
C. -14 s
D. -126 s

- 14** A company is awarded a grant of \$5,500, to be disbursed in equal sums over five years. How much will the company receive each year?

A. \$5,500 B. \$1,100
C. $-\$1,100$ D. $-\$5,500$

- 15** After the summer solstice, the amount of daylight decreases by an average of two minutes per day. What is the change in daylight after 30 days?

A. 60 minutes
B. 15 minutes
C. -15 minutes
D. -60 minutes

- 16** A beach has lost 42 feet of shoreline due to erosion over six years. What is the change in the shoreline each year due to erosion?

A. -252 ft
B. -7 ft
C. 7 ft
D. 252 ft

- 17** Solve. $7.8 \div (-2.6) =$

A. 5.2
B. 3
C. -3
D. -5.2

- 18** Solve. $2.95 \times -(-16) =$

A. 47.2
B. 5.42
C. -5.42
D. -47.2

- 19** Solve. $-102 \div \frac{9}{2} =$

A. -459
B. $-22\frac{2}{3}$
C. $22\frac{2}{3}$
D. 459

- 20** Solve. $\frac{-8}{3} \times \frac{1}{-9} =$

A. $-\frac{9}{24}$
B. $-\frac{8}{27}$
C. $\frac{8}{27}$
D. $\frac{9}{24}$

Math-D Lesson-9 Key

Lesson 9

Multiply and Divide Rational Numbers

(7.NS.2.a, 7.NS.2.b, 7.NS.2.c)

1. A. To find the change in balance of her bank account, multiply the change per month of -15.87 by the number of months, 5. Since the numbers have different signs, the answer is a negative number.
2. B. To find the change in elevation, multiply the rate of descent, $-26\frac{2}{3}$, by the number of minutes, 4. Since the numbers have different signs, the answer is a negative number.
3. D. The product of two factors with different signs is a negative number.
4. B. To find how much debt is paid each month, divide the total debt, -720 , by the number of months, 12. Since the numbers have different signs, the answer is a negative number.
5. C. The product of two positive numbers is a positive number.
6. C. The product of two positive numbers is a positive number.
7. D. To find the change in temperature, multiply the change in temperature, -4 , by the number of hours, 7. Since the numbers have different signs, the answer is a negative number.
8. D. When both numbers in a division problem are negative, the quotient is a positive number.
9. B. The quotient of two numbers with different signs is a negative number. $-11 \div 16 = -0.6875$. Rounded to the nearest hundredth (penny), the answer is $-\$0.69$.
10. D. The product of two numbers with different signs is a negative number.
11. D. To find the number of miles Jacob has completed, multiply 0.75 by 26.2 . The product of two numbers with the same sign is a positive number.
12. A. The quotient of two numbers with different signs is a negative number.
13. B. The quotient of two numbers with the same sign is a positive number.
14. C. Divide the total change in elevation, -392 , by the rate of descent, -56 . The quotient of two numbers with the same sign is a positive number.
15. A. Multiply the unit rate, -24 , by the time, 12, to find the total change in volume. The product of two numbers with different signs is a negative number.
16. B. The quotient of two numbers with different signs is a negative number.

Math-D Practice-9 Key

Practice 9

Multiply and Divide Rational Numbers

pp. 18–19

(7.NS.2.a, 7.NS.2.b, 7.NS.2.c)

1. B. To find how long it will take the hurricane to make landfall, divide the distance from land, 105, by the hurricane's speed, 15. The quotient of two numbers with the same sign is a positive number.
2. A. Multiply the number of rabbits per litter, 8, by the number of litters per year, 9. The product of two positive numbers is a positive number.
3. D. Multiply the amount of water flowing over the waterfall every second, 16, by the number of seconds in one minute, 60. The product of two positive numbers is a positive number.
4. D. Multiply the rate, 20, by the number of seconds, 15. The product of two positive numbers is a positive number.
5. B. Divide the distance run, 36, by the time, 4.5. The quotient of two positive numbers is a positive number.
6. D. Divide the height of the balloon, 240, by the time it traveled, 60. The quotient of two positive numbers is a positive number.
7. B. The product of two numbers with opposite signs is a negative number.
8. C. The quotient of two positive numbers is a positive number.
9. A. The product of two negative numbers is a positive number, so each term becomes positive: 3.14×5 . The product of two positive numbers is a positive number.
10. D. The quotient of two negative numbers is a positive number.
11. A. Multiply the number of gallons of gas, 60, by the rate of consumption, 12. The product of two positive numbers is a positive number.
12. D. To find the change in temperature, multiply the rate of change in temperature, -2 , by the number of minutes, 35. The product of two numbers with opposite signs is a negative number.
13. B. Divide the total change in elevation, -42 , by the rate of descent, -3 . The quotient of two negative numbers is a positive number.
14. B. To find the amount of money received each year, divide the total amount of the grant, \$5,500, by the number of years, 5. The quotient of two positive numbers is a positive number.
15. D. Multiply the rate of change of daylight, -2 , by the length of time, 30. The product of two numbers with opposite signs is a negative number.
16. B. Divide the total change in length of the shoreline, -42 , by the length of time, 6. The quotient of two numbers with opposite signs is a negative number.
17. C. The product of two numbers with opposite signs is a negative number, so the second term becomes a negative 2.6. The quotient of two numbers with opposite signs is a negative number.
18. A. The product of two negative numbers is a positive number, so the second term becomes a positive 16. The product of two positive numbers is a positive number.
19. B. The quotient of two numbers with opposite signs is a negative number.
20. C. The product of two negative numbers is a positive number.