



TABE

MATH - D

Unit - 1

Lesson - 8

Rational Numbers

**SUBTRACT**

Revised: March 10, 2024

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# Lesson 8

## Subtract Rational Numbers

7.NS.1.c – High, 7.NS.1.d – High

When you subtract rational numbers, you can change the problem to an addition problem by adding the opposite of the second number. For two rational numbers,  $p$  and  $q$ :

$$p - q = p + (-q)$$

$$p - (-q) = p + q$$

When adding a positive number and a negative number, use the rule for adding rational numbers of different signs. Subtract the lesser absolute value from the greater absolute value and use the sign of the addend with the greater absolute value.

You can also find the distance between two points on a number line using subtraction. Because distance is always expressed as a positive number, the distance will be the absolute value of their difference.

$$\text{the distance from } p \text{ to } q = |p - q|$$

**Example** Kelly's high score on a video game is 500 points, and her low score is  $-200$  points. What is the difference in her low and high scores? What is the distance between her scores on a number line?

1) Model this problem with a subtraction equation.

$$-200 - 500 = ?$$

2) Rewrite the subtraction equation as an addition equation by adding the opposite of the second number.

The opposite of 500 is  $-500$ .

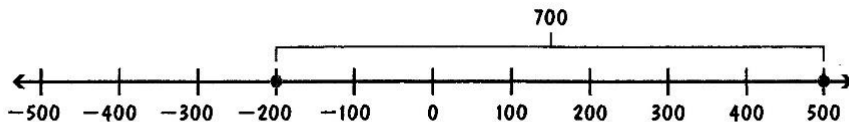
$$-200 + (-500) = ?$$

3) Use the rules for adding rational numbers to find the answer.

$$-200 + (-500) = -700$$

The difference between Kelly's low score and high scores is  $-700$  points.

4) Use a number line and the distance equation to determine the distance between the two points.



$$|-200 - 500| = |-200 + (-500)| = 700$$

The distance between  $-200$  and  $500$  is 700 units.

1. What is the distance between  $-1\frac{3}{4}$  and  $2\frac{1}{2}$  on a number line?

A.  $4\frac{1}{4}$

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

C.  $-\frac{3}{4}$

D.  $-4\frac{1}{4}$

1. A  $|2\frac{1}{2} - (-1\frac{3}{4})| = |2\frac{1}{2} + 1\frac{3}{4}| = 4\frac{1}{4}$ .

### Strategy

To find the distance, take the absolute value of the difference between the numbers.

## Practice

Read each question. Select the correct answer.

1 The freezing point of chlorine is  $-101.5^{\circ}\text{C}$ . The freezing point of hydrogen is  $-259.1^{\circ}\text{C}$ . How much higher is the freezing point of chlorine than hydrogen?

A.  $-360.6^{\circ}\text{C}$

B.  $-157.6^{\circ}\text{C}$

C.  $157.6^{\circ}\text{C}$

D.  $360.6^{\circ}\text{C}$

2 In an old newspaper, Carrie found a stock's price listed as  $34\frac{5}{16}$ . She looked for its price in the next day's paper and found it to be  $33\frac{13}{16}$ . What was the change in the price of that stock?

A.  $-1\frac{1}{8}$

B.  $-\frac{1}{2}$

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

D.  $1\frac{1}{8}$

3  $-145 - (-234) =$

A.  $-379$

B.  $-89$

C.  $89$

D.  $379$

4 Raymond has \$159.78 in his checking account. He wants to purchase a tablet that costs \$239.99. What would be the balance in Raymond's checking account if he purchased the tablet?

A.  $-399.77$

B.  $-80.21$

C.  $80.21$

D.  $399.77$

5  $4.36 - 5.8 =$

A.  $-10.16$

B.  $-1.44$

C.  $1.44$

D.  $10.16$

6  $-\frac{4}{5} - \frac{7}{10} =$

A.  $-1\frac{1}{2}$

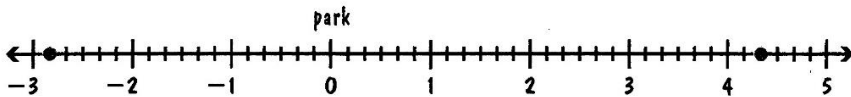
B.  $-\frac{1}{10}$

C.  $\frac{1}{10}$

D.  $1\frac{1}{2}$

7

On a map, Brent's house is  $4\frac{1}{3}$  inches east of the park. Sam's house is  $2\frac{5}{6}$  inches west of the park. If the park is located at 0 on the number line, what is the distance between Brent's house and Sam's house on the map?



A.  $-7\frac{1}{6}$

B.  $-1\frac{1}{2}$

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

D.  $7\frac{1}{6}$

8

Jackson ran 3.8 miles yesterday. Kellen ran 4.2 miles yesterday. How many more miles did Kellen run than Jackson?

A. -8

B. -0.4

C. 0.4

D. 8

9

$7.8 - (-2.43) =$

A. -10.23

B. -5.37

C. 5.37

D. 10.23

10

Maddie is in a cave that is 349 feet below sea level. Katy is on a rock wall that is 563 feet above sea level. What is the distance between their elevations?

A. -912

B. -214

C. 214

D. 912

11

At Mary's home, the outside temperature was  $76^{\circ}\text{F}$ . At Mary's sister's home, the outside temperature was  $-12^{\circ}\text{F}$ . What is the difference in the outside temperature between Mary's house and her sister's house?

A.  $88^{\circ}\text{F}$

B.  $-64^{\circ}\text{F}$

C.  $64^{\circ}\text{F}$

D.  $-88^{\circ}\text{F}$

12

$5\frac{1}{8} - 3\frac{9}{10} =$

A.  $-9\frac{1}{40}$

B.  $-1\frac{9}{40}$

C.  $1\frac{9}{40}$

D.  $9\frac{1}{40}$

13

An airplane is flying at an altitude of 1,250 feet. A submarine is traveling at a depth of 450 feet below sea level. Which expression could be used to find the distance between the airplane and the submarine?

A.  $1250 + (-450)$

B.  $-1250 + (-450)$

C.  $|-1250 + (-450)|$

D.  $|1250 - (-450)|$

# Practice 8

# Subtract Rational Numbers

7.NS.1.c – High, 7.NS.1.d – High

1 Isla is on an oil rig and is pulling a probe from 330 meters below sea level to 35 meters above sea level. How far is the probe being pulled?

- A. 365 m
- B. 295 m
- C. -295 m
- D. -365 m

2 Kylie's house is 240 feet WEST of the building she works in. Brandon's house is 730 feet EAST of the building. Which expression models the distance between their houses?

- A.  $240 - 730$
- B.  $730 + (-240)$
- C.  $|240 - 730|$
- D.  $|-240 - 730|$

3 Jason calculates his maximum bench press to be 120.34 kilograms. Owen's is 113.72 kilograms. How many more kilograms is Jason's maximum bench press than Owen's?

- A. 6.26 kg
- B. 6.62 kg
- C. 7 kg
- D. 7.34 kg

4 Subtract.  $\frac{5}{6} - \frac{7}{8} =$

- A.  $-\frac{1}{24}$
- B.  $-\frac{1}{4}$
- C.  $\frac{1}{24}$
- D.  $\frac{1}{4}$

5 After purchasing a television, Breanne's credit card balance is \$1,524.31. She returns the television and is refunded \$667.79. What is Breanne's new balance?

- A. \$845.79
- B. \$856.52
- C. \$2,191.31
- D. \$2,192.10

6 Jake is plumbing a new bathroom and has a copper pipe that is  $56\frac{7}{8}$  inches long. He needs it to be  $48\frac{1}{4}$  inches to fit. How many inches must Jake cut off?

- A.  $6\frac{5}{8}$  in.
- B.  $6\frac{3}{4}$  in.
- C.  $8\frac{5}{8}$  in.
- D.  $8\frac{3}{4}$  in.

7 Zeke bought a new laptop and received a discount of \$64.55. Ellen also bought a laptop but received a discount of \$32.15. How much more did Zeke save than Ellen?

- A. \$32.40
- B. \$32.55
- C. \$96.55
- D. \$96.70

8 Subtract.  $|-5.3 - (-4.1)| =$

- A. -9.4
- B. -1.2
- C. 1.2
- D. 9.4

9 The air temperature is  $-3.3^{\circ}\text{F}$  at ground level. The air temperature 10 feet below ground is  $22.5^{\circ}\text{F}$ . How many degrees separate these two temperatures on a thermometer?

- A.  $-25.8^{\circ}\text{F}$
- B.  $-19.2^{\circ}\text{F}$
- C.  $19.2^{\circ}\text{F}$
- D.  $25.8^{\circ}\text{F}$

10 Riley has  $37\frac{1}{8}$  fluid ounces of water. He drinks  $12\frac{5}{16}$  fluid ounces. How many fluid ounces does Riley have left?

- A.  $24\frac{3}{8}$  fl oz
- B.  $24\frac{13}{16}$  fl oz
- C.  $25\frac{1}{8}$  fl oz
- D.  $25\frac{4}{16}$  fl oz

- 11** Eric is 895 feet above ground in a building. He takes an elevator and is now 35 feet below ground. What distance does Eric travel?
- A. 860 ft  
B. 870 ft  
C. 920 ft  
D. 930 ft
- 12** Subtract.  $4.3 - 9.43 =$
- A. 13.73                      B. 5.13  
C. -5.13                      D. -13.7
- 13** Maria ran a marathon in 6.24 hours. Meagan ran it in 5.89 hours. How much time elapsed between their finishes?
- A. 0.24 hr  
B. 0.35 hr  
C. 0.65 hr  
D. 0.89 hr
- 14** Casey's car insurance costs \$58.74 per month. He gets a quote from another company that is \$49.83 per month. How much would Casey save per month if he switched insurance companies?
- A. \$7.74                      B. \$7.92  
C. \$8.91                      D. \$9.83
- 15** A point is plotted at  $5\frac{3}{4}$  and another at  $-3\frac{1}{8}$  on a number line. What is the distance between the points?
- A.  $2\frac{3}{8}$   
B.  $2\frac{1}{2}$   
C.  $8\frac{7}{8}$   
D.  $9\frac{1}{4}$
- 16** Subtract.  $23\frac{5}{7} - 18\frac{2}{3} =$
- A.  $5\frac{1}{21}$                       B.  $5\frac{3}{7}$   
C.  $41\frac{7}{10}$                       D.  $42\frac{8}{21}$
- 17** Last year Geneva earned \$21.65 per hour. This year she earns \$22.95 per hour. By how much did Geneva's hourly rate increase?
- A. \$1.30                      B. \$1.40  
C. \$2.30                      D. \$2.40
- 18** Doug digs a hole  $2\frac{3}{4}$  feet below the surface of the ground. He puts a post that is  $7\frac{1}{4}$  feet tall in the hole. How high above ground is the top of the post?
- A.  $3\frac{1}{4}$  ft  
B.  $4\frac{1}{2}$  ft  
C.  $5\frac{1}{4}$  ft  
D. 10 ft
- 19** John buys a jacket that was originally \$74.99 but has a discount of \$13.25. How much is the jacket before taxes?
- A. \$60.99                      B. \$61.25  
C. \$61.54                      D. \$61.74
- 20** An ant walks 124.3 centimeters from its nest towards food. The food is 168.89 centimeters from the nest. What distance does the ant have left to walk?
- A. 293.19 cm  
B. 292.31 cm  
C. 46.53 cm  
D. 44.59 cm

# Math-D Lesson-8 Key

## Lesson 8

### Subtract Rational Numbers

(7.NS.1.c, 7.NS.1.d)

1. C. To find the difference in the freezing points, subtract the freezing point of hydrogen from the freezing point of chlorine. Change the subtraction problem into an addition problem and use the rule for adding rational numbers of different signs:  $-101.5 - (-259.1) = -101.5 + 259.1 = 157.6$ .
2. B. To find the difference in the stock prices, subtract the new price from the old price. Change the subtraction problem into an addition problem and use the rule for adding rational numbers of different signs:  
 $33\frac{13}{16} - 34\frac{5}{16} = 33\frac{13}{16} + (-34\frac{5}{16}) = -\frac{1}{2}$ .
3. C. Change the subtraction problem into an addition problem and use the rule for adding rational numbers of different signs:  $-145 - (-234) = -145 + 234 = 89$ .
4. B. Subtract the tablet cost from the balance in his account. Change the subtraction problem into an addition problem and use the rule for adding rational numbers of different signs:  $159.78 - 239.99 = 159.78 + (-239.99) = -80.21$ .
5. B. Change the subtraction problem into an addition problem and use the rule for adding rational numbers of different signs:  $4.36 - 5.8 = 4.36 + (-5.8) = -1.44$ .
6. A. Convert  $-\frac{4}{5}$  into a fraction with a like denominator of 10:  $-\frac{4}{5} \times \frac{2}{2} = -\frac{8}{10}$ . Change the subtraction problem into an addition problem. Because the signs are the same, add the numbers:  $-\frac{8}{10} - \frac{7}{10} = -\frac{8}{10} + (-\frac{7}{10}) = -\frac{15}{10}$  or  $-1\frac{1}{2}$ .
7. D. The distance of the two houses is in relation to the park. In this case, the park represents 0 on the number line. East represents a positive number. West represents a negative number.  
 $|4\frac{1}{3} - (-2\frac{5}{6})| = |4\frac{1}{2} + 2\frac{5}{6}| = 7\frac{1}{6}$
8. C. To find the difference in miles run, subtract the number of miles Jackson ran from the number of miles Kellen ran.  $4.2 - 3.8 = 0.4$ .
9. D. Subtracting a negative is the same as adding a positive.  $7.8 - (-2.43) = 7.8 + 2.43 = 10.23$ .
10. D. To find the distance between the elevation, take the absolute value of the difference between the elevations. An elevation below sea level is represented by a negative number.  $|563 - (-349)| = |563 + 349| = 912$ .
11. A. Subtract the temperature at Mary's house from the temperature at her sister's house to find the change in temperature.  $76 - (-12) = 76 + 12 = 88$ .
12. C. Convert each mixed number into an improper fraction having like denominators:  $5\frac{1}{8} = \frac{41}{8} = \frac{205}{40}$ ;  $3\frac{9}{10} = \frac{39}{10} = \frac{156}{40}$ . Use the rules for adding rational numbers with opposite signs:  $\frac{205}{40} - \frac{156}{40} = \frac{205}{40} + (-\frac{156}{40}) = \frac{49}{40}$  or  $1\frac{9}{40}$ .

# Math-D Practice-8 Key

## Practice 8

### Subtract Rational Numbers

p. 7

(7.NS.1.c, 7.NS.1.d)

1. A. Subtract the numbers to find the distance between them, and use absolute value because distance is positive:  $|35 - (-330)| = 365$  m.
2. D. Absolute value is used for distance between numbers. To find distance, subtract the numbers. If 0 represents the building, Kylie's house would be represented by  $-240$ .
3. B. Subtract Owen's maximum from Jason's to find how much more Jason's maximum bench press is than Owen's:  $120.34 - 113.72 = 6.62$  kg.
4. A. Find a common denominator:  $\frac{5}{6} \times \frac{4}{4} = \frac{20}{24}$  and  $\frac{7}{8} \times \frac{3}{3} = \frac{21}{24}$ . Because the signs are different, subtract the numerators and get  $\frac{20}{24} - \frac{21}{24} = -\frac{1}{24}$ .
5. B. Subtract the refund from Breanne's current balance to find the new balance:  $1,524.31 - 667.79 = \$856.52$ .
6. C. Subtract the length of pipe that Jake needs from the original length to find how much he needs to cut off. Find a common denominator:  $56\frac{7}{8} - 48\frac{1}{4} = 56\frac{7}{8} - 48\frac{2}{8} = 8\frac{5}{8}$  in.
7. A. Subtract Ellen's discount from Zeke's to find the difference:  $64.55 - 32.15 = \$32.40$ .
8. Subtracting a negative can be rewritten as adding a positive. Add 4.1 to  $-5.3$  and get  
C)  $|-1.2| \rightarrow 1.2$
9. D. This is asking for the distance, in degrees, between two temperatures. Subtract and find the absolute value:  $|-3.3 - 22.5| = 25.8^\circ\text{F}$ .
10. B. To find the difference, subtract the amount Riley drank from the original amount. Find a common denominator and regroup:  $37\frac{1}{8} - 12\frac{5}{16} = 36\frac{2}{16} - 12\frac{5}{16} = 24\frac{13}{16}$  fl oz.
11. D. Subtract and find the absolute value to find the distance Eric traveled:  $|895 - (-35)| = 930$  ft.
12. C. Write a 0 at the end of 4.3 to have the same number of decimal places as 9.43. Then subtract:  $4.30 - 9.43 = -5.13$ .
13. B. Find the absolute value of the difference of Maria's and Meagan's times:  $|6.24 - 5.89| = 0.35$  hr.
14. C. Subtract the new quote from Casey's current cost per month to find the difference:  $58.74 - 49.83 = \$8.91/\text{mo}$ .
15. C. Subtract and find the absolute value. Change subtraction of a negative to addition of a positive. Find a common denominator:  $|5\frac{3}{4} - (-3\frac{1}{8})| = |5\frac{6}{8} + 3\frac{1}{8}| = 8\frac{7}{8}$ .
16. A. Rewrite the mixed numbers with a common denominator:  $23\frac{15}{21} - 18\frac{14}{21} = 5\frac{1}{21}$ .
17. A. Subtract Geneva's wage from last year from her current wage to find the amount of her raise:  $22.95 - 21.65 = \$1.30/\text{hr}$ .
18. B. Subtract the portion that is below ground from the height of the post. Regroup and simplify:  $7\frac{1}{4} - 2\frac{3}{4} = 6\frac{5}{4} - 2\frac{3}{4} = 4\frac{2}{4} = 4\frac{1}{2}$  ft.
19. D. Subtract the discount from the original price to get the price before taxes:  $74.99 - 13.25 = \$61.74$ .
20. D. Find the absolute value of the difference to find the distance:  $|124.3 - 168.89| = 44.59$  cm.