

Study Aid

- See Lesson 1.1, Example 2.
- Try Mid-Chapter Review questions 1 and 2.

**Study Aid**

- See Lesson 1.2, Example 1.
- Try Mid-Chapter Review questions 4, 5, and 7.

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- See Lesson 1.3, Examples 1, 3, and 4.
- Try Mid-Chapter Review questions 9 and 10.

FREQUENTLY ASKED Questions

Q: How do you place a negative rational on a number line?

A: You place the negative rational as far to the left of 0 as its opposite is to the right. For example, place $-2\frac{5}{8}$ to the left of 0, the same distance that $2\frac{5}{8}$ is to the right of 0. Notice that $-2\frac{5}{8}$ is the same as $-2 + \left(-\frac{5}{8}\right)$, which is not equal to $-2 + \frac{5}{8}$.

Q: How can you determine whether one rational number is greater than another?

A: Numbers can be compared on a number line. If a number is farther to the right, it is greater. Therefore, any negative rational is less than any positive one.

It helps to look first at the integer part of a rational to decide where to place it. Sometimes writing all the numbers in the same form, either as decimals or as fractions with a common positive numerator or denominator, makes comparison easier.

For example, $-3\frac{1}{2} < -1\frac{2}{3}$ since $-3 < -1$.

$-2\frac{1}{2} < -2\frac{2}{5}$ since $-2.5 < -2.4$ or since $-2\frac{5}{10} < -2\frac{4}{10}$.

Q: How can you add and subtract rational numbers to solve problems?

You add in situations where you combine. For example, suppose the level of water in a full pail goes down to the $\frac{1}{4}$ mark and then $\frac{5}{8}$ of another identical pail is added back in.

$$\begin{aligned} -\frac{3}{4} + \frac{5}{8} &= -\frac{6}{8} + \frac{5}{8} \\ &= -\frac{1}{8} \end{aligned}$$

The new level is $\frac{1}{8}$ of a pail lower than the original level.

You subtract in situations where you have a loss or reduction. For example, suppose the level of water in a pail goes down by $\frac{1}{4}$ of the pail's capacity, and then the remaining water is poured into a new identical pail to the $\frac{3}{8}$ mark.

$$\begin{aligned} -\frac{1}{4} - \frac{3}{8} &= -\frac{2}{8} - \frac{3}{8} \\ &= -\frac{5}{8} \end{aligned}$$

The new level is $\frac{5}{8}$ of a pail lower than the original level.

Q: How can you multiply and divide rational numbers to solve problems?

A: You multiply and divide rationals by combining the rules you know for multiplying and dividing integers with those for multiplying and dividing positive fractions or decimals.

For example, suppose one investment loses $\frac{3}{4}$ of its value. Then, it loses $\frac{5}{8}$ of that new value. What fraction of the value of the original investment is the final value?

$\frac{1}{4} \times \frac{3}{8} = \frac{3}{32}$ is the final value. That's because you end up with $\frac{1}{4}$ of the value after the first loss and then $\frac{3}{8}$ of that after the second loss.

For example, suppose you have two investments of equal value. The first investment loses $\frac{3}{4}$ of its value; the second loses $\frac{5}{8}$ of its value. How much more is the loss per dollar on the first investment than on the second one?

$$\begin{aligned} -\frac{3}{4} \div \left(-\frac{5}{8}\right) &= \frac{6}{8} \div \frac{5}{8} \\ &= \frac{6}{5} \end{aligned}$$

For each dollar lost on the second investment, you lose $\frac{6}{5}$ of a dollar, or \$1.20, on the first investment.

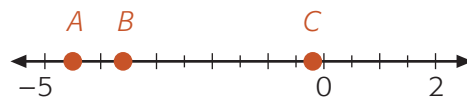
Study Aid

- See Lesson 1.4, Example 2.
- Try Mid-Chapter Review questions 12, 13, and 14.

Practice

Lesson 1.1

1. What rational numbers describe the points *A*, *B*, and *C*?
2. Locate each rational on a number line from -10 to $+10$.
 - a) -2.6
 - b) $-\frac{18}{4}$
 - c) $\frac{23}{-3}$
 - d) $-8\frac{1}{3}$
3. On a February day, the daytime high temperature in Saddle Lake First Nations Reserve, AB, was -4.5 °C. The temperature in Portage la Prairie, MB, on the same day was -12.8 °C. Which place was colder? Explain.



Lesson 1.2

4. Use $>$, $<$, or $=$ to make true statements. Explain how you know each statement is true.
- a) $-\frac{2}{3} \blacksquare -\frac{5}{6}$ b) $\frac{2}{3} \blacksquare \frac{5}{8}$ c) $-2\frac{1}{4} \blacksquare -\frac{9}{4}$ d) $\frac{2}{-5} \blacksquare -\frac{3}{10}$
5. Write these rational numbers in order from least to greatest.
- a) $-\frac{3}{5}, \frac{1}{-3}, -1\frac{1}{3}$ c) $0.7, -0.3, -0.\bar{3}$
- b) $-\frac{2}{5}, -2\frac{1}{5}, \frac{4}{5}$ d) $0, -1.5, -2$
6. List four rational numbers between $-\frac{3}{8}$ and $-\frac{1}{2}$.
7. A rational number of the form $\frac{\blacksquare}{6}$ is between $-\frac{3}{4}$ and $-\frac{1}{2}$. What is the numerator of the rational number?

Lesson 1.3

8. Calculate.
- a) $2\frac{1}{4} - 5\frac{1}{3}$ d) $-\frac{5}{8} + \left(-\frac{1}{3}\right)$
- b) $\frac{3}{5} + \left(-\frac{8}{9}\right)$ e) $-3.5 + (-7.7)$
- c) $-7.2 - (-4.8)$ f) $-7\frac{1}{14} + \left(-\frac{1}{4}\right)$
9. Kristen walked 5.7 km east and then 9.1 km west. How far east or west was Kristen from her original position?
10. The difference of two rational numbers is $\frac{3}{5}$. The sum is $\frac{1}{3}$. What are the rational numbers?

Lesson 1.4

11. The daily changes in selling price for shares in Robots Inc. during a week were $-\$4.50$, $-\$0.95$, $\$0.25$, $-\$2.36$, and $-\$3.72$. What was the mean daily change in selling price for the share during this week?
12. a) Create two other expressions that give the same answer as $\left(-1\frac{3}{4}\right)\left(5\frac{1}{3}\right)$.
- b) Describe a situation that $\left(-1\frac{3}{4}\right)\left(5\frac{1}{3}\right)$ might represent.
13. Noah had 1.5 times as much savings as Kelly had debt. Then, Kelly doubled her debt. What rational number division describes Noah's money as compared to Kelly's?
14. Create and solve your own problem involving multiplying or dividing rational numbers.

