

7th Grade Math

Week 1

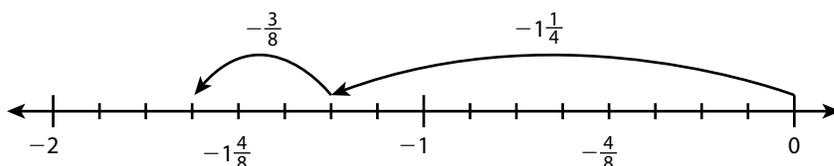
Add Negative Fractions

Study the example problem showing how to add negative fractions. Then solve problems 1–6.

Example

Willie is making cookies. From a bag of sugar, he removed $1\frac{1}{4}$ cups for the cookie dough and $\frac{3}{8}$ cup to sprinkle on top. What number represents the total change in the amount of sugar in the bag?

You can use a number line to solve this problem.



The model shows that the total change in the amount of sugar in the bag is $-1\frac{5}{8}$ cups.

You can also use an equation to find the solution.

$$\begin{array}{rclcl} \text{Change in sugar} & + & \text{Change in sugar} & = & \text{Overall} \\ \text{for dough} & & \text{for sprinkles} & & \text{change} \\ -1\frac{1}{4} & + & \left(-\frac{3}{8}\right) & = & -1\frac{5}{8} \end{array}$$

1 Use a common denominator to find $-1\frac{1}{4} + \left(-\frac{3}{8}\right)$.

2 Use a common denominator to find $-\frac{2}{3} + \left(-\frac{4}{5}\right)$.

Show your work.

Solution: _____

Solve.

- 3 Serena is building a bookcase. She cuts two pieces of wood from one board. One piece is $1\frac{7}{8}$ feet long and another is $3\frac{1}{2}$ feet long. What is the total change in the length of the original board?

Show your work.

Solution: _____

- 4 In an experiment, the temperature of a solution is $-\frac{7}{8}$ °F. The temperature drops $1\frac{1}{2}$ °F. What is the temperature after the drop?

Show your work.

Solution: _____

- 5 The sum of two negative fractions with different denominators is $-\frac{7}{10}$. What are two possible fractions?

Show your work.

Solution: _____

- 6 Find the sum.

a. $-2\frac{1}{10} + (-4\frac{4}{5})$ _____

b. $-3\frac{5}{6} + (-1\frac{7}{12})$ _____

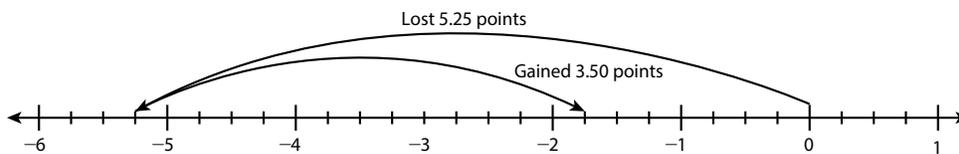
Add and Subtract Rational Numbers

Study the example problem showing how to add and subtract rational numbers. Then solve problems 1–7.

Example

On a test, wrong answers are worth -5.25 points and right answers are worth 3.5 points. So far, Marshall has one right answer and one wrong answer. What is Marshall's current score?

You can solve this problem using a number line.



The number line model shows that Marshall's current score is -1.75 .

- 1** Write an addition equation to represent the situation.

- 2** Find $-5\frac{1}{4} + 3\frac{1}{2}$. Explain how you found your answer.

- 3** Elaine says that when you add two rational numbers, the sign depends on how many negative numbers you have. Do you agree with Elaine? Explain your answer.



Solve.

- 4 A gardener cuts a plant down by $1\frac{5}{8}$ inches. The plant then grows $9\frac{1}{4}$ more inches. What is the total change in the height of the plant? Explain.

Show your work.

Solution: _____

- 5 Solve each problem.
- a. What is $-4.3 - (-6.8)$? _____
- b. What is $1\frac{3}{5} + (-2\frac{7}{10})$? _____
- 6 You are playing a game. You lose 4.8 points, lose another 7.6 points, and then win 2.5 points. What is the overall change in your score?

Show your work.

Solution: _____

- 7 Find the number that makes the equation true.

$$-\frac{7}{10} + ? = -2\frac{9}{20}$$

Show your work.

Solution: _____

Add and Subtract Rational Numbers

Solve the problems.

1 What is $-8.3 - (-5.4)$?

- A -13.7 C 2.9
 B -2.9 D 13.7

Lon chose A as the correct answer. How did he get that answer?

How do you subtract a negative number?



2 Michelle poured $\frac{7}{8}$ cup of water from a pitcher into a glass. Then she poured another $\frac{2}{3}$ cup. What is the change in the amount of water in the pitcher? Explain.

Can a common denominator help you?



3 Which expressions are equal to $0.50 - (-1.75)$? Select all that apply.

- A $\frac{1}{50} - (-1\frac{3}{4})$ C $0.50 + 1.75$
 B $-0.50 - 1.75$ D $\frac{1}{2} + 1\frac{3}{4}$

How do you write a decimal as a fraction?



4 Tell whether each statement is *True* or *False*.

- a. $0.45 - (-0.4) = 0.85$ True False
 b. $-1\frac{5}{8} - (-5\frac{5}{8}) = -7\frac{1}{4}$ True False
 c. $-7\frac{3}{7} + \frac{1}{7} = -7\frac{2}{7}$ True False

What is the first step in solving these problems?



Solve.

5 Consider the following equation.

$$-\frac{5}{6} + \square = \text{a negative number}$$

a. Write a fraction that makes this equation true.

b. Show that your fraction makes the equation true.

Will a number that makes the equation true be positive or negative?



6 During a hot summer week, the water level in Wei's pool decreased by 1.9 centimeters. Wei added water to the pool, increasing the level by 3.5 centimeters. During the next week, the water level decreased by 2.4 centimeters. How does the new water level compare to the original water level?

Show your work.

Solution: _____

What do positive and negative values represent in this situation?



7 If a is a negative rational number and b is a positive rational number, which of the following must be true? Give an example for the statements that are true and a counterexample for the statements that are false.

a. $a - b$ is positive.

b. $b - a$ is positive.

c. $b + (-a)$ is negative.

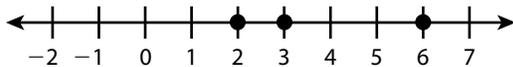
Estimating with Decimals

Study the example showing how to use estimation when computing with positive and negative decimals. Then solve problems 1–9.

Example

The temperature at noon was 5.6°F . During the afternoon the temperature dropped 2.8°F and then dropped another 2.2°F in the evening. Estimate the new temperature.

You can use a number line to understand the problem by approximating, or *rounding*, each temperature to the nearest degree.



5.6 rounds up to 6.
2.8 rounds up to 3.
2.2 rounds down to 2.

Now, you can estimate the new temperature by finding $6 - 3 - 2$. So, using estimation, the new temperature will be about 1°F .

- 1 Based on the estimate, do you think the actual new temperature will be above or below 0°F ? Explain.

- 2 Write and solve an equation to find the new temperature using exact values. What is the exact value of the new temperature?

- 3 Peter got an exact new temperature of 11.6°F . Explain how Peter can use the estimate to determine that his answer is wrong. Then find and correct Peter's error.

- 4 Janet estimated to the nearest half degree before she found her exact answer. Is Janet's estimate more or less accurate than the estimate in the example problem? Explain.



Solve.

- 5 Kyle and Joan are estimating the total weight of three boxes that each weigh 14.62 pounds. Each student's estimate is shown below.

Kyle	Joan
$3(15) = 45 \text{ lb}$	$3(14.5) = 43.5 \text{ lb}$

Which estimate is more accurate? Explain how you know. Then find the actual total weight of the boxes.

- 6 Estimate $55.8 \div (-3.1)$. Then find the exact quotient.

Show your work.

Solution: _____

Use the following situation to solve problems 7–9.

Dusan had \$49.60 in his checking account. He wrote one check for \$24.40 and another check for \$25.49.

- 7 Estimate the amount of money in Dusan's account after he wrote the checks.
-

- 8 Explain why the estimate might not be enough information to show Dusan whether he has enough money in his checking account to cover the checks.
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- 9 Dusan says that because he always rounds to the nearest dollar, he will always have more money in his account than his estimate. Is Dusan correct? Explain.
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Estimating with Fractions

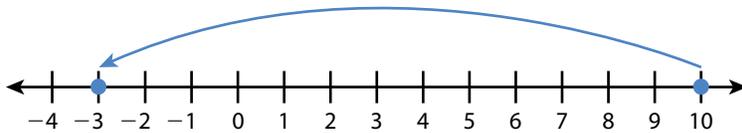
Study the example showing how to use estimation when computing with positive and negative fractions. Then solve problems 1–6.

Example

A high diving board is about $9\frac{5}{6}$ feet above the water's surface. A diver jumps off the diving board and ends up $3\frac{1}{4}$ feet below the surface of the water. What is the total distance of the jump?

You can use rounding and a number line to help you estimate the answer.

Actual Distance	Nearest Integer
$9\frac{5}{6}$	10
$-3\frac{1}{4}$	-3



- 1** To the nearest integer, what is the distance of the jump?

- 2** What is the exact distance of the jump?

Show your work.

Solution: _____

- 3** Compare the estimated distance of the jump to the actual distance? Is the actual distance reasonable?



Solve.

4 Think about the problem $-6\frac{3}{5} - (-7\frac{4}{15}) + 2\frac{1}{5}$.

a. Estimate the answer.

b. Find the actual answer.

c. Compare the estimate and the actual answer. Is your actual answer reasonable?

5 James baked $5\frac{1}{4}$ dozen peanut butter cookies and $4\frac{5}{6}$ dozen oatmeal cookies for a bake sale.

a. Estimate the number of dozens of cookies he baked.

b. Find the actual number of dozens of cookies he baked.

c. How do the numbers compare? Is the actual number of dozens you found reasonable?

6 What is the smallest integer that makes the difference $x - (\frac{3}{4} + \frac{4}{5})$ greater than 1? Use estimation to find the answer, and then find the exact difference to show that your answer is correct.

Solve Problems with Rational Numbers

Solve the problems.

1 Which expression is the best estimate of $1.25 + (-2.69)$?

- A** $1 + (-3)$ **C** $2 + (-3)$
B $1 + (-2)$ **D** $2 + (-2)$

Sue chose **B** as the correct answer. How did she get that answer?

How might a number line help you estimate decimals?

2 Which expression is the best estimate of $1\frac{1}{5} \times 3\frac{2}{3}$?

- A** 2×4
B 1×4
C 2×3
D 1×3

Should you round each value up or down?

3 The answer to which situation is best estimated by -7 ?

- A** The temperature falls 1.9°F from 4.3°F .
B A hot-air balloon rises 4.1 meters from the ground and then rises 2.3 meters more.
C A submarine goes 3.8 feet below the surface of the ocean and then goes 2.5 feet farther down.
D The amount of money Sarah has after she buys milk for $\$3.85$ and bread for $\$2.45$.

How can you estimate decimal amounts?



Solve.

4 Tell whether each statement is *True* or *False*.

- a. $-3\frac{3}{4} + 1 = -3\frac{2}{3} - (-1)$ True False
- b. $2.855 - 1.375 = 1.48$ True False
- c. $-12\frac{7}{12} + (-9\frac{5}{6}) = 3\frac{7}{12}$ True False
- d. $6\frac{2}{5} - (-7\frac{1}{10}) = 13\frac{1}{2}$ True False

Can you tell if the sum or difference will be positive or negative?



5 Justin earned \$25.67 one week and \$37.85 the next week. He also purchased a DVD for \$19.99 and gas for his car for \$22.07. He started with a zero balance in his checking account. Justin recorded all of these transactions in his checkbook and ended up with a balance of \$105.58. Was his balance correct? If it was, write an equation to support the answer. If not, find the correct balance.

An estimate might help you determine whether Justin is correct.



6 Write a sum, difference, product, and quotient whose answers could all have an estimate of about 6. One expression should include only mixed numbers, one expression should include only decimals, one expression should include only negative rational numbers, and one expression should include only positive rational numbers.

Sum: _____

Difference: _____

Product: _____

Quotient: _____

When do you round a rational number up? When do you round a rational number down?



Find Unit Rates with Fractions

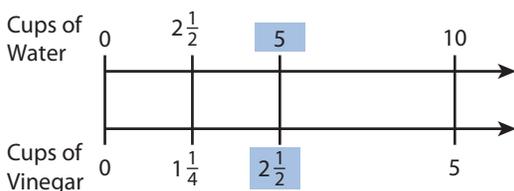
Study the example problem showing how to find a unit rate. Then solve problems 1–8.

Example

Helena uses this recipe to make homemade fabric softener. How much water and vinegar does she use for a half batch? How much water and vinegar does she use for a double batch?

You can use a double number line to help you solve this problem.

You can use the recipe to see that you need 5 cups of water for $2\frac{1}{2}$ cups of vinegar. Label these on the number line. Find half of each quantity for a half batch. Double each quantity for a double batch.



Helena needs $2\frac{1}{2}$ cups water and $1\frac{1}{4}$ cup vinegar for a half batch. She needs 10 cups of water and 5 cups of vinegar for a double batch.

Recipe for Fabric Softener

Ingredients:

5 cups hot water

$2\frac{1}{2}$ cups white vinegar

$1\frac{1}{2}$ cups hair conditioner

Directions:

Mix all ingredients together.

- 1 If Helena uses $1\frac{1}{4}$ cups of water to make fabric softener, how much vinegar does she need?

- 2 Use the recipe to find how much hair conditioner Helena needs to make a half batch and a double batch.

- 3 Explain how to find the unit rate of water to vinegar. What does the unit rate mean in this context?



Solve.

Use the following recipe for granola bars to solve problems 4–8.

2 cups of oats	$\frac{1}{4}$ cup of flaxseed
$\frac{1}{2}$ cup of quinoa	$\frac{2}{3}$ cup of soy protein

- 4** Write ratios for the amount of oats to the amount of each of the other grains.

- 5** Show how to find the unit rate of oats to quinoa. Tell what the unit rate means.

- 6** Find unit rates for the other two ratios that you wrote in problem 4.

- 7** Suppose you are making granola bars with 3 cups of oats. How much quinoa, flaxseed, and soy protein would you need to use? Explain.

- 8** In addition to the grains listed above, the recipe also includes $1\frac{1}{4}$ cups of dried fruit. Show how to find the amount of dried fruit needed if you use 3 cups of oats.

Compare Unit Rates

Study the example problem showing how to compare unit rates. Then solve problems 1–6.

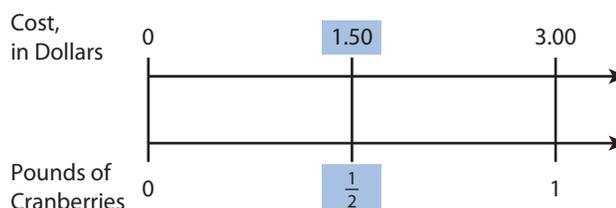
Example

The Produce Place sells cranberries in bulk for \$2.40 per pound. The store also sells an 8-ounce package of cranberries for \$1.50. Which is the better buy?

Use a double number line to find the cost per pound for the package of cranberries. Remember that 8 ounces = $\frac{1}{2}$ pound.

Multiply both \$1.50 and $\frac{1}{2}$ pound by 2 to find the price for 1 pound.

The bulk price is \$2.40 per pound, and the package price is \$3.00 per pound. Because $\$2.40 < \3.00 , the bulk cranberries are a better buy.



- 1** Use division to find the price per ounce for the bulk cranberries and the package of cranberries. Round to the nearest cent. (1 pound = 16 ounces)

- 2** Compare the prices per ounce for packaged and bulk cranberries. Which price is less? How much less?

- 3** The Produce Place sells a 12-ounce package of cranberries for the same unit price as the 8-ounce package. What is the price of the 12-ounce package? Explain.



Solve.

- 4 Brandi jogged $2\frac{1}{2}$ miles in 30 minutes. Sharna jogged $3\frac{1}{2}$ miles in $\frac{3}{4}$ hour. Who jogged at a slower rate?

Show your work.

Solution: _____

- 5 Amhed pays \$2.10 for $5\frac{1}{4}$ pounds of bananas. Janel pays \$3.25 for $6\frac{1}{2}$ pounds of bananas. Which is the better buy? Explain why.

- 6 The directions for Clean-All say to mix $1\frac{1}{2}$ cups of cleaner with 2 quarts of water. The directions for Mega-Clean say to mix $3\frac{1}{2}$ cups of cleaner with 1 gallon of water. Which solution has more cleaner per quart of water?

(1 gallon = 4 quarts)

Show your work.

Solution: _____

Ratios Involving Complex Fractions

Solve the problems.

- 1 A road sign gives drivers information about traffic on busy highways. One sign shows "15 miles in 20 minutes." What is this speed in miles per hour?

Show your work.

What fraction of an hour is 20 minutes?



Solution: _____

- 2 During a heavy rainstorm, a city in Florida received $12\frac{1}{4}$ inches of rain in $25\frac{1}{2}$ hours. What is the approximate rainfall rate in inches per hour?

- A about 2 inches per hour
 B about $\frac{1}{4}$ inch per hour
 C about 1 inch per hour
 D about $\frac{1}{2}$ inch per hour

You can write a ratio and estimate the unit rate.



- 3 Jeremy swims $5\frac{3}{5}$ kilometers in a 7-day period. He swims the same distance each day. What distance does he swim in a day?

- A $39\frac{1}{5}$ km C $\frac{4}{5}$ km
 B $1\frac{1}{5}$ km D $\frac{4}{35}$ km

What rate do you need to find?



Eli chose **A** as the correct answer. How did he get that answer?



Solve.

4 Mrs. Cain's coleslaw recipe calls for $\frac{1}{3}$ cup of oil, $\frac{1}{2}$ cup of vinegar, and $\frac{1}{4}$ cup of sugar. Tell whether each statement is *True* or *False*.

Make sure the terms in each ratio are in the correct order.



- a. The recipe uses $1\frac{1}{2}$ cups of oil for each cup of vinegar. True False
- b. The recipe uses 2 cups of sugar for each cup of vinegar. True False
- c. The recipe uses 2 cups of vinegar for each cup of sugar. True False
- d. The recipe uses $\frac{2}{3}$ cup of oil for each cup of vinegar. True False

5 Fill in the table to show the amount of each ingredient needed to make different-size batches of coleslaw. Use the information from problem 4.

How can you use unit rates to solve the problem?



	Batch 1	Batch 2	Batch 3
Vinegar (cups)	1		
Oil (cups)		1	
Sugar (cups)			$\frac{3}{2}$

6 Rida and Elisa are each paid by the hour. Rida worked $5\frac{1}{2}$ hours and earned \$77. Elisa worked $3\frac{3}{4}$ hours and earned \$60. Whose hourly rate is greater?

In this problem, hourly rate means how much the person is paid per hour.



Show your work.

Solution: _____