

Student Guide

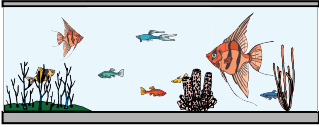
Subtract Fractions (SG pp. 100–103)
Questions 1–20

- Answers will vary.
- Explanations will vary.
- $\frac{3}{8}$ will be left. Strategies may vary. Students can trade each fourth (yellow) for 2 eighths (blue). $\frac{6}{8} - \frac{3}{8} = \frac{3}{8}$.
- Yes; $\frac{3}{8}$ is a little less than $\frac{1}{2}$.
- * A possible response: Keenya's single-color method is like finding common denominators like Julia does. You end up having the same kind of pieces to subtract or the same denominator to subtract.

Subtract Fractions

Mr. Moreno's Aquarium

It is Jacob's and Keenya's turn to feed the tropical fish in Mr. Moreno's classroom aquarium. Jacob sees that the can of fish food is $\frac{3}{4}$ full. Every week, the fish eat $\frac{1}{4}$ of a can of fish food. Mr. Moreno asks Jacob to estimate how much fish food will be left at the end of the week.




"Will the can of fish food be more than half full or less than half full at the end of the week?" asked Mr. Moreno.

Discuss

- Estimate the amount of fish food that will be left. How would you answer Mr. Moreno's question? Explain your reasoning.

Jacob decides to estimate this way:

Since I know $\frac{2}{8}$ is the same as $\frac{1}{4}$, then $\frac{3}{8}$ must be more than $\frac{1}{4}$. So if I subtract more than $\frac{1}{4}$ from $\frac{3}{4}$, the answer must be less than $\frac{1}{2}$.



- Do you agree with Jacob's estimate? Explain why or why not.
- Find an exact answer to the problem using fraction circle pieces. Show how you solved the problem.



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Subtract Fractions


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Keenya solves the problem this way:

To solve $\frac{3}{4} - \frac{1}{4}$, I show both fractions using circle pieces like this.



Then I replace the yellow pieces with blue pieces so all the pieces are the same size and color. Now the pieces look like this:

I take one piece away from the first fraction for every piece in the second fraction.

I have three pieces left in the first fraction, so my answer is $\frac{3}{8}$ of a can. I write the number sentence like this:

$$\frac{3}{4} - \frac{1}{4} = \frac{3}{8}$$

- Does Jacob's estimate agree with Keenya's exact answer? Explain how you know.


Julia solves $\frac{3}{4} - \frac{1}{4}$ this way:

$$\frac{3}{4} \times \frac{2}{2} = \frac{6}{8}$$

$$\frac{1}{4} \times \frac{2}{2} = \frac{2}{8}$$

$$\frac{6}{8} - \frac{2}{8} = \frac{4}{8} = \frac{1}{2}$$

I find a fraction equivalent to $\frac{3}{4}$ so I can rename it as eighths. It is easier for me to subtract fractions with like denominators.



- How is Keenya's method similar to Julia's method?

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Subtract Fractions

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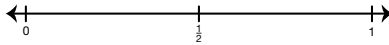
*Answers and/or discussion are included in the lesson.

Before cleaning the aquarium, Jacob drains all the water. The aquarium was $\frac{7}{8}$ full when he started draining it. A little later he sees that it is $\frac{1}{4}$ full. Jacob estimates that about $\frac{1}{2}$ of the tank has drained out so far.

6. Make an estimate of your own. Is Jacob's estimate too high or too low? Explain your reasoning.
7. Find the exact amount of water that has drained out of the fish tank by solving the problem with fraction circle pieces.
8. Write a number sentence for your solution to Question 7.
9. Does your estimate in Question 6 agree with your answer in Question 7? Explain.

After cleaning the aquarium, Jacob refills it with a small hose from the sink. When he first checks the tank, it is $\frac{1}{2}$ full. Two minutes later, it is $\frac{2}{3}$ full.

10. Estimate how much water was added to the tank during the two minutes. Show the location of your estimate by marking an "X" on a number line like the one shown below.



Jacob decides to solve the problem without using circle pieces.

$$\frac{2}{3} - \frac{1}{12} = \frac{2-1}{12-3} = \frac{1}{9} ?$$



So the answer is $\frac{1}{9}$ of the tank was added.

11. Is Jacob's answer reasonable? Why or why not?
12. If his answer is not reasonable, what mistake did Jacob make?
13. Use circle pieces to find an exact answer to the problem. Include a number sentence.

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✓ Check-In: Questions 14-20

Solve the subtraction problems in Questions 14-19 using fraction circle pieces or another strategy. For each problem, first estimate whether the answer is closest to 0, $\frac{1}{2}$, or 1.

14. Jackie is running a $\frac{3}{4}$ -mile race. How much farther does she have to go after she has run $\frac{1}{2}$ of a mile?
15. Ming is making cookies. Ming poured $\frac{2}{3}$ of a cup of sugar into a measuring cup. The recipe for cookie dough calls for $\frac{1}{2}$ of a cup of sugar. How much sugar should Ming take out of the measuring cup?
16. Shannon spent $\frac{1}{3}$ of her allowance on a CD and $\frac{1}{2}$ of her allowance on a movie. What fraction of her allowance does she have left?
17. Jerome lives $\frac{2}{5}$ of a mile from school. Lee Yah lives $\frac{1}{2}$ of a mile from school. How much farther from school does Jerome live than Lee Yah?
18. Mr. Moreno always fills up the gas tank in his car when there is $\frac{1}{4}$ tank left. The gas gauge of his car is shown. How much of the tank of gas does Mr. Moreno have to use before filling it up again? Hint: Think of a number line.



19. Solve each of the following subtraction problems. Write a number sentence to show how you solved each problem.

A. $\frac{4}{5} - \frac{3}{10}$ B. $\frac{7}{8} - \frac{1}{2}$ C. $\frac{5}{9} - \frac{5}{9}$ D. $\frac{2}{3} - \frac{7}{12}$

E. $\frac{4}{5} - \frac{1}{2}$ F. $1 - \frac{3}{10}$ G. $\frac{1}{3} - \frac{1}{4}$ H. $\frac{3}{4} - \frac{1}{12}$

20. Choose one problem from Question 19. Show or tell how to solve it with circle pieces and then with a multiplication strategy.

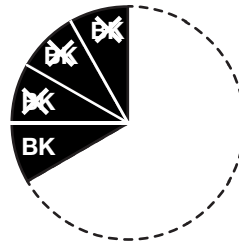
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*Answers and/or discussion are included in the lesson.

6. Answers and explanations will vary. Possible response: Jacob's estimate is about right. $\frac{7}{8}$ is a little more than $\frac{3}{4}$, so taking away $\frac{1}{4}$ is a little more than $\frac{1}{2}$.
7. $\frac{5}{8}$ tank has drained.
8. $\frac{7}{8} - \frac{1}{4} = \frac{5}{8}$ or $\frac{7}{8} - \frac{2}{8} = \frac{5}{8}$.
9. Answers will vary. Possible response: I estimated $\frac{1}{2}$ tank and $\frac{5}{8}$ is a little more than $\frac{4}{8}$ which is equal to $\frac{1}{2}$. My estimate was close.
10. Estimates will vary. Estimates should be just a little less than $\frac{2}{3}$ since $\frac{1}{12}$ is a small amount.
11. No; $\frac{1}{9}$ is a small amount and is not close to $\frac{2}{3}$.
12. Jacob subtracted the numerators and denominators separately.
- 13.* $\frac{7}{12}$ tank of water was added.
 $\frac{2}{3} - \frac{1}{12} = \frac{7}{12}$ or $\frac{8}{12} - \frac{1}{12} = \frac{7}{12}$
14. Between 0 and $\frac{1}{2}$; $\frac{1}{4}$ mile
15. Closest to $\frac{1}{2}$; $\frac{7}{8} - \frac{1}{2} = \frac{3}{8}$ or $\frac{7}{8} - \frac{4}{8} = \frac{3}{8}$ cup
16. Closest to 0; $\frac{1}{6}$ of her allowance; $\frac{1}{3} + \frac{1}{2} = \frac{5}{6}$ and $\frac{6}{6} - \frac{5}{6} = \frac{1}{6}$
17. Closest to 0; $\frac{1}{5}$ mile; $\frac{4}{10} - \frac{1}{5} = \frac{1}{5}$ mile
18. $\frac{3}{8}$ of a tank; $\frac{5}{8} - \frac{1}{4} = \frac{3}{8}$
19. Number sentences will vary. One sentence is given for each.

A. $\frac{5}{10} - \frac{8}{10} - \frac{3}{10} = \frac{5}{10}$	B. $\frac{3}{8} - \frac{7}{8} - \frac{4}{8} = \frac{3}{8}$
C. $\frac{1}{5} - \frac{3}{5} - \frac{2}{5} = \frac{1}{5}$	D. $\frac{1}{12} - \frac{8}{12} - \frac{7}{12} = \frac{1}{12}$
E. $\frac{3}{10} - \frac{8}{10} - \frac{5}{10} = \frac{3}{10}$	F. $\frac{7}{10} - \frac{10}{10} - \frac{3}{10} = \frac{7}{10}$
G. $\frac{1}{12} - \frac{4}{12} - \frac{3}{12} = \frac{1}{12}$	H. $\frac{8}{12} - \frac{9}{12} - \frac{1}{12} = \frac{8}{12}$
20. Problems chosen will vary. Sample solution for 19G: Solve $\frac{1}{3} - \frac{1}{4}$ with circle pieces:



Solve $\frac{1}{3} - \frac{1}{4}$ using a multiplication strategy:

$$\frac{1}{3} \times \frac{4}{4} = \frac{4}{12}$$

$$\frac{1}{4} \times \frac{3}{3} = \frac{3}{12}$$

$$\frac{4}{12} - \frac{3}{12} = \frac{1}{12}$$

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Subtract Fractions (SG p. 104)

Homework

Questions 1–8

1. A. closest to $\frac{1}{2}$; $\frac{6}{12}$
 B. closest to 0; $\frac{1}{12}$
 C. closest to 1; $\frac{5}{6}$
 D. closest to 1; $\frac{9}{10}$
 E. closest to 0; $\frac{1}{8}$
 F. closest to 0; 0
 G. closest to $\frac{1}{2}$; $\frac{5}{12}$
 H. closest to $\frac{1}{2}$; $\frac{3}{5}$
 I. closest to 0; $\frac{2}{10}$
2. $1 - \frac{3}{5} = \frac{2}{5}$ box of popcorn
3. $\frac{3}{4} - \frac{1}{8} = \frac{5}{8}$ mile
4. Miguel's eraser is longer; $\frac{10}{12} - \frac{7}{12} = \frac{3}{12}$ inch longer
5. Ming's ride is shorter; $\frac{2}{3} - \frac{1}{2} = \frac{1}{6}$
 or $\frac{4}{6} - \frac{3}{6} = \frac{1}{6}$ shorter
6. $\frac{7}{8} - \frac{1}{4} = \frac{5}{8}$ pound
7. $\frac{1}{2} + \frac{1}{8} = \frac{5}{8}$; $\frac{8}{8} - \frac{5}{8} = \frac{3}{8}$ of the collection
8. $\frac{4}{5} - \frac{4}{10} = \frac{4}{10}$; $\frac{4}{10}$ of the bag

1. For each problem, estimate whether the difference is closest to 0, $\frac{1}{2}$, or 1. Then solve the subtraction problems using the *Fraction Circle Pieces* page in the *Student Guide* Reference section or another strategy.

A. $\frac{2}{8} - \frac{3}{12}$	B. $\frac{2}{3} - \frac{7}{12}$	C. $\frac{2}{2} - \frac{1}{6}$
D. $\frac{5}{5} - \frac{1}{10}$	E. $\frac{1}{4} - \frac{1}{8}$	F. $\frac{6}{8} - \frac{3}{4}$
G. $\frac{2}{4} - \frac{1}{12}$	H. $1 - \frac{2}{5}$	I. $\frac{2}{5} - \frac{2}{10}$

Mr. Moreno's students wrote the following word problems about their class. Solve each problem. Include number sentences.

2. Jacob ate $\frac{3}{5}$ of a box of caramel popcorn. How much of the box of popcorn is left?

3. Keenya is going on a $\frac{3}{4}$ -mile walk through the park. She already walked $\frac{1}{8}$ mile. How much farther does Keenya need to walk?

4. Julia's purple eraser is $\frac{7}{12}$ of an inch long. Miguel's red eraser is $\frac{5}{6}$ of an inch long. Whose eraser is longer? How much longer?

5. Ming rides his bike $\frac{3}{8}$ of a block to school and Mark rides his bike $\frac{2}{5}$ of a block to school. Who rides a shorter distance to school? How much shorter is that student's ride?

6. Fern made $\frac{7}{8}$ of a pound of fudge. Her little sister ate $\frac{1}{4}$ of a pound. How much fudge is left for Fern?

7. Sam shared his baseball card collection with his friends. Josh took $\frac{1}{2}$ and Michael took $\frac{1}{8}$ of the cards. What fraction of the collection was left for Sam?

8. Kathy had $\frac{4}{5}$ of a bag of sticky sour candies. She tripped and spilled $\frac{4}{10}$ of the bag of candies. What fraction of the bag did not spill?

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Subtract Fractions

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Student Activity Book

Name _____ Date _____

Find Fraction Differences

- Use fraction circle pieces to show both fractions in the subtraction problems below.
- Estimate the answer. Show your estimate on the number line in the second column.
- Use the single-color method to do the subtraction problem with circle pieces.
- Make a sketch to show how you subtracted as shown in the example.
- Write two number sentences for each problem.

Problem	Estimate and Fraction Difference	Number Sentences
Example $\frac{3}{5} - \frac{1}{10}$		$\frac{3}{5} - \frac{1}{10} = \frac{1}{2}$ $\frac{6}{10} - \frac{1}{10} = \frac{5}{10}$
1. $\frac{1}{2} - \frac{1}{8}$		
2. $\frac{2}{3} - \frac{1}{6}$		

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**Find Fraction Differences (SAB pp. 105–106)
Questions 1–6**

For Questions 1–6, estimates on number lines and number sentences will vary. Possible responses given.

Problem	Estimate and Fraction Difference	Number Sentences
1. $\frac{1}{2} - \frac{1}{8}$		$\frac{1}{2} - \frac{1}{8} = \frac{3}{8}$ $\frac{4}{8} - \frac{1}{8} = \frac{3}{8}$
2. $\frac{2}{3} - \frac{1}{6}$		$\frac{2}{3} - \frac{1}{6} = \frac{1}{2}$ $\frac{4}{6} - \frac{1}{6} = \frac{3}{6}$ $\frac{3}{3} - \frac{1}{6} = \frac{5}{6}$

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Name _____ Date _____

Problem	Estimate and Fraction Difference	Number Sentences
3. $1 - \frac{3}{4}$		
4. $\frac{2}{3} - \frac{1}{4}$		
5. $\frac{7}{10} - \frac{2}{5}$		
6. $\frac{5}{6} - \frac{3}{4}$		

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*Answers and/or discussion are included in the lesson.

Problem	Estimate and Fraction Difference	Number Sentences
3. $1 - \frac{3}{4}$		$1 - \frac{3}{4} = \frac{1}{4}$ $\frac{4}{4} - \frac{3}{4} = \frac{1}{4}$
4.* $\frac{2}{3} - \frac{1}{4}$		$\frac{2}{3} - \frac{1}{4} = \frac{5}{12}$ $\frac{8}{12} - \frac{3}{12} = \frac{5}{12}$
5. $\frac{7}{10} - \frac{2}{5}$		$\frac{7}{10} - \frac{2}{5} = \frac{3}{10}$ $\frac{7}{10} - \frac{4}{10} = \frac{3}{10}$
6. $\frac{5}{6} - \frac{3}{4}$		$\frac{5}{6} - \frac{3}{4} = \frac{1}{12}$ $\frac{10}{12} - \frac{9}{12} = \frac{1}{12}$

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Add and Subtract Fractions (SAB pp. 107–108)
Homework
Questions 1–8

Number sentences may vary.

1. Mark; $\frac{5}{6} - \frac{4}{6} = \frac{1}{6}$ or $\frac{5}{6} - \frac{2}{3} = \frac{1}{6}$
2. $\frac{9}{10} - \frac{1}{2} = \frac{4}{10}$ mile or $\frac{9}{10} - \frac{5}{10} = \frac{4}{10}$ mile
3. $\frac{12}{12} - \frac{10}{12} = \frac{2}{12}$ strip
4. $\frac{2}{3} + \frac{2}{9} = \frac{8}{9}$; $\frac{9}{9} - \frac{8}{9} = \frac{1}{9}$ bowl
5. $\frac{1}{3} + \frac{3}{6} = \frac{5}{6}$; $\frac{6}{6} - \frac{5}{6} = \frac{1}{6}$; 10 minutes
6. $\frac{1}{4} + \frac{3}{12} = \frac{6}{12}$; $\frac{1}{2}$ are fifth graders
7. A. $\frac{1}{5} + \frac{3}{10} = \frac{5}{10}$; the jar is half full
 B. $\frac{1}{4}$ of a jar more; $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$ jar
8. Word problems will vary.

Name _____ Date _____

Add and Subtract Fractions



Solve each word problem. Include a number sentence in your solution.

1. The library held a reading contest. In one night, Mark read $\frac{5}{6}$ of the book *The Magic Pen* and Miguel read $\frac{2}{3}$ of *The Magic Pen*. Who read more of the book? How much more of the book did that student read?
2. Diana wants to buy a book from Buy More Book Store. It is $\frac{9}{10}$ of a mile from her house. By 3:00, she had walked one-half of a mile. How much farther does Diana have to walk?
3. The librarian is making bookmarks for the contest participants. Each strip of paper is one foot long. He wants to make 5-inch bookmarks and waste as little paper as possible. What fraction of each strip will be left after making bookmarks?
4. Sam invites Levi over to his house to read. They share a big bowl of popcorn. Sam eats $\frac{2}{3}$ of the bowl and Levi eats $\frac{2}{6}$ of the bowl. How much of the bowl of popcorn remains?

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5. Michael's goal is to read for 60 minutes. He reads for $\frac{1}{3}$ hour and then takes a break. Then he reads for $\frac{1}{6}$ of an hour and takes another break to add up his minutes. How many more minutes does Michael need to read?
6. The library is filled with contestants from the third, fourth, and fifth grades. $\frac{1}{4}$ of the contestants are third graders and $\frac{3}{10}$ of the contestants are fourth graders. What part of the contestants are fifth graders?
7. The librarian adds a marble to a jar for every book read. The jar was $\frac{1}{2}$ full yesterday. Today, he adds $\frac{3}{10}$ of a jar more to the marbles.
 - A. What fraction of the jar is full?
 - B. The students are awarded an extra 15 minutes of silent reading when the jar is $\frac{3}{4}$ full. How much more of the jar needs to be filled to get the reward?
8. Write your own subtraction word problem about a library reading contest. Show how to solve it.

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