



A Story of Units

Pleasanton
UNIFIED SCHOOL DISTRICT

Mathematics Curriculum



Grade 5 • MODULE 3

Addition and Subtraction of Fractions

PROBLEM SETS

Video tutorials: <http://embarc.online>

Info for parents: <http://bit.ly/pusdmath>

Version 3



Table of Contents

GRADE 5 • MODULE 3

Addition and Subtraction of Fractions

Module Overview	2
Topic A: Equivalent Fractions	10
Topic B: Making Like Units Pictorially	40
Mid-Module Assessment and Rubric	119
Topic C: Making Like Units Numerically	126
Topic D: Further Applications	204
End-of-Module Assessment and Rubric	260
Answer Key	267

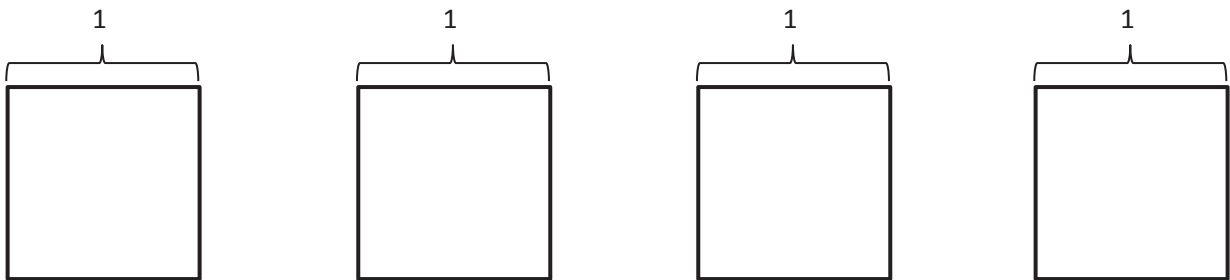
Name _____

Date _____

1. Use the folded paper strip to mark points 0 and 1 above the number line and $\frac{0}{2}$, $\frac{1}{2}$, and $\frac{2}{2}$ below it.

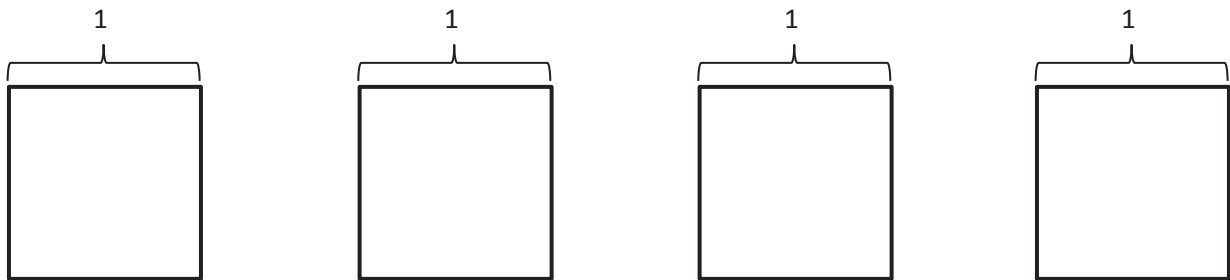


Draw one vertical line down the middle of each rectangle, creating two parts. Shade the left half of each. Partition with horizontal lines to show the equivalent fractions $\frac{2}{4}$, $\frac{3}{6}$, $\frac{4}{8}$, and $\frac{5}{10}$. Use multiplication to show the change in the units.

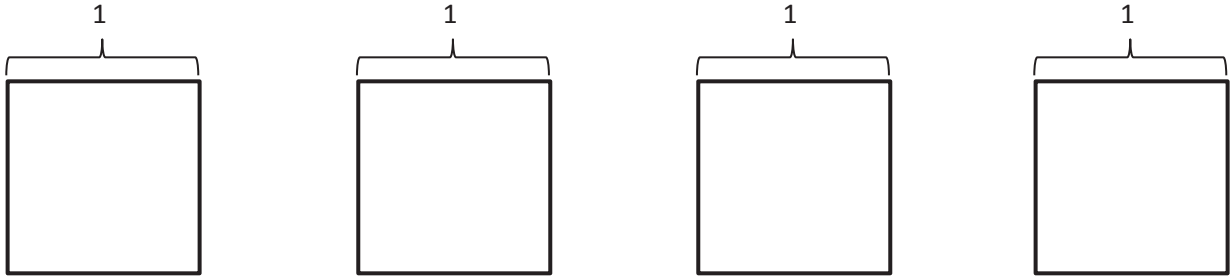


$$\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$$

2. Use the folded paper strip to mark points 0 and 1 above the number line and $\frac{0}{3}$, $\frac{1}{3}$, $\frac{2}{3}$, and $\frac{3}{3}$ below it. Follow the same pattern as Problem 1 but with thirds.



3. Continue the pattern with 3 fourths.



4. Continue the process, and model 2 equivalent fractions for 6 fifths.



Name _____

Date _____

1. Show each expression on a number line. Solve.

a. $\frac{2}{5} + \frac{1}{5}$

b. $\frac{1}{3} + \frac{1}{3} + \frac{1}{3}$

c. $\frac{3}{10} + \frac{3}{10} + \frac{3}{10}$

d. $2 \times \frac{3}{4} + \frac{1}{4}$

2. Express each fraction as the sum of two or three equal fractional parts. Rewrite each as a multiplication equation. Show Part (a) on a number line.

a. $\frac{6}{7}$

b. $\frac{9}{2}$

c. $\frac{12}{10}$

d. $\frac{27}{5}$

3. Express each of the following as the sum of a whole number and a fraction. Show Parts (c) and (d) on number lines.

a. $\frac{9}{7}$

b. $\frac{9}{2}$

c. $\frac{32}{7}$

d. $\frac{24}{9}$

4. Marisela cut four equivalent lengths of ribbon. Each was 5 eighths of a yard long. How many yards of ribbon did she cut? Express your answer as the sum of a whole number and the remaining fractional units. Draw a number line to represent the problem.

Name _____

Date _____

1. Draw a rectangular fraction model to find the sum. Simplify your answer, if possible.

a. $\frac{1}{2} + \frac{1}{3} =$

b. $\frac{1}{3} + \frac{1}{5} =$

c. $\frac{1}{4} + \frac{1}{3} =$

d. $\frac{1}{3} + \frac{1}{7} =$

e. $\frac{3}{4} + \frac{1}{5} =$

f. $\frac{2}{3} + \frac{2}{7} =$

Solve the following problems. Draw a picture and write the number sentence that proves the answer. Simplify your answer, if possible.

2. Jamal used $\frac{1}{3}$ yard of ribbon to tie a package and $\frac{1}{6}$ yard of ribbon to tie a bow. How many yards of ribbon did Jamal use?

3. Over the weekend, Nolan drank $\frac{1}{6}$ quart of orange juice, and Andrea drank $\frac{3}{4}$ quart of orange juice. How many quarts did they drink together?
4. Nadia spent $\frac{1}{4}$ of her money on a shirt and $\frac{2}{5}$ of her money on new shoes. What fraction of Nadia's money has been spent? What fraction of her money is left?

Name _____

Date _____

1. For the following problems, draw a picture using the rectangular fraction model and write the answer. When possible, write your answer as a mixed number.

a. $\frac{2}{3} + \frac{1}{2} =$

b. $\frac{3}{4} + \frac{2}{3} =$

c. $\frac{1}{2} + \frac{3}{5} =$

d. $\frac{5}{7} + \frac{1}{2} =$

e. $\frac{3}{4} + \frac{5}{6} =$

f. $\frac{2}{3} + \frac{3}{7} =$

Solve the following problems. Draw a picture, and write the number sentence that proves the answer. Simplify your answer, if possible.

2. Penny used $\frac{2}{5}$ lb of flour to bake a vanilla cake. She used another $\frac{3}{4}$ lb of flour to bake a chocolate cake. How much flour did she use altogether?

3. Carlos wants to practice piano 2 hours each day. He practices piano for $\frac{3}{4}$ hour before school and $\frac{7}{10}$ hour when he gets home. How many hours has Carlos practiced piano? How much longer does he need to practice before going to bed in order to meet his goal?

Name _____

Date _____

1. For the following problems, draw a picture using the rectangular fraction model and write the answer. Simplify your answer, if possible.

a. $\frac{1}{3} - \frac{1}{4} =$

b. $\frac{2}{3} - \frac{1}{2} =$

c. $\frac{5}{6} - \frac{1}{4} =$

d. $\frac{2}{3} - \frac{1}{7} =$

e. $\frac{3}{4} - \frac{3}{8} =$

f. $\frac{3}{4} - \frac{2}{7} =$

2. Mr. Penman had $\frac{2}{3}$ liter of salt water. He used $\frac{1}{5}$ of a liter for an experiment. How much salt water does Mr. Penman have left?

3. Sandra says that $\frac{4}{7} - \frac{1}{3} = \frac{3}{4}$ because all you have to do is subtract the numerators and subtract the denominators. Convince Sandra that she is wrong. You may draw a rectangular fraction model to support your thinking.

Name _____

Date _____

1. For the following problems, draw a picture using the rectangular fraction model and write the answer. Simplify your answer, if possible.

a. $1\frac{1}{4} - \frac{1}{3} =$

b. $1\frac{1}{5} - \frac{1}{3} =$

c. $1\frac{3}{8} - \frac{1}{2} =$

d. $1\frac{2}{5} - \frac{1}{2} =$

e. $1\frac{2}{7} - \frac{1}{3} =$

f. $1\frac{2}{3} - \frac{3}{5} =$

2. Jean-Luc jogged around the lake in $1\frac{1}{4}$ hour. William jogged the same distance in $\frac{5}{6}$ hour. How much longer did Jean-Luc take than William in hours?

3. Is it true that $1\frac{2}{5} - \frac{3}{4} = \frac{1}{4} + \frac{2}{5}$? Prove your answer.

3. Shelby bought a 2-ounce tube of blue paint. She used $\frac{2}{3}$ ounce to paint the water, $\frac{3}{5}$ ounce to paint the sky, and some to paint a flag. After that, she has $\frac{2}{15}$ ounce left. How much paint did Shelby use to paint her flag?
4. Jim sold $\frac{3}{4}$ gallon of lemonade. Dwight sold some lemonade, too. Together, they sold $1\frac{5}{12}$ gallons. Who sold more lemonade, Jim or Dwight? How much more?

5. Leonard spent $\frac{1}{4}$ of his money on a sandwich. He spent 2 times as much on a gift for his brother as on some comic books. He had $\frac{3}{8}$ of his money left. What fraction of his money did he spend on the comic books?

Name _____

Date _____

1. Add or subtract.

a. $2 + 1\frac{1}{5} =$

b. $2 - 1\frac{3}{8} =$

c. $5\frac{2}{5} + 2\frac{3}{5} =$

d. $4 - 2\frac{2}{7} =$

e. $9\frac{3}{4} + 8 =$

f. $17 - 15\frac{2}{3} =$

g. $15 + 17\frac{2}{3} =$

h. $100 - 20\frac{7}{8} =$

2. Calvin had 30 minutes in time-out. For the first $23\frac{1}{3}$ minutes, Calvin counted spots on the ceiling. For the rest of the time, he made faces at his stuffed tiger. How long did Calvin spend making faces at his tiger?
3. Linda planned to spend 9 hours practicing piano this week. By Tuesday, she had spent $2\frac{1}{2}$ hours practicing. How much longer does she need to practice to reach her goal?

4. Gary says that $3 - 1\frac{1}{3}$ will be more than 2, since $3 - 1$ is 2. Draw a picture to prove that Gary is wrong.

Name _____

Date _____

1. First make like units, and then add.

a. $\frac{3}{4} + \frac{1}{7} =$

b. $\frac{1}{4} + \frac{9}{8} =$

c. $\frac{3}{8} + \frac{3}{7} =$

d. $\frac{4}{9} + \frac{4}{7} =$

e. $\frac{1}{5} + \frac{2}{3} =$

f. $\frac{3}{4} + \frac{5}{6} =$

g. $\frac{2}{3} + \frac{1}{11} =$

h. $\frac{3}{4} + 1\frac{1}{10} =$

2. Whitney says that to add fractions with different denominators, you always have to multiply the denominators to find the common unit; for example:

$$\frac{1}{4} + \frac{1}{6} = \frac{6}{24} + \frac{4}{24}.$$

Show Whitney how she could have chosen a denominator smaller than 24, and solve the problem.

3. Jackie brought $\frac{3}{4}$ of a gallon of iced tea to the party. Bill brought $\frac{7}{8}$ of a gallon of iced tea to the same party. How much iced tea did Jackie and Bill bring to the party?
4. Madame Curie made some radium in her lab. She used $\frac{2}{5}$ kg of the radium in an experiment and had $1\frac{1}{4}$ kg left. How much radium did she have at first? (Extension: If she performed the experiment twice, how much radium would she have left?)

Name _____

Date _____

1. Add.

a. $2\frac{1}{4} + 1\frac{1}{5} =$

b. $2\frac{3}{4} + 1\frac{2}{5} =$

c. $1\frac{1}{5} + 2\frac{1}{3} =$

d. $4\frac{2}{3} + 1\frac{2}{5} =$

e. $3\frac{1}{3} + 4\frac{5}{7} =$

f. $2\frac{6}{7} + 5\frac{2}{3} =$

g. $15\frac{1}{5} + 3\frac{5}{8} =$

h. $15\frac{5}{8} + 5\frac{2}{5} =$

2. Erin jogged $2\frac{1}{4}$ miles on Monday. Wednesday, she jogged $3\frac{1}{3}$ miles, and on Friday, she jogged $2\frac{2}{3}$ miles. How far did Erin jog altogether?

3. Darren bought some paint. He used $2\frac{1}{4}$ gallons painting his living room. After that, he had $3\frac{5}{6}$ gallons left. How much paint did he buy?
4. Clayton says that $2\frac{1}{2} + 3\frac{3}{5}$ will be more than 5 but less than 6 since $2 + 3$ is 5. Is Clayton's reasoning correct? Prove him right or wrong.

Name _____

Date _____

1. Generate equivalent fractions to get like units. Then, subtract.

a. $\frac{1}{2} - \frac{1}{3} =$

b. $\frac{7}{10} - \frac{1}{3} =$

c. $\frac{7}{8} - \frac{3}{4} =$

d. $1\frac{2}{5} - \frac{3}{8} =$

e. $1\frac{3}{10} - \frac{1}{6} =$

f. $2\frac{1}{3} - 1\frac{1}{5} =$

g. $5\frac{6}{7} - 2\frac{2}{3} =$

h. Draw a number line to show that your answer to (g) is reasonable.

2. George says that, to subtract fractions with different denominators, you always have to multiply the denominators to find the common unit; for example:

$$\frac{3}{8} - \frac{1}{6} = \frac{18}{48} - \frac{8}{48}$$

Show George how he could have chosen a denominator smaller than 48, and solve the problem.

3. Meiling has $1\frac{1}{4}$ liter of orange juice. She drinks $\frac{1}{3}$ liter. How much orange juice does she have left?
(Extension: If her brother then drinks twice as much as Meiling, how much is left?)
4. Harlan used $3\frac{1}{2}$ kg of sand to make a large hourglass. To make a smaller hourglass, he only used $1\frac{3}{7}$ kg of sand. How much more sand did it take to make the large hourglass than the smaller one?

Name _____

Date _____

1. Subtract.

a. $3\frac{1}{5} - 2\frac{1}{4} =$

b. $4\frac{2}{5} - 3\frac{3}{4} =$

c. $7\frac{1}{5} - 4\frac{1}{3} =$

d. $7\frac{2}{5} - 5\frac{2}{3} =$

e. $4\frac{2}{7} - 3\frac{1}{3} =$

f. $9\frac{2}{3} - 2\frac{6}{7} =$

g. $17\frac{2}{3} - 5\frac{5}{6} =$

h. $18\frac{1}{3} - 3\frac{3}{8} =$

2. Toby wrote the following:

$$7\frac{1}{4} - 3\frac{3}{4} = 4\frac{2}{4} = 4\frac{1}{2}.$$

Is Toby's calculation correct? Draw a number line to support your answer.

3. Mr. Neville Iceguy mixed up $12\frac{3}{5}$ gallons of chili for a party. If $7\frac{3}{4}$ gallons of chili was mild, and the rest was extra spicy, how much extra spicy chili did Mr. Iceguy make?
4. Jazmyne decided to spend $6\frac{1}{2}$ hours studying over the weekend. She spent $1\frac{1}{4}$ hours studying on Friday evening and $2\frac{2}{3}$ hours on Saturday. How much longer does she need to spend studying on Sunday in order to reach her goal?

Name _____

Date _____

1. Are the following expressions greater than or less than 1? Circle the correct answer.

a. $\frac{1}{2} + \frac{2}{7}$ greater than 1 less than 1

b. $\frac{5}{8} + \frac{3}{5}$ greater than 1 less than 1

c. $1\frac{1}{4} - \frac{1}{3}$ greater than 1 less than 1

d. $3\frac{5}{8} - 2\frac{5}{9}$ greater than 1 less than 1

2. Are the following expressions greater than or less than $\frac{1}{2}$? Circle the correct answer.

a. $\frac{1}{4} + \frac{2}{3}$ greater than $\frac{1}{2}$ less than $\frac{1}{2}$

b. $\frac{3}{7} - \frac{1}{8}$ greater than $\frac{1}{2}$ less than $\frac{1}{2}$

c. $1\frac{1}{7} - \frac{7}{8}$ greater than $\frac{1}{2}$ less than $\frac{1}{2}$

d. $\frac{3}{7} + \frac{2}{6}$ greater than $\frac{1}{2}$ less than $\frac{1}{2}$

3. Use $>$, $<$, or $=$ to make the following statements true.

a. $5\frac{2}{3} + 3\frac{3}{4}$ _____ $8\frac{2}{3}$

b. $4\frac{5}{8} - 3\frac{2}{5}$ _____ $1\frac{5}{8} + \frac{2}{5}$

c. $5\frac{1}{2} + 1\frac{3}{7}$ _____ $6 + \frac{13}{14}$

d. $15\frac{4}{7} - 11\frac{2}{5}$ _____ $4\frac{4}{7} + \frac{2}{5}$

4. Is it true that $4\frac{3}{5} - 3\frac{2}{3} = 1 + \frac{3}{5} + \frac{2}{3}$? Prove your answer.
5. Jackson needs to be $1\frac{3}{4}$ inches taller in order to ride the roller coaster. Since he can't wait, he puts on a pair of boots that add $1\frac{1}{6}$ inches to his height and slips an insole inside to add another $\frac{1}{8}$ inch to his height. Will this make Jackson appear tall enough to ride the roller coaster?
6. A baker needs 5 lb of butter for a recipe. She found 2 portions that each weigh $1\frac{1}{6}$ lb and a portion that weighs $2\frac{2}{7}$ lb. Does she have enough butter for her recipe?

Name _____

Date _____

1. Rearrange the terms so that you can add or subtract mentally. Then, solve.

a. $\frac{1}{4} + 2\frac{2}{3} + \frac{7}{4} + \frac{1}{3}$

b. $2\frac{3}{5} - \frac{3}{4} + \frac{2}{5}$

c. $4\frac{3}{7} - \frac{3}{4} - 2\frac{1}{4} - \frac{3}{7}$

d. $\frac{5}{6} + \frac{1}{3} - \frac{4}{3} + \frac{1}{6}$

2. Fill in the blank to make the statement true.

a. $11\frac{2}{5} - 3\frac{2}{3} - \frac{11}{3} = \underline{\hspace{2cm}}$

b. $11\frac{7}{8} + 3\frac{1}{5} - \underline{\hspace{2cm}} = 15$

c. $\frac{5}{12} - \underline{\hspace{2cm}} + \frac{5}{4} = \frac{2}{3}$

d. $\underline{\hspace{2cm}} - 30 - 7\frac{1}{4} = 21\frac{2}{3}$

e. $\frac{24}{5} + \underline{\hspace{2cm}} + \frac{8}{7} = 9$

f. $11.1 + 3\frac{1}{10} - \underline{\hspace{2cm}} = \frac{99}{10}$

3. DeAngelo needs 100 lb of garden soil to landscape a building. In the company's storage area, he finds 2 cases holding $24\frac{3}{4}$ lb of garden soil each, and a third case holding $19\frac{3}{8}$ lb. How much gardening soil does DeAngelo still need in order to do the job?

4. Volunteers helped clean up 8.2 kg of trash in one neighborhood and $11\frac{1}{2}$ kg in another. They sent $1\frac{1}{4}$ kg to be recycled and threw the rest away. How many kilograms of trash did they throw away?

Name _____

Date _____

Solve the word problems using the RDW strategy. Show all of your work.

1. In a race, the second place finisher crossed the finish line $1\frac{1}{3}$ minutes after the winner. The third-place finisher was $1\frac{3}{4}$ minutes behind the second-place finisher. The third-place finisher took $34\frac{2}{3}$ minutes. How long did the winner take?

2. John used $1\frac{3}{4}$ kg of salt to melt the ice on his sidewalk. He then used another $3\frac{4}{5}$ kg on the driveway. If he originally bought 10 kg of salt, how much does he have left?

3. Sinister Stan stole $3\frac{3}{4}$ oz of slime from Messy Molly, but his evil plans require $6\frac{3}{8}$ oz of slime. He stole another $2\frac{3}{5}$ oz of slime from Rude Ralph. How much more slime does Sinister Stan need for his evil plan?
4. Gavin had 20 minutes to do a three-problem quiz. He spent $9\frac{3}{4}$ minutes on Problem 1 and $3\frac{4}{5}$ minutes on Problem 2. How much time did he have left for Problem 3? Write the answer in minutes and seconds.

5. Matt wants to shave $2\frac{1}{2}$ minutes off his 5K race time. After a month of hard training, he managed to lower his overall time from $21\frac{1}{5}$ minutes to $19\frac{1}{4}$ minutes. By how many more minutes does Matt need to lower his race time?

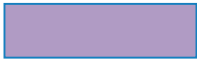
Names _____ and _____ Date _____

1. Draw the following ribbons. When finished, compare your work to your partner's.

- a. 1 ribbon. The piece shown below is only $\frac{1}{3}$ of the whole. Complete the drawing to show the whole ribbon.



- b. 1 ribbon. The piece shown below is $\frac{4}{5}$ of the whole. Complete the drawing to show the whole ribbon.



- c. 2 ribbons, A and B. One third of A is equal to all of B. Draw a picture of the ribbons.

- d. 3 ribbons, C, D, and E. C is half the length of D. E is twice as long as D. Draw a picture of the ribbons.

2. Half of Robert's piece of wire is equal to $\frac{2}{3}$ of Maria's wire. The total length of their wires is 10 feet. How much longer is Robert's wire than Maria's?

3. Half of Sarah's wire is equal to $\frac{2}{5}$ of Daniel's. Chris has 3 times as much as Sarah. In all, their wire measures 6 ft. How long is Sarah's wire in feet?







Video tutorials: <http://embarc.online>
Info for parents: <http://bit.ly/pusdmath>