
CHAPTER 1

FRACTIONS

Fractions are a stumbling block for a lot of math students. Everyone gets confused when it comes to learning fractions. I will teach you how to write, understand, add, subtract, multiply, and divide fractions; in a *fraction* of the time you might expect.

Can you solve these problems?

$$9/16 - 2/8 =$$

$$4/10 + 1/5 =$$

$$3/9 \times 2/5 =$$

Read this chapter and in about an hour not only will these problems be easy for you, but you'll be able to solve them in your head.

LESSON 1: BEGINNING FRACTIONS

First of all, what is a fraction? A fraction is a piece of something. If I broke a vase into 100 pieces and picked up 1 of the pieces, I would be holding a *fraction* of the vase.

Here are a few more fractions you will recognize:

- A penny is a *fraction* of one dollar.
- A second is a *fraction* of one minute.
- A slice of pizza is a *fraction* of the whole pizza.
- An inch is a *fraction* of one foot.
- Your leg is a *fraction* of you!

Let's start with a dollar bill because it has a "1" written right on it, so it will represent ONE.



Now let's divide that dollar into ten pieces. We all know what that would be- DIMES!

If we broke up one dollar into dimes, we would have ten dimes. Ten dimes equal one dollar.



Each dime is $1/10$ (one tenth) of the dollar. Look at that fraction.

$$\frac{1}{10}$$

An arrow points from the '10' in the denominator to the text below.

The "10" on the bottom is how many dimes it takes to make 1 dollar. The "1" on top means 1 dime.

One dime is one tenth ($1/10$) of the dollar. It is a fraction of the dollar. Think of the fraction " $1/10$ " as *one of the ten pieces*.

Two dimes would be written as...

$$\frac{2}{10}$$

because we have two of the ten pieces.

Let's try another fraction. This time instead of breaking up the dollar into dimes, we will break it up into quarters. How many quarters are in a dollar? That's right, four.



Each quarter is one of the four pieces that you need to make one dollar, so each one is written as $\frac{1}{4}$. You can say "one fourth" or "one quarter," either one is correct. Now you know why twenty five cents is called a quarter -because it's a quarter of a dollar.

Sometimes fractions are written with a slanted line like $\frac{1}{4}$. Other times they are written with one number on top, one number on bottom, and a straight line in between them; like the one below.


$$\frac{1}{4}$$

Either way it means the same thing, one of four the pieces.

How would you write *one penny* as a fraction?

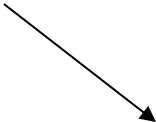


Think about how many pennies are in a dollar. There are one hundred, so that is the number on the bottom of the fraction. We are talking about only one penny, so that is the number on the top of the fraction.


$$\frac{1}{100}$$


To read this fraction, say *one-one hundredth*. A penny is one-one hundredth of a dollar.

How would you write 2 pennies as a fraction? There are 100 pennies in 1 dollar, so that is the number on the bottom. The 2 goes on top.

$$\frac{2}{100}$$


Here's a tricky question. How many dollars would you have, if you had 100/100? Well, let's think about that. If you had 100 of the 100 pennies, that would be 1 whole dollar.

$$\frac{100}{100} = 1$$


Now let's say you had 4/4 of a dollar. How many dollars would you have?

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

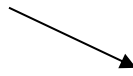
Well, if the bottom number is 4, and the top number is 4, we have all 4 pieces to make 1 dollar. Any time the number on top is the same as the number on bottom, it equals 1.

Let's say I sliced a candy bar into 4 equal pieces. I want to write a fraction to show how much of the candy bar I have eaten.

The number on the bottom of the fraction will show how many pieces there are in one candy bar.


$$\frac{\quad}{4}$$

The number on top will be how many of the 4 pieces I ate. I ate all 4 pieces, so put that number on top.


$$\frac{4}{4}$$

How many candy bars did I eat? You could say I ate four-fourths of the candy bar, but that sounds a little goofy. Let's just say I ate one candy bar.

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

Answer the questions on the next worksheet, to make sure you understand what a fraction means.

Name: _____ Date: _____

WORKSHEET 2-1

1. Which of the following are fractions?

36 42.9 $\frac{2}{5}$ 0 $\frac{1}{100}$

2. A dime is $\frac{1}{10}$ of a dollar and a quarter is $\frac{1}{4}$ of a dollar. Can you write a fraction for one penny?
3. What does the number on the bottom of a fraction mean?
4. Give a number that is equal to $\frac{25}{25}$.
5. Write a fraction of a dollar that equals 2 dimes.
6. Write the fraction that represents the picture below.



7. Write a fraction that equals 1.
8. I bought a pack of gum. There were 10 pieces in the pack. I gave my sister 3 of the pieces. Write a fraction that shows how much gum I have left in the pack.
9. Which fraction is bigger? Use a $<$ or $>$ sign.
 $\frac{1}{4}$ — $\frac{1}{100}$
10. Write a fraction that stands for 3 cents.

LESSON 2: ADDING FRACTIONS

So now that you know what fractions are, let's have some fun with them. I have 5 pennies and you have 2 pennies. To add them together, use fractions like this:


$$\frac{5}{100} + \frac{2}{100} =$$

Now we don't want to add the 100's together because the amount of pennies in a dollar can't change. Just add up the top numbers, $5 + 2 = 7$ and the answer is...

$$\frac{7}{100}$$

You just added fractions! Remember, the number on top is how many pennies and the number on bottom is how many pennies it takes to make one.

Next, we will add 1 quarter (think money) and 2 quarters. Look at the math and the pictures below.

$$\frac{1}{4} + \frac{2}{4}$$


To add fractions, just add the numbers on top. You can't change the number of quarters in one dollar, so the only math to solve is $1 + 2$.

$$\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$$

Try adding fractions on your own. Complete the next worksheet. If you don't get 100% correct, read this lesson again.

Name: _____

Date: _____

WORKSHEET 2-2

Add the following fractions.

1. $\frac{3}{8} + \frac{3}{8} =$

2. $\frac{5}{21} + \frac{9}{21} =$

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

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

5. $\frac{5}{12} + \frac{4}{12} =$

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

7. $\frac{8}{32} + \frac{18}{32} =$

8. $\frac{3}{6} + \frac{3}{6} =$

9. $\frac{4}{16} + \frac{7}{16} =$

10. $\frac{3}{14} + \frac{5}{14} =$

11. $\frac{11}{44} + \frac{11}{44} =$

12. $\frac{3}{27} + \frac{4}{27} =$

13. $\frac{2}{9} + \frac{4}{9} =$

14. $\frac{18}{48} + \frac{16}{48} =$

15. $\frac{4}{15} + \frac{3}{15} =$

16. $\frac{8}{24} + \frac{4}{24} =$

17. $1/4 + 2/4 =$

18. $3/12 + 4/12 =$

19. $4/10 + 2/10 =$

20. $1/3 + 2/3 =$

21. $5/16 + 3/16 =$

22. $3/8 + 3/8 =$

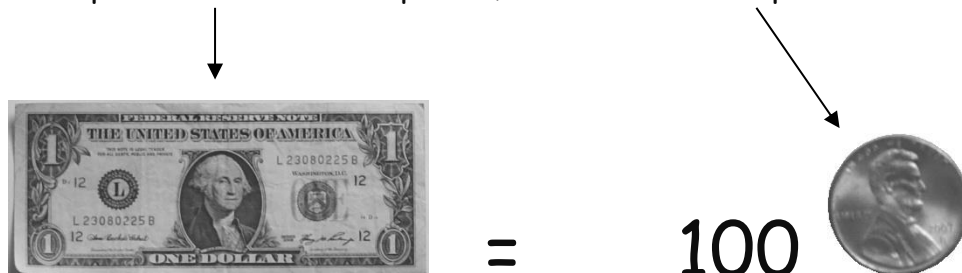
23. $3/7 + 2/7 =$

24. $6/32 + 8/32 =$

25. $7/14 + 2/14 =$

LESSON 3: EQUIVALENT FRACTIONS

If I split a dollar into 100 pieces, I would have 100 pennies.

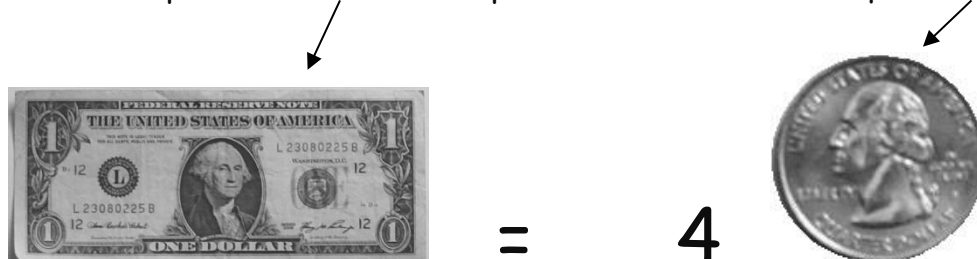


If I put 50 of those 100 pennies in my hand, I would be holding half of the dollar or "fifty one-hundredths." We write that fraction like this:

$$\frac{50}{100}$$

That fraction means I have 50 of the 100 pieces that it takes to make 1 whole dollar.

Now let's split that dollar into 4 pieces. That would be 4 quarters.

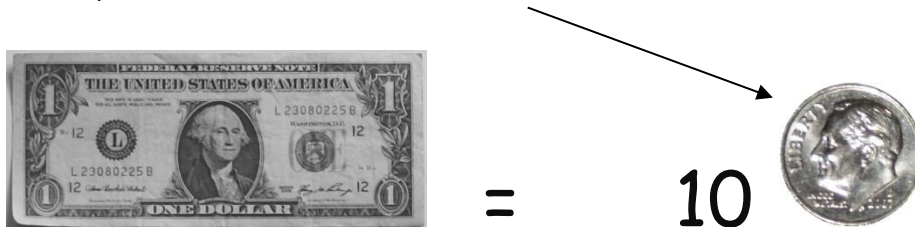


If I put 2 of those quarters in my hand, again I would be holding half of the dollar in my hand or "two fourths." We write that fraction like this:

$$\frac{2}{4}$$

That fraction means I have 2 of the 4 pieces that it takes to make 1 whole dollar.

I will split up that dollar one more time. This time I split it into 10 pieces. We call those pieces dimes.



Again, I put half of the dollar into my hand. That means I have 5 of the 10 dimes in my hand. That fraction is "five tenths."

$$\frac{5}{10}$$

That fraction means I have 5 of the 10 pieces that it takes to make 1 whole dollar. Let's take a closer look at those last 3 *equivalent* fractions. The word *equivalent* means equal.

$$\frac{50}{100} \quad \frac{2}{4} \quad \frac{5}{10}$$

All 3 of those fractions are equal to one half. Since the number on top is half of the number on bottom, they are all half. The first one is 50 of the 100 pennies, also known as half a dollar. The second fraction is 2 of the 4 quarters, or half a dollar. And the third fraction is 5 of the 10 dimes, also half a dollar.

All those fractions equal one half. But there is a more simple way to write one half. It is written as 1 of 2 pieces.

$$\frac{1}{2}$$

If I split a dollar into 2 fifty-cent pieces and I put one of them in my hand, I would be holding half a dollar. Looking at the fraction on the last page, I have 1 of the 2 pieces that it takes to make one whole dollar.

We have just learned 4 different ways to write one half.

$$\frac{1}{2}$$

$$\frac{50}{100}$$

$$\frac{2}{4}$$

$$\frac{5}{10}$$

Here are 4 more ways to write one half.

$$\frac{3}{6}$$

$$\frac{8}{16}$$

$$\frac{100}{200}$$

$$\frac{45}{90}$$

As long as the number on top is half of the number on bottom, it will always equal one half or $\frac{1}{2}$. Can you make up 4 more fractions that equal one half?

To do that, pick any number. Put that on the top of the fraction, then double that number and put it on the bottom of the fraction. You are sure to have a fraction that equals $\frac{1}{2}$. For example, these fractions all equal one half:

$$\frac{12}{24}$$

$$\frac{11}{22}$$

$$\frac{40}{80}$$

$$\frac{4000}{8000}$$

Look at the first fraction and picture 2 dozen eggs; there are 24 total eggs. Half of the eggs would be 12, that's why $\frac{12}{24} = \frac{1}{2}$

Can you see why all of those fractions above equal $\frac{1}{2}$? If not, go back and read these lessons again. You must understand why those fractions equal $\frac{1}{2}$ before you move on.

Below are 4 statements. Find the one that is NOT true or not equal.

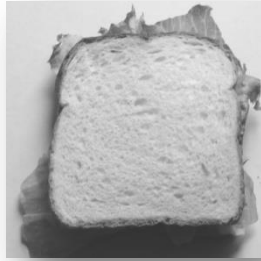
1. $1/2 = 5/10$

2. $8/16 = 1/2$

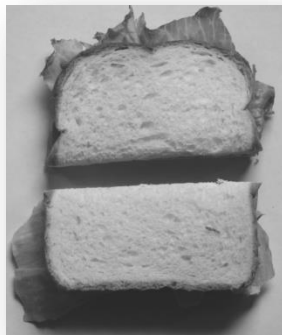
3. $3/4 = 1/2$
4. $50/100 = \frac{1}{2}$

That's right, number 3 is not equal. $3/4$ is more than $1/2$.

Just to make sure you completely understand, let's try one more example. Look at the sandwich below; it is one sandwich.



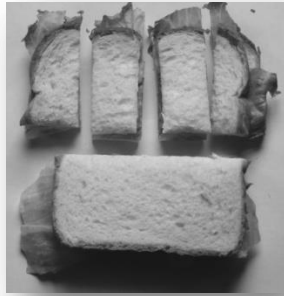
Cut the sandwich in half. I get half and you get half.



Even if you slice your half into two pieces, you still have $1/2$ of the whole sandwich.



You could look at it as you have $2/4$ (2 of the 4 pieces). No matter how many times you slice your half sandwich into smaller pieces, you still have only $1/2$ of a sandwich.



Here we have my half sandwich and your half. Your half is cut into 4 pieces. To write that as a fraction, I have $1/2$ and you have $4/8$. Do you understand how and why $1/2$ equals $4/8$? Look at the picture above. My half sandwich is "one of the two pieces" it takes to make one whole sandwich. Your half is "four of the eight *little* pieces" it takes to make one whole sandwich.

The number on the bottom of the fraction is called the *denominator*. You can remember that by thinking:

"The De-**bottom**-nator"

The number on top is called the *numerator* because it is the "number" of pieces we are talking about.

If this makes sense to you, complete the next worksheet. If you are confused, go back to where it was easy.

Name: _____ Date: _____

WORKSHEET 2-3

1. Circle the fraction that is equal to $\frac{1}{2}$.

$$\frac{4}{6} \quad \frac{6}{6} \quad \frac{3}{6} \quad \frac{2}{6}$$

2. Which fraction is a bigger amount? Use a $<$ or $>$ sign.

$$\frac{9}{10} \quad \frac{3}{10}$$

3. Write a math problem using fractions that means "four eighths plus three eighths."

4. I have a deck of cards. This deck has 52 cards. I want to separate the cards into 4 equal piles. Write a fraction that shows how much of the deck is in each pile.

5. I have one dozen eggs. One dozen is 12 eggs. I cooked 5 of the eggs. Write a fraction that shows how much of the dozen is left.

6. Look at the fraction below. Which number is the denominator?

$$\frac{3}{8}$$

7. Look at the fraction above. Which number is the numerator?