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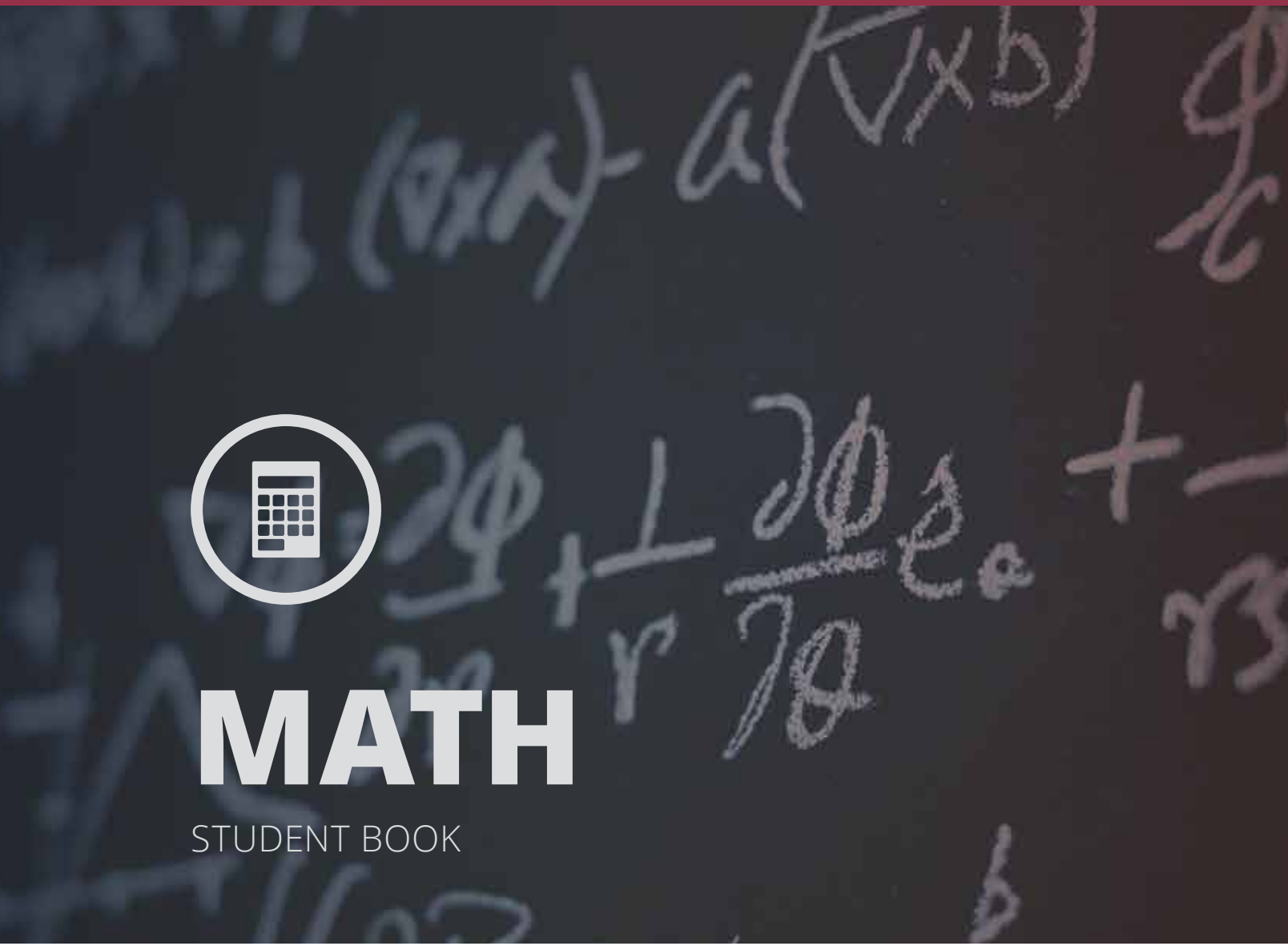

MATH

STUDENT BOOK

6th Grade | Unit 3

Alpha Omega
PUBLICATIONS

MATH 603
Decimals

LIFEPAC Test is located in the center of the booklet. Please remove before starting the unit.

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Decimals

Introduction

In this unit, we will explore decimal numbers. We will learn about place value and how it is used to read, write, compare, round, and estimate with decimal numbers. We will also add, subtract, multiply, and divide by decimal numbers in order to solve problems. Finally, we will study the metric system, which like the decimal system, is based on the number ten. We will learn about measuring length, mass, and capacity, in the metric system. We will also multiply and divide by powers of ten in order to convert metric units.

Objectives

Read these objectives. The objectives tell you what you will be able to do when you have successfully completed this LIFEPAC. When you have finished this LIFEPAC, you should be able to:

- Identify the place value of decimal numbers.
- Read and write decimal numbers.
- Order, compare, round, and estimate with decimal numbers.
- Add and subtract decimal numbers.
- Multiply and divide by decimal numbers.
- Multiply and divide decimal numbers by powers of ten.
- Understand the metric system and how to convert metric units.

Survey the LIFEPAC. Ask yourself some questions about this study and write your questions here.

1. DECIMAL NUMBERS

Do you remember what place value is? It's the position of each digit in a number, and it tells how much each digit is worth.

Objectives

Review these objectives. When you have completed this section, you should be able to:

- Identify place value for decimal numbers.
- Read and write decimal numbers.
- Compare and order decimal numbers.
- Round decimal numbers using place value.
- Estimate with decimal numbers using different types of estimation.
- Add and subtract decimal numbers.

Vocabulary

clustering. Method of estimation where you determine what number your values are close to, and then use that number to solve your problem.

decimal fraction. A fraction in which the denominator is 10 or a power of 10.

decimal point. A period separating the whole number and fractional parts of a number.

fraction. A number that expresses a portion of a whole.

front-end. Estimation where only the digits of the largest place value are added or subtracted.

inequality. Statement showing a relationship between numbers that are not necessarily equal; uses the symbols >, <, or ≥.

number line. A line that graphically represents all numbers.

place value. The position of a digit in a number, which determines its value.

Note: *All vocabulary words in this LIFEPAC appear in* **boldface** *print the first time they are used. If you are not sure of the meaning when you are reading, study the definitions given.*

DECIMALS AND PLACE VALUE

The position of each digit in a number tells us how much that digit is worth. For example, in the number 29,071, the 2 is in the ten thousands place. So, there are 2 ten thousands, or twenty thousand. Take a look at the value of each digit.

29,071
2 ten thousands: 2 × 10,000 = 20,000
9 thousands: 9 × 1,000 = 9,000
0 hundreds: 0 × 100 = 0
7 tens: 7 × 10 = 70
1 ones: 1 × 1 = 1

The number 29,071 is called a whole number because the smallest place value in which it has a digit is the ones place. However, in our world, the numbers we deal with are rarely whole numbers! We have cents to represent numbers that are less than a whole dollar. Measurements are often less than a whole amount, too. For example, in baking, you may need less than a whole cup of an ingredient. Or, in baseball, a player's batting average is always less than 1.

Did you know?

Did you notice that there were zero hundreds? Even though there were no hundreds in the number, we can't just leave the place blank. We have to put a zero in to hold that position. Zero acts as a placeholder.

Let's look at the number line below to see how these numbers that are less than a whole can be represented. Remember that a number line is a graph that represents all numbers, even numbers that are smaller than a whole!

Fractions come between the whole numbers on a number line, and have two parts: the numerator, or the top number, and the denominator, or the bottom number. The numerator tells how many parts we have, and the denominator tells how many total parts there are.

Let's divide the area between 0 and 1 into 10 parts. Now, we can put a point on one of these places. Let's find the fraction that represents this point. Since the space between 0 and 1 is divided into 10 total parts, the denominator of this fraction is 10. To find the numerator, count how many places it is from 0 to our point.

$$\frac{\text{numerator}}{\text{denominator}} = \frac{4}{10} = 0.4$$

This point represents the fraction four-tenths. Four-tenths is called a *decimal fraction* because it has a power of 10 in the denominator. Decimal fractions can be written short hand as decimal numbers using a decimal point.

So, to represent amounts that are part of a whole, we use fractions. The top number, or the numerator, in a fraction tells how many parts we have, and the bottom number, or the denominator, tells how many total parts are in the whole. For example, the fraction $\frac{4}{10}$ tells us that we have four of ten parts. Fractions that have a denominator of ten or a power of ten (like 10, 100, or 1,000) are called decimal fractions. That's because they can be written shorthand as decimal numbers, using a decimal point. The digits to the left of the decimal point represent the whole number part of the number. The digits to the right of the decimal point represent the fraction part of a number.

This might help!

Decimal fractions can be written shorthand because they have a denominator that is a power of ten and our decimal system is based on the number ten. In fact, the prefix "deci-" means ten.

Notice in the chart that the places to the right of the decimal point all end in *-ths*. For example, the hundreds place is to the left of the decimal point. But, the hundred*ths* place is to the right of the point. The tens place is to the left of the decimal point. And, the ten*ths* place is to the right. Also, notice that there is *no* "oneths" place. The first place value to the right of the decimal point is the tenths.

Whole numbers ← → Fractions (decimals)

Thousands			Units			Fractions (decimals)		
hundreds	tens	ones	hundreds	tens	ones	tenths	hundredths	thousandths
100,000	10,000	1,000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

decimal point

Example:

Which digit is in the hundredths place? **0.861**

Solution:

The hundredths place is the second place to the right of the decimal. So, the 6 is in the hundredths place. There are six-hundredths.

Key point!

In this decimal number, there is no whole number part. So, we write a zero to the left of the decimal point. This decimal number is between 0 and 1 on the number line.

Example:

What place is the 0 in? **7.08**

Solution:

The zero is in the first place to the right of the decimal point, or the tenths place. That means that there no tenths.

DECIMAL FRACTIONS

Earlier in the lesson, we saw that decimal fractions can be written shorthand as decimal numbers. Let's practice doing that. It's important to remember that rewriting a number in a different form doesn't change the value of the number.

Example:

Rewrite the following decimal fractions as decimal numbers.

$15\frac{72}{100}$ $125\frac{1}{10}$ $8\frac{55}{1000}$

Solution:

The decimal point goes between the whole number part and the fraction part of the number. The denominator of each fraction (bottom number) tells us how many places out the digits should go. With tenths, we go out one place; with hundredths, two places; and with thousandths, three places. Notice in the thousandths example that we'll have to use zero as a placeholder.

$15\frac{72}{100}$ is the same as 15.72.

$125\frac{1}{10}$ is the same as 125.1

$8\frac{55}{1000}$ is the same as 8.055.

Key point!

In the thousandths example, we used zero as a place holder. We had to write the zero in the tenths place because if we didn't it would have changed the number. For example, 8.55 would be $\frac{55}{100}$, not $\frac{55}{1000}$. And, 8.550 would be $\frac{550}{1000}$, not $\frac{55}{1000}$.

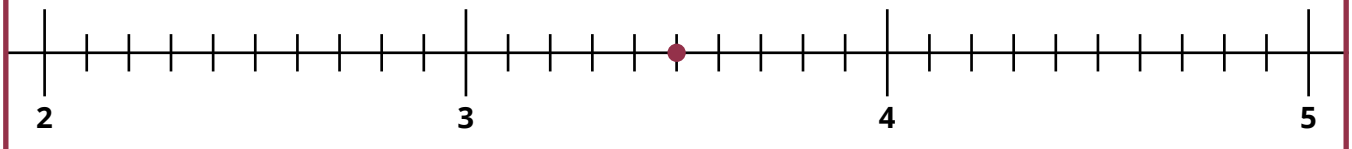
Example:

Represent the following decimal number on a number line.

3.5

Solution:

The decimal number 3.5 represents the number three and five-tenths. It can also be written as the fraction $3\frac{5}{10}$. It comes between 3 and 4 on the number line because it is a little more than 3, but less than 4.



Reading and writing decimal numbers is very similar to reading and writing whole numbers. In fact, the whole number part of a decimal number is written and read in the same way. Then, the decimal point is written and read as "and." Finally, the decimal part of the number (digits to the right of the decimal point) is written and read as a fraction. Take a look at some examples.

Example:

15.72 → "Fifteen and seventy-two hundredths"

125.1 → "One hundred twenty-five and one-tenth"

8.055 → "Eight and fifty-five thousandths"

Let's review!

Before going on to the practice problems, make sure you understand the main points of this lesson.

- ✓ Fractions represent amounts that are part of the whole.
- ✓ Decimal fractions (denominator of 10, 100, or 1,000) can be written as decimal numbers.
- ✓ The decimal point is read as "and". It comes between the whole number part and fraction part of a decimal number.
- ✓ The place values to the right of the decimal point end in *-ths*.
- ✓ If there is no whole number part to a number, write a zero to the left of the decimal point. These numbers come between 0 and 1 on the number line.

Match the following items.

1.1

_____ a fraction in which the denominator is 10 or a power of 10

_____ a period separating the whole number and fractional parts of a number

_____ a number that expresses a portion of a whole

_____ a line that graphically represents all numbers

_____ the position of a digit in a number, which determines its value

a. place value
b. decimal fraction
c. number line
d. fraction
e. decimal point

Answer true or false.

1.2 _____ The decimal number 6.05 can be read as "six and five-hundredths."

1.3 _____ The decimal number 11.8 can be read as "eleven and eight tens."

Circle each correct answer.

1.4 Which digit is in the ones place?

114.92

a. 4 b. 9 c. 1 d. 2

1.5 Which digit is in the hundredths place?

52.48

a. 5 b. 2 c. 4 d. 8

1.6 Which digit is in the thousandths place?

1,356.209

a. 1 b. 9 c. 3 d. 2

1.7 Which digit is in the tens place?

80.315

a. 0 b. 3 c. 8 d. 1

1.8 Which place is the 7 in?

502.78

a. tens b. tenths c. ones d. hundredths

1.9 Which place is the 1 in?

13.49

a. ones b. tens c. tenths d. hundreds

1.10 Which place is the 0 in?

10.56

a. ones b. tens c. tenths d. hundreds

1.11 Which place is the 4 in?

815.604

a. hundreds b. hundredths c. thousandths d. tenths

1.12 Where does the number 8.1 lie on the number line?

a. Between 1 and 2 b. Between 0 and 1 c. Between 8 and 9 d. Between 7 and 8

1.13 Where does the number 20.7 lie on the number line?

a. Between 0 and 1 b. Between 2 and 3 c. Between 21 and 22 d. Between 20 and 21

Rewrite the following decimal fractions as decimal numbers.

1.14 $14\frac{25}{100}=$ _____

1.15 $2\frac{8}{100}=$ _____

1.16 $50\frac{427}{1000}=$ _____

ORDERING AND COMPARING

Who's right? Did Ondi's smoothie cost more, or did Carlton's? Keep reading to find out! In this lesson, we'll learn how to compare decimal numbers and their values.

COMPARING DECIMAL NUMBERS

Let's look at how much Ondi and Carlton each paid for their smoothies. Ondi paid $3.42 and Carlton paid $3.08. Ondi claims that because the amount that Carlton paid has a larger number in it, he paid more. Carlton says she's wrong. So, who is right?

Ondi is *right* that the amount Carlton paid has a larger digit in it, *but* she didn't account for the place value of the digit. Remember that place value is the position of a digit that tells how much the digit is worth. The value of each position goes down as you move from left to right through the number. So, we actually have to compare the values of each place value position to see which number is larger.

Even though the amount that Carlton paid has a larger digit in it, the amount he paid was less than the amount that Ondi paid!

In math, we often use a symbol to show the relationship between two numbers. These symbols are called inequality symbols.

> means "is greater than"
< means "is less than"
= means "is equal to"

We can compare the amounts that Ondi and Carlton paid using an inequality. In fact, there are two different ways we could write the inequality statement. Take a look.

$3.42 > $3.08
$3.08 < $3.42

Notice that in either statement, the larger number faces the opening of the symbol. Keep that in mind as you compare numbers and write inequality statements.

Example:

Complete the inequality statement with the correct symbol.

11.247 ___ 11.35

Solution:

The numbers in this example do not have the same number of digits after the decimal point. So, add zeros to the end of the second number until they do and line up the decimal points vertically.

11.247

11.350

Key point!

The first step in comparing decimal numbers is to add zeros at the ends of the numbers so that they have the same number of digits after the decimal point. This does not change the value of the number, as long as the zeros are added at the end of the number and after the decimal point.

Now, compare the two numbers from left to right. Notice that they have the same whole number to the left of the decimal point. Beginning at the tenths place, however, the digits are different. In the first number, the digit in the tenths place is a 2. In the second number, the digit in the tenths place is a 3. Since 3 is larger than 2, 11.350 is larger than 11.247. Complete the inequality with the symbol that opens towards 11.350.

11.247 < 11.35

Example:

Complete the inequality statement with the correct symbol.

4.500 ___ 4.5

Solution:

Again, the numbers in this example do not have the same number of digits after the decimal point. So, add zeros to the end of the first number until they do and line up the decimal points vertically.

4.500

4.500

Step by Step

To compare decimal numbers, begin by adding zeros at the end of the number so that is has the same number of digits after the decimal point as the number you are comparing it to. Then, compare the whole number part of the numbers. Finally, compare the decimal part of the numbers by comparing the digits in each place value position. Only digits that have the same place value should be compared.

Now, compare the two numbers from left to right. Every digit in every place value position is the same! So, these two decimal numbers are equal. Use the equal sign to complete the inequality.

4.500 = 4.5

USING A NUMBER LINE TO ORDER DECIMAL NUMBERS

Another way to compare decimal numbers is to use the number line. On the number line, numbers get bigger in value as you move from left to right. One way to put several decimal numbers in order is to locate all of them on the number line and then list the numbers from left to right. We can also use place value to order numbers from smallest to largest.

Example:

Put the following list of numbers in order from smallest to largest.

8, 7.5, 10.13, 7.242, 8.56

Solution:

For this example, let's try ordering the numbers using place value. Add zeros to the end of any numbers that have fewer digits. Notice that the number 8 has no decimal point. Whole numbers are usually written with no decimal point, but we can write a decimal point and zeros at the end of it without changing its value.

8.000

7.500

10.130

7.242

8.560

Begin by comparing the whole number part of each number. The smallest whole number part is 7. So, compare 7.500 and 7.242. 7.242 is smaller than 7.500. Then, compare the numbers that have 8 as the whole number part: 8.000 and 8.560. 8.000 is smaller than 8.560. Finally, the largest whole number part is 10 in the number 10.130. Now, list the numbers in order from smallest to largest.

7.242, 7.500, 8.000, 8.560, 10.130

Let's review!

Before going on to the practice problems, make sure you understand the main points of this lesson.

- ✓ Inequality statements use the symbols <, >, or = to show the relationship between two numbers.
- ✓ Numbers can be compared and ordered using place value or a number line.
- ✓ To compare numbers, you can add zeros to the end of each number and after the decimal point so that all the numbers have the same amount of digits after the decimal point.
- ✓ Numbers get larger in value as you move from left to right on the number line.

Answer true or false.

1.17 _____ An inequality is a statement that shows that two numbers are equal.

Circle each correct answer.

1.18 Complete the inequality statement with the symbol that makes it true.

28.005 ___ 28.05

a. > b. < c. =

1.19 Complete the inequality statement with the symbol that makes it true.

1.67 ___ 16.7

a. > b. < c. =

1.20 Complete the inequality statement with the symbol that makes it true.

13.8 ___ 13.80

a. > b. < c. =

1.21 Complete the inequality statement with the symbol that makes it true.

8.4 ___ 6.9

a. > b. < c. =

1.22 Complete the inequality statement with the symbol that makes it true.

2.0 ___ 2

a. > b. < c. =

1.23 Complete the inequality statement with the symbol that makes it true.

9.134 ___ 9.125

a. > b. < c. =

1.24 Which of the following lists is not in order from smallest to largest?

a. 10.1, 10.5, 11.2, 12.9
b. 4.75, 4.8, 4.92, 5
c. 0.5, 1.3, 2.6, 3.8
d. 2.33, 1.87, 3.6, 7.1

Put the following numbers in order from smallest to largest.

1.25 16.85, 16, 16.15, 16.819, 16.02

_____ , _____ , _____ , _____ , _____

1.26 3.6, 3.1, 4.2, 5.0, 4.5, 4.9

_____ , _____ , _____ , _____ , _____ , _____

1.27 0.61, 1.25, 0.12, 1.1, 0.5, 0.924

_____ , _____ , _____ , _____ , _____ , _____

ROUNDING AND ESTIMATING

Do you remember how to round whole numbers? The rule is to look at the digit to the right of the place value you are rounding to. If that digit is a 5 or larger, round up. If that digit is less than five, don't round up. The remaining digits become zeros. In this lesson, we'll learn how to round decimal numbers, too!

ROUNDING

Rounding decimal numbers is the same as rounding whole numbers. The rules are identical!

Look to the digit to the right of the place value you are rounding to.

- If the digit to the right is 5 or larger, round the digit to the left up.
- If the digit to the right is less than 5, keep the digit to the left the same.
- The digits to the right of the place value you are rounding to become zeros.

Let's practice with some examples.

Example:

Round 0.284 to the nearest tenth.

Solution:

The tenths place is the first position to the right of the decimal point. A 2 is in the tenths place. The digit to the right of it is 8, which is larger than 5. So, round 2 up to 3. The remaining digits become zeros.

0.284 rounds to 0.300, or 0.3

This might help!

Zeros after the decimal point and at the end of a decimal number may be added or removed without changing the value of the number. That's why 0.300 and 0.3 represent the same value. Also, you should write a zero before the decimal point if there is no whole number part. For example, three-tenths is written as 0.3, not .3.

Remember that adding zeros to the end of a number and after the decimal point does not change the value of the number. This is the same for removing zeros that are at the end of a number and after the decimal point. Because it isn't necessary to have the extra zeros, and it's shorter and easier to write a number, you should always write your final answer without the extra zeros. However, the zero before the decimal point, when there is no whole number part, should always be written.

Example:

Round 135.29 to the nearest whole number.

Solution:

Rounding to the nearest whole number means to round to the nearest one, which is the digit directly to the left of the decimal point. So, a 5 is in the ones place. The digit to the right of it is 2, which is less than 5. So, keep 5 the same. The remaining digits become zeros. Since all the zeros are at the end of the number and after the decimal point, they can be left off. And, since there is no decimal portion of the number, the decimal point can be left off.

135.29 rounds to 135.00, or just 135.

Did you know?

Rounding to the nearest whole number is the same as rounding to the nearest one.

Example:

Round 60.798 to the nearest hundredth.

Solution:

There is a 9 in the hundredths place. The digit to the right of it is 8, which is larger than 5. So, round the 9 up to 10. That means that the digit in the hundredths place will become a zero, and the digit in the tenths place will round up from 7 to 8.

60.798 rounds to 60.800, or 60.8.

ESTIMATION

Remember that an estimate is an approximate value that is close to the actual value. For example, we could add the numbers 237 and 289 to find the exact sum. Or, we could estimate that their sum is about 500. Estimation is very helpful when you don't need an exact answer, or when you need an answer quickly.

There are a few different ways to estimate. The most common, and probably the most accurate, uses rounding. Let's look at an example that uses rounding to estimate.

Example:

Round each number to the nearest ten and estimate the sum.

140.97 + 28.75

Solution:

Begin by rounding each number to the nearest ten. In 140.97, the 4 is in the tens place. The digit to the right of it is 0, so keep the 4 the same and make the rest of the digits zero.

140.97 rounds to 140.00, or 140.

In 28.75, the 2 is in the tens place. The digit to the right of it is 8, so round the 2 up to 3 and make the rest of the digits zero.

28.75 rounds to 30.00 or 30.

Now, estimate the sum: 140 + 30 = 170.

Keep in mind...

Remember that estimation is used to quickly find an approximate value. It is not meant to be the exact value of a sum or value. Also, there is no one right answer for an estimate, although some estimates are better than others.

The next type of estimation is called front-end estimation. In front-end estimation, we keep the digit that is in the largest place value the same, and make the rest of the digits zero. Front-end estimation does not use rounding.

It is a very quick way of estimating, but it usually isn't quite as accurate as estimating using rounding. Here's an example that uses front-end estimation.

Example:

Estimate the following difference using front-end estimation.

924.58 - 377.652

Did you know?

With front-end estimation, there is *no* rounding. Notice that 377.652 became 300. We didn't round it to 400. That's what makes it faster than rounding, but less accurate.

Solution:

The largest place value in each number is the hundreds place. Keep the digits in the hundreds place the same and make the rest of the digits zero.

924.58 becomes 900.00, or 900.

377.652 becomes 300.000, or 300.

Now, estimate the difference: 900 - 300 = 600.

The last type of estimation is called clustering. Clustering is very useful if all the numbers in a problem are close to the same value.

For example, 38.77 and 40.23 are both close to 40. Take a look at an example that uses clustering to estimate.

Example:

Estimate the following sum using clustering.

11.9 + 9.53 + 10.422

Did you know?

Since all three values are close to 10, another way to estimate the sum is to use multiplication. Remember that multiplication is the same as repeated addition. So, 10 + 10 + 10 can be expressed as 3 × 10, or 30.

Solution:

We can quickly see that all three values are close to 10. So, count each value as 10 and estimate the sum.

10 + 10 + 10 = 30

Let's review!

Before going on to the practice problems, make sure you understand the main points of this lesson.

- ✓ Rounding decimal numbers is the same as rounding whole numbers.
- ✓ An estimate is an approximate value that is quick to find and close to the actual value.
- ✓ An estimate can be found by rounding, clustering, or using front-end estimation.

Match each word to its definition.

1.28 _____ method of estimation where you determine what number your values are close to, and then use that number to solve your problem

_____ estimation where only the digits of the largest place value are added or subtracted

a. clustering

b. front-end

Fill in each blank with the correct answer.

1.29 Round 287.9412 to the nearest tenth. Do not write extra zeros. _____

1.30 Round 14.5621 to the nearest hundredth. Do not write extra zeros. _____

1.31 Round 224.91 to the nearest whole number. Do not write extra zeros. _____

1.32 Round 0.1347 to the nearest tenth. Do not write extra zeros. _____

1.33 Round 2.8962 to the nearest hundredth. Do not write extra zeros. _____

1.34 Round 82.265 to the nearest whole number. Do not write extra zeros. _____

Circle each correct answer.

1.35 Estimate the following sum by rounding each number to the nearest ten.
129.5 + 34.62 + 19.1

a. 160 b. 170 c. 180 d. 190

1.36 Estimate the following sum using front-end estimation.
48.1 + 29.7 + 11.8

a. 70 b. 80 c. 90 d. 100

1.37 Estimate the following sum by clustering.
14.2 + 15.51 + 14.99 + 15.8

a. 40 b. 60 c. 80 d. 100

1.38 Estimate the following difference by rounding each number to the nearest hundred.
1,348.5 - 567.21

a. 800 b. 500 c. 600 d. 700

1.39 Estimate the following difference using front-end estimation.
788.44 - 225.6

a. 500 b. 600 c. 700 d. 400

1.40 Estimate the following sum by clustering.
128.2 + 129.11 + 132.5

a. 300 b. 390 c. 420 d. 450

ADDING AND SUBTRACTING

Take a look below. Marcy and Levi each did the same addition problem, but they got different answers! What did they do differently? Who did the problem correctly?

ADDING DECIMAL NUMBERS

How is it possible that Marcy and Levi each did the same addition problem, yet they got different answers? Well, one of them followed the rules for adding decimal numbers and the other didn't! That's why rules in mathematics are so important. Rules ensure that there is only one correct answer. Just imagine how confusing it would be if there were many acceptable answers to the same addition problem!

Adding decimal numbers is the same as adding whole numbers, with one extra rule. Always line up the decimal points before adding. This is done so that only digits that have the same place value, or worth, are added together. So, who did the addition problem correctly? Marcy!

One way to help you remember to line up the decimal points is to add zeros to the end of the number so that each addend has the same number of digits. Take a look at an example.

Step by Step

To add decimal numbers, first add zeros to the end of the numbers so that each addend has the same number of digits after the decimal point. Then, line up the decimal points vertically and add from right to left, carrying if necessary. Bring down the decimal point in the sum.

Example:

A toothbrush costs $2.49, a tube of toothpaste is $3.19, and dental floss is $0.99 at the supermarket. How much would it cost to buy all three?

Solution:

To find the total cost, add the three amounts. Each amount already has two places after the decimal point, so we don't have to add any extra zeros.

$$\begin{array}{r} {\scriptstyle 1\ \ 2} \\ 2.49 \\ 3.19 \\ +\ 0.99 \\ \hline 6.67 \end{array}$$

The total cost is $6.67.

Be careful!

Always make sure to bring down the decimal point in the answer. For example, if we had forgotten to bring down the point in this example, the answer would have been $667. That would be an expensive trip to the supermarket!

SUBTRACTING DECIMAL NUMBERS

The rules for subtracting decimal numbers are the same as for adding decimal numbers. Add extra zeros so that each number has the same number of digits after the decimal point. Then, line up the decimal points vertically and subtract from right to left, borrowing if necessary. Finally, bring down the decimal point in the difference.

Example:

Subtract 0.992 from 4.25.

Solution:

Add a zero to the end of 4.25 so that each number has three digits after the decimal point. Then, line up the decimal points and subtract.

$$\begin{array}{r} {\scriptstyle 3\ 1114} \\ 4.25\overset{1}{0} \\ +\ 0.992 \\ \hline 3.258 \end{array}$$

The difference between 4.25 and 0.992 is 3.258.

Example:

The Washington Middle School football team is in the middle of an important game. They have to move the football 8 yards in order to get another first down. If their running back runs for 4.5 yards, how many yards is he short of the first down?

Solution:

To find how many yards short the team is from the first down, subtract 4.5 from 8. Notice that the whole number does not have a decimal point. Remember that we can add a decimal point and zeros at the end of the number without changing the value of the number. So, rewrite 8 as 8.0. Then, line up the decimal points and subtract from right to left.

$$\begin{array}{r} {}^{7}\cancel{8}{}^{1}0 \\ +\ 4.5 \\ \hline 3.5 \end{array}$$

The team is 3.5 yards short of the first down.

Key point!

We can always add a decimal point and zeros at the end of a whole number without changing the value of the number. This can make adding or subtracting decimal numbers much easier.

Let's review!

Before going on to the practice problems, make sure you understand the main points of this lesson.

- ✓ The rules for adding and subtracting decimal numbers are important because they ensure that there is one right answer to a problem.
- ✓ To add or subtract decimal numbers, add zeros to the end of each number so that they all have the same number of digits after the decimal point.
- ✓ Add or subtract from right to left and bring down the decimal point in the sum or difference.

Fill in each blank with the correct answer.

1.41 Marcy and Levi each add 113.5 + 22.41. If the whole numbers are added, the sum would be _____ .

1.42 Find the sum.

$$\begin{array}{r} 2.680 \\ 34.200 \\ +\ 20.386 \\ \hline \end{array}$$

1.43 Find the difference.

$$\begin{array}{r} 431.6 \\ -\ 245.8 \\ \hline \end{array}$$

Circle each correct answer.

1.44 Add the following numbers.
26.89 + 34.5 + 68.6

a. 118.89 b. 129.99 c. 130.09 d. 36.10

1.45 Add the following numbers.

$$\begin{array}{r} 68.47 \\ 75.20 \\ +\ 60.05 \\ \hline \end{array}$$

a. 20.372 b. 203.72 c. 20.362 d. 203.62

1.46 Brady studied 1.5 hours on Monday, 0.75 hours on Tuesday, 1.25 hours on Wednesday, and 1 hour on Thursday. How many total hours did he study this week?

a. 3.4 hours b. 4.5 hours c. 4.2 hours d. 3.51 hours

1.47 Tosha received a 9.5 for vault, a 9.1 for bars, a 9.625 for beam, and a 9.25 for her floor exercise at her last gymnastics meet. What was her combined (or total) score?

a. 107.36 b. 36.475 c. 37.475 d. 37.375

1.48 Subtract the following numbers.
84.6 - 28.43

a. 5.617 b. 20.03 c. 56.17 d. 113.03

1.49 Subtract the following numbers.
219.8 - 197

a. 22.8 b. 200.1 c. 23.8 d. 24.2

1.50 Jesse's mom spent $37.52 at the grocery store. If she gives the clerk $50, how much should she get back in change?

a. $13.48 b. $37.02 c. $87.52 d. $12.48

1.51 A 3.25-inch piece is cut off of a 14-inch board. How many inches long is the board after it has been cut?

a. 10.75 inches b. 10.85 inches c. 11.25 inches d. 11.75 inches

TEACHER CHECK _____ initials _____ date

Review the material in this section in preparation for the Self Test. The Self Test will check your mastery of this particular section. The items missed on this Self Test will indicate specific areas where restudy is needed for mastery.

SELF TEST 1: DECIMAL NUMBERS

Circle each correct answer (each answer, 7 points).

1.01 In the number 29.154, the digit 1 is in the _____ place.

a. ones b. tenths c. tens d. hundredths

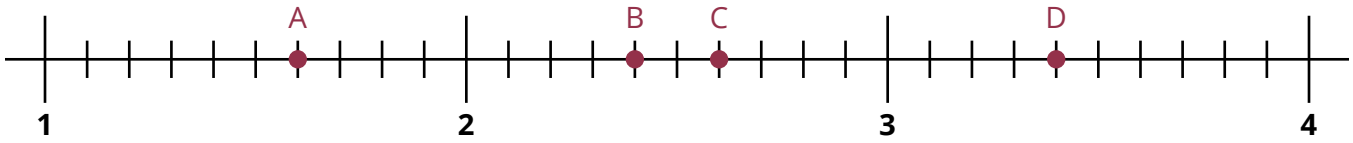
1.02 Which digit is in the hundredths place?
18.36

a. 1 b. 8 c. 3 d. 6

1.03 Rewrite the decimal fraction as a decimal number.
$8\ \frac{25}{1000}$

a. 8.025 b. 8.25 c. 82.5 d. 8.0025

1.04 Which letter on the number line represents 2.4?



a. A b. B c. C d. D

1.05 Complete the inequality statement.
13.01 ___ 13.1

a. < b. > c. =

1.06 Which of the following statements is false?

a. 1.5 > 1.4 b. 3.0 = 3 c. 6.5 < 6.05 d. 9.12 > 9.02

1.07 Which of the following lists is in order from smallest to largest?

a. 0.05, 0.2, 0.48, 0.6 b. 0.2, 0.05, 0.48, 0.6
c. 0.2, 0.48, 0.05, 0.6 d. 0.05, 0.2, 0.6, 0.48

1.08 Round each number to the nearest ten and estimate the sum.
82.14 + 38.5 + 41.3

a. 130 b. 140 c. 150 d. 160

1.09 Estimate the difference using front-end estimation.
987.12 - 342.5

a. 700 b. 600 c. 500 d. 400

1.010 Estimate the sum by clustering.
28.71 + 29.1 + 32.45 + 31 + 30.9

a. 150 b. 130 c. 120 d. 180

1.011 At the grocery store, Charlie bought a jar of spaghetti sauce for $2.49, a package of spaghetti noodles for $1.58, and a gallon of milk for $3.17. How much did he spend on these three items?

a. $6.04 b. $6.24 c. $7.24 d. $7.04

1.012 If Charlie gives the clerk a ten-dollar bill, how much change should he get back?

a. $3.76 b. $2.76 c. $2.96 d. $3.24

Fill in each blank with the correct answer (each answer, 7 points).

1.013 Add.

28.3 + 14.62 = _____

1.014 Subtract.

80.2 - 15.89 = _____

Answer true or false (this answer, 2 points).

1.015 _____ The number 14.592 rounded to the nearest hundredth is 14.6.

80/100 **SCORE** _____ **TEACHER** _____ _____
initials date

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