DECIMAL NUMBERS

Introduction

You learned about place value of a number in Chapter 1. For example, in the number 125 the place value of the 5 is ones, the 2 is tens, and the 1 is hundreds. In the decimal number 125.36, the dot to the right of the 5 is called a **decimal point**. All of the numbers to the left of the decimal point represent numbers whose absolute values are greater than or equal to 1. The numbers to the right of the decimal represent fractional values between 0 and 1. Similar to integer digits, the digits to the right of the decimal point have their own place values. The following chart shows the place values of each digit in the number 87,896.7134.

8	7,	8	9	6	.	7	1	3	4
Ten-thousands	Thousands	Hundreds	Tens	Ones	Decimal point	**Tenths**	**Hundredths**	**Thousandths**	**Ten-thousandths**

1 of 5

DECIMAL NUMBERS

Integers can be written as decimal numbers by placing a decimal point to the right of the ones digit, followed by a zero. There can be an infinite number of digits after a decimal point.

Decimals with an infinite number of digits after the decimal point that repeat the same digits over and over are known as **repeating decimals**.

If a decimal has an infinite number of digits but does not repeat it is an **irrational number**.

The decimal numbers that are not infinite are called **terminating decimals**.

Study the examples below.

Whole Number Decimal	Terminating Decimal	Repeating Decimal	Irrational Number
7.0	0.125	0.333333333...	1.4142135...
109.0	5.0245	2.452452452...	3.1411592654...

The "..." to the right of the repeating decimal and irrational numbers above indicate that they go on forever. Repeating decimals can be written with a bar over the digits that repeat to show that it is a repeating decimal. So, 0.33333333... can be written as $0.\overline{3}$ and 2.452452452... can be written as $2.\overline{452}$.

DECIMAL NUMBERS

Rounding Decimal Numbers

When a decimal number has many digits after the decimal point it is common to **round** that decimal to a specific place value. If the place value is not specified, round to the hundredths place for this course. This is usually the case in money problems, since cents are the smallest coin available.

1 cent = $0.01
25 cents = $0.25

To round a number to the hundredths place, look at the digit to its right (in the thousandths place). If it is 5 or greater, then add 1 to the digit in the hundredths place. If it is less than 5, don't change the digit in the hundredths place.

EXAMPLE A

Round 567.4386 to two decimal places.

"Two decimal places" means the hundredths place. In this example, the digit in the hundredths place is **3** (567.4**3**86).

The number to the right of **3** is **8** (567.4**38**6). Because 8 is greater than 5, add 1 to 3.

The number rounded to two decimal places is **567.44**.

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DECIMAL NUMBERS

EXAMPLE B

Round 87.13977 to the tenths place.

The digit in the tenths place is **1** (87.**1**3977).

The number to the right of **1** is **3** (87.**13**977). Because 3 is less than 5, do not change the 1.

The rounded number is **87.1**.

EXAMPLE C

Round 100.0098 to the thousandths place.

The digit in the thousandths place is **9** (100.00**9**8).

The number to the right of **9** is **8** (100.00**98**). Because 8 > 5, add 1 to 9. However, because 9 + 1 is 10, the 1 in 10 carries to the hundredths place, so the rounded number is **100.010**.

We can write 100.010 as **100.01** because any zeros after the right-most non-zero digit can be removed without changing a number's value.

DECIMAL NUMBERS

Extended Example 1a

Write the repeating decimal 1.951295129512... using a bar over the decimal.

END OF LESSON

Label each decimal number as a whole number decimal, a terminating decimal, a repeating decimal, or an irrational number.

1.73205080757…

Round the decimal number to the specified place value.

358.50122; ten-thousandths place

Round the decimal number to the specified place value.

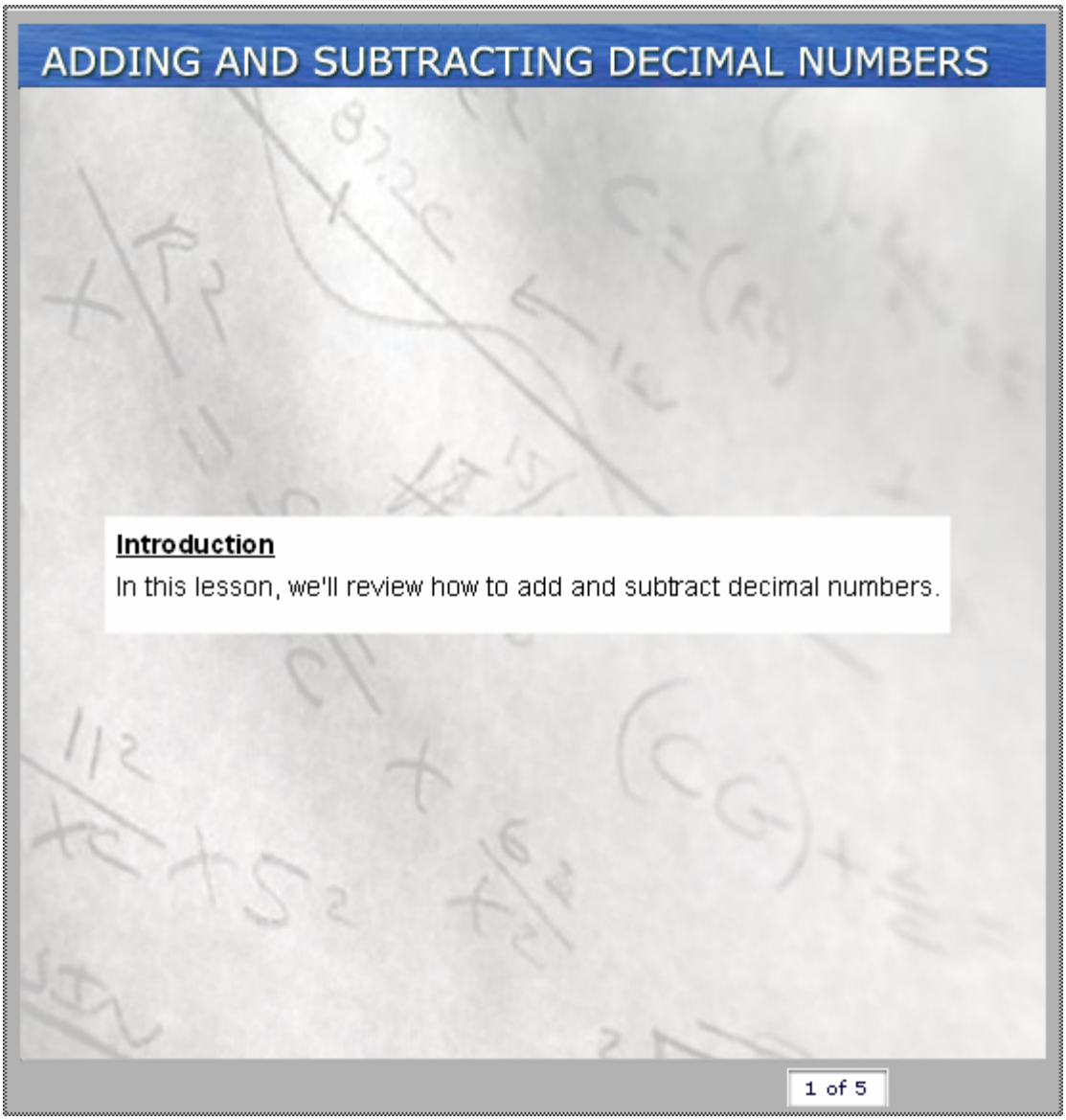
98.3259; thousandths place

Round the decimal number to the specified place value.

9,237.24955; thousandths place

Round the decimal number to the specified place value.

435.99; tenths place


ADDING AND SUBTRACTING DECIMAL NUMBERS
Introduction
In this lesson, we'll review how to add and subtract decimal numbers.
1 of 5

ADDING AND SUBTRACTING DECIMAL NUMBERS

Decimal numbers, like whole numbers, can be vertically aligned for addition and subtraction. When writing decimal numbers vertically, align the decimal points such that the digits with the same place values are aligned in columns. Once the decimals are aligned, add or subtract as usual, carrying the decimal point straight down.

EXAMPLE A

Add: $34.09 + 16.14$

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ } \\ 34.09 \\ +\,16.14 \\ \hline \\ 50.23 \end{array}$$

Align the numbers at the decimal point.

Add as usual.

Carry the decimal point straight down.

EXAMPLE B

Subtract: $87.25 - 14.91$

$$\begin{array}{r} {\scriptstyle 6\ \ 12\ \ } \\ 87.25 \\ -\,14.91 \\ \hline \\ 72.34 \end{array}$$

Align the numbers at the decimal point.

Subtract as usual.

Carry the decimal point straight down.

ADDING AND SUBTRACTING DECIMAL NUMBERS

When adding or subtracting decimal numbers, sometimes the numbers do not have the same number of digits after the decimal point. In this case, we still align the numbers at the decimal point and we use zero as a placeholder for the number with fewer decimal places. This is shown in the examples below.

EXAMPLE C

Add: $9.586 + 22.3897$

$$\begin{array}{r} {\scriptstyle 1\quad 1\,1} \\ 9.5860 \\ +\ 22.3897 \\ \hline \downarrow \\ 31.9757 \end{array}$$

Align the numbers at the decimal point. Since 9.586 has no digit in the ten-thousandths place, use zero as a place holder.

Add as usual.

Carry the decimal point straight down.

EXAMPLE D

Subtract: $75.1742 - 35$

$$\begin{array}{r} 75.1742 \\ -\ 35.0000 \\ \hline \downarrow \\ 40.1742 \end{array}$$

Align the numbers at the decimal point. Write 35 as a decimal number using zeros for place holders to the ten-thousandths place. Subtract.

Carry the decimal point straight down.

ADDING AND SUBTRACTING DECIMAL NUMBERS

To add and subtract signed decimals, we apply the same rules as for the addition and subtraction of integers, with the additional step of aligning decimal points.

EXAMPLE E

Add: $-9.56+(-15.35)$

Both numbers are negative. Find the absolute value of each:
$|-9.56| = 9.56$ and $|-15.35| = 15.35$.

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ \ \ } \\ 9.56 \\ +\ 15.35 \\ \hline \\ -24.91 \end{array}$$

Add 9.56 and 15.35 as usual: align the numbers at the decimal point.

Carry the decimal point straight down. Note: The answer is negative!

EXAMPLE F

Subtract: $20.576 - 27.03$

Rewrite the problem as addition: $20.576 + (-27.03)$.

20.576 is positive and 27.03 is negative, so find the absolute value of each:
$|20.576| = 20.576$, and $|-27.03| = 27.03$.

$$\begin{array}{r} {\scriptstyle 6\ 9\ 12\ 10\ \ } \\ 27.\cancel{0}\cancel{3}\cancel{0} \\ -\ 20.576 \\ \hline \\ -6.454 \end{array}$$

Subtract 20.576 from 27.03: align the numbers at the decimal point and add a 0 placeholder.

Carry the decimal point straight down.
Since $|-27.03| > |20.576|$ the sign of the answer is negative.

ADDING AND SUBTRACTING DECIMAL NUMBERS

Extended Example 1a

Add: 456.6+8.99

END OF LESSON

5 of 5

Add or subtract.

0.99 + 153.016

Add or subtract.

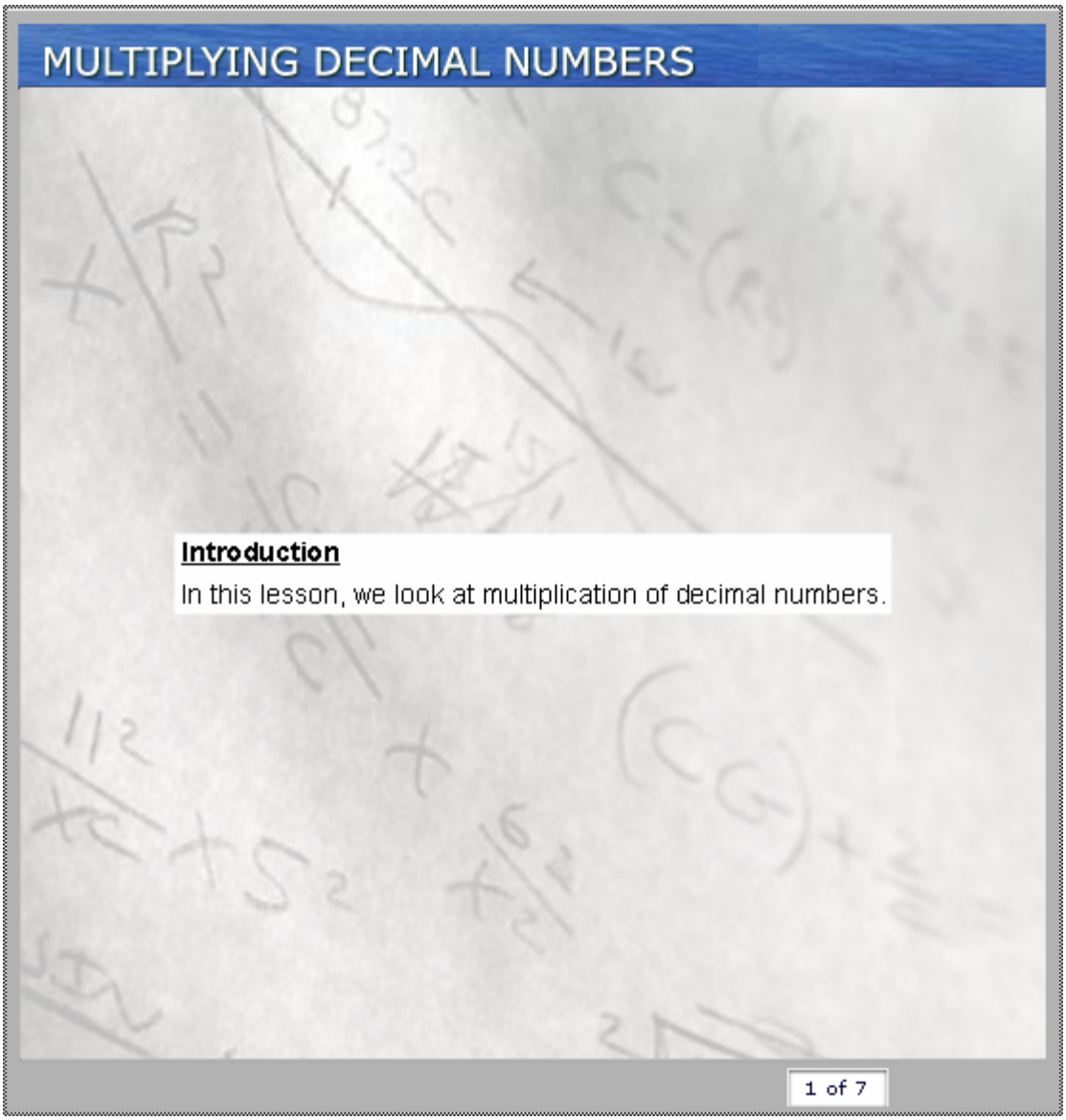
352.415 – 157.9143

Add or subtract.

–123.9 + (–246.995)

Add or subtract.

–4.04 – 17.2358


MULTIPLYING DECIMAL NUMBERS
Introduction
In this lesson, we look at multiplication of decimal numbers.
1 of 7

MULTIPLYING DECIMAL NUMBERS

When you multiply decimal numbers, you can ignore the decimal points and multiply the numbers as if they were integers. Once you finish multiplying, count the number of decimal places in each factor. Use the sum of the counts to place the decimal point in the product. That is, place the decimal point before the digit that is that many places from the end. The examples in this lesson will help you understand this concept.

EXAMPLE A

Multiply: 36.21×2.4

Notice that there are two decimal places in the first factor and one decimal place in the second factor—the sum of the counts is three decimal places.

$$\begin{array}{r} 3621 \\ \times\ \ 24 \\ \hline 14484 \\ +7242 \\ \hline 86\,904 \end{array} \Rightarrow 86.904$$

Multiply the factors, ignoring the decimal points.

3 digits

The product is 86904 without a decimal point. Count three places from right to left in the product and place the decimal point.

MULTIPLYING DECIMAL NUMBERS

EXAMPLE B

Multiply: -3×0.85697

Notice that there are zero decimal places in the first factor and five in the second factor. The sum of the counts is five.

$$\begin{array}{r} 85697 \\ \times \quad -3 \\ \hline -257091 \end{array} \Rightarrow -2.57091$$

Multiply the factors, ignoring the decimal points. Recall that a negative number times a positive number has a negative product.

The product is –257091 without a decimal point. Count five places from the right in the product and place the decimal point.

5 digits

When the product does not have as many digits as the required number of decimal places, add zeros as placeholders to the left of the product.

EXAMPLE C

Multiply: 2.5×0.00008

Notice that there is one decimal place in the first factor and five decimal places in the second factor, for a total of six decimal places.

$$\begin{array}{r} 25 \\ \times \quad 8 \\ \hline 200 \end{array}$$

Multiply the factors, ignoring the decimal points.

The product is 200 without a decimal point.

$$000200 \Rightarrow 0.000200 \Rightarrow 0.0002$$

6 digits

Count six places from the right in the product. Since there are only three places, write three zeros to the left of the digit 2 and place the decimal point. Any zeros to the right of the digit 2 can be dropped.

3 of 7

MULTIPLYING DECIMAL NUMBERS

Multiplying by Powers of Ten

Multiplying a decimal number by a multiple of ten (10, 100, or 1,000 ...) is simple. All you do is move the decimal point to the right as many places as there are zeros in the multiple of ten. Study the examples below.

a. $24.06 \times 10 = 240.6$ There is one zero in 10; move the decimal point in 24.06 one place to the right: 24.06 → 240.6.

b. $24.06 \times 100 = 2,406.$ There are two zeros in 100; move the decimal point in 24.06 two places to the right.

c. $24.06 \times 1,000 = 24,060.$ There are three zeros in 1,000; move the decimal point in 24.06 three places to the right (you have to write in a zero for a placeholder after 6).

d. $-0.4529 \times 100 = -45.29$ There are two zeros in 100; move the decimal point in –0.4529 two places to the right.

e. $-0.4529 \times 1,000 = -452.9$ There are three zeros in 1,000; move the decimal point in –0.4529 three places to the right.

f. $-0.4529 \times 10,000 = -4,529.$ There are four zeros in 10,000; move the decimal point in –0.4529 four places to the right.

MULTIPLYING DECIMAL NUMBERS

However, if you are multiplying by a power of ten that is less than 1, such as 0.1, 0.01, or 0.001, then you need to move the decimal point to the left as many places as there are digits after the decimal point in the power of ten.

a. $24.06 \times 0.1 = 2.406$ There is one digit after the decimal in 0.1; move the decimal in 24.06 one place to the left.

b. $24.06 \times 0.01 = 0.2406$ There are two digits after the decimal point in 0.01; move the decimal point in 24.06 two places to the left.

c. $24.06 \times 0.001 = 0.02406$ There are three digits after the decimal in 0.001; move the decimal in 24.06 three places to the left (you have to write in a zero for a placeholder in front of 2).

d. $-0.4529 \times 0.01 = -0.004529$ There are two digits after the decimal in 0.01; move the decimal in –0.4529 two places to the left, writing in the necessary zero placeholders.

e. $-0.4529 \times 0.001 = -0.0004529$ There are three digits after the decimal in 0.001; move the decimal in –0.4529 three places to the left, writing in the necessary zero placeholders.

f. $-0.4529 \times 0.0001 = -0.00004529$ There are four digits after the decimal in 0.0001; move the decimal four places to the left, writing in the necessary zero placeholders.

MULTIPLYING DECIMAL NUMBERS

Extended Example 1a

Multiply: -7.9×0.008

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MULTIPLYING DECIMAL NUMBERS

Let's put what we've learned in this section and the previous one to use to simplify a more complex problem.

EXAMPLE D

Simplify: $(-263.582) + 0.56897 \times 1,000$

Recall the order of operations: in this case, we perform the multiplication first.

$= (-263.582) + 568.97$ Multiply $0.56897 \times 1,000$: move the decimal point in the first factor as many places to the right as there are zeros in the second factor (three places).

$$\begin{array}{r} {\scriptstyle 8\ 16\ 10} \\ 568.9\not{7}\not{\ }\not{0} \\ -\ 263.582 \\ \hline 305.388 \end{array}$$

263.582 is negative and 568.97 is positive, so find the absolute value of each: $|-263.582| = 263.582$, and $|568.97| = 568.97$. Subtract 263.582 from 568.97—line up the decimals and add a zero placeholder. Since $|568.97| > |-263.582|$ the answer is positive.

Multiply.

0.4×17.6

Multiply.

98.4445×-0.0003

Multiply.

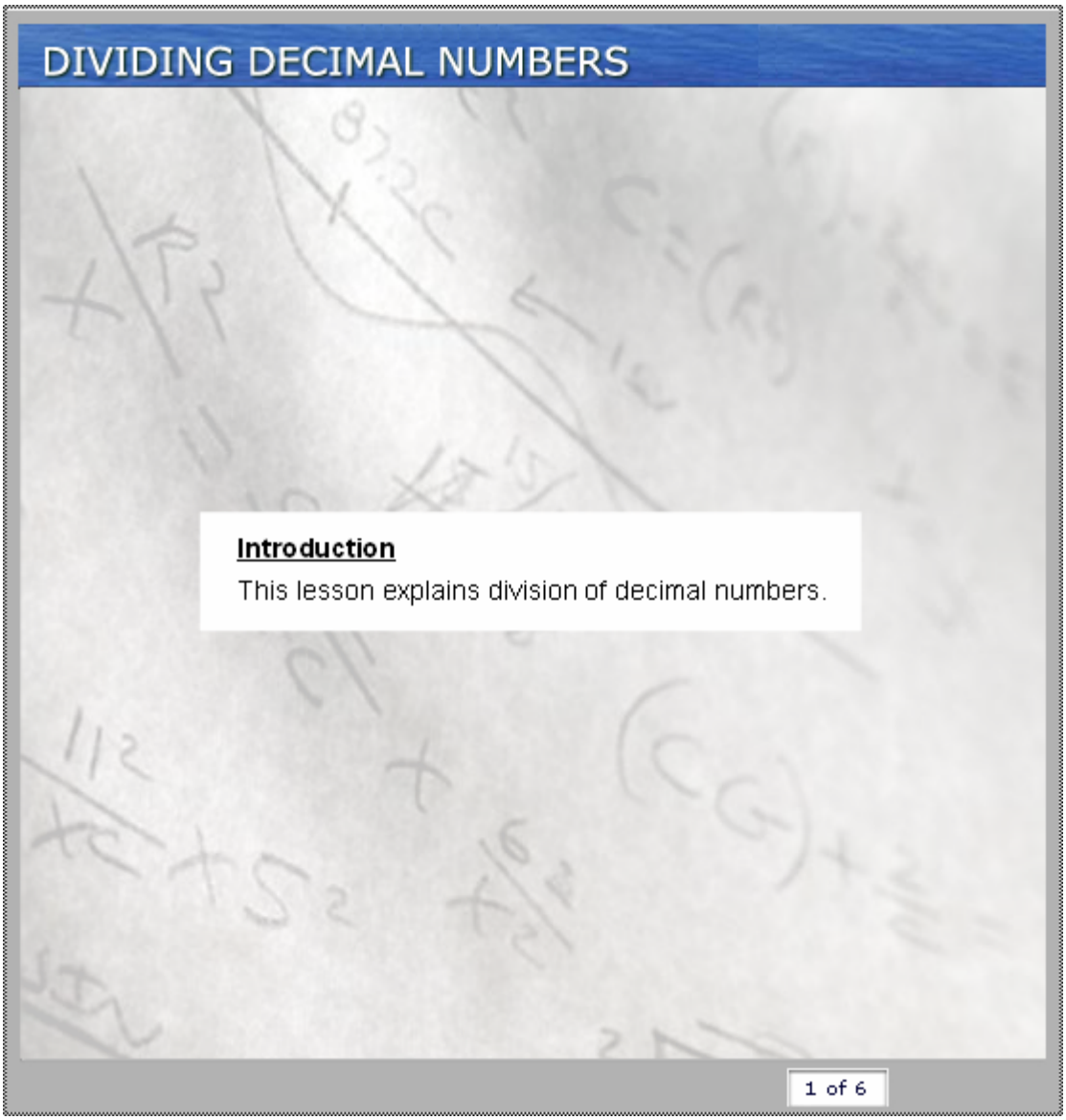
-9×59.9

Multiply.

-63.38×7.343

Multiply.

14.934×0.0078


DIVIDING DECIMAL NUMBERS
Introduction
This lesson explains division of decimal numbers.
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DIVIDING DECIMAL NUMBERS

When you divide decimal numbers, if the divisor is a decimal, move its decimal point to the right as many places as necessary to make it an integer. Then move the decimal point in the dividend the same way. Then you are ready to divide as usual.

EXAMPLE A

Divide: $4.522 \div 0.05$

$0.05\overline{)4.52\,2}$ (2→ 2→)

Move the decimal point in 0.05 two places to the right. This changes the divisor to 5.

Also move the decimal point in 4.522 two places to the right, which changes it to 452.2.

$$\begin{array}{r} 90.44 \\ 5\overline{)452.2} \\ -45\downarrow \\ \hline 22 \\ -20 \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$

Because 5 goes into 45 nine times, write 9 in the quotient. The next digit in the dividend, 2, is smaller than 5, so put 0 in the quotient after 9. Bring the decimal point straight up to the quotient.

Then bring down 22 and continue dividing by 5. Because 5 goes into 22 four times, put a 4 in the quotient after the decimal point.

$22 - 20 = 2$. Since there are no digits following 2 in the dividend, write in a zero as a place holder. Then divide 20 by 5, and write 4 in the quotient. There is no remainder.

DIVIDING DECIMAL NUMBERS

When dividing signed decimal numbers, use the rules for dividing integers.

EXAMPLE B

Divide: $20.06 \div -3.4$

$-3.4\overline{)20.06}$ (1 → 1 → 1)

Move decimal point in –3.4 one place to the right. This changes the divisor to –34. Also move the decimal point in 20.06 one place to the right, which changes it to 200.6.

$$-34\overline{)200.6}\quad -5.9$$

By the rules of dividing with integers, a positive divided by a negative is a negative—make the quotient negative.

$$\begin{array}{r} -170 \\ \hline 306 \\ -306 \\ \hline 0 \end{array}$$

Because 34 goes into 200 five times, write 5 in the quotient. The remainder is 30. Since 34 does not go into 30, bring down the 6 from the dividend. Bring the decimal point straight up to the quotient. 34 goes into 306 nine times. Write a 9 in the quotient.

If the dividend does not have as many digits as places moved by the divisor use zeros as placeholders—see Example C below.

EXAMPLE C

Divide: $2.4 \div 0.003$

$0.003\overline{)2.400}$ (3 → 3 →)

Move decimal in 0.003 three places to the right. This changes the divisor to 3. The dividend has only one decimal place, so write two zeros after 4 to make three places. The dividend is now 2400.

$$3\overline{)2400}\quad 800$$

$$\begin{array}{r} -24\downarrow \\ \hline 00 \end{array}$$

Because 3 goes into 24 eight times, write 8 in the quotient. There is no remainder and only zeros to carry down. Write the two zeros in the quotient and bring the decimal point straight up to the quotient.

DIVIDING DECIMAL NUMBERS

Dividing by Powers of Ten

To divide by multiples of 10 (such as 10, 100, or 1,000) move the decimal point of the dividend to the left as many places as there are zeros in the divisor. See the examples below.

a. $24.06 \div 10 = 2.406$ There is one zero in 10; move the decimal point one place to the left.

b. $24.06 \div 100 = 0.2406$ There are two zeros in 100; move the decimal point two places to the left.

c. $24.06 \div 1{,}000 = 0.02406$ There are three zeros in 1,000; move the decimal point three places to the left, writing a zero as a placeholder.

d. $-0.4529 \div 100 = -0.004529$ There are two zeros in 100; move the decimal point in –0.4529 two places to the left, writing in the zero placeholders.

e. $-0.4529 \div 1{,}000 = -0.0004529$ There are three zeros in 1,000; move the decimal point in –0.4529 three places to the left, writing in the zero placeholders.

f. $-0.4529 \div 10{,}000 = -0.00004529$ There are four zeros in 10,000; move the decimal point in –0.4529 four places to the left, writing in the zero placeholders.

DIVIDING DECIMAL NUMBERS

However, if you are dividing by a power of ten that is less than 1 (such as 0.1, 0.01, or 0.001), then you need to move the decimal point to the right as many places as there are digits after the decimal point in the divisor.

a. $24.06 \div 0.1 = 240.6$ There is one digit after the decimal point in 0.1; move the decimal point in the dividend one place to the right.

b. $24.06 \div 0.01 = 2,406.$ There are two digits after the decimal point in 0.01; move the decimal point in the dividend two places to the right.

c. $24.06 \div 0.001 = 24,060.$ There are three digits after the decimal point in 0.001; move the decimal point in the dividend three places to the right.

d. $-0.4529 \div 0.01 = -45.29$ There are two digits after the decimal in 0.01; move the decimal point in –0.4529 two places to the right.

e. $-0.4529 \div 0.001 = -452.9$ There are three digits after the decimal in 0.001; move the decimal point in –0.4529 three places to the right.

f. $-0.4529 \div 0.0001 = -4,529.$ There are four digits after the decimal in 0.0001; move the decimal point in –0.4529 four places to the right.

DIVIDING DECIMAL NUMBERS

Extended Example 1a

Divide: $-3.623 \div 0.005$

END OF LESSON

6 of 6

Divide.

$-26.892 \div 0.249$

Divide.

$-6.045 \div -12.5$

Divide.

$-53.7948 \div -4.981$

Divide.

$0.024794 \div -0.12397$

Divide.

$-209.6901 \div 20.99$

FRACTIONS AND DECIMALS

Introduction

Fractions and decimals are closely related, as we'll see in this lesson. Any fraction can be written as either a **terminating decimal** or a **repeating decimal**. However, not all decimals can be written as fractions, as in the case of **irrational numbers**.

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FRACTIONS AND DECIMALS

Changing Fractions to Decimals

To change a fraction to a decimal, treat the fraction bar as a division symbol and divide the numerator by the denominator.

EXAMPLE A

Change $\frac{4}{5}$ to a decimal.

$$5\overline{)4} \Rightarrow 5\overline{)4.0} \Rightarrow 5\overline{)40}$$

$$\begin{array}{r} 0.8 \\ -40 \\ \hline 0 \end{array}$$

Write the fraction as the division problem $4 \div 5$.

Because 5 is larger than 4, express 4 as 4.0. Bring the decimal point straight up to the quotient.

Then continue dividing.

The division ends at 0.8, a terminating decimal.

FRACTIONS AND DECIMALS

When it is necessary to round to a specific decimal place, always perform the division out to one more place than the place value which you are rounding to. Recall that this extra place holds the number that helps us to decide to round up or down.

EXAMPLE B

Change $\frac{22}{7}$ to a decimal. Round your answer to two decimal places.

$$7\overline{)22} \Rightarrow 7\overline{)22.000}$$

$$\begin{array}{r} 3.142 \\ -21 \\ \hline 10 \\ -7 \\ \hline 30 \\ -28 \\ \hline 20 \\ -14 \\ \hline 6 \end{array}$$

You have to divide 22 by 7.

To round the answer to two decimal places, you need three digits after the decimal point.

Because the digit to the right of 4 is 2 and $2 < 5$, leave 4 unchanged. The rounded answer is 3.14.

FRACTIONS AND DECIMALS

A negative fraction converts to a negative decimal. When changing negative fractions into decimals, automatically put the negative sign in the quotient and divide as usual.

EXAMPLE C

Change $-\frac{3}{8}$ to a decimal.

$8\overline{)-3} \Rightarrow 8\overline{)\,3.0}$ $\quad -0.$

The fraction is negative. So is the decimal.

$\Rightarrow 8\overline{)\,3.000}$ $\quad -0.375$

You have to divide 3 by 8. Because 3 < 8, express 3 as 3.0 and bring the decimal point straight up in the quotient.

-24

60

–0.375 is a terminating decimal.

-56

40

So: $-\frac{3}{8} = -0.375$.

-40

0

FRACTIONS AND DECIMALS

Recall that in Section 1 of this chapter, you learned to write repeating decimals with a bar over the digits that repeat. Recall: 0.457457457… can be written as $0.\overline{457}$

EXAMPLE D

Change $\frac{2}{3}$ to a decimal.

$$3\overline{)2} \Rightarrow 3\overline{)2.0} \Rightarrow 3\overline{)2.000}$$

$$\begin{array}{r} 0.666 \\ -18 \\ \hline 20 \\ -18 \\ \hline 20 \\ -18 \\ \hline 2 \end{array}$$

You have to divide 2 by 3. Because 2 < 3, express 2 as 2.0 and bring the decimal point straight up in the quotient.

As you can see, 6 will continue to repeat. Once a repeating pattern is clear, stop the division and write the quotient using a bar over the repeating digits.

So: $\frac{2}{3} = 0.\overline{6}$.

FRACTIONS AND DECIMALS

Mixed numbers can be changed into decimal numbers in two ways. One method is to first change the mixed number into an improper fraction, and then divide.

EXAMPLE E

Change $3\frac{5}{8}$ to a decimal.

$8\overline{)29} \Rightarrow 8\overline{)29.000}$ (quotient: 3.625)

First write $3\frac{5}{8}$ as the improper fraction $\frac{29}{8}$.

-24

Now you have to divide 29 by 8.

50

-48

Eight goes into 29 three times with a remainder of 5. Write 3 in the quotient. Since there are no remaining digits in the dividend write 29 as 29.0 and bring the decimal straight up in the quotient. Now you can bring down a zero to continue dividing.

20

-16

40

Bring down more zeros as needed.

-40

0

So: $3\frac{5}{8} = 3.625$.

FRACTIONS AND DECIMALS

The second method of converting a mixed number to a decimal involves keeping the whole number part (because we know that this is the number to the left of the decimal point) and dividing the fractional part.

EXAMPLE F

Change $3\frac{5}{8}$ to a decimal.

$$8\overline{)5} \Rightarrow 8\overline{)5.0} \Rightarrow 8\overline{)5.000}$$

$$\begin{array}{r} 0.625 \\ 8\overline{)5.000} \\ -48 \\ \hline 20 \\ -16 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

Hold on to the whole number 3 and divide 5 by 8.

Because 5 < 8, rewrite 5 as 5.0 and bring the decimal point straight up into the quotient.

The quotient, 0.625, is now the decimal portion of the answer.

Write the 3 from the original mixed number in front of the decimal to get 3.625.

Again we see that: $3\frac{5}{8} = 3.625$.

FRACTIONS AND DECIMALS

Extended Example 1a

Write $\frac{10}{13}$ as a decimal rounded to the nearest thousandth.

END OF LESSON

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Change the fraction or mixed number to a decimal. Round answers to the nearest thousandths place or write repeating decimals with a bar over the decimal.

$$-\frac{7}{16} =$$

Change the fraction or mixed number to a decimal. Round answers to the nearest thousandths place or write repeating decimals with a bar over the decimal.

$$\frac{103}{24} =$$

Change the fraction or mixed number to a decimal. Round answers to the nearest thousandths place or write repeating decimals with a bar over the decimal.

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

Change the fraction or mixed number to a decimal. Round answers to the nearest thousandths place or write repeating decimals with a bar over the decimal.

$$22\frac{9}{16} =$$

Change the fraction or mixed number to a decimal. Round answers to the nearest thousandths place or write repeating decimals with a bar over the decimal.

$$17\frac{7}{15} =$$

SOLVING EQUATIONS WITH DECIMAL NUMBERS

Introduction

Equations with decimals are solved in a way similar to equations with integers or fractions. When solving equations with decimals, follow the guidelines below.

	Steps for Solving an Equation with Decimal Numbers
Step 1	If fractions are present, multiply each term of the equation by the LCD of the fractions.
Step 2	If parentheses are present, use the distributive property.
Step 3	Combine any like terms on each side of the equation.
Step 4	Rewrite the equation so that variable terms are on one side of the equation and constant terms are on the other side.
Step 5	Divide both sides by the numerical coefficient of the variable to solve, if necessary.
Step 6	Check the answer in the original equation.

SOLVING EQUATIONS WITH DECIMAL NUMBERS

EXAMPLE A

Solve: $x - 1.5 = 8$

$x - 1.5 = 8$

$+1.5 \quad +1.5$

$x \quad = 9.5$

To get x alone on one side of the equation, add 1.5 to both sides.

EXAMPLE B

Solve: $-2y = 6.7$

$-2y = 6.7$

$\frac{-2y}{-2} = \frac{6.7}{-2}$ Divide both sides by the coefficient of y, which is -2.

$y = -3.35$ Remember that dividing a positive number by a negative number results in a negative number.

EXAMPLE C

Solve: $-3y + 1.34 = 6.7 - y$

$-3y + 1.34 = 6.7 - y$ Bring the variable terms to one side and the non-variable terms to the opposite side.

$-3y + y = 6.7 - 1.34$

$\frac{-2y}{-2} = \frac{5.36}{-2}$ Combine the like terms.

$y = -2.68$ Isolate the variable by dividing both sides of the equation by -2.

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SOLVING EQUATIONS WITH DECIMAL NUMBERS

EXAMPLE D

Solve: $5(x-0.36)=-x+2.4$

$5(x-0.36)=-x+2.4$

$5(x-0.36)=-x+2.4$ Multiply by 5 using the distributive property.

$5x-1.8=-x+2.4$

$+x \qquad +x$ Add x to both sides to remove $-x$ from the right side.

$6x-1.8=2.4$ Simplify the result.

$+1.8 \quad +1.8$ Add 1.8 to both sides to remove −1.8 from the left side.

$6x \qquad =4.2$ Simplify each side.

$\frac{6x}{6}=\frac{4.2}{6}$ Divide both sides by the coefficient of x, which is 6.

$x=0.7$ Simplify 4.2 divided by 6 to find the final answer.

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SOLVING EQUATIONS WITH DECIMAL NUMBERS

EXAMPLE E

Solve: $\frac{2}{3}x+\frac{3}{4}=0.5x+4.5$

$$\frac{2}{3}x+\frac{3}{4}=0.5x+4.5$$

Find the LCD of the fractions: 12.

$$\frac{12}{1}\cdot\frac{2}{3}x+\frac{12}{1}\cdot\frac{3}{4}=12\cdot 0.5x+12\cdot 4.5$$

Multiply both sides of the equation by 12.

$$\frac{\cancel{12}^{4}}{1}\cdot\frac{2}{\cancel{3}}x+\frac{\cancel{12}^{3}}{1}\cdot\frac{3}{\cancel{4}}=6x+54$$

Simplify the fractions.

$$8x+9=6x+54$$

$$\underline{-6x \quad -6x}$$

Subtract $6x$ from both sides to bring the variable terms to one side.

$$2x+9=54$$

$$\underline{-9 \quad -9}$$

Subtract 9 from both sides to bring the non-variable terms to the other side.

$$\frac{\cancel{2}x}{\cancel{2}}=\frac{45}{2}$$

Divide both sides by the coefficient of x, which is 2.

$$x=\frac{45}{2}=22.5$$

Simplify 45 divided by 2 to find the final answer.

SOLVING EQUATIONS WITH DECIMAL NUMBERS

Extended Example 1a

Solve, and round your answer to two decimal places: $5x + 0.98 = 6.8 - 4x$

END OF LESSON

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Solve. Round each answer to the hundredths place, if necessary.

$2y - 4.2 = -8.6$

Solve. Round each answer to the hundredths place, if necessary.

$6x + 8.65 - 3x = 10$

Solve. Round each answer to the hundredths place, if necessary.

$7x - 9.64 = 5x + 2.32$

Solve. Round each answer to the hundredths place, if necessary.

$$5(0.212x - 1.1) = 3(4x + 7.02)$$

Solve. Round each answer to the hundredths place, if necessary.

$$9.7(1 - y) - 2.4(0.2y + 3) = 1.9(y + 1)$$