

Decimals Through Ten-Thousandths

(pages 95–98)



Decimals are another way to write fractions when the denominators are 10, 100, 1,000, and so on. You use **place-value** positions to name decimals.

Writing a Decimal	To write $\frac{14}{100}$ as a decimal, write 14 in a place-value chart (one digit in each place) so that it ends in the hundredths place. The decimal is 0.14.
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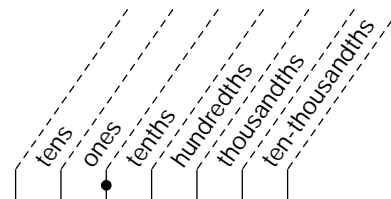
EXAMPLES

A Use the place-value chart at the right to help you write

$$\frac{23}{1,000} \text{ as a decimal.}$$

Write the digits 2 and 3 so that the 3 is in the thousandths place.

Fill in zeroes to the left through the ones place: $\frac{23}{1,000}$ is 0.023



B Write 0.0012 in words.

The 2 is in the ten-thousandths place. 0.0012 is twelve ten-thousandths.

Try These Together

1. Write thirty and 3 hundredths as a decimal.

HINT: The word "and" tells you the location of the decimal point.

2. Write $52\frac{4}{1,000}$ as a decimal.

HINT: Write the whole number part (52) starting in the tens place. Use zeros to fill in the tenths and hundredths places.

PRACTICE

Write each fraction or mixed number as a decimal.

- | | | | |
|----------------------|----------------------|----------------------|----------------------|
| 3. $\frac{5}{10}$ | 4. $\frac{8}{100}$ | 5. $\frac{6}{10}$ | 6. $\frac{7}{1,000}$ |
| 7. $1\frac{2}{10}$ | 8. $5\frac{2}{100}$ | 9. $\frac{3}{1,000}$ | 10. $2\frac{3}{10}$ |
| 11. $\frac{32}{100}$ | 12. $17\frac{1}{10}$ | 13. $6\frac{5}{100}$ | 14. $\frac{65}{100}$ |

Write each expression as a decimal.

15. five hundredths 16. eighty-five thousandths 17. two tenths
18. **Saving Money** Alex saves \$1.25 of his allowance every week. Write \$1.25 in words.
19. **Health** A human's normal body temperature is ninety-eight and six tenths degrees. Write ninety-eight and six tenths as a decimal.



20. **Standardized Test Practice** Which decimal represents eight and nine hundredths?

A 0.89

B 8.9

C 8.09

D 89.9

Answers: 1. 30.03 2. 52.004 3. 0.5 4. 0.08 5. 0.6 6. 0.007 7. 1.2 8. 5.02 9. 0.003 10. 2.3 11. 0.32 12. 17.1 13. 6.05 14. 0.65 15. 0.05 16. 0.085 17. 0.2 18. one and twenty-five hundredths 19. 98.6 20. C

Length in the Metric System

(pages 102–104)



The basic unit of length in the **metric system** is the **meter**. A centimeter is one-hundredth of a meter. A millimeter is one-thousandth of a meter. A kilometer is a thousand meters.

Choosing a Unit of Length	<p>A millimeter is about the width of the lead in a pencil.</p> <p>A centimeter is about the width of a little fingernail.</p> <p>A meter is about the length of the handle of a broom.</p> <p>A kilometer is about the length of TEN football fields.</p>
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EXAMPLES

A How many meters are in 5 kilometers?

One kilometer is 1,000 meters. Two kilometers is $2 \times 1,000$ or 2,000 meters. There are 5,000 meters in 5 kilometers.

B Use a centimeter ruler to measure the width of a piece of notebook paper.

The width is about 21.5 centimeters.

Try These Together

1. What unit of length in the metric system would you use to measure the distance across your city or town?

HINT: What unit is large enough to use for long distances?

2. What metric unit of length would you use to measure the thickness of a piece of cardboard?

HINT: Choose a unit that is very small.

PRACTICE

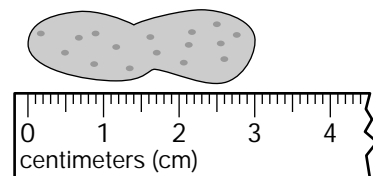
Write the unit of length: millimeter, centimeter, meter, or kilometer, that you would use to measure each of the following.

- the height of a refrigerator
- the length of a banana
- the thickness of a quarter
- the distance from New York to Los Angeles
- the length of a car
- the height of a two-story house
- How many centimeters are in 2 meters?
- How many meters are in 8 kilometers?
- School** For a science experiment, students need a piece of string about as long as their science textbook. What metric unit should they use to measure the string?



12. Standardized Test Practice How long is the peanut in centimeters?

- A** 2 centimeters **B** 3 centimeters
C 4 centimeters **D** 5 centimeters



Answers: 1. kilometer 2. millimeter 3. meter 4. centimeter 5. millimeter 6. kilometer 7. meter 8. meter 9. 200 10. 8,000 11. centimeter 12. B

Comparing and Ordering Decimals

(pages 105–108)



You can compare decimals by comparing the digits in each place-value position or by placing the decimals on a number line. Recall that $<$ means *less than* and $>$ means *greater than*.

Comparing Decimals	Line up the decimal points of the two numbers you want to compare. Then starting at the left, compare the digits in the same place-value position. When you come to a place where the digits are not equal, the decimal with the greater digit is the greater decimal number. On a number line, numbers to the right are greater than numbers to the left.
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EXAMPLES

A Which number is greater, 1.09 or 1.9?

1.09
1.9

The digits are the same in the ones place but the second number has a greater digit in the tenths place, so 1.9 is the greater number.

$$1.9 > 1.09$$

B Order these numbers from least to greatest: 21.98, 24.03, 2.4, 2.198.

21.98
24.03
2.4
2.198

$$2.198, 2.4, 21.98, 24.03$$

Try These Together

1. Which of these numbers is to the left of 4.5 on a number line: 40.5 or 4.05?

HINT: Which number is less than 4.5?

2. Order these numbers from greatest to least: 0.01, 0.002, 0.02.

HINT: You can also look at hundredths as money. Which is greater, 2 cents or 1 cent?

PRACTICE

State the greater number in each pair.

3. 0.41 or 0.45

4. 1.8 or 1.6

5. 8.25 or 8.31

6. 46.85 or 46.96

7. 0.06 or 0.61

8. 0.78 or 0.45

9. 1.363 or 1.367

10. 458.6 or 458.4

11. 1.03 or 1.01

Order each set of decimals from least to greatest.

12. 1.81

13. 12.56

14. 456.9

1.75

12.58

455.8

1.78

12.36

455.4

1.83

12.41

456.3

15. Which is the greatest, 5.06, 5.60, or 5.006?



16. **Standardized Test Practice** Which of these numbers is the smallest: 4.015, 4.014, 4.018, or 4.011?

A 4.011

B 4.014

C 4.018

D 4.015

Answers: 1. 4.05 2. 0.02, 0.01, 0.002 3. 0.45 4. 1.8 5. 8.31 6. 46.96 7. 0.61 8. 0.78 9. 1.367 10. 458.6 11. 1.03 12. 1.75, 1.78, 1.81, 1.83 13. 12.36, 12.41, 12.56, 12.58 14. 455.4, 455.8, 456.3, 456.9 15. 5.60 16. A

Rounding Decimals (pages 109–111)



You can round decimals to any place-value position.

Rounding Decimals	<ul style="list-style-type: none"> • Underline the place you want to round to. • Look at the digit to the right of the underlined place. • Leave the underlined digit the same if the digit to the right is 0, 1, 2, 3, or 4. • Round up by adding 1 to the underlined digit if the digit to the right is 5, 6, 7, 8, or 9. • Then drop all the digits to the right of the underlined digit.
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EXAMPLES

A Round 25.0743 to the nearest tenth.

Underline the digit in the tenths place (0). Look at the digit to the right (7). Since 7 is greater than 5, add one to the 0. Then drop all the digits to the right. 25.1

B Round 324.67 to the nearest ten.

Underline the digit in the tens place (2). Because the next digit to the right is less than 5, leave the 2 the same. Replace the 4 with a 0 to keep the digits to the left of the decimal in the proper places. Drop the digits to the right of the decimal. 320

Try These Together

1. Round \$6.50 to the nearest dollar.

HINT: Remember that with a 5 you round up.

2. Is 0.345 closer to 0.3 or 0.4?

HINT: Use zeros to write each number with the same number of decimal places.

PRACTICE

Round each number to the underlined place-value position.

- | | | |
|---------------------|---------------------|---------------------|
| 3. 1. <u>2</u> 1 | 4. 8. <u>6</u> 3 | 5. 13. <u>5</u> 8 |
| 6. 4. <u>3</u> 7 | 7. 9. <u>6</u> 4 | 8. 27. <u>5</u> 3 |
| 9. 38. <u>6</u> 22 | 10. 23. <u>2</u> 59 | 11. 99. <u>3</u> 48 |
| 12. 95. <u>5</u> 24 | 13. 24. <u>8</u> 56 | 14. 87. <u>6</u> 35 |

15. Round 67.687 to the nearest tenth.

16. Round \$12.35 to the nearest dollar.

17. **Entertainment** It costs \$3.99 to rent a movie from the video store. If you rented a movie, how much would you probably say it cost? (Round \$3.99 to the nearest dollar.)

18. **Standardized Test Practice** People in the United States are living longer than ever before. The average life span is 76.1 years. What is this number rounded to the nearest year?

A 77

B 76.2

C 76.1

D 76

Answers: 1. \$7 2. 0.3 3. 1.2 4. 8.6 5. 13.6 6. 4.4 7. 9.6 8. 27.5 9. 38.62 10. 23.26 11. 99.35 12. 95.52 13. 24.9 14. 87.64 15. 67.7 16. \$12.00 17. \$4 18. D

Estimating Sums and Differences (pages 112–115)



One way to estimate sums is to round the amounts to the same place-value position and then add. **Clustering** is another way to estimate.

Estimating by Rounding	<ul style="list-style-type: none"> • Round each number to the same place-value position, often ones. • Add or subtract the rounded numbers.
Estimating by Clustering	<p>Use clustering when all the numbers are close to the same number.</p> <ul style="list-style-type: none"> • Round each number to the same number—the number they cluster around. • Add or subtract the rounded numbers.

EXAMPLES

A Estimate using rounding.

$$\$45.27 - \$4.87$$

Round each amount to the nearest dollar.

$$\$45 - \$5 = \$40$$

B Estimate using clustering.

$$10.76 + 11.1 + 10.98 + 11 + 10.7$$

All the numbers cluster around 11, so add

$$11 + 11 + 11 + 11 + 11 = 55.$$

Try These Together

1. About how much more is \$25.10 than \$14.98?

HINT: Round each amount to the nearest dollar and subtract.

2. About how much lower is a temperature of 59.5 degrees than one of 91.3 degrees?

HINT: Round before you subtract.

PRACTICE

Estimate using rounding.

3. $1.2 + 1.8$

4. $0.76 + 0.14$

5. $5.3 + 4.8$

6. $18.2 + 2.4$

7. $25.6 + 3.8$

8. $\$1.86 + \1.25

9. $20.3 - 18.1$

10. $7.6 - 4.3$

11. $15.8 - 12.3$

Estimate using clustering.

12. $\$6.12 + \5.87

13. $28.9 + 29.1$

14. $0.86 + 0.9 + 0.93$

15. $4.56 + 4.59 + 4.61$

16. $2.9 + 3.2 + 3.1$

17. $0.3 + 0.32 + 0.29$

18. Estimate the sum $\$5.67 + \4.69 .

19. About how much more is 68.1 than 57.7?

20. **Money Matters** Keesha is going out for pizza with her friends. She knows pizza will cost \$5.65 and a drink will cost \$1.55. Estimate how much money she should bring with her.



21. **Standardized Test Practice** To make a dessert, Thomas needs 1.2 pounds of chocolate chips and 0.8 pounds of peanut butter chips. Estimate how many pounds of chocolate and peanut butter chips he needs all together.

A 1

B 2

C 3

D 4

Answers: 1. about \$10 2. about 30 degrees 3. 3 4. 0.9 or 1 5. 10 6. 20 7. 30 8. \$3.00 9. 2 10. 4 11. 4 12. \$12.00 13. 58 14. 2.7 15. 13.8 16. 9 17. 0.9 18. \$11.00 19. 10 20. \$8.00 21. B
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Adding and Subtracting Decimals

(pages 118–121)



You add and subtract decimals the same way you do whole numbers, after you line up the decimal points.

Adding and Subtracting Decimals

- Write the numbers you want to add or subtract so that the decimal points are in a line. Add zeros if they are needed.
- Estimate the sum or difference so you can check to see if your final answer is reasonable.
- Add or subtract. Compare the result with your estimate.

EXAMPLES

A Find the sum of 2.45 and 30.7.

Line up the decimal points and add a zero.

$$\begin{array}{r} 2.45 \\ + 30.70 \\ \hline 33.15 \end{array}$$

*Estimate first.
This is about $31 + 2$ or 33 .
This is reasonably close to the estimate of 33 .*

B How much is 60 minus 27.8?

Line up the decimal points and add a zero.

$$\begin{array}{r} 60.0 \\ - 27.8 \\ \hline 32.2 \end{array}$$

*Estimate first.
This is about $60 - 30$ or 30 .
This is reasonably close to the estimate of 30 .*

Try These Together

1. Solve $x = 3 - 2.09$.

HINT: Remember that 3 is the same as 3.00

2. Solve $4.56 + 23 = y$.

HINT: Rewrite 23 with a decimal point and two zeros as you line up the numbers to add.

PRACTICE

Add or subtract.

3. $5.6 + 4.2$

4. $1.25 + 1.34$

5. $12.61 + 3.27$

6. $25.69 - 24.54$

7. $2.7 - 1.1$

8. $13.32 - 9.12$

9. $\$10.26 - \8.28

10. $5.68 + 3.45$

11. $9 + 3.43$

Solve each equation.

12. $4.05 + 2.68 = g$

13. $m = 16.51 - 13.25$

14. $b = 0.06 + 0.15$

15. What is the value of $c + d$ if $c = 22.4$ and $d = 36.2$?

16. Evaluate $q - r$ if $q = 3.5$ and $r = 2.1$.

17. **Surveys** Manuel surveyed two of his friends to find out the average number of sodas they drink in one week. Carl drinks 4.5 sodas and Jon drinks 6.75 sodas. How many sodas do Carl and Jon drink together in one week?

18. **Standardized Test Practice** Janette is 1.55 meters tall and Kirsten is 1.47 meters tall. How much taller is Janette than Kirsten?

A 0.08 m

B 0.06 m

C 0.07 m

D 0.09 m

Answers: 1. 0.91 2. 27.56 3. 9.8 4. 2.59 5. 15.88 6. 1.15 7. 1.6 8. 4.2 9. \$1.98 10. 9.13 11. 12.43 12. 6.73 13. 3.26 14. 0.21 15. 58.6 16. 1.4 17. 11.25 18. A

Chapter 3 Review



Decimal Derby

This year's mule derby had 8 mules running a quarter-mile race. The finishing times are given below.

Mule	1	2	3	4	5	6	7	8
Time (sec.)	52.206	58.671	51.992	52.187	52.037	52.945	55.473	53.628

- Place the mules in the order in which they finished the race.
- What was the time difference between the first and second place mules?
- What was the time difference between the second and third place mules?
- How many seconds were there between the time the first place mule finished, and the time the last place mule finished?
- What were the finishing times of the first three mules, rounded to the nearest tenth?
- The mules' names are in the table below. Use the mules' names and the order in which they finished the race to complete the sentences below.

Mule	1	2	3	4	5	6	7	8
Name	If You Just Try	You and Me	Working	Fun and Easy	Decimals	Little	Easy Math	Hard Work

_____ with _____ is _____
 _____ a _____. _____ makes
 _____ for _____.

Answers are located on p. 108.