

3-1

Representing Decimals (pages 102–105)

Decimals are numbers that are expressed using a decimal point. The decimal point separates the whole number part of the decimal from the part that is less than one. You use **place-value** positions to name decimals.

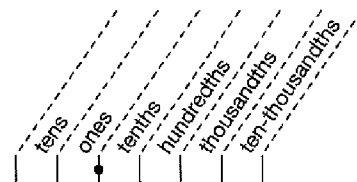
Decimals can be written in standard form and expanded form. **Standard form** is the usual way to write a number. **Expanded form** is a sum of the products of each digit and its place value.

word form	eighteen hundredths
standard form	0.18
expanded form	$(1 \times 0.1) + (8 \times 0.01)$

EXAMPLES

- A** Use the place-value chart at the right to help you write twenty-three thousandths 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; twenty-three thousandths is written as 0.023.



- B** Write 0.0012 in word form.

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

Try These Together

- Write thirty and three hundredths as a decimal.
HINT: The word "and" tells you the location of the decimal point.
- Write 52 and 4 thousandths 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 decimal in word form.

- 0.5
- 0.08
- 0.007
- 1.2
- 5.02
- 2.3
- 17.1
- 0.65

Write each decimal in standard form and in expanded form.

- five hundredths
- eighty-five thousandths
- two tenths
- Health** A human's normal body temperature is ninety-eight and six tenths degrees. Write ninety-eight and six tenths as a decimal.



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

- A** 0.89 **B** 8.9 **C** 8.09 **D** 89.9

3-2**Comparing and Ordering Decimals** (pages 108–110)

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.

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 21.98, 24.03, 2.4, and 2.198 from least to greatest.

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 0.01, 0.002, and 0.02 from greatest to least.

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

PRACTICE

Use $>$, $<$, or $=$ to compare each pair of decimals.

3. $0.41 \bigcirc 0.45$

4. $1.8 \bigcirc 1.80$

5. $8.25 \bigcirc 8.31$

6. $46.85 \bigcirc 46.96$

7. $0.06 \bigcirc 0.61$

8. $0.78 \bigcirc 0.45$

9. $1.363 \bigcirc 1.367$

10. $458.6 \bigcirc 458.4$

11. $1.03 \bigcirc 1.01$

Order each set of decimals from least to greatest.

12. 12.56, 12.58, 12.36, 12.41

13. 456.9, 455.8, 455.4, 456.3

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

15. **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

3-3**Rounding Decimals** (pages 111–113)

You can round decimals to any place-value position.

Rounding Decimals

- Underline the digit to be rounded.
- Look at the digit to the right of the place being rounded.
- 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.

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 decimal to the indicated place-value position.

- | | | |
|------------------------|--------------------------|--------------------------|
| 3. 1.21; tenths | 4. 8.63; ones | 5. 38.622; hundredths |
| 6. 4.37; tenths | 7. 24.8568; thousandths | 8. 27.53; ones |
| 9. 13.58; tenths | 10. 23.2594; thousandths | 11. 99.3482; thousandths |
| 12. 95.524; hundredths | 13. 9.64; tenths | 14. 87.635; hundredths |
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.)

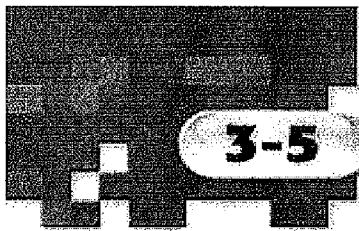
18. **Standardized Test Practice** People in the United States are living longer than ever before. The average life span is 76.1 years. What is this number rounded to the nearest year?

A 77

B 76.2

C 76.1

D 76

**3-5****Adding and Subtracting Decimals**

(pages 121–124)

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**
- Subtract 27.8 from 60.

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. Subtract
- $3 - 2.09$
- .

HINT: Remember that 3 is the same as 3.00

2. Add
- $4.56 + 23$
- .

*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. $9 + 3.43$

12. $4.05 + 2.68$

13. $16.51 - 13.25$

14. $0.06 + 0.15$

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

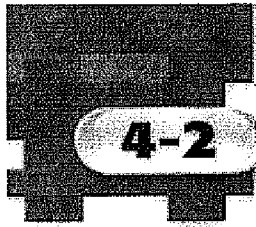
16. Evaluate
- $q - r$
- if
- $q = 3.5$
- and
- $r = 2.1$
- .

- 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

**4-2****Multiplying Decimals** (pages 141–143)

When you multiply two decimals, multiply as with whole numbers. To place the decimal point, find the sum of the number of decimal places in each factor. The product has the same number of decimal places.

EXAMPLES

Find the value of each expression.

A Find 2.9×4.1 .

3×4 Round the decimals. Estimate the product; 12.

2.9 one decimal place
 $\times 4.1$ one decimal place

 29

11.6

 11.89 two decimal places

The product is 11.89. Compared to the estimate, the product is reasonable.

B Find 3.2×5.7 .

3×6 Round the decimals. Estimate the product; 18.

3.2 one decimal place
 $\times 5.7$ one decimal place

 224

18.24 two decimal places

The product is 18.24. Compared to the estimate, the product is reasonable.

Try These Together

Multiply.

1. 7.6
 $\times 2.3$

HINT: Estimate the product. Then multiply as with whole numbers.

2. 0.52
 $\times 2.6$

HINT: Count the decimal places in the factors.

PRACTICE

Multiply.

3. 0.52×1.7

4. 6.6×0.054

5. 2.73×5.86

6. 1.5×6.4

7. 0.9×0.036

8. 3.25×7.3

9. 0.85×0.04

10. 4.6×8.2

11. 12.6×2.7

12. Find $2.5a + b$ if $a = 4.65$ and $b = 5.8$



13. **Standardized Test Practice** Multiply 1.6×0.023 .

A 0.0368

B 0.368

C 3.68

D 36.8

4-4

Dividing by Decimals (pages 152-155)

When you divide decimals by decimals, you must change the divisor to a whole number. To do this, multiply both the divisor and dividend by the same power of 10. Then divide as with whole numbers.

EXAMPLES

Find each quotient.

A $4.4 \div 2.5$

First estimate: $4 \div 2 = 2$

$$\begin{array}{r} 1.76 \\ 2.5 \overline{)44.4} \\ \underline{-25} \\ 190 \\ \underline{-175} \\ 150 \\ \underline{-150} \\ 0 \end{array}$$

Multiply the dividend and divisor by 10. Place the decimal point. Divide as with whole numbers.

B Find $33.08 \div 16.2$ to the nearest hundredth.

$$\begin{array}{r} 2.041 \\ 16.2 \overline{)33.08} \\ \underline{324} \\ 68 \\ \underline{-0} \\ 680 \\ \underline{-648} \\ 320 \\ \underline{-162} \\ 158 \end{array}$$

Divide to the thousandths place to round to the nearest hundredth. Since 68 is less than the divisor, write a zero in the quotient. To the nearest hundredth, the quotient is 2.04.

Try These Together

Divide.

1. $5.4 \div 1.2$

HINT: Multiply the dividend and divisor by the same power of 10.

2. $16.646 \div 4.1$

HINT: Do not forget to fill in spaces in the quotient with zeros.

PRACTICE

Divide.

3. $3.9 \overline{)849.03}$

4. $5.97 \overline{)3,826.77}$

5. $11.5 \overline{)634.11}$

6. $0.15 \div 0.008$

7. $6.8034 \div 6.67$

8. $8.814 \div 0.0678$

Find each quotient to the nearest hundredth.

9. $0.31 \overline{)9.4}$

10. $17.6 \overline{)21.191}$

11. $8.39 \overline{)486.7}$

12. $63.66 \div 7.23$

13. $1.76 \div 28$

14. $59.681 \div 0.98$

15. **Hobbies** Paquita wants to make a necklace 55.9 cm long using beads with a diameter of 1.3 cm. How many beads does she need?

16. **Standardized Test Practice** Find $4.998 \div 3.4$.

A 1.47

B 1.52

C 6.82

D 16.99

