

1-4

Adding and Subtracting Decimals

Today's lesson is on adding and subtracting decimals numbers

Gather your supplies:

Clicker

Your notebook

Your pencil

Get ready for the warm-up problem.



A box of 20 thank-you cards sells for \$9.00. What is the price of one card?

(A) \$0.18

(D) \$0.38

(B) \$0.45

(E) \$0.42

(C) \$0.40


(F) \$0.55

1-4

Adding and Subtracting Decimals

What You'll Learn

To add and subtract decimals and to solve problems involving decimals

 **New Vocabulary** front-end estimation

Why Learn This?

To find the sum or difference of two amounts of money, you need to add or subtract decimals.

If you estimate before you add or subtract, you can tell whether your answer is reasonable. One way to estimate is to round.



EXAMPLE Finding Decimal Sums

1 Find $3.026 + 14.7 + 1.38$.

Step 1 Estimate. $3.026 + 14.7 + 1.38$
 $\approx 3 + 15 + 1$, or 19

Step 2 Add. \downarrow Line up the decimal points.
 \leftarrow Write zeros so that all of the decimals have the same number of digits to the right of the decimal point.

$$\begin{array}{r} 3.026 \\ 14.700 \\ + 1.380 \\ \hline 19.106 \end{array}$$

Check for Reasonableness The sum 19.106 is reasonable, since it is close to 19.

1 **EXAMPLE** First estimate and then find the sum

$$6.8 + 4.65 + 2.125$$

Estimate $6.8 + 4.65 + 2.125 \approx 7 + 5 + 2$, or 14

Add. \leftarrow Line up the decimal points.
 \leftarrow Write zeros so that all decimals have the same number of digits to the right of the decimal point.

$$\begin{array}{r} 6.800 \\ 4.650 \\ + 2.125 \\ \hline 13.575 \end{array}$$

Check for Reasonableness The sum 13.575 is reasonable since it is close to 14.



Add 0.84 + 2.0 + 3.32

(A) 5.16

(B) 6.16

(C) 4.36

(D) 7.16

In **front-end estimation**, you estimate by first adding the “front-end digits.” Then you estimate the sum of the remaining digits. You adjust the sum of the front-end digits as necessary.

EXAMPLE Using Front-End Estimation



2 Food Use front-end estimation to estimate the total cost of buying one of every size of popcorn shown at the left.

Step 1 Add the front-end digits. These are the dollar amounts.

$$\begin{array}{r} \$3.98 \\ \$6.49 \\ \$9.08 \\ + \$3.47 \\ \hline \$21 \end{array}$$

Step 2 Estimate the total cents. Then adjust the dollar amounts.

$$\begin{array}{r} \$3.98 \rightarrow \text{about } \$1 \\ \$6.49 \\ \$9.08 \\ + \$3.47 \\ \hline \$21 \quad \text{about } \$2 \end{array}$$

The total cost is about $\$21 + \2 , or $\$23$.

2 EXAMPLE Use front-end estimation and adjust to estimate each sum.

a. $25.1 + 33.2 + 71.0$

$$\begin{array}{r} 25.1 \\ 33.2 \\ + 71.0 \\ \hline 129 \\ + 0 \end{array}$$

← Add the front-end digits.

← Adjust for the other amounts.

The total is about 129.

b. $\$4.99 + \2.95

$$\begin{array}{r} 4.99 \\ + 2.95 \\ \hline 6 \\ + 2 \end{array}$$

← Add the front-end digits.

← Adjust for the cents.

← .99 about \$1

.95 about \$1

The total is about $\$6 + \2 , or $\$8$.

EXAMPLE Finding a Difference



3 A basketball hoop is 46 cm across. A basketball is 24.28 cm across. What is the difference between these measurements?

Estimate $46 - 24.28 \approx 46 - 24$, or 22

Write 46 with a decimal point and two zeros.

Rename 46 as 45 and 10 tenths.

Rename 10 tenths as 9 tenths and 10 hundredths.

$$\begin{array}{r} 46.00 \\ - 24.28 \\ \hline \end{array}$$

$$\begin{array}{r} 45 \overset{10}{00} \\ - 24.28 \\ \hline \end{array}$$

$$\begin{array}{r} 45 \overset{9}{10} \overset{10}{00} \\ - 24.28 \\ \hline 21.72 \end{array}$$

The difference is 21.72 cm.

Check for Reasonableness 21.72 is close to 22, so the answer is reasonable.

3 EXAMPLE Professional ice hockey rinks can be from 25.9 m to 30.0 m wide. What is the difference between these widths?

Estimate $30.0 - 25.9 \approx 30 - 26$, or 4

Subtract.

$$\begin{array}{r} 10 \\ 30.0 \\ - 25.9 \\ \hline 4.1 \end{array}$$

← Rename 30 as 29 and 10 tenths.
← Subtract 25.9.
← Simplify.

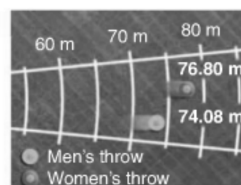
The difference between the widths is 4.1 m.

Check for Reasonableness The difference 4.1 is reasonable since it is close to 4.



Quick Check

3. Use the graph at the right. How much greater is the women's record discus throw than the men's throw?



Error Analysis Explain and correct the error in the work at the right.

$$\begin{array}{r} 5.8 \\ - 2 \\ \hline 5.6 \end{array}$$

Time for you to go to the whiteboard and work out some problems.

8. $0.6 + 3.4$

10. $8.001 + 0.77$

12. $0.445 + 8.99 + 3$

9. $6.2 + 0.444$

11. $7 + 11.436 + 3.08$

13. $0.33 + 1.11 + 3.2$

18. $22.2 - 4.3$

21. $9.1 - 6.05$

24. $60 - 2.037$

19. $8.91 - 6.08$

22. $0.8 - 0.126$

25. $9 - 0.45$

Power down your clickers and put them away. You have an assignment worksheet for homework, due tomorrow.

Name _____ Class _____ Date _____

1-4 • Guided Problem Solving

Student Page 22, Exercise 33:

Population In 2000, the New England states had a total population of about 13.92 million. Find the population of Maine.

State	Population
Connecticut	3.41 million
Maine	_____ million
Massachusetts	6.35 million
New Hampshire	1.24 million
Rhode Island	1.05 million
Vermont	0.61 million

Understand

1. What are you being asked to do?

2. How will you use the total population of the New England states to answer the question?

Plan and Carry Out

3. Find the sum of the populations of the other states.

4. What is the total population of all the New England states?

5. Write an expression to find the population of Maine.

6. Evaluate the expression to find the population of Maine.

7. Find the population of Maine.

Check

8. How can you check your answer?

Solve Another Problem

9. You and a friend calculate your grade for a class. You have an 83.5 and your friend has an 85.65. Who has the higher grade? How much higher is it?
