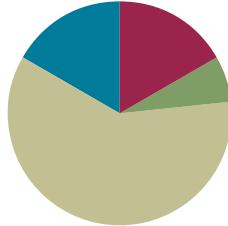


## Lesson 15

**Objective:** Express money amounts given in various forms as decimal numbers.

### Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(4 minutes)
Concept Development	(36 minutes)
Student Debrief	(10 minutes)
<b>Total Time</b>	<b>(60 minutes)</b>



### Fluency Practice (10 minutes)

- Add Fractions **4.3E** (5 minutes)
- State the Value of the Coins **3.4C** (5 minutes)

### Add Fractions (5 minutes)

Note: This fluency activity reviews Lesson 13.

T: (Write  $90 + 7 = \underline{\hspace{2cm}}$ .) Say the addition sentence in unit form.

S: 9 tens + 7 ones = 97 ones.

T: (Write  $\frac{9}{10} + \frac{7}{100} = \underline{\hspace{2cm}}$ .) Say the addition sentence in unit form.

S: 9 tenths + 7 hundredths = 97 hundredths.

Continue with the following possible sequence:  $40 + 8$  and  $\frac{4}{10} + \frac{8}{100}$ ;  $20 + 9$  and  $\frac{2}{10} + \frac{9}{100}$ .

T: (Write  $70 + 18 = \underline{\hspace{2cm}}$ .) Say the addition sentence in unit form.

S: 7 tens + 18 ones = 88 ones.

T: (Write  $\frac{7}{10} + \frac{18}{100} = \underline{\hspace{2cm}}$ .) Say the addition sentence in unit form.

S: 7 tenths + 18 hundredths = 88 hundredths.

Continue with the following possible sequence:  $60 + 13$  and  $\frac{6}{10} + \frac{13}{100}$ ;  $30 + 29$  and  $\frac{3}{10} + \frac{29}{100}$ .

## State the Value of the Coins (5 minutes)

Note: This fluency activity prepares students for Lessons 15–16.

- T: (Write  $10\text{¢} = 1 \underline{\hspace{1cm}}$ .) What coin has a value of 10 cents?  
 T: 1 dime.  
 T:  $90\text{¢}$  is the same as how many dimes?  
 T: 9 dimes.  
 T: (Write  $25\text{¢} = 1 \underline{\hspace{1cm}}$ .) What coin has a value of 25 cents?  
 T: 1 quarter.  
 T:  $50\text{¢}$  is the same as how many quarters?  
 T: 2 quarters.  
 T:  $75\text{¢}$  is the same as how many quarters?  
 T: 3 quarters.  
 T:  $100\text{¢}$  is the same as how many quarters?  
 T: 4 quarters.  
 T: What is the value of 2 quarters?  
 T: 50 cents.  
 T: What is the total value of 2 quarters and 2 dimes?  
 T: 70 cents.  
 T: What is the total value of 2 quarters and 6 dimes?  
 T: 110 cents.

Continue with the following possible sequence: 1 quarter 5 dimes, 3 quarters 2 dimes, 2 quarters 7 dimes, and 3 quarters 2 dimes 1 penny.

## Application Problem (4 minutes)

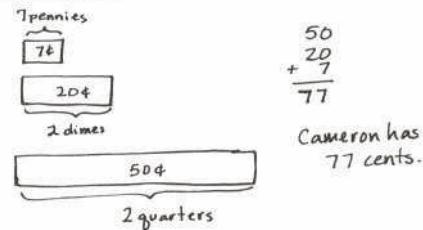
At the end of the day, Cameron counted the money in his pockets. He counted 7 pennies, 2 dimes, and 2 quarters. Tell the amount of money, in cents, that was in Cameron's pockets.

Solution A

$$\begin{array}{ccccccc} 1 & 0 & 0 & 1 & 0 & 1 & 0 \\ & 10 & 10 & 25 & 25 \\ & 0 & 0 & 0 & 0 \\ \hline 7 & + & 20 & + & 50 & = & 77 \end{array}$$

Cameron has 77¢.

Solution B



Note: This Application Problem builds on the previous knowledge of money from Grade 2 Module 7, where students solved word problems involving money. In this lesson, students extend their prior work with money amounts to think of the number of dollars and cents units and record money amounts using decimals.

## Concept Development (36 minutes)

Materials: (S) Personal white board

### Problem 1: Express pennies, dimes, and quarters as fractional parts of a dollar.

T: How many pennies are in 1 dollar?

S: 100 pennies.

T:  $\frac{1}{100}$  dollar is equal to how many cents?

S: 1 cent.

T: (Write  $1\text{¢} = \frac{1}{100}$  dollar.)

T: We can write 1 hundredth dollar using a decimal.

Write  $\frac{1}{100}$  in decimal form.

S: (Write 0.01.)

T: Place the dollar sign before the ones. (Write  $1\text{¢} = \frac{1}{100}$  dollar = \$0.01.) (Point to the number sentence.)

We can read \$0.01 as 1 cent.

T: (Show 7 pennies.) 7 pennies are how many cents?

S: 7 cents.

T: What fraction of a dollar is 7 cents?

S:  $\frac{7}{100}$  dollar.

T: Write a number sentence to show the value of 7 pennies as cents, as a fraction of a dollar, and in decimal form.

S: (Write  $7\text{¢} = \frac{7}{100}$  dollar = \$0.07.)

Repeat writing equivalent number sentences for 31, 80, and 100 pennies.

T: A dime also represents a fractional part of a dollar. How many dimes are in a dollar?

S: 10 dimes.

T: Draw a strip diagram to show how many dimes are needed to make 1 dollar.

S: (Draw.)

T: What fraction of a dollar is 1 dime?

S:  $\frac{1}{10}$  dollar.

T:  $\frac{1}{10}$  dollar is equal to how many cents?

S: 10 cents.

### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Depending on the needs of English language learners and students working below grade level, try to couple the language at the beginning of this vignette with a visual model, such as the array of pennies on the Problem Set or an area model.

### NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

To support students working below grade level in writing equivalent number sentences, offer a sentence frame such as the following:

$\underline{\quad}\text{¢} = \frac{\underline{\quad}}{100}$  dollar = \$ $\underline{\quad}.\underline{\quad}\underline{\quad}$

- T: (Write  $10\text{¢} = \frac{1}{10}$  dollar.) Write  $\frac{1}{10}$  dollar as an equivalent decimal using the dollar sign to tell the unit.  
 S: (Write  $10\text{¢} = \frac{1}{10}$  dollar = \$0.10.)

Repeat writing equivalent number sentences for 8 dimes and 10 dimes.

- T: With your partner, draw a strip diagram to show how many quarters equal 1 dollar. Write a number sentence to show the equivalence of the value of 1 quarter written as cents, as a fraction of a dollar, and as a decimal.

Expect many students to write  $\frac{1}{4}$  dollar, which is correct.

To write the value of 1 quarter as a decimal, remind students to write an equivalent fraction using 100 as the denominator so that students show  $25\text{¢} = \frac{25}{100}$  dollar = \$0.25.

**Problem 2: Express the total value of combinations of pennies, dimes, and quarters in fraction and decimal form.**

- T: (Write 7 dimes 2 pennies.) What is the value of 7 dimes 2 pennies expressed in cents?  
 S: 72 cents.  
 T: What number sentence did you use to find that value?  
 S:  $70 + 2 = 72$ .  $\rightarrow (7 \times 10\text{¢}) + 2\text{¢} = 72\text{¢}$ .  
 T: What fraction of a dollar is 72 cents?  
 S:  $\frac{72}{100}$  dollar.  
 T: On your personal white board, express  $\frac{72}{100}$  dollar in decimal form, using the dollar sign.  
 S: \$0.72.

Repeat with 2 quarters 3 dimes 6 pennies.

- T: (Write 3 quarters 4 dimes.) What is the value of 3 quarters 4 dimes expressed in cents? (Allow students time to work.)  
 S: 115 cents.  
 T: How did you find that value?  
 S: I counted by 25 three times and then counted up by 10 four times.  $\rightarrow (3 \times 25) + (4 \times 10) = 115$ .  
 $\rightarrow 75\text{¢} + 40\text{¢} = 115\text{¢}$ .  
 T: Do we have more or less than a dollar?  
 S: More.  
 T: What fraction of a dollar is 115¢?  
 S:  $\frac{115}{100}$  dollars.  $\rightarrow 1\frac{15}{100}$  dollars.



**NOTES ON  
READING DECIMALS  
AND FRACTIONS  
OF A UNIT:**

Make sure to offer English language learners and others valuable practice reading fractions and decimals correctly. To make close connections among decimals, fractions, and units, read numbers such as 0.33 meter as “thirty-three hundredths meter” and  $\frac{1}{100}$  dollar as “one hundredth dollar.” Also, share common ways in which decimals and fractions are read daily, such as “zero point thirty-three meters” or “one hundredth of a dollar.” Model for and guide students toward the preferred method of reading decimals and fractions based on the situation.

- T: Express  $1 \frac{15}{100}$  dollars as a decimal, using the dollar sign to express the unit.  
 S: \$1.15.

Repeat the process with 5 quarters 7 pennies.

- T: What did we do when finding the value of a set of coins?  
 S: We multiplied by 25 to find the value of the quarters and by 10 to find the value of the dimes.  
     → We just used multiplication and addition with whole numbers, and then we expressed our answer as a fraction of a dollar and in decimal form with the dollar sign.

**Problem 3: Find the sum of two sets of bills and cents using whole number calculations and unit form**

- T: (Write 6 dollars 1 dime 7 pennies + 8 dollars 1 quarter.) Let's rewrite each addend as dollars and cents.

S: 6 dollars 17 cents + 8 dollars 25 cents.

T: Let's add like units to find the sum. 6 dollars + 8 dollars is ...?

S: 14 dollars.

T: 17 cents + 25 cents is ...?

S: 42 cents.

T: Write the complete number sentence on your board.

S: 6 dollars 17 cents + 8 dollars 25 cents = 14 dollars 42 cents.

T: Write your sum in decimal form using the dollar sign to designate the unit.

S: \$14.42.

T: (Write 5 dollars 3 dimes 17 pennies + 4 dollars 3 quarters 2 dimes.) Work with a partner to write an expression showing each addend in unit form as dollars and cents.

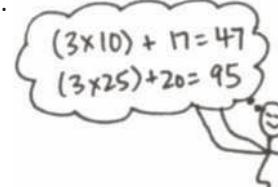
S: 5 dollars 47 cents + 4 dollars 95 cents.

T: Add dollars with dollars and cents with cents to find the sum.

5 dollars 3 dimes 17 pennies + 4 dollars 3 quarters 2 dimes

Solution A

$$\begin{aligned} & 5 \text{ dollars } 47 \text{ cents} + 4 \text{ dollars } 95 \text{ cents} \\ &= 9 \text{ dollars } \overbrace{142 \text{ cents}}^{100 \text{ cents}} \\ &= 10 \text{ dollars } 42 \text{ cents} \\ &= \$10.42 \end{aligned}$$



S: 9 dollars 142 cents. → 10 dollars 42 cents.

T: Why do these two different solutions show the same answer? Talk to your partner.

S: 142 cents is the same as 1 dollar 42 cents. We changed 9 dollars to 10 dollars (Solution A).  
     → We completed the dollar. 95 cents + 47 cents is the same as 95 + 5 + 42 or 100 + 42, which is 1 dollar and 42 cents (Solution B). → We added to get 142 cents and then decomposed the cents into 1 dollar and 42 cents (Solution A).

Solution B

$$\begin{aligned} & 5 \text{ dollars } 47 \text{ cents} + 4 \text{ dollars } 95 \text{ cents} \\ &= 9 \text{ dollars } \overbrace{47 \text{ cents}}^{42 \text{ cents}} + 95 \text{ cents} \\ &= 10 \text{ dollars } 42 \text{ cents} \\ &= \$10.42 \end{aligned}$$

Give students additional practice as necessary. This final component is directly applied in Lesson 16 to word problems.

- 10 dollars 1 quarter 3 dimes + 3 dollars 5 dimes 14 pennies
- 15 dollars 7 dimes 6 pennies + 2 quarters 23 pennies

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

### Student Debrief (10 minutes)

**Lesson Objective:** Express money amounts given in various forms as decimal numbers.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- How is money related to decimals and fractions? How is it different? Think about why we would write money in expanded notation.
- I have  $\frac{2}{5}$  dollar in my pocket. Use what you know about equivalent fractions to determine how many cents I have. What are some possible combinations of coins that may be in my pocket? Do not forget about nickels!

Name Jack
Date \_\_\_\_\_

1. 100 pennies = \$1.00       $100\text{¢} = \frac{100}{100}$  dollar

2. 1 penny = \$0.01       $1\text{¢} = \frac{1}{100}$  dollar

3. 6 pennies = \$0.06       $6\text{¢} = \frac{6}{100}$  dollar

4. 10 pennies = \$0.10       $10\text{¢} = \frac{10}{100}$  dollar

5. 26 pennies = \$0.26       $26\text{¢} = \frac{26}{100}$  dollar

6. 10 dimes = \$1.00       $10\text{¢} = \frac{100}{100}$  dollar

7. 1 dime = \$0.10       $10\text{¢} = \frac{1}{10}$  dollar

8. 3 dimes = \$0.30       $30\text{¢} = \frac{3}{10}$  dollar

9. 5 dimes = \$0.50       $50\text{¢} = \frac{5}{10}$  dollar

10. 6 dimes = \$0.60       $60\text{¢} = \frac{6}{10}$  dollar

11. 4 quarters = \$1.00       $100\text{¢} = \frac{100}{100}$  dollar

12. 1 quarter = \$0.25       $25\text{¢} = \frac{25}{100}$  dollar

13. 2 quarters = \$0.50       $50\text{¢} = \frac{50}{100}$  dollar

14. 3 quarters = \$0.75       $75\text{¢} = \frac{75}{100}$  dollar

Solve. Give the total amount of money in fraction form and decimal form.

15. 3 dimes and 8 pennies       $\frac{38}{100}$  dollar      \$0.38

16. 8 dimes and 23 pennies       $\frac{103}{100}$  dollars      \$1.03

17. 3 quarters, 3 dimes, and 5 pennies       $\frac{110}{100}$  dollars      \$1.10

18. 236 cents is what fraction of a dollar?  
\_\_\_\_\_  
 $\frac{236}{100}$  dollars      \$2.36

Solve. Express the answer as a decimal.

19. 2 dollars 17 pennies + 4 dollars 2 quarters = 2 dollars 17 cents + 4 dollars 50 cents  
= 6 dollars 67 cents  
= \$6.67

20. 3 dollars 8 dimes + 1 dollar 2 quarters 5 pennies = 3 dollars 80 cents + 1 dollar 55 cents  
= 5 dollars 35 cents  
= \$5.35

21. 9 dollars 9 dimes + 4 dollars 3 quarters 16 pennies = 9 dollars 90 cents + 4 dollars 91 cents  
= 14 dollars 81 cents  
= \$14.81

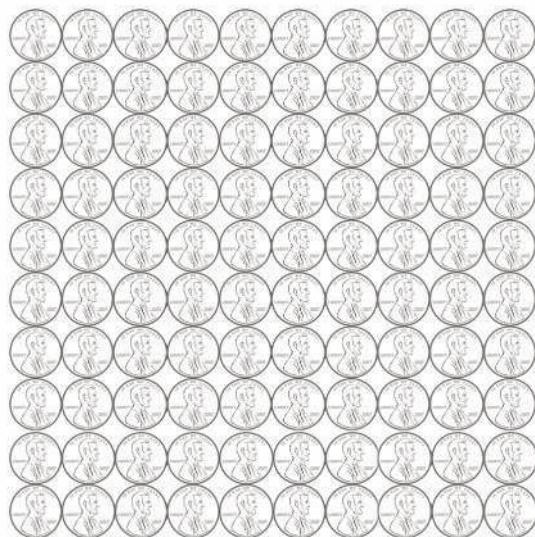
- Are \$1 and \$1.00 equal? Are \$0.1 and \$0.10 equal? Are all these forms correct? Which form may not be used frequently and why?
- How did the Application Problem prepare you for today's lesson?
- How might dimes be expressed as fractions differently than as tenths of a dollar? Use an example from Problems 6–10.
- How can the fraction of a dollar for Problem 13 be simplified?
- When adding fractions and whole numbers, we sometimes complete the next whole or the next hundred to simplify the addition. How, in Problem 20, could you decompose 8 dimes to simplify the addition?

### Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name \_\_\_\_\_

Date \_\_\_\_\_



1. 100 pennies = \$\_\_\_\_\_.  
 $100\text{¢} = \frac{1}{100}$  dollar

2. 1 penny = \$\_\_\_\_\_.  
 $1\text{¢} = \frac{1}{100}$  dollar

3. 6 pennies = \$\_\_\_\_\_.  
 $6\text{¢} = \frac{6}{100}$  dollar

4. 10 pennies = \$\_\_\_\_\_.  
 $10\text{¢} = \frac{10}{100}$  dollar

5. 26 pennies = \$\_\_\_\_\_.  
 $26\text{¢} = \frac{26}{100}$  dollar



6. 10 dimes = \$\_\_\_\_\_.  
 $100\text{¢} = \frac{1}{10}$  dollar

7. 1 dime = \$\_\_\_\_\_.  
 $10\text{¢} = \frac{1}{10}$  dollar

8. 3 dimes = \$\_\_\_\_\_.  
 $30\text{¢} = \frac{3}{10}$  dollar

9. 5 dimes = \$\_\_\_\_\_.  
 $50\text{¢} = \frac{5}{10}$  dollar

10. 6 dimes = \$\_\_\_\_\_.  
 $60\text{¢} = \frac{6}{10}$  dollar

11. 4 quarters = \$\_\_\_\_\_.  
 $100\text{¢} = \frac{1}{100}$  dollar

12. 1 quarter = \$\_\_\_\_\_.  
 $25\text{¢} = \frac{1}{100}$  dollar

13. 2 quarters = \$\_\_\_\_\_.  
 $50\text{¢} = \frac{2}{100}$  dollar

14. 3 quarters = \$\_\_\_\_\_.  
 $75\text{¢} = \frac{3}{100}$  dollar



Solve. Give the total amount of money in fraction form and decimal form.

15. 3 dimes and 8 pennies

16. 8 dimes and 23 pennies

17. 3 quarters 3 dimes and 5 pennies

18. 236 cents is what fraction of a dollar?

Solve. Express the answer as a decimal.

19. 2 dollars 17 pennies + 4 dollars 2 quarters

20. 3 dollars 8 dimes + 1 dollar 2 quarters 5 pennies

21. 9 dollars 9 dimes + 4 dollars 3 quarters 16 pennies

Name \_\_\_\_\_

Date \_\_\_\_\_

Solve. Give the total amount of money in fraction form and decimal form.

1. 2 quarters and 3 dimes
  
2. 1 quarter 7 dimes and 23 pennies

Solve. Express the answer as a decimal.

3. 2 dollars 1 quarter 14 pennies + 3 dollars 2 quarters 3 dimes



Name \_\_\_\_\_

Date \_\_\_\_\_



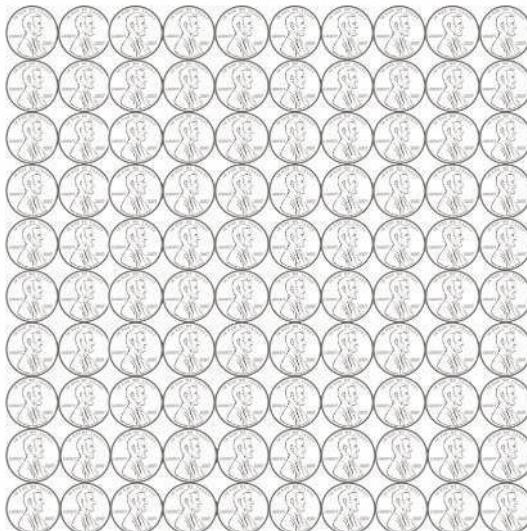
1. 100 pennies = \$ \_\_\_\_ . \_\_\_\_\_       $100\text{¢} = \frac{1}{100}$  dollar

2. 1 penny = \$ \_\_\_\_ . \_\_\_\_\_       $1\text{¢} = \frac{1}{100}$  dollar

3. 3 pennies = \$ \_\_\_\_ . \_\_\_\_\_       $3\text{¢} = \frac{3}{100}$  dollar

4. 20 pennies = \$ \_\_\_\_ . \_\_\_\_\_       $20\text{¢} = \frac{20}{100}$  dollar

5. 37 pennies = \$ \_\_\_\_ . \_\_\_\_\_       $37\text{¢} = \frac{37}{100}$  dollar



6. 10 dimes = \$ \_\_\_\_ . \_\_\_\_\_       $100\text{¢} = \frac{1}{10}$  dollar

7. 2 dimes = \$ \_\_\_\_ . \_\_\_\_\_       $20\text{¢} = \frac{2}{10}$  dollar

8. 4 dimes = \$ \_\_\_\_ . \_\_\_\_\_       $40\text{¢} = \frac{4}{10}$  dollar

9. 6 dimes = \$ \_\_\_\_ . \_\_\_\_\_       $60\text{¢} = \frac{6}{10}$  dollar

10. 9 dimes = \$ \_\_\_\_ . \_\_\_\_\_       $90\text{¢} = \frac{9}{10}$  dollar



11. 3 quarters = \$ \_\_\_\_ . \_\_\_\_\_       $75\text{¢} = \frac{75}{100}$  dollar

12. 2 quarters = \$ \_\_\_\_ . \_\_\_\_\_       $50\text{¢} = \frac{50}{100}$  dollar

13. 4 quarters = \$ \_\_\_\_ . \_\_\_\_\_       $100\text{¢} = \frac{100}{100}$  dollar

14. 1 quarter = \$ \_\_\_\_ . \_\_\_\_\_       $25\text{¢} = \frac{25}{100}$  dollar



Solve. Give the total amount of money in fraction form and decimal form.

15. 5 dimes and 8 pennies

16. 3 quarters and 13 pennies

17. 3 quarters 7 dimes and 16 pennies

18. 187 cents is what fraction of a dollar?

Solve. Express the answer in decimal form.

19. 1 dollar 2 dimes 13 pennies + 2 dollars 3 quarters

20. 2 dollars 6 dimes + 2 dollars 2 quarters 16 pennies

21. 8 dollars 8 dimes + 7 dollars 1 quarter 8 dimes

