LESSON 1

Add Dollars and Cents

LESSON AT A GLANCE

Lesson Objective
Find sums of decimal amounts in dollars and cents.

Materials
MathBoard

GO DIGITAL HMH Mega Math

1 TEACH and TALK GO DIGITAL • Mega Math

Unlock the Problem

Math Processes and Practices

Have students read the problem.

- **How do you know which operation to use?** Possible answer: since you need to find the total amount Carlos spent in all, you add the amount he spent on a new skateboard, and on a helmet and pads.

Direct students' attention to Step 1.

- **Why is it important to line up the decimal points?** Possible answer: by lining up the decimal points, you are making sure the place values are correctly lined up.
- **How do you record the sum of the pennies?** 6 + 9 = 15; regroup 15 pennies as 1 dime 5 pennies. Write 5 in the pennies place of the sum and 1 above the dimes column to show the regrouped dime.

Allow students time to discuss why they add from right to left, and then work with students through the remaining steps.

This lesson builds on adding whole numbers presented in Chapter 1 and prepares students for adding decimals taught in Grade 5.

Name _____

Add Dollars and Cents

Essential Question How can you find sums of decimal amounts in dollars and cents?

Unlock the Problem Real World

Carlos bought a new skateboard for $99.46 and a helmet and pads for $73.49. How much did Carlos spend in all?

- What operation can you use to find the amount Carlos spent?

addition

You add money amounts in the same way as you add whole numbers. Use the decimal point to line up the digits.

Use place value.

Add. $99.46 + $73.49

STEP 1	STEP 2	STEPS 3 and 4	STEP 5
Add the pennies. Regroup 15 pennies.	Add the dimes.	Add the ones. Add the tens.	Insert the decimal point and dollar sign.
1 $ 99.46 + $ 73.49 5	1 $ 99.46 + $ 73.49 95	1 1 $ 99.46 + $ 73.49 172 95	1 1 $ 99.46 + $ 73.49 $172 95

So, Carlos spent $172.95.

Try This! Find the sum.

A.

		1			1			
	$	2	3	.	1	8		
+	$	5	7	.	4	5		
	$	8	0	.	6	3		

B.

		1			1			
	$	1	9	.	0	7		
+	$	6	5	.	2	8		
	$	8	4	.	3	5		

Possible explanation: if the sum of the digits in a given place is greater than 9, you need to regroup.

Math Talk Mathematical Practices

Explain how you know when to regroup.

GR: Practice, p. GRP1

Name _____ Lesson 1

Add Dollars and Cents

Find the sum.

1. $58.36 + $ 5.87 = $64.23	2. $7.96 + $3.08 = $11.04	3. $98.45 + $ 4.76 = $103.21	4. $14.66 + $30.76 = $45.42
5. $26.71 + $ 5.09 = $31.80	6. $30.25 + $27.42 = $57.67	7. $54.01 + $85.23 = $139.24	8. $42.49 + $30.73 = $73.22
9. $ 7.76 + $54.02 = $61.78	10. $21.06 + $63.48 = $84.54	11. $34.59 + $ 7.45 = $42.04	12. $53.97 + $60.00 = $113.97
13. $71.25 + $ 5.90 = $77.15	14. $40.39 + $17.25 = $57.64	15. $14.99 + $ 5.23 = $20.22	16. $22.85 + $40.25 = $63.10
17. $ 5.23 + $30.55 = $35.78	18. $43.32 + $86.85 = $130.17	19. $31.26 + $88.90 = $120.16	20. $83.77 + $60.35 = $144.12

Problem Solving Real World

21. The bill for tonight's dinner is $56.85. Mr. Asham adds a $10.50 tip. How much does Mr. Asham pay in all?
$67.35

22. Maria buys a video game for $25.99 and batteries for $7.30. What is the total cost for these two items?
$33.29

GR: Reteach, p. GRR1

Name _____ Lesson 1 Reteach

Add Dollars and Cents

To add money amounts, line up the decimal points and then add as with whole numbers.

Find the sum.

$38.37 + $41.47

Step 1: Write the problem on grid paper. Align the digits by place value. Think of pennies as hundredths and dimes as tenths.

Step 2: Add the hundredths. Regroup 14 hundredths as 1 tenth 4 hundredths. Write 1 in the tenths column. Then add the tenths.

Step 3: Add the ones and then add the tens. Regroup if necessary. Write the decimal point and dollar sign.

	T	O	T	H
			1	
	$	3	8	. 3 7
+	$	4	1	. 4 7
			7	8 4

So, $38.37 + $41.47 = $79.84.

Find the sum.

1. $7.81 + $5.09 = $12.90	2. $35.06 + $51.48 = $86.54	3. $ 5.32 + $85.44 = $90.76	4. $40.36 + $17.45 = $57.81
5. $37.60 + $ 9.04 = $46.64	6. $80.26 + $19.31 = $99.57	7. $48.04 + $64.65 = $112.69	8. $52.66 + $50.48 = $103.14
9. $8.47 + $7.33 = $15.80	10. $69.19 + $ 4.95 = $74.14	11. $24.70 + $62.33 = $87.03	12. $10.00 + $25.75 = $35.75

*GR – Getting Ready Lessons and Resources (*www.thinkcentral.com*)

Share and Show

1. Explain what is happening in Step 2.

Possible explanation: in Step 2, you add the dimes and regroup 13 dimes as 1 dollar 3 dimes.

STEPS 1 and 2	STEPS 3 AND 4	STEP 5
1	11	11
$84.60	$84.60	$84.60
+ $35.70	+ $35.70	+ $35.70
30	120 30	$ 120 30

Find the sum.

2. $ 3.09 + $ 8.92 = **$12.01**

3. $ 26.08 + $ 41.39 = **$67.47**

4. $ 7.27 + $ 26.43 = **$33.69**

5. $ 30.47 + $ 28.56 = **$59.03**

On Your Own

Find the sum.

6. $ 9.57 + $ 4.09 = **$13.66**

7. $ 89.36 + $ 3.85 = **$93.21**

8. $ 23.75 + $ 10.98 = **$34.73**

9. $ 8.52 + $ 36.07 = **$44.59**

10. $ 48.92 + $ 7.08 = **$56.00**

11. $ 60.45 + $ 17.42 = **$77.87**

12. $ 58.02 + $ 73.54 = **$131.56**

13. $ 61.74 + $ 60.57 = **$122.31**

Problem Solving

14. Lena bought new inline skates for $49.99. The sales tax was $4.13. How much did Lena spend in all for her new inline skates?

$54.12

Try This!

Have students solve A and B. Ask student volunteers to share their work and explain each step they took to find each sum.

Use Math Talk to check students' understanding of adding dollars and cents.

2 PRACTICE

Share and Show • Guided Practice

For Exercise 1, discuss what is happening in Step 2. Be sure students understand that they are adding 6 dimes + 7 dimes, or 13 dimes. 13 dimes is then regrouped as 1 dollar 3 dimes. Continue with what is happening in Steps 3–5.

Work with students to complete Exercises 2–5. Discuss when it is and is not necessary to regroup and why.

On Your Own • Independent Practice

For Exercises 6–13, make sure students are inserting the decimal point and dollar sign in each sum.

Problem Solving Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 14, explain *sales tax* to students. Be sure students understand it is an amount that is added to the cost of an item.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you find the sums of decimal amounts in dollars and cents? Possible answer: I line up each addend by the digits and decimal point. I add the pennies and regroup if necessary. Then I add the dimes and any regrouped dimes, regrouping if necessary. Next, I add the ones and then the tens, regrouping if necessary. Last, I place the decimal point and dollar sign in the sum.

Math Journal WRITE Math

Explain how adding with dollars and cents is similar to and different from adding with whole numbers.

LESSON 2

Subtract Dollars and Cents

LESSON AT A GLANCE

Lesson Objective
Find differences between decimal amounts in dollars and cents.

Materials
MathBoard

GO DIGITAL
iTools: Measurement
HMH Mega Math

1 TEACH and TALK

GO DIGITAL • iTools

Unlock the Problem

Math Processes and Practices

Have students read the problem. Ask them to underline the information needed to solve the problem and to name the operation that can be used to find the amount that Sandi saved.

- **In Step 1, why do you need to regroup?**
  Possible answer: I cannot subtract 7 pennies from 4 pennies. So, I need to regroup 2 dimes 4 pennies as 1 dime 14 pennies. Now I can subtract 7 pennies from 14 pennies.

Direct students' attention to Step 2.

- **Explain how to regroup 4 dollars 1 dime.**
  Possible explanation: I cannot subtract 4 dimes from 1 dime. So, 4 dollars 1 dime is regrouped as 3 dollars 11 dimes.

Work with students through Steps 3–5. Remind students to place the decimal point and dollar sign in their answer.

Use **Math Talk** to check students' understanding of regrouping to subtract.

This lesson builds on subtracting whole numbers presented in Chapter 1 and prepares students for subtracting decimals taught in Grade 5.

Name _____

Subtract Dollars and Cents

Essential Question How can you find differences between decimal amounts in dollars and cents?

Unlock the Problem Real World

Sandi wanted to buy a new coat online. She figured out that the cost of the coat, with shipping, would be $84.24. The next week, Sandi bought the same coat in a local store on sale for a total of $52.47. How much did Sandi save by buying the coat on sale?

You subtract money amounts in the same way as you subtract whole numbers.

- Underline the information you need to solve the problem.
- What operation can you use to find the difference between the two prices?

subtraction

Use place value.

Subtract. $84.24 − $52.47

Use the decimal point to line up the digits. Work from right to left. Check each place to see if you need to regroup to subtract.

STEP 1	STEP 2	STEPS 3 and 4	STEP 5
Regroup 2 dimes and 4 pennies as 1 dime and 14 pennies. Subtract the pennies.	Regroup 4 dollars and 1 dime as 3 dollars and 11 dimes. Subtract the dimes.	Subtract the ones. Subtract the tens.	Insert the decimal point and dollar sign.
1 14 $84.2~~4~~ − $52.47 7	11 3 ~~1~~ 14 $8~~4.2~~~~4~~ − $52.47 77	11 3 ~~1~~ 14 $8~~4.2~~~~4~~ − $52.47 31 77	11 3 ~~1~~ 14 $8~~4.2~~~~4~~ − $52.47 $31 77

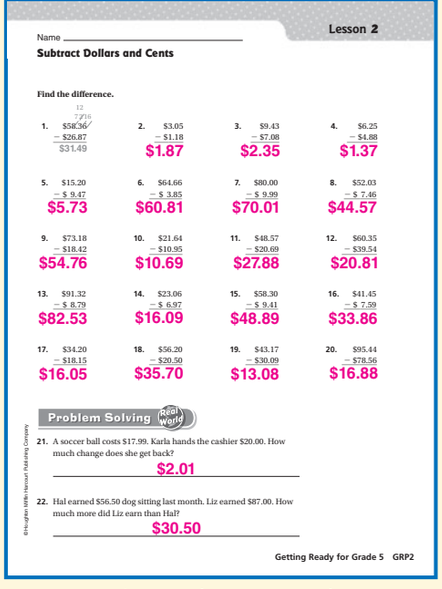
So, Sandi saved $31.77.

Possible explanation: if the digit to be subtracted in any place is greater than the digit being subtracted from, I need to regroup.

Math Talk **Mathematical Practices**

Explain how you know in which places to regroup to subtract.

GR: Practice, p. GRP2



Name _____ Lesson 2

Subtract Dollars and Cents

Find the difference.

1. $5836 − $26.87 = $31.49	2. $3.05 − $1.18 = $1.87	3. $9.43 − $7.08 = $2.35	4. $6.25 − $4.88 = $1.37
5. $15.20 − $ 9.47 = $5.73	6. $64.66 − $ 3.85 = $60.81	7. $80.00 − $ 9.99 = $70.01	8. $52.03 − $ 7.46 = $44.57
9. $73.18 − $18.42 = $54.76	10. $21.64 − $10.95 = $10.69	11. $48.57 − $20.69 = $27.88	12. $60.35 − $39.54 = $20.81
13. $91.32 − $ 8.79 = $82.53	14. $23.06 − $ 6.97 = $16.09	15. $58.30 − $ 9.41 = $48.89	16. $41.45 − $ 7.59 = $33.86
17. $34.20 − $18.15 = $16.05	18. $56.20 − $20.50 = $35.70	19. $43.17 − $30.09 = $13.08	20. $95.44 − $78.56 = $16.88

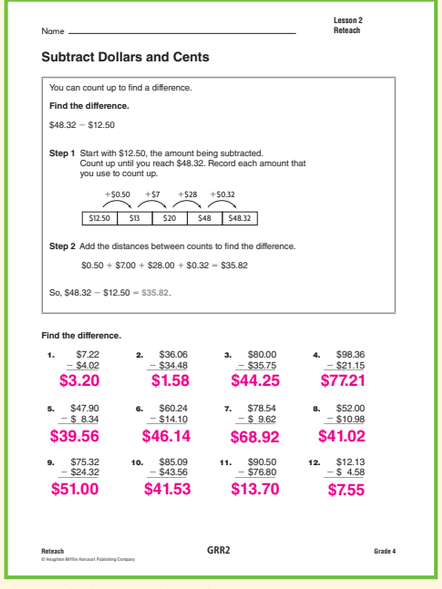
Problem Solving Real World

21. A soccer ball costs $17.99. Karla hands the cashier $20.00. How much change does she get back?
$2.01

22. Hal earned $56.50 dog sitting last month. Liz earned $87.00. How much more did Liz earn than Hal?
$30.50

Getting Ready for Grade 5 GRP2

GR: Reteach, p. GRR2



Name _____ Lesson 2 Reteach

Subtract Dollars and Cents

You can count up to find a difference.

Find the difference.

$48.32 − $12.50

Step 1 Start with $12.50, the amount being subtracted. Count up until you reach $48.32. Record each amount that you use to count up.

+$0.50 +$7 +$28 +$0.32

$12.50	$13	$20	$48	$48.32

Step 2 Add the distances between counts to find the difference.

$0.50 + $7.00 + $28.00 + $0.32 = $35.82

So, $48.32 − $12.50 = $35.82.

Find the difference.

1. $7.22 − $4.02 = $3.20	2. $36.06 − $34.48 = $1.58	3. $80.00 − $35.75 = $44.25	4. $98.36 − $21.15 = $77.21
5. $47.90 − $ 8.34 = $39.56	6. $60.24 − $14.10 = $46.14	7. $78.54 − $ 9.62 = $68.92	8. $52.00 − $10.98 = $41.02
9. $75.32 − $24.32 = $51.00	10. $85.09 − $43.56 = $41.53	11. $90.50 − $76.80 = $13.70	12. $12.13 − $ 4.58 = $7.55

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Share and Show

1. Find the difference. Regroup as needed.

$\$\ \cancel{7}^{6}.\cancel{1}^{\not 0}\cancel{4}^{14}$
$\$\ 4.38$
$2.76

Find the difference.

2. $\$5.89 - \$3.16$ **$2.73**

3. $\$30.07 - \$11.32$ **$18.75**

4. $\$60.00 - \$42.75$ **$17.25**

5. $\$99.08 - \$91.36$ **$7.72**

On Your Own

Find the difference.

6. $\$9.08 - \$7.26$ **$1.82**

7. $\$73.45 - \$12.13$ **$61.32**

8. $\$90.00 - \$42.17$ **$47.83**

9. $\$80.03 - \$49.53$ **$30.50**

10. $\$15.36 - \$\ 2.73$ **$12.63**

11. $\$84.00 - \$27.85$ **$56.15**

12. $\$74.19 - \$\ 8.46$ **$65.73**

13. $\$79.62 - \$23.58$ **$56.04**

Problem Solving

14. Bert earned $78.70 last week. This week he earned $93.00. How much more did he earn this week than last week?

$14.30 more

2 PRACTICE

Share and Show • Guided Practice

For Exercise 1, be sure students understand that since you cannot subtract 3 dimes from 0 dimes, you must regroup 7 dollars 0 dimes as 6 dollars 10 dimes. Then you can take away 3 dimes from 10 dimes.

Work with students through Exercises 2–5 to make sure they understand when it is necessary to regroup.

On Your Own • Independent Practice

For Exercises 6–13, make sure students are carefully recording any regrouped amounts in the proper position.

Problem Solving Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 14, students should recognize that the amount Bert earned last week should be subtracted from the amount he earned this week.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you find differences between decimal amounts in dollars and cents?

Possible answer: I line up each amount by the digits and decimal point, placing the greater value on top. I start by subtracting the pennies and work right to left. If there are not enough pennies to subtract, I regroup a dime as 10 pennies and then subtract. Then, I move on to the dimes, dollars, and so on, regrouping if necessary. Last, I place the decimal point and dollar sign in the final answer.

Math Journal WRITE Math

Write a word problem with dollars and cents that can be solved using subtraction. Include the solution.

LESSON 3

Algebra • Order of Operations

LESSON AT A GLANCE

Lesson Objective
Use the order of operations to find the value of expressions.

Vocabulary
order of operations

Materials
MathBoard

GO DIGITAL
- Animated Math Models
- HMH Mega Math

1 TEACH and TALK • Animated Math Models

Unlock the Problem

Math Processes and Practices

Read the problem together. Use the questions to help students understand that this is a multistep problem.

Explain that when we use an expression to represent this problem, it is important to perform the operations in the correct order.

Use the expression $2 + 3 \times 4$ to illustrate what can happen if we perform operations in the incorrect order.

- **What is the value of the expression if you add first, and then multiply?** 20 ($2 + 3 = 5$; $5 \times 4 = 20$)
- **What is the value if you multiply first, and then add?** 14 ($3 \times 4 = 12$; $2 + 12 = 14$)

Because we multiply before we add, the second answer is correct.

This lesson builds on number theory and operations presented in Chapter 2 and prepares students for using the order of operations taught in Grade 5.

Name _____

Order of Operations

Essential Question How can you use the order of operations to find the value of expressions?

Unlock the Problem Real World

At a visit to the Book Fair, Jana buys 7 hardcover books and 5 paperback books. She is going to give an equal number of books to each of her three cousins. How many books will each of Jana's cousins get?

To find the value of an expression involving parentheses, you can use the order of operations. Remember, the order of operations is a special set of rules that give you the order in which calculations are done in an expression.

First, perform operations inside the parentheses.

Then, multiply and divide from left to right.

Finally, add and subtract from left to right.

- What operation can you use to find the total number of books that Jana buys?
  addition
- What operation can you use to find how many books each of Jana's cousins gets?
  division

Use the order of operations to find the value of $(7 + 5) \div 3$.

STEP 1

Perform operations in parentheses.

$(7 + 5) \div 3$

12 $\div 3$

STEP 2

Use the order of operations. In this case, divide.

$12 \div 3$

4

So, each of Jana's cousins will get 4 books.

- **What if** Jana decides to keep 3 books for herself? How will this change the expression? How many books will each of Jana's cousins get?
  The new expression would be $(7 + 5 - 3) \div 3$. Each of Jana's cousins will get 3 books.

Math Talk Mathematical Practices

What operation should you do first to find the values of $(6 + 2) \times 3$ and $6 + (2 \times 3)$? What is the value of each expression?

add, multiply; 24, 12

GR: Practice, p. GRP3

Name _____ ALGEBRA Lesson 3

Order of Operations

Follow the order of operations to find the value of the expression. Show each step. Check students' work.

1. $3 + (18 \times 2) \div 3$
   $3 + 36 \div 3$
   $3 + 12$
   15
2. $(20 - 8) \times 2$ — 24
3. $(48 \div 6) + 5$ — 13
4. $(9 \times 4) + 6$ — 42
5. $(10 + 5) \times 9$ — 135
6. $(40 \div 10) + 11$ — 15
7. $5 + (21 \div 3) \times 5$ — 40
8. $7 \times 4 + (15 \div 3)$ — 33
9. $6 + (24 \div 8) - 3$ — 6
10. $43 - 28 + (12 \div 2)$ — 21
11. $(13 \times 2) - 2 - 5$ — 19
12. $15 + 6 \times (8 \div 4)$ — 27

Problem Solving Real World

13. Each carton has 12 eggs. There are 2 full cartons in the refrigerator. Margot uses 3 eggs to make a quiche. How many eggs are left?
    21 eggs
14. There are 6 rows in the parking lot. Each row has 12 parking spaces. At 9 o'clock the lot is full. An hour later, there are 15 empty spaces. How many cars are in the lot an hour later?
    57 cars

Getting Ready for Grade 5 GRP3

GR: Reteach, p. GRR3

Name _____ Lesson 3 Reteach

Algebra • Order of Operations

The **order of operations** is a set of rules that gives the order in which calculations are done in an expression.

Order of Operations
1. First, perform operations inside the parentheses.
2. Then, multiply and divide from left to right.
3. Last, add and subtract from left to right.

Use the order of operations to find the value of the expression. Show each step.

$8 + (10 \div 5) - 4$

Step 1	Step 2	Step 3
First divide. **Think:** $10 \div 5 = 2$	Then add and subtract from left to right. **Think:** $8 + 2 = 10$	Subtract.
$8 + (10 \div 5) - 4$ $8 + 2 - 4$	$8 + 2 - 4$ $10 - 4$	$10 - 4 = 6$

So, $8 + (10 \div 5) - 4 = 6$.

Write *correct* if the operations are listed in the correct order. If not correct, write the correct order of operations.

1. $(9 \div 3) \times 4$ multiply, divide — divide, multiply
2. $15 - (8 \div 2)$ subtract, divide — divide, subtract
3. $(36 + 10) \times 3$ multiply, add — add, multiply
4. $(16 - 4) \div 2 + 5$ subtract, divide, add — correct

Follow the order of operations to find the value of the expression. Show each step. Check students' work.

5. $(6 \times 7) + 3$ — 45
6. $(8 + 12) \div 4$ — 5
7. $(20 - 5) \times 3 + 4$ — 49
8. $18 + 6 + (16 \div 4)$ — 28

GRR3 Grade 4

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Share and Show

Write *correct* if the operations are listed in the correct order. If not correct, write the correct order of operations.

1. $(4 + 5) \times 2$ multiply, add
   add, multiply

2. $8 \div (4 \times 2)$ multiply, divide
   correct

3. $12 + (16 \div 4)$ add, divide
   divide, add

4. $9 + 2 \times (3 - 1)$ add, multiply, subtract
   subtract, multiply, add

Follow the order of operations to find the value of the expression. Show each step. **Check students' work.**

5. $6 + (2 \times 5)$ **16**

6. $18 - (12 \div 4)$ **15**

7. $8 \times (9 - 3)$ **48**

8. $(12 + 8) \div 2 \times 3$ **30**

On Your Own

Follow the order of operations to find the value of the expression. Show each step. **Check students' work.**

9. $6 + (9 \div 3)$ **9**

10. $(3 \times 6) \div 2$ **9**

11. $(49 \div 7) + 5$ **12**

12. $9 \times (8 - 2)$ **54**

13. $45 \div (17 - 2)$ **3**

14. $(32 + 4) \div 9 - 2$ **2**

15. $8 \times 9 - (12 - 8)$ **68**

16. $(36 - 4) + 8 \div 4$ **34**

Problem Solving

17. Mr. Randall bought 4 shirts, which were on sale. The shirts were originally priced $20. The sales price of the shirts was $5 less than the original price. Write and find the value of an expression for the total amount that Mr. Randall paid for the shirts.
    Possible answer: $4 \times (20 - 5)$; $60

For the **What if** question, have students find the value of the expression. Discuss the order of operations they used.

Use **Math Talk** to check students' understanding of the order of operations.

2 PRACTICE

Share and Show • Guided Practice

Discuss Exercises 1–4 with students. Be sure students understand that you do not simply calculate from left to right. Guide students through Exercises 5–8.

On Your Own • Independent Practice

For Exercises 9–16, students may refer to the order of operations rules on page GR5.

Problem Solving Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 17, some students may benefit from drawing a picture to represent the problem.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you use the order of operations to find the value of expressions? Possible answer: when an expression has more than one type of operation, you first perform operations inside parentheses. Then you multiply and divide from left to right. Then you add and subtract from left to right.

Math Journal WRITE Math

Explain why it is important to follow the order of operations. Include an example in your explanation.

LESSON 4

Divide by Multiples of Ten

LESSON AT A GLANCE

Lesson Objective
Use patterns to divide by multiples of ten.

Materials
MathBoard

This lesson builds on division presented in Chapter 4 and prepares students for dividing by two-digit numbers taught in Grade 5.

1 TEACH and TALK

Unlock the Problem

Math Processes and Practices

Have students read the problem and discuss Example 1.

- **Why is the expression 2,000 ÷ 10 used to solve the problem?** Possible answer: there are 2,000 flyers, and they will be divided equally between 10 volunteers.
- **Why did we start with the basic fact 2 ÷ 1 = 2?** Possible answer: 2 ÷ 1 = 2 is the basic fact related to the division problem 2,000 ÷ 10.
- **Explain why 20 ÷ 10 = 2 is the next step in the solution.** Possible explanation: the quotient is the same as the quotient in the basic fact, and the divisor is the same as the divisor in the problem I am trying to solve.

Invite students to share their descriptions of the pattern used to solve the problem.

Direct students' attention to Example 2.

Discuss the basic fact and pattern used to find 2,800 ÷ 40.

Name _____

Divide by Multiples of Ten

Essential Question How can you use patterns to divide by multiples of ten?

Unlock the Problem (Real World)

A charity asked 10 volunteers to hand out 2,000 flyers about a fund-raising event. Each volunteer will get the same number of flyers. How many flyers will each volunteer hand out?

You can use patterns and a basic fact to divide by multiples of ten.

Example 1 Find 2,000 ÷ 10.

Think: I know that 2 ÷ 1 = 2, so 20 ÷ 10 = 2.

20 ÷ 10 = 2
200 ÷ 10 = 20
2,000 ÷ 10 = 200

So, each volunteer will hand out 200 flyers.

Describe the pattern used to divide 2,000 by 10.

Possible answer: as the number of zeros in the dividend increases, the number of zeros in the quotient increases by the same number.

Example 2 Find 2,800 ÷ 40.

28 ÷ 4 = 7, so 280 ÷ 40 = 7.

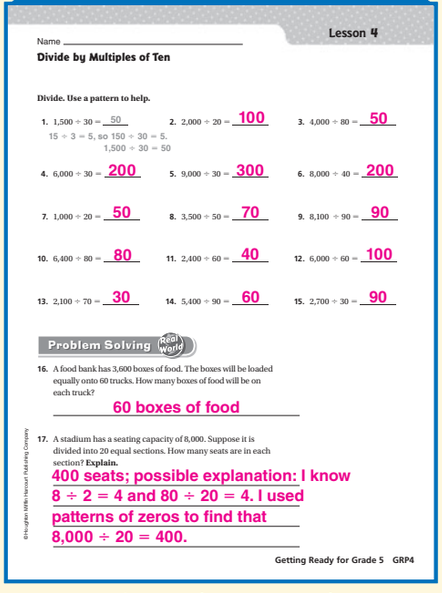
2,800 ÷ 40 = 70

Possible explanation: find the basic fact related to the division problem. Use patterns of zeros to solve.

Math Talk Mathematical Practices

Explain how you can use basic facts to help divide by multiples of ten.

GR: Practice, p. GRP4



Name _____ Lesson 4

Divide by Multiples of Ten

Divide. Use a pattern to help.

1. 1,500 ÷ 30 = 50 (15 ÷ 3 = 5, so 150 ÷ 30 = 5. 1,500 ÷ 30 = 50)
2. 2,000 ÷ 20 = 100
3. 4,000 ÷ 80 = 50
4. 6,000 ÷ 30 = 200
5. 9,000 ÷ 30 = 300
6. 8,000 ÷ 40 = 200
7. 1,000 ÷ 20 = 50
8. 3,500 ÷ 50 = 70
9. 8,100 ÷ 90 = 90
10. 6,400 ÷ 80 = 80
11. 2,400 ÷ 60 = 40
12. 6,000 ÷ 60 = 100
13. 2,100 ÷ 70 = 30
14. 5,400 ÷ 90 = 60
15. 2,700 ÷ 30 = 90

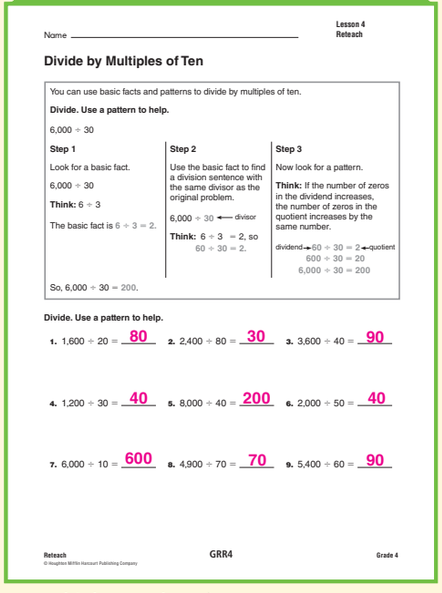
Problem Solving (Real World)

16. A food bank has 3,600 boxes of food. The boxes will be loaded equally onto 60 trucks. How many boxes of food will be on each truck?
60 boxes of food

17. A stadium has a seating capacity of 8,000. Suppose it is divided into 20 equal sections. How many seats are in each section? **Explain.**
400 seats; possible explanation: I know 8 ÷ 2 = 4 and 80 ÷ 20 = 4. I used patterns of zeros to find that 8,000 ÷ 20 = 400.

Getting Ready for Grade 5 GRP4

GR: Reteach, p. GRR4



Name _____ Lesson 4 Reteach

Divide by Multiples of Ten

You can use basic facts and patterns to divide by multiples of ten.

Divide. Use a pattern to help.

6,000 ÷ 30

Step 1
Look for a basic fact.
6,000 ÷ 30
Think: 6 ÷ 3
The basic fact is 6 ÷ 3 = 2.

Step 2
Use the basic fact to find a division sentence with the same divisor as the original problem.
6,000 ÷ 30 ← divisor
Think: 6 ÷ 3 = 2, so 60 ÷ 30 = 2.

Step 3
Now look for a pattern.
Think: If the number of zeros in the dividend increases, the number of zeros in the quotient increases by the same number.
dividend → 60 ÷ 30 = 2 ← quotient
600 ÷ 30 = 20
6,000 ÷ 30 = 200

So, 6,000 ÷ 30 = 200.

Divide. Use a pattern to help.

1. 1,600 ÷ 20 = 80
2. 2,400 ÷ 80 = 30
3. 3,600 ÷ 40 = 90
4. 1,200 ÷ 30 = 40
5. 8,000 ÷ 40 = 200
6. 2,000 ÷ 50 = 40
7. 6,000 ÷ 10 = 600
8. 4,900 ÷ 70 = 70
9. 5,400 ÷ 60 = 90

Reteach

GRR4
Grade 4

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Share and Show

MATH BOARD

1. Find 6,000 ÷ 20.

Think: I can use patterns to divide, starting with 60 ÷ 20.

6 ÷ 2 = 3, so 60 ÷ 20 = 3.

600 ÷ 20 = 30

6,000 ÷ 20 = 300

Divide. Use a pattern to help.

2. 8,000 ÷ 20 = 400

3. 4,000 ÷ 40 = 100

4. 1,200 ÷ 60 = 20

On Your Own

Divide. Use a pattern to help.

5. 9,000 ÷ 30 = 300

6. 5,000 ÷ 50 = 100

7. 1,800 ÷ 60 = 30

8. 7,000 ÷ 10 = 700

9. 3,200 ÷ 80 = 40

10. 6,300 ÷ 90 = 70

Problem Solving

Real World

11. A group of musicians wants to sell a total of 1,000 tickets for 20 concerts. Suppose they sell the same number of tickets for each concert. How many tickets will they sell for each concert? Explain how you solved the problem.

50; Possible explanation: I used a basic fact and patterns to solve. I know 10 ÷ 2 = 5, so 100 ÷ 20 = 5; 1,000 ÷ 20 = 50.

Use **Math Talk** to check students' understanding of how they can use patterns and basic facts to divide by multiples of ten.

2 PRACTICE

MATH BOARD

Share and Show • Guided Practice

Guide students through each step in the solution of Exercise 1. For Exercises 2–4, ask students to write the basic fact that they will use to find the quotient.

On Your Own • Independent Practice

When students are using a pattern to help them divide in Exercises 5–10, remind them that as the number of zeros in the dividend increases, the number of zeros in the quotient increases by the same number.

Problem Solving

Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 11, ask students how they can use a basic fact and patterns to solve the problem.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you use patterns to divide by multiples of ten? Possible answer: I find a basic fact related to the division problem I am trying to solve. Then I use patterns of zeros to solve. As the number of zeros in the dividend increases, the number of zeros in the quotient increases by the same number.

Math Journal

WRITE Math

Explain how to divide 4,500 by 90 using a basic fact and patterns.

LESSON 5

Model Division with 2-Digit Divisors

LESSON AT A GLANCE

Lesson Objective
Use base-ten blocks to divide with 2-digit divisors.

Materials
MathBoard, base-ten blocks

GO DIGITAL iTools: Base-Ten Blocks

1 TEACH and TALK GO DIGITAL • iTools

Unlock the Problem

Math Processes and Practices

Have students read the problem. Help them to understand the steps for solving the problem.

- **Why is division used to solve the problem?** Possible answer: 154 children need to be placed on 11 equal-sized teams.
- **In Step 2, why are there 15 tens?** Possible answer: there were 5 tens to begin with. After the hundred block was regrouped as 10 tens, I added 10 tens and 5 tens to get 15 tens.
- **In Step 3, why do you draw 4 ones in each oval?** Possible answer: there were 4 ones to begin with. To these are added the 40 ones obtained by regrouping 4 leftover tens, for a total of 4 + 40 = 44. When these are shared among 11 ovals, each oval gets 4 ones.

Use **Math Talk** to check students' understanding of the inverse relationship between dividing and multiplying.

This lesson builds on division with 1-digit divisors presented in Chapter 4 and prepares students to divide with 2-digit divisors taught in Grade 5.

Name _____

Model Division with 2-Digit Divisors

Essential Question How can you use models to divide?

CONNECT You have used base-ten blocks to divide whole numbers by 1-digit divisors. You can follow the same steps to divide whole numbers by 2-digit divisors.

Unlock the Problem Real World

Activity **Materials** ■ base-ten blocks

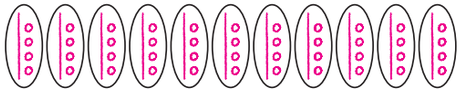
There are 154 children participating in a soccer tournament. There are 11 equal-sized teams of children. How many children are on each team?

- What do you need to find?
  the number of children on each team
- What is the dividend? the divisor?
  154; 11

STEP 1
Use base-ten blocks to model 154 children. Show 154 as 1 hundred 5 tens 4 ones. Draw 11 ovals for the teams.

STEP 2
Share the base-ten blocks equally among 11 groups. Since there are not enough hundreds to share equally, regroup 1 hundred as 10 tens. There are now 15 tens. Share the tens and draw a vertical line segment for each ten.

STEP 3
If there are any tens left over, regroup each as 10 ones. Share the ones equally among 11 groups. Draw a small circle for each one.



There are 1 ten(s) and 4 one(s) in each group.

So, there are 14 children on each team.

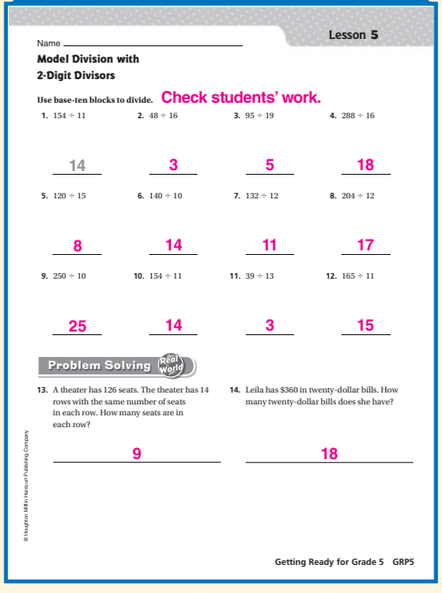
- Explain why you need to regroup in Step 3.
  Possible explanation: there were 4 tens left over after I shared the tens. In order to share the leftover tens, I needed to regroup them as ones.

Math Talk Mathematical Practices

Explain how you can check your answer.

Possible explanation: I can multiply to check my division. If 14 × 11 = 154, then my answer is correct.

GR: Practice, p. GRP5



Name _____ Lesson 5

Model Division with 2-Digit Divisors

Use base-ten blocks to divide. **Check students' work.**

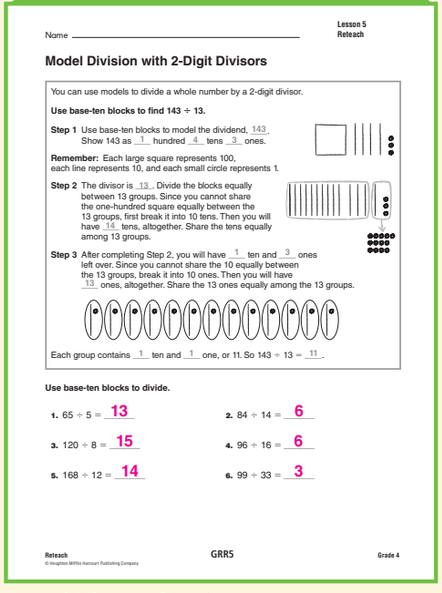
1. 154 ÷ 11 — 14
2. 48 ÷ 16 — 3
3. 95 ÷ 19 — 5
4. 288 ÷ 16 — 18
5. 120 ÷ 15 — 8
6. 140 ÷ 10 — 14
7. 132 ÷ 12 — 11
8. 204 ÷ 12 — 17
9. 250 ÷ 10 — 25
10. 154 ÷ 11 — 14
11. 39 ÷ 13 — 3
12. 165 ÷ 11 — 15

Problem Solving Real World

13. A theater has 126 seats. The theater has 14 rows with the same number of seats in each row. How many seats are in each row? — 9
14. Leila has $360 in twenty-dollar bills. How many twenty-dollar bills does she have? — 18

Getting Ready for Grade 5 GRP5

GR: Reteach, p. GRR5



Name _____ Lesson 5 Reteach

Model Division with 2-Digit Divisors

You can use models to divide a whole number by a 2-digit divisor.

Use base-ten blocks to find 143 ÷ 13.

Step 1 Use base-ten blocks to model the dividend, 143. Show 143 as 1 hundred 4 tens 3 ones.

Remember: Each large square represents 100, each line represents 10, and each small circle represents 1.

Step 2 The divisor is 13. Divide the blocks equally between 13 groups. Since you cannot share the one-hundred square equally between the 13 groups, first break it into 10 tens. Then you will have 14 tens, altogether. Share the tens equally among 13 groups.

Step 3 After completing Step 2, you will have 1 ten and 3 ones left over. Since you cannot share the 10 equally between the 13 groups, break it into 10 ones. Then you will have 13 ones, altogether. Share the 13 ones equally among the 13 groups.

Each group contains 1 ten and 1 one, or 11. So 143 ÷ 13 = 11.

Use base-ten blocks to divide.

1. 65 ÷ 5 = 13
2. 84 ÷ 14 = 6
3. 120 ÷ 8 = 15
4. 96 ÷ 16 = 6
5. 168 ÷ 12 = 14
6. 99 ÷ 33 = 3

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Share and Show

MATH BOARD

1. Use base-ten blocks to find 182 ÷ 14. Describe the steps you took to find your answer.

13; Possible answer: I modeled 182 and regrouped 1 hundred to give me 18 tens 2 ones. Then I shared the tens equally among 14 groups. I regrouped the leftover tens as ones and shared them equally among 14 groups.

Use base-ten blocks to divide.

2. 60 ÷ 12 = 5

3. 135 ÷ 15 = 9

On Your Own

Use base-ten blocks to divide.

4. 180 ÷ 10 = 18

5. 150 ÷ 15 = 10

6. 88 ÷ 11 = 8

7. 96 ÷ 16 = 6

8. 176 ÷ 11 = 16

9. 156 ÷ 13 = 12

Problem Solving

Real World

10. Nicole has $250 in ten-dollar bills. How many ten-dollar bills does Nicole have?

25

11. At Dante's party, 16 children share 192 crayons. At Maria's party, 13 children share 234 crayons. Each party splits the crayons up equally among the children attending. How many more crayons does each child at Maria's party get than each child at Dante's party? Explain.

6; At Maria's party, each child gets 234 ÷ 13 = 18 crayons. At Dante's party, each child gets 192 ÷ 16 = 12 crayons; 18 − 12 = 6

Getting Ready Lessons and Resources, pp. GR11–GR12

Checkpoint

Name _____

Checkpoint

Concepts and Skills

Find the sum or difference.

1. $2.87 + $8.09 = $10.96
2. $7.65 − $5.23 = $2.42
3. $37.05 + $14.95 = $52.00
4. $30.00 − $12.69 = $17.31

Use base-ten blocks to divide.

5. 143 ÷ 11 = 13
6. 224 ÷ 16 = 14
7. 108 ÷ 18 = 6

Follow the order of operations to find the value of the expression. Show each step.

Check students' work.

8. (8 × 2) + 4 = 20
9. 16 − (3 × 5) = 1
10. 24 ÷ (15 − 7) = 3
11. 15 ÷ (9 − 4) × 4 = 12

Divide. Use a pattern to help.

12. 6,000 ÷ 30 = 200
13. 2,000 ÷ 20 = 100
14. 3,200 ÷ 40 = 80
15. 8,100 ÷ 90 = 90

Problem Solving Real World

16. Ellis bought groceries that were worth $99.86. After using coupons, the bill was $84.92. How much did Ellis save by using coupons?

$14.94

Fill in the bubble completely to show your answer.

17. Taby buys a dog leash for $18.50 and a dog collar for $12.75. What is the total cost of the leash and the collar?
   - Ⓐ $5.75
   - Ⓑ $6.25
   - Ⓒ $30.25
   - Ⓓ $31.25

18. Mr. Martin pays $35.93 for shoes for himself and $18.67 for shoes for his son. How much more do Mr. Martin's shoes cost than his son's?
   - Ⓐ $17.26
   - Ⓑ $17.36
   - Ⓒ $23.24
   - Ⓓ $54.60

19. Chris and Susan each collect baseball cards. Chris has 75 cards and Susan has 93 cards. They want to combine their collections and divide the cards evenly between them. Which expression can they use to find the number of cards each of them should have?
   - Ⓐ 75 + 93 ÷ 2
   - Ⓑ 75 + (93 ÷ 2)
   - Ⓒ (75 + 93) × 2
   - Ⓓ (75 + 93) ÷ 2

20. A store expects 4,000 customers during its 20-hour sale. Suppose the same number of customers arrives each hour. How many customers come each hour?
   - Ⓐ 20
   - Ⓑ 200
   - Ⓒ 2,000
   - Ⓓ 8,000

2 PRACTICE

MATH BOARD

Share and Show • Guided Practice

For Exercise 1, make sure students understand why it is necessary to regroup. For Exercises 2–3, encourage students to plan their solutions using the steps they took in Exercise 1 as a model.

On Your Own • Independent Practice

After students have solved Exercise 4, you may wish to review with them the steps they took to solve problems like this in Lesson 4, when they used patterns to divide by multiples of 10.

Problem Solving Math Processes and Practices

UNLOCK THE PROBLEM Help students see that to solve Exercise 10, they must divide 250 by 10. Exercise 11 is a multi-step problem. To solve it, students must first find the number of crayons each guest received at each party, and then find the difference of the two amounts.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you use models to divide? Possible answer: model the dividend with base-ten blocks. Share the blocks equally among the number of groups represented by the divisor, regrouping as necessary.

Math Journal WRITE Math

Explain how you can use a model to find the quotient 168 ÷ 12.

LESSON 6

Place Value Through Millions

LESSON AT A GLANCE

Lesson Objective
Read and write whole numbers through millions.

Materials
MathBoard

GO DIGITAL
- Animated Math Models
- HMH Mega Math

1 TEACH and TALK

GO DIGITAL • Animated Math Models

Unlock the Problem

Math Processes and Practices

Draw attention to the place-value chart. Review the facts that *ones* and *thousands* are called *periods*, and that each period is made up of ones, tens, and hundreds.

Point out that in this lesson, students will extend the place-value chart one period to the left, the millions period. Reassure students that they can use the same methods to read, write, and represent numbers in the millions as they used with numbers in the thousands and the ones.

- **In the number 123,456, what digit is in the ten thousands place? In what place is the digit 4?** 2; hundreds

Have students read the problem.

- **In the number 1,550,000, what digit is in the millions place?** 1

Use **Math Talk** to check students' understanding of place value.

This lesson builds on reading and writing numbers through hundred thousands presented in Chapter 1 and prepares students to read and write numbers through millions taught in Grade 5.

Name _____

Place Value Through Millions

Essential Question How can you read, write, and represent whole numbers through millions?

Unlock the Problem Real World

The population of Idaho is about 1,550,000. Write 1,550,000 in standard form, word form, and expanded form.

You know how to read and write numbers through hundred thousands. The place-value chart can be expanded to help you read and write greater numbers, like 1,550,000.

One million is 1,000 thousands and is written as 1,000,000. The millions period is to the left of the thousands period on a place-value chart.

- What is the value of the ten thousands place?
  50,000

PERIODS

MILLIONS			THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
		1,	5	5	0,	0	0	0
		1 × 1,000,000	5 × 100,000	5 × 10,000	0 × 1,000	0 × 100	0 × 10	0 × 1
		1,000,000	500,000	50,000	0	0	0	0

The place value of the 1 in 1,550,000 is millions.

Standard form: 1,550,000

Word Form: One million, five hundred fifty thousand

Expanded Form: 1,000,000 + 500,000 + 50,000

Math Talk Mathematical Practices
Explain how 8,000,000 is different than 800,000.

Try This! Use place value to read and write the number.

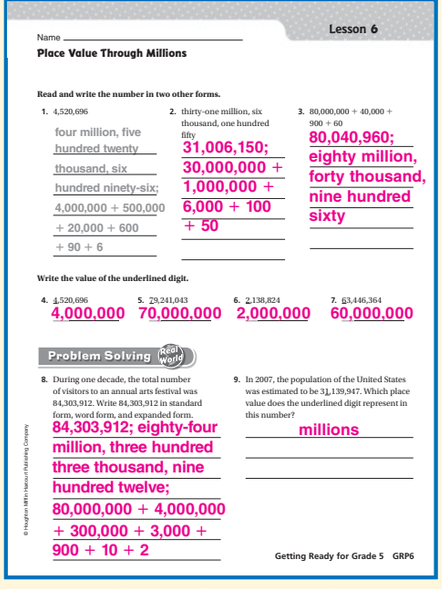
Standard Form: 62,080,126

Word Form: Sixty-two million, eighty thousand, one hundred twenty-six

Expanded Form: 60,000,000 + 2,000,000 + 80,000 + 100 + 20 + 6

Possible explanation: 8,000,000 has 80 hundred thousands, but 800,000 only has 8 hundred thousands.

GR: Practice, p. GRP6



Name _____ Lesson 6

Place Value Through Millions

Read and write the number in two other forms.

1. 4,520,696
   four million, five hundred twenty thousand, six hundred ninety-six; 4,000,000 + 500,000 + 20,000 + 600 + 90 + 6
2. thirty-one million, six thousand, one hundred fifty
   31,006,150; 30,000,000 + 1,000,000 + 6,000 + 100 + 50
3. 80,000,000 + 40,000 + 900 + 60
   80,040,960; eighty million, forty thousand, nine hundred sixty

Write the value of the underlined digit.

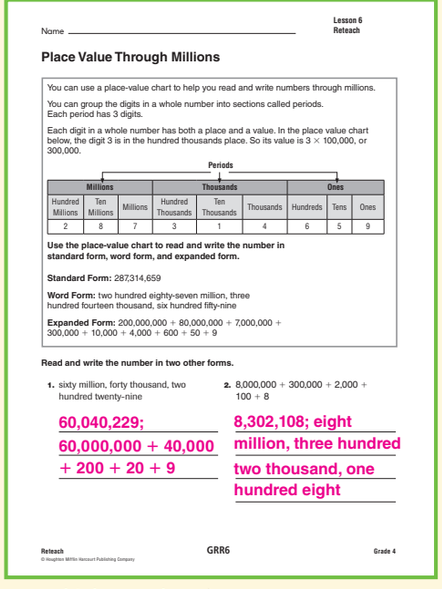
4. 4,520,696 — 4,000,000
5. 79,241,043 — 70,000,000
6. 2,138,824 — 2,000,000
7. 63,446,364 — 60,000,000

Problem Solving Real World

8. During one decade, the total number of visitors to an annual arts festival was 84,303,912. Write 84,303,912 in standard form, word form, and expanded form.
   84,303,912; eighty-four million, three hundred three thousand, nine hundred twelve; 80,000,000 + 4,000,000 + 300,000 + 3,000 + 900 + 10 + 2
9. In 2007, the population of the United States was estimated to be 31,139,947. Which place value does the underlined digit represent in this number?
   millions

Getting Ready for Grade 5 GRP6

GR: Reteach, p. GRR6



Name _____ Lesson 6 Reteach

Place Value Through Millions

You can use a place-value chart to help you read and write numbers through millions.

You can group the digits in a whole number into sections called periods. Each period has 3 digits.

Each digit in a whole number has both a place and a value. In the place value chart below, the digit 3 is in the hundred thousands place. So its value is 3 × 100,000, or 300,000.

Periods

Millions			Thousands			Ones		
Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
2	8	7	3	1	4	6	5	9

Use the place-value chart to read and write the number in standard form, word form, and expanded form.

Standard Form: 287,314,659

Word Form: two hundred eighty-seven million, three hundred fourteen thousand, six hundred fifty-nine

Expanded Form: 200,000,000 + 80,000,000 + 7,000,000 + 300,000 + 10,000 + 4,000 + 600 + 50 + 9

Read and write the number in two other forms.

1. sixty million, forty thousand, two hundred twenty-nine
   60,040,229; 60,000,000 + 40,000 + 200 + 20 + 9
2. 8,000,000 + 300,000 + 2,000 + 100 + 8
   8,302,108; eight million, three hundred two thousand, one hundred eight

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Share and Show

1. Write the number 3,298,076 in word form and expanded form.

Word Form: three million, two hundred ninety-eight thousand, seventy-six

Expanded Form: 3,000,000 + 200,000 + 90,000 + 8,000 + 70 + 6

Read and write the number in two other forms.

2. fifty million, three thousand, eighty-seven

50,003,087; 50,000,000 + 3,000 + 80 + 7

3. 60,000,000 + 400,000 + 200 + 30 + 9

60,400,239; sixty million, four hundred thousand, two hundred thirty-nine

On Your Own

Read and write the number in two other forms.

4. 70,000,000 + 8,000,000 + 20,000 + 8

78,020,008; seventy-eight million, twenty thousand, eight

5. twenty million, eleven thousand, twelve

20,011,012; 20,000,000 + 10,000 + 1,000 + 10 + 2

Write the value of the underlined digit.

6. 3,3<u>5</u>6,000 — 50,000

7. 45,6<u>8</u>7,909 — 900

8. <u>7</u>0,000,044 — 70,000,000

9. <u>3</u>0,051,218 — 30,000,000

Problem Solving

10. According to one organization, there are about 93,600,000 pet cats and about 77,500,000 pet dogs in the U.S. Are there more pet cats or pet dogs? **Explain** how you know.

Cats; possible explanation: the greatest place value in both numbers is ten millions. Since the number of cats has a 9 in the ten millions place and the number of dogs has a 7, the number of pet cats is greater.

2 PRACTICE

Share and Show • Guided Practice

For Exercise 1, check that students do not use the word *and* when writing numbers in word form ("two hundred *and* ninety-eight thousand") and that they hyphenate correctly (*ninety-eight*, *seventy-six* but not *two-hundred*).

On Your Own • Independent Practice

In Exercises 6–9, encourage students to refer to the place-value chart to solve the problems. First, they should find the place value of the underlined digit. Then they should write the digit with zeros to its right to indicate the value of the digit.

Problem Solving

Math Processes and Practices

UNLOCK THE PROBLEM Help students see that to solve Exercise 10, they must find and compare the place values of the first digits of the numbers. So, 9 ten millions is greater than 7 ten millions.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you read, write, and represent whole numbers through millions? Possible answer: find the place value of each digit in a number using a place-value chart through millions. Use the place values to read, write, and represent the numbers.

Math Journal

Choose a number in the ten millions. Show how to write the number in standard form, word form, and expanded form.

LESSON 7

Decimals and Place Value

LESSON AT A GLANCE

Lesson Objective
Read and write decimals using place value.

Materials
MathBoard

1 TEACH and TALK

Unlock the Problem

Math Processes and Practices

Have students read the problem.

- **How do you read the number 1.06? How do you read the number 1.28?** one and six hundredths; one and twenty-eight hundredths

Explain that in this lesson, students will extend the place-value chart two places to the *right* of the place-value chart to millions they have used before. Point out that the ones place in the chart on page GR15 is the same as the ones place at the right end of the chart on page GR13.

Remind students that the value of each place in place-value charts they have used before is always one-tenth of the value of the place to its left. For example, the value of the hundreds place is one-tenth of the value of the thousands place.

- **How does the value of the tenths place compare to the value of the ones place?** It is one-tenth of the value. **How does the value of the hundredths place compare to the value of the tenths place?** It is one-tenth of the value.

Use **Math Talk** to check students' understanding of the difference between standard form and word form.

This lesson builds on understanding decimal notation to hundredths presented in Chapter 9 and prepares students to use place value to hundredths taught in Grade 5.

Name _____

Decimals and Place Value

Essential Question How can you use place value to read, write, and represent decimals?

CONNECT Decimals, like whole numbers, can be written in standard form, word form, and expanded form.

Unlock the Problem (Real World)

One of the world's tiniest frogs lives in Asia. Adult males range in length from about 1.06 to 1.28 centimeters, about the size of a pea.

You can use a place-value chart to help you understand decimals. Whole numbers are to the left of the decimal point in the place-value chart, and decimal amounts are to the right of the decimal point. The value of each place is one-tenth of the place to its left.

- What decimals do you see in the problem? **1.06 and 1.28**
- The numbers 1.06 and 1.28 are between which two whole numbers? **1 and 2**

Use a place-value chart.

Write each of the decimals on a place-value chart. Be sure to line up each place and the decimal point.

Ones		Tenths	Hundredths
1	.	0	6
1	.	2	8

The place-value position of the digit 8 in 1.28 is hundredths. The value of the digit 8 in 1.28 is 8 hundredths, or $8 \times \frac{1}{100}$ or 0.08.

You can also write 1.28 in word form and expanded form.

Word form: one and twenty-eight hundredths

Expanded form: $1 + 0.2 + 0.08$

Math Talk Mathematical Practices

Explain why 1.28 is not one and twenty-eight tenths in word form.

Try This! **Use place value to read and write the decimal.**

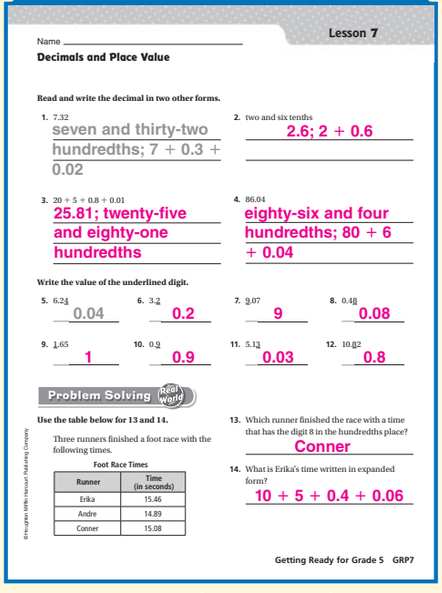
Standard Form: 3.46

Word Form: three and forty-six hundredths

Expanded Form: 3 + 0.4 + 0.06

Possible explanation: because the last digit is in the hundredths place, so it's one and twenty-eight hundredths, not tenths.

GR: Practice, p. GRP7



Name _____ Lesson 7

Decimals and Place Value

Read and write the decimal in two other forms.

1. 7.32 — seven and thirty-two hundredths; 7 + 0.3 + 0.02
2. two and six tenths — 2.6; 2 + 0.6
3. 20 + 5 + 0.8 + 0.01 — 25.81; twenty-five and eighty-one hundredths
4. 86.04 — eighty-six and four hundredths; 80 + 6 + 0.04

Write the value of the underlined digit.

5. 6.24 — 0.04
6. 3.2 — 0.2
7. 9.07 — 9
8. 0.48 — 0.08
9. 1.65 — 1
10. 0.9 — 0.9
11. 5.13 — 0.03
12. 10.82 — 0.8

Problem Solving (Real World)

Use the table below for 13 and 14.

Three runners finished a foot race with the following times.

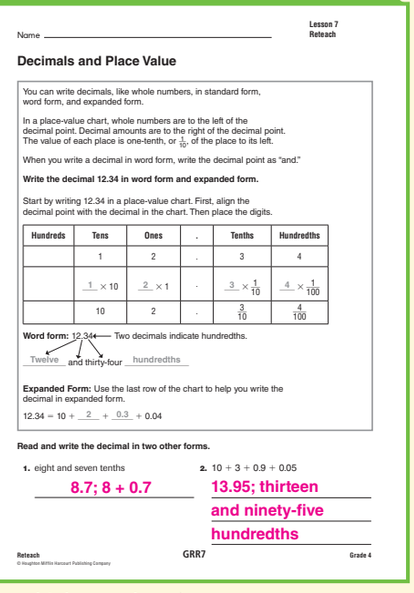
Foot Race Times

Runner	Time (in seconds)
Erika	15.46
Andre	14.89
Conner	15.08

13. Which runner finished the race with a time that has the digit 8 in the hundredths place? Conner
14. What is Erika's time written in expanded form? 10 + 5 + 0.4 + 0.06

Getting Ready for Grade 5 GRP7

GR: Reteach, p. GRR7



Name _____ Lesson 7 Reteach

Decimals and Place Value

You can write decimals, like whole numbers, in standard form, word form, and expanded form.

In a place-value chart, whole numbers are to the left of the decimal point. Decimal amounts are to the right of the decimal point. The value of each place is one-tenth, or $\frac{1}{10}$, of the place to its left.

When you write a decimal in word form, write the decimal point as "and."

Write the decimal 12.34 in word form and expanded form.

Start by writing 12.34 in a place-value chart. First, align the decimal point with the decimal in the chart. Then place the digits.

Hundreds	Tens	Ones	.	Tenths	Hundredths
	1	2	.	3	4
	1 × 10	2 × 1	.	3 × $\frac{1}{10}$	4 × $\frac{1}{100}$
	10	2	.	$\frac{3}{10}$	$\frac{4}{100}$

Word form: 12.34 — Two decimals indicate hundredths. Twelve and thirty-four hundredths

Expanded Form: Use the last row of the chart to help you write the decimal in expanded form.

12.34 = 10 + 2 + 0.3 + 0.04

Read and write the decimal in two other forms.

1. eight and seven tenths — 8.7; 8 + 0.7
2. 10 + 3 + 0.9 + 0.05 — 13.95; thirteen and ninety-five hundredths

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Share and Show

1. Write the decimal 4.06 in word form and expanded form.

Word Form: four and six hundredths

Expanded Form: 4 + 0.06

Read and write the decimal in two other forms.

2. five and two tenths
   5.2; 5 + 0.2

3. 6 + 0.8 + 0.09
   6.89; six and eighty-nine hundredths

On Your Own

Read and write the decimal in two other forms.

4. seven and three hundredths:
   7.03; 7 + 0.03

5. 2 + 0.3 + 0.01
   2.31; two and thirty-one hundredths

Write the value of the underlined digit.

6. 4.5̲6
   0.5

7. 5.0̲9
   0.09

8. 7̲.4
   7

9. 1.3̲2
   0.3

Problem Solving

10. James is 1.63 meters tall. Write James's height in word form.
Explain how you found your answer.
One and sixty-three hundredths; Possible explanation: I wrote the ones place first, and since the last number is in the hundredths place, there are sixty-three hundredths.

11. Ani was told to write the number four and eight hundredths. She wrote 4.8. **Explain** whether or not you think Ani is correct. If you think she is not correct, write the number correctly.
Possible explanation: no, she wrote the 8 in the wrong place value. The number should be 4.08.

2 PRACTICE

Share and Show • Guided Practice

For Exercise 1, help students see that since there is a zero in the tenths place, there are no tenths in either the word or expanded form of 4.06. However, the 6 in the hundredths place indicates that there are *six hundredths* in these forms of the number.

On Your Own • Independent Practice

If students have difficulty with Exercises 6–9, refer them to the place-value chart on page GR15. Have them identify the value of each digit in the given numbers. So, for Exercise 6, the value of the 4 is 4 ones or 4, the value of the 5 is 5 tenths, and the value of the 6 is 6 hundredths.

Problem Solving

Math Processes and Practices

UNLOCK THE PROBLEM Exercise 11 illustrates the importance of identifying the place value of each digit in a number. The 8 is supposed to be in the hundredths place, but Ani wrote it in the tenths place. There are no tenths in the number, so she should have written a zero in the tenths place.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you use place value to read, write, and represent decimals? Possible answer: find the place value of each digit in a number using a place-value chart. Use the place values to read, write, and represent the numbers.

Math Journal

WRITE Math

Choose a number with a decimal in the hundredths. Show how to write the number in standard form, word form, and expanded form.

LESSON 8

Round Decimals

LESSON AT A GLANCE

Lesson Objective
Round decimal amounts, including money amounts, to the nearest whole number or dollar.

Materials
MathBoard

GO DIGITAL iTools: Number Lines

This lesson builds on rounding whole numbers presented in Chapter 1 and prepares students for rounding decimals in Grade 5.

1 TEACH and TALK GO DIGITAL • iTools

Unlock the Problem

Math Processes and Practices

Have students read the problem and discuss how they know a rounded answer is needed.

- **Explain how you find the two whole number benchmarks 1.35 is between.** Possible answer: I know 1.35 is greater than 1 and less than 2, so it is between the benchmarks 1 and 2.
- **How do you know 1.35 rounds to 1?** Possible answer: the point for 1.35 is between 1 and 2. The distance from 1.35 to 1 is less than the distance from 1.35 to 2, so 1.35 rounds to 1.

For Exercise 1, invite students to share their strategies with the class.

For Exercise 2, discuss with students why they can use what they know about rounding decimal amounts to rounding money amounts.

Use **Math Talk** to focus on students' understanding of lesson concepts.

Name _____

Round Decimals

Essential Question How can you round decimal amounts, including amounts of money, to the nearest whole number or dollar?

Unlock the Problem Real World

Ami sells fruits and nuts at an outdoor market. She sold a bag of nuts that weighed 1.35 pounds. About how much did the bag of nuts weigh, rounded to the nearest whole number?

- Underline the information that you need to find.

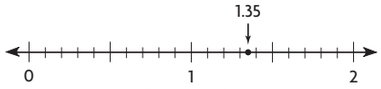
You know that you can use a number line or place value to round whole numbers. You can use the same strategies to round decimals.

Use a number line.

To round a decimal to the nearest whole number, find the whole numbers it is between.

1 < 1.35 < 2

Use a number line to see which whole number 1.35 is closer to.



1.35 is closer to 1 than 2.

So, the bag of nuts weighed about 1 pound.

In both cases, I find two numbers the given number is between. Then I use a number line to find which of the two numbers the given number is closer to.

Math Talk Mathematical Practices

Explain how rounding decimals is like rounding whole numbers.

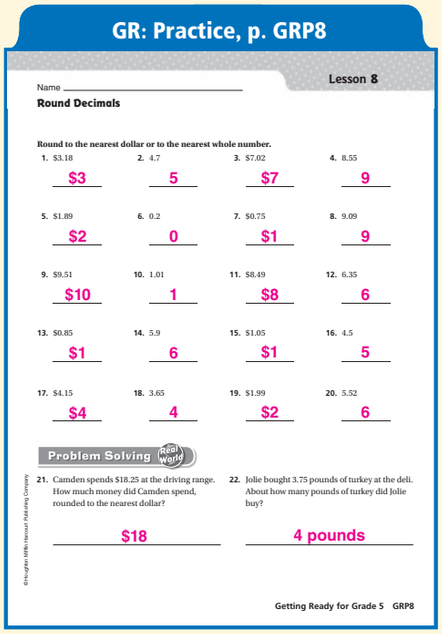
1. **What if** Ami sold a bag of nuts that weighed 2.82 pounds? About how much does the bag weigh, rounded to the nearest whole number?

about 3 pounds

2. **Describe** how you would round $3.90 to the nearest whole dollar.

$3.90 is between $3 and $4. On a number line I can see that $3.90 is closer to $4 than to $3. So, $3.90 rounded to the nearest dollar is $4.

GR: Practice, p. GRP8



Name _____ Lesson 8

Round Decimals

Round to the nearest dollar or to the nearest whole number.

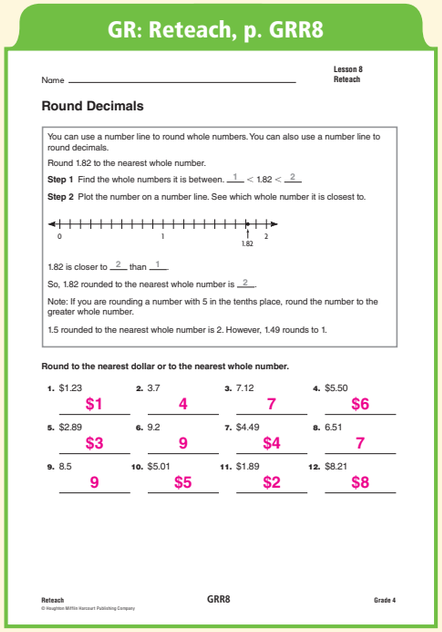
1. $3.18 $3	2. 4.7 5	3. $7.02 $7	4. 8.55 9
5. $1.89 $2	6. 0.2 0	7. $0.75 $1	8. 9.09 9
9. $9.51 $10	10. 1.01 1	11. $8.49 $8	12. 6.35 6
13. $0.85 $1	14. 5.9 6	15. $1.05 $1	16. 4.5 5
17. $4.15 $4	18. 3.65 4	19. $1.99 $2	20. 5.52 6

Problem Solving Real World

21. Camden spends $18.25 at the driving range. How much money did Camden spend, rounded to the nearest dollar? $18

22. Jolie bought 3.75 pounds of turkey at the deli. About how many pounds of turkey did Jolie buy? 4 pounds

GR: Reteach, p. GRR8



Name _____ Lesson 8 Reteach

Round Decimals

You can use a number line to round whole numbers. You can also use a number line to round decimals.

Round 1.82 to the nearest whole number.

Step 1 Find the whole numbers it is between. 1 < 1.82 < 2

Step 2 Plot the number on a number line. See which whole number it is closest to.

1.82 is closer to 2 than 1

So, 1.82 rounded to the nearest whole number is 2

Note: If you are rounding a number with 5 in the tenths place, round the number to the greater whole number.

1.5 rounded to the nearest whole number is 2. However, 1.49 rounds to 1.

Round to the nearest dollar or to the nearest whole number.

1. $1.23 $1	2. 3.7 4	3. 7.12 7	4. $5.50 $6
5. $2.89 $3	6. 9.2 9	7. $4.49 $4	8. 6.51 7
9. 8.5 9	10. $5.01 $5	11. $1.89 $2	12. $8.21 $8

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Share and Show

1. Round $2.67 to the nearest dollar. Locate and mark $2.67 on the number line. Which whole dollar is it closest to? $3

Round to the nearest dollar or to the nearest whole number.

2. $0.78 $1	3. 2.1 2	4. 3.5 4	5. $4.50 $5

On Your Own

Round to the nearest dollar or to the nearest whole number.

6. $1.70 $2	7. 2.2 2	8. $3.99 $4	9. 3.45 3
10. $1.53 $2	11. 0.9 1	12. $0.19 $0	13. 4.38 4

Problem Solving

14. Candice spent $13.55 at the arts and crafts fair. How much money did Candice spend, rounded to the nearest dollar?

$14

15. Mr. Marsh bought 2.25 pounds of American cheese. About how many pounds of cheese did Mr. Marsh buy?

2 pounds

2 PRACTICE

Share and Show • Guided Practice

Use Exercise 1 to check students' understanding of lesson concepts. Discuss with students why their answer will be a whole number dollar amount.

On Your Own • Independent Practice

For Exercises 6–13, ask students to correctly place each amount on a number line before rounding. Point out that number lines can be used to show either money or decimal amounts.

Problem Solving Math Processes and Practices

UNLOCK THE PROBLEM In Exercise 15, be sure students understand that the word "about" suggests that they can find the answer by rounding to the nearest pound.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you round decimal amounts, including amounts of money, to the nearest whole number or dollar? Possible answer: I can find and label the amount on a number line by finding which benchmarks the decimal or money amount is between. I can then compare to find which benchmark the decimal or money amount is closer to.

Math Journal WRITE Math

Describe how to use a number line to round 3.41 to the nearest whole number.

LESSON 9

Place Value to Compare Decimals

LESSON AT A GLANCE

Lesson Objective
Compare decimals to hundredths using place value.

Materials
MathBoard

GO DIGITAL
Animated Math Models
HMH Mega Math

1 TEACH and TALK

GO DIGITAL • Animated Math Models

Unlock the Problem

Math Processes and Practices

Have students read the problem.

- **How do you read the number 0.16? How do you read the number 0.18?** sixteen hundredths; eighteen hundredths

Help students to see the importance of lining up the places when comparing decimals. Show the hummingbird weight and the nickel weight lined up incorrectly.

0. 1 6
0. 1 8

- **A student said that since 1 is greater than the number below it, 0, and 6 is greater than the number below it, 1, then 0.16 is greater than 0.18. Was the student correct? Explain.** No. Possible answer: the student didn't line up the places correctly. As a result, the student compared digits in different places.

Use Math Talk to check students' understanding of using place value to compare decimals.

This lesson builds on comparing to hundredths presented in Chapter 9 and prepares students to compare decimals to thousandths taught in Grade 5.

Name _____

Place Value to Compare Decimals

Essential Question How can you use place value to compare decimals?

Unlock the Problem Real World

Hummingbirds are small, fast, light birds that feed on flowers, trees, and insects. Suppose a particular hummingbird weighs 0.16 ounces. A nickel weighs about 0.18 ounces. Does the hummingbird weigh more or less than a nickel?

- What do you need to do to solve the problem?
  compare the weights
- Circle the numbers you need to compare.

Use a place-value chart.

Write each of the decimals on a place-value chart. Be sure to line up each place and the decimal point. Then compare the numbers in each place.

Ones		Tenths	Hundredths
0	.	1	6
0	.	1	8

$0 = 0$ $\quad 1 = \underline{1}$ $\quad 6 < \underline{8}$

Since 6 $<$ 8, 0.16 $<$ 0.18.

So, the hummingbird weighs **less than** a nickel.

Math Talk Mathematical Practices

Explain why you start comparing the decimals by comparing the ones place.

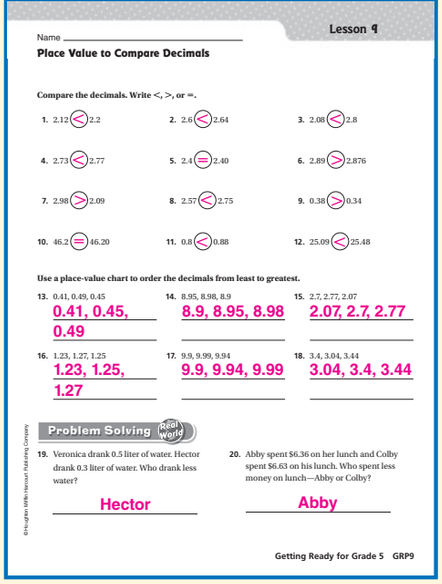
Try This! **Use a place-value chart to compare the decimals.**

Write <, >, or =.

A. 1.32 $<$ 1.34
B. 0.67 $>$ 0.6
C. 0.99 $=$ 0.99

Possible explanation: I compare the ones place first because if the digits are different, then I can tell which decimal is greater or smaller. I work from left to right until I find a place with different digits.

GR: Practice, p. GRP9



Name _____ Lesson 9

Place Value to Compare Decimals

Compare the decimals. Write <, >, or =.

1. 2.12 $<$ 2.2
2. 2.6 $<$ 2.64
3. 2.08 $<$ 2.8
4. 2.73 $<$ 2.77
5. 2.4 $=$ 2.40
6. 2.89 $>$ 2.876
7. 2.98 $>$ 2.09
8. 2.57 $<$ 2.75
9. 0.38 $>$ 0.34
10. 46.2 $=$ 46.20
11. 0.8 $<$ 0.88
12. 25.09 $<$ 25.48

Use a place-value chart to order the decimals from least to greatest.

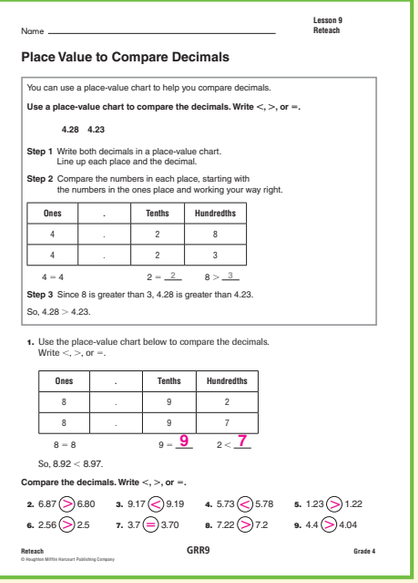
13. 0.41, 0.49, 0.45 — 0.41, 0.45, 0.49
14. 8.95, 8.98, 8.9 — 8.9, 8.95, 8.98
15. 2.7, 2.77, 2.07 — 2.07, 2.7, 2.77
16. 1.23, 1.27, 1.25 — 1.23, 1.25, 1.27
17. 9.9, 9.99, 9.94 — 9.9, 9.94, 9.99
18. 3.4, 3.04, 3.44 — 3.04, 3.4, 3.44

Problem Solving Real World

19. Veronica drank 0.5 liter of water. Hector drank 0.3 liter of water. Who drank less water? Hector
20. Abby spent $6.36 on her lunch and Colby spent $6.63 on his lunch. Who spent less money on lunch—Abby or Colby? Abby

Getting Ready for Grade 5 GRP9

GR: Reteach, p. GRR9



Name _____ Lesson 9 Reteach

Place Value to Compare Decimals

You can use a place-value chart to help you compare decimals.

Use a place-value chart to compare the decimals. Write <, >, or =.

4.28 4.23

Step 1 Write both decimals in a place-value chart. Line up each place and the decimal.

Step 2 Compare the numbers in each place, starting with the numbers in the ones place and working your way right.

Ones	.	Tenths	Hundredths
4	.	2	8
4	.	2	3

4 = 4 $\quad$ 2 = 2 $\quad$ 8 > 3

Step 3 Since 8 is greater than 3, 4.28 is greater than 4.23.

So, 4.28 > 4.23.

1. Use the place-value chart below to compare the decimals. Write <, >, or =.

Ones	.	Tenths	Hundredths
8	.	9	2
8	.	9	7

8 = 8 $\quad$ 9 = 9 $\quad$ 2 < 7

So, 8.92 < 8.97.

Compare the decimals. Write <, >, or =.

2. 6.87 $>$ 6.80
3. 9.17 $<$ 9.19
4. 5.73 $<$ 5.78
5. 1.23 $>$ 1.22
6. 2.56 $>$ 2.5
7. 3.7 $=$ 3.70
8. 7.22 $>$ 7.2
9. 4.4 $>$ 4.04

Reteach

GRR9 Grade 4

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Share and Show

MATH BOARD

1. Use the place-value chart below to compare the decimals. Write <, >, or =.

Ones		Tenths	Hundredths
3	.	0	5
3	.	0	1

3 = 3 0 = 0 5 > 1

So, 3.05 > 3.01.

Compare the decimals. Write <, >, =.

2. 7.24 < 7.42

3. 8.80 < 8.81

4. 0.11 = 0.11

5. 4.33 > 4.31

On Your Own

Compare the decimals. Write <, >, =.

6. 0.04 = 0.04

7. 1.1 < 1.7

8. 0.34 < 0.36

9. 4.04 > 4.01

10. 9.67 > 9.63

11. 1.4 < 1.42

12. 0.02 < 0.2

13. 5.4 = 5.40

Use a place-value chart to order the decimals from least to greatest.

14. 0.59, 0.51, 0.52
0.51, 0.52, 0.59

15. 7.15, 7.18, 7.1
7.1, 7.15, 7.18

16. 1.3, 1.33, 1.03
1.03, 1.3, 1.33

Problem Solving

Real World

17. Jill, Ally, and Maria ran the 50-yard dash. Jill ran the race in 6.87 seconds. Ally ran the race in 6.82 seconds. Maria ran the race in 6.93. Who ran the race the fastest? **Explain** how you can use a place-value chart to find the answer.

Ally; Possible explanation: I used a place-value chart to line up the numbers. Then I compared each place.

2 PRACTICE

MATH BOARD

Share and Show • Guided Practice

For Exercise 1, be sure students understand why the numbers 3.05 and 3.01 are written in the chart as they are.

If students have difficulty with Exercises 2–5, have them compare digits left to right, reading them aloud. So, for Exercise 2, the student can say, "7 is equal to 7, 2 is less than 4," and stop there, having found the first place where the digits are not equal. Since 2 is less than 4, $7.24 < 7.42$.

On Your Own • Independent Practice

For Exercises 6–13, suggest that students use a place-value chart to compare the two numbers in each exercise.

Problem Solving

Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 17, be sure students understand that the runner who ran *fastest* was the one who completed the race in the *least* amount of time. Since $6.82 < 6.87 < 6.93$, the runner with a time of 6.82 ran the fastest race.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you use place value to compare decimals? Possible answer: write the decimals in a place-value chart, being careful to line up the places correctly. Then compare the digits left to right.

Math Journal

WRITE Math

Write two numbers between 2 and 3, writing each number to hundredths. Then explain how you can use place value to compare the decimals.

LESSON 10

Decompose Multiples of 10, 100, 1,000

LESSON AT A GLANCE

Lesson Objective
Decompose multiples of 10, 100, and 1,000.

Materials
MathBoard

This lesson builds on relating factors and multiples presented in Chapters 2 and 5 and prepares students for multiplication patterns taught in Grade 5.

1 TEACH and TALK

Unlock the Problem

Math Processes and Practices

Have students read the problem. If they aren't sure what they are being asked to find, restate the question as, "What number must you multiply the height of the model by to produce the height of the building?"

One Way

- **What does the word "decompose" mean in the sentence "Decompose 1,200"?** Possible answer: express 1,200 as a product of its factors.

Help students write the unknown factor in each equation using mental math and a pattern.

- **Compare the total number of zeros in the factors to the number of zeros in the product 1,200.** Possible answer: for each equation, the total number of zeros in the factors is the same as the number of zeros in the product 1,200.
- **How can you decompose the following numbers: 90; 900; 9,000?** 9 × 10; 9 × 100; 9 × 1,000

Another Way

- **Decompose 120 using place value.** 120 = 12 tens = 12 × 10

Use **Math Talk** to check students' understanding of factors and multiples.

Name _____

Decompose Multiples of 10, 100, 1,000

Essential Question How can you find factors of multiples of 10, 100, and 1,000?

Unlock the Problem Real World

Architects make scale models of buildings before they build the real thing. The height of an actual building is going to be 1,200 feet. The scale model is 12 feet tall. How many times the height of the model is the height of the actual building?

- What do you need to find?
  factors of 1,200
- Circle the numbers you need to use to solve the problem.

You can decompose a multiple of 10, 100, or 1,000 by finding factors.

One Way Use mental math and a pattern.

Decompose 1,200.

1,200 = **1,200** × 1

1,200 = **120** × 10

1,200 = **12** × 100

So, the building is 100 times the height of the model.

Remember
A multiple of 10, 100, or 1,000 is a number that has a factor of 10, 100, or 1,000.

Another Way Use place value.

Decompose 1,200.

1,200 = 12 hundreds = 12 × **100**

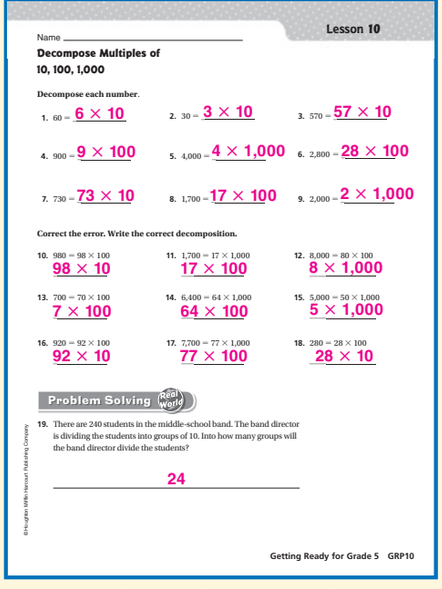
So, 1,200 = 12 × 100.

Math Talk Mathematical Practices
Explain the difference between factors and multiples.

- Explain how you use mental math and a pattern to find factors of multiples of 10, 100, or 1,000.
  Possible explanation: I use mental math and a pattern to find a factor that when multiplied will result in a multiple with the correct place value.

Possible explanation: Factors are multiplied to get a product. A multiple is a product of factors.

GR: Practice, p. GRP10



Name _____ Lesson 10

Decompose Multiples of 10, 100, 1,000

Decompose each number.

1. 60 = 6 × 10
2. 30 = 3 × 10
3. 570 = 57 × 10
4. 900 = 9 × 100
5. 4,000 = 4 × 1,000
6. 2,800 = 28 × 100
7. 730 = 73 × 10
8. 1,700 = 17 × 100
9. 2,000 = 2 × 1,000

Correct the error. Write the correct decomposition.

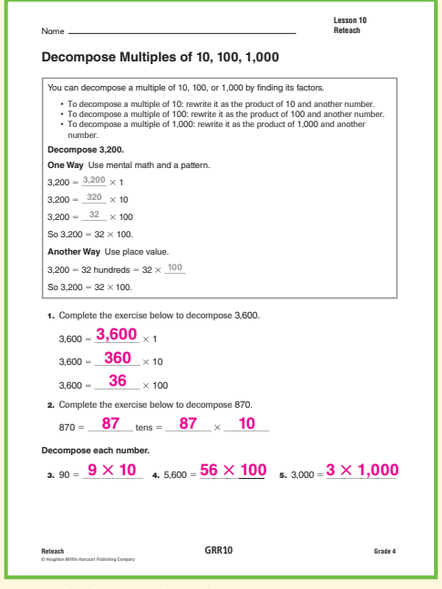
10. 980 = 98 × 100 → 98 × 10
11. 1,700 = 17 × 1,000 → 17 × 100
12. 8,000 = 80 × 100 → 8 × 1,000
13. 700 = 70 × 100 → 7 × 100
14. 6,400 = 64 × 1,000 → 64 × 100
15. 5,000 = 50 × 1,000 → 5 × 1,000
16. 920 = 92 × 100 → 92 × 10
17. 7,700 = 77 × 1,000 → 77 × 100
18. 280 = 28 × 100 → 28 × 10

Problem Solving Real World

19. There are 240 students in the middle-school band. The band director is dividing the students into groups of 10. Into how many groups will the band director divide the students?
    24

Getting Ready for Grade 5 GRP10

GR: Reteach, p. GRR10



Name _____ Lesson 10 Reteach

Decompose Multiples of 10, 100, 1,000

You can decompose a multiple of 10, 100, or 1,000 by finding its factors.

- To decompose a multiple of 10: rewrite it as the product of 10 and another number.
- To decompose a multiple of 100: rewrite it as the product of 100 and another number.
- To decompose a multiple of 1,000: rewrite it as the product of 1,000 and another number.

Decompose 3,200.

One Way Use mental math and a pattern.

3,200 = 3,200 × 1

3,200 = 320 × 10

3,200 = 32 × 100

So 3,200 = 32 × 100.

Another Way Use place value.

3,200 = 32 hundreds = 32 × 100

So 3,200 = 32 × 100.

1. Complete the exercise below to decompose 3,600.
   3,600 = 3,600 × 1
   3,600 = 360 × 10
   3,600 = 36 × 100
2. Complete the exercise below to decompose 870.
   870 = 87 tens = 87 × 10

Decompose each number.

3. 90 = 9 × 10
4. 5,600 = 56 × 100
5. 3,000 = 3 × 1,000

Reteach © Houghton Mifflin Harcourt Publishing Company GRR10 Grade 4

*GR – Getting Ready Lessons and Resources (*www.thinkcentral.com*)

Share and Show

1. Complete the exercise below to decompose 2,800.

2,800 = 2,800 × 1

2,800 = 280 × 10

2,800 = 28 × 100

2. Complete the exercise below to decompose 930.

930 = 93 tens = 93 × 10

Decompose each number. Possible answers are given.

3. 80 = 8 × 10

4. 320 = 32 × 10

5. 8,000 = 8 × 1,000

On Your Own

Decompose each number. Possible answers are given.

6. 90 = 9 × 10

7. 40 = 4 × 10

8. 890 = 89 × 10

9. 300 = 3 × 100

10. 7,000 = 7 × 1,000

11. 3,700 = 37 × 100

Correct the error. Write the correct decomposition. Possible answers are given.

12. 560 = 56 × 100
56 × 10

13. 4,300 = 43 × 1,000
43 × 100

14. 6,000 = 60 × 10
6 × 1,000

Problem Solving

15. Jon goes to the bank with $990. How many ten-dollar bills can he get? Show how you found your answer.

99; Possible answer: 99 × 1 = 99; 99 × 10 = 990

2 PRACTICE

Share and Show • Guided Practice

For Exercise 1, help students use mental math and a pattern to find each unknown factor. Before starting, ask students to determine the total number of zeros that will be in the factors of each equation. For Exercise 3, students may wonder why the answer, 8 × 10, is not broken down further to 2 × 2 × 2 × 2 × 5. Assure them that doing so would not be wrong, but that in these exercises, they should look for just two factors, one of them a multiple of 10. A similar explanation applies to Exercises 4–5 as well.

On Your Own • Independent Practice

For Exercises 12–14, students can check their answers by confirming that there are the same number of zeros in their answers as there are in the numbers on the left side of the equations.

Problem Solving Math Processes and Practices

UNLOCK THE PROBLEM Exercise 15 asks students to apply what they have learned to a real-world problem involving a multiple of 10, namely a $10 bill.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you find factors of multiples of 10, 100, and 1,000? Possible answer: decompose the number using either mental math and a pattern or place value.

Math Journal WRITE Math

Decompose 5,900, where one factor is 10, 100, or 1,000. Explain your reasoning.

LESSON 11

Number Patterns

LESSON AT A GLANCE

Lesson Objective
Use multiplication to describe patterns.

Materials
MathBoard

GO DIGITAL Animated Math Models

1 TEACH and TALK

GO DIGITAL • Animated Math Models

Unlock the Problem

Math Processes and Practices

Give students an opportunity to describe patterns they have seen, such as skip counting by 3s or reciting the first 5 even numbers.

Have students read the problem.

- **In Step 1, how do you know that "Multiply by 2" describes the sequence?** Possible answer: I can get from each term to the next one by multiplying by 2.
- **Give another pattern that you can describe with the rule "Multiply by 2."** Possible answer: 5, 10, 20, 40

Be sure students understand that a rule describes a pattern only if it gives a method for getting from each number in the pattern to the next number.

- **Blythe said that "Multiply by 3" describes the pattern 2, 6, 10, 14. Was she right?** No. Possible answer: it is true that you can get from 2 to 6 by multiplying by 3. But the rule fails after that. 6×3 is not equal to 10, and 10×3 is not equal to 14.

Use **Math Talk** to check students' understanding of finding rules to describe sequences.

This lesson builds on creating number patterns presented in Chapter 5 and prepares students for describing and continuing number patterns taught in Grade 5.

Name _____

Number Patterns

Essential Question How can you use multiplication to describe a pattern?

Unlock the Problem Real World

You know how to use a rule and a first term to write a sequence. Now, you will describe a sequence using a rule.

- Do the numbers in the sequence increase or decrease? **increase**
- Underline the information you need to find.

Describe a pattern.

A scientist counts the number of lily pads in a pond each day. She records the number of lily pads in the table below. How many lily pads will be in the pond on days 5 and 6?

Day	1	2	3	4
Lilly Pads	8	16	32	64

STEP 1 Describe the sequence.

THINK: How do I get from one term to the next?

Try multiplying by 2 since $8 \times 2 = 16$.

× 2 × 2 × 2

8, 16, 32, 64

Possible explanation: I can add 8 to 8 to get 16, but if I add 8 to 16, I get 24. Since the next number in the pattern is 32, adding 8 isn't the rule.

Math Talk Mathematical Practices

Explain how you know the rule isn't add 8.

Write a rule to describe the number of lily pads in the pond.

RULE: Multiply by 2

STEP 2 Find the next two terms in the sequence.

× 2 × 2 × 2 × 2 × 2

8, 16, 32, 64, 128, 256

So, there will be 128 lily pads on day 5 and 256 lily pads on day 6.

GR: Practice, p. GRP11

Name _____ Lesson 11

Number Patterns

Describe the pattern. Then find the next two numbers in the pattern.

1. 4, 12, 36, 108, 324, 972 — Multiply by 3.
2. 14, 28, 56, 112, 224, 448 — Multiply by 2.
3. 2, 8, 32, 128, 512, 2,048 — Multiply by 4.
4. 1, 5, 25, 125, 625, 3,125 — Multiply by 5.

Determine the pattern and use it to fill in the blanks.

5. 1, 6, 36, 216, 1,296
6. 2, 6, 18, 54, 162
7. 3, 12, 48, 192, 768
8. 4, 12, 36, 108, 324
9. 1, 2, 4, 8, 16
10. 5, 20, 80, 320, 1,280

Problem Solving Real World

11. Pippen works at an aquarium. Each month, she counts the number of fish in one of the aquariums. She records the total number of fish in the table below. If the pattern continues, how many fish will be in the aquarium in Months 6 and 7?

Month	1	2	3	4	5
Number of Fish	4	8	16	32	64

128 in Month 6; 256 in Month 7

Getting Ready for Grade 5 GRP11

GR: Reteach, p. GRR11

Name _____ Lesson 11 Reteach

Number Patterns

You already know how to use a rule and the first term to write a sequence. Now you will use multiplication to describe a pattern.

Stephen is saving his money to buy a car. The table shows how much money he has saved at the end of each month. If the pattern continues, how much money will Stephen have saved after months 5 and 6?

Number of Months	1	2	3	4
Total Amount Saved ($)	15	30	60	120

Step 1 Describe the sequence.

Think: How do I get from one term to the next?

Try multiplying by 2, since $15 \times 2 = 30$.

× 2 × 2 × 2

15, 30, 60, 120

Step 2 Write a rule that describes how much money Stephen has saved at the end of each month.

Rule: Multiply by 2.

Step 3 Use the rule to find the next two terms in the sequence.

× 2 × 2 × 2 × 2 × 2

15, 30, 60, 120, 240, 480

So, at the end of month 5, Stephen will have saved $240. At the end of month 6, have will have saved $480.

Describe the pattern. Then find the next two numbers in the pattern.

1. 2, 10, 50, 250, 1,250 — Multiply by 5.
2. 2, 6, 18, 54, 162 — Multiply by 3.

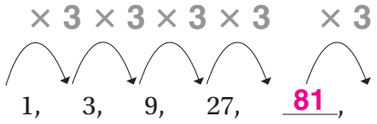
Reteach GRR11 Grade 4

*GR – Getting Ready Lessons and Resources (*www.thinkcentral.com*)

Share and Show

MATH BOARD

1. Find the next two numbers in the pattern below.



Describe the pattern. Then find the next two numbers in the pattern.

2. 1, 2, 4, 8, 16, 32
Multiply by 2.

3. 7, 14, 28, 56, 112, 224
Multiply by 2.

On Your Own

Describe the pattern. Then find the next two numbers in the pattern.

4. 1, 4, 16, 64, 256, 1,024
Multiply by 4.

5. 2, 6, 18, 54, 162, 486
Multiply by 3.

Determine the pattern and use it to fill in the blanks.

6. 1, 5, 25, 125, 625

7. 3, 6, 12, 24, 48

8. 2, 8, 32, 128, 512

Problem Solving

Real World

9. A clothing store starts selling a new type of sneaker. The table shows the number of pairs of sneakers sold in the first four weeks. If the pattern continues, how many pairs of sneakers will the store sell in weeks 5 and 6? **Explain.**

Week	1	2	3	4
Pairs Sold	5	10	20	40

80 pairs in week 5 and 160 pairs in week 6; possible explanation: I used the pattern multiply by 2.

Getting Ready Lessons and Resources, pp. GR25–GR26

Checkpoint

Name _____

Checkpoint

Concepts and Skills

Round to the nearest whole dollar or to the nearest whole number.

1. $7.23 $7
2. 2.89 3
3. 0.52 1
4. $9.49 $9

Compare the decimals. Write <, >, or =.

5. 0.6 = 0.60
6. 5.08 < 5.80
7. 8.14 < 8.17
8. 7.37 > 7.32

Read and write the numbers in two other forms.

9. seventy-five million, three hundred thousand, two hundred seven
75,300,207; 70,000,000 + 5,000,000 + 300,000 + 200 + 7

10. 30,000,000 + 40,000 + 6,000 + 20 + 2
30,046,022; thirty million, forty-six thousand, twenty-two

Decompose each number.

11. 20 = 2 × 10
12. 740 = 74 × 10
13. 6,000 = 6 × 1,000

Problem Solving

Real World

14. A new music website is keeping track of the number of members that join. The table shows the number of members in the first four days. If the pattern continues, how many members will the website have on day 6? **Explain** how you found your answer.

Day	1	2	3	4
Members	5	15	45	135

1,215; I used the pattern "multiply by 3" to find the number of members on day 6.

15. A particular female Asian elephant weighs 4.63 tons. What is this decimal written in word form?
(A) four and sixty-three tenths
(B) four and sixty-three hundredths
(C) four hundred and sixty-three
(D) four and sixty-three thousandths

16. Joe, Adam, Michael, and Carl all work at an office. Joe earns $15.53 per hour. Adam earns $15.59 per hour. Carl earns $15.95 per hour. Michael earns $15.91. Who earns the most money per hour?
(A) Joe
(B) Adam
(C) Carl
(D) Michael

17. Which number is ninety-eight million, forty thousand, six hundred fifty three written in another form?
(A) 98,040,653
(B) 98,400,653
(C) 98,046,053
(D) 98,40,653

18. Which rule describes the pattern below?
3, 12, 48, 192
(A) Multiply by 2.
(B) Multiply by 3.
(C) Add 9.
(D) Multiply by 4.

2 PRACTICE

MATH BOARD

Share and Show • Guided Practice

As students begin Exercises 1–3, stress that the rule they find must allow them to get from each number in the sequence to the next number.

On Your Own • Independent Practice

To solve Exercise 8, students may have to try several possible rules. To help them get started, you might ask if "Multiply by 2" is the rule. Help them to see that it cannot be the rule, because $2 \times 2 = 4$ and $4 \times 2 = 8$. So, for the rule "Multiply by 2," the third term in the sequence is 8, not 32. Encourage them to try other possible rules until they find the one that allows them to get from each term in the sequence to the next term.

Problem Solving

Math Processes and Practices

UNLOCK THE PROBLEM Exercise 9 asks students to apply what they have learned to a real-world problem. They should try possible rules until they find the correct one, "Multiply by 2," then use it to find the fifth and sixth terms of the sequence.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you use multiplication to describe a pattern? Possible answer: I look for a factor that allows me to get from each term in the sequence to the next term. The pattern is to multiply by the factor that I find.

Math Journal

WRITE Math

Find the next term in the sequence 3, 12, 48, 192. Explain how you found the term.

Getting Ready for Grade 5 Test

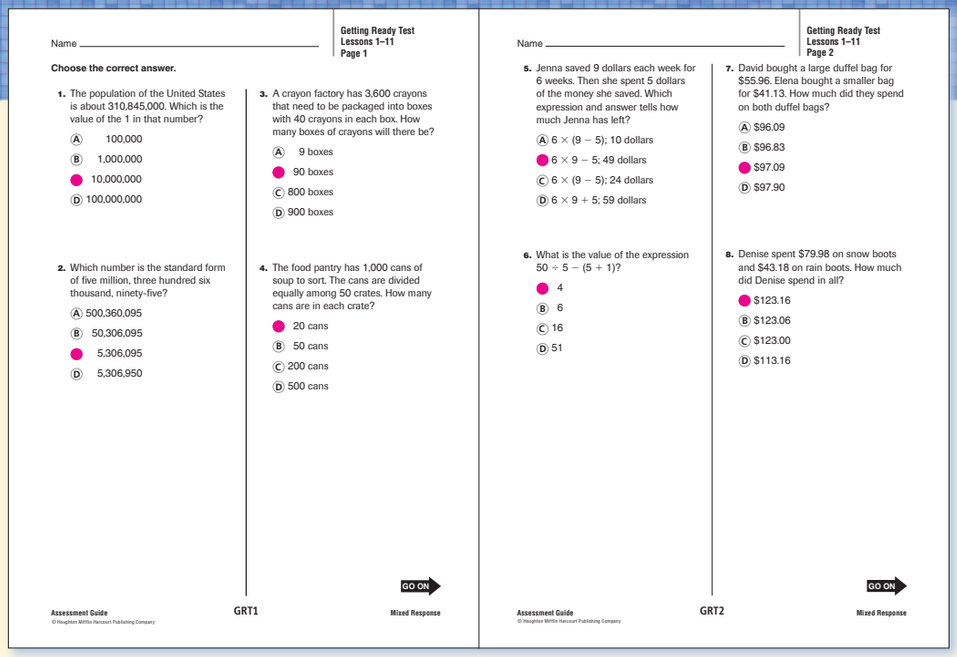
LESSONS 1 TO 11

Summative Assessment

Use the **Getting Ready Test** to assess students' progress in Getting Ready for Grade 5 Lessons 1–11.

Getting Ready Tests are provided in multiple-choice and mixed-response format in the *Getting Ready Lessons and Resources*.

GO DIGITAL Getting Ready Test is available online.



Name _____ Getting Ready Test Lessons 1–11 Page 1

Choose the correct answer.

1. The population of the United States is about 310,845,000. Which is the value of the 1 in that number?
   - (A) 100,000
   - (B) 1,000,000
   - (C) 10,000,000
   - (D) 100,000,000

2. Which number is the standard form of five million, three hundred six thousand, ninety-five?
   - (A) 500,360,095
   - (B) 50,306,095
   - (C) 5,306,095
   - (D) 5,306,950

3. A crayon factory has 3,600 crayons that need to be packaged into boxes with 40 crayons in each box. How many boxes of crayons will there be?
   - (A) 9 boxes
   - (B) 90 boxes
   - (C) 800 boxes
   - (D) 900 boxes

4. The food pantry has 1,000 cans of soup to sort. The cans are divided equally among 50 crates. How many cans are in each crate?
   - (A) 20 cans
   - (B) 50 cans
   - (C) 200 cans
   - (D) 500 cans

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Name _____ Getting Ready Test Lessons 1–11 Page 2

5. Jenna saved 9 dollars each week for 6 weeks. Then she spent 5 dollars of the money she saved. Which expression and answer tells how much Jenna has left?
   - (A) 6 × (9 − 5); 10 dollars
   - (B) 6 × 9 − 5; 49 dollars
   - (C) 6 × (9 − 5); 24 dollars
   - (D) 6 × 9 + 5; 59 dollars

6. What is the value of the expression 50 ÷ 5 − (5 + 1)?
   - (A) 4
   - (B) 6
   - (C) 16
   - (D) 51

7. David bought a large duffel bag for $55.96. Elena bought a smaller bag for $41.13. How much did they spend on both duffel bags?
   - (A) $96.09
   - (B) $96.83
   - (C) $97.09
   - (D) $97.90

8. Denise spent $79.98 on snow boots and $43.18 on rain boots. How much did Denise spend in all?
   - (A) $123.16
   - (B) $123.06
   - (C) $123.00
   - (D) $113.16

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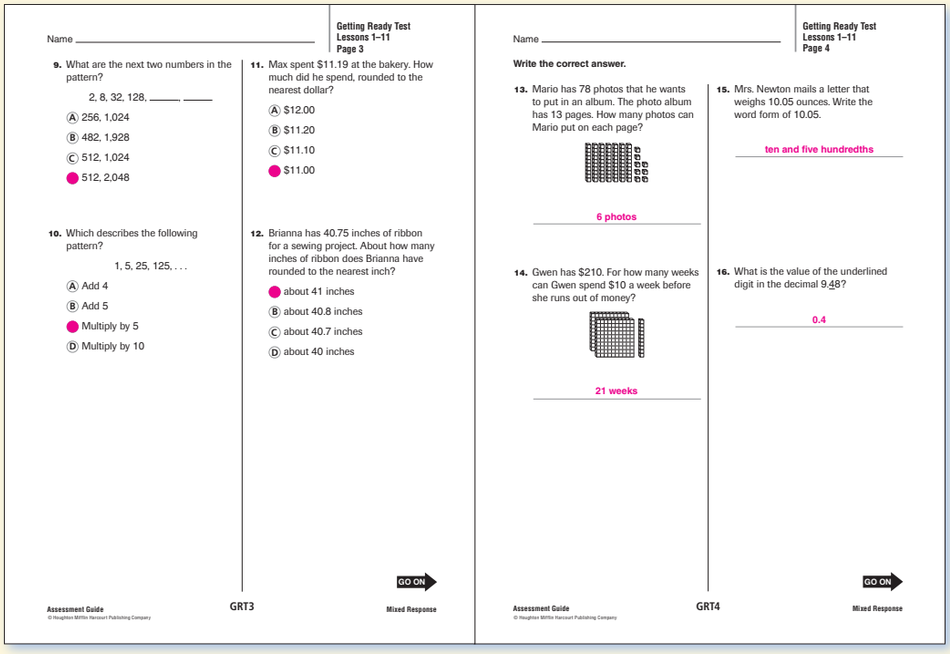

Name _____ Getting Ready Test Lessons 1–11 Page 3

9. What are the next two numbers in the pattern?
   2, 8, 32, 128, ____, ____
   - (A) 256, 1,024
   - (B) 482, 1,928
   - (C) 512, 1,024
   - (D) 512, 2,048

10. Which describes the following pattern?
    1, 5, 25, 125, . . .
    - (A) Add 4
    - (B) Add 5
    - (C) Multiply by 5
    - (D) Multiply by 10

11. Max spent $11.19 at the bakery. How much did he spend, rounded to the nearest dollar?
    - (A) $12.00
    - (B) $11.20
    - (C) $11.10
    - (D) $11.00

12. Brianna has 40.75 inches of ribbon for a sewing project. About how many inches of ribbon does Brianna have rounded to the nearest inch?
    - (A) about 41 inches
    - (B) about 40.8 inches
    - (C) about 40.7 inches
    - (D) about 40 inches

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Name _____ Getting Ready Test Lessons 1–11 Page 4

Write the correct answer.

13. Mario has 78 photos that he wants to put in an album. The photo album has 13 pages. How many photos can Mario put on each page?
    6 photos

14. Gwen has $210. For how many weeks can Gwen spend $10 a week before she runs out of money?
    21 weeks

15. Mrs. Newton mails a letter that weighs 10.05 ounces. Write the word form of 10.05.
    ten and five hundredths

16. What is the value of the underlined digit in the decimal 9.48?
    0.4

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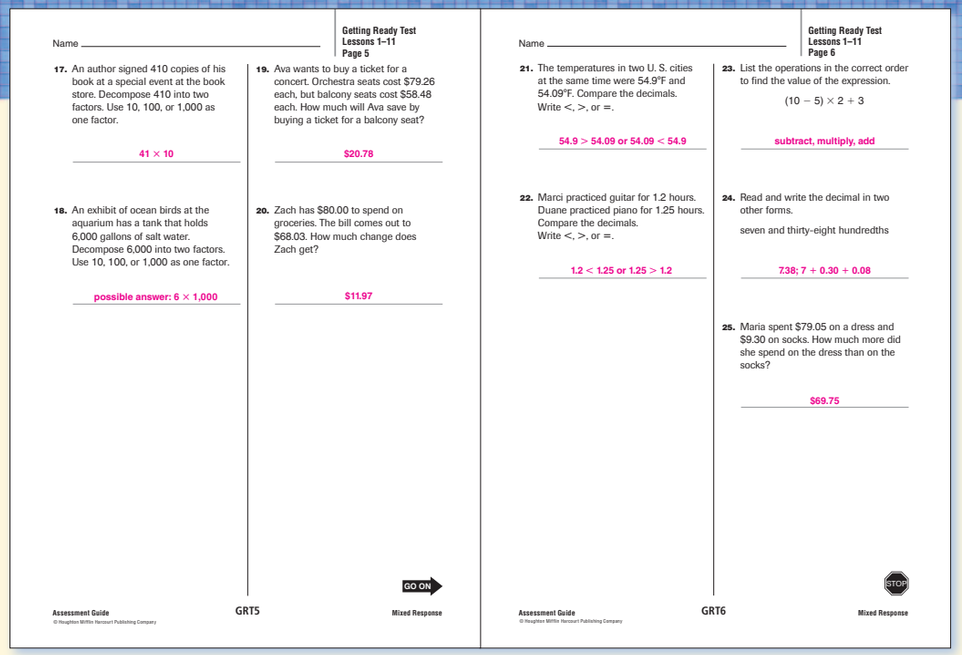
Data-Driven Decision Making RtI

Item	Lesson	Common Error	Intervene With
1, 2	6	May not understand the place value of numbers to ten millions	R—GRR6
3, 4	4	May not understand how to use patterns to divide by multiples of ten	R—GRR4
5, 6, 23	3	May not understand how to use the order of operations to find the value of expressions	R—GRR3
7, 8	1	May not understand how to find sums of decimal amounts in dollars and cents	R—GRR1
9, 10	11	May not understand how to use multiplication to describe a pattern	R—GRR11
11, 12	8	May be unable to round decimals, including amounts of money, to the nearest whole number or dollar	R—GRR8

Key: R—Getting Ready Lessons and Resources: Reteach



Name _____ Getting Ready Test Lessons 1–11 Page 5

17. An author signed 410 copies of his book at a special event at the book store. Decompose 410 into two factors. Use 10, 100, or 1,000 as one factor.

41 × 10

18. An exhibit of ocean birds at the aquarium has a tank that holds 6,000 gallons of salt water. Decompose 6,000 into two factors. Use 10, 100, or 1,000 as one factor.

possible answer: 6 × 1,000

19. Ava wants to buy a ticket for a concert. Orchestra seats cost $79.26 each, but balcony seats cost $58.48 each. How much will Ava save by buying a ticket for a balcony seat?

$20.78

20. Zach has $80.00 to spend on groceries. The bill comes out to $68.03. How much change does Zach get?

$11.97

GO ON

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Name _____ Getting Ready Test Lessons 1–11 Page 6

21. The temperatures in two U. S. cities at the same time were 54.9°F and 54.09°F. Compare the decimals. Write <, >, or =.

54.9 > 54.09 or 54.09 < 54.9

22. Marci practiced guitar for 1.2 hours. Duane practiced piano for 1.25 hours. Compare the decimals. Write <, >, or =.

1.2 < 1.25 or 1.25 > 1.2

23. List the operations in the correct order to find the value of the expression.

(10 − 5) × 2 + 3

subtract, multiply, add

24. Read and write the decimal in two other forms.

seven and thirty-eight hundredths

7.38; 7 + 0.30 + 0.08

25. Maria spent $79.05 on a dress and $9.30 on socks. How much more did she spend on the dress than on the socks?

$69.75

STOP

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Portfolio Suggestions

The portfolio represents the growth, talents, achievements, and reflections of the mathematics learner. Students might spend a short time selecting work samples for their portfolios.

You may want to have students respond to the following questions:

- What new understanding of math have I developed in the past several weeks?
- What growth in understanding or skills can I see in my work?
- What can I do to improve my understanding of math ideas?
- What would I like to learn more about?

For information about how to organize, share, and evaluate portfolios, see the *Chapter Resources*.

Data-Driven Decision Making

RtI

Item	Lesson	Common Error	Intervene With
13, 14	5	May not understand how to use models to divide	**R**—GRR5
15, 16, 24	7	May not understand how to use place value to read, write, and represent decimals	**R**—GRR7
17, 18	10	May not be able to find the factors of multiples of 10, 100, and 1,000	**R**—GRR10
19, 20, 25	2	May not understand how to find differences of decimal amounts in dollars and cents	**R**—GRR2
21, 22	9	May not understand how to use place value to compare decimals	**R**—GRR9

Key: R—Getting Ready Lessons and Resources: Reteach

LESSON 12

Add Related Fractions

LESSON AT A GLANCE

Lesson Objective
Add fractions when one denominator is a multiple of the other.

Materials
MathBoard, Fraction Strips (see *eTeacher Resources*)

GO DIGITAL
*i*Tools: Fractions
HMH Mega Math

1 TEACH and TALK GO DIGITAL • *i*Tools

Activity Math Processes and Practices

Invite students to read and discuss the first paragraph. Then distribute the fraction strips and have students model the problem as shown in Step 1. Discuss Step 2.

- **Why do you need to show $\frac{1}{2}$ using $\frac{1}{6}$ strips?**
  Possible answer: I need to add equal-size pieces. I can show $\frac{1}{2}$ using $\frac{1}{6}$ pieces. Then I can find how many $\frac{1}{6}$ pieces there are in all.

Direct students' attention to Step 3.

- **Describe how you add the fractions.**
  Possible answer: add the numerators: 3 + 2 = 5; keep the denominator the same: 6.

Have students discuss the sizes of the $\frac{1}{2}$ and the $\frac{1}{6}$ pieces and the relationship between the denominators of the fractions. They should notice that the $\frac{1}{2}$ piece is three times the size of the $\frac{1}{6}$ piece, and the $\frac{1}{6}$ piece is one third the size of the $\frac{1}{2}$ piece. Guide students to see that 6 is a multiple of 2.

This lesson builds on adding fractions with like denominators presented in Chapter 7 and prepares students for adding fractions with unlike denominators taught in Grade 5.

Name _____

Add Related Fractions

Essential Question How can you add fractions when one denominator is a multiple of the other?

When you add fractions, you find how many equal-size pieces there are in all. The denominator shows the size of the pieces. To add fractions with denominators that are not the same, first find equivalent fractions with the same denominator.

Activity

Materials ■ fraction strips

Find $\frac{1}{2} + \frac{2}{6}$.

STEP 1 Model the problem.

Think: To add fractions, you need to count equal size pieces. The $\frac{1}{2}$ strip and the $\frac{1}{6}$ strip are different sizes.

STEP 2 Show $\frac{1}{2}$ using $\frac{1}{6}$ strips.

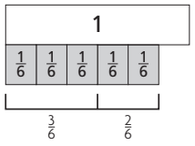
$\frac{1}{2} = \frac{3}{6}$

STEP 3 Add. Use the equivalent fraction you found. Find $\frac{3}{6} + \frac{2}{6}$.

How many $\frac{1}{6}$ strips are there?
5

Write the sum. $\frac{3}{6} + \frac{2}{6} =$ $\frac{5}{6}$

So, $\frac{1}{2} + \frac{2}{6} =$ $\frac{5}{6}$.



- **Describe** how the sizes of the $\frac{1}{2}$ strip and the $\frac{1}{6}$ strip compare. Then describe how the denominators of the fractions $\frac{1}{2}$ and $\frac{1}{6}$ are related.

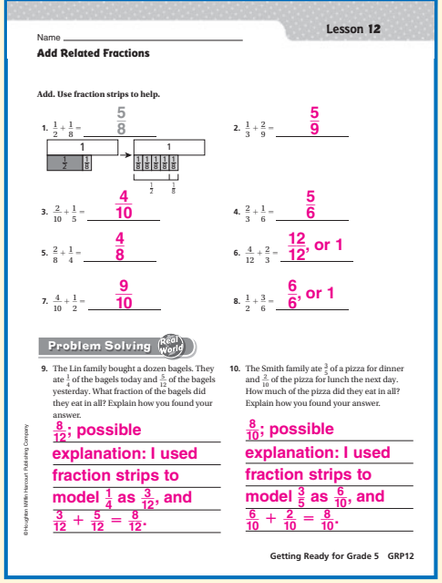
Possible explanation: the $\frac{1}{2}$ strip is three times the size of the $\frac{1}{6}$ strip. The denominator 6 is three times the denominator 2.

Possible explanation: one $\frac{1}{2}$ strip is the same length as three $\frac{1}{6}$ strips.

Math Talk Mathematical Practices

Explain how you know $\frac{1}{2}$ and $\frac{3}{6}$ are equivalent fractions.

GR: Practice, p. GRP12



Name _____ Lesson 12

Add Related Fractions

Add. Use fraction strips to help.

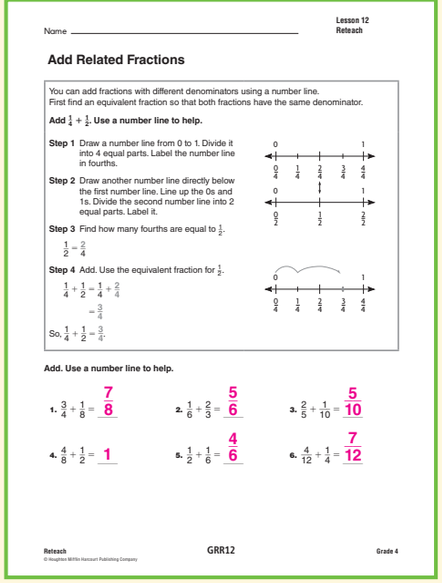
1. $\frac{1}{2} + \frac{1}{8} =$ $\frac{5}{8}$
2. $\frac{1}{3} + \frac{2}{9} =$ $\frac{5}{9}$
3. $\frac{2}{10} + \frac{1}{5} =$ $\frac{4}{10}$
4. $\frac{2}{3} + \frac{1}{6} =$ $\frac{5}{6}$
5. $\frac{2}{8} + \frac{1}{4} =$ $\frac{4}{8}$
6. $\frac{4}{12} + \frac{2}{3} =$ $\frac{12}{12}$, or 1
7. $\frac{4}{10} + \frac{1}{2} =$ $\frac{9}{10}$
8. $\frac{1}{2} + \frac{3}{6} =$ $\frac{6}{6}$, or 1

Problem Solving Real World

9. The Lin family bought a dozen bagels. They ate $\frac{1}{4}$ of the bagels today and $\frac{5}{12}$ of the bagels yesterday. What fraction of the bagels did they eat in all? Explain how you found your answer.
   $\frac{8}{12}$; possible explanation: I used fraction strips to model $\frac{1}{4}$ as $\frac{3}{12}$, and $\frac{3}{12} + \frac{5}{12} = \frac{8}{12}$.
10. The Smith family ate $\frac{3}{5}$ of a pizza for dinner and $\frac{2}{10}$ of the pizza for lunch the next day. How much of the pizza did they eat in all? Explain how you found your answer.
    $\frac{8}{10}$; possible explanation: I used fraction strips to model $\frac{3}{5}$ as $\frac{6}{10}$, and $\frac{6}{10} + \frac{2}{10} = \frac{8}{10}$.

Getting Ready for Grade 5 GRP12

GR: Reteach, p. GRR12



Name _____ Lesson 12 Reteach

Add Related Fractions

You can add fractions with different denominators using a number line. First find an equivalent fraction so that both fractions have the same denominator.

Add $\frac{1}{4} + \frac{1}{2}$. Use a number line to help.

Step 1 Draw a number line from 0 to 1. Divide it into 4 equal parts. Label the number line in fourths.

Step 2 Draw another number line directly below the first number line. Line up the 0s and 1s. Divide the second number line into 2 equal parts. Label it.

Step 3 Find how many fourths are equal to $\frac{1}{2}$.

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

Step 4 Add. Use the equivalent fraction for $\frac{1}{2}$.

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

$= \frac{3}{4}$

So, $\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$.

Add. Use a number line to help.

1. $\frac{3}{4} + \frac{1}{8} =$ $\frac{7}{8}$
2. $\frac{1}{6} + \frac{2}{3} =$ $\frac{5}{6}$
3. $\frac{2}{5} + \frac{1}{10} =$ $\frac{5}{10}$
4. $\frac{4}{8} + \frac{1}{2} =$ 1
5. $\frac{1}{2} + \frac{1}{6} =$ $\frac{4}{6}$
6. $\frac{4}{12} + \frac{1}{4} =$ $\frac{7}{12}$

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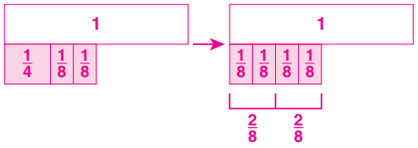
Share and Show

1. **Explain** which fraction strips you could use to add $\frac{1}{3}$ and $\frac{3}{6}$.

Possible explanation: $\frac{1}{6}$ strips because the $\frac{1}{3}$ strip and the $\frac{1}{6}$ strip are different sizes. I need to show $\frac{1}{3}$ using $\frac{1}{6}$ strips and then add.

2. Use fraction strips to add $\frac{1}{4} + \frac{2}{8}$.



$\frac{1}{4} + \frac{2}{8} =$ **$\frac{4}{8}$**

Add. Use fraction strips to help.

3. $\frac{1}{4} + \frac{1}{2} =$ **$\frac{3}{4}$**

4. $\frac{1}{2} + \frac{3}{8} =$ **$\frac{7}{8}$**

5. $\frac{1}{2} + \frac{3}{10} =$ **$\frac{8}{10}$**

On Your Own

Add. Use fraction strips to help.

6. $\frac{1}{3} + \frac{2}{6} =$ **$\frac{4}{6}$**

7. $\frac{1}{5} + \frac{3}{10} =$ **$\frac{5}{10}$**

8. $\frac{3}{8} + \frac{1}{4} =$ **$\frac{5}{8}$**

9. $\frac{5}{12} + \frac{1}{3} =$ **$\frac{9}{12}$**

10. $\frac{1}{3} + \frac{8}{12} =$ **$\frac{12}{12}$ or 1**

11. $\frac{8}{10} + \frac{1}{5} =$ **$\frac{10}{10}$ or 1**

Problem Solving

12. Paola used $\frac{1}{4}$ of a carton of eggs today and $\frac{4}{12}$ of the carton yesterday. What fraction of the carton of eggs did she use in all? **Explain** how you found your answer.

$\frac{7}{12}$; Possible explanation: I used fraction strips to model $\frac{1}{4}$ as $\frac{3}{12}$. Then I added $\frac{3}{12}$ to $\frac{4}{12}$ to get $\frac{7}{12}$.

Use **Math Talk** to check students' understanding of why $\frac{1}{2}$ and $\frac{3}{6}$ are equivalent fractions.

2 PRACTICE

Share and Show • Guided Practice

Use Exercises 1–5 to check students' understanding of lesson concepts. For Exercise 1, elicit from students that the $\frac{1}{3}$ piece and the $\frac{1}{6}$ piece are different sizes. They must find an equivalent fraction to add equal-size pieces. In Exercise 2, make sure students correctly use the fraction strips to rename $\frac{1}{4}$ as $\frac{2}{8}$.

On Your Own • Independent Practice

For Exercises 6–11, have students who need extra support rewrite the addition exercises using the equivalent fractions.

Problem Solving

Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 12, students have to find equivalent fractions to add $\frac{1}{4}$ and $\frac{4}{12}$. Have students check their work to be sure they are adding fractions with the same denominator and that they are not adding the denominators.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you add fractions when one denominator is a multiple of the other? Possible answer: I can use fraction strips to find an equivalent fraction so both fractions have the same denominator. Then I add the numerators. The denominator stays the same.

Math Journal

Draw a diagram that shows how to add $\frac{1}{10}$ and $\frac{1}{2}$ using fraction strips. Explain each step.

LESSON 13

Subtract Related Fractions

LESSON AT A GLANCE

Lesson Objective
Subtract fractions when one denominator is a multiple of the other.

Materials
MathBoard, Fraction Strips (see *eTeacher Resources*)

GO DIGITAL
- Animated Math Models
- iTools: Fractions
- HMH Mega Math

1 TEACH and TALK

GO DIGITAL • Animated Math Models

Activity
Math Processes and Practices

Read and discuss the first paragraph with students.

One Way
Distribute the fraction strips. Have students model the problem.

- **Why do you need to show $\frac{1}{4}$ using $\frac{1}{8}$ strips?** Possible answer: I need to subtract equal-size pieces. Both fractions can be shown using $\frac{1}{8}$ pieces.
- **Describe how you subtract the fractions.** Possible answer: subtract the numerators: $5 - 2 = 3$; keep the denominator the same: 8.

Another Way
Guide students through the example.

- **Explain how you compared the $\frac{1}{4}$ piece to the five $\frac{1}{8}$ pieces.** Possible answer: $\frac{1}{4}$ is equivalent to $\frac{2}{8}$. There are three more eighths in $\frac{5}{8}$ than in $\frac{1}{4}$.

This lesson builds on subtracting fractions with like denominators presented in Chapter 7 and prepares students for subtracting fractions with unlike denominators taught in Grade 5.

Name _____

Subtract Related Fractions

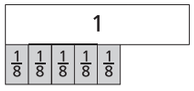
Essential Question How can you subtract fractions when one denominator is a multiple of the other?

When you subtract fractions, you must use equal-size pieces. To subtract fractions with different denominators, first find equivalent fractions with the same denominator. You can also compare to find the difference.

Activity

Materials ■ fraction strips

Find $\frac{5}{8} - \frac{1}{4}$.



One Way Find an equivalent fraction.

Model the problem.

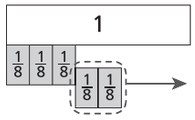
Think: You need to subtract $\frac{1}{4}$ from $\frac{5}{8}$, but the $\frac{1}{4}$ strip and the $\frac{1}{8}$ strips are different sizes.

Show $\frac{1}{4}$ using $\frac{1}{8}$ strips.

$\frac{1}{4} = \frac{2}{8}$

Subtract. Use the equivalent fraction you found.

Find $\frac{5}{8} - \frac{2}{8}$.

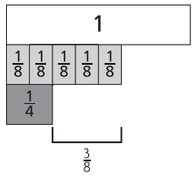


Write the difference. $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$

So, $\frac{5}{8} - \frac{1}{4} = \frac{3}{8}$

Another Way Compare to find the difference.

Model the problem.



Think: The $\frac{1}{4}$ strip is the same size as two $\frac{1}{8}$ strips.

Compare the $\frac{1}{4}$ strip to the five $\frac{1}{8}$ strips. Find the difference.

$\frac{5}{8} - \frac{1}{4} = \frac{3}{8}$.

Possible explanation: the $\frac{1}{4}$ strip is equivalent to two $\frac{1}{8}$ strips. The denominator 8 is 2 times the denominator 4.

Math Talk Mathematical Practices

Explain how the $\frac{1}{4}$ strip is related to the $\frac{1}{8}$ strip. Then describe how the denominators 4 and 8 are related.

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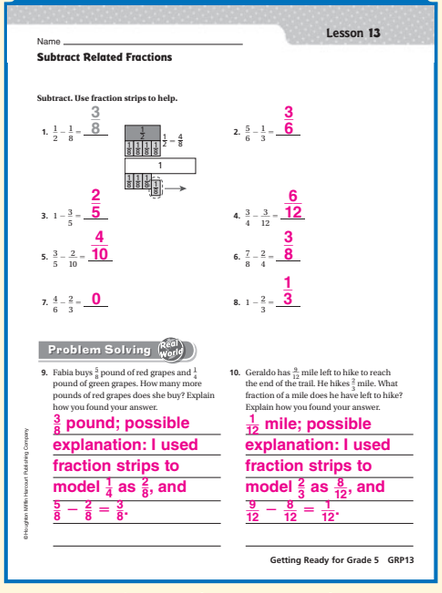

Name _____ Lesson 13

Subtract Related Fractions

Subtract. Use fraction strips to help.

1. $\frac{1}{2} - \frac{1}{8} = \frac{3}{8}$
2. $\frac{5}{6} - \frac{1}{3} = \frac{3}{6}$
3. $1 - \frac{3}{5} = \frac{2}{5}$
4. $\frac{3}{4} - \frac{3}{12} = \frac{6}{12}$
5. $\frac{3}{5} - \frac{2}{10} = \frac{4}{10}$
6. $\frac{7}{8} - \frac{2}{4} = \frac{3}{8}$
7. $\frac{4}{6} - \frac{2}{3} = \frac{0}{}$
8. $1 - \frac{2}{3} = \frac{1}{3}$

Problem Solving Real World

9. Fabia buys $\frac{3}{8}$ pound of red grapes and $\frac{1}{4}$ pound of green grapes. How many more pounds of red grapes does she buy? Explain how you found your answer.
$\frac{3}{8}$ pound; possible explanation: I used fraction strips to model $\frac{1}{4}$ as $\frac{2}{8}$, and $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$.

10. Geraldo has $\frac{5}{12}$ mile left to hike to reach the end of the trail. He hikes $\frac{2}{3}$ mile. What fraction of a mile does he have left to hike? Explain how you found your answer.
$\frac{1}{12}$ mile; possible explanation: I used fraction strips to model $\frac{2}{3}$ as $\frac{8}{12}$, and $\frac{9}{12} - \frac{8}{12} = \frac{1}{12}$.

Getting Ready for Grade 5 GRP13

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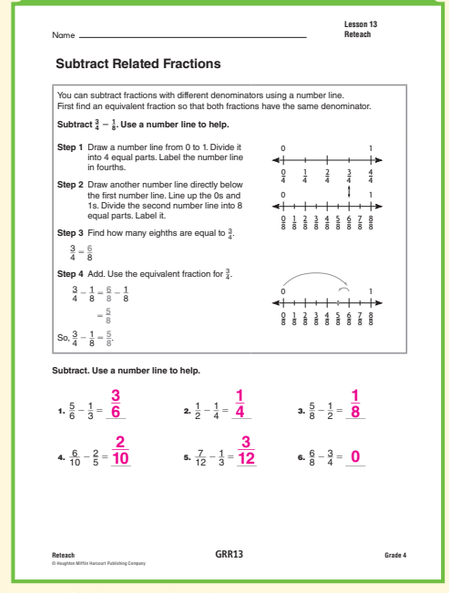

Name _____ Lesson 13 Reteach

Subtract Related Fractions

You can subtract fractions with different denominators using a number line. First find an equivalent fraction so that both fractions have the same denominator.

Subtract $\frac{3}{4} - \frac{1}{8}$. Use a number line to help.

Step 1 Draw a number line from 0 to 1. Divide it into 4 equal parts. Label the number line in fourths.

Step 2 Draw another number line directly below the first number line. Line up the 0s and 1s. Divide the second number line into 8 equal parts. Label it.

Step 3 Find how many eighths are equal to $\frac{3}{4}$.

$\frac{3}{4} = \frac{6}{8}$

Step 4 Add. Use the equivalent fraction for $\frac{3}{4}$.

$\frac{3}{4} - \frac{1}{8} = \frac{6}{8} - \frac{1}{8}$

$= \frac{5}{8}$

So, $\frac{3}{4} - \frac{1}{8} = \frac{5}{8}$.

Subtract. Use a number line to help.

1. $\frac{5}{6} - \frac{1}{3} = \frac{3}{6}$
2. $\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$
3. $\frac{5}{8} - \frac{1}{2} = \frac{1}{8}$
4. $\frac{6}{10} - \frac{2}{5} = \frac{2}{10}$
5. $\frac{7}{12} - \frac{1}{3} = \frac{3}{12}$
6. $\frac{6}{8} - \frac{3}{4} = \frac{0}{}$

Reteach GRR13 Grade 4

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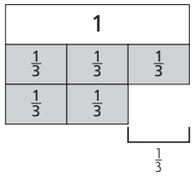
Share and Show

MATH BOARD

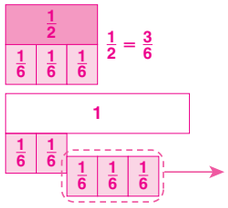
1. A student subtracted $\frac{2}{3}$ from 1 whole as shown at the right. Explain the student's method. Then find the difference.



Possible explanation: the student knows that 1 whole is equivalent to $\frac{3}{3}$. He compared $\frac{3}{3}$ to $\frac{2}{3}$ to find the difference of $\frac{1}{3}$.

2. Use fraction strips to subtract $\frac{5}{6} - \frac{1}{2}$.

$\frac{5}{6} - \frac{1}{2} =$ **$\frac{2}{6}$**



Subtract. Use fraction strips to help.

3. $\frac{1}{2} - \frac{3}{8} =$ **$\frac{1}{8}$**

4. $1 - \frac{2}{5} =$ **$\frac{3}{5}$**

5. $\frac{2}{4} - \frac{2}{12} =$ **$\frac{4}{12}$**

On Your Own

Subtract. Use fraction strips to help.

6. $\frac{4}{5} - \frac{2}{10} =$ **$\frac{6}{10}$**

7. $\frac{7}{8} - \frac{3}{4} =$ **$\frac{1}{8}$**

8. $\frac{5}{6} - \frac{2}{3} =$ **$\frac{1}{6}$**

9. $\frac{7}{10} - \frac{2}{5} =$ **$\frac{3}{10}$**

10. $\frac{2}{6} - \frac{1}{3} =$ **0**

11. $\frac{6}{8} - \frac{1}{2} =$ **$\frac{2}{8}$**

Problem Solving

Real World

12. Boris had $\frac{2}{3}$ of a book left to read. He read $\frac{1}{6}$ of the book today. What fraction of the book does he have left to read now? Explain how you found your answer.

$\frac{3}{6}$; Possible explanation: I used fraction strips to model $\frac{2}{3}$ as $\frac{4}{6}$. Then I took $\frac{1}{6}$ away, which left $\frac{3}{6}$.

2 PRACTICE

MATH BOARD

Share and Show • Guided Practice

Use Exercises 1–5 to check students' understanding of lesson concepts. For Exercise 1, students should identify that the comparison method is being used to solve the problem. In Exercise 2, make sure students are able to use the fraction strips to rename $\frac{1}{2}$ as $\frac{3}{6}$.

On Your Own • Independent Practice

For Exercises 6–11, encourage students to try both solution methods shown in the learning model.

Problem Solving

Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 12, have students look for important words to help them determine what operation to use to solve the problem.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you subtract fractions when one denominator is a multiple of the other? Possible answer: I can use fraction strips to find an equivalent fraction so both fractions have the same denominator. Then I subtract the numerators. The denominator stays the same. I can also compare with fraction strips to find the difference.

Math Journal

WRITE Math

Describe how you would use fraction strips to compare $\frac{1}{10}$ and 1 to find the difference.

LESSON 14

Compare Fraction Products

LESSON AT A GLANCE

Lesson Objective
Compare the size of the product to the size of each factor when multiplying fractions in real-world situations.

Materials
MathBoard

This lesson builds on multiplying fractions by whole numbers presented in Chapter 8 and prepares students for multiplying fractions and mixed numbers taught in Grade 5.

1 TEACH and TALK

Unlock the Problem

Math Processes and Practices

One Way

Have students shade the models to represent each problem.

Complete the problems with students. They should make the generalization that when a fraction less than 1 is multiplied by a whole number, the product is greater than the fraction. Also, when a whole number is multiplied by a fraction less than 1, the product is less than the whole number.

- **Compare the model for Problem B to the model for Problem A.** Possible answer: they look the same, but the model in Problem A is showing 3 groups of $\frac{2}{3}$ and the model in Problem B is showing $\frac{2}{3}$ of 3 wholes.
- **How are the expressions you wrote for each problem alike and how are they different?** Possible answer: alike: the factors in both expressions are the same. Different: the factors are ordered differently.

Name _____

Compare Fraction Products

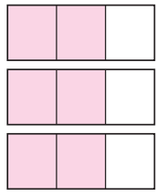
Essential Question How does the size of the product compare to the size of each factor when multiplying fractions in real-world situations?

Unlock the Problem Real World

One Way Use a model.

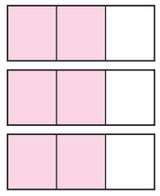
A. Serena uses $\frac{2}{3}$ yard of fabric to make a pillow. How much fabric does she need to make 3 pillows?

- Shade the model to show 3 groups of $\frac{2}{3}$.
- Write an expression for three groups of $\frac{2}{3}$: 3 × $\frac{2}{3}$.
- What can you say about the product when $\frac{2}{3}$ is multiplied by a whole number? Write *greater than* or *less than*. The product is greater than $\frac{2}{3}$.



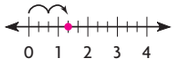
B. Serena has 3 yards of fabric. She uses $\frac{2}{3}$ of it to make a blanket. How much fabric does she use to make the blanket?

- There are 3 wholes. Each represents one yard.
- Shade $\frac{2}{3}$ of each whole.
- Write an expression for $\frac{2}{3}$ of three wholes: $\frac{2}{3}$ × 3
- What can you say about the product when 3 is multiplied by a fraction less than 1? Write *greater than* or *less than*. The product is less than 3.



Another Way Use a number line.

A. Show $\frac{2}{3} \times 2$.



B. Show $\frac{2}{3} \times 3$.

Complete each statement with *greater than* or *less than*.

- The product of $\frac{2}{3}$ and 2 is greater than $\frac{2}{3}$.
- The product of a whole number greater than 1 and $\frac{2}{3}$ will be less than the whole number factor.

Math Talk Mathematical Practices

What if a different fraction was multiplied by 2 and 3? Would your statements still be true? **Explain.**

Yes; Possible explanation: Several groups of $\frac{2}{3}$ is greater than $\frac{2}{3}$. A whole number times a fraction means part of the whole number.

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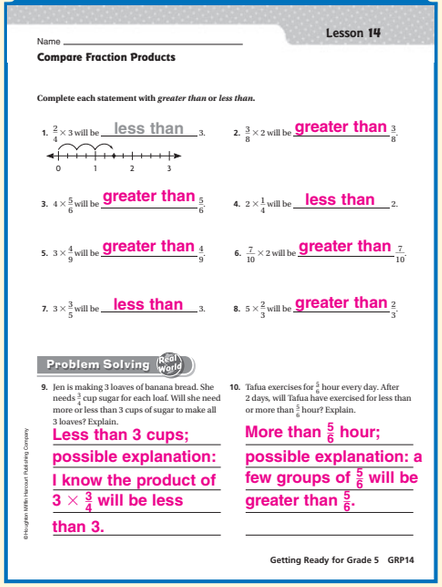

Name _____ Lesson 14

Compare Fraction Products

Complete each statement with *greater than* or *less than*.

1. $\frac{2}{4} \times 3$ will be less than 3.
2. $\frac{3}{8} \times 2$ will be greater than $\frac{3}{8}$.
3. $4 \times \frac{5}{6}$ will be greater than $\frac{5}{6}$.
4. $2 \times \frac{1}{4}$ will be less than 2.
5. $3 \times \frac{4}{9}$ will be greater than $\frac{4}{9}$.
6. $\frac{7}{10} \times 2$ will be greater than $\frac{7}{10}$.
7. $3 \times \frac{3}{5}$ will be less than 3.
8. $5 \times \frac{2}{3}$ will be greater than $\frac{2}{3}$.

Problem Solving Real World

9. Jen is making 3 loaves of banana bread. She needs $\frac{3}{4}$ cup sugar for each loaf. Will she need more or less than 3 cups of sugar to make all 3 loaves? Explain. Less than 3 cups; possible explanation: I know the product of $3 \times \frac{3}{4}$ will be less than 3.

10. Tafua exercises for $\frac{5}{6}$ hour every day. After 2 days, will Tafua have exercised for less than or more than $\frac{5}{6}$ hour? Explain. More than $\frac{5}{6}$ hour; possible explanation: a few groups of $\frac{5}{6}$ will be greater than $\frac{5}{6}$.

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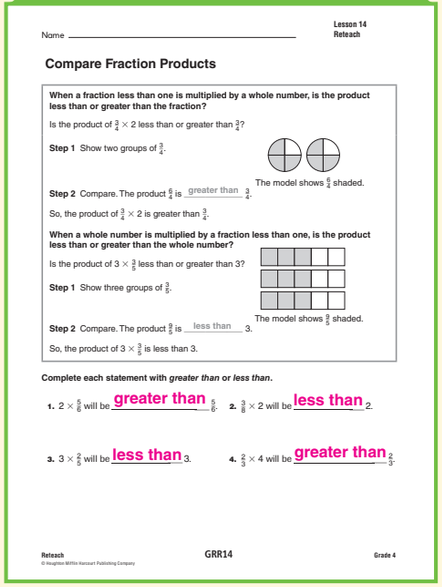

Name _____ Lesson 14 Reteach

Compare Fraction Products

When a fraction less than one is multiplied by a whole number, is the product less than or greater than the fraction?

Is the product of $\frac{3}{4} \times 2$ less than or greater than $\frac{3}{4}$?

Step 1 Show two groups of $\frac{3}{4}$.

The model shows $\frac{6}{4}$ shaded.

Step 2 Compare. The product $\frac{6}{4}$ is greater than $\frac{3}{4}$.

So, the product of $\frac{3}{4} \times 2$ is greater than $\frac{3}{4}$.

When a whole number is multiplied by a fraction less than one, is the product less than or greater than the whole number?

Is the product of $3 \times \frac{3}{8}$ less than or greater than 3?

Step 1 Show three groups of $\frac{3}{8}$.

The model shows $\frac{9}{8}$ shaded.

Step 2 Compare. The product $\frac{9}{8}$ is less than 3.

So, the product of $3 \times \frac{3}{8}$ is less than 3.

Complete each statement with *greater than* or *less than*.

1. $2 \times \frac{5}{6}$ will be greater than $\frac{5}{6}$.
2. $\frac{3}{8} \times 2$ will be less than 2.
3. $3 \times \frac{2}{5}$ will be less than 3.
4. $\frac{2}{3} \times 4$ will be greater than $\frac{2}{3}$.

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Share and Show

MATH BOARD

1. Complete the statement with *greater than* or *less than*.

$2 \times \frac{3}{4}$ will be greater than $\frac{3}{4}$.

Complete each statement with *greater than* or *less than*.

2. $3 \times \frac{2}{5}$ will be less than 3.

3. $3 \times \frac{1}{3}$ will be greater than $\frac{1}{3}$

On Your Own

Complete each statement with *greater than* or *less than*.

4. $3 \times \frac{3}{8}$ will be greater than $\frac{3}{8}$.

5. $\frac{5}{6} \times 5$ will be greater than $\frac{5}{6}$.

6. $\frac{3}{10} \times 6$ will be greater than $\frac{3}{10}$.

7. $4 \times \frac{5}{9}$ will be less than 4.

Problem Solving

Real World

8. Celia wants to sew 4 pillows. She needs $\frac{3}{8}$ yard of fabric for each pillow. Will she need more than $\frac{3}{8}$ yard or less than $\frac{3}{8}$ yard of fabric to make all the pillows? Explain.

More; possible explanation: she will need more than one pillow's worth of fabric.

9. Rohan walks $\frac{3}{4}$ mile to school each day. After 5 days, will Rohan have walked more than 5 miles or less than 5 miles to school? Explain.

Less; possible explanation: $\frac{3}{4}$ is less than 1, so 5 amounts less than 1 is less than 5.

Another Way

Guide students through the examples.

- **How does the number line show that $\frac{2}{3} \times 3$ is less than 3?** Possible answer: 3 "hops" of $\frac{2}{3}$ on the number line is 2, which is less than 3.

Use **Math Talk** to focus on students' understanding of lesson concepts.

2 PRACTICE

MATH BOARD

Share and Show • Guided Practice

Use Exercises 1–3 to check students' understanding of lesson concepts. For Exercise 1, students should use the number line to show that the product of $2 \times \frac{3}{4}$ is greater than $\frac{3}{4}$.

On Your Own • Independent Practice

For Exercises 4–7, encourage students to use a model or a number line to help them complete each sentence.

Problem Solving

Math Processes and Practices

UNLOCK THE PROBLEM For Exercises 8 and 9, students have to compare the size of the product to the size of a factor in a real-world situation. Have students write a multiplication expression to help them answer each problem.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How does the size of the product compare to the size of each factor when multiplying fractions in real-world situations? Possible answer: the product of a whole number greater than 1 and a fraction less than 1 will be greater than the fraction and less than the whole-number factor.

Math Journal

WRITE Math

Write a word problem that can be solved by comparing the size of a product and the size of a factor when multiplying a whole number and a fraction. Include the solution.

LESSON 15

Repeated Subtraction with Fractions

LESSON AT A GLANCE

Lesson Objective
Use repeated subtraction to solve problems involving division with fractions.

Materials
MathBoard, Number Lines (see *eTeacher Resources*)

1 TEACH and TALK

Unlock the Problem

Math Processes and Practices

Read and discuss the problem.

- **Why can you use division to solve this problem?** Possible answer: I'm dividing a whole, 3 cups, into equal-size groups of $\frac{1}{2}$ cup, and I'm trying to find the number of equal-size groups.

Discuss how to use repeated subtraction on a number line to find the quotient.

- **How does the number line help you divide?** Possible answer: I can start with 3 and then make "hops" of $\frac{1}{2}$ until I reach 0 or get as close to it as possible. The number of "hops" is how many times I count back by $\frac{1}{2}$; it is the number of equal-size groups.
- **What does 3 represent in the division problem?** the dividend **What does $\frac{1}{2}$ represent?** the divisor

Use **Math Talk** to check students' understanding of what the number of groups of $\frac{1}{2}$ represents.

This lesson builds on dividing whole numbers presented in Chapter 4 and subtracting fractions with like denominators presented in Chapter 7 and prepares students for dividing fractions taught in Grade 5.

Name _____

Repeated Subtraction with Fractions

Essential Question How can you use repeated subtraction to solve problems involving division with fractions?

Unlock the Problem Real World

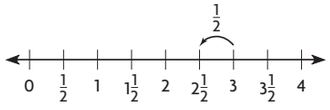
Mr. Jones is making snacks for his family. He has 3 cups of almonds and is dividing them into $\frac{1}{2}$-cup portions. How many portions can he make?

You have used repeated subtraction to divide whole numbers. Now, you will use repeated subtraction to solve a problem involving division by a fraction.

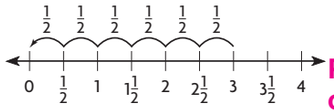
- What do you need to find? **the number of portions**
- What other operation can you use instead of repeated subtraction to solve the problem? **division**

Use repeated subtraction to divide 3 by $\frac{1}{2}$.

STEP 1 Start at 3 and count back $\frac{1}{2}$.



STEP 2 Subtract by $\frac{1}{2}$ until you reach 0 or get as close to it as possible.



Math Talk Mathematical Practices

Explain why you count the number of groups of $\frac{1}{2}$.

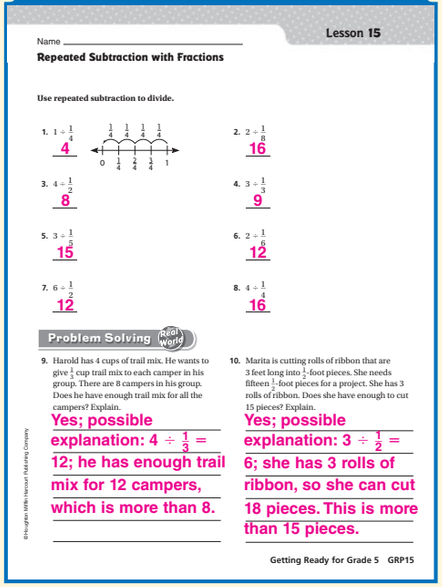
Possible explanation: each group of $\frac{1}{2}$ represents one $\frac{1}{2}$-cup portion.

STEP 3 Find the number of times you counted back by $\frac{1}{2}$.

You counted **6** groups of $\frac{1}{2}$ to reach 0.

So, Mr. Jones can make **6** half-cup portions of almonds.

GR: Practice, p. GRP15



Name _____ Lesson 15

Repeated Subtraction with Fractions

Use repeated subtraction to divide.

1. $1 \div \frac{1}{4}$ **4**
2. $2 \div \frac{1}{8}$ **16**
3. $4 \div \frac{1}{2}$ **8**
4. $3 \div \frac{1}{3}$ **9**
5. $3 \div \frac{1}{5}$ **15**
6. $2 \div \frac{1}{6}$ **12**
7. $6 \div \frac{1}{2}$ **12**
8. $4 \div \frac{1}{4}$ **16**

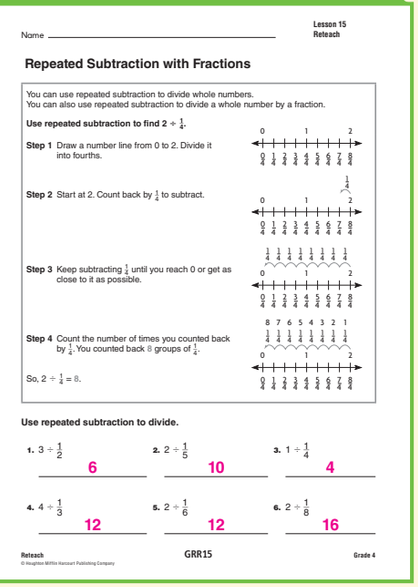
Problem Solving Real World

9. Harold has 4 cups of trail mix. He wants to give $\frac{1}{3}$ cup trail mix to each camper in his group. There are 8 campers in his group. Does he have enough trail mix for all the campers? Explain.
Yes; possible explanation: $4 \div \frac{1}{3} = 12$; he has enough trail mix for 12 campers, which is more than 8.

10. Marita is cutting rolls of ribbon that are 3 feet long into $\frac{1}{2}$-foot pieces. She needs fifteen $\frac{1}{2}$-foot pieces for a project. She has 3 rolls of ribbon. Does she have enough to cut 15 pieces? Explain.
Yes; possible explanation: $3 \div \frac{1}{2} = 6$; she has 3 rolls of ribbon, so she can cut 18 pieces. This is more than 15 pieces.

Getting Ready for Grade 5 GRP15

GR: Reteach, p. GRR15



Name _____ Lesson 15 Reteach

Repeated Subtraction with Fractions

You can use repeated subtraction to divide whole numbers.
You can also use repeated subtraction to divide a whole number by a fraction.

Use repeated subtraction to find $2 \div \frac{1}{4}$.

Step 1 Draw a number line from 0 to 2. Divide it into fourths.

Step 2 Start at 2. Count back by $\frac{1}{4}$ to subtract.

Step 3 Keep subtracting $\frac{1}{4}$ until you reach 0 or get as close to it as possible.

Step 4 Count the number of times you counted back by $\frac{1}{4}$. You counted back 8 groups of $\frac{1}{4}$.

So, $2 \div \frac{1}{4} = 8$.

Use repeated subtraction to divide.

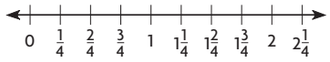
1. $3 \div \frac{1}{2}$ **6**
2. $2 \div \frac{1}{5}$ **10**
3. $1 \div \frac{1}{4}$ **4**
4. $4 \div \frac{1}{3}$ **12**
5. $2 \div \frac{1}{6}$ **12**
6. $2 \div \frac{1}{8}$ **16**

Reteach GRR15 Grade 4

***GR** – Getting Ready Lessons and Resources (*www.thinkcentral.com*)

Share and Show

1. Use repeated subtraction and the number line to find $2 \div \frac{1}{4}$.



Start subtracting at 2.

Count back by groups of $\frac{1}{4}$.

How many groups did you count to reach 0? 8

Use repeated subtraction to divide.

2. $2 \div \frac{1}{3}$ — 6

3. $5 \div \frac{1}{2}$ — 10

4. $1 \div \frac{1}{8}$ — 8

On Your Own

Use repeated subtraction to divide.

5. $1 \div \frac{1}{5}$ — 5

6. $2 \div \frac{1}{2}$ — 4

7. $4 \div \frac{1}{3}$ — 12

8. $2 \div \frac{1}{5}$ — 10

9. $7 \div \frac{1}{2}$ — 14

10. $3 \div \frac{1}{4}$ — 12

Problem Solving

11. You are putting raisins into snack bags. You have 3 cups of raisins. You want to put $\frac{1}{3}$ cup of raisins in each bag. How many bags can you make?

9 bags

12. Margaret is cutting straws that are 4 inches long into $\frac{1}{2}$-inch pieces. She has two straws. She needs twenty $\frac{1}{2}$-inch pieces. Does she have enough to cut 20 pieces? **Explain.**

No; Possible explanation: $4 \div \frac{1}{2} = 8$; she has 2 straws, so she can cut $2 \times 8 = 16$ pieces, which is less than 20.

2 PRACTICE

Share and Show • Guided Practice

Use Exercises 1–4 to check students' understanding of lesson concepts. In Exercise 1, make sure students start at 2 on the number line and count back by $\frac{1}{4}$ until they reach 0. The number of groups of $\frac{1}{4}$ is the quotient.

On Your Own • Independent Practice

For Exercises 5–10, encourage students to use a number line to help them find each quotient.

Problem Solving

Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 11, have students explain why they need to use division to solve the problem. Exercise 12 is a multistep problem that requires students to divide, multiply the quotient by 2, and then compare the product to the given number to decide whether there are enough straws.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you use repeated subtraction to solve problems involving division with fractions? Possible answer: I can subtract the divisor from the dividend repeatedly until I reach 0 or get as close to it as possible. The number of times I subtract the divisor is the quotient.

Math Journal

Explain how to use repeated subtraction to find the quotient of $5 \div \frac{1}{5}$.

LESSON 16

Fractions and Division

LESSON AT A GLANCE

Lesson Objective
Write division problems as fractions.

Materials
MathBoard

GO DIGITAL *i*Tools: Fractions

1 TEACH and TALK GO DIGITAL • *i*Tools

Unlock the Problem

Math Processes and Practices

Read the problem together. Students should understand that there are three sisters sharing the pizzas. Direct students' attention to the four pizzas.

- **How can the pizzas be divided equally?** Each pizza can be cut into equal-size slices. The slices can be divided equally among the sisters.
- **Why is it helpful to divide each pizza into 3 equal-size pieces?** Possible answer: it is helpful because the pizzas are being shared equally among 3 people.

Have students look at the expression 4 ÷ 3 and the fraction $\frac{4}{3}$. Tell students that a fraction is a way to show division. Explain that they can think of the fraction bar as a division sign, so $\frac{4}{3}$ means the same as 4 ÷ 3.

This lesson builds on division presented in Chapter 4 and fraction concepts presented in Chapters 6–8 and prepares students for fraction operations taught in Grade 5.

Name _____

Fractions and Division

Essential Question How can you write division problems as fractions?

Division and fractions both show sharing equal numbers of things or making equal-size groups. You can write division problems as fractions.

Unlock the Problem Real World

Mavi and her 2 sisters want to share 4 small pizzas equally. How much pizza will each person have?

- How many people want to share the pizzas?
  3 people

Think: What is 4 divided by 3, or 4 ÷ 3?

Each pizza is divided into **3** equal slices.

How many slices are in 4 pizzas? **12**

What fraction of the pizza is each slice? **$\frac{1}{3}$**

How many $\frac{1}{3}$-size slices does each sister get? **4**

What fraction of the pizzas does each sister get? **$\frac{4}{3}$**

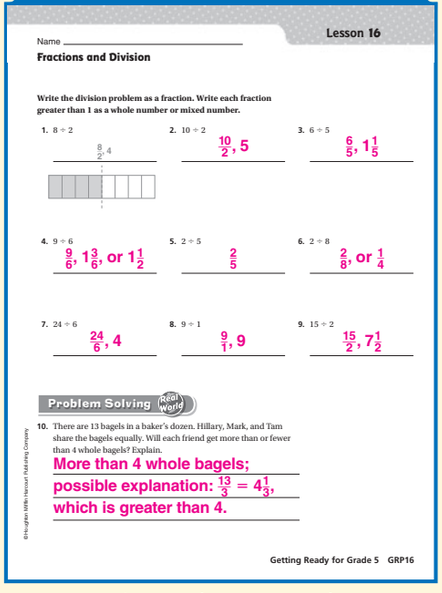
So, 4 ÷ 3 is the same as $\frac{4}{3}$.

Possible answer: I can write $\frac{4}{3}$ as $1\frac{1}{3}$.

Math Talk Mathematical Practices

How can you write $\frac{4}{3}$ as a mixed number?

GR: Practice, p. GRP16



Name _____ Lesson 16

Fractions and Division

Write the division problem as a fraction. Write each fraction greater than 1 as a whole number or mixed number.

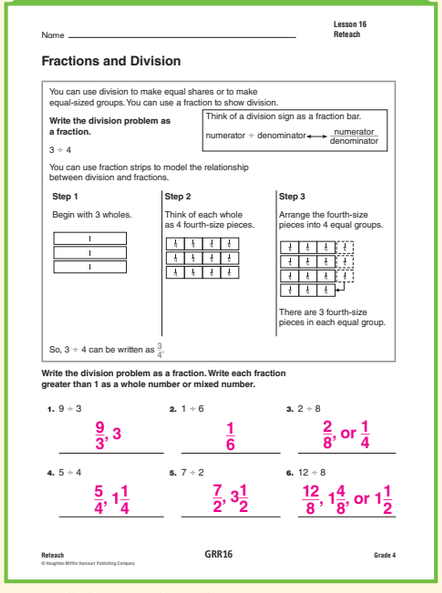
1. 8 ÷ 2 — $\frac{8}{2}$, 4
2. 10 ÷ 2 — $\frac{10}{2}$, 5
3. 6 ÷ 5 — $\frac{6}{5}$, $1\frac{1}{5}$
4. 9 ÷ 6 — $\frac{9}{6}$, $1\frac{3}{6}$, or $1\frac{1}{2}$
5. 2 ÷ 5 — $\frac{2}{5}$
6. 2 ÷ 8 — $\frac{2}{8}$, or $\frac{1}{4}$
7. 24 ÷ 6 — $\frac{24}{6}$, 4
8. 9 ÷ 1 — $\frac{9}{1}$, 9
9. 15 ÷ 2 — $\frac{15}{2}$, $7\frac{1}{2}$

Problem Solving Real World

10. There are 13 bagels in a baker's dozen. Hillary, Mark, and Tam share the bagels equally. Will each friend get more than or fewer than 4 whole bagels? Explain.
    More than 4 whole bagels; possible explanation: $\frac{13}{3} = 4\frac{1}{3}$, which is greater than 4.

Getting Ready for Grade 5 GRP16

GR: Reteach, p. GRR16



Name _____ Lesson 16 Reteach

Fractions and Division

You can use division to make equal shares or to make equal-sized groups. You can use a fraction to show division.

Write the division problem as a fraction.

3 ÷ 4

Think of a division sign as a fraction bar.

numerator ÷ denominator ↔ $\frac{\text{numerator}}{\text{denominator}}$

You can use fraction strips to model the relationship between division and fractions.

Step 1 Begin with 3 wholes.

Step 2 Think of each whole as 4 fourth-size pieces.

Step 3 Arrange the fourth-size pieces into 4 equal groups.

There are 3 fourth-size pieces in each equal group.

So, 3 ÷ 4 can be written as $\frac{3}{4}$.

Write the division problem as a fraction. Write each fraction greater than 1 as a whole number or mixed number.

1. 9 ÷ 3 — $\frac{9}{3}$, 3
2. 1 ÷ 6 — $\frac{1}{6}$
3. 2 ÷ 8 — $\frac{2}{8}$, or $\frac{1}{4}$
4. 5 ÷ 4 — $\frac{5}{4}$, $1\frac{1}{4}$
5. 7 ÷ 2 — $\frac{7}{2}$, $3\frac{1}{2}$
6. 12 ÷ 8 — $\frac{12}{8}$, $1\frac{4}{8}$, or $1\frac{1}{2}$

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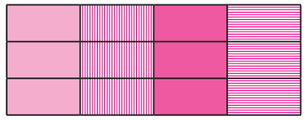
*GR – Getting Ready Lessons and Resources (*www.thinkcentral.com*)

Share and Show

MATH BOARD

1. Alex baked a pan of corn bread and cut it into 12 equal-size pieces. Alex and his 3 sisters want to share the pieces equally.



What division problem can you write to solve the problem? Possible answer: 12 ÷ 4

Write the division problem as a fraction. $\frac{12}{4}$

Write the division problem as a fraction. Write each fraction greater than 1 as a whole number or mixed number.

2. 6 ÷ 2	3. 1 ÷ 4	4. 1 ÷ 3	5. 32 ÷ 8
$\frac{6}{2}$, 3	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{32}{8}$, 4

On Your Own

Write the division problem as a fraction. Write each fraction greater than 1 as a whole number or mixed number.

6. 5 ÷ 6	7. 3 ÷ 2	8. 1 ÷ 8	9. 2 ÷ 4
$\frac{5}{6}$	$\frac{3}{2}$, $1\frac{1}{2}$	$\frac{1}{8}$	$\frac{2}{4}$ or $\frac{1}{2}$

10. 12 ÷ 3	11. 9 ÷ 4	12. 11 ÷ 2	13. 8 ÷ 6
$\frac{12}{3}$, 4	$\frac{9}{4}$, $2\frac{1}{4}$	$\frac{11}{2}$, $5\frac{1}{2}$	$\frac{8}{6}$ $1\frac{2}{6}$ or $1\frac{1}{3}$

Problem Solving Real World

14. Stefan and his 2 friends want to share 16 muffins equally. Will each friend get more than or less than 5 whole muffins? **Explain** how you know.

More; possible explanation: $\frac{16}{3} = 5\frac{1}{3}$, so everyone gets 5 whole muffins and $\frac{1}{3}$ of the remaining muffin.

Generalize that they can think of the division of two whole numbers as a fraction. Therefore, students can write the answer to the problem on page GR35 as a mixed number instead of a quotient with a remainder.

Use Math Talk to check students' understanding of writing a fraction greater than 1 as a mixed number and vice versa.

2 PRACTICE

MATH BOARD

Share and Show • Guided Practice

Discuss Exercise 1 with students. Students should understand that 4 people will share the 12 pieces of corn bread. Suggest that students shade the diagram to model the problem.

As students complete Exercises 2–5, reinforce that they can think of the division of two whole numbers as a fraction whether they are dividing a lesser number by a greater number or a greater number by a lesser number.

On Your Own • Independent Practice

For Exercises 6–13, remind students to write fractions that are greater than 1 as a whole number or a mixed number.

Problem Solving Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 14, students should recognize that the answer may include a fractional part. They should also understand that 3 friends will share 16 muffins equally.

Getting Ready Lessons and Resources, pp. GR37–GR38

Checkpoint

Name _____

Checkpoint

Concepts and Skills

Complete each statement with *greater than* or *less than*.

1. $3 \times \frac{2}{3}$ will be less than 3.
2. $\frac{7}{8} \times 3$ will be greater than $\frac{7}{8}$.

Add or subtract. Use fraction strips to help.

3. $\frac{1}{2} + \frac{2}{10} =$ $\frac{7}{10}$
4. $\frac{1}{4} + \frac{5}{8} =$ $\frac{7}{8}$
5. $\frac{4}{6} + \frac{1}{3} =$ $\frac{6}{6}$ or 1
6. $1 - \frac{5}{6} =$ $\frac{1}{6}$
7. $\frac{7}{8} - \frac{1}{4} =$ $\frac{5}{8}$
8. $\frac{3}{5} - \frac{4}{10} =$ $\frac{2}{10}$

Write the division problem as a fraction. Write each fraction greater than 1 as a whole number or mixed number.

9. $7 \div 8 =$ $\frac{7}{8}$
10. $8 \div 5 =$ $\frac{8}{5}$, $1\frac{3}{5}$
11. $16 \div 3 =$ $\frac{16}{3}$, $5\frac{1}{3}$

Use repeated subtraction to divide.

12. $3 \div \frac{1}{5} =$ 15
13. $4 \div \frac{1}{2} =$ 8
14. $6 \div \frac{1}{3} =$ 18

Problem Solving Real World

15. Manny had $\frac{3}{4}$ of his paper written. He wrote another $\frac{1}{8}$ of the paper today. What fraction of the paper does he have left to write now? **Explain** how you found your answer.

$\frac{1}{8}$; Possible explanation: I used fraction strips to add $\frac{3}{4}$ and $\frac{1}{8}$ to get $\frac{7}{8}$. Then I used fraction strips to find $1 - \frac{7}{8}$, which is $\frac{1}{8}$.

Fill in the bubble completely to show your answer.

16. Mr. Martin is going to paint 5 small rooms. He needs $\frac{3}{4}$ gallon of paint for each room. How much paint will he need to paint all of the rooms?
   - Ⓐ less than $\frac{3}{4}$ gallon
   - Ⓑ more than $\frac{3}{4}$ gallon
   - Ⓒ exactly $\frac{3}{4}$ gallon
   - Ⓓ exactly 5 gallons

17. A chef is preparing individual-size pies. She has 4 cups of strawberries to put in the pies. She wants to put $\frac{1}{4}$ cup of strawberries in each pie. How many pies can she make?
   - Ⓐ 4
   - Ⓑ 8
   - Ⓒ 14
   - Ⓓ 16

18. Which shows the division problem $6 \div 4$ written as a fraction or mixed number?
   - Ⓐ $\frac{4}{6}$
   - Ⓑ $1\frac{1}{4}$
   - Ⓒ $1\frac{2}{4}$
   - Ⓓ $2\frac{2}{4}$

19. Pablo ate $\frac{1}{8}$ of a pizza yesterday and $\frac{3}{8}$ of the pizza today. What fraction of the pizza did he eat in all?
   - Ⓐ $\frac{5}{8}$
   - Ⓑ $\frac{4}{12}$
   - Ⓒ $\frac{4}{8}$
   - Ⓓ $\frac{3}{8}$

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you write division problems as fractions? Possible answer: write the dividend as the numerator and the divisor as the denominator. If the fraction is greater than 1, you can write the amount as a fraction greater than 1 or a mixed number.

Math Journal WRITE Math

Write a word problem that can be solved by writing a division problem as a fraction. Include the division problem, the quotient written as a fraction, and the solution.

LESSON 17

Locate Points on a Grid

LESSON AT A GLANCE

Lesson Objective
Use ordered pairs to locate points on a grid.

Vocabulary
ordered pair

Materials
MathBoard

GO DIGITAL
iTools: Algebra
HMH Mega Math

1 TEACH and TALK GO DIGITAL • iTools

Unlock the Problem

Math Processes and Practices

Have students read the description of an ordered pair.

- **Why do you think the pairs of numbers are called "ordered pairs"?** Possible answer: to name the precise location of a point on a grid, the pair of numbers must be in a particular order.

Discuss the problem.

- **What do you need to find?** the ordered pair at which Terminal *A* is located

This lesson builds on measurement and data presented in Chapter 12, and prepares students for graphing ordered pairs taught in Grade 5.

Name _____

Locate Points on a Grid

Essential Question How can you use ordered pairs to locate points on a grid?

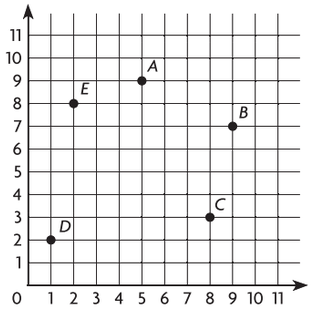
An ordered pair is a pair of numbers that names a point on a grid. The first number shows how many units to move horizontally. The second number shows how many units to move vertically.

(2 , 4)

Move 2 units right from 0. Then move 4 units up.

Unlock the Problem Real World

At the airport, passengers travel from one terminal to another in shuttle buses. The shuttle buses travel in a route that begins at Terminal A. Where is Terminal A?



Count units on the grid to find out.

- Start at zero.
- Move right 5 units.
- From there, move up 9 units.

Terminal A is located at (5, 9).

Try This!

What terminal is located at (8, 3)? Explain how you know.

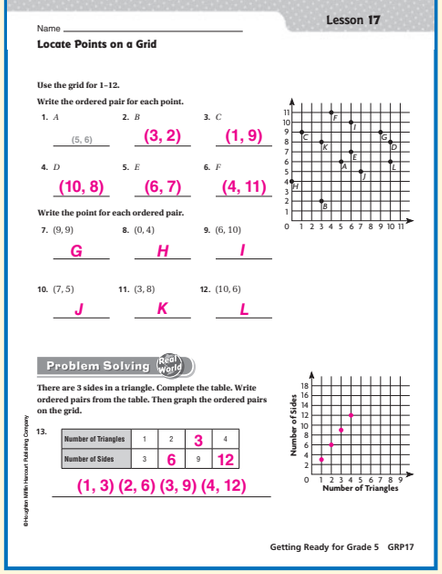
Terminal *C*; possible explanation: I started at 0 and moved 8 units to the right. From there I moved 3 units up. Terminal *C* is located at (8, 3).

Possible explanation: the first ordered pair means right 3 and up 6. The next ordered pair means right 6 and up 3.

Math Talk Mathematical Practices

Explain why (3, 6) and (6, 3) are two different ordered pairs.

GR: Practice, p. GRP17



Name _____ Lesson 17

Locate Points on a Grid

Use the grid for 1–12.

Write the ordered pair for each point.

1. *A* (5, 6)
2. *B* (3, 2)
3. *C* (1, 9)
4. *D* (10, 8)
5. *E* (6, 7)
6. *F* (4, 11)

Write the point for each ordered pair.

7. (9, 9) *G*
8. (0, 4) *H*
9. (6, 10) *I*
10. (7, 5) *J*
11. (3, 8) *K*
12. (10, 6) *L*

Problem Solving Real World

There are 3 sides in a triangle. Complete the table. Write ordered pairs from the table. Then graph the ordered pairs on the grid.

13.

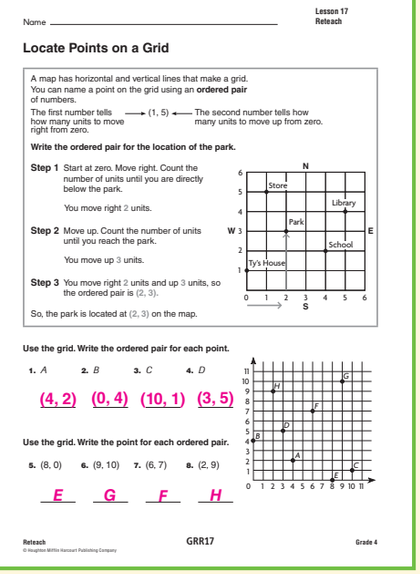
Number of Triangles	1	2	3	4
Number of Sides	3	6	9	12

(1, 3) (2, 6) (3, 9) (4, 12)

Number of Sides / Number of Triangles

Getting Ready for Grade 5 GRP17

GR: Reteach, p. GRR17



Name _____ Lesson 17 Reteach

Locate Points on a Grid

A map has horizontal and vertical lines that make a grid. You can name a point on the grid using an **ordered pair** of numbers.

The first number tells how many units to move right from zero. → (1, 5) ← The second number tells how many units to move up from zero.

Write the ordered pair for the location of the park.

Step 1 Start at zero. Move right. Count the number of units until you are directly below the park.

You move right 2 units.

Step 2 Move up. Count the number of units until you reach the park.

You move up 3 units.

Step 3 You move right 2 units and up 3 units, so the ordered pair is (2, 3).

So, the park is located at (2, 3) on the map.

N Store Library Park School Ty's House W E S

Use the grid. Write the ordered pair for each point.

1. *A* (4, 2)
2. *B* (0, 4)
3. *C* (10, 1)
4. *D* (3, 5)

Use the grid. Write the point for each ordered pair.

5. (8, 0) *E*
6. (9, 10) *G*
7. (6, 7) *F*
8. (2, 9) *H*

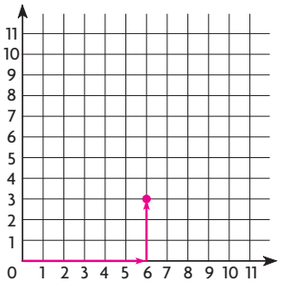
Reteach GRR17 Grade 4

*GR – Getting Ready Lessons and Resources (*www.thinkcentral.com*)

Share and Show

1. To graph the point (6, 3), where do you start? In which direction and how many units will you move first? What will you do next? Describe the steps and record them on the grid.

Start at 0. Move right 6 units. Then move up 3 units.

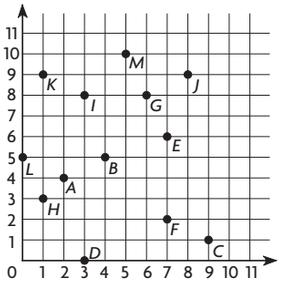


Use the grid for Exercises 2–5. Write the ordered pair for each point.

2. *A* **(2, 4)**
3. *B* **(4, 5)**
4. *C* **(9, 1)**
5. *D* **(3, 0)**

On Your Own

Use the grid for Exercises 6–13.
Write the ordered pair for each point.



6. *E* **(7, 6)**
7. *F* **(7, 2)**
8. *G* **(6, 8)**
9. *H* **(1, 3)**

Write the point for each ordered pair.

10. (3, 8) ***I***
11. (8, 9) ***J***
12. (1, 9) ***K***
13. (0, 5) ***L***

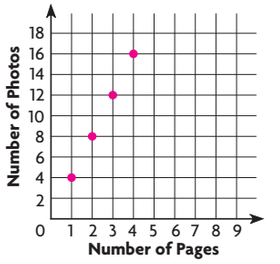
Problem Solving

There are four photos on each page of a photo album. Complete the table. Write the data in the table as ordered pairs. Then graph the ordered pairs on the grid. Use the number of pages as the first number and the number of photos as the second number in the ordered pair.

14.

Number of Pages	1	**2**	3	4
Number of Photos	4	8	**12**	**16**

(1, 4) (2, 8) (3, 12) (4, 16)



Try This!

- **Compare this problem to the previous problem.** Possible answer: in the previous problem, we were asked to find the ordered pair for a point on the grid; in this problem, we are asked to find the point for an ordered pair.

Use **Math Talk** to check students' understanding of ordered pairs.

2 PRACTICE

Share and Show • Guided Practice

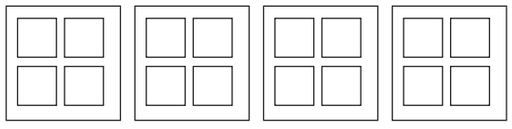
For Exercise 1, be sure students understand that the first number in an ordered pair is the number of units to move horizontally from 0 and the second number is the number of units to move vertically. Discuss Exercises 2–5 with students.

On Your Own • Independent Practice

Point out that for Exercises 6–9, students must find the ordered pair for a given point, and for Exercises 10–13, they must find the point for the ordered pair.

Problem Solving Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 14, students may benefit from drawing a picture of the photo album pages to understand the problem.



3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you use ordered pairs to locate points on a grid? Possible answer: start at 0 and move right the number of units shown by the first number of the ordered pair. Then move up the number of units shown by the second number of the ordered pair.

Math Journal WRITE Math

Describe how to use an ordered pair to graph a point on a grid.

LESSON 18

Area and Tiling

LESSON AT A GLANCE

Lesson Objective
Use tiling to find the area of a rectangle.

Materials
MathBoard

GO DIGITAL
Animated Math Models
*i*Tools: Geometry

1 TEACH and TALK

GO DIGITAL • Animated Math Models

Unlock the Problem

Math Processes and Practices

Read and discuss the problem. Have students mark each half tile as they count the number of half tiles.

- **How many half tiles are there?** 10
- **If each whole tile measures 4 square feet, how can you find the measure of each half tile?** Possible answer: divide 4 by 2.
- **What is the measure of each half tile?** 2 square feet
- **Why can you use the area formula for a rectangle to find the number of whole tiles?** Possible answer: the whole tiles form a rectangle, so you can count the number of whole tiles along the base and multiply it by the number whole tiles along the height.
- **Why do you have to multiply the number of whole tiles by 4 to find the area of the whole tiles?** Possible answer: because each whole tile measures 4 square feet

Use **Math Talk** to check students' understanding of how to find the area of half tiles when the area of a whole tile is an odd number of square units.

This lesson builds on finding the area of rectangles presented in Chapter 13 and prepares students for multiplying fractions taught in Grade 5.

Name _____

Area and Tiling

Essential Question How can you use tiling to find the area of a rectangle?

Unlock the Problem (Real World)

Rhonda is tiling the floor of her new sunroom. The diagram shows the layout of the tiles. Each tile measures 4 square feet. What is the area of Rhonda's sunroom floor?

- Underline what you are asked to find.
- Circle the information you will use to solve the problem.

To find the area of the sunroom floor, you can combine the areas of the half tiles and the whole tiles.

Find the area of the sunroom floor.

STEP 1 Find the area of the half tiles.

Count the number of half tiles. 10

1 tile = 4 square feet, so 1 half tile = 4 ÷ 2 or 2 square feet.

Multiply the number of half tiles by 2 square feet to find the area of the half tiles:

10 × 2 = 20 square feet

STEP 2 Find the area of the whole tiles.

Find the number of whole tiles: $b \times h$ = 8 × 10 = 80 tiles

Since the area of 1 tile is 4 square feet, multiply the number of whole tiles by 4 to find the area of the whole tiles.

80 × 4 = 320 square feet

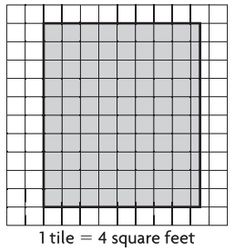
STEP 3 Find the total area.

Add the areas of the half tiles and whole tiles.

half tiles: 20 + whole tiles: 320 = 340 square feet

So, the area of Rhonda's sunroom floor is 340 square feet.

Rhonda's Sunroom Floor



1 tile = 4 square feet

Remember

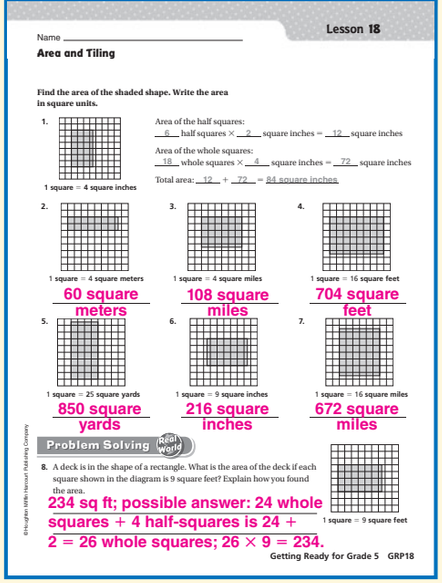
The formula for the area of a rectangle is $A = b \times h$ or $l \times w$.

Math Talk Mathematical Practices

Explain how to find the area of 6 half tiles if 1 whole tile is 9 square inches.

Possible answer: 6 half tiles ÷ 2 = 3 whole tiles, and 3 tiles × 9 square inches = 27 square inches.

GR: Practice, p. GRP18



Name _____ Lesson 18

Area and Tiling

Find the area of the shaded shape. Write the area in square units.

1. 1 square = 4 square inches
Area of the half squares: 6 half squares × 2 square inches = 12 square inches
Area of the whole squares: 18 whole squares × 4 square inches = 72 square inches
Total area: 12 + 72 = 84 square inches

2. 1 square = 4 square meters — 60 square meters

3. 1 square = 4 square miles — 108 square miles

4. 1 square = 16 square feet — 704 square feet

5. 1 square = 25 square yards — 850 square yards

6. 1 square = 9 square inches — 216 square inches

7. 1 square = 16 square miles — 672 square miles

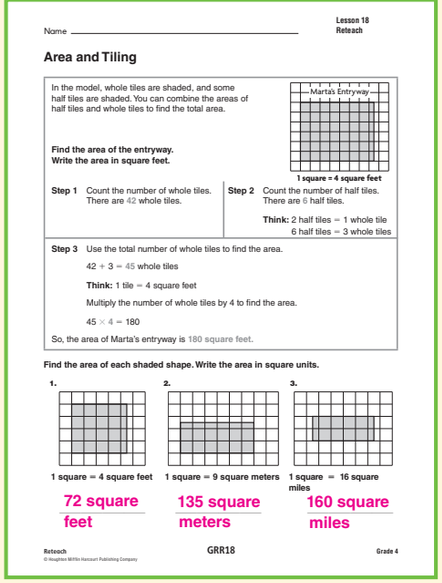
Problem Solving (Real World)

8. A deck is in the shape of a rectangle. What is the area of the deck if each square shown in the diagram is 9 square feet? Explain how you found the area.
234 sq ft; possible answer: 24 whole squares + 4 half-squares is 24 + 2 = 26 whole squares; 26 × 9 = 234.

1 square = 9 square feet

Getting Ready for Grade 5 GRP18

GR: Reteach, p. GRR18



Name _____ Lesson 18 Reteach

Area and Tiling

In the model, whole tiles are shaded, and some half tiles are shaded. You can combine the areas of half tiles and whole tiles to find the total area.

Marta's Entryway

1 square = 4 square feet

Find the area of the entryway. Write the area in square feet.

Step 1 Count the number of whole tiles. There are 42 whole tiles.

Step 2 Count the number of half tiles. There are 6 half tiles.
Think: 2 half tiles = 1 whole tile
6 half tiles = 3 whole tiles

Step 3 Use the total number of whole tiles to find the area.
42 + 3 = 45 whole tiles
Think: 1 tile = 4 square feet
Multiply the number of whole tiles by 4 to find the area.
45 × 4 = 180
So, the area of Marta's entryway is 180 square feet.

Find the area of each shaded shape. Write the area in square units.

1. 1 square = 4 square feet — 72 square feet

2. 1 square = 9 square meters — 135 square meters

3. 1 square = 16 square miles — 160 square miles

Reteach © Houghton Mifflin Harcourt Publishing Company GRR18 Grade 4

*GR – Getting Ready Lessons and Resources (*www.thinkcentral.com*)

Share and Show

1. Find the area of the shaded shape.

STEP 1 Find the area of the half squares:

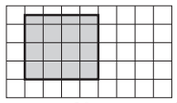
4 half squares × 8 square yards = 32 square yards

STEP 2 Find the area of the whole squares:

4 × 3 = 12 squares

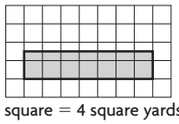
12 squares × 16 square yards = 192 square yards

STEP 3 Find the total area: 32 + 192 = 224 square yards



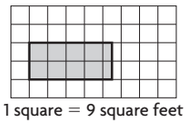
1 square = 16 square yards

Find the area of each shaded shape. Write the area in square units.

2. 

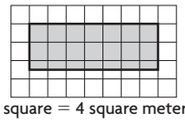
1 square = 4 square yards

42 square yards

3. 

1 square = 9 square feet

81 square feet

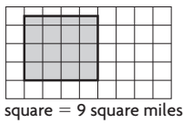
4. 

1 square = 4 square meters

70 square meters

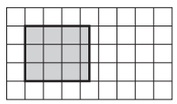
On Your Own

Find the area of each shaded shape. Write the area in square units.

5. 

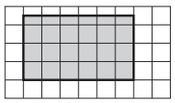
1 square = 9 square miles

126 square miles

6. 

1 square = 16 square meters

168 square meters

7. 

1 square = 25 square meters

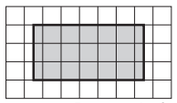
525 square meters

Problem Solving

8. A mosaic table top is shown. Each square has an area of 5 square inches. What is the area of the table top? **Explain.**

90 square inches; 6 half squares =15 square inches, and 15 whole squares = 75 square inches; 15 + 75 = 90.

Table Top



1 square = 5 square inches

2 PRACTICE

Share and Show • Guided Practice

Use Exercises 1–4 to check students' understanding of lesson concepts. Have students explain how they found the area of the half squares and the whole squares.

On Your Own • Independent Practice

For Exercises 5–7, remind students that area is expressed in square units. They should include the square units in their answers.

Problem Solving Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 8, a whole square is an odd number of square inches. Remind students that they can find the area of the half squares by finding one half the area of the same number of whole squares or they can combine two half squares into one whole square and count the number of whole squares formed.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you use tiling to find the area of a rectangle? Possible answer: I can count the number of half squares and multiply by $\frac{1}{2}$ the area of a whole square. Then I can count the number of whole squares and multiply by the area of a square. Finally, I can add the areas of the half squares and the whole squares and express the answer in square units.

Math Journal WRITE Math

Use grid paper to draw a rectangle that contains whole squares and half squares. Explain how to find the area of the rectangle.

LESSON 19

Multiply Three Factors

LESSON AT A GLANCE

Lesson Objective
Find the product of three factors.

Materials
MathBoard

GO DIGITAL Animated Math Models

1 TEACH and TALK GO DIGITAL • Animated Math Models

Unlock the Problem

Math Processes and Practices

Review the Associative and Commutative Properties. Read and discuss the problem.

- **Why can you use multiplication to solve the problem?** Possible answer: we are finding the total of same-size groups.

Example

- **How does using properties help you multiply 4 × (16 × 6)?** Possible answer: I can use the Commutative Property to write (16 × 6) as (6 × 16). Then I can use the Associative Property to write 4 × (6 × 16) as (4 × 6) × 16. The basic fact 4 × 6 is easy. Then I just need to multiply 24 × 16.

This lesson builds on multiplying whole numbers presented in Chapters 2 and 3 and prepares students for finding the volume of rectangular prisms taught in Grade 5.

Name _____

Multiply Three Factors

Essential Question How can you find the product of three factors?

Unlock the Problem Real World

You can use properties of multiplication to help make multiplication of three factors easier.

Sam ships ④ boxes of car model kits to Toy Mart. Each box contains ⑯ cartons, with ⑥ kits in each carton. How many car model kits does Sam ship?

- Underline what you are asked to find.
- Circle the numbers you will use to solve the problem.
- What operation can you use to solve the problem? **multiplication**

Example Find 4 × (16 × 6).

STEP 1

Simplify the problem. Rewrite 4 × (16 × 6) as a product of two factors.

4 × (16 × 6) = 4 × (6 × 16) Commutative Property

= (4 × 6) × 16 Associative Property

= 24 × 16

So, 4 × (16 × 6) = 24 × 16.

STEP 2

Multiply.

$$\begin{array}{r} {\scriptstyle 1\ 2} \\ 16 \\ \times\ 24 \\ \hline 64 \quad \leftarrow 4 \times 16 \\ +\ 320 \quad \leftarrow 20 \times 16 \\ \hline 384 \quad \leftarrow \text{Add.} \end{array}$$

So, Sam ships 384 car model kits.

Try This!

(18 × 8) × 3 = 18 × (8 × 3) Associative Property

= 18 × 24

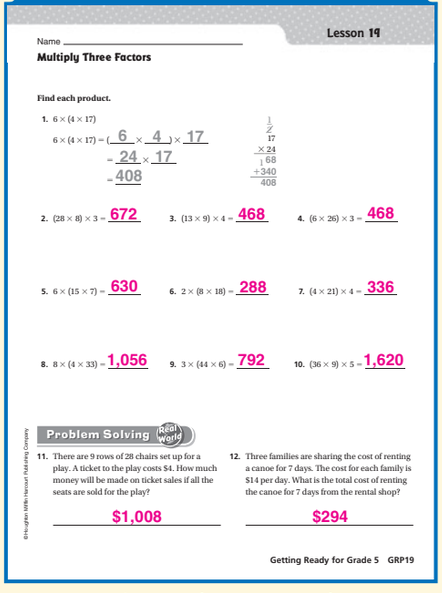
= 432

Math Talk Mathematical Practices

Explain how using properties makes it easier to multiple three factors.

Possible explanation: the properties allow you to rearrange the factors, so it is possible to multiply the factors in fewer steps.

GR: Practice, p. GRP19



Name _____ Lesson 19

Multiply Three Factors

Find each product.

1. 6 × (4 × 17)

6 × (4 × 17) = (6 × 4) × 17
= 24 × 17
= 408

$$\begin{array}{r} {\scriptstyle 1\ 2} \\ 17 \\ \times\ 24 \\ \hline 68 \\ +340 \\ \hline 408 \end{array}$$

2. (28 × 8) × 3 = 672
3. (13 × 9) × 4 = 468
4. (6 × 26) × 3 = 468
5. 6 × (15 × 7) = 630
6. 2 × (8 × 18) = 288
7. (4 × 21) × 4 = 336
8. 8 × (4 × 33) = 1,056
9. 3 × (44 × 6) = 792
10. (36 × 9) × 5 = 1,620

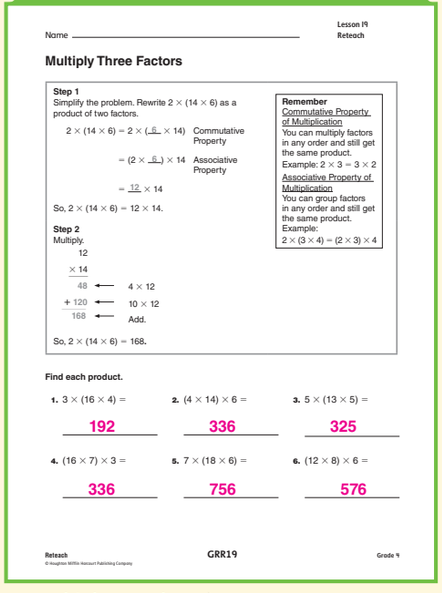
Problem Solving Real World

11. There are 9 rows of 28 chairs set up for a play. A ticket to the play costs $4. How much money will be made on ticket sales if all the seats are sold for the play?
$1,008

12. Three families are sharing the cost of renting a canoe for 7 days. The cost for each family is $14 per day. What is the total cost of renting the canoe for 7 days from the rental shop?
$294

Getting Ready for Grade 5 GRP19

GR: Reteach, p. GRR19



Name _____ Lesson 19 Reteach

Multiply Three Factors

Step 1
Simplify the problem. Rewrite 2 × (14 × 6) as a product of two factors.

2 × (14 × 6) = 2 × (6 × 14) Commutative Property

= (2 × 6) × 14 Associative Property

= 12 × 14

So, 2 × (14 × 6) = 12 × 14.

Step 2
Multiply.

$$\begin{array}{r} 12 \\ \times\ 14 \\ \hline 48 \quad \leftarrow 4 \times 12 \\ +\ 120 \quad \leftarrow 10 \times 12 \\ \hline 168 \quad \leftarrow \text{Add.} \end{array}$$

So, 2 × (14 × 6) = 168.

Remember
Commutative Property of Multiplication
You can multiply factors in any order and still get the same product.
Example: 2 × 3 = 3 × 2
Associative Property of Multiplication
You can group factors in any order and still get the same product.
Example:
2 × (3 × 4) = (2 × 3) × 4

Find each product.

1. 3 × (16 × 4) = 192
2. (4 × 14) × 6 = 336
3. 5 × (13 × 5) = 325
4. (16 × 7) × 3 = 336
5. 7 × (18 × 6) = 756
6. (12 × 8) × 6 = 576

Reteach

GRR19

Grade 5

*GR – Getting Ready Lessons and Resources (*www.thinkcentral.com*)

Share and Show

1. Find the product of $7 \times (6 \times 13)$.

STEP 1 Simplify the problem.

Rewrite $7 \times (6 \times 13)$ as a product of two factors.

$7 \times (6 \times 13) = (\underline{7} \times \underline{6}) \times 13$

Associative Property

$= \underline{42} \times \underline{13}$

STEP 2 Multiply.

$$\begin{array}{r} 13 \\ \times\ 42 \\ \hline 546 \end{array}$$

Find each product.

2. $3 \times (14 \times 3) = \underline{126}$
3. $2 \times (4 \times 13) = \underline{104}$
4. $(16 \times 6) \times 3 = \underline{288}$

On Your Own

Find each product.

5. $7 \times (17 \times 4) = \underline{476}$
6. $(18 \times 4) \times 6 = \underline{432}$
7. $9 \times (17 \times 5) = \underline{765}$
8. $(5 \times 26) \times 3 = \underline{390}$
9. $9 \times (19 \times 2) = \underline{342}$
10. $(21 \times 4) \times 6 = \underline{504}$

Problem Solving

11. There are 3 basketball leagues. Each league has 8 teams. Each team has 13 players. How many players are there in all 3 leagues?

312 players

12. There are 8 boxes of tennis balls. There are 24 cans of tennis balls in each box. There are 3 tennis balls in each can. How many tennis balls are there in all?

576 tennis balls

Try This!

Point out that it is not always necessary for students to use both the Associative and Commutative Properties when multiplying three factors.

Use Math Talk to check students' understanding of lesson concepts.

2 PRACTICE

Share and Show • Guided Practice

Use Exercises 1–4 to check students' understanding of lesson concepts. Ask students to explain the steps they used to find each product.

On Your Own • Independent Practice

For Exercises 5–10, have students identify the properties they used to get each answer. Encourage students to try one property first before using both.

Problem Solving Math Processes and Practices

UNLOCK THE PROBLEM For Exercises 11 and 12, have students explain why they can use multiplication to solve each problem. Encourage students to write a multiplication expression for each problem.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you find the product of three factors? Possible answer: I can use properties to rearrange the factors, so I can multiply two factors that form a basic fact first. Then I can use two factors to find the final product.

Math Journal WRITE Math

Write a word problem that can be solved by multiplying three factors. Include the solution.

LESSON 20

Find Area of the Base

LESSON AT A GLANCE

Lesson Objective
Find the area of the base of a rectangular prism.

Vocabulary
rectangular prism, base

Materials
MathBoard

GO DIGITAL iTools: Geometry

This lesson builds on finding the area of rectangles presented in Chapter 13 and prepares students for finding volume of a rectangular prism taught in Grade 5.

1 TEACH and TALK GO DIGITAL • iTools

Unlock the Problem

Math Processes and Practices

Be sure students understand the definitions of rectangular prism and base.

Example

Read and discuss the problem.

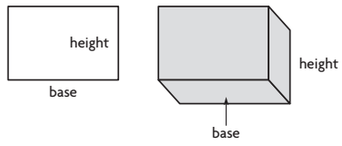
- **What do you need to find?** the area of the base of the box
- **Why can you use the area formula of a rectangle to find the area of the base?** The base shape is a rectangle.
- **How can you find the base and the height of the base?** Possible answer: I can use the labels on the rectangular prism to find the base and height.

Name _____

Find Area of the Base

Essential Question How can you find the area of the base of a rectangular prism?

Connect The base of a rectangle is different than the base of a rectangular prism. The base of a rectangle is a side, but the base of a rectangular prism is a rectangle. To find the area of a rectangle, use the formula $A = b \times h$ or $l \times w$.



Unlock the Problem Real World

Example

Ana is making a diorama for a class project. The diorama is in the shape of a rectangular prism. She wants to paint the bottom of the diorama. What is the area of the base?

The base shape is a rectangle.

Use a formula to find the area.

$A = b \times h$

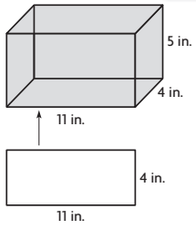
base = 11 inches

height = 4 inches

A = 11 × 4

A = 44 square inches

So, the area of the base of the diorama is 44 square inches.



- What shape is the base of the diorama?
  rectangle
- What are the base and height of the base of the diorama?
  base is 11 inches; height is 4 inches

Math Talk Mathematical Practices

Why would multiplying 11 by 5 give an incorrect answer for the area of the base?

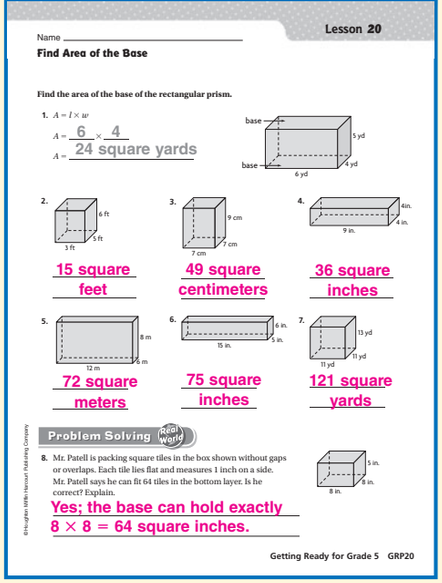
Possible explanation: The diorama is 5 inches tall. The bottom of the box is 11 inches long and 4 inches wide.

Remember

Area of a rectangle:
$A = b \times h$ or $l \times w$

Area of a square: $A = s \times s$

GR: Practice, p. GRP20



Name _____ Lesson 20

Find Area of the Base

Find the area of the base of the rectangular prism.

1. $A = l \times w$
   A = 6 × 4
   A = 24 square yards

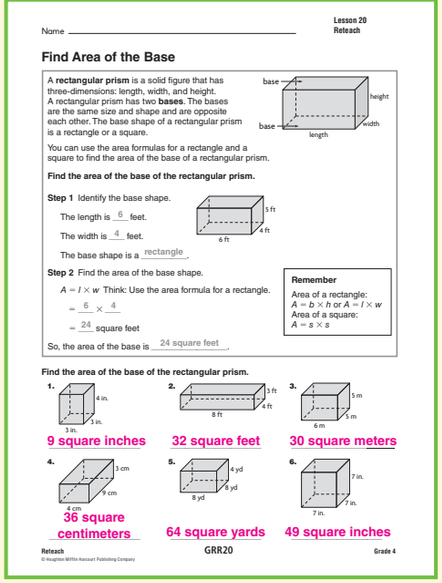
2. 15 square feet
3. 49 square centimeters
4. 36 square inches
5. 72 square meters
6. 75 square inches
7. 121 square yards

Problem Solving Real World

8. Mr. Patell is packing square tiles in the box shown without gaps or overlaps. Each tile lies flat and measures 1 inch on a side. Mr. Patell says he can fit 64 tiles in the bottom layer. Is he correct? Explain.
   Yes; the base can hold exactly 8 × 8 = 64 square inches.

Getting Ready for Grade 5 GRP20

GR: Reteach, p. GRR20



Name _____ Lesson 20 Reteach

Find Area of the Base

A **rectangular prism** is a solid figure that has three-dimensions: length, width, and height. A rectangular prism has two **bases**. The bases are the same size and shape and are opposite each other. The base shape of a rectangular prism is a rectangle or a square.

You can use the area formulas for a rectangle and a square to find the area of the base of a rectangular prism.

Find the area of the base of the rectangular prism.

Step 1 Identify the base shape.
The length is 6 feet.
The width is 4 feet.
The base shape is a rectangle.

Step 2 Find the area of the base shape.
$A = l \times w$ Think: Use the area formula for a rectangle.
= 6 × 4
= 24 square feet
So, the area of the base is 24 square feet.

Remember
Area of a rectangle:
$A = b \times h$ or $A = l \times w$
Area of a square:
$A = s \times s$

Find the area of the base of the rectangular prism.

1. 9 square inches
2. 32 square feet
3. 30 square meters
4. 36 square centimeters
5. 64 square yards
6. 49 square inches

Reteach © Houghton Mifflin Harcourt Publishing Company GRR20 Grade 4

*GR – Getting Ready Lessons and Resources (*www.thinkcentral.com*)

Share and Show

MATH BOARD

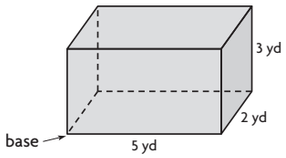
1. Find the area of the base of the rectangular prism.

The base shape is a rectangle.

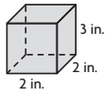
length = 5 yards, width = 2 yards

$A = 5 \times 2 = 10$ square yards

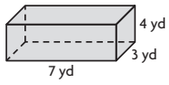
So, the area of the base is 10 square yards.



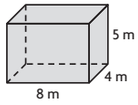
Find the area of the base of the rectangular prism.

2. 

4 square inches

3. 

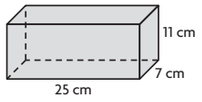
21 square yards

4. 

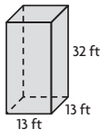
32 square meters

On Your Own

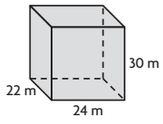
Find the area of the base of the rectangular prism.

5. 

175 square cm

6. 

169 square feet

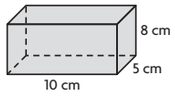
7. 

528 square meters

Problem Solving

Real World

8. Julio makes sugar cubes for horses. Each sugar cube edge is 1 centimeter in length. He packs the sugar cubes in the box shown without gaps. Julio says he can fit 80 sugar cubes in the bottom layer. Is he correct? Explain.



No. Possible explanation: the base of the box is a 10 cm by 5 cm rectangle. The area is $10 \times 5 = 50$ square centimeters, so only 50 sugar cubes will fit.

Use **Math Talk** to check students' understanding of lesson concepts.

Read the Remember box with students to help them recognize that the base and height of a rectangle can also be referred to as the length and width.

2 PRACTICE

MATH BOARD

Share and Show • Guided Practice

Use Exercises 1–4 to check students' understanding of lesson concepts. Have students identify the base of each rectangular prism and explain how they found the area.

On Your Own • Independent Practice

For Exercises 5–7, remind students that area is given in square units. Students should write their answers in square units. Encourage students to circle the length and the width of the base as a reminder of what numbers to use to find each area.

Problem Solving

Math Processes and Practices

UNLOCK THE PROBLEM For Exercise 8, students must find the area of the base of the box to determine whether the 80 sugar cubes will fit in the bottom layer.

3 SUMMARIZE

Math Processes and Practices

Essential Question

How can you find the area of the base of a rectangular prism? Possible answer: for the base of a rectangular prism, I can identify the measures of the base and height. Then I can use the formula $A = b \times h$ to find the area of the base in square units.

Math Journal

WRITE Math

Explain how to find the area of the base of a rectangular prism with a length of 5 ft, a width of 4 ft, and a height of 3 ft.

Getting Ready Lessons and Resources, pp. GR47–GR48

Checkpoint

Name _____

Checkpoint

Concepts and Skills

Find each product.

1. $(13 \times 8) \times 5 =$ 520
2. $7 \times (12 \times 8) =$ 672
3. $4 \times (17 \times 3) =$ 204

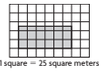
Find the area of the shaded shape. Write the area in square units.

4. 

56 square yards

5. 

336 square feet

6. 

375 square meters

Find the area of the base of the rectangular prism.

7. 

4 square inches

8. 

54 square feet

9. 

144 square centimeters

Problem Solving Real World

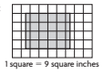
10. There are 6 grades competing in a spelling bee. Each grade has 10 teams. Each team has 4 members. How many members are competing in the spelling bee?

240

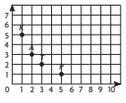
Fill in the bubble completely to show your answer.

11. There are 9 crates of oranges. There are 18 boxes of oranges in each crate. There are 6 bags of oranges in each box. How many bags of oranges are there in all?
   - (A) 108
   - (B) 162
   - (C) 972
   - (D) 1152

12. A small tiled balcony is shown. Each tile is 9 square inches. What is the area of the shaded section in square inches?
   - (A) 20 square inches
   - (B) 144 square inches
   - (C) 162 square inches
   - (D) 180 square inches



13. Which ordered pair names point A on the grid?
   - (A) (1, 5)
   - (B) (2, 3)
   - (C) (3, 2)
   - (D) (5, 1)



14. What is the area of the base of the rectangular prism?
   - (A) 40 square meters
   - (B) 48 square meters
   - (C) 144 square meters
   - (D) 432 square meters

Getting Ready for Grade 5 Test

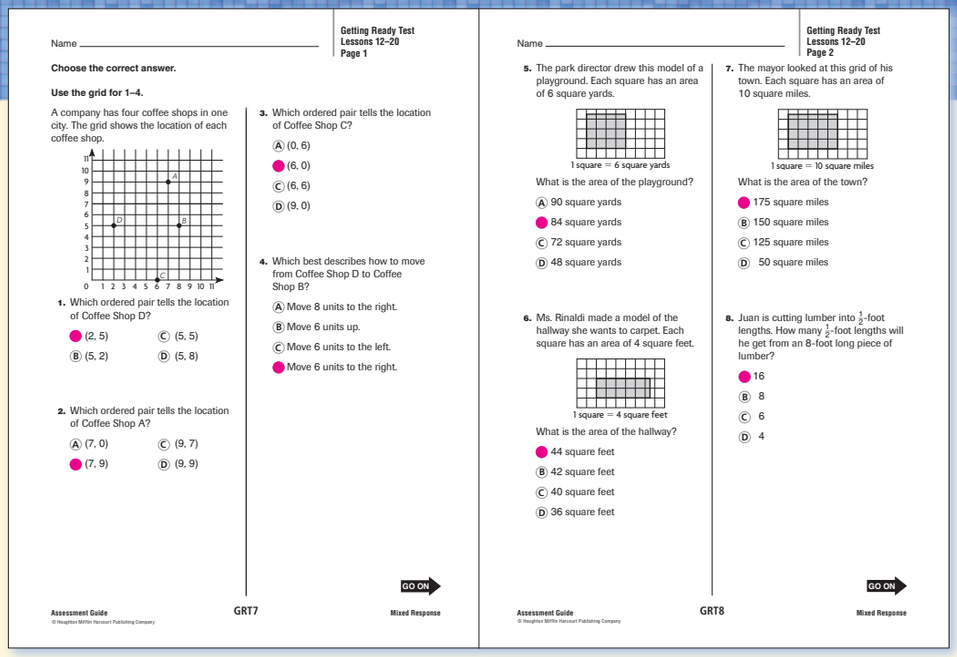
LESSONS 12 TO 20

Summative Assessment

Use the **Getting Ready Test** to assess students' progress in Getting Ready for Grade 5 Lessons 12–20.

Getting Ready Tests are provided in multiple-choice and mixed-response format in the *Getting Ready Lessons and Resources*.

GO DIGITAL Getting Ready Test is available online.


Name _____ Getting Ready Test Lessons 12–20 Page 1

Choose the correct answer.

Use the grid for 1–4.

A company has four coffee shops in one city. The grid shows the location of each coffee shop.

1. Which ordered pair tells the location of Coffee Shop D?
   - (2, 5)
   - (B) (5, 2)
   - (C) (5, 5)
   - (D) (5, 8)

2. Which ordered pair tells the location of Coffee Shop A?
   - (A) (7, 0)
   - (7, 9)
   - (C) (9, 7)
   - (D) (9, 9)

3. Which ordered pair tells the location of Coffee Shop C?
   - (A) (0, 6)
   - (6, 0)
   - (C) (6, 6)
   - (D) (9, 0)

4. Which best describes how to move from Coffee Shop D to Coffee Shop B?
   - (A) Move 8 units to the right.
   - (B) Move 6 units up.
   - (C) Move 6 units to the left.
   - Move 6 units to the right.

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Name _____ Getting Ready Test Lessons 12–20 Page 2

5. The park director drew this model of a playground. Each square has an area of 6 square yards.

1 square = 6 square yards

What is the area of the playground?
- (A) 90 square yards
- 84 square yards
- (C) 72 square yards
- (D) 48 square yards

6. Ms. Rinaldi made a model of the hallway she wants to carpet. Each square has an area of 4 square feet.

1 square = 4 square feet

What is the area of the hallway?
- 44 square feet
- (B) 42 square feet
- (C) 40 square feet
- (D) 36 square feet

7. The mayor looked at this grid of his town. Each square has an area of 10 square miles.

1 square = 10 square miles

What is the area of the town?
- 175 square miles
- (B) 150 square miles
- (C) 125 square miles
- (D) 50 square miles

8. Juan is cutting lumber into $\frac{1}{2}$-foot lengths. How many $\frac{1}{2}$-foot lengths will he get from an 8-foot long piece of lumber?
   - 16
   - (B) 8
   - (C) 6
   - (D) 4

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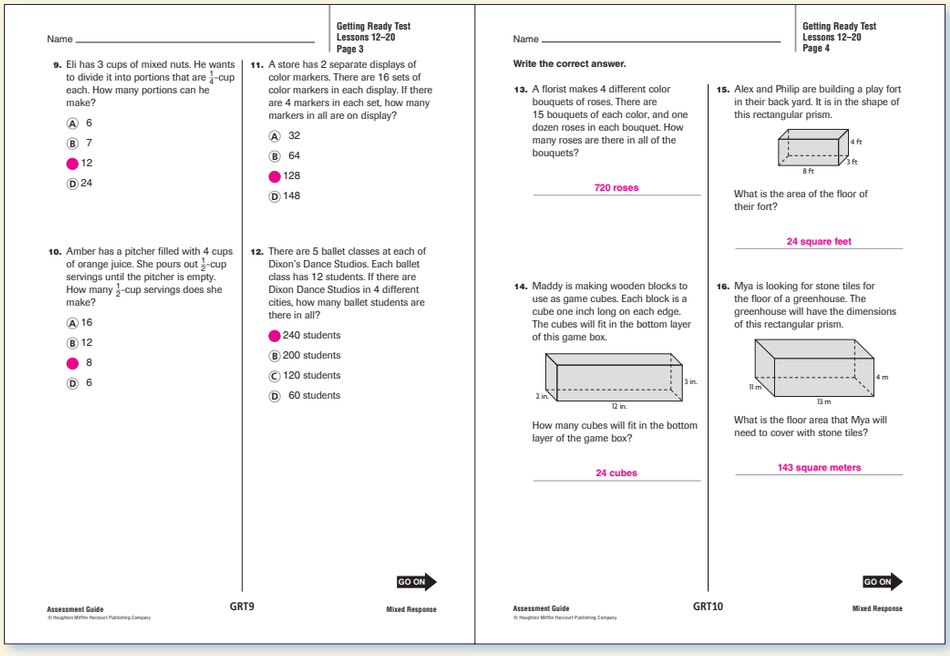
Name _____ Getting Ready Test Lessons 12–20 Page 3

9. Eli has 3 cups of mixed nuts. He wants to divide it into portions that are $\frac{1}{4}$-cup each. How many portions can he make?
   - (A) 6
   - (B) 7
   - 12
   - (D) 24

10. Amber has a pitcher filled with 4 cups of orange juice. She pours out $\frac{1}{2}$-cup servings until the pitcher is empty. How many $\frac{1}{2}$-cup servings does she make?
    - (A) 16
    - (B) 12
    - 8
    - (D) 6

11. A store has 2 separate displays of color markers. There are 16 sets of color markers in each display. If there are 4 markers in each set, how many markers in all are on display?
    - (A) 32
    - (B) 64
    - 128
    - (D) 148

12. There are 5 ballet classes at each of Dixon's Dance Studios. Each ballet class has 12 students. If there are Dixon Dance Studios in 4 different cities, how many ballet students are there in all?
    - 240 students
    - (B) 200 students
    - (C) 120 students
    - (D) 60 students

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Name _____ Getting Ready Test Lessons 12–20 Page 4

Write the correct answer.

13. A florist makes 4 different color bouquets of roses. There are 15 bouquets of each color, and one dozen roses in each bouquet. How many roses are there in all of the bouquets?

720 roses

14. Maddy is making wooden blocks to use as game cubes. Each block is a cube one inch long on each edge. The cubes will fit in the bottom layer of this game box.

How many cubes will fit in the bottom layer of the game box?

24 cubes

15. Alex and Philip are building a play fort in their back yard. It is in the shape of this rectangular prism.

What is the area of the floor of their fort?

24 square feet

16. Mya is looking for stone tiles for the floor of a greenhouse. The greenhouse will have the dimensions of this rectangular prism.

What is the floor area that Mya will need to cover with stone tiles?

143 square meters

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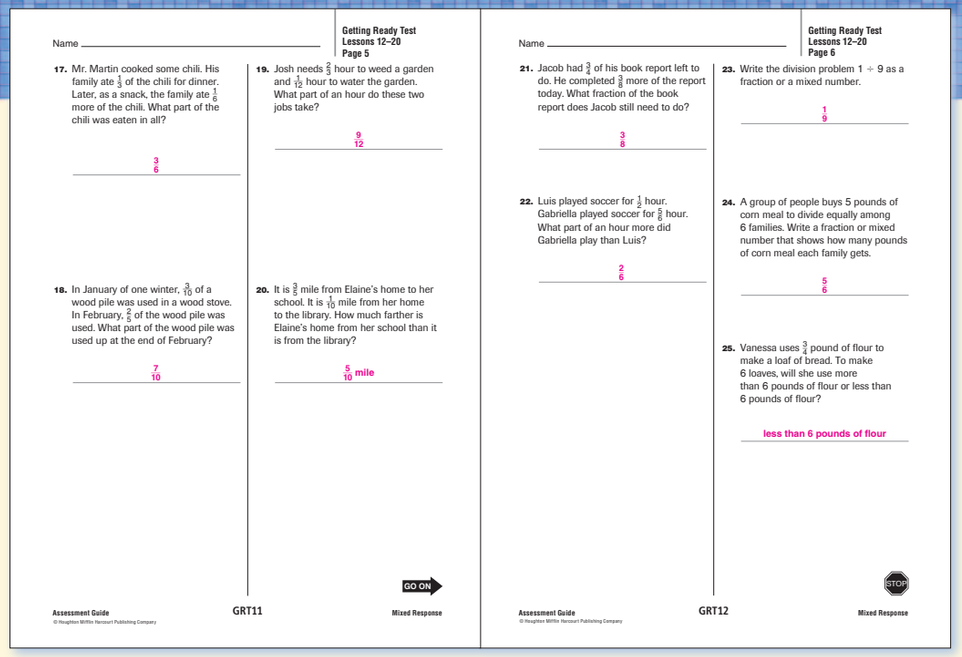
Data-Driven Decision Making RtI

Item	Lesson	Common Error	Intervene With
1–4	17	May not understand how to use ordered pairs to locate points on a grid	**R**—GRR17
5–7	18	May not understand how to use tiling to find the area of a rectangle	**R**—GRR18
8–10	15	May not understand how to use repeated subtraction to solve problems involving division with fractions	**R**—GRR15
11–13	19	May not understand how to find the product of three factors	**R**—GRR19
14–16	20	May not understand how to find the area of the base of a rectangular prism	**R**—GRR20

Key: R—Getting Ready Lessons and Resources: Reteach



Name _____ Getting Ready Test Lessons 12–20 Page 5

17. Mr. Martin cooked some chili. His family ate $\frac{1}{3}$ of the chili for dinner. Later, as a snack, the family ate $\frac{1}{6}$ more of the chili. What part of the chili was eaten in all?

$\frac{3}{6}$

18. In January of one winter, $\frac{3}{10}$ of a wood pile was used in a wood stove. In February, $\frac{2}{5}$ of the wood pile was used. What part of the wood pile was used up at the end of February?

$\frac{7}{10}$

19. Josh needs $\frac{3}{4}$ hour to weed a garden and $\frac{1}{12}$ hour to water the garden. What part of an hour do these two jobs take?

$\frac{9}{12}$

20. It is $\frac{3}{5}$ mile from Elaine's home to her school. It is $\frac{1}{10}$ mile from her home to the library. How much farther is Elaine's home from her school than it is from the library?

$\frac{5}{10}$ mile

GO ON

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Name _____ Getting Ready Test Lessons 12–20 Page 6

21. Jacob had $\frac{3}{4}$ of his book report left to do. He completed $\frac{2}{8}$ more of the report today. What fraction of the book report does Jacob still need to do?

$\frac{3}{8}$

22. Luis played soccer for $\frac{1}{2}$ hour. Gabriella played soccer for $\frac{2}{6}$ hour. What part of an hour more did Gabriella play than Luis?

$\frac{2}{6}$

23. Write the division problem $1 \div 9$ as a fraction or a mixed number.

$\frac{1}{9}$

24. A group of people buys 5 pounds of corn meal to divide equally among 6 families. Write a fraction or mixed number that shows how many pounds of corn meal each family gets.

$\frac{5}{6}$

25. Vanessa uses $\frac{3}{4}$ pound of flour to make a loaf of bread. To make 6 loaves, will she use more than 6 pounds of flour or less than 6 pounds of flour?

less than 6 pounds of flour

STOP

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Portfolio Suggestions The portfolio represents the growth, talents, achievements, and reflections of the mathematics learner. Students might spend a short time selecting work samples for their portfolios.

You may want to have students respond to the following questions:

- What new understanding of math have I developed in the past several weeks?
- What growth in understanding or skills can I see in my work?
- What can I do to improve my understanding of math ideas?
- What would I like to learn more about?

For information about how to organize, share, and evaluate portfolios, see the *Chapter Resources*.

Data-Driven Decision Making RtI

Item	Lesson	Common Error	Intervene With
17–19	12	May not know how to add fractions when one denominator is a multiple of the other	**R**—GRR12
20–22	13	May not know how to subtract fractions when one denominator is a multiple of the other	**R**—GRR13
23, 24	16	May not understand how to write division problems as fractions	**R**—GRR16
25	14	May not understand how to compare the size of the product to the size of each factor when multiplying fractions	**R**—GRR14

Key: R—Getting Ready Lessons and Resources: Reteach