6
LEVEL

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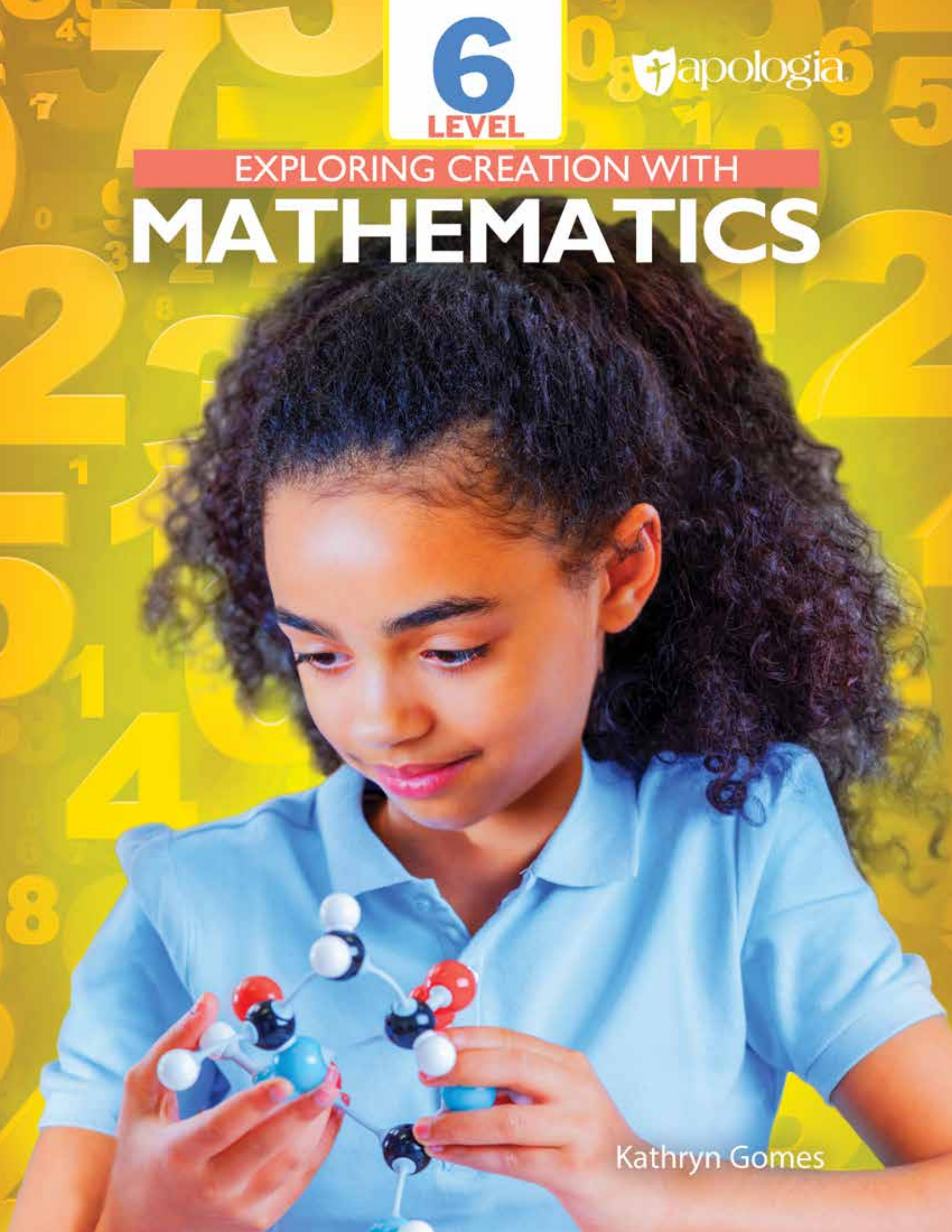
EXPLORING CREATION WITH

MATHEMATICS



Kathryn Gomes

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TEXTBOOK

TEACHING GUIDE & ANSWER KEY

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TABLE OF CONTENTS

CHAPTER

1

WHOLE NUMBERS

In this chapter, you will learn to:

- Find multiples and factors
- Evaluate exponents
- Use the order of operations

LESSON 1: MULTIPLES

The Most Multiples

You Will Need:

- 2 players
- 2 different colored pencils
- Numbered cards 3–10 (such as Uno cards or playing cards)

You Will Do:

1. Shuffle the cards. Player One draws a card and colors in all the multiples of that number on the chart below. It is ok for players to skip count if they do not remember all of the multiples.
2. Player Two draws a card and colors in the multiples of that number. If a multiple is already colored in, it is skipped.
3. Play continues until all the numbered cards have been played. The player with the most squares colored in wins.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Multiples are the result of multiplying a number. For instance, the multiples of 7 are 7, 14, 21, 28, and on and on. There is no end to the number of multiples.

If a number is the multiple of two or more numbers, we call it a **common multiple**. Below is a list of the multiples of 4 and 5. The common multiples of 4 and 5 are circled.

Multiples of 4: 4, 8, 12, 16, (20), 24, 28, 32, 36, (40), 44, 48, …

Multiples of 5: 5, 10, 15, (20), 25, 30, 35, (40), 45, 50, …

Common multiples can help you solve many different kinds of problems. But, they are especially helpful when you try to add and subtract fractions with different denominators. You will learn more about that in Chapter 3.

MULTIPLES: The result of multiplying a number

COMMON MULTIPLE: When a number is a multiple of 2 or more numbers

EXAMPLE 1: **List the first 8 multiples of 8.**

We can skip count to find these or just do the multiplication in our head.

$8 \times 1 = 8$ $8 \times 5 = 40$

$8 \times 2 = 16$ $8 \times 6 = 48$

$8 \times 3 = 24$ $8 \times 7 = 56$

$8 \times 4 = 32$ $8 \times 8 = 64$

EXAMPLE 2: **Find a common multiple of 5 and 8.**

First, we will list the multiples of 5. Then, the multiples of 8. We will circle the numbers that are common on both lists.

Multiples of 5: 5, 10, 15, 20, 25, 30, 35, (40), 45, 50,…

Multiples of 8: 8, 16, 24, 32, (40), 48, 56, 64, 72,…

40 is a common multiple of 5 and 8.

1. List the next 7 multiples for each number.

a. 4, _____, _____, _____, _____, _____, _____, _____

b. 7, _____, _____, _____, _____, _____, _____, _____

c. 6, _____, _____, _____, _____, _____, _____, _____

d. 9, _____, _____, _____, _____, _____, _____, _____

e. 5, _____, _____, _____, _____, _____, _____, _____

2. Is 33 a multiple of 3? Yes or no?

3. Is 42 a multiple of 4? Yes or no?

4. List a common multiple of 4 and 7. _____

5. Look back at the multiples of 5 above. Circle any multiples of 5 that are also multiples of 3.

6. Give an example of a number that is a common multiple of 4 and 6. There is more than one correct answer.

_____

7. At a certain store, hot dogs are only sold in packs of 10, and buns are only sold in bags of 8. What is the least number of hot dogs and buns you can buy so that there is one bun for each hot dog?

_____

8. Mrs. Gong volunteers at the library every 6 days and Mr. Gong volunteers at the local theater every 7 days. How many days will it be before they are both volunteering on the same day?

_____

WARM UP

Use your knowledge of multiplication problems to fill in the blanks in each problem. It may take you a few guesses to find the right digit.

a.
$$\begin{array}{r} 3,214 \\ \times \quad \square \\ \hline 19,284 \end{array}$$

b.
$$\begin{array}{r} 4\,\square \\ \times\ 3\ 8 \\ \hline 352 \\ +\ 1320 \\ \hline 1,672 \end{array}$$

When we multiply multi-digit numbers, we multiply the ones first and then continue from there. No matter how large the number is that you are multiplying, make sure you always start with the ones and work your way left.

Let's review several different kinds of multiplication problems.

EXAMPLE 1: **Find the product.**

$$\begin{array}{r} 2{,}329 \\ \times \quad 4 \\ \hline \end{array}$$

We are multiplying a 4-digit number by a 1-digit number. We just need to start with the ones place value.

$$\begin{array}{r} {\scriptstyle 3\ \ } \\ 2329 \\ \times \quad 4 \\ \hline 6 \end{array}$$

Multiply the 4 by the 9 ones. This results in 36. We write the 6 ones place value below and the 3 above the tens column.

$$\begin{array}{r} {\scriptstyle 1\ 13} \\ 2{,}329 \\ \times \quad 4 \\ \hline 9{,}316 \end{array}$$

Multiply by the tens, hundreds, and thousands being careful to add on any regroupings.

A quick estimate helps us check to make sure our answer makes sense. Our answer should be close to, but less than, 10,000.

$2500 \times 4 = 10{,}000$

When we multiply a 2-digit by a 2-digit number, we need to pay very careful attention to place value.

EXAMPLE 2: **Find the product.**

$$\begin{array}{r} 35 \\ \times\ 42 \\ \hline \end{array}$$

$$\begin{array}{r} {\scriptstyle 1} \\ 35 \\ \times\ 42 \\ \hline 70 \end{array}$$

When multiplying the 2 by the 5 ones, we must regroup and write a 1 above the tens column. We add this to 6 tens and write a 7 below.

$$\begin{array}{r} {\scriptstyle 2} \\ 35 \\ \times\ 42 \\ \hline 70 \\ 00 \end{array}$$

Before multiplying through by the 4 tens, we need to write a zero in the ones column. 4 tens times 5 is 200. We write the 0 and put the 2 above the tens column.

$$\begin{array}{r} {\scriptstyle 2} \\ 35 \\ \times\ 42 \\ \hline 70 \\ +\ 1{,}400 \\ \hline 1{,}470 \end{array}$$

4 multiplied by 3 is 12. Add on the 2 to 12 to get 14. Finally, we add up the total.

A quick estimate helps us check to make sure our answer makes sense.

$40 \times 40 = 1{,}600$

EXAMPLE 3: **Find the product.**

2,049
× 27

$$\begin{array}{r} {\scriptstyle 36} \\ 2{,}049 \\ \times\ 27 \\ \hline 14{,}343 \end{array}$$

Multiply through by the 7 ones, and be careful with the regrouping.

$$\begin{array}{r} {\scriptstyle 1} \\ 2{,}049 \\ \times\ 27 \\ 14{,}343 \\ +\ 40{,}980 \\ \hline \end{array}$$

Before multiplying through by the tens, we need to write a zero in the ones column. Then we multiply the 2 by 9 to get 18. We write the 8 below in the tens column and the one above the hundreds column.

$$\begin{array}{r} 2{,}049 \\ \times\ 27 \\ 14{,}343 \\ +\ 40{,}980 \\ \hline 55{,}323 \end{array}$$

Finally, we add up the total.

A quick estimate helps us check to make sure our answer makes sense.

2,000 × 30 = 60,000

Physicisists are scientists who study mattter, energy, and time. They use multiplication in when finding the force of an object by multiplying the mass by the acceleration. They use this calculation for many things including putting a spacecraft into orbit.

The Dawn spacecraft is the first spacecraft to have orbited two extraterrestrial bodies. Scientists used multiplication to launch it into orbit.

Find each product. Write the letter in the box below with the same number to solve the riddle.

WHAT DID THE SKELETON ORDER FOR DINNER?

____	____	____	____	____		____	____	____	____
350	3,699	297	900	20,410		900	1,476	1,443	350

P $1{,}233 \times 3$

E $4{,}082 \times 5$

B 37×39

S 14×25

S 35×10

R 25×36

A 27×11

I 82×18

R 18×50

LESSON 3: FACTORS

Fabulous Factors

You Will Need:

- 2 players
- 2 colored pencils

You Will Do:

1. Player One chooses any number on the board and circles it with his or her colored pencil.
2. Player Two circles all the factors of Player One's number that are on the board. For instance, if Player One circled 24, then Player Two would circle 1, 2, 3, 4, 6, 8, and 12.
3. Player Two chooses a number on the board and circles it.
4. Player One circles all the factors of Player Two's number that are still available on the board. Players can agree on a certain number of turns until the game is over. Or, they can play until all spaces are circled. The player with the most numbers circled wins.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

A **factor** is a number that divides into another number, leaving no remainder. It is often helpful to find a factor of two numbers. The largest factor that two numbers share is called the **greatest common factor**.

Finding the factors of a number is an important skill that will help you solve many kinds of problems in the future. It can help you simplify fractions or start a long division problem.

FACTOR: A factor is a number that is multiplied to get a product. It also divides evenly into that product.

Example: The factors of 30 are 1, 2, 3, 5, 6, 10, 15, and 30. The factors of 25 are 1, 5, and 25.

GREATEST COMMON FACTOR: This is the largest factor that two numbers have in common.
Example: The greatest common factor of 25 and 30 is 5.

EXAMPLE 1: **Find all the factors of 24.**

The easiest way is to make a list of all the ways you can multiply two numbers to get 24. If we go in order, we can make sure we don't miss any.

1×24

2×12

3×8

4×6

$5 \times ???$

We cannot multiply 5 to get 24. And then we would be up to 6, which we already listed. We have a complete list.

Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24

EXAMPLE 2: **What is the greatest common factor of 56 and 28?**

Start by listing the factors.

Factors of 28: 1, 2, 4, 7, 14, 28

Factors of 56: 1, 2, 4, 7, 8, 14, 28, 56

The greatest common factor is 28.

A **prime** number is a number with only one pair of factors. That pair of factors will always be 1 and the number itself. The prime numbers less than 10 are 2, 3, 5, and 7. It must be a pair of numbers, 1 and the number. This is why 1 is not prime, it only has one factor; itself!

If a number is greater than 1 and has more than one pair of factors, we say it is **composite**. The number 15 is a composite number.

PRIME: Any whole number greater than 1 is prime if its only factors are 1 and itself.

COMPOSITE: Any whole number greater than 1 that is not prime.

EXAMPLE 3: **List the factors of 23. Is 23 prime or composite?**

We will make a list.

1 × 23	6 × ?????
2 × ????	7 × ?????
3 × ???	8 × ????
4 × ????	9 × ????
5 × ????	10 × ????

We cannot multiply 2, 3, 4, 5, 6, 7, 8, 9 or 10 to get 23. At that point, we know we haven't skipped any factors.

Factors of 23: 1, 23

23 is prime.

1. List the factors of each number.

50 6 22 35

2. Find the greatest common factor of each pair of numbers.

a. 77 49	b. 99 88
c. 56 42	d. 64 48

3. Find the factors of each number. Then, circle whether it is prime or composite.

12

prime/composite

27

prime/composite

31

prime/composite

39

prime/composite

WARM UP

Prepare for today's lesson by making a list of all the prime numbers under 30. Use the list of numbers below to help you eliminate numbers that have more than two factors.

1. One is not prime. You can cross it out.
2. Any number other than 2 that has 2 as a factor is not prime. You can cross out all of these numbers on the list. This will mean that you are crossing out all of the even numbers except 2.
3. Any number other than 3 that has 3 as a factor is not prime. You can skip count by 3's to eliminate all of these numbers.
4. Any number other than 5 that has 5 as a factor is not prime. You can cross out all of these numbers on the list. They will all have a zero or a 5 as their ones digit.
5. Look at the remaining numbers. Do any of them have more than 2 factors? If so, cross them out.
6. The remaining numbers are a list of primes. Check your list against the one in the answer key.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

Prime numbers under 30: _____

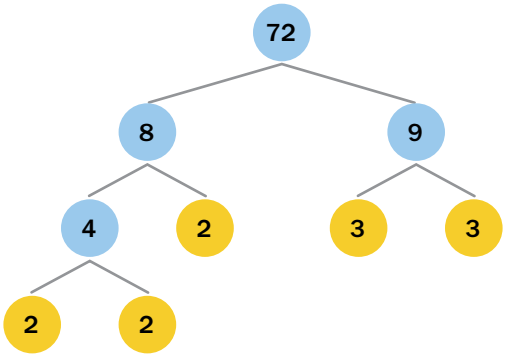
In the last lesson, you found pairs of factors for a number. In this lesson, you will find the **prime factorization** of a number. The prime factorization of a number is when we write a number only as the product of prime numbers. Below are examples of two prime factorizations.

$$30 = 2 \times 3 \times 5$$

$$36 = 2 \times 2 \times 3 \times 3$$

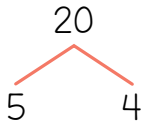
PRIME FACTORIZATION:
Rewriting the number as a product of prime numbers.

A tree diagram is a helpful way to find the prime factorization of a number.

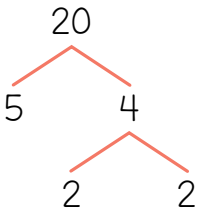


$72 = \_2\_ \times \_2\_ \times \_2\_ \times \_3\_ \times \_3\_$

EXAMPLE 1: **Find the prime factorization of 20.**

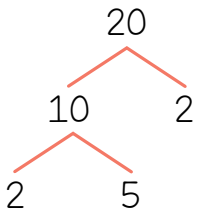


Begin by rewriting 20 as the product of 2 numbers. These two numbers will be the first branches of our tree.



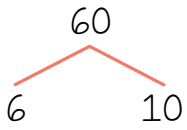
The factor 5 is prime, so that branch of the tree is done. But, 4 is not prime. We will split it into two factors.

We know that 2 is prime. All of the branches of the tree are prime, so the tree is finished. Let's write out the product. When we do this, we always write the factors in order from least to greatest. $20 = 2 \times 2 \times 5$

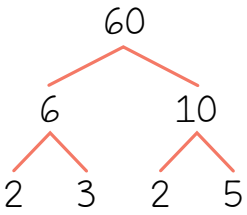


Note that if we had started with two different factors, we would still have arrived at the same answer. The order is different, but when we write the factors in order from least to greatest, we will see that it is the same answer.
$20 = 2 \times 2 \times 5$

EXAMPLE 2: **Find the prime factorization of 60.**



This is a larger number. But remember, you can start with any factor pair. Choose the factor pair that is the easiest for you.



Neither of the branches ends in a prime number. We will need to split both branches again into factor pairs.

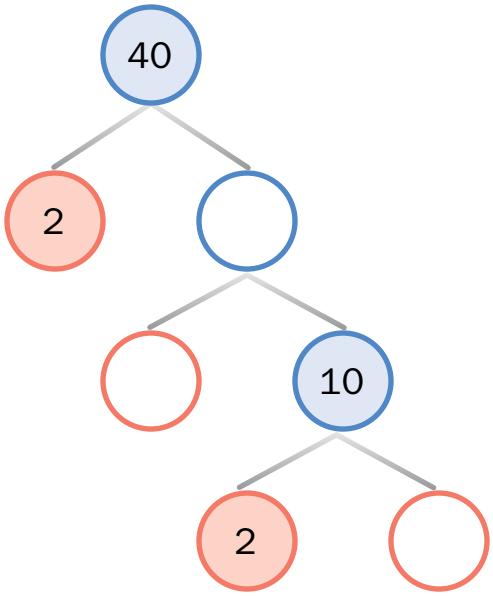
Every branch ends in a prime number. We do not need to factor again. Now we need to write out the factors from least to greatest. $60 = 2 \times 2 \times 3 \times 5$

Prime numbers are very important in math and in life. They are used for many things including generating strong passwords for cyber security.

PRACTICE

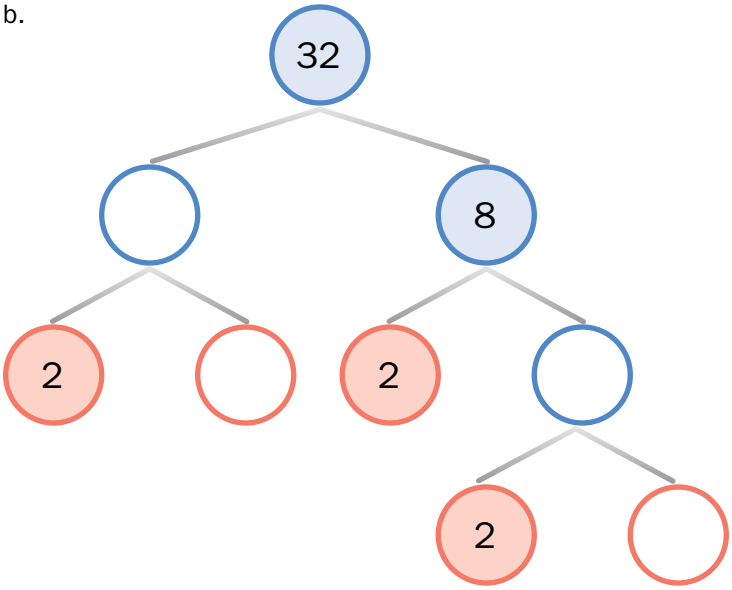
1. Fill in the missing numbers on each tree diagram. Then write out the prime factorization.

a.



40 = _____ × _____ × _____ × _____

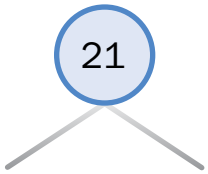
b.



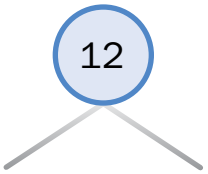
32 = _____ × _____ × _____ × _____ × _____

2. Use tree diagrams to find the prime factorization of each number.

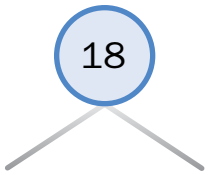
a.



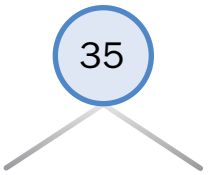
b.



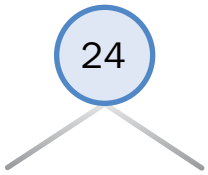
c.



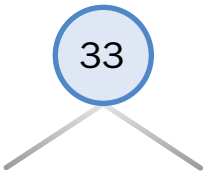
d.



e.



f.



LESSON 5: LONG DIVISION (DAY ONE)

Long Division Scramble

You Will Need:

- Lesson 5: Activity Sheet
- Scissors

You Will Do:

1. Carefully tear out the activity sheet from the back of the answer key. Cut the strips apart along the dashed lines.
2. Rearrange the strips to correctly show each long division problem. Have your parent check your answers.

In this lesson and the next, we will be reviewing long division. We use long division to systematically divide large numbers. Begin by reviewing the steps shown in the box to the right.

Because the problems are longer, some students have trouble remembering which step to do next. Remember that you continue to Divide, Multiply, Subtract, and Bring Down until you get to the end of the dividend.

STEPS FOR LONG DIVISION		
D	÷	Divide
M	×	Multiply
S	–	Subtract
B	↓	Bring down

EXAMPLE 1: **Find the quotient.**

D

$$\begin{array}{r} 5 \\ 9\overline{)504} \end{array}$$

Divide. We cannot divide 9 into 5. However, 9 goes into 50 five times. Write the 5 above the zero.

M

S

$$\begin{array}{r} 5 \\ 9\overline{)504} \\ -\,45 \\ \hline 5 \end{array}$$

Multiply 9 by 5. The product is 45. Write that directly below and then subtract. There are 5 remaining.

B

$$\begin{array}{r} 5 \\ 9\overline{)504} \\ -\,45 \\ \hline 54 \end{array}$$

Bring down the 4.

$$\begin{array}{r} 56 \\ 9\overline{)504} \\ -\,45 \\ \hline 54 \\ -\,54 \\ \hline 0 \end{array}$$

Divide 9 into 54. Nine goes into 54 six times. Write the 6 above the 4 in the ones column. Multiply and subtract. There is no remainder.

EXAMPLE 2: **Find the quotient.**

D

$$\begin{array}{r} 1 \\ 5\overline{)86} \end{array}$$

Divide 5 into 8. It goes into 8 one time. Write the one above the 8.

M

S

$$\begin{array}{r} 1 \\ 5\overline{)86} \\ -\,5 \\ \hline 3 \end{array}$$

Multiply 5 by 1. Write the product below and subtract. There are 3 remaining.

B

$$\begin{array}{r} 1 \\ 5\overline{)86} \\ -\,5 \\ \hline 36 \end{array}$$

Bring down the 6.

$$\begin{array}{r} 17 \text{ r. } 1 \\ 5\overline{)86} \\ -\,5 \\ \hline 36 \\ -\,35 \\ \hline 1 \end{array}$$

Divide 5 into 36. Five goes into 36 seven times. Multiply and subtract. There is a remainder of 1.

We can write the remainder using the letter "r" for remainder. Or, we can write the remainder as a fraction.

$86 \div 5 = 17 \text{ r. } 1$

$86 \div 5 = 17\ \frac{1}{5}$

When we write a remainder as a fraction, the remainder is the numerator and the divisor is the denominator.

Find each quotient. For answers with remainders, write the answer with the "r." notation and again as a fraction so you can practice both methods.

a. $6\overline{)126}$

b. $5\overline{)650}$

c. $8\overline{)91}$

d. $6\overline{)27}$

e. $4\overline{)123}$

f. $7\overline{)145}$

g. $9\overline{)108}$

h. $4\overline{)323}$

WARM UP

Today we will be using estimation to help us divide. Get ready for today's lesson by circling the number that is closest to each quotient below.

a. $21\overline{)38}$

1 3 5

b. $16\overline{)33}$

1 2 3

c. $24\overline{)52}$

1 2 3

d. $15\overline{)85}$

3 5 7

We will be practicing long division again in this lesson. The only difference is we will now solve problems with a two-digit divisor. We will follow the same four steps to do this: divide, multiply, subtract, and bring down.

When we divide in the first step, we will use estimation to help us decide how many times the divisor goes into the first part of our dividend. You also may need to do some multiplication on scratch paper on the side to check your estimate.

EXAMPLE 1: **Find the quotient.**

$21\overline{)382}$

D

$$\begin{array}{r} 1 \\ 21\overline{)382} \end{array}$$

Divide. We cannot divide 21 into 3. We need to estimate how many times it will divide into 38. We know that 21 x 2 = 42, which is too large. We will estimate that it goes into 38 one time.

M

S

$$\begin{array}{r} 1 \\ 21\overline{)382} \\ -\,21 \\ \hline 17 \end{array}$$

Multiply 1 x 21 and write the product below. Subtract. The difference is less than 21, so we now know that we divided correctly in the first step.

B

```
   18
21)382
 - 21
  172
```

Bring down the 2. We now need to divide 21 into 172. Again, we will use estimation. We know 160 ÷ 20 = 8. We will estimate that 21 goes into 172 eight times.

```
   18 r. 4
21)382
 - 21
  172
- 168
    4
```

Multiply. The product of 8 x 21 is 168. Write this below. Subtract. There are 4 remaining. We can write the remainder with the "r." notation.

We can also write the answer with a fraction.

$18\frac{4}{21}$

Another strategy is to use multiples to help you divide. You'll want to make a list of the multiples of the divisor on the side or on a separate sheet of scratch paper. One advantage of this method is that you can use the same list many times for the same problem. Let's work through an example to see how this can help you.

Common Mistake

If you do not divide correctly on the first step, you will have a difference that is larger than your divisor.

			1	
3	3	6	7	1
	–	3	3	
		3	4	

33 can still go 1 more time into 34. We did not divide correctly on the first step.

Since we used 1 to start, we need to go back and increase that number to a 2.

EXAMPLE 2: **Find the quotient.**

$33\overline{)671}$

Before we start the long division steps, we will make a list of the multiples of 33.

$33 \times 1 = 33$

$33 \times 2 = 66$

$33 \times 3 = 99$

$33 \times 4 = 132$

D

$$\begin{array}{r} 2 \\ 33\overline{)671} \end{array}$$

Divide. We cannot divide 33 into 6. We need to divide it into 67. Looking at our list of multiples, we can see that it will divide into 67 two times.

M

S

$$\begin{array}{r} 2 \\ 33\overline{)671} \\ -\ 66 \\ \hline 1 \end{array}$$

Multiply 2×33 and write the product below. Subtract. The difference is less than 33, so we now know that we divided correctly in the first step.

B

$$\begin{array}{r} 20 \\ 33\overline{)671} \\ -\ 66 \\ \hline 11 \end{array}$$

Bring down the 1. We now need to divide 33 into 11. It is larger than 11, so we know it goes in zero times. Write the zero above.

$$\begin{array}{r} 20 \text{ r. } 11 \\ 33\overline{)671} \\ -\ 66 \\ \hline 11 \\ -\ 0 \\ \hline 11 \end{array}$$

Multiply. The product will be zero. Write this below. Subtract. There are 11 remaining.

We can also write the answer using a fraction.

$20\ \frac{11}{33}$

Simplified the answer will be:

$20\ \frac{1}{3}$

1. Find each quotient. Use estimation to help you divide correctly.

a. $16\overline{)339}$ b. $15\overline{)852}$ c. $22\overline{)375}$

2. Find each quotient. A list of multiples is provided to help you divide correctly.

a. $24\overline{)679}$

$24 \times 1 = 24$
$24 \times 2 = 48$
$24 \times 3 = 72$
$24 \times 4 = 96$

b. $13\overline{)5614}$

$13 \times 1 = 13$
$13 \times 2 = 26$
$13 \times 3 = 39$
$13 \times 4 = 52$
$13 \times 5 = 65$
$13 \times 6 = 78$
$13 \times 7 = 91$

3. Find each quotient. First, write out a list of the multiples on a separate sheet of paper and then divide.

a. $15\overline{)467}$ b. $22\overline{)875}$

EXPONENTS

Exponent Exploration

You Will Need:

- Beans (or another small counter to act out the problem)
- Calculator

You Will Do:

1. Brandon's grandmother offers him two options for his Christmas present. In option 1, he can choose to receive $30. In option 2, he can receive $2 on the first day, $4 on the second day, and $8 on the third day, with the amount doubling each day for 10 days. Which option would you choose?
2. Act out the problem with your beans or another counter. Let each bean represent $1. Write in the amount of money that Brandon would receive each day if he chooses option 2.

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
$2	$4	$8							

3. Use your calculator to add up the total amount.

   Total for Option 1: $30

   Total for Option 2: _____

You have already learned that you can use multiplication instead of doing repeated addition.

$3 + 3 + 3 + 3 + 3 = 15$ or $3 \times 5 = 15$

But what about repeated multiplication? In the opening activity, the amount of money was multiplied by 2 each day. You could find the amount for the tenth day by multiplying by 2 ten times.

$$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

We can write repeated multiplication like this using a base and exponent. A base is the number we are multiplying, and the exponent shows us the number of times we will multiply the base by itself. We write the exponent up and to the right of the base and in a smaller size.

BASE → 2^{10} ← EXPONENT

BASE: The number we are multiplying by itself.

EXPONENT: The number that shows us how many times we need to multiply the base by itself.

We can also use exponents for an expression that has two different bases.

EXAMPLE 1: **Write the expression using exponents. 4 × 4 × 4 =**

The base is 4 and the exponent is 3.

4^3

EXAMPLE 2: **Write the expression using exponents. 3 × 3 × 6 × 6 × 6 =**

We will use 2 different bases and 2 different exponents to write this expression.

$3^2 \times 6^3$

EXAMPLE 3: **Use your calculator to find the correct exponent. $5^{\square} = 125$**

We could make a list and use a calculator to check.

$5^1 = 5$

$5^2 = 5 \times 5 = 25$

$5^3 = 5 \times 5 \times 5 = 125$

The exponent is 3.

1. Write the expression using exponents.

a. $3 \times 3 \times 3 =$ _____

b. $6 \times 6 \times 6 \times 6 =$ _____

c. $8 \times 8 \times 8 \times 8 \times 8 =$ _____

d. $10 \times 10 =$ _____

e. $5 \times 5 \times 5 \times 6 \times 6 =$ _____

2. Write out the expression using repeated multiplication.

a. 7^3 _____

b. 2^3 _____

c. 5^6 _____

d. $4^3 \times 2^5$ _____

3. Use your calculator to find the missing exponent for each equation.

a. $2^{\square} = 32$

b. $6^{\square} = 1{,}296$

c. $3^{\square} = 243$

d. $4^{\square} = 256$

LESSON 8: SQUARES AND SQUARE ROOTS

Square Number Bingo

You Will Need:

- A pair of dice
- 2 players
- 2 colored pencils

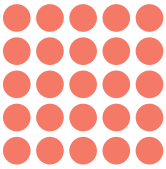
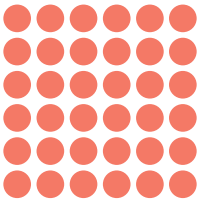
You Will Do:

1. Player One rolls the dice and adds the numbers to get a result between 2 and 12. They then multiply the number by itself. For instance, if a 1 and 4 is rolled, then multiply 5 × 5 to get 25. Player One shades in any space with that product on the board below.
2. Player Two rolls and shades as well. If there is no available space to shade, then the turn is skipped.
3. The first player to get five spaces in a row vertically, horizontally, or diagonally wins. If no one gets 5 proper spaces, the one with the most colored spaces wins.

64	4	36	64	49
36	121	9	25	36
25	16	49	36	25
121	100	81	64	49
100	144	16	9	36

If you multiply a number by itself, the product is called a **square number**. The products are all amounts that can be formed into a square. These numbers can also be called **perfect squares**.

SQUARE NUMBER:
The result of multiplying a number by itself. Another name for these numbers is **PERFECT SQUARES**.

Square Numbers					
$1 \times 1 = 1$	$2 \times 2 = 4$	$3 \times 3 = 9$	$4 \times 4 = 16$	$5 \times 5 = 25$	$6 \times 6 = 36$
					

We can also use exponents when we square numbers. The expression 3^2 is read as *3 squared* or *3 to the 2nd power* and the expression 4^3 is read as *4 cubed* or *4 to the 3rd power*.

$3 \times 3 = 3^2 = 9$

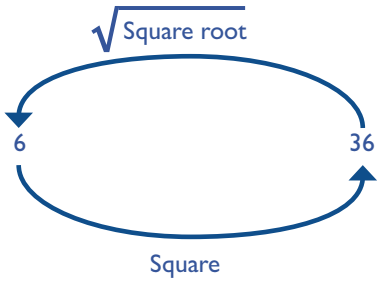
EXAMPLE 1: **Find each square number.**

$4^2 =$ $10^2 =$ $7^2 =$

Write out each expression as repeated multiplication. Then, find the product.

$4^2 = 4 \times 4 = 16$ $10^2 = 10 \times 10 = 100$ $7^2 = 7 \times 7 = 49$

The opposite of squaring a number is finding the **square root**. When we find a square root, we ask ourselves, "What number could I square to get this product?" The symbol for square root is unique. It looks a bit like the long division symbol, but has a small check mark at the bottom.



SQUARE ROOT: the number that can be multiplied by itself to give the original number. For example, the square root of 36 is 6, because 6 x 6 = 36. The symbol for square root is $\sqrt{}$.

The square root of 81 is 9, because if we square 9 (multiplying 9 by itself) we will get 81.

EXAMPLE 2: **Find the square root of each number.**

$\sqrt{4}$ = $\sqrt{49}$ = $\sqrt{64}$ =

We need to think of what number we can square to get each of the results that are under the square root sign.

$\sqrt{4} = 2$ $\sqrt{49} = 7$ $\sqrt{64} = 8$

1. Square each of the numbers below.

a. 8^2 _____ b. 11^2 _____

c. 6^2 _____ d. 13^2 _____

2. Find each square root.

a. $\sqrt{9}$ = _____ b. $\sqrt{1}$ = _____

c. $\sqrt{81}$ = _____ d. $\sqrt{25}$ = _____

e. $\sqrt{100}$ = _____ f. $\sqrt{169}$ = _____

g. $\sqrt{4}$ =_____ h. $\sqrt{16}$ = _____

3. A square tile has a side length of 9 inches. What is the area of the tile in square inches?

4. The area of a square garden is 25 square feet. What is the length of one side of the garden?

5. A square blanket has an area of 36 square feet. What is the length of one side of the blanket?

CHALLENGE!

Two square numbers have a sum of 25. What are the two numbers?

LESSON 9: THE ORDER OF OPERATIONS (DAY ONE)

Order of Operations Foldable

You Will Need:

- Lesson 9: Activity Sheet
- Scissors
- Colored pencils

You Will Do:

1. Carefully tear the activity sheet out of the back of the answer key and cut along the dashed lines. Cut slits on the smaller dashed lines and fold along the solid lines so that the images show on the outside and the large letters are on top of the step descriptions.
2. Color in the arrows above the "multiplication and division" and "addition and subtraction" steps. This is to remind you to always work from left to right.
3. Draw in parentheses and brackets on the top right flap.
4. Write two more examples of exponents on the exponents flap.
5. Look at the large letters on the top of your foldable. They spell *PEMDAS*. This acronym is one way students remember the order of operations.
6. You will fill in the inside of the foldable after reading today's lesson.

The **order of operations** is an agreed upon order mathematicians use when working on problems. They created the order to make sure all mathematicians arrive at the same answer every time. You have worked with 3 steps of the order of operations before, but now you will learn the entire order.

The Order of Operations

1. Perform operations that are in grouping symbols.
2. Evaluate exponents.
3. Multiply and Divide (from left to right).
4. Add and Subtract (from left to right).

THE ORDER OF OPERATIONS:

This is an agreed upon order for doing math problems.

EXAMPLE 1: **Evaluate the expression. $20 - 10 \div 2$**

$20 - 10 \div 2$	There are no parentheses or exponents. We can skip the first step. We now need to multiply or divide from left to right. There is no multiplication. We need to divide. $10 \div 2 = 5$
$20 - 5$	Now we do addition and subtraction from left to right. There is no addition. We need to subtract.
15	We have arrived at an answer that all mathematicians would agree to. Do you see how this is different from $20 - 10 = 10$ then $10 \div 2 = 5$. Mathematicians must agree on the order to always arrive at the same answer!

EXAMPLE 2: **Evaluate the expression. $3 \times 5^2 + 4 \times (2 + 4)$**

$3 \times 5^2 + 4 \times 6$	Our first step is to do whatever is inside of grouping symbols. In this example we have parentheses. $2 + 4 = 6$
$3 \times 25 + 4 \times 6$	Next, we need to evaluate the exponent. $5^2 = 5 \times 5 = 25$
$75 + 24$	Now, we multiply (or divide) working from left to right. $3 \times 25 = 75$ and $4 \times 6 = 24$
99	Finally, we add (or subtract) working from left to right. $75 + 24 = 99$

EXAMPLE 3: **Evaluate the expression. $3 + (4^2 - 10)$**

$3 + (16 - 10)$	Our first step is to do whatever is inside of the parentheses. There are two operations. When this happens you start again at the beginning of the order of operations. There are no more grouping symbols so we will evaluate the exponent first. Now, we subtract within the parentheses. $16 - 10 = 6$
$3 + 6$	Finally, we evaluate this problem and see we need to add to get the final answer. $3 + 6 = 9$

Fill in the inside of your foldable following the order of operations shown in the above examples.

Evaluate each expression. Remember to use PEMDAS through each stage of solving. Look at your foldable if you need help remembering the steps.

a. $5 + 21 \div 3 \times 2$

b. $9 + (62 - 12)$

c. $33 \div (15 - 4) + 3$

d. $(7 + 42) - 2 \times 3$

e. $16 + 12 \div 4 - 2^2$

f. $81 \div 3^2$

g. $10^2 - 60 \div 6$

h. $4 \times 5^2 + (3 + 2)$

WARM UP

The first letter of each step in the order of operations is written below. Do your best to write in the name of each step. Then, use your foldable from the last lesson to fill in any steps you forgot.

P_____

E_____

M/D_____/_____

A/S_____/_____

1. Evaluate each expression. Use your foldable to help you remember the steps.

a. $5 \times (5 + 1) - 7$

b. $(8 + 2^2) \div 3 + 9$

c. $4 \times 3 + (9 - 9) + 3^2$

d. $20 + 10 \div 2 - 3^2$

e. $21 \div (15 - 8) + 10$

f. $64 \div (2^2 + 4)$

WARM UP

Evaluate each expression.

a. $10^2 + (12 \div 4)$

b. $64 \div 4^2$

The **Distributive Property** states that multiplying a number by a group of numbers added together is the same as doing each multiplication separately. It can help us do many math problems mentally. It will also be essential in helping you do more complicated math in the future. Master breaking down simple problems now and becoming comfortable with it so that eventually it becomes second nature to you. Let's see why the property works.

$10 \times (3 + 2) = 10 \times 5 = 50$ $10 \times 3 + 10 \times 2 = 30 + 20 = 50$

THE DISTRIBUTIVE PROPERTY:

Multiplying a number by a group of numbers added together is the same as doing each multiplication separately.

EXAMPLE 1: **Find the product of 7 × 56 mentally.**

Start by breaking the number 56 apart. We can do this by putting the addition inside parentheses.

7×56

$7 \times (50 + 6)$

$7 \times 50 + 7 \times 6$

To multiply 7 times 50, think of 7×5, and then add a zero on the end.

$350 + 42 = 392$

Rewrite each multiplication problem by breaking the second factor apart. Then multiply mentally by using the Distributive Property.

a. 5×46

$5 \times (\_\_\_\_\_ + \_\_\_\_\_)$

b. 6×34

$6 \times (\_\_\_\_\_ + \_\_\_\_\_)$

c. 3×23

$3 \times (\_\_\_\_\_ + \_\_\_\_\_)$

d. 8×41

$8 \times (\_\_\_\_\_ + \_\_\_\_\_)$

e. 7×31

$7 \times (\_\_\_\_\_ + \_\_\_\_\_)$

f. 9×33

$9 \times (\_\_\_\_\_ + \_\_\_\_\_)$

g. 10×45

$10 \times (\_\_\_\_\_ + \_\_\_\_\_)$

h. 7×52

$7 \times (\_\_\_\_\_ + \_\_\_\_\_)$

SKILLS CHECK

You have been working with multiples and factors as part of the Unit 1 skills practice. Here are a few more for you to try.

1. List the next 5 multiples of each number.

a. 4, 8, _____, _____, _____, _____, _____

b. 7, 14, _____, _____, _____, _____, _____

2. Find all the factors of the given number.

a. 24 _____

b. 35 _____

3. Find each product or quotient.

a. $\begin{array}{r} 4{,}516 \\ \times \quad 3 \\ \hline \end{array}$

b. $4\overline{)23}$

c. $\begin{array}{r} 34 \\ \times \ 27 \\ \hline \end{array}$

d. $24\overline{)491}$

4. Evaluate each expression.

a. $9 \div 3 + 2 =$

b. $4^2 - 9 + 6 =$

5. Use mental math to find the product.

4×83

6
LEVEL

apologia

EXPLORING CREATION WITH

MATHEMATICS

TEACHING GUIDE & ANSWER KEY

Kathryn Gomes

TABLE OF CONTENTS

WEEK-BY-WEEK DAILY SCHEDULE

Below is a suggested weekly schedule to help you stay on track. It uses a four-day week to leave room for a co-op day or a review day. This schedule covers 36 weeks, but we encourage you to adjust it to the needs of your child and your family's calendar.

Week	Day 1	Day 2	Day 3	Day 4
1	UNIT 1 INTRO CHAPTER 1 Lesson 1 Skills practice: multiples and factors ☐	CHAPTER 1 Lesson 2 Skills practice: multiples and factors ☐	CHAPTER 1 Lesson 3 Skills practice: multiples and factors ☐	CHAPTER 1 Lesson 4 Skills practice: multiples and factors ☐
2	CHAPTER 1 Lesson 5 Skills practice: multiples and factors ☐	CHAPTER 1 Lesson 6 Skills practice: multiples and factors ☐	CHAPTER 1 Lesson 7 Skills practice: multiples and factors ☐	CHAPTER 1 Lesson 8 Skills practice: multiples and factors ☐
3	CHAPTER 1 Lesson 9 Skills practice: multiples and factors ☐	CHAPTER 1 Lesson 10 Skills practice: multiples and factors ☐	CHAPTER 1 Lesson 11 Skills practice: multiples and factors ☐	CHAPTER 1 Chapter Review ☐
4	CHAPTER 2 Lesson 12 Skills practice: long division ☐	CHAPTER 2 Lesson 13 Skills practice: long division ☐	CHAPTER 2 Lesson 14 Skills practice: long division ☐	CHAPTER 2 Lesson 15 Skills practice: long division ☐

TEACHER'S NOTES

UNIT 1: WHOLE NUMBERS, DECIMALS, AND FRACTIONS

Unit One moves through a broad range of topics. Much of the content was introduced in previous Math Levels 4 and 5, but all kids need the review and reinforcement. And in some cases, more challenging problems are added in, like with the mixed number lessons. This unit lays the foundation for the rest of the year and for much of middle school-level mathematics.

SUPPLY LIST

Skills Practice:

- Colored pencils
- Numbered cards 3-10 (such as Uno® cards or playing cards)
- Notecards
- Factor table worksheets (available on the Book Extras website)
- Long division worksheets (available on the Book Extras website)
- Prime factorization worksheets (available on the Book Extras website)

Chapter One:

- 2 players
- Colored pencils
- Numbered cards 3-10
- Scissors
- Beans (or another small counter)
- Calculator
- Dice
- Glue

Chapter Two:

- Scissors
- Game pieces
- 2 or more players
- Scratch paper
- A takeout menu
- A calculator

Chapter Three:

- Scissors
- 2 players
- An envelope
- Dominoes
- 2 players
- 2 different colored counters (this can be snacks or small game pieces)
- Dice
- Fraction tiles
- Graham crackers
- A recipe
- Markers

SKILLS PRACTICE FOR UNIT ONE: WHOLE NUMBER OPERATIONS

As mentioned at the beginning of this book, the skills practice reviews skills that have already been introduced in this book. There is one exception, and that is the Unit One skills practice. The skills reviewed here were covered in previous levels of Exploring Creation with Mathematics. If you are switching programs, it is possible you haven't covered this material before. You may find the pace of the review is too quick for your child. Please adjust the pacing. These concepts are very important, and it would be better to review them thoroughly than just push forward.

Skill One: Multiples and Factors

I cannot overemphasize the importance of students grasping multiples and factors. These concepts are interwoven through so much of mathematics. Polish this skill before students need to use them, such as when they work with fractions in Chapter 3.

1. Play "The Most Multiples" from Lesson 1. You can print additional game boards from the Book Extras website.
2. Print factor table worksheets off the Book Extras website.
3. Choose a number between 1 and 10, and have your child skip count to list all the multiples. This is just a quick activity that can be done verbally before starting the lesson for that day. Most students at this level will mainly need to focus on 4's, 6's, 7's, and 8's. Target the fact families your child seems to struggle with.

Skill Two: Long Division

Long division takes time to master. It also can be very taxing because it is such a long process. That is why I think long division is a perfect skill for the skills practice. Give your child one quick problem or activity each day. Spreading it out ensures they will master it without overwhelming them with an entire page of long division problems.

1. Notecard problems. This is one of my favorite ways to do the skills practice when the skill itself is pretty taxing. I just write out one problem on a notecard or post-it. Have your child do that one problem before starting the lesson. Here are problems you can use. There are enough for the whole skills practice.

96 9)864	59 r. 3 6)357	14 r. 3 15)213
99 5)495	19 r. 1 9)172	10 r. 8 12)128
85 4)340	11 r. 5 16)181	10 r. 46 51)556

2. There are long division worksheets available on the Book Extras website.

3. Find the missing digit puzzles. These are available on the Book Extras website. Instead of solving an entire long division problem, students just need to fill in the missing digits. It helps reinforce the steps of the process in a way that is less challenging.

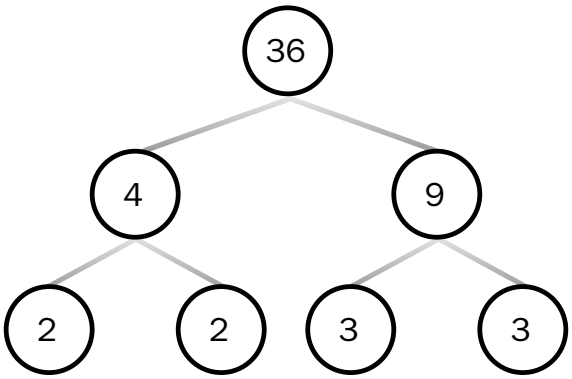
Skill Three: Prime Numbers and Prime Factorization

Knowing the prime numbers up to 100 is a huge advantage for students. Minimally, they should know all of them up to 25. And prime factorization is a skill that takes some practice before it becomes automatic.

1. Have your child recite the prime numbers up to 100 (or 25) to you. The list is below so you can quickly check, or they can self-check. Consider offering them a prize if they can recite or write all the prime numbers under 100 by the end of the unit.

   2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

2. Have your child choose any number under 100 and write out the prime factorization. They can check their answer by multiplying on a calculator. There is an example below.



$36 = 2 \times 2 \times 3 \times 3$

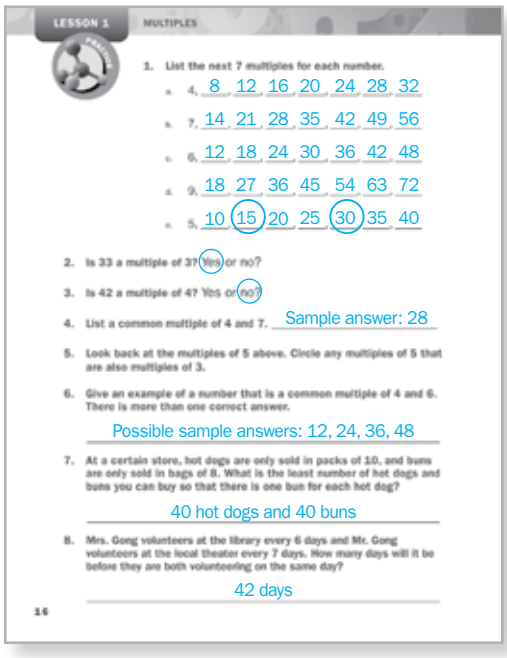
3. There are prime factorization worksheets on the Book Extras website.

CHAPTER 1: WHOLE NUMBERS, DECIMALS, AND FRACTIONS

LESSON 1

This lesson is probably review for your student. It is helpful to have a gentle entry into a new level of mathematics. Multiples are foundational for finding the common denominator in future fraction lessons. There are additional copies of the game board on the Book Extras website so that you can play this game as part of the skills practice.

Page 16 Answers



LESSON 1 MULTIPLES

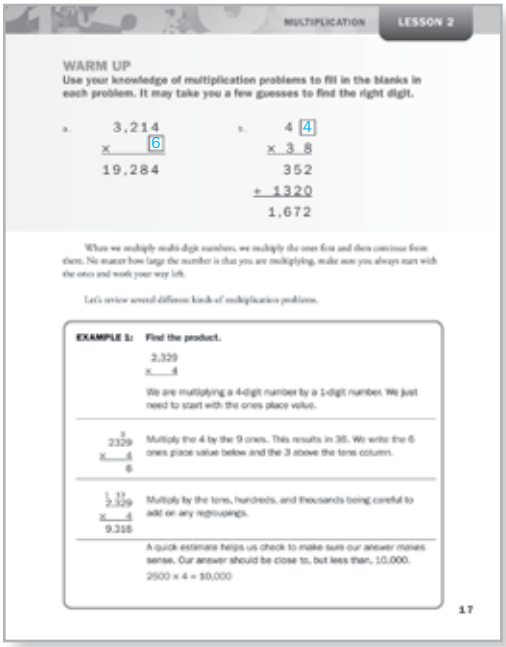
1. List the next 7 multiples for each number.
   a. 4, 8, 12, 16, 20, 24, 28, 32
   b. 7, 14, 21, 28, 35, 42, 49, 56
   c. 6, 12, 18, 24, 30, 36, 42, 48
   d. 9, 18, 27, 36, 45, 54, 63, 72
   e. 5, 10, 15, 20, 25, 30, 35, 40
2. Is 33 a multiple of 3? Yes or no?
3. Is 42 a multiple of 4? Yes or no?
4. List a common multiple of 4 and 7. Sample answer: 28
5. Look back at the multiples of 5 above. Circle any multiples of 5 that are also multiples of 3.
6. Give an example of a number that is a common multiple of 4 and 6. There is more than one correct answer.
   Possible sample answers: 12, 24, 36, 48
7. At a certain store, hot dogs are only sold in packs of 10, and buns are only sold in bags of 8. What is the least number of hot dogs and buns you can buy so that there is one bun for each hot dog?
   40 hot dogs and 40 buns
8. Mrs. Gong volunteers at the library every 6 days and Mr. Gong volunteers at the local theater every 7 days. How many days will it be before they are both volunteering on the same day?
   42 days

16

LESSON 2

When students make mistakes in multi-digit multiplication, they often make the mistake repeatedly. Common mistakes include mixing up the regrouping and not realizing they are multiplying by a number in the tens place. The code in the practice helps students catch mistakes before they do the entire page incorrectly. You also might want to let your child check his or her work with a calculator.

Page 17 Answers



MULTIPLICATION LESSON 2

WARM UP

Use your knowledge of multiplication problems to fill in the blanks in each problem. It may take you a few guesses to find the right digit.

a. 3,214 × 6 = 19,284

b. 4 4 × 3 8 = 352 + 1320 = 1,672

When we multiply multi-digit numbers, we multiply the ones first and then continue from there. No matter how large the number is that you are multiplying, make sure you always start with the ones and work your way left.

Let's review several different kinds of multiplication problems.

EXAMPLE 1: Find the product.

2,329 × 4

We are multiplying a 4-digit number by a 1-digit number. We just need to start with the ones place value.

2329 × 4 = 6

Multiply the 4 by the 9 ones. This results in 36. We write the 6 ones place value below and the 3 above the tens column.

3 2329 × 4 = 9,316

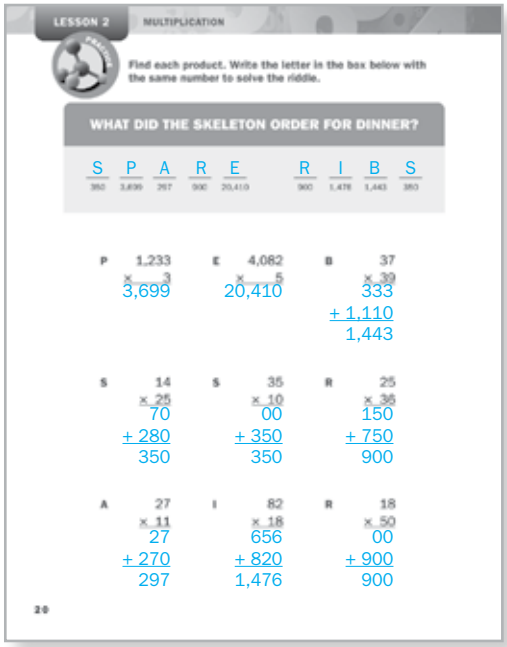
Multiply by the tens, hundreds, and thousands being careful to add on any regroupings.

A quick estimate helps us check to make sure our answer makes sense. Our answer should be close to, but less than, 10,000.

2500 × 4 = 10,000

17

Page 20 Answers



LESSON 2 MULTIPLICATION

Find each product. Write the letter in the box below with the same number to solve the riddle.

WHAT DID THE SKELETON ORDER FOR DINNER?

S	P	A	R	E		R	I	B	S
350	3,699	297	900	20,410		900	1,476	1,443	350

P 1,233 × 3 = 3,699

E 4,082 × 5 = 20,410

B 37 × 39 = 333 + 1,110 = 1,443

S 14 × 25 = 70 + 280 = 350

S 35 × 10 = 00 + 350 = 350

R 25 × 36 = 150 + 750 = 900

A 27 × 11 = 27 + 270 = 297

I 82 × 18 = 656 + 820 = 1,476

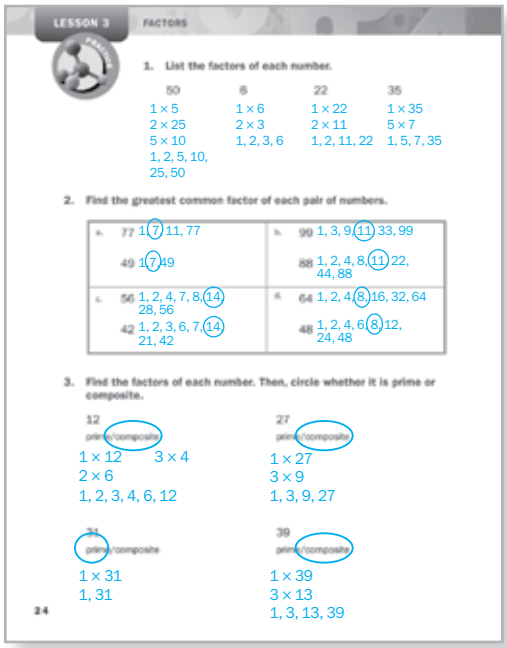
R 18 × 50 = 00 + 900 = 900

20

LESSON 3

Factors are so essential in mathematics. Students will continue to review factors in the Unit 1 skills practice. This skill will be essential when they factor quadratics in high school. More immediately, they will need to be able to identify common factors when simplifying fractions.

Page 24 Answers



LESSON 3 FACTORS

1. List the factors of each number.

50	6	22	35
1 × 5 2 × 25 5 × 10 1, 2, 5, 10, 25, 50	1 × 6 2 × 3 1, 2, 3, 6	1 × 22 2 × 11 1, 2, 11, 22	1 × 35 5 × 7 1, 5, 7, 35

2. Find the greatest common factor of each pair of numbers.

a. 77: 1, (7), 11, 77 49: 1, (7), 49	b. 99: 1, 3, 9, (11), 33, 99 88: 1, 2, 4, 8, (11), 22, 44, 88
c. 56: 1, 2, 4, 7, 8, (14), 28, 56 42: 1, 2, 3, 6, 7, (14), 21, 42	d. 64: 1, 2, 4, (8), 16, 32, 64 48: 1, 2, 4, 6, (8), 12, 24, 48

3. Find the factors of each number. Then, circle whether it is prime or composite.

12 (composite)
1 × 12, 2 × 6, 3 × 4
1, 2, 3, 4, 6, 12

27 (composite)
1 × 27, 3 × 9
1, 3, 9, 27

31 (prime)
1 × 31
1, 31

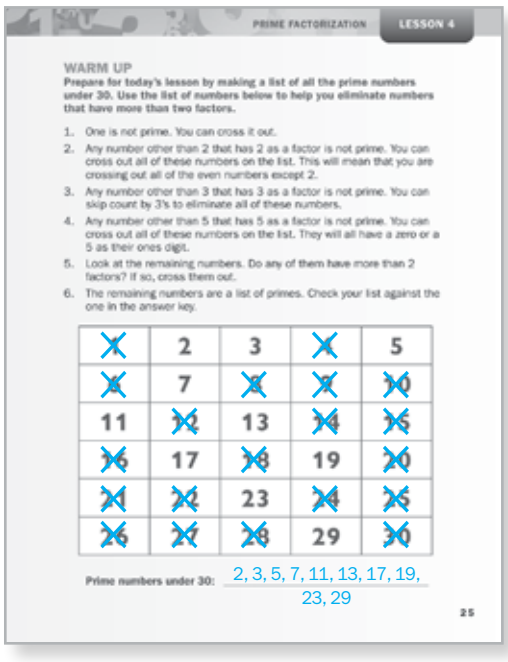
39 (composite)
1 × 39, 3 × 13
1, 3, 13, 39

24

LESSON 4

Some students will really prefer this method of factoring to what we did in the previous lesson. The beauty of it is that you can split the number in many different ways and still arrive at the correct answer. All of the work with primes will also help them start to identify prime numbers more quickly.

Page 25 Answers


PRIME FACTORIZATION LESSON 4

WARM UP

Prepare for today's lesson by making a list of all the prime numbers under 30. Use the list of numbers below to help you eliminate numbers that have more than two factors.

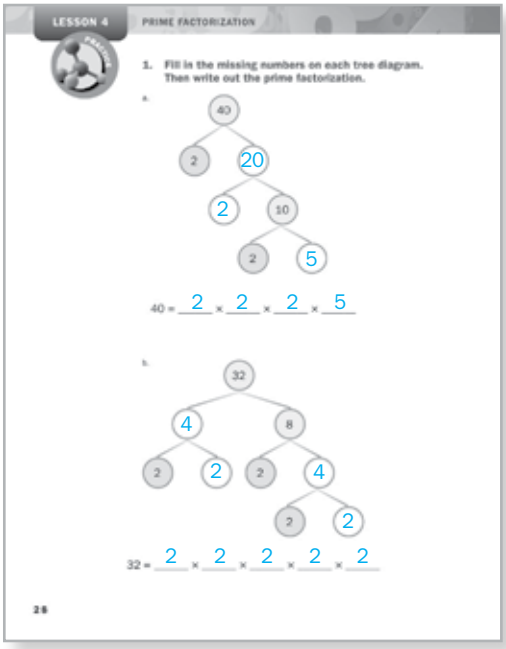
1. One is not prime. You can cross it out.
2. Any number other than 2 that has 2 as a factor is not prime. You can cross out all of these numbers on the list. This will mean that you are crossing out all of the even numbers except 2.
3. Any number other than 3 that has 3 as a factor is not prime. You can skip count by 3's to eliminate all of these numbers.
4. Any number other than 5 that has 5 as a factor is not prime. You can cross out all of these numbers on the list. They will all have a zero or a 5 as their ones digit.
5. Look at the remaining numbers. Do any of them have more than 2 factors? If so, cross them out.
6. The remaining numbers are a list of primes. Check your list against the one in the answer key.

~~1~~	2	3	~~4~~	5
~~6~~	7	~~8~~	~~9~~	~~10~~
11	~~12~~	13	~~14~~	~~15~~
~~16~~	17	~~18~~	19	~~20~~
~~21~~	~~22~~	23	~~24~~	~~25~~
~~26~~	~~27~~	~~28~~	29	~~30~~

Prime numbers under 30: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

25

Page 28 Answers


LESSON 4 PRIME FACTORIZATION

1. **Fill in the missing numbers on each tree diagram. Then write out the prime factorization.**

a. 40 → 2, 20 → 2, 10 → 2, 5

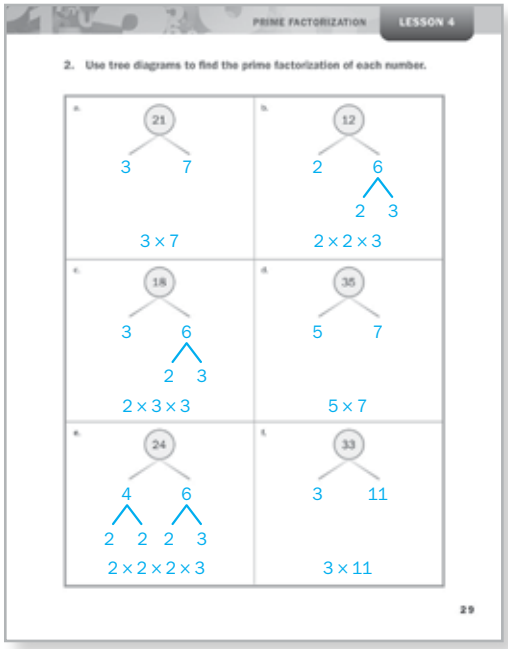
40 = 2 × 2 × 2 × 5

b. 32 → 4, 8 → 2, 2, 2, 4 → 2, 2

32 = 2 × 2 × 2 × 2 × 2

28

Page 29 Answers


PRIME FACTORIZATION LESSON 4

2. **Use tree diagrams to find the prime factorization of each number.**

a. 21 → 3, 7 — 3 × 7

b. 12 → 2, 6 → 2, 3 — 2 × 2 × 3

c. 18 → 3, 6 → 2, 3 — 2 × 3 × 3

d. 35 → 5, 7 — 5 × 7

e. 24 → 4, 6 → 2, 2, 2, 3 — 2 × 2 × 2 × 3

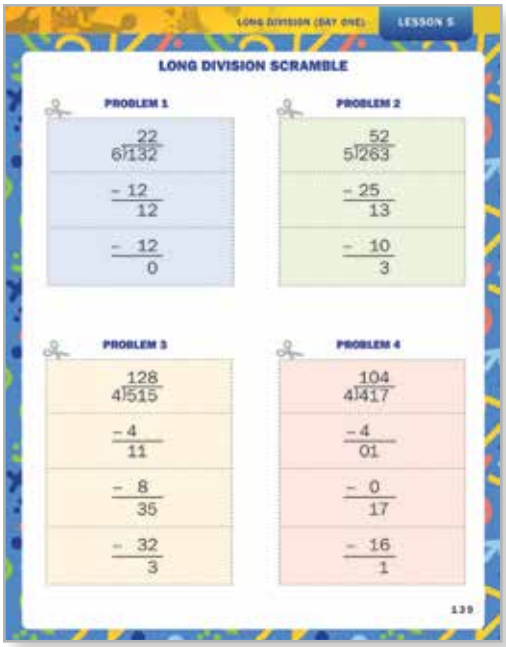
f. 33 → 3, 11 — 3 × 11

29

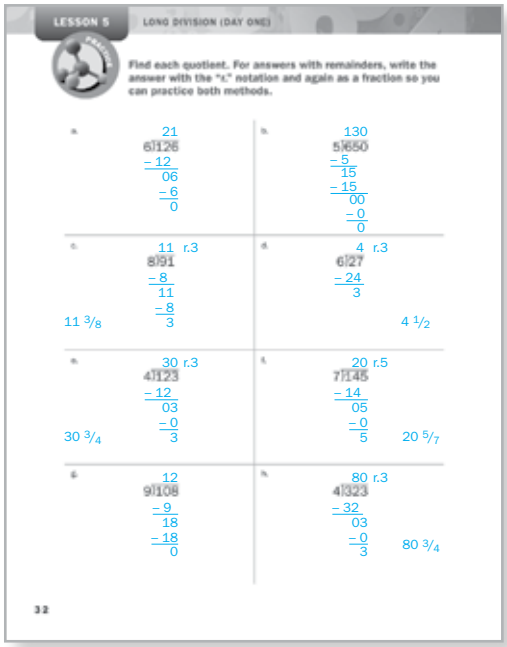
LESSON 5

Students have seen long division before in previous levels. But it is very common for students to struggle to remember all of the steps, or to just get rusty on the process after a break. This first lesson only uses one-digit divisors.

Activity Sheet Answers



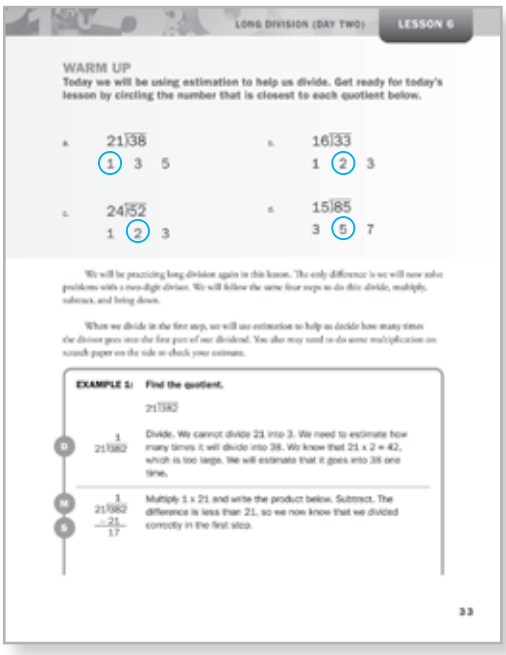
Page 32 Answers



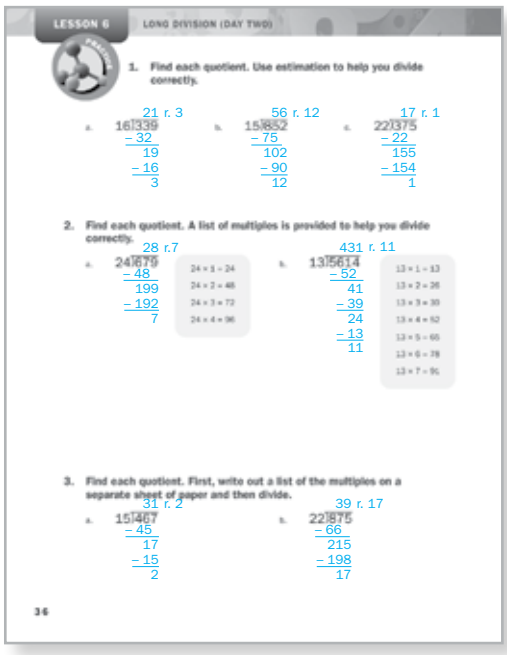
LESSON 6

Now we are working with two-digit divisors. Estimation is going to be very key as we think about placing the first digit in the quotient.

Page 33 Answers



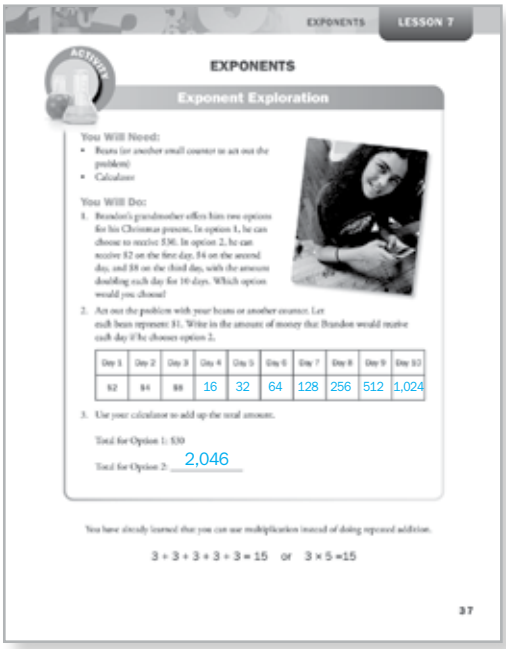
Page 36 Answers



LESSON 7

It is very common for students to mix up exponents with multiplication. For instance, a student might mistakenly write $2^3 = 6$. The best way to combat that is to keep having students write out what the exponent represents, $2^3 = 2 \times 2 \times 2$, until it really clicks.

Page 37 Answers


EXPONENTS LESSON 7

ACTIVITY

EXPONENTS

Exponent Exploration

You Will Need:

- Beans (or another small counter to act out the problem)
- Calculator

You Will Do:

1. Brandon's grandmother offers him two options for his Christmas present. In option 1, he can choose to receive $30. In option 2, he can receive $2 on the first day, $4 on the second day, and $8 on the third day, with the amount doubling each day for 10 days. Which option would you choose?
2. Act out the problem with your beans or another counter. Let each bean represent $1. Write in the amount of money that Brandon would receive each day if he chooses option 2.

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
$2	$4	$8	16	32	64	128	256	512	1,024

3. Use your calculator to add up the total amount.

Total for Option 1: $30

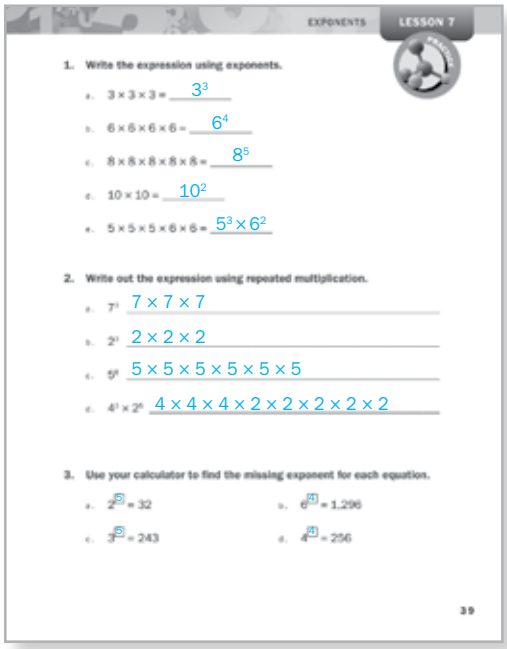
Total for Option 2: 2,046

You have already learned that you can use multiplication instead of doing repeated addition.

3 + 3 + 3 + 3 + 3 = 15 or 3 × 5 = 15

37

Page 39 Answers


EXPONENTS LESSON 7

PRACTICE

1. Write the expression using exponents.
   a. 3 × 3 × 3 = 3^3
   b. 6 × 6 × 6 × 6 = 6^4
   c. 8 × 8 × 8 × 8 × 8 = 8^5
   d. 10 × 10 = 10^2
   e. 5 × 5 × 5 × 6 × 6 = $5^3 \times 6^2$

2. Write out the expression using repeated multiplication.
   a. 7^3 7 × 7 × 7
   b. 2^3 2 × 2 × 2
   c. 5^8 5 × 5 × 5 × 5 × 5 × 5 × 5
   d. $4^3 \times 2^5$ 4 × 4 × 4 × 2 × 2 × 2 × 2 × 2

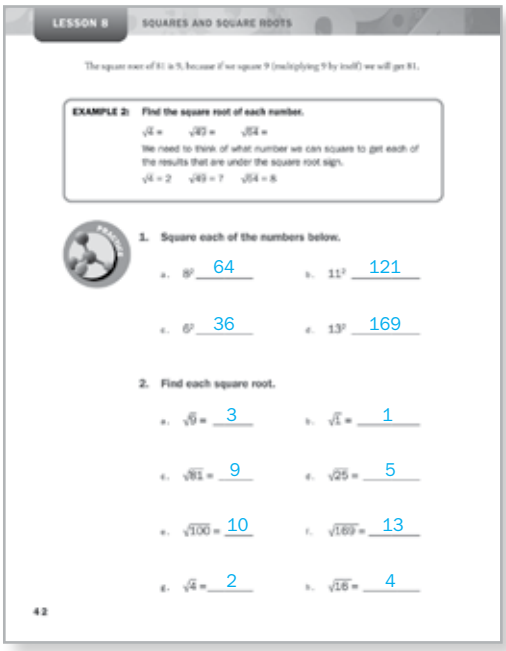
3. Use your calculator to find the missing exponent for each equation.
   a. $2^{[5]} = 32$
   b. $6^{[4]} = 1,296$
   c. $3^{[5]} = 243$
   d. $4^{[4]} = 256$

39

LESSON 8

I love teaching this concept visually with squares and the sides of squares. It is also really important to emphasize the inverse relationship between the two operations. Inverse operations are a key overarching concept in mathematics and will become essential when students start solving equations.

Page 42 Answers


LESSON 8 SQUARES AND SQUARE ROOTS

The square root of 81 is 9, because if we square 9 (multiplying 9 by itself) we will get 81.

EXAMPLE 2: Find the square root of each number.

$\sqrt{4}$ = $\sqrt{49}$ = $\sqrt{64}$ =

We need to think of what number we can square to get each of the results that are under the square root sign.

$\sqrt{4} = 2$ $\sqrt{49} = 7$ $\sqrt{64} = 8$

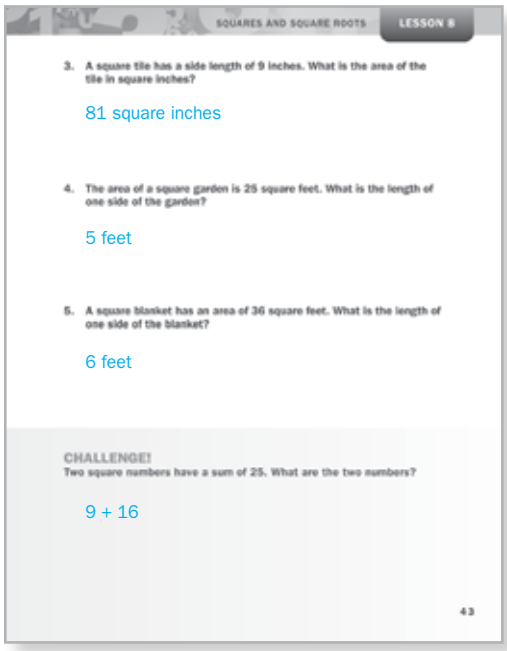
PRACTICE

1. Square each of the numbers below.
   a. 8^2 64
   b. 11^2 121
   c. 6^2 36
   d. 13^2 169

2. Find each square root.
   a. $\sqrt{9}$ = 3
   b. $\sqrt{1}$ = 1
   c. $\sqrt{81}$ = 9
   d. $\sqrt{25}$ = 5
   e. $\sqrt{100}$ = 10
   f. $\sqrt{169}$ = 13
   g. $\sqrt{4}$ = 2
   h. $\sqrt{16}$ = 4

42

Page 43 Answers


SQUARES AND SQUARE ROOTS LESSON 8

3. A square tile has a side length of 9 inches. What is the area of the tile in square inches?

   81 square inches

4. The area of a square garden is 25 square feet. What is the length of one side of the garden?

   5 feet

5. A square blanket has an area of 36 square feet. What is the length of one side of the blanket?

   6 feet

CHALLENGE!

Two square numbers have a sum of 25. What are the two numbers?

9 + 16

43

LESSON 9

Some students think of Please Excuse My Dear Aunt Sally to remember the acronym PEMDAS.

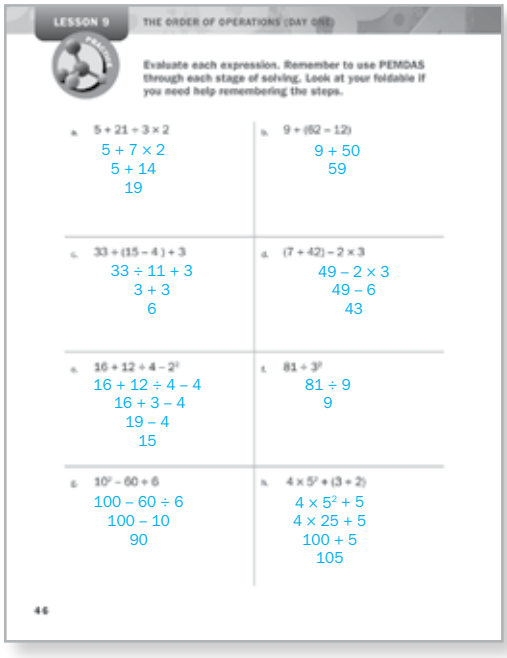
One of the most common mistakes when solving order of operations problems is to not realize that you do addition and subtraction together from left to right. The same goes for multiplication and division. If there is a division sign to the left of a multiplication sign, that is what you do first.

$10 \div 5 \times 3 =$

$2 \times 3 =$

6

Page 46 Answers



LESSON 9 THE ORDER OF OPERATIONS (DAY ONE)

Evaluate each expression. Remember to use PEMDAS through each stage of solving. Look at your foldable if you need help remembering the steps.

a. $5 + 21 \div 3 \times 2$
$5 + 7 \times 2$
$5 + 14$
19

b. $9 + (82 - 12)$
$9 + 50$
59

c. $33 \div (15 - 4) + 3$
$33 \div 11 + 3$
$3 + 3$
6

d. $(7 + 42) - 2 \times 3$
$49 - 2 \times 3$
$49 - 6$
43

e. $16 + 12 \div 4 - 2^2$
$16 + 12 \div 4 - 4$
$16 + 3 - 4$
$19 - 4$
15

f. $81 \div 3^2$
$81 \div 9$
9

g. $10^2 - 60 \div 6$
$100 - 60 \div 6$
$100 - 10$
90

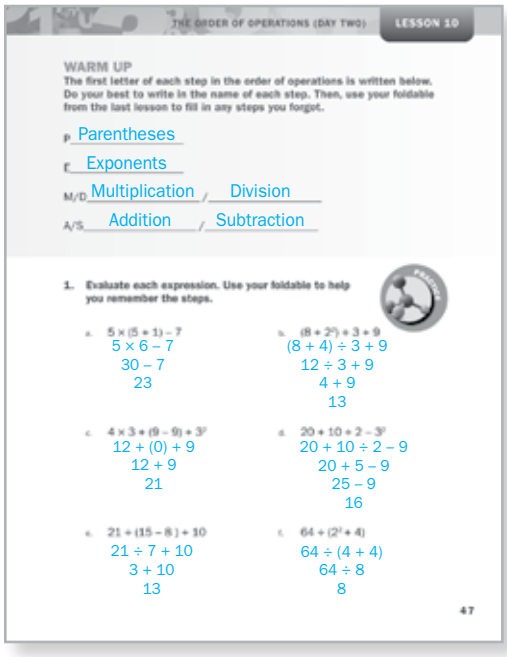
h. $4 \times 5^2 + (3 + 2)$
$4 \times 5^2 + 5$
$4 \times 25 + 5$
$100 + 5$
105

46

LESSON 10

Another day of practice with the order of operations. Most students will need this second day to really grasp the steps.

Page 47 Answers



THE ORDER OF OPERATIONS (DAY TWO) LESSON 10

WARM UP

The first letter of each step in the order of operations is written below. Do your best to write in the name of each step. Then, use your foldable from the last lesson to fill in any steps you forgot.

P Parentheses

E Exponents

M/D Multiplication / Division

A/S Addition / Subtraction

1. Evaluate each expression. Use your foldable to help you remember the steps.

a. $5 \times (5 + 1) - 7$
$5 \times 6 - 7$
$30 - 7$
23

b. $(8 + 2^2) \div 3 + 9$
$(8 + 4) \div 3 + 9$
$12 \div 3 + 9$
$4 + 9$
13

c. $4 \times 3 + (9 - 9) + 3^2$
$12 + (0) + 9$
$12 + 9$
21

d. $20 + 10 \div 2 - 3^2$
$20 + 10 \div 2 - 9$
$20 + 5 - 9$
$25 - 9$
16

e. $21 \div (15 - 8) + 10$
$21 \div 7 + 10$
$3 + 10$
13

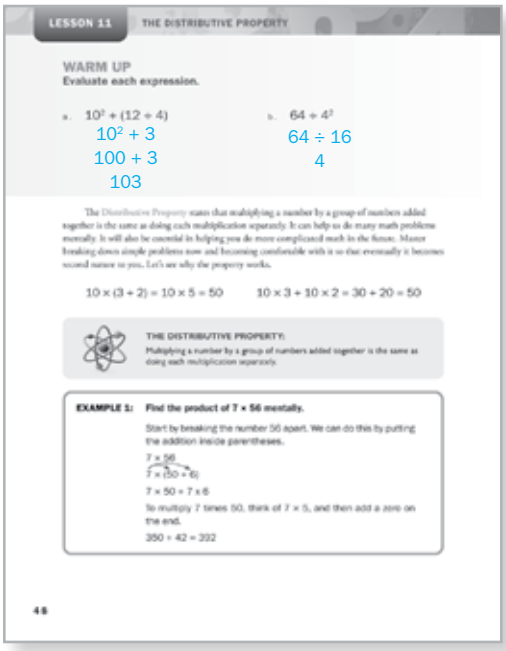
f. $64 \div (2^2 + 4)$
$64 \div (4 + 4)$
$64 \div 8$
8

47

LESSON 11

Students are introduced to the Distributive Property in this lesson so that they can multiply facts like 8 x 42 mentally. This increases their number sense. But, the second reason is to give them some background with the distributive property before seeing it applied algebraically. That will come later in this book.

Page 48 Answers



LESSON 11 THE DISTRIBUTIVE PROPERTY

WARM UP
Evaluate each expression.

a. $10^2 + (12 \div 4)$
$10^2 + 3$
$100 + 3$
103

b. $64 \div 4^2$
$64 \div 16$
4

The Distributive Property states that multiplying a number by a group of numbers added together is the same as doing each multiplication separately. It can help us do many math problems mentally. It will also be essential in helping you do more complicated math in the future. Master breaking down simple problems now and becoming comfortable with it so that eventually it becomes second nature to you. Let's see why the property works.

$10 \times (3 + 2) = 10 \times 5 = 50$ $10 \times 3 + 10 \times 2 = 30 + 20 = 50$

THE DISTRIBUTIVE PROPERTY:
Multiplying a number by a group of numbers added together is the same as doing each multiplication separately.

EXAMPLE 1: Find the product of 7 × 56 mentally.

Start by breaking the number 56 apart. We can do this by putting the addition inside parentheses.

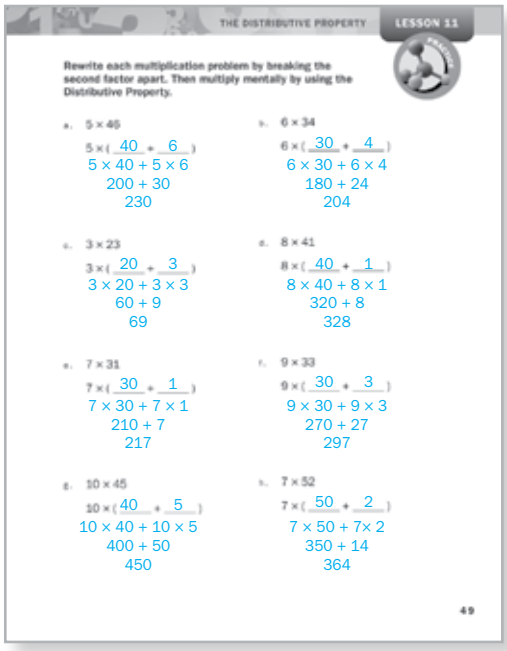
7×56
$7 \times (50 + 6)$
$7 \times 50 + 7 \times 6$

To multiply 7 times 50, think of 7 × 5, and then add a zero on the end.

$350 + 42 = 392$

48

Page 49 Answers



THE DISTRIBUTIVE PROPERTY LESSON 11

Rewrite each multiplication problem by breaking the second factor apart. Then multiply mentally by using the Distributive Property.

a. 5×46
$5 \times (40 + 6)$
$5 \times 40 + 5 \times 6$
$200 + 30$
230

b. 6×34
$6 \times (30 + 4)$
$6 \times 30 + 6 \times 4$
$180 + 24$
204

c. 3×23
$3 \times (20 + 3)$
$3 \times 20 + 3 \times 3$
$60 + 9$
69

d. 8×41
$8 \times (40 + 1)$
$8 \times 40 + 8 \times 1$
$320 + 8$
328

e. 7×31
$7 \times (30 + 1)$
$7 \times 30 + 7 \times 1$
$210 + 7$
217

f. 9×33
$9 \times (30 + 3)$
$9 \times 30 + 9 \times 3$
$270 + 27$
297

g. 10×45
$10 \times (40 + 5)$
$10 \times 40 + 10 \times 5$
$400 + 50$
450

h. 7×52
$7 \times (50 + 2)$
$7 \times 50 + 7 \times 2$
$350 + 14$
364

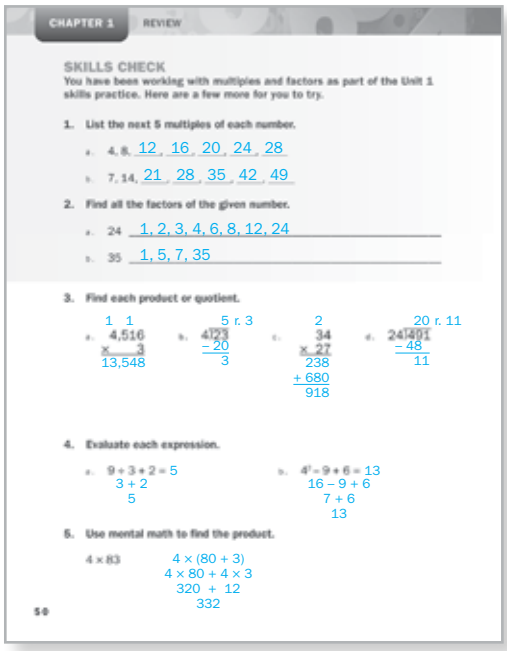
49

CHAPTER 1 REVIEW

The Chapter 1 review is a quick way for you to see if your child is mastering the material. If they seem to be struggling with any of the concepts, you might want to take a day to review before moving onto the unit project.

An optional Chapter 1 test is provided in the back of this answer key. If you plan to use it, give it to your child after he or she has completed the chapter review.

Page 50 Answers



CHAPTER 1 REVIEW

SKILLS CHECK
You have been working with multiples and factors as part of the Unit 1 skills practice. Here are a few more for you to try.

1. List the next 5 multiples of each number.
a. 4, 8, 12, 16, 20, 24, 28
b. 7, 14, 21, 28, 35, 42, 49

2. Find all the factors of the given number.
a. 24 1, 2, 3, 4, 6, 8, 12, 24
b. 35 1, 5, 7, 35

3. Find each product or quotient.
a. $4{,}516 \times 3 = 13{,}548$
b. $4\overline{)23}$ R 3, -20, 3
c. 34×27, 238, $+680$, 918
d. $24\overline{)491}$ R 11, -48, 11

4. Evaluate each expression.
a. $9 + 3 + 2 = 5$
$3 + 2$
5
b. $4^2 - 9 + 6 = 13$
$16 - 9 + 6$
$7 + 6$
13

5. Use mental math to find the product.
4×83
$4 \times (80 + 3)$
$4 \times 80 + 4 \times 3$
$320 + 12$
332

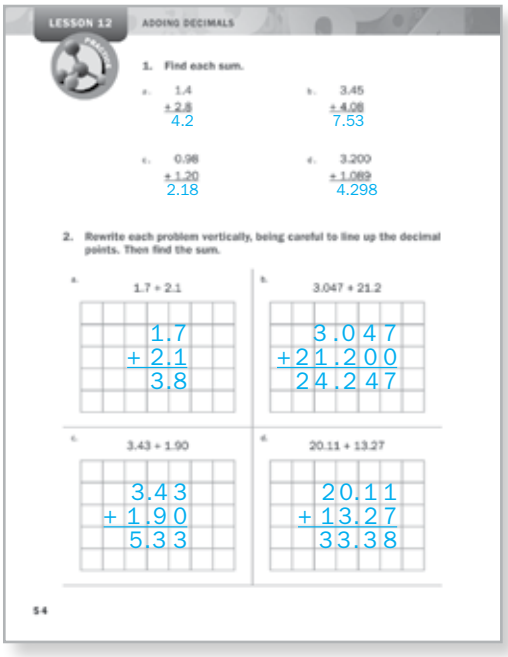
50

CHAPTER 2: MULTIPLICATION, FACTORS, AND MULTIPLES

LESSON 12

They play the game in this lesson using tenths. They will play it again in the next lesson with subtraction and in Lesson 13 with hundredths.

Page 54 Answers


LESSON 12 ADDING DECIMALS

1. Find each sum.

a. 1.4 + 2.8 = 4.2

b. 3.45 + 4.08 = 7.53

c. 0.98 + 1.20 = 2.18

d. 3.200 + 1.089 = 4.298

2. Rewrite each problem vertically, being careful to line up the decimal points. Then find the sum.

a. 1.7 + 2.1

1.7
+ 2.1
3.8

b. 3.047 + 21.2

3.047
+21.200
24.247

c. 3.43 + 1.90

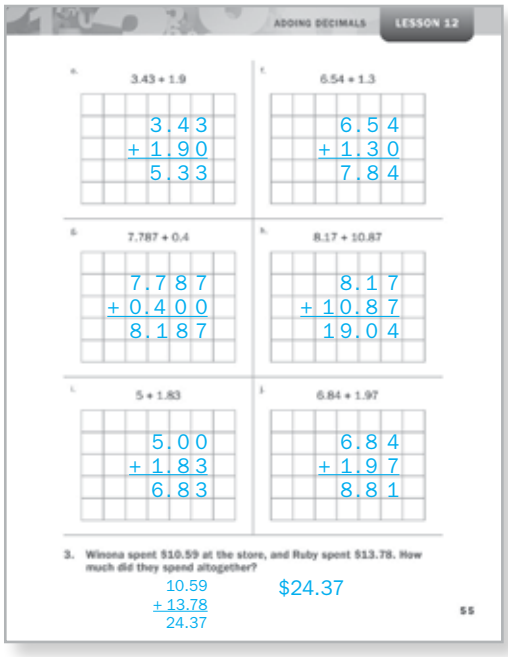
3.43
+ 1.90
5.33

d. 20.11 + 13.27

20.11
+ 13.27
33.38

54

Page 55 Answers


ADDING DECIMALS LESSON 12

a. 3.43 + 1.9

3.43
+ 1.90
5.33

c. 6.54 + 1.3

6.54
+ 1.30
7.84

e. 7.787 + 0.4

7.787
+ 0.400
8.187

h. 8.17 + 10.87

8.17
+ 10.87
19.04

i. 5 + 1.83

5.00
+ 1.83
6.83

j. 6.84 + 1.97

6.84
+ 1.97
8.81

3. Winona spent $10.59 at the store, and Ruby spent $13.78. How much did they spend altogether?

10.59
+ 13.78
24.37

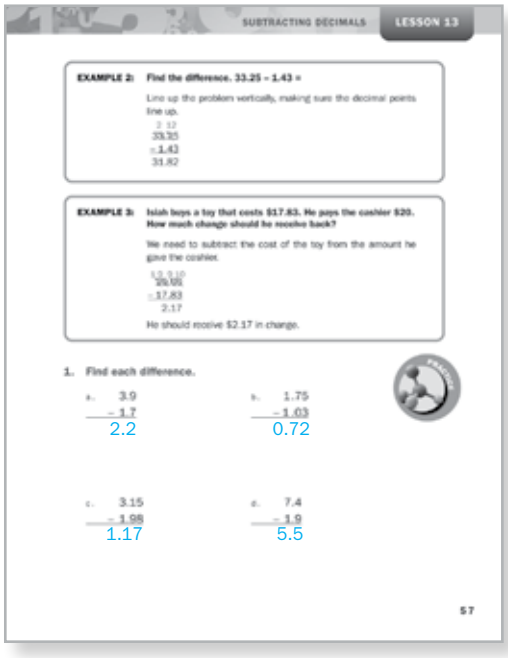
$24.37

55

LESSON 13

Now students are subtracting and moving backward on the gameboard.

Page 57 Answers


SUBTRACTING DECIMALS LESSON 13

EXAMPLE 2: Find the difference. 33.25 − 1.43 =

Line up the problem vertically, making sure the decimal points line up.

33.25
− 1.43
31.82

EXAMPLE 3: Isiah buys a toy that costs $17.83. He pays the cashier $20. How much change should he receive back?

We need to subtract the cost of the toy from the amount he gave the cashier.

20.00
− 17.83
2.17

He should receive $2.17 in change.

1. Find each difference.

a. 3.9 − 1.7 = 2.2

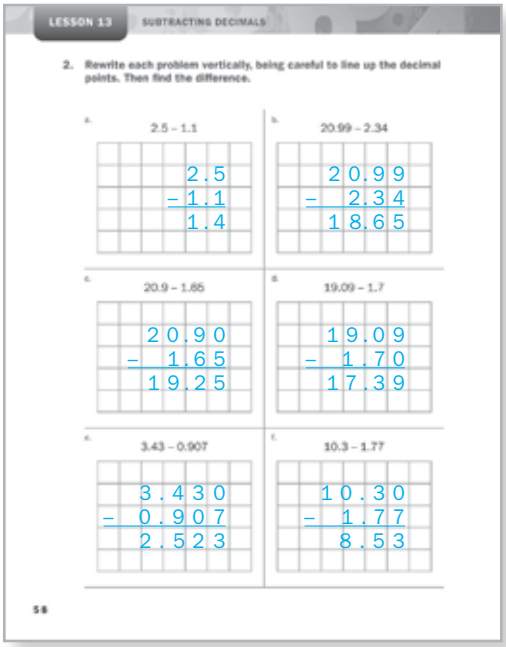
b. 1.75 − 1.03 = 0.72

c. 3.15 − 1.98 = 1.17

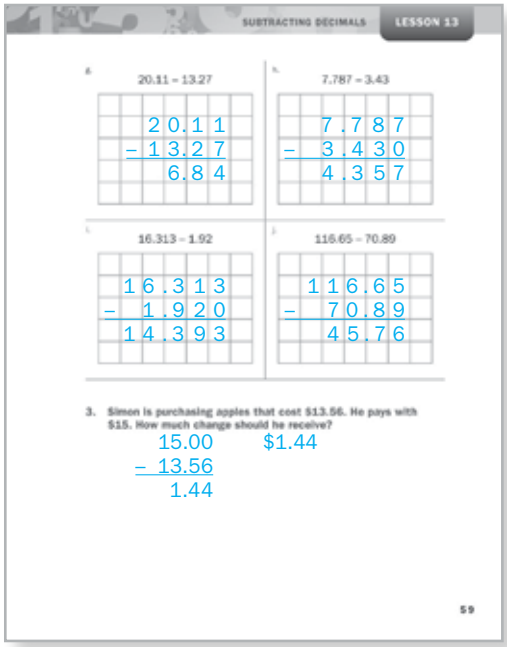
e. 7.4 − 1.9 = 5.5

57

Page 58 Answers



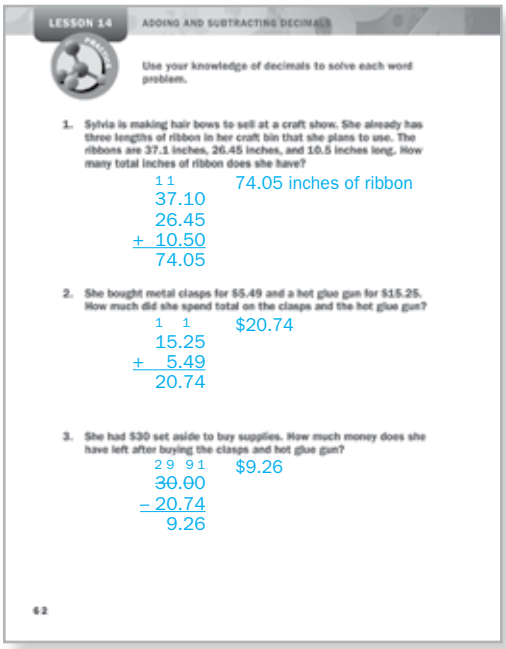
Page 59 Answers



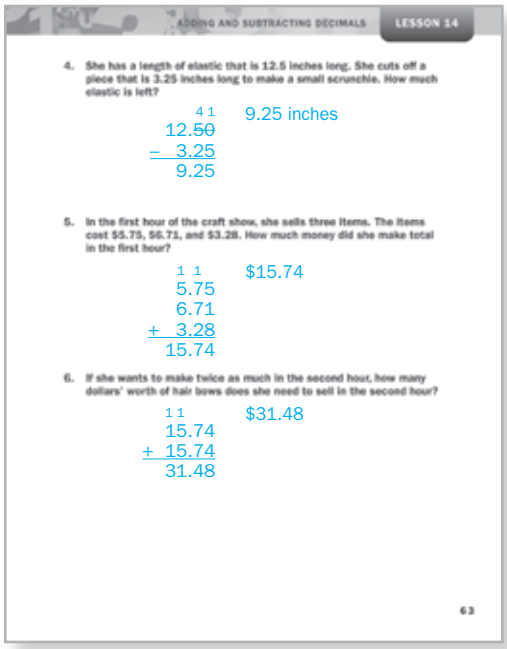
LESSON 14

Adding hundredths repeatedly can quickly become complicated. That is why I have them round the answers. It also allows them to use the same gameboard. Rounding is a skill that students struggle with consistently, so it is good for them to have some practice with it in this game.

Page 62 Answers



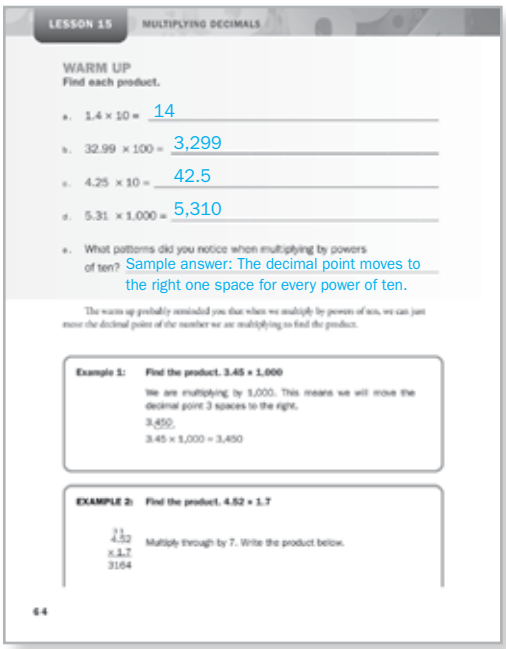
Page 63 Answers



LESSON 15

In Level 5 of this series, students are shown the why behind ignoring the decimal points and then counting the spaces at the end. At this level, it is time to just practice the trick until it becomes automatic.

Page 64 Answers



LESSON 15 MULTIPLYING DECIMALS

WARM UP
Find each product.

a. 1.4 × 10 = 14
b. 32.99 × 100 = 3,299
c. 4.25 × 10 = 42.5
d. 5.31 × 1,000 = 5,310
e. What patterns did you notice when multiplying by powers of ten? Sample answer: The decimal point moves to the right one space for every power of ten.

The warm up probably reminded you that when we multiply by powers of ten, we can just move the decimal point of the number we are multiplying to find the product.

Example 1: Find the product. 3.45 × 1,000

We are multiplying by 1,000. This means we will move the decimal point 3 spaces to the right.

3,450

3.45 × 1,000 = 3,450

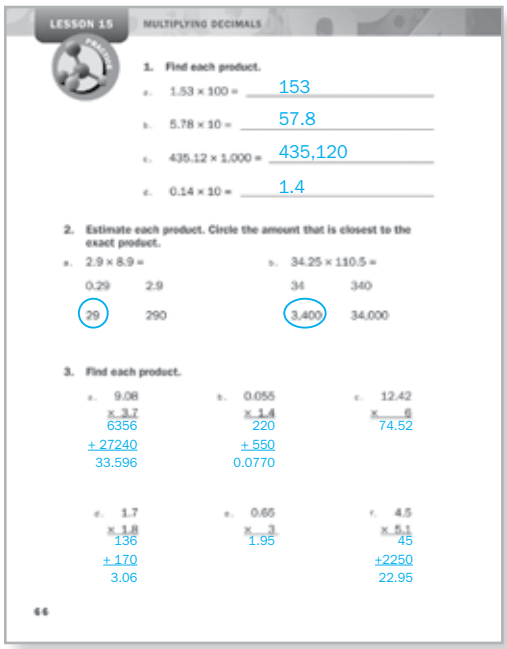
EXAMPLE 2: Find the product. 4.52 × 1.7

11
4.52
× 1.7
3164

Multiply through by 7. Write the product below.

64

Page 66 Answers



LESSON 15 MULTIPLYING DECIMALS

1. Find each product.
a. 1.53 × 100 = 153
b. 5.78 × 10 = 57.8
c. 435.12 × 1,000 = 435,120
d. 0.14 × 10 = 1.4

2. Estimate each product. Circle the amount that is closest to the exact product.
a. 2.9 × 8.9 =
0.29 2.9
29 290
b. 34.25 × 110.5 =
34 340
3,400 34,000

3. Find each product.
a. 9.08 × 3.7 = 6356 + 27240 = 33.596
b. 0.055 × 1.4 = 220 + 550 = 0.0770
c. 12.42 × 6 = 74.52
d. 1.7 × 1.8 = 136 + 170 = 3.06
e. 0.65 × 3 = 1.95
f. 4.5 × 5.1 = 45 + 2250 = 22.95

66

LESSON 16

This lesson was inspired by many personal experiences where I have been asked to "figure out the bill" for a group of friends since I am the math person in the group. I'm on a mission to empower everyone to be able to figure this stuff out on their own.

Page 67 Answers

DIVIDING WHOLE NUMBERS WITH DECIMAL ANSWERS LESSON 16

ACTIVITY

LESSON 16: DIVIDING WHOLE NUMBERS WITH DECIMAL ANSWERS

Splitting the Bill

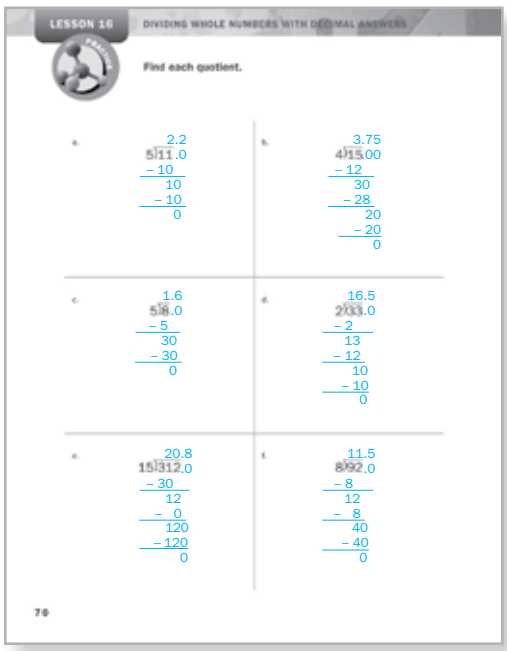
You Will Need:
- Lesson 16: Activity Sheets
- Scissors

You Will Do:
1. Carefully tear out the activity sheets from the back of the answer key. Cut out the dollar bills and coins, and use them to act out each of these scenarios.
2. Imagine four friends go to a restaurant. There are three dessert specials that they are considering ordering and sharing. They are going to split the bill evenly. How much will each friend owe if they choose option 1? What about options 2 and 3?

Dessert Special #1	Dessert Special #2	Dessert Special #3
Homemade Blueberry Pie $12	Dark Chocolate Dream $10	Banana Split Sundae $9
Each friend will owe: $3	Each friend will owe: $2.50	Each friend will owe: $2.25

67

Page 70 Answers



LESSON 16 DIVIDING WHOLE NUMBERS WITH DECIMAL ANSWERS

Find each quotient.

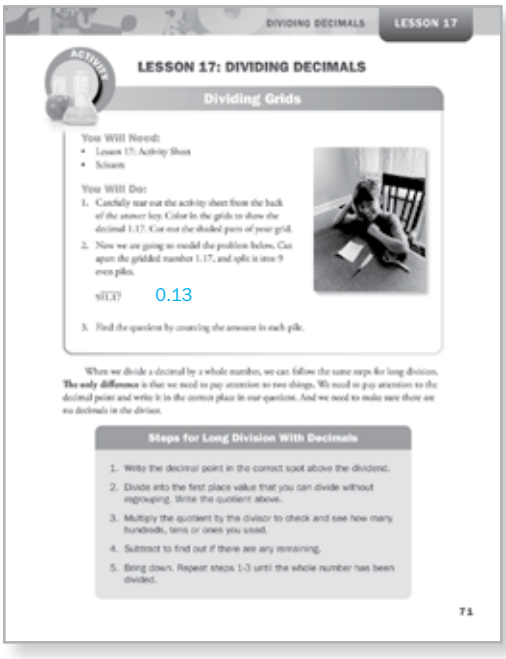
a. 5)11.0 = 2.2 (− 10, 10, − 10, 0)
b. 4)15.00 = 3.75 (− 12, 30, − 28, 20, − 20, 0)
c. 5)8.0 = 1.6 (− 5, 30, − 30, 0)
d. 2)33.0 = 16.5 (− 2, 13, − 12, 10, − 10, 0)
e. 15)312.0 = 20.8 (− 30, 12, − 0, 120, − 120, 0)
f. 8)92.0 = 11.5 (− 8, 12, − 8, 40, − 40, 0)

70

LESSON 17

In addition to teaching a new skill, this lesson is also a great review of the long division process.

Page 71 Answers


DIVIDING DECIMALS LESSON 17

LESSON 17: DIVIDING DECIMALS

Dividing Grids

You Will Need:
- Lesson 17: Activity Sheet
- Scissors

You Will Do:
1. Carefully tear out the activity sheet from the back of the answer key. Color in the grids to show the decimal 1.17. Cut out the shaded parts of your grid.
2. Now we are going to model the problem below. Cut apart the gridded number 1.17, and split it into 9 even piles.

9|1.17 0.13

3. Find the quotient by counting the amount in each pile.

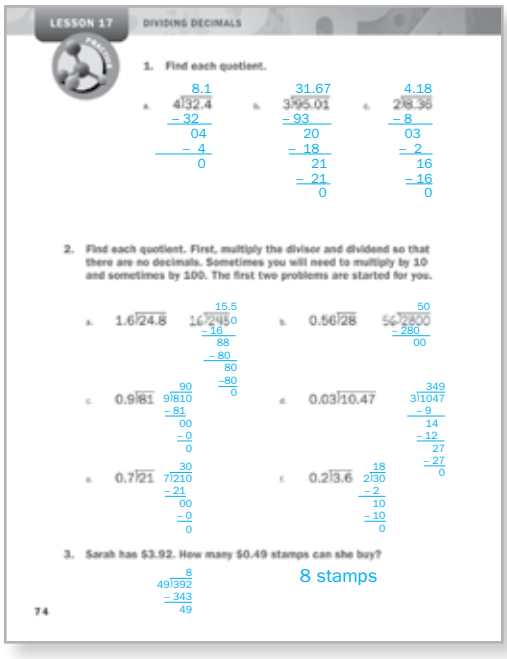
When we divide a decimal by a whole number, we can follow the same steps for long division. **The only difference** is that we need to pay attention to two things. We need to pay attention to the decimal point and write it in the correct place in our quotient. And we need to make sure there are no decimals in the divisor.

Steps for Long Division With Decimals

1. Write the decimal point in the correct spot above the dividend.
2. Divide into the first place value that you can divide without regrouping. Write the quotient above.
3. Multiply the quotient by the divisor to check and see how many hundreds, tens or ones you used.
4. Subtract to find out if there are any remaining.
5. Bring down. Repeat steps 1-3 until the whole number has been divided.

71

Page 74 Answers


LESSON 17 DIVIDING DECIMALS

1. Find each quotient.

a. 8.1 / 4|32.4 − 32, 04, − 4, 0

b. 31.67 / 3|95.01 − 93, 20, − 18, 21, − 21, 0

c. 4.18 / 2|8.36 − 8, 03, − 2, 16, − 16, 0

2. Find each quotient. First, multiply the divisor and dividend so that there are no decimals. Sometimes you will need to multiply by 10 and sometimes by 100. The first two problems are started for you.

a. 1.6|24.8 → 16|248 = 15.5, − 16, 88, − 80, 80, − 80, 0

b. 0.56|28 → 56|2800 = 50, − 280, 00

c. 0.9|81 = 90, 9|810, − 81, 00, − 0, 0

d. 0.03|10.47 = 349, 3|1047, − 9, 14, − 12, 27, − 27, 0

e. 0.7|21 = 30, 7|210, − 21, 00, − 0, 0

f. 0.2|3.6 = 18, 2|36, − 2, 16, − 16, 0

3. Sarah has $3.92. How many $0.49 stamps can she buy?

8 stamps

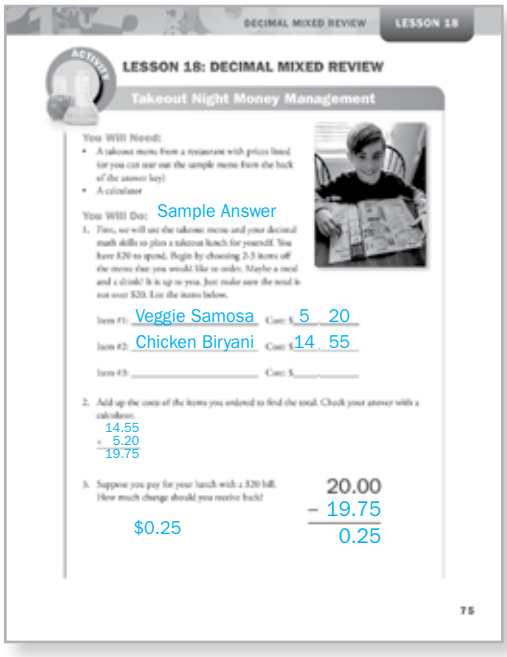
8, 49|392, − 343, 49

74

LESSON 18

We definitely need a review lesson after all of those decimal skills. And why not teach some money management at the same time? That was a bonus for all of you parents. Additionally, kids are far more motivated to do math when given a context like the one in this lesson.

Page 75 Answers


DECIMAL MIXED REVIEW LESSON 18

LESSON 18: DECIMAL MIXED REVIEW

Takeout Night Money Management

You Will Need:
- A takeout menu from a restaurant with prices listed (or you can tear out the sample menu from the back of the answer key)
- A calculator

You Will Do: Sample Answer

1. Then, we will use the takeout menu and your decimal math skills to plan a takeout lunch for yourself. You have $20 to spend. Begin by choosing 2-3 items off the menu that you would like to order. Maybe a meal and a drink? It is up to you. Just make sure the total is not over $20. List the items below.

Item #1: Veggie Samosa Cost: $ 5.20

Item #2: Chicken Biryani Cost: $ 14.55

Item #3: _____ Cost: $ _____

2. Add up the costs of the items you ordered to find the total. Check your answer with a calculator.

14.55
+ 5.20
19.75

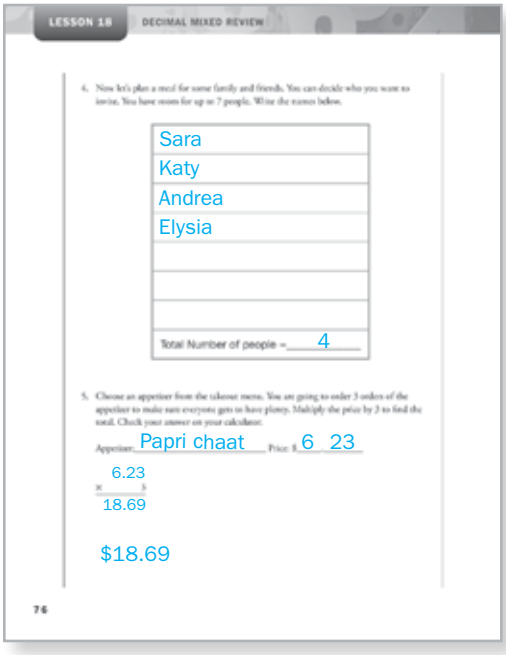
3. Suppose you pay for your lunch with a $20 bill. How much change should you receive back?

$0.25

20.00
− 19.75
0.25

75

Page 76 Answers


LESSON 18 DECIMAL MIXED REVIEW

4. Now let's plan a meal for some family and friends. You can decide who you want to invite. You have room for up to 7 people. Write the names below.

Sara
Katy
Andrea
Elysia
Total Number of people = 4

5. Choose an appetizer from the takeout menu. You are going to order 3 orders of the appetizer to make sure everyone gets to have plenty. Multiply the price by 3 to find the total. Check your answer on your calculator.

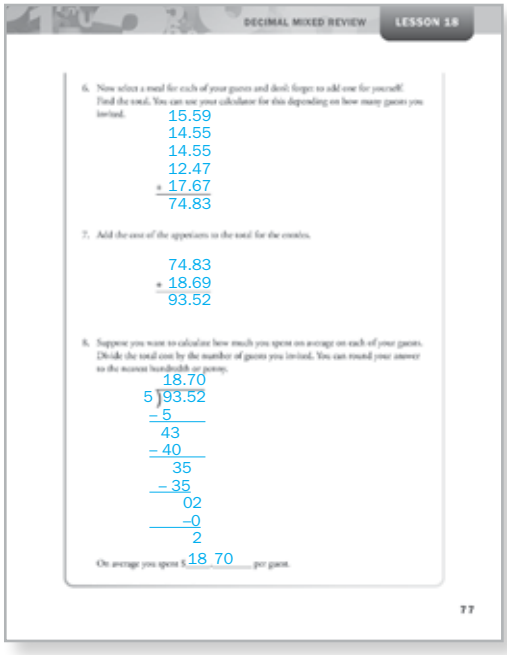
Appetizer: Papri chaat Price: $ 6 23

6.23
× 3
18.69

$18.69

76

Page 77 Answers


DECIMAL MIXED REVIEW LESSON 18

6. Now select a meal for each of your guests and don't forget to add one for yourself. Find the total. You can use your calculator for this depending on how many guests you invited.

15.59
14.55
14.55
12.47
+ 17.67
74.83

7. Add the cost of the appetizers to the total for the entrées.

74.83
+ 18.69
93.52

8. Suppose you want to calculate how much you spent on average on each of your guests. Divide the total cost by the number of guests you invited. You can round your answer to the nearest hundredth or penny.

18.70
5) 93.52
– 5
43
– 40
35
– 35
02
– 0
2

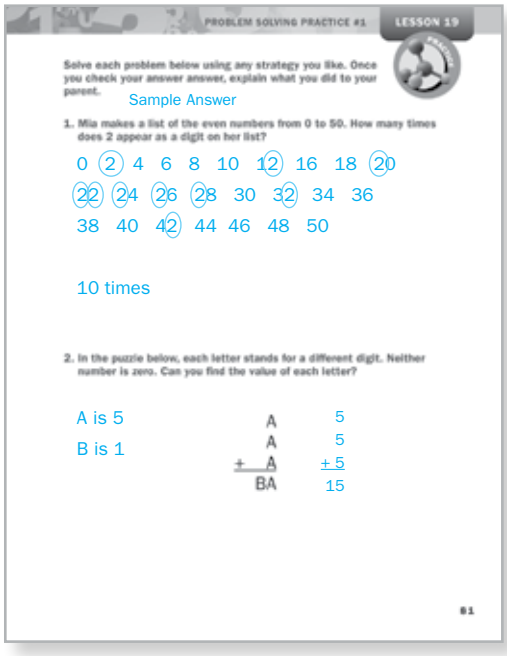
On average you spent $ 18 70 per guest.

77

LESSON 19

In each unit there will be one problem-solving lesson. There is a complete description of this program element in the beginning of this book. The main thing to keep in mind is that the process is more important than the results. Your child can be making a lot of progress but still not find the right answer.

Page 81 Answers


PROBLEM SOLVING PRACTICE #1 LESSON 19

Solve each problem below using any strategy you like. Once you check your answer answer, explain what you did to your parent.

Sample Answer

1. Mia makes a list of the even numbers from 0 to 50. How many times does 2 appear as a digit on her list?

0 (2) 4 6 8 10 (12) 16 18 (20)
(22) (24) (26) (28) 30 (32) 34 36
38 40 (42) 44 46 48 50

10 times

2. In the puzzle below, each letter stands for a different digit. Neither number is zero. Can you find the value of each letter?

A is 5
B is 1

A 5
A 5
+ A + 5
BA 15

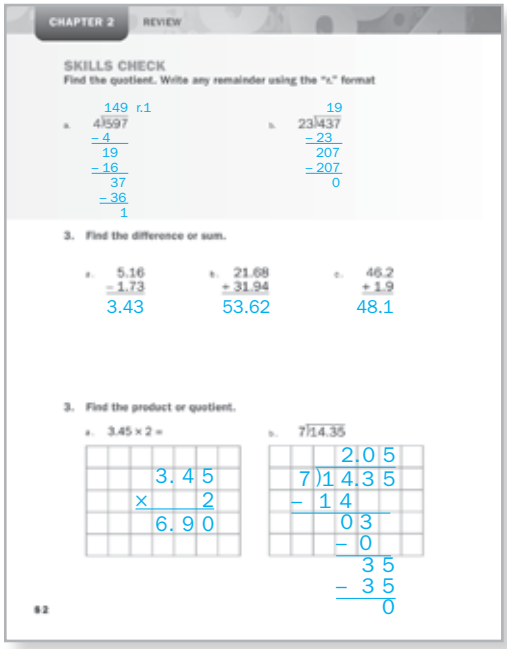
81

CHAPTER 2 REVIEW

The Chapter 2 review is a quick way for you to see if your child is mastering the material. If they seem to be struggling with any of the concepts, you might want to take a day to review before moving onto the unit project.

An optional Chapter 2 test is provided in the back of this answer key. If you plan on using it, give it to your child after he or she has completed the chapter review.

Page 82 Answers



CHAPTER 2 REVIEW

SKILLS CHECK

Find the quotient. Write any remainder using the "r." format

a. 149 r.1 (4)597; −4; 19; −16; 37; −36; 1

b. 19 (23)437; −23; 207; −207; 0

3. Find the difference or sum.

a. 5.16 − 1.73 = 3.43

b. 21.68 + 31.94 = 53.62

c. 46.2 + 1.9 = 48.1

3. Find the product or quotient.

a. 3.45 × 2 = 6.90

b. 7)14.35 = 2.05; −14; 03; −0; 35; −35; 0

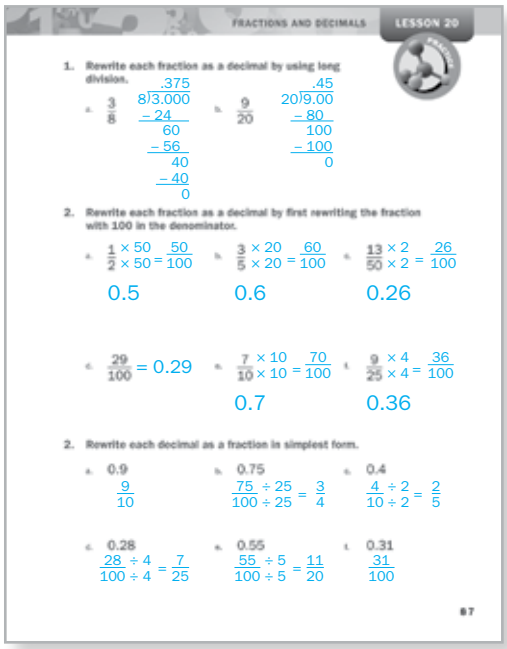
82

CHAPTER 3: FRACTIONS

LESSON 20

Mathematicians have to be able to switch between different forms of a number fluently. In this lesson, we are focused on fractions and decimals. Later on in this course, we will add in percents. And in all three cases, memorizing some benchmarks really helps.

Page 87 Answers



FRACTIONS AND DECIMALS — LESSON 20

1. Rewrite each fraction as a decimal by using long division.

a. $\frac{3}{8}$ = 8)3.000; −24; 60; −56; 40; −40; 0

b. $\frac{9}{20}$ = 20)9.00; −80; 100; −100; 0

2. Rewrite each fraction as a decimal by first rewriting the fraction with 100 in the denominator.

a. $\frac{1}{2} \times \frac{50}{50} = \frac{50}{100}$ = 0.5

b. $\frac{3}{5} \times \frac{20}{20} = \frac{60}{100}$ = 0.6

c. $\frac{13}{50} \times \frac{2}{2} = \frac{26}{100}$ = 0.26

d. $\frac{29}{100}$ = 0.29

e. $\frac{7}{10} \times \frac{10}{10} = \frac{70}{100}$ = 0.7

f. $\frac{9}{25} \times \frac{4}{4} = \frac{36}{100}$ = 0.36

2. Rewrite each decimal as a fraction in simplest form.

a. 0.9 = $\frac{9}{10}$

b. 0.75 = $\frac{75 \div 25}{100 \div 25} = \frac{3}{4}$

c. 0.4 = $\frac{4 \div 2}{10 \div 2} = \frac{2}{5}$

d. 0.28 = $\frac{28 \div 4}{100 \div 4} = \frac{7}{25}$

e. 0.55 = $\frac{55 \div 5}{100 \div 5} = \frac{11}{20}$

f. 0.31 = $\frac{31}{100}$

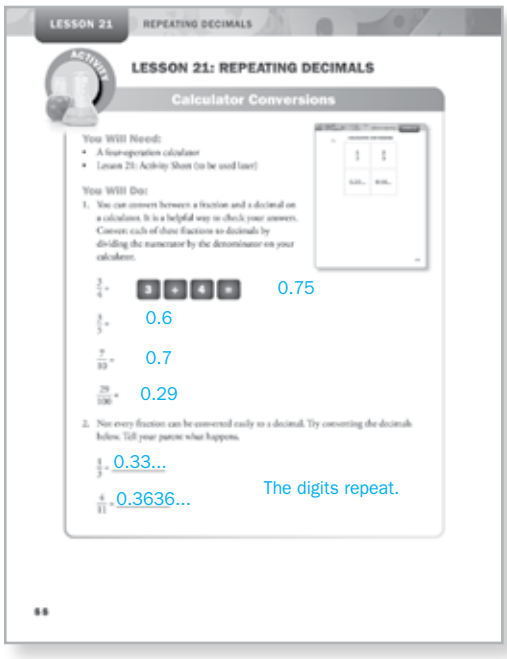
87

LESSON 21

The two main repeating decimals to memorize are 1/3 = 0.3333... and 2/3 = 0.66666… Because of this, there are two new cards included to be added to the game from Lesson 20.

The four operations needed on your calculator are addition, subtraction, multiplication, and division. Any simple and inexpensive calculator will have these.

Page 88 Answers


LESSON 21 REPEATING DECIMALS

LESSON 21: REPEATING DECIMALS

Calculator Conversions

You Will Need:
- A four-operation calculator
- Lesson 21 Activity Sheet (to be used later)

You Will Do:

1. You can convert between a fraction and a decimal on a calculator. It is a helpful way to check your answers. Convert each of these fractions to decimals by dividing the numerator by the denominator on your calculator.

$\frac{1}{4}$ = 3 ÷ 4 = 0.75

$\frac{1}{5}$ = 0.6

$\frac{7}{10}$ = 0.7

$\frac{29}{100}$ = 0.29

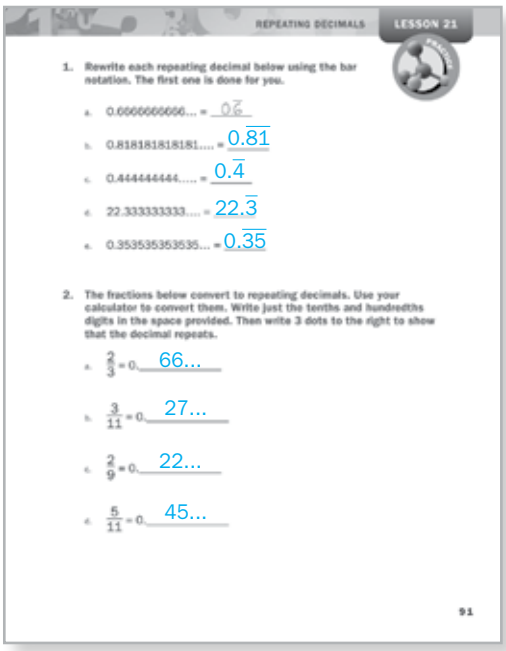
2. Not every fraction can be converted easily to a decimal. Try converting the decimals below. Tell your partner what happens.

$\frac{1}{3}$ = 0.33...

$\frac{4}{11}$ = 0.3636... The digits repeat.

88

Page 91 Answers


REPEATING DECIMALS LESSON 21

1. Rewrite each repeating decimal below using the bar notation. The first one is done for you.

a. 0.0666666666... = $0.0\overline{6}$

b. 0.8181818181... = $0.\overline{81}$

c. 0.444444444... = $0.\overline{4}$

d. 22.333333333... = $22.\overline{3}$

e. 0.353535353535... = $0.\overline{35}$

2. The fractions below convert to repeating decimals. Use your calculator to convert them. Write just the tenths and hundredths digits in the space provided. Then write 3 dots to the right to show that the decimal repeats.

a. $\frac{2}{3}$ = 0.66...

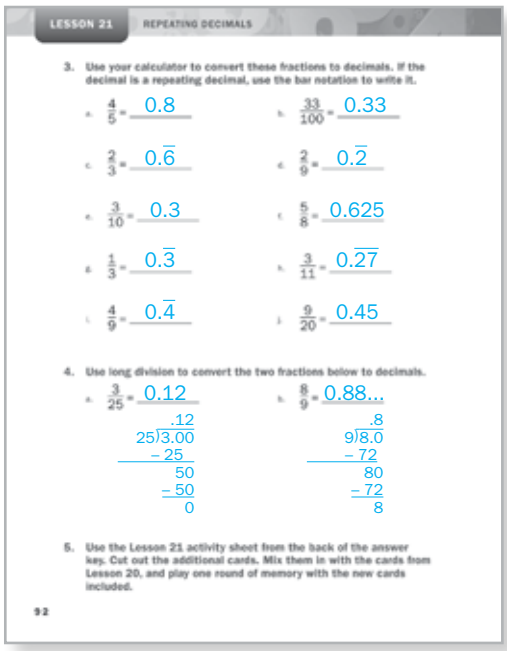
b. $\frac{3}{11}$ = 0.27...

c. $\frac{2}{9}$ = 0.22...

d. $\frac{5}{11}$ = 0.45...

91

Page 92 Answers


LESSON 21 REPEATING DECIMALS

3. Use your calculator to convert these fractions to decimals. If the decimal is a repeating decimal, use the bar notation to write it.

a. $\frac{4}{5}$ = 0.8

b. $\frac{33}{100}$ = 0.33

c. $\frac{2}{3}$ = $0.\overline{6}$

d. $\frac{2}{9}$ = $0.\overline{2}$

e. $\frac{3}{10}$ = 0.3

f. $\frac{5}{8}$ = 0.625

g. $\frac{1}{3}$ = $0.\overline{3}$

h. $\frac{3}{11}$ = $0.\overline{27}$

i. $\frac{4}{9}$ = $0.\overline{4}$

j. $\frac{9}{20}$ = 0.45

4. Use long division to convert the two fractions below to decimals.

a. $\frac{3}{25}$ = 0.12

.12
25⟌3.00
− 25
50
− 50
0

b. $\frac{8}{9}$ = 0.88...

.8
9⟌8.0
− 72
80
− 72
8

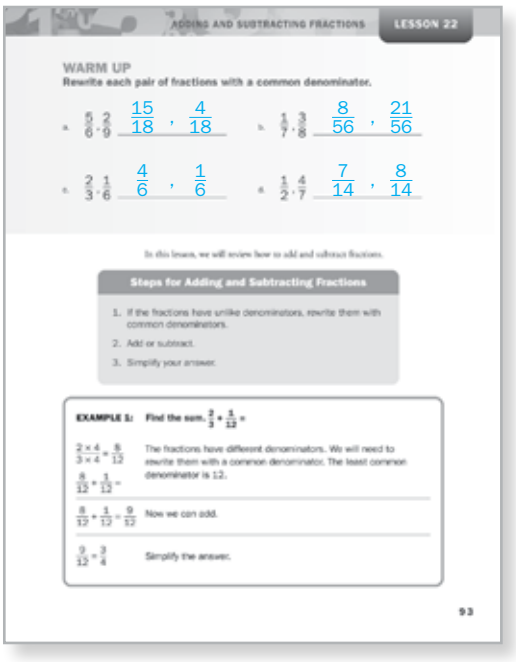
5. Use the Lesson 21 activity sheet from the back of the answer key. Cut out the additional cards. Mix them in with the cards from Lesson 20, and play one round of memory with the new cards included.

92

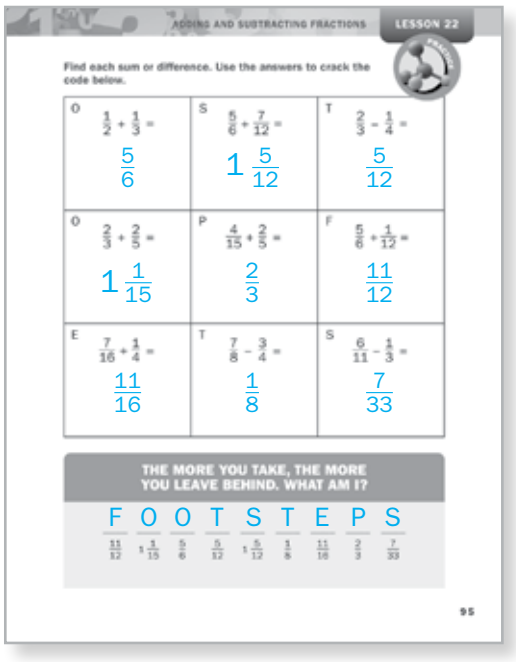
LESSON 22

To add and subtract fractions, you essentially "unsimplify" them so that you can perform the operation. Because of this, you often must simplify again at the end when you have your answer.

Page 93 Answers



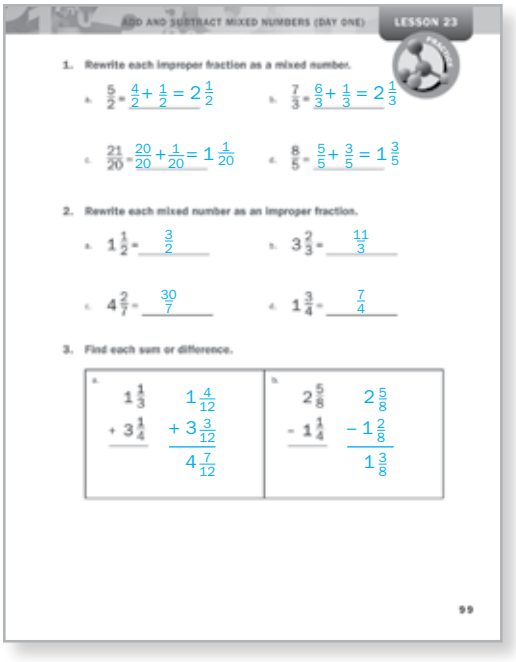
Page 95 Answers



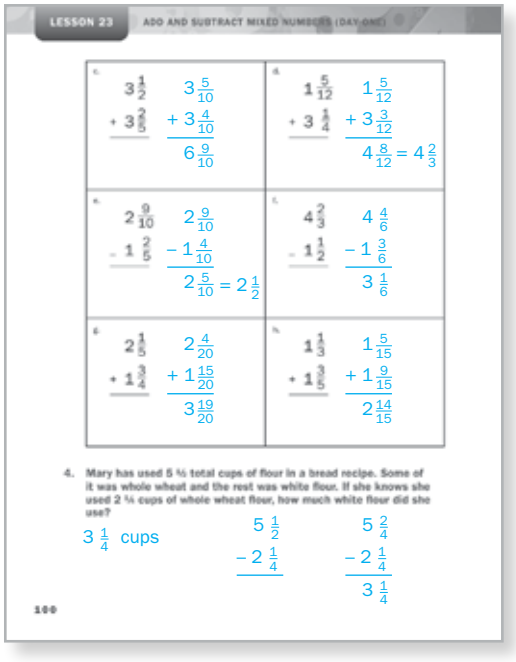
LESSON 23

Bear with your student in this lesson. There are many layered skills when you add and subtract mixed numbers. There is regrouping in addition to all the skills they just practiced in Lesson 22.

Page 99 Answers



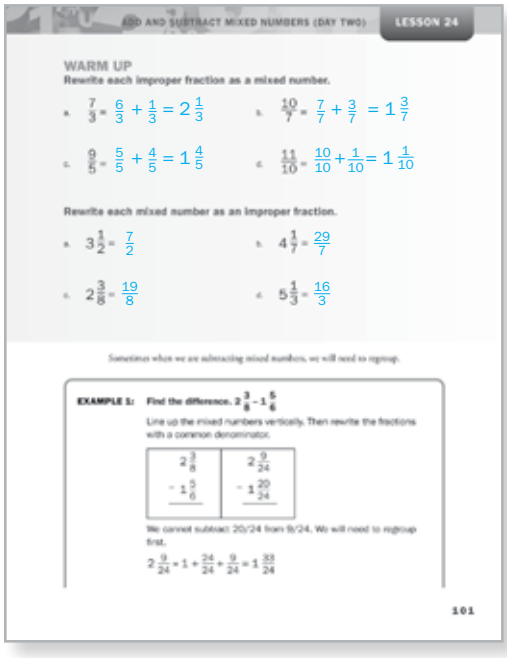
Page 100 Answers



LESSON 24

I added a second day of mixed numbers because most students will need it. And this concept has built in review of regrouping and simplifying fractions.

Page 101 Answers



ADD AND SUBTRACT MIXED NUMBERS (DAY TWO) LESSON 24

WARM UP

Rewrite each improper fraction as a mixed number.

a. $\frac{7}{3} = \frac{6}{3} + \frac{1}{3} = 2\frac{1}{3}$ b. $\frac{10}{7} = \frac{7}{7} + \frac{3}{7} = 1\frac{3}{7}$

c. $\frac{9}{5} = \frac{5}{5} + \frac{4}{5} = 1\frac{4}{5}$ d. $\frac{11}{10} = \frac{10}{10} + \frac{1}{10} = 1\frac{1}{10}$

Rewrite each mixed number as an improper fraction.

a. $3\frac{1}{2} = \frac{7}{2}$ b. $4\frac{1}{7} = \frac{29}{7}$

c. $2\frac{3}{8} = \frac{19}{8}$ d. $5\frac{1}{3} = \frac{16}{3}$

Sometimes when we are subtracting mixed numbers, we will need to regroup.

EXAMPLE 1: Find the difference. $2\frac{3}{8} - 1\frac{5}{6}$

Line up the mixed numbers vertically. Then rewrite the fractions with a common denominator.

$2\frac{3}{8} \rightarrow 2\frac{9}{24}$

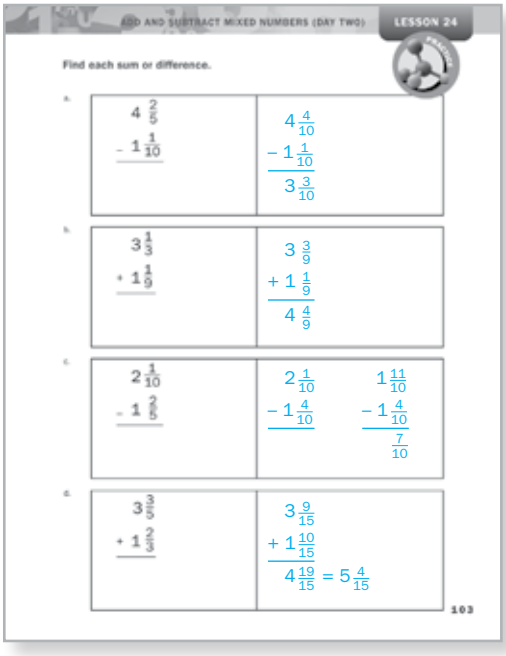
$-1\frac{5}{6} \rightarrow -1\frac{20}{24}$

We cannot subtract 20/24 from 9/24. We will need to regroup first.

$2\frac{9}{24} = 1 + \frac{24}{24} + \frac{9}{24} = 1\frac{33}{24}$

101

Page 103 Answers



ADD AND SUBTRACT MIXED NUMBERS (DAY TWO) LESSON 24

Find each sum or difference.

a. $4\frac{2}{5} - 1\frac{1}{10}$ → $4\frac{4}{10} - 1\frac{1}{10} = 3\frac{3}{10}$

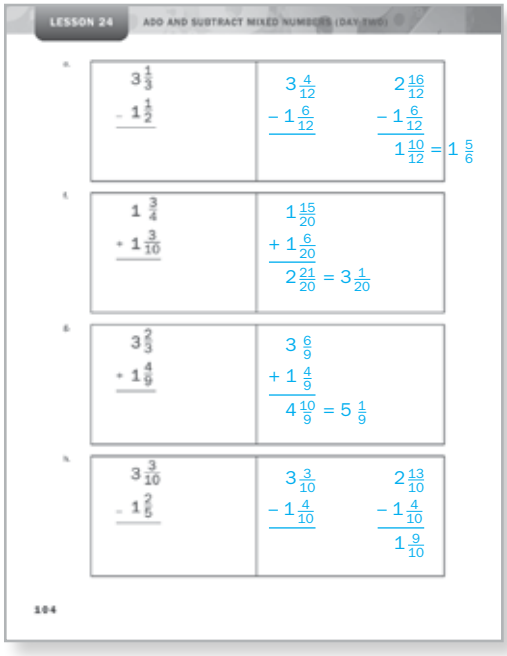
b. $3\frac{1}{3} + 1\frac{1}{9}$ → $3\frac{3}{9} + 1\frac{1}{9} = 4\frac{4}{9}$

c. $2\frac{1}{10} - 1\frac{2}{5}$ → $2\frac{1}{10} - 1\frac{4}{10}$ → $1\frac{11}{10} - 1\frac{4}{10} = \frac{7}{10}$

d. $3\frac{3}{5} + 1\frac{2}{3}$ → $3\frac{9}{15} + 1\frac{10}{15} = 4\frac{19}{15} = 5\frac{4}{15}$

103

Page 104 Answers



LESSON 24 ADD AND SUBTRACT MIXED NUMBERS (DAY TWO)

a. $3\frac{1}{3} - 1\frac{1}{2}$ → $3\frac{4}{12} - 1\frac{6}{12}$ → $2\frac{16}{12} - 1\frac{6}{12} = 1\frac{10}{12} = 1\frac{5}{6}$

b. $1\frac{3}{4} + 1\frac{3}{10}$ → $1\frac{15}{20} + 1\frac{6}{20} = 2\frac{21}{20} = 3\frac{1}{20}$

c. $3\frac{2}{3} + 1\frac{4}{9}$ → $3\frac{6}{9} + 1\frac{4}{9} = 4\frac{10}{9} = 5\frac{1}{9}$

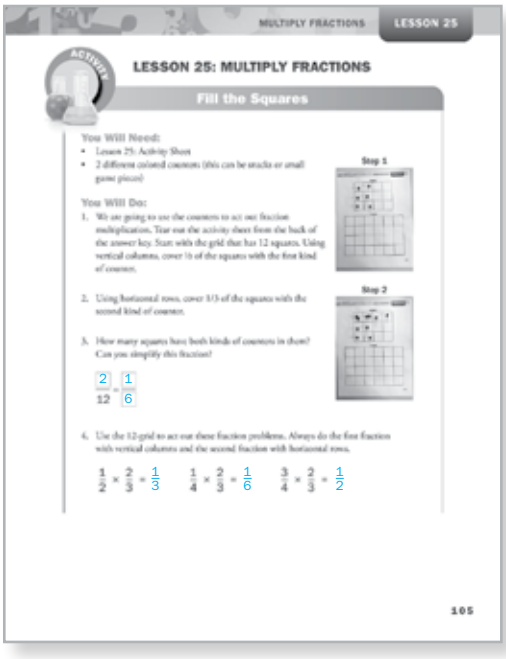
d. $3\frac{3}{10} - 1\frac{2}{5}$ → $3\frac{3}{10} - 1\frac{4}{10}$ → $2\frac{13}{10} - 1\frac{4}{10} = 1\frac{9}{10}$

104

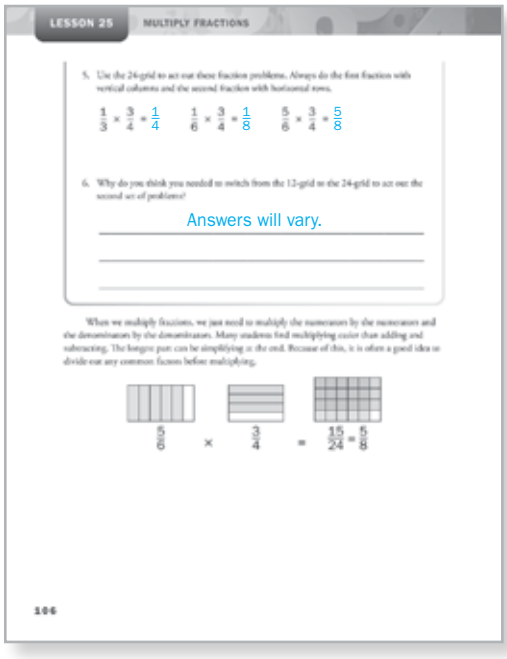
LESSON 25

While it is harder to grasp conceptually, multiplying fractions is a much easier operation to execute. This lesson will probably feel much more manageable than what we have been working on earlier in the chapter. This lesson is also laying the groundwork for the skills students will need when converting units in future science classes.

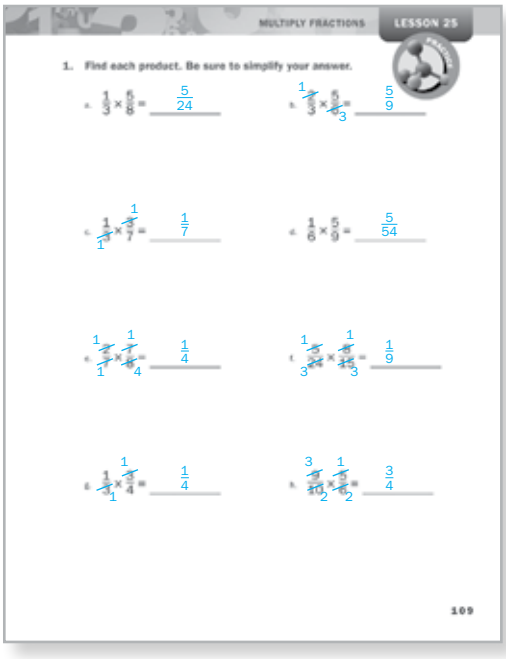
Page 105 Answers



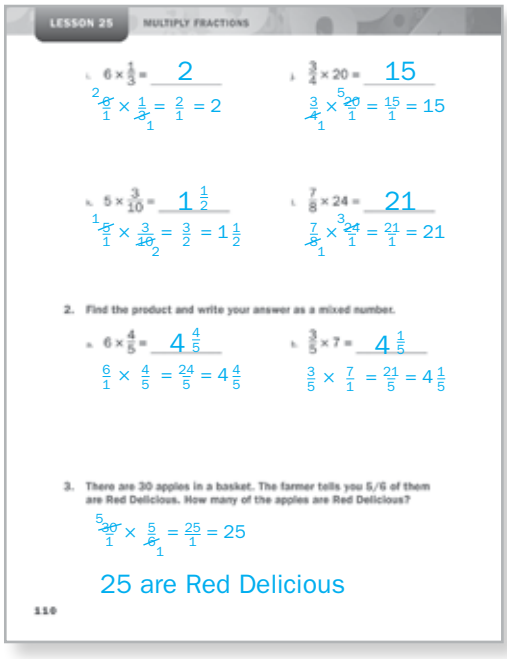
Page 106 Answers



Page 109 Answers



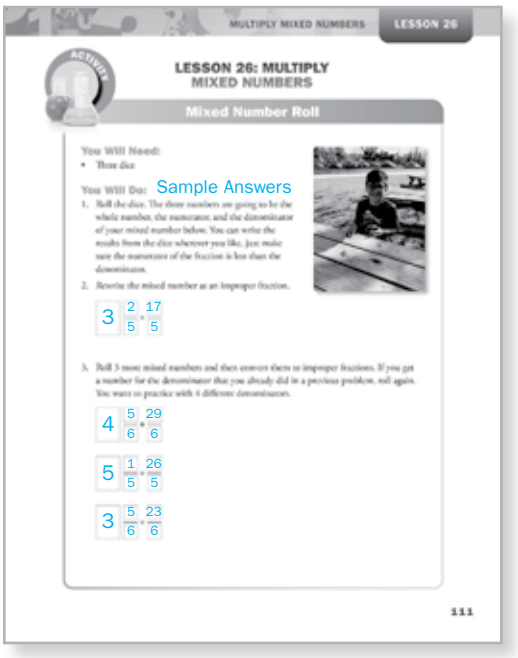
Page 110 Answers



LESSON 26

The key skill in this lesson is being able to convert between improper fractions and mixed numbers. That will come up again in Lesson 27.

Page 111 Answers



MULTIPLY MIXED NUMBERS LESSON 26

LESSON 26: MULTIPLY MIXED NUMBERS

Mixed Number Roll

You Will Need:
- Three dice

You Will Do: Sample Answers

1. Roll the dice. The three numbers are going to be the whole number, the numerator, and the denominator of your mixed number below. You can write the results from the dice wherever you like, just make sure the numerator of the fraction is less than the denominator.
2. Rewrite the mixed number as an improper fraction.

$3\frac{2}{5} = \frac{17}{5}$

3. Roll 3 more mixed numbers and then convert them to improper fractions. If you get a number for the denominator that you already did in a previous problem, roll again. You want to practice with 6 different denominators.

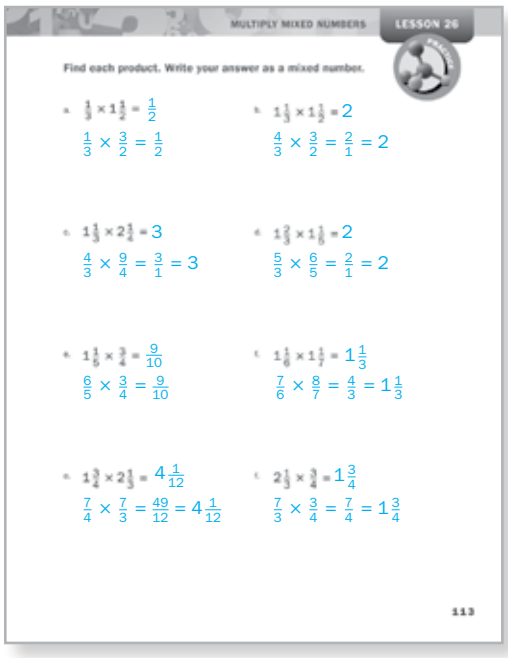
$4\frac{5}{6} = \frac{29}{6}$

$5\frac{1}{5} = \frac{26}{5}$

$3\frac{5}{6} = \frac{23}{6}$

111

Page 113 Answers



MULTIPLY MIXED NUMBERS LESSON 26

Find each product. Write your answer as a mixed number.

a. $\frac{1}{3} \times 1\frac{1}{2} = \frac{1}{2}$
$\frac{1}{3} \times \frac{3}{2} = \frac{1}{2}$

b. $1\frac{1}{3} \times 1\frac{1}{2} = 2$
$\frac{4}{3} \times \frac{3}{2} = \frac{2}{1} = 2$

c. $1\frac{1}{3} \times 2\frac{1}{4} = 3$
$\frac{4}{3} \times \frac{9}{4} = \frac{3}{1} = 3$

d. $1\frac{2}{3} \times 1\frac{1}{5} = 2$
$\frac{5}{3} \times \frac{6}{5} = \frac{2}{1} = 2$

e. $1\frac{1}{5} \times \frac{3}{4} = \frac{9}{10}$
$\frac{6}{5} \times \frac{3}{4} = \frac{9}{10}$

f. $1\frac{1}{6} \times 1\frac{1}{7} = 1\frac{1}{3}$
$\frac{7}{6} \times \frac{8}{7} = \frac{4}{3} = 1\frac{1}{3}$

g. $1\frac{3}{4} \times 2\frac{1}{3} = 4\frac{1}{12}$
$\frac{7}{4} \times \frac{7}{3} = \frac{49}{12} = 4\frac{1}{12}$

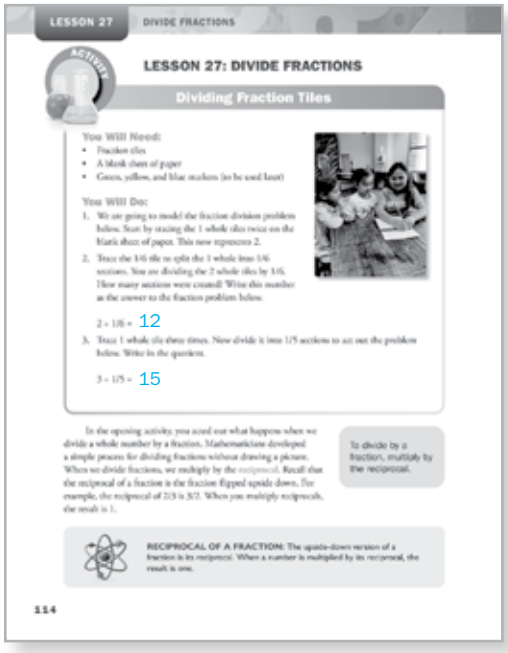
h. $2\frac{1}{3} \times \frac{3}{4} = 1\frac{3}{4}$
$\frac{7}{3} \times \frac{3}{4} = \frac{7}{4} = 1\frac{3}{4}$

113

LESSON 27

I love the visual of the opening activity. I don't think I ever really understood what dividing by a fraction meant until I was out of school. Fraction tiles make it so much easier to picture what is happening and why flipping the fraction and multiplying gives you the correct answer.

Page 114 Answers



LESSON 27 DIVIDE FRACTIONS

LESSON 27: DIVIDE FRACTIONS

Dividing Fraction Tiles

You Will Need:
- Fraction tiles
- A blank sheet of paper
- Green, yellow, and blue markers (to be used later)

You Will Do:

1. We are going to model the fraction division problem below. Start by tracing the 1 whole tile twice on the blank sheet of paper. This now represents 2.
2. Trace the 1/6 tile to split the 1 whole into 1/6 sections. You are dividing the 2 whole tiles by 1/6. How many sections were created? Write this number as the answer to the fraction problem below.

$2 \div 1/6 =$ 12

3. Trace 1 whole tile three times. Now divide it into 1/5 sections to act out the problem below. Write in the quotient.

$3 \div 1/5 =$ 15

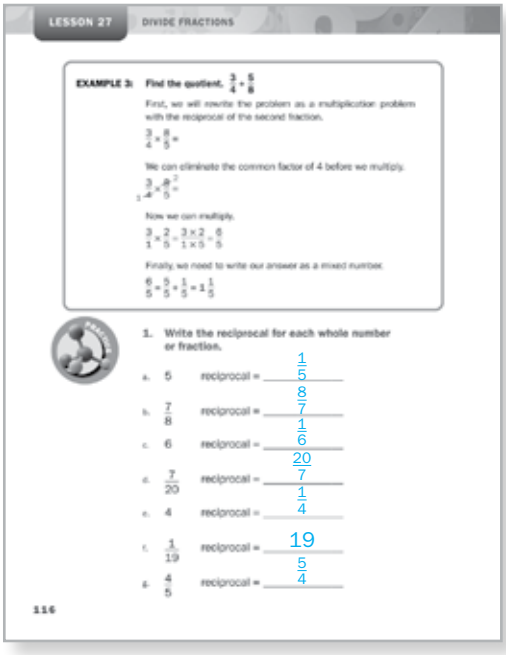
In the opening activity, you acted out what happens when we divide a whole number by a fraction. Mathematicians developed a simple process for dividing fractions without drawing a picture. When we divide fractions, we multiply by the reciprocal. Recall that the reciprocal of a fraction is the fraction flipped upside down. For example, the reciprocal of 2/3 is 3/2. When you multiply reciprocals, the result is 1.

To divide by a fraction, multiply by the reciprocal.

RECIPROCAL OF A FRACTION: The upside-down version of a fraction is its reciprocal. When a number is multiplied by its reciprocal, the result is one.

114

Page 116 Answers



LESSON 27 DIVIDE FRACTIONS

EXAMPLE 3: Find the quotient. $\frac{3}{4} \div \frac{5}{8}$

First, we will rewrite the problem as a multiplication problem with the reciprocal of the second fraction.

$\frac{3}{4} \times \frac{8}{5} =$

We can eliminate the common factor of 4 before we multiply.

$\frac{3}{\cancel{4}_1} \times \frac{\cancel{8}^2}{5}$

Now we can multiply.

$\frac{3}{1} \times \frac{2}{5} = \frac{3 \times 2}{1 \times 5} = \frac{6}{5}$

Finally, we need to write our answer as a mixed number.

$\frac{6}{5} = \frac{5}{5} + \frac{1}{5} = 1\frac{1}{5}$

1. Write the reciprocal for each whole number or fraction.

a. 5 reciprocal = $\frac{1}{5}$

b. $\frac{7}{8}$ reciprocal = $\frac{8}{7}$

c. 6 reciprocal = $\frac{1}{6}$

d. $\frac{7}{20}$ reciprocal = $\frac{20}{7}$

e. 4 reciprocal = $\frac{1}{4}$

f. $\frac{1}{19}$ reciprocal = 19

g. $\frac{4}{5}$ reciprocal = $\frac{5}{4}$

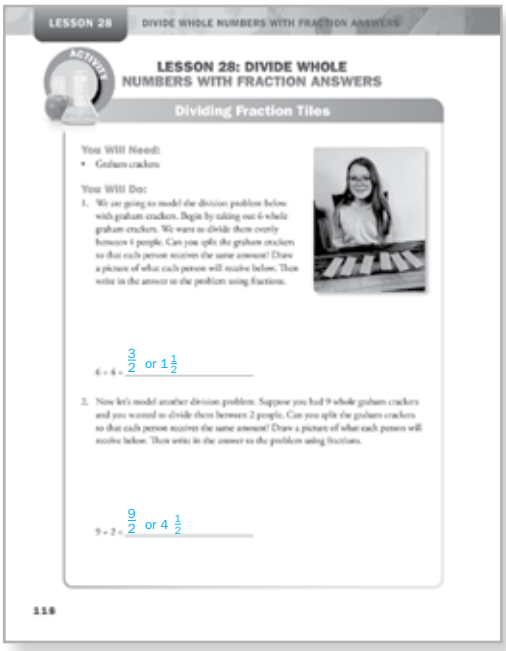
116

Page 117 Answers

LESSON 28

This lesson is very similar to Lesson 15. The only difference is that the quotients are mixed numbers.

Page 118 Answers



LESSON 28 DIVIDE WHOLE NUMBERS WITH FRACTION ANSWERS

LESSON 28: DIVIDE WHOLE NUMBERS WITH FRACTION ANSWERS

Dividing Fraction Tiles

You Will Need:
- Graham crackers

You Will Do:

1. We are going to model the division problem below with graham crackers. Begin by taking out 6 whole graham crackers. We want to divide them evenly between 4 people. Can you split the graham crackers so that each person receives the same amount? Draw a picture of what each person will receive below. Then write in the answer to the problem using fractions.

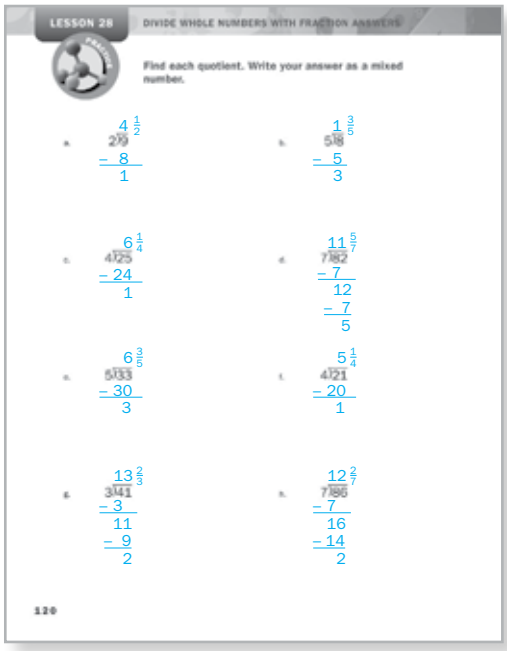
$6 \div 4 =$ $\frac{3}{2}$ or $1\frac{1}{2}$

2. Now let's model another division problem. Suppose you had 9 whole graham crackers and you wanted to divide them between 2 people. Can you split the graham crackers so that each person receives the same amount? Draw a picture of what each person will receive below. Then write in the answer to the problem using fractions.

$9 \div 2 =$ $\frac{9}{2}$ or $4\frac{1}{2}$

118

Page 120 Answers



LESSON 28 DIVIDE WHOLE NUMBERS WITH FRACTION ANSWERS

Find each quotient. Write your answer as a mixed number.

a. $2\overline{)9}$ → $4\frac{1}{2}$; -8; 1

b. $5\overline{)18}$ → $3\frac{3}{5}$; -15; 3

c. $4\overline{)25}$ → $6\frac{1}{4}$; -24; 1

d. $7\overline{)82}$ → $11\frac{5}{7}$; -7; 12; -7; 5

e. $5\overline{)33}$ → $6\frac{3}{5}$; -30; 3

f. $4\overline{)21}$ → $5\frac{1}{4}$; -20; 1

g. $3\overline{)41}$ → $13\frac{2}{3}$; -3; 11; -9; 2

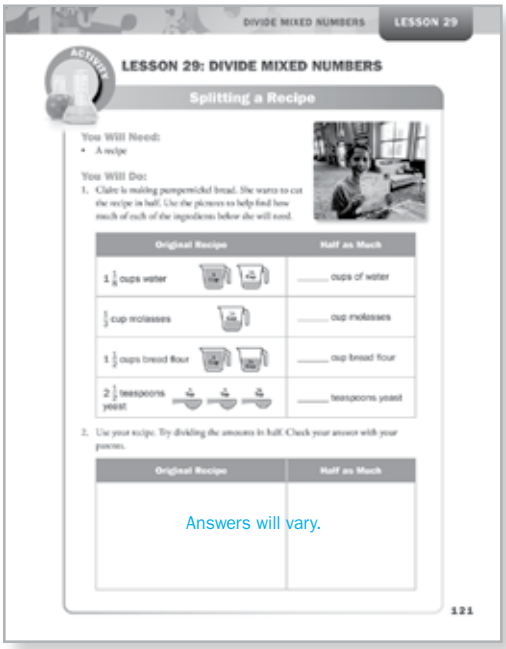
h. $7\overline{)86}$ → $12\frac{2}{7}$; -7; 16; -14; 2

120

LESSON 29

Again, in this lesson students have to be able to switch between mixed numbers and improper fractions and back again. Converting between different forms of a number is a key skill in mathematics.

Page 121 Answers



DIVIDE MIXED NUMBERS LESSON 29

ACTIVITY

LESSON 29: DIVIDE MIXED NUMBERS

Splitting a Recipe

You Will Need:
- A recipe

You Will Do:
1. Claire is making pumpernickel bread. She wants to cut the recipe in half. Use the pictures to help find how much of each of the ingredients below she will need.

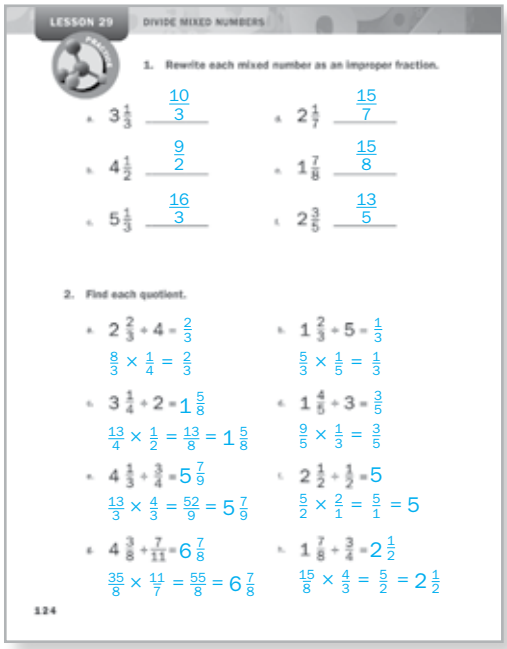
Original Recipe	Half as Much
$1\frac{1}{4}$ cups water	_____ cups of water
$\frac{1}{2}$ cup molasses	_____ cup molasses
$1\frac{1}{2}$ cups bread flour	_____ cup bread flour
$2\frac{1}{2}$ teaspoons yeast	_____ teaspoons yeast

2. Use your recipe. Try dividing the amounts in half. Check your answer with your partner.

Original Recipe	Half as Much
	Answers will vary.

121

Page 124 Answers



LESSON 29 DIVIDE MIXED NUMBERS

PRACTICE

1. Rewrite each mixed number as an improper fraction.

a. $3\frac{1}{3}$ $\frac{10}{3}$ d. $2\frac{1}{7}$ $\frac{15}{7}$

b. $4\frac{1}{2}$ $\frac{9}{2}$ e. $1\frac{7}{8}$ $\frac{15}{8}$

c. $5\frac{1}{3}$ $\frac{16}{3}$ f. $2\frac{3}{5}$ $\frac{13}{5}$

2. Find each quotient.

a. $2\frac{2}{3} \div 4 = \frac{2}{3}$
$\frac{8}{3} \times \frac{1}{4} = \frac{2}{3}$

b. $1\frac{2}{3} \div 5 = \frac{1}{3}$
$\frac{5}{3} \times \frac{1}{5} = \frac{1}{3}$

c. $3\frac{1}{4} \div 2 = 1\frac{5}{8}$
$\frac{13}{4} \times \frac{1}{2} = \frac{13}{8} = 1\frac{5}{8}$

d. $1\frac{4}{5} \div 3 = \frac{3}{5}$
$\frac{9}{5} \times \frac{1}{3} = \frac{3}{5}$

e. $4\frac{1}{3} \div \frac{3}{4} = 5\frac{7}{9}$
$\frac{13}{3} \times \frac{4}{3} = \frac{52}{9} = 5\frac{7}{9}$

f. $2\frac{1}{2} \div \frac{1}{2} = 5$
$\frac{5}{2} \times \frac{2}{1} = \frac{5}{1} = 5$

g. $4\frac{3}{8} \div \frac{7}{11} = 6\frac{7}{8}$
$\frac{35}{8} \times \frac{11}{7} = \frac{55}{8} = 6\frac{7}{8}$

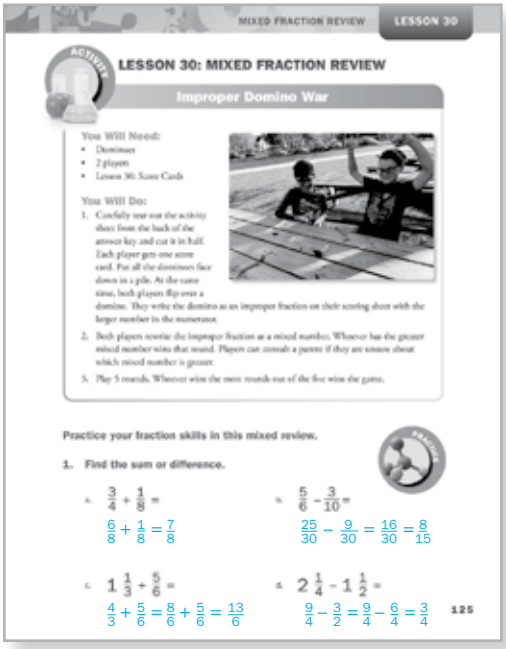
h. $1\frac{7}{8} \div \frac{3}{4} = 2\frac{1}{2}$
$\frac{15}{8} \times \frac{4}{3} = \frac{5}{2} = 2\frac{1}{2}$

124

LESSON 30

This lesson is just a mix of review, so students have another opportunity to practice.

Page 125 Answers



MIXED FRACTION REVIEW LESSON 30

ACTIVITY

LESSON 30: MIXED FRACTION REVIEW

Improper Domino War

You Will Need:
- Dominoes
- 2 players
- Lesson 30: Score Cards

You Will Do:
1. Carefully tear out the activity sheet from the back of the answer key and cut it in half. Each player gets one score card. Put all the dominoes face down in a pile. At the same time, both players flip over a domino. They write the domino as an improper fraction on their scoring sheet with the larger number in the numerator.
2. Both players rewrite the improper fraction as a mixed number. Whoever has the greater mixed number wins that round. Players can consult a parent if they are unsure about which mixed number is greater.
3. Play 5 rounds. Whoever wins the most rounds out of the five wins the game.

Practice your fraction skills in this mixed review.

PRACTICE

1. Find the sum or difference.

a. $\frac{3}{4} + \frac{1}{8} =$
$\frac{6}{8} + \frac{1}{8} = \frac{7}{8}$

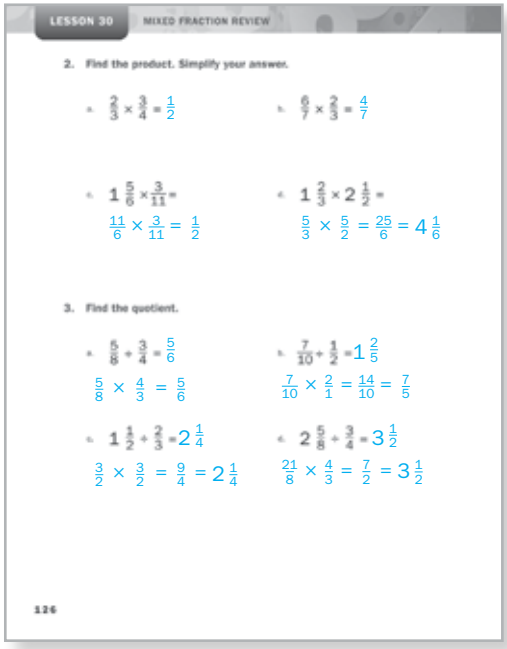
b. $\frac{5}{6} - \frac{3}{10} =$
$\frac{25}{30} - \frac{9}{30} = \frac{16}{30} = \frac{8}{15}$

c. $1\frac{1}{3} + \frac{5}{6} =$
$\frac{4}{3} + \frac{5}{6} = \frac{8}{6} + \frac{5}{6} = \frac{13}{6}$

d. $2\frac{1}{4} - 1\frac{1}{2} =$
$\frac{9}{4} - \frac{3}{2} = \frac{9}{4} - \frac{6}{4} = \frac{3}{4}$

125

Page 126 Answers



LESSON 30 MIXED FRACTION REVIEW

2. Find the product. Simplify your answer.

a. $\frac{2}{3} \times \frac{3}{4} = \frac{1}{2}$

b. $\frac{6}{7} \times \frac{2}{3} = \frac{4}{7}$

c. $1\frac{5}{6} \times \frac{3}{11} =$
$\frac{11}{6} \times \frac{3}{11} = \frac{1}{2}$

d. $1\frac{2}{3} \times 2\frac{1}{2} =$
$\frac{5}{3} \times \frac{5}{2} = \frac{25}{6} = 4\frac{1}{6}$

3. Find the quotient.

a. $\frac{5}{8} \div \frac{3}{4} = \frac{5}{6}$
$\frac{5}{8} \times \frac{4}{3} = \frac{5}{6}$

b. $\frac{7}{10} \div \frac{1}{2} = 1\frac{2}{5}$
$\frac{7}{10} \times \frac{2}{1} = \frac{14}{10} = \frac{7}{5}$

c. $1\frac{1}{2} \div \frac{2}{3} = 2\frac{1}{4}$
$\frac{3}{2} \times \frac{3}{2} = \frac{9}{4} = 2\frac{1}{4}$

d. $2\frac{5}{8} \div \frac{3}{4} = 3\frac{1}{2}$
$\frac{21}{8} \times \frac{4}{3} = \frac{7}{2} = 3\frac{1}{2}$

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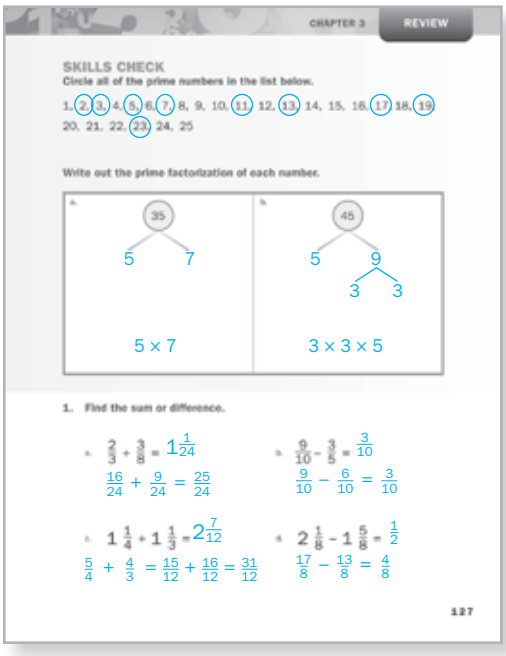
CHAPTER 3 REVIEW

The Chapter 3 review is a quick way for you to see if your child is mastering the material. If they seem to be struggling with any of the concepts, you might want to take a day to review before moving onto the unit project. An optional Chapter 3 test is provided in the back of this answer key. If you plan on using it, give it to your child after he or she has completed the chapter review.

Page 127 Answers



CHAPTER 3 REVIEW

SKILLS CHECK

Circle all of the prime numbers in the list below.

1, (2), (3), 4, (5), 6, (7), 8, 9, 10, (11), 12, (13), 14, 15, 16, (17), 18, (19), 20, 21, 22, (23), 24, 25

Write out the prime factorization of each number.

a. 35 → 5 × 7

b. 45 → 3 × 3 × 5

1. Find the sum or difference.

a. $\frac{2}{3} + \frac{3}{8} = 1\frac{1}{24}$; $\frac{16}{24} + \frac{9}{24} = \frac{25}{24}$

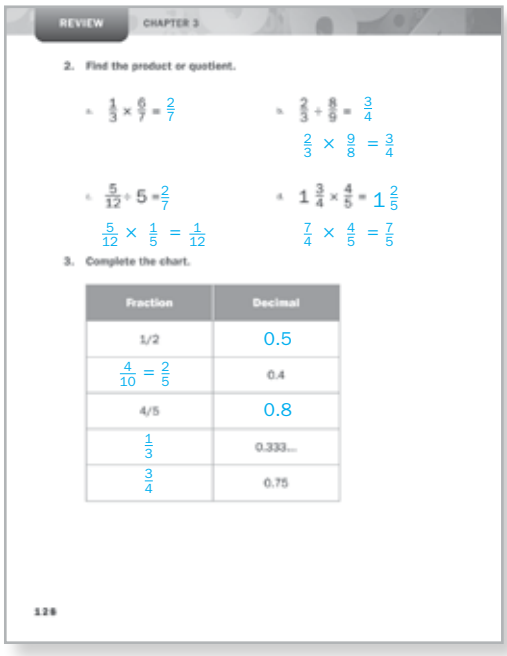
b. $\frac{9}{10} - \frac{3}{5} = \frac{3}{10}$; $\frac{9}{10} - \frac{6}{10} = \frac{3}{10}$

c. $1\frac{1}{4} + 1\frac{1}{3} = 2\frac{7}{12}$; $\frac{5}{4} + \frac{4}{3} = \frac{15}{12} + \frac{16}{12} = \frac{31}{12}$

d. $2\frac{1}{8} - 1\frac{5}{8} = \frac{1}{2}$; $\frac{17}{8} - \frac{13}{8} = \frac{4}{8}$

127

Page 128 Answers



REVIEW CHAPTER 3

2. Find the product or quotient.

a. $\frac{1}{3} \times \frac{6}{7} = \frac{2}{7}$

b. $\frac{2}{3} \div \frac{8}{9} = \frac{3}{4}$; $\frac{2}{3} \times \frac{9}{8} = \frac{3}{4}$

c. $\frac{5}{12} \div 5 = \frac{2}{7}$; $\frac{5}{12} \times \frac{1}{5} = \frac{1}{12}$

d. $1\frac{3}{4} \times \frac{4}{5} = 1\frac{2}{5}$; $\frac{7}{4} \times \frac{4}{5} = \frac{7}{5}$

3. Complete the chart.

Fraction	Decimal
1/2	0.5
$\frac{4}{10} = \frac{2}{5}$	0.4
4/5	0.8
$\frac{1}{3}$	0.333...
$\frac{3}{4}$	0.75

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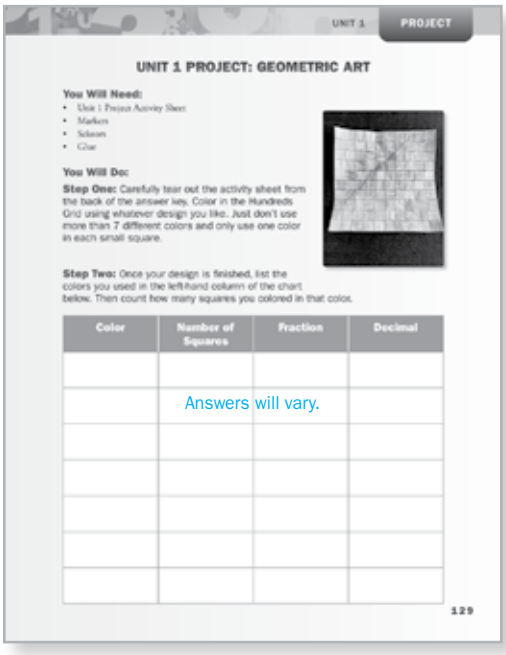
UNIT 1 PROJECT

Students can make any type of design that they like. This art connection is a fun change of pace after so much decimal and fraction work.

Page 129 Answers



UNIT 1 PROJECT

UNIT 1 PROJECT: GEOMETRIC ART

You Will Need:

- Unit 1 Project Activity Sheet
- Markers
- Scissors
- Glue

You Will Do:

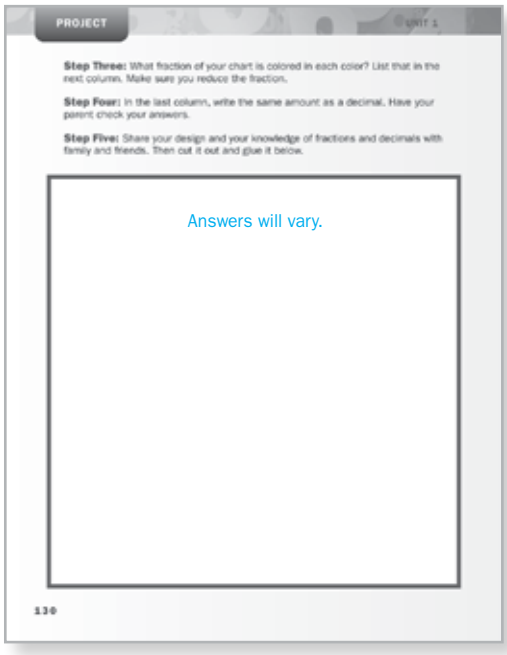
Step One: Carefully tear out the activity sheet from the back of the answer key. Color in the Hundreds Grid using whatever design you like. Just don't use more than 7 different colors and only use one color in each small square.

Step Two: Once your design is finished, list the colors you used in the left-hand column of the chart below. Then count how many squares you colored in that color.

Color	Number of Squares	Fraction	Decimal
	Answers will vary.		

129

Page 130 Answers



PROJECT UNIT 1

Step Three: What fraction of your chart is colored in each color? List that in the next column. Make sure you reduce the fraction.

Step Four: In the last column, write the same amount as a decimal. Have your parent check your answers.

Step Five: Share your design and your knowledge of fractions and decimals with family and friends. Then cut it out and glue it below.

Answers will vary.

130

COMPLETE SUPPLY LIST

- Fraction tiles
- A protractor
- Colored pencils
- Numbered cards 3-10
- Notecards
- Scissors
- Beans
- Four-operation calculator
- Dice
- Glue
- Game pieces
- A takeout menu
- An envelope
- Dominoes
- Graham crackers
- A recipe
- Markers
- Bingo chips
- A paper clip
- A miniature bag of Skittles®
- Fruit salad
- A bowl
- A quarter
- Four different kinds of beverages
- Similar items from two different grocery stores
- Thick string, yarn, or a thin piece of ribbon
- A bobbin
- A chenille stem
- A small plastic cup
- A pair of sharp scissors or a knife
- A stopwatch
- Measuring tape
- Pennies, marbles, or other small weights
- Several food items from your refrigerator or pantry
- A store flyer or magazine
- A tape measure
- Ice cubes
- Salt, sugar, baking soda
- 5 transparent cups
- 5 labels
- A tablespoon
- A permanent marker
- Colored pencils
- Glue stick
- A deck of cards
- A Monopoly™ gameboard
- An analog thermometer
- Masking tape
- Sticky notes
- 2 blank sheets of poster board
- World almanac or access to the internet for research
- A printer
- 3 sheets of 8.5 × 11" colored paper
- A stapler
- A sheet protector
- A ruler
- A highlighter
- A set of 3D shapes (including a sphere, a cone, a cylinder, and several types of pyramids and prisms)
- A box (it can be any size)
- Rectangle or square shapes (magnetic tiles, the green triangles from a pattern block set, or triangles that are the same size and shape cut out of cardboard)
- A refrigerator (or another larger, rectangular object to measure, like a deep freeze or a dresser)
- A bag of small marshmallows
- Several pieces of card stock or thick paper