Chapter 3

School-Home Letter

Dear Family,

During the next few weeks, our math class will be learning to multiply by 2-digit whole numbers. We will also learn how to describe the reasonableness of an estimate.

You can expect to see homework that provides practice with estimation and multiplication of numbers with more than 1 digit.

Here is a sample of how your child will be taught to multiply by a 2-digit number.

Vocabulary

compatible numbers Numbers that are easy to compute mentally

estimate To find an answer that is close to the exact amount

partial products A method of multiplying in which the ones, tens, hundreds, and so on are multiplied separately and then the products are added together

MODEL Multiply 2-Digit Numbers

This is one way that we will be multiplying by 2-digit numbers.

STEP 1

Multiply by the ones digit.

$$\begin{array}{r} {\scriptstyle 2} \\ 24 \\ \times\ 25 \\ \hline 120 \end{array} \leftarrow \text{partial product}$$

STEP 2

Multiply by the tens digit. Start by placing a zero in the ones place.

$$\begin{array}{r} {\scriptstyle 2} \\ 24 \\ \times\ 25 \\ \hline 120 \\ +\ 480 \end{array} \leftarrow \text{partial product}$$

STEP 3

Add the partial products.

$$\begin{array}{r} {\scriptstyle 2} \\ 24 \\ \times\ {\scriptstyle 1}25 \\ \hline 120 \\ +\ 480 \\ \hline 600 \end{array} \leftarrow \text{product}$$

Tips

Estimating to Check Multiplication

When estimation is used to check that a multiplication answer is reasonable, usually each factor is rounded to a multiple of 10 that has only one nonzero digit. Then mental math can be used to recall the basic fact product, and patterns can be used to determine the correct number of zeros in the estimate.

Capítulo 3

Carta para la casa

Querida familia,

Durante las próximas semanas, en la clase de matemáticas aprenderemos a multiplicar por números enteros de 2 dígitos. También aprenderemos cómo describir qué tan razonable es una estimación.

Llevaré a la casa tareas con actividades para practicar la estimación y la multiplicación de números con más de 1 dígito.

Este es un ejemplo de la manera como aprenderemos a multiplicar por números de 2 dígitos.

Vocabulario

números compatibles Números que son fáciles de calcular mentalmente

estimar Hallar un total que se aproxime a la cantidad exacta

productos parciales Método de multiplicación a través del cual las unidades, decenas, centenas, etc., se multiplican por separado, y luego se suman los productos

MODELO Multiplicar números de 2 dígitos

Esta es una manera en la que multiplicaremos por números de 2 dígitos.

PASO 1

Multiplica por el dígito de las unidades.

$$\begin{array}{r} {\scriptstyle 2} \\ 24 \\ \times\ 25 \\ \hline 120 \end{array} \leftarrow \text{producto parcial}$$

PASO 2

Multiplica por el dígito de las decenas. Comienza escribiendo un cero en el lugar del las unidades.

$$\begin{array}{r} {\scriptstyle 2} \\ 24 \\ \times\ 25 \\ \hline 120 \\ +\ 480 \\ \hline \end{array} \leftarrow \text{producto parcial}$$

PASO 3

Suma los productos parciales.

$$\begin{array}{r} {\scriptstyle 2} \\ 24 \\ \times\ 25 \\ \hline 120 \\ +\ 480 \\ \hline 600 \end{array} \leftarrow \text{producto}$$

Pistas

Estimar para comprobar la multiplicación

Cuando se usa la estimación para comprobar que la respuesta de una multiplicación es razonable, cada factor se suele redondear al múltiplo de 10 que tiene un solo dígito distinto de cero. Después se puede usar el cálculo mental para recordar el producto básico de la operación, y se pueden usar patrones para determinar la cantidad correcta de ceros de la estimación.

Name _____

Multiply by Tens

COMMON CORE STANDARD—4.NBT.5
Use place value understanding and properties of operations to perform multi-digit arithmetic.

Choose a method. Then find the product.

Methods will vary.

1. 16×60

Use the halving-and-doubling strategy.

Find half of 16: $16 \div 2 = 8$.

Multiply this number by 60: $8 \times 60 = 480$

Double this result: $2 \times 480 = 960$

960

2. 80×22

1,760

3. 30×52

1,560

4. 60×20

1,200

5. 40×35

1,400

6. 10×90

900

7. 31×50

1,550

Problem Solving Real World

8. Kenny bought 20 packs of baseball cards. There are 12 cards in each pack. How many cards did Kenny buy?

240 cards

9. The Hart family drove 10 hours to their vacation spot. They drove an average of 48 miles each hour. How many miles did they drive?

480 miles

Lesson Check (4.NBT.5)

1. For the school play, 40 rows of chairs are set up. There are 22 chairs in each row. How many chairs are there?

880 chairs

2. At West School, there are 20 classrooms. Each classroom has 20 students. How many students are at West School?

400 students

Spiral Review (4.OA.1, 4.OA.2, 4.OA.3, 4.NBT.4)

3. Alex has 48 stickers. This is 6 times the number of stickers Max has. How many stickers does Max have?

8 stickers

4. Ali's dog weighs 8 times as much as her cat. Together, the two pets weigh 54 pounds. How much does Ali's dog weigh?

48 pounds

5. Allison has 3 containers with 25 crayons in each. She also has 4 boxes of markers with 12 markers in each box. She gives 10 crayons to a friend. How many crayons and markers does Allison have now?

113 crayons and markers

6. The state of Utah covers 82,144 square miles. The state of Montana covers 145,552 square miles. What is the total area of the two states?

227,696 square miles

Name _____

Estimate Products

COMMON CORE STANDARD—4.NBT.5
Use place value understanding and properties of operations to perform multi-digit arithmetic.

Estimate the product. Choose a method.

Possible estimates are given. Methods will vary.

1. 38×21

38×21
↓ ↓
40×20

800

2. 63×19

1,200

3. $27 \times \$42$

$1,000

4. 73×67

4,900

5. $37 \times \$44$

$1,600

6. 85×71

6,300

7. 88×56

5,400

8. 97×13

1,300

9. 92×64

5,400

Problem Solving Real World

Possible estimates are given.

10. A dime has a diameter of about 18 millimeters. About how many millimeters long would a row of 34 dimes be?

about 600 millimeters

11. A half-dollar has a diameter of about 31 millimeters. About how many millimeters long would a row of 56 half-dollars be?

about 1,800 millimeters

Lesson Check (4.NBT.5)

1. What is a reasonable estimate for the product of 43×68?

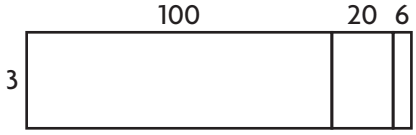
Possible answer: about 2,800

2. Marissa burns 93 calories each time she plays fetch with her dog. She plays fetch with her dog once a day. About how many calories will Marissa burn playing fetch with her dog in 28 days?

Possible answer: about 2,700 calories

Spiral Review (4.NBT.1, 4.NBT.3, 4.NBT.5)

3. Use the model to find 3×126.



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4. A store sold a certain brand of jeans for $38. One day, the store sold 6 pairs of jeans of that brand. How much did the 6 pairs of jeans cost?

$228

5. The Gateway Arch in St. Louis, Missouri, weighs about 20,000 tons. Write an amount that could be the exact number of tons the Arch weighs.

Possible answer: 17,246 tons

6. What is another name for 23 ten thousands?

Possible answer: 230,000

Name _____

Area Models and Partial Products

COMMON CORE STANDARD—4.NBT.5
Use place value understanding and properties of operations to perform multi-digit arithmetic.

Draw a model to represent the product. Then record the product.

Check students' models.

1. 13×42

	40	2
10	400	20
3	120	6

$400 + 20 + 120 + 6 =$ 546

2. 18×34

612

3. 22×26

572

4. 15×33

495

5. 23×29

667

6. 19×36

684

Problem Solving Real World

7. Sebastian made the following model to find the product 17×24.

	20	4
10	200	40
7	14	28

$200 + 40 + 14 + 28 = 282$

Is his model correct? **Explain**.

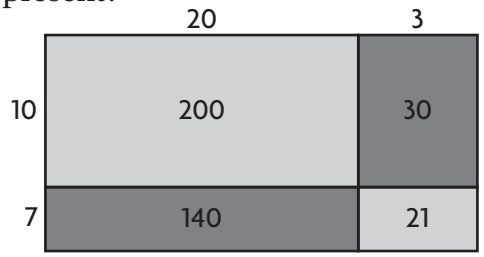
No; he incorrectly multiplied 20 times 7; $17 \times 24 = 408$.

8. Each student in Ms. Sike's kindergarten class has a box of crayons. Each box has 36 crayons. If there are 18 students in Ms. Sike's class, how many crayons are there?

648 crayons

Lesson Check (4.NBT.5)

1. What product does the model below represent?



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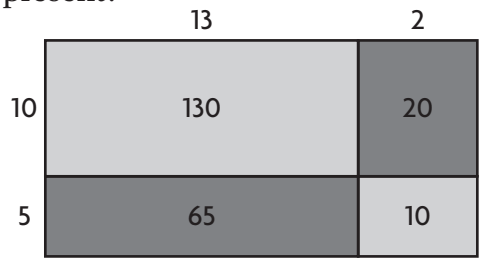
2. What product does the model below represent?



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Spiral Review (4.OA.3, 4.NBT.5)

3. Mariah builds a tabletop using square tiles. There are 12 rows of tiles and 30 tiles in each row. How many tiles does Mariah use?

360 tiles

4. Trevor bakes 8 batches of biscuits, with 14 biscuits in each batch. He sets aside 4 biscuits from each batch for a bake sale and puts the rest in a container. How many biscuits does Trevor put in the container?

80 biscuits

5. Li feeds her dog 3 cups of food each day. About how many cups of food does her dog eat in 28 days?

about 90 cups

6. Find the product of $20 \times 9 \times 5$. Tell which property you used.

900; Commutative Property

Name _____

Multiply Using Partial Products

COMMON CORE STANDARD—4.NBT.5
Use place value understanding and properties of operations to perform multi-digit arithmetic.

Record the product.

1.
$$\begin{array}{r} 23 \\ \times\ 79 \\ \hline 1{,}400 \\ 210 \\ 180 \\ +\ 27 \\ \hline 1{,}817 \end{array}$$

2.
$$\begin{array}{r} 56 \\ \times\ 32 \\ \hline 1{,}792 \end{array}$$

3.
$$\begin{array}{r} 87 \\ \times\ 64 \\ \hline 5{,}568 \end{array}$$

4.
$$\begin{array}{r} 33 \\ \times\ 25 \\ \hline 825 \end{array}$$

5.
$$\begin{array}{r} 94 \\ \times\ 12 \\ \hline 1{,}128 \end{array}$$

6.
$$\begin{array}{r} 51 \\ \times\ 77 \\ \hline 3{,}927 \end{array}$$

7.
$$\begin{array}{r} 69 \\ \times\ 49 \\ \hline 3{,}381 \end{array}$$

8.
$$\begin{array}{r} 86 \\ \times\ 84 \\ \hline 7{,}224 \end{array}$$

9.
$$\begin{array}{r} 98 \\ \times\ 42 \\ \hline 4{,}116 \end{array}$$

10.
$$\begin{array}{r} 73 \\ \times\ 37 \\ \hline 2{,}701 \end{array}$$

11.
$$\begin{array}{r} 85 \\ \times\ 51 \\ \hline 4{,}335 \end{array}$$

Problem Solving Real World

12. Evelyn drinks 8 glasses of water a day, which is 56 glasses of water a week. How many glasses of water does she drink in a year? (1 year = 52 weeks)

2,912 glasses

13. Joe wants to use the Hiking Club's funds to purchase new walking sticks for each of its 19 members. The sticks cost $26 each. The club has $480. Is this enough money to buy each member a new walking stick? If not, how much more money is needed?

No; $14 more is needed.

Lesson Check (4.NBT.5)

1. A carnival snack booth made $76 selling popcorn in one day. It made 22 times as much selling cotton candy. How much money did the snack booth make selling cotton candy?

$1,672

2. List the partial products of 42×28.

800, 40, 320, 16

Spiral Review (4.OA.1, 4.OA.3, 4.NBT.5)

3. Last year, the city library collected 117 used books for its shelves. This year, it collected 3 times as many books. How many books did it collect this year?

351 books

4. Washington Elementary has 232 students. Washington High has 6 times as many students. How many students does Washington High have?

1,392 students

5. List the partial products of 35×7.

210, 35

6. Shelby has ten $5 bills and thirteen $10 bills. How much money does Shelby have in all?

$180

Name _____

Multiply with Regrouping

COMMON CORE STANDARD—4.NBT.5
Use place value understanding and properties of operations to perform multi-digit arithmetic.

Possible estimates are given.

Estimate. Then find the product.

1. Estimate: 2,700

Think: 87 is close to 90 and 32 is close to 30.

$90 \times 30 = 2{,}700$

$$\begin{array}{r} {\scriptstyle 2\ \ \ } \\ {\scriptstyle 1\ \ \ } \\ 87 \\ \times\ 32 \\ \hline 174 \\ +\ 2{,}610 \\ \hline 2{,}784 \end{array}$$

2. Estimate: 2,100

$$\begin{array}{r} 73 \\ \times\ 28 \\ \hline 2{,}044 \end{array}$$

3. Estimate: 2,000

$$\begin{array}{r} 48 \\ \times\ 38 \\ \hline 1{,}824 \end{array}$$

4. Estimate: 3,000

$$\begin{array}{r} 59 \\ \times\ 52 \\ \hline 3{,}068 \end{array}$$

5. Estimate: 3,200

$$\begin{array}{r} 84 \\ \times\ 40 \\ \hline 3{,}360 \end{array}$$

6. Estimate: 6,400

$$\begin{array}{r} 83 \\ \times\ 77 \\ \hline 6{,}391 \end{array}$$

7. Estimate: 1,800

$$\begin{array}{r} 91 \\ \times\ 19 \\ \hline 1{,}729 \end{array}$$

Problem Solving Real World

8. Baseballs come in cartons of 84 baseballs. A team orders 18 cartons of baseballs. How many baseballs does the team order?

1,512 baseballs

9. There are 16 tables in the school lunch room. Each table can seat 22 students. How many students can be seated at lunch at one time?

352 students

Lesson Check (4.NBT.5)

1. The art teacher has 48 boxes of crayons. There are 64 crayons in each box. How many crayons does the teacher have?

3,072 crayons

2. A basketball team scored an average of 52 points in each of 15 games. Based on the average, how many points did the team score in all?

780 points

Spiral Review (4.OA.1, 4.OA.2, 4.OA.3, 4.NBT.5)

3. One Saturday, an orchard sold 83 bags of apples. There are 27 apples in each bag. How many apples were sold?

2,241 apples

4. Hannah has a grid of squares that has 12 rows with 15 squares in each row. She colors 5 rows of 8 squares in the middle of the grid blue. She colors the rest of the squares red. How many squares does Hannah color red?

140 squares

5. Gabriella has 4 times as many erasers a Leona. Leona has 8 erasers. How many erasers does Gabriella have?

32 erasers

6. Phil has 3 times as many rocks as Peter. Together, they have 48 rocks. How many more rocks does Phil have than Peter?

24 rocks

Name _____

Choose a Multiplication Method

COMMON CORE STANDARD—4.NBT.5
Use place value understanding and properties of operations to perform multi-digit arithmetic.

Possible estimates are given.

Estimate. Then choose a method to find the product.

1. Estimate: 1,200

$$\begin{array}{r} 31 \\ \times\ 43 \\ \hline 93 \\ +\ 1{,}240 \\ \hline 1{,}333 \end{array}$$

2. Estimate: 6,300

$$\begin{array}{r} 67 \\ \times\ 85 \\ \hline 5{,}695 \end{array}$$

3. Estimate: 2,800

$$\begin{array}{r} 68 \\ \times\ 38 \\ \hline 2{,}584 \end{array}$$

4. Estimate: 1,700

$$\begin{array}{r} 95 \\ \times\ 17 \\ \hline 1{,}615 \end{array}$$

5. Estimate: 2,500

$$\begin{array}{r} 49 \\ \times\ 54 \\ \hline 2{,}646 \end{array}$$

6. Estimate: 2,700

$$\begin{array}{r} 91 \\ \times\ 26 \\ \hline 2{,}366 \end{array}$$

7. Estimate: 1,600

$$\begin{array}{r} 82 \\ \times\ 19 \\ \hline 1{,}558 \end{array}$$

8. Estimate: 1,500

$$\begin{array}{r} 46 \\ \times\ 27 \\ \hline 1{,}242 \end{array}$$

9. Estimate: 1,200

$$\begin{array}{r} 41 \\ \times\ 33 \\ \hline 1{,}353 \end{array}$$

10. Estimate: 1,300

$$\begin{array}{r} 97 \\ \times\ 13 \\ \hline 1{,}261 \end{array}$$

11. Estimate: 5,600

$$\begin{array}{r} 75 \\ \times\ 69 \\ \hline 5{,}175 \end{array}$$

Problem Solving Real World

12. A movie theatre has 26 rows of seats. There are 18 seats in each row. How many seats are there?

468 seats

13. Each class at Briarwood Elementary collected at least 54 cans of food during the food drive. If there are 29 classes in the school, what was the least number of cans collected?

1,566 cans

Lesson Check (4.NBT.5)

1. A choir needs new robes for each of its 46 singers. Each robe costs $32. What will be the total cost for all 46 robes?

$1,472

2. A wall on the side of a building is made up of 52 rows of bricks with 44 bricks in each row. How many bricks make up the wall?

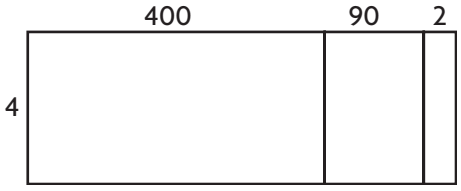
2,288 bricks

Spiral Review (4.NBT.4, 4.NBT.5)

3. Write an expression that shows how to multiply 4×362 using place value and expanded form.

$(4 \times 300) + (4 \times 60) + (4 \times 2)$

4. Use the model below. What is the product 4×492?



1,968

5. What is the sum $13{,}094 + 259{,}728$?

272,822

6. During the 2008–2009 season, there were 801,372 people who attended the home hockey games in Philadelphia. There were 609,907 people who attended the home hockey games in Phoenix. How much greater was the home attendance in Philadelphia than in Phoenix that season?

191,465

Name _____

Problem Solving • Multiply 2-Digit Numbers

COMMON CORE STANDARD—4.OA.3
Use the four operations with whole numbers to solve problems.

Solve each problem. Use a bar model to help.

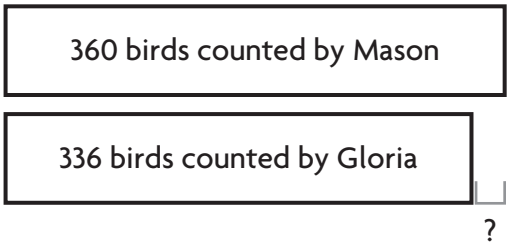
1. Mason counted an average of 18 birds at his bird feeder each day for 20 days. Gloria counted an average of 21 birds at her bird feeder each day for 16 days. How many more birds did Mason count at his feeder than Gloria counted at hers?

Birds counted by Mason: 18 × 20 = 360

Birds counted by Gloria: 21 × 16 = 336

Draw a bar model to compare.

Subtract. 360 − 336 = 24



So, Mason counted 24 more birds.

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2. The 24 students in Ms. Lee's class each collected an average of 18 cans for recycling. The 21 students in Mr. Galvez's class each collected an average of 25 cans for recycling. How many more cans were collected by Mr. Galvez's class than Ms. Lee's class?

93 more cans

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3. At East School, each of the 45 classrooms has an average of 22 students. At West School, each of the 42 classrooms has an average of 23 students. How many more students are at East School than at West School?

24 more students

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4. A zoo gift shop orders 18 boxes of 75 key rings each and 15 boxes of 80 refrigerator magnets each. How many more key rings than refrigerator magnets does the gift shop order?

150 more key rings

Lesson Check (4.OA.3)

1. Ace Manufacturing ordered 17 boxes with 85 ball bearings each. They also ordered 15 boxes with 90 springs each. How many more ball bearings than springs did they order?

95 ball bearings

2. Elton hiked 16 miles each day on a 12-day hiking trip. Lola hiked 14 miles each day on her 16-day hiking trip. In all, how many more miles did Lola hike than Elton hiked?

32 miles

Spiral Review (4.OA.2, 4.NBT.1, 4.NBT.3, 4.NBT.5)

3. An orchard has 24 rows of apple trees. There are 35 apple trees in each row. How many apple trees are in the orchard?

840 apple trees

4. An amusement park reported 354,605 visitors last summer. What is this number rounded to the nearest thousand?

355,000

5. Attendance at the football game was 102,653. What is the value of the digit 6?

600

6. Jill's fish weighs 8 times as much as her parakeet. Together, the pets weigh 63 ounces. How much does the fish weigh?

56 ounces