Name _____

Multiply by Tens

One section of seating at an arena has 30 rows. Each row has 40 seats. How many seats in all are in that section?

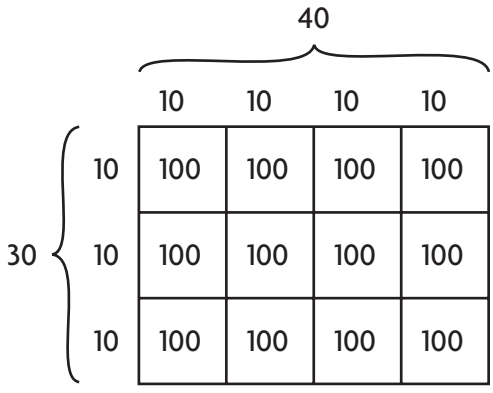
Multiply. 30 × 40

Step 1 Think of each factor as a multiple of 10 and as a repeated addition.

$30 = \underline{3} \times \underline{10}$ or $\underline{10} + \underline{10} + \underline{10}$

$40 = \underline{4} \times \underline{10}$ or $\underline{10} + \underline{10} + \underline{10} + \underline{10}$

Step 2 Draw a diagram to show the multiplication.



Step 3 Each small square in the diagram shows 10 × 10, or 100. Count the squares.

There are 12 squares of 100.

Step 4 Use patterns and mental math to find 12 × 100.

$12 \times 1 = \underline{12}$

$12 \times 10 = \underline{120}$

$12 \times 100 = \underline{1{,}200}$

There are 1,200 seats in that section.

Choose a method. Then find the product.

1. $20 \times 90 =$ _____ **2.** $40 \times 40 =$ _____ **3.** $60 \times 70 =$ _____

4. $50 \times 30 =$ _____ **5.** $80 \times 60 =$ _____ **6.** $90 \times 40 =$ _____

Name _____

Multiplying with Tens

Solve each problem.

1. Juice boxes come in cases of 24. A school ordered 480 juice boxes. How many cases of juice boxes did the school order?

_____

2. John has 630 baseball cards. He sorts the cards into stacks of 30 cards. How many stacks can he make?

_____

3. A bank received a supply of 2,000 quarters. Each roll of quarters has 40 quarters in it. How many rolls of quarters did the bank receive?

_____

4. There are 10 tickets in each strip of carnival tickets. A total of 3,850 tickets were sold in one day. How many strips of tickets were sold that day?

_____

5. 

Explain what strategy you used to solve Problem 3.

_____

_____

_____

_____

Name _____

Estimate Products

You can use rounding and compatible numbers to estimate products.

Use mental math and rounding to estimate the product.

Estimate. $62 \times \$23$

Step 1 Round each factor to the nearest ten. — 62 rounds to **60**. $23 rounds to **$20**.

Step 2 Rewrite the problem using the rounded numbers. — $60 \times \$20$

Step 3 Use mental math. — $6 \times \$2 = \$12$; $6 \times \$20 = \$120$; $60 \times \$20 = \$1,200$

So, $62 \times \$23$ is about **$1,200**.

Use mental math and compatible numbers to estimate the product.

Estimate. 24×78

Step 1 Use compatible numbers. 25×80

Step 2 Use $25 \times 4 = 100$ to help find 25×8. $25 \times 8 = 200$

Step 3 Since 80 has 1 zero, write 1 zero to the right of the product.

24×78 ↓ ↓ $25 \times 80 = 2{,}000$

So, 24×78 is about **2,000**.

Estimate the product. Choose a method.

1. 78×21 _____

2. $59 \times \$46$ _____

3. 81×33 _____

4. 67×21 _____

5. $88 \times \$42$ _____

6. 51×36 _____

7. 73×73 _____

8. $99 \times \$44$ _____

9. 92×19 _____

10. 26×37 _____

11. 89×18 _____

12. 58×59 _____

Name _____

Decode the Message

Use rounding to estimate the greatest product in each exercise. Then write the letter of the correct answer above its place in the letter puzzle below. For example, the letter of the greatest product from Exercise 1 goes above Blank 1. The first one has been done for you.

1.	**A**	42×50	**E**	33×64	**T**	48×56
2.	**A**	12×15	**B**	11×14	**C**	10×13
3.	**J**	91×24	**O**	89×33	**P**	82×31
4.	**K**	78×46	**R**	74×48	**E**	79×55
5.	**A**	45×32	**I**	48×39	**R**	43×34
6.	**I**	25×26	**E**	23×27	**Y**	22×27
7.	**T**	50×48	**W**	56×42	**B**	51×44
8.	**T**	34×62	**R**	32×69	**S**	37×65
9.	**N**	88×72	**P**	67×70	**M**	91×64
10.	**D**	43×53	**H**	42×56	**M**	42×61

What is a great way to evaluate the reasonableness of an answer?

						T			
4.	**8.**	**7.**	**5.**	**10.**	**2.**	**1.**	**6.**	**3.**	**9.**

11. Write Math For Exercise 10, how did you use estimation to decide which was the greatest product?

12. **Stretch Your Thinking** How could you estimate the product 253×93? **Explain.**

Name _____

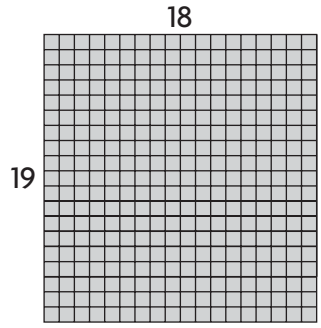
Area Models and Partial Products

You can use area models to multiply 2-digit numbers by 2-digit numbers.

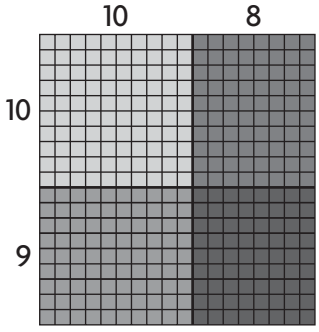
Use the model and partial products to solve.

Draw a rectangle to find 19 × 18.

The rectangle is 19 units long and 18 units wide.



Step 1 Break apart the factors into tens and ones. Divide the area model into four smaller rectangles to show the factors.



Step 2 Find the products for each of the smaller rectangles.

$10 \times 10 = 100$ $10 \times 8 = 80$ $9 \times 10 = 90$ $9 \times 8 = 72$

Step 3 Find the sum of the products. $100 + 80 + 90 + 72 = 342$

So, $19 \times 18 = 342$.

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

1. 21×25

2. 16×14

3. 24×15

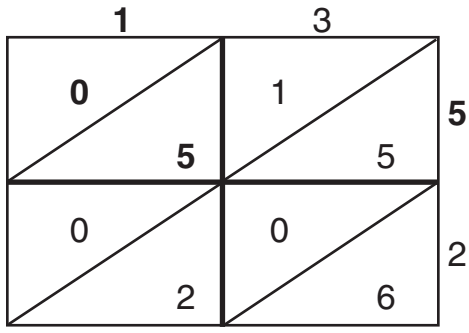
Name _____

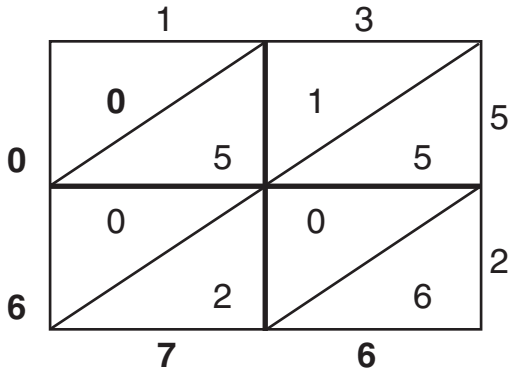
The Lattice Method

Among the earliest methods of multiplication is the lattice method.

Multiply. 13 × 52

- Write one factor along the top of the lattice and the other factor along the right side.
- Multiply each digit of the factors. Record the products inside the lattice so the ones and tens are separated by a diagonal.
- Add the numbers in the grid along the diagonals, starting from the lower right corner. Record each sum at the end of its diagonal just as you do when adding columns.
- Read the digits down the left and across the bottom. This is the product.

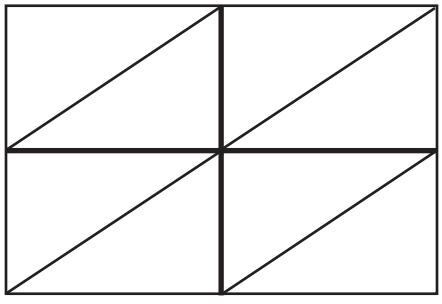




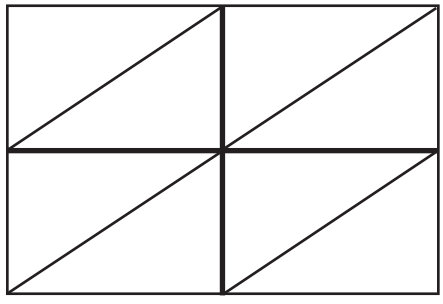
So, 13 × 52 = 676.

Use the lattice method to find the product.

1. 31 × 22 = _____



2. 32 × 56 = _____



3. Write Math How does the lattice method use partial products to multiply?

_____

_____

_____

Name _____

Multiply Using Partial Products

Multiply 25 × 43. Record the product.

Think: I can use partial products to find 25 × 43.

Step 1 Multiply the tens by the tens.
20 × 4 tens = 80 tens, or 800.

Step 2 Multiply the ones by the tens.
20 × 3 ones = 60 ones, or 60.

Step 3 Multiply the tens by the ones.
5 × 4 tens = 20 tens, or 200.

Step 4 Multiply the ones by the ones.
5 × 3 ones = 15 ones, or 15.

Step 5 Add the partial products.
800 + 60 + 200 + 15 = 1,075.

	tens	ones
	4	3
×	2	5
	8	0	0
		6	0
	2	0	0
+		1	5
	1,	0	7	5

So, 25 × 43 = 1,075.

Record the product.

1. 25 × 62 = _____

2. 59 × 38 = _____

3. 85 × 72 = _____

4. 46 × 52 = _____

5. 76 × 23 = _____

6. 38 × 95 = _____

Name _____

Reverse and Record

When Nestor records 2-digit by 2-digit multiplication, he always records the partial products in the following order:

(1) Multiply the tens by the tens.
(2) Multiply the ones by the tens.
(3) Multiply the tens by the ones.
(4) Multiply the ones by the ones.

One day he decides to reverse the order. He starts by multiplying the ones by the ones and works backward to multiplying the tens by the tens. He uses this strategy to multiply some numbers. Will Nestor's strategy give him the correct products?

Use Nestor's new strategy to find the products below. The first problem has been completed for you.

1. 57 × 35 35 250 210 + 1,500 1,995	**2.** 31 × 22 _____	**3.** 44 × 63 _____
4. 75 × 27 _____	**5.** 83 × 19 _____	**6.** 59 × 95 _____

7. Stretch Your Thinking How can Nestor check that his products are correct?

_____

_____

_____

Name _____

Multiply with Regrouping

Estimate. Then use regrouping to find 28 × 43.

Step 1 Round to estimate the product. $30 \times 40 = 1{,}200$

Step 2 Think: 28 = 2 tens 8 ones.
Multiply 43 by 8 ones.
8 × 3 = 24. Record the 4. Write the regrouped 2 above the tens place.
8 × 40 = 320. Add the regrouped tens: 320 + 20 = 340.

$$\begin{array}{r} \overset{2}{\not 4}3 \\ \times\ 28 \\ \hline 344 \end{array} \longleftarrow 8 \times 43$$

Step 3 Multiply 43 by 2 tens.
20 × 3 = 60 and 20 × 40 = 800.
Record 860 below 344.

$$\begin{array}{r} \overset{2}{\not 4}3 \\ \times\ 28 \\ \hline 344 \\ 860 \end{array} \longleftarrow 20 \times 43$$

Step 4 Add the partial products.

$$1{,}204 \longleftarrow 344 + 860$$

So, 28 × 43 = 1,204. 1,204 is close to 1,200. The answer is reasonable.

Estimate. Then find the product.

1. Estimate: _____

$$\begin{array}{r} 36 \\ \times\ 12 \\ \hline \end{array}$$

2. Estimate: _____

$$\begin{array}{r} 43 \\ \times\ 29 \\ \hline \end{array}$$

3. Estimate: _____

$$\begin{array}{r} 51 \\ \times\ 47 \\ \hline \end{array}$$

Name _____

Multiplication Mystery

Write the multiplication problem represented by the partial products. Then write the product.

1. 800 + 280 + 60 + 21

2. 600 + 40 + 180 + 12

3. 2,000 + 280 + 300 + 42

4. 3,600 + 300 + 300 + 25

5. 2,100 + 560 + 0 + 0

6. 7,200 + 270 + 320 + 12

7. Write Math Which exercise did you find the most difficult to solve? **Explain**.

Choose a Multiplication Method

Estimate. Then use regrouping to find 47 × 89.

$$\begin{array}{r} 89 \\ \times\ 47 \\ \hline \end{array}$$

Step 1 Estimate the product. $50 \times 90 = 4{,}500$

Step 2 Multiply the 9 ones by the 7 ones. Regroup the 63 ones as 6 tens 3 ones.

$$\begin{array}{r} {\scriptstyle 6\ \ } \\ 8\mathbf{9} \\ \times\ 4\mathbf{7} \\ \hline 3 \end{array}$$

Step 3 Multiply the 8 tens, or 80, by the 7 ones, or 7. Add the regrouped tens. Regroup the 62 tens as 6 hundreds 2 tens.

$$\begin{array}{r} {\scriptstyle 6\ \ } \\ 8\mathbf{9} \\ \times\ \mathbf{47} \\ \hline 623 \end{array}$$

Step 4 Multiply the 9 ones by the 4 tens, or 40. Regroup the 36 tens as 3 hundreds 6 tens.

$$\begin{array}{r} {\scriptstyle 3\ \ } \\ {\scriptstyle \cancel{6}\ \ } \\ 8\mathbf{9} \\ \times\ \mathbf{47} \\ \hline 623 \\ 60 \end{array}$$

Step 5 Multiply the 8 tens, or 80, by the 4 tens, or 40. Add the regrouped tens. Regroup the 35 hundreds as 3 thousands 5 hundreds.

$$\begin{array}{r} {\scriptstyle 3\ \ } \\ {\scriptstyle \cancel{6}\ \ } \\ \mathbf{8}9 \\ \times\ \mathbf{47} \\ \hline 623 \\ 3{,}560 \end{array}$$

Step 6 Add the partial products.

$$\begin{array}{r} {\scriptstyle 3\ \ } \\ {\scriptstyle \cancel{6}\ \ } \\ 89 \\ \times\ 47 \\ \hline 623 \\ +\ 3{,}560 \\ \hline 4{,}183 \end{array}$$

So, $47 \times 89 = 4{,}183$. Since 4,183 is close to the estimate of 4,500, it is reasonable.

Estimate. Then choose a method to find the product.

1. Estimate: _____

$$\begin{array}{r} 76 \\ \times\ 31 \\ \hline \end{array}$$

2. Estimate: _____

$$\begin{array}{r} 24 \\ \times\ 35 \\ \hline \end{array}$$

3. Estimate: _____

$$\begin{array}{r} 14 \\ \times\ 28 \\ \hline \end{array}$$

4. Estimate: _____

$$\begin{array}{r} 64 \\ \times\ 56 \\ \hline \end{array}$$

Name _____

Product Pairs

Tatum and Elija are doing their homework together. They need to find two problems that have the same product. Help Tatum and Elija finish their homework by finding the product in the first problem. Then find the unknown digit in the second problem that will make the products equal.

1.

$$\begin{array}{r} 34 \\ \times\ 15 \\ \hline \end{array} \qquad \begin{array}{r} 3\ 0 \\ \times 1\ \square \\ \hline \end{array}$$

2.

$$\begin{array}{r} 46 \\ \times\ 25 \\ \hline \end{array} \qquad \begin{array}{r} 5\ 0 \\ \times 2\ \square \\ \hline \end{array}$$

3.

$$\begin{array}{r} 54 \\ \times\ 39 \\ \hline \end{array} \qquad \begin{array}{r} 8\ 1 \\ \times 2\ \square \\ \hline \end{array}$$

4.

$$\begin{array}{r} 75 \\ \times\ 27 \\ \hline \end{array} \qquad \begin{array}{r} 4\ 5 \\ \times 4\ \square \\ \hline \end{array}$$

5.

$$\begin{array}{r} 44 \\ \times\ 32 \\ \hline \end{array} \qquad \begin{array}{r} 8\ 8 \\ \times 1\ \square \\ \hline \end{array}$$

6.

$$\begin{array}{r} 90 \\ \times\ 24 \\ \hline \end{array} \qquad \begin{array}{r} 8\ 0 \\ \times 2\ \square \\ \hline \end{array}$$

7.

$$\begin{array}{r} 64 \\ \times\ 49 \\ \hline \end{array} \qquad \begin{array}{r} 5\ 6 \\ \times 5\ \square \\ \hline \end{array}$$

8.

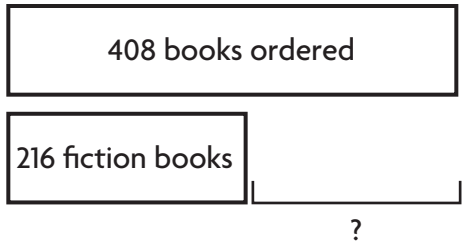
$$\begin{array}{r} 38 \\ \times\ 35 \\ \hline \end{array} \qquad \begin{array}{r} 9\ 5 \\ \times 1\ \square \\ \hline \end{array}$$

9. Stretch Your Thinking Show two problems that each have two 2-digit factors and the same product.

Name _____

Problem Solving • Multiply 2-Digit Numbers

A library ordered 17 cases with 24 books in each case. In 12 of the cases, 18 books were fiction books. The rest of the books were nonfiction. How many nonfiction books did the library order?

Read the Problem	Solve the Problem
What do I need to find? I need to find how many nonfiction books were ordered.	• First, find the total number of books ordered. 17 × 24 = 408 books ordered • Next, find the number of fiction books. 12 × 18 = 216 fiction books • Last, draw a bar model. I need to subtract.  408 − 216 = 192 So, the library ordered 192 nonfiction books.
What information do I need to use? 17 cases of 24 books each were ordered. In 12 cases, 18 books were fiction books.	
How will I use the information? I can find the total number of books ordered and the number of fiction books ordered. Then I can draw a bar model to compare the total number of books to the number of fiction books.	

1. A grocer ordered 32 cases with 28 small cans of fruit in each case. The grocer also ordered 24 cases with 18 large cans of fruit in each case. How many more small cans of fruit did the grocer order?

2. Rebecca rode her bike 16 miles each day for 30 days. Michael rode his bike 25 miles for 28 days. Who rode farther? How much farther?

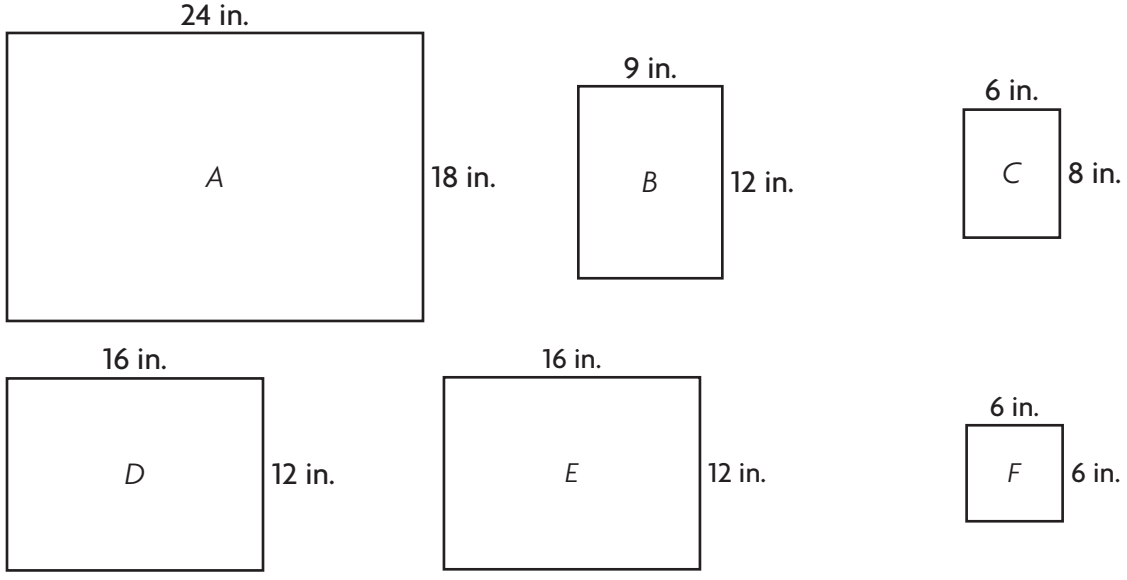
Name _____

Pastry Chef's Problem

A pastry chef is making lemon squares and pumpkin squares for a special event. Here are the facts the chef knows.

- Each square is to measure 1 inch by 1 inch.
- There are to be an equal number of each type of square.
- All squares need to be baked at the same time.
- The chef has only the pans shown below.

1. The chef wants to make the greatest number of squares possible while using only 4 pans. Which pans should the chef choose?



The chef should use pans _____ .

The chef will make _____ of each kind of square.

2. Write Math **Explain** how you solved the problem.

_____

_____

_____

_____

_____

_____