

Name _____

Multiply Using Partial Products

Essential Question How can you use place value and partial products to multiply 2-digit numbers?



Number and Operations in Base Ten—4.NBT.B.5

MATHEMATICAL PRACTICES
MP4, MP7, MP8

Unlock the Problem

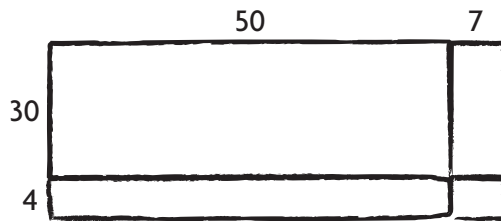
CONNECT You know how to break apart a model to find partial products. How can you use what you know to find and record a product?

Multiply. 34×57 **Estimate.** $30 \times 60 =$ _____

SHADE THE MODEL

THINK AND RECORD

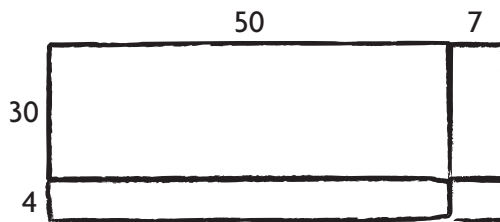
STEP 1



$$\begin{array}{r} 57 \\ \times 34 \\ \hline \end{array}$$

← Multiply the tens by the tens.
 $30 \times 5 \text{ tens} = 150 \text{ tens}$

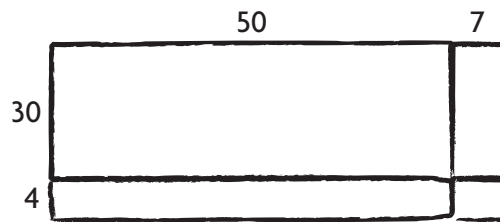
STEP 2



$$\begin{array}{r} 57 \\ \times 34 \\ \hline 1,500 \\ \hline \end{array}$$

← Multiply the ones by the tens.
 $30 \times 7 \text{ ones} = 210 \text{ ones}$

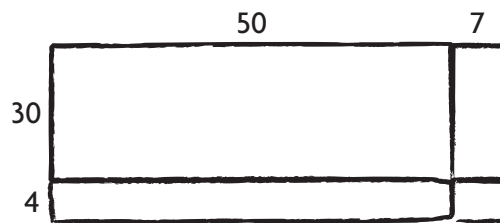
STEP 3



$$\begin{array}{r} 57 \\ \times 34 \\ \hline 1,500 \\ 210 \\ \hline \end{array}$$

← Multiply the tens by the ones.
 $4 \times 5 \text{ tens} = 20 \text{ tens}$

STEP 4



$$\begin{array}{r} 57 \\ \times 34 \\ \hline 1,500 \\ 210 \\ 200 \\ \hline + \end{array}$$

← Multiply the ones by the ones.
 $4 \times 7 \text{ ones} = 28 \text{ ones}$
← Add the partial products.

So, $34 \times 57 = 1,938$. Since 1,938 is close to the estimate of 1,800, it is reasonable.



MATHEMATICAL PRACTICES 8

Use Repeated Reasoning You can write $10 \times 4 \text{ ones} = 40 \text{ ones}$ as $10 \times 4 = 40$. What is another way to write $10 \times 3 \text{ tens} = 30 \text{ tens}$?

Example

The apples from each tree in an orchard can fill 23 bushel baskets. If 1 row of the orchard has 48 trees, how many baskets of apples can be filled?



Multiply. 48×23

Estimate. $50 \times 20 = \underline{\quad}$

THINK

RECORD

STEP 1

Multiply the tens by the tens.

$$\begin{array}{r} 23 \\ \times 48 \\ \hline \end{array}$$

$\leftarrow 40 \times \underline{\quad}$ tens = $\underline{\quad}$ tens

STEP 2

Multiply the ones by the tens.

$$\begin{array}{r} 23 \\ \times 48 \\ \hline 800 \end{array}$$

$\leftarrow 40 \times \underline{\quad}$ ones = $\underline{\quad}$ ones

STEP 3

Multiply the tens by the ones.

$$\begin{array}{r} 23 \\ \times 48 \\ \hline 800 \\ 120 \end{array}$$

$\leftarrow 8 \times \underline{\quad}$ tens = $\underline{\quad}$ tens

STEP 4

Multiply the ones by the ones. Then add the partial products.

$$\begin{array}{r} 23 \\ \times 48 \\ \hline 800 \\ 120 \\ + \quad \quad \quad \\ \hline \end{array}$$

$\leftarrow 8 \times \underline{\quad}$ ones = $\underline{\quad}$ ones

So, 1,104 baskets can be filled.



MATHEMATICAL PRACTICES 1

Evaluate Reasonableness

How do you know your answer is reasonable?

Share and Show



1. Find 24×34 .

| | | |
|----|-----|----|
| | 30 | 4 |
| 20 | 600 | 80 |
| 4 | 120 | 16 |

| | | | | |
|--|--|----------|---|---|
| | | 3 | 4 | |
| | | \times | 2 | 4 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Name _____

Record the product.

$$\begin{array}{r} 2. \quad 12 \\ \times 12 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 31 \\ \times 24 \\ \hline \end{array}$$

$$\begin{array}{r} \checkmark 4. \quad 25 \\ \times 43 \\ \hline \end{array}$$

$$\begin{array}{r} \checkmark 5. \quad 37 \\ \times 26 \\ \hline \end{array}$$

On Your Own

Record the product.

$$\begin{array}{r} 6. \quad 54 \\ \times 15 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 87 \\ \times 16 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 62 \\ \times 56 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad 49 \\ \times 63 \\ \hline \end{array}$$

Math
Talk

MATHEMATICAL PRACTICES 4

Model Mathematics How would you model and record 74×25 ?

Practice: Copy and Solve Record the product.

10. 38×47

11. 46×27

12. 72×53

13. 98×69

14. 53×68

15. 76×84

16. 92×48

17. 37×79

MATHEMATICAL PRACTICE 2

Reason Abstractly Algebra Find the unknown digits. Complete the problem.

$$\begin{array}{r} 18. \quad \square 6 \\ \times \square 4 \\ \hline 1,400 \\ 120 \\ 280 \\ + 24 \\ \hline \end{array}$$

$$\begin{array}{r} 19. \quad \square 2 \\ \times \square 7 \\ \hline 7,200 \\ 180 \\ 560 \\ + 14 \\ \hline \end{array}$$

$$\begin{array}{r} 20. \quad \square 6 \\ \times 5 \square \\ \hline 1,500 \\ 300 \\ 90 \\ + 18 \\ \hline \end{array}$$

$$\begin{array}{r} 21. \quad 3 \square \\ \times \square 8 \\ \hline 600 \\ 80 \\ 240 \\ + 32 \\ \hline \end{array}$$

Problem Solving • Applications



Use the picture graph for 22–24.

22. **MATHEMATICAL PRACTICE 4** **Use Graphs** A fruit-packing warehouse is shipping 15 boxes of grapefruit to a store in Santa Rosa, California. What is the total weight of the shipment?

23. **GO DEEPER** How much less do 13 boxes of tangelos weigh than 18 boxes of tangerines?

24. What is the weight of 12 boxes of oranges?

25. **THINK SMARTER** Each person in the United States eats about 65 fresh apples each year. Based on this estimate, how many apples do 3 families of 4 eat each year?

26. **GO DEEPER** The product 26×93 is greater than 25×93 . How much greater? Explain how you know without multiplying.

Pounds of Citrus Fruit per Box

| Citrus Fruit | Weight per Box (in pounds) |
|--------------|----------------------------|
| Grapefruit | |
| Orange | |
| Tangelo | |
| Tangerine | |

Key: Each = 10 pounds.



WRITE

Math

Show Your Work



27. **THINK SMARTER** Margot wants to use partial products to find 22×17 .

Write the numbers in the boxes to show 22×17 .

$$\left(\square \times \square \right) + \left(\square \times \square \right) + \left(\square \times \square \right) + \left(\square \times \square \right)$$

Name _____

Multiply Using Partial Products



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

Record the product.

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

$$2. \quad \begin{array}{r} 56 \\ \times 32 \\ \hline \end{array}$$

$$3. \quad \begin{array}{r} 87 \\ \times 64 \\ \hline \end{array}$$

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

$$5. \quad \begin{array}{r} 94 \\ \times 12 \\ \hline \end{array}$$

$$6. \quad \begin{array}{r} 51 \\ \times 77 \\ \hline \end{array}$$

$$7. \quad \begin{array}{r} 69 \\ \times 49 \\ \hline \end{array}$$

Problem Solving



- 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)
- 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?

- WRITE** *Math* Explain why it works to break apart a number by place values to multiply.

Lesson Check (4.NBT.B.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?
2. List the partial products of 42×28 .

Spiral Review (4.OA.A.1, 4.OA.A.3, 4.NBT.B.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?
4. Washington Elementary has 232 students. Washington High has 6 times as many students. How many students does Washington High have?

5. List the partial products of 35×7 .
6. Shelby has ten \$5 bills and thirteen \$10 bills. How much money does Shelby have in all?

