Chapter 3

Multiply 2-Digit Numbers

Show What You Know

Check your understanding of important skills.

Name _____

▶ Practice Multiplication Facts Find the product.

1. $8 \times 7 =$ _____
   $7 \times 8 =$ _____

2. $3 \times (2 \times 4) =$ _____
   $(3 \times 2) \times 4 =$ _____

▶ 2-Digit by 1-Digit Multiplication Find the product.

3. $\begin{array}{r} 28 \\ \times\ 3 \\ \hline \end{array}$

4. $\begin{array}{r} 56 \\ \times\ 6 \\ \hline \end{array}$

5. $\begin{array}{r} 71 \\ \times\ 5 \\ \hline \end{array}$

6. $\begin{array}{r} 69 \\ \times\ 8 \\ \hline \end{array}$

7. $\begin{array}{r} 36 \\ \times\ 4 \\ \hline \end{array}$

▶ Multiply by 1-Digit Numbers Find the product.

8. $\begin{array}{r} 72 \\ \times\ 4 \\ \hline \end{array}$

9. $\begin{array}{r} 456 \\ \times\ 5 \\ \hline \end{array}$

10. $\begin{array}{r} 804 \\ \times\ 7 \\ \hline \end{array}$

11. $\begin{array}{r} 1{,}341 \\ \times\ 9 \\ \hline \end{array}$

12. $\begin{array}{r} 65 \\ \times\ 6 \\ \hline \end{array}$

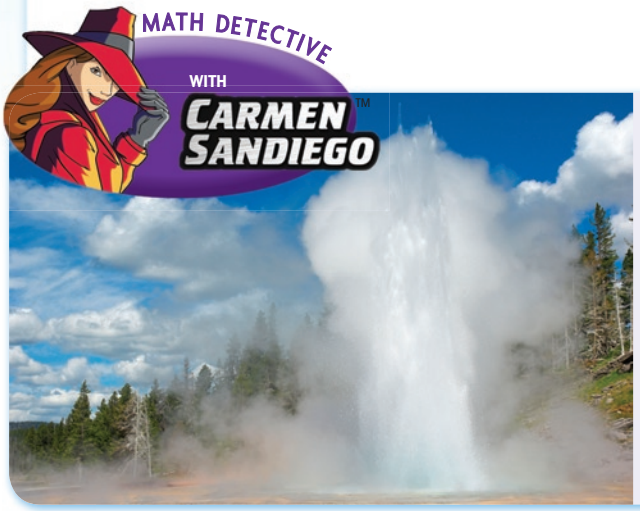
13. $\begin{array}{r} 392 \\ \times\ 8 \\ \hline \end{array}$

14. $\begin{array}{r} 1{,}478 \\ \times\ 3 \\ \hline \end{array}$

15. $\begin{array}{r} \$1{,}627 \\ \times\ 2 \\ \hline \end{array}$

16. $\begin{array}{r} 584 \\ \times\ 7 \\ \hline \end{array}$

17. $\begin{array}{r} 2{,}837 \\ \times\ 4 \\ \hline \end{array}$



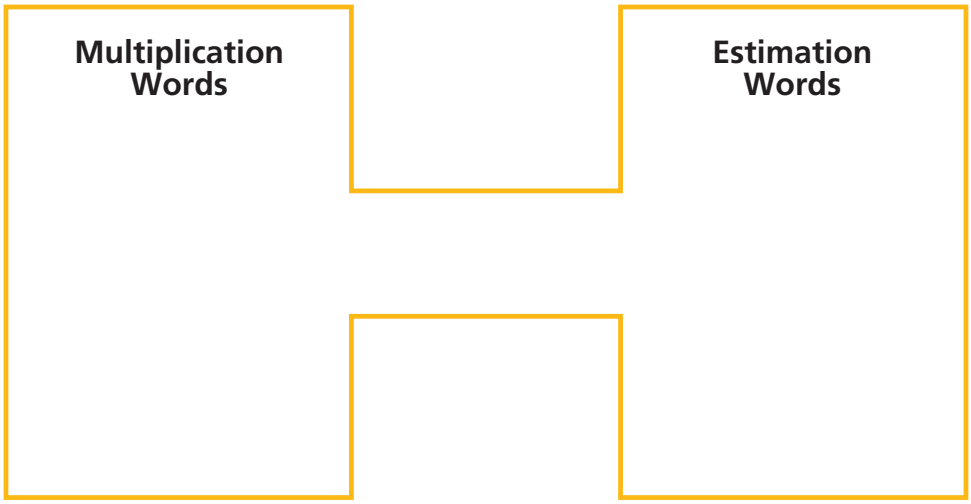
Yellowstone National Park, which is located in Wyoming, Montana, and Idaho, was America's first National Park. The park has over 500 geysers. Grand Geyser erupts about every 8 hours.

Be a Math Detective. Based on this estimate, how many times would you see this geyser erupt if you could watch it for 1 year? There are 24 hours in a day and 365 days in a year.

Vocabulary Builder

Visualize It

Complete the H-diagram using the words with a ✓.



Review Words

Associative Property of Multiplication
Commutative Property of Multiplication
✓ estimate
✓ factor
✓ partial product
✓ place value
✓ product
regroup
✓ round

Preview Words

✓ compatible numbers

Understand Vocabulary

Draw a line to match each word or phrase with its definition.

Word	Definition
1. Commutative Property of Multiplication	• A number that is multiplied by another number to find a product
2. estimate	• To exchange amounts of equal value to rename a number
3. compatible numbers	• To find an answer that is close to the exact amount
4. factor	• Numbers that are easy to compute mentally
5. regroup	• The property that states when the order of two factors is changed, the product is the same.

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Name _____

Multiply by Tens

Essential Question What strategies can you use to multiply by tens?

UNLOCK the Problem REAL WORLD

Animation for a computer-drawn cartoon requires about 20 frames per second. How many frames would need to be drawn for a 30-second cartoon?

- The phrase "20 frames per second" means 20 frames are needed for each second of animation. How does this help you know what operation to use?

_____

_____

One Way Use place value.

Multiply. 20×30

You can think of 30 as 3 tens.

$20 \times 30 = 20 \times$ _____ tens

$=$ _____ tens

$= 600$

Remember

The Associative Property states that you can group factors in different ways and get the same product. Use parentheses to group the factors you multiply first.

Another Way Use the Associative Property.

You can think of 30 as 3×10.

$20 \times 30 = 20 \times (3 \times 10)$

$= (20 \times 3) \times 10$

$=$ _____ $\times$ _____

$=$ _____

So, _____ frames would need to be drawn.

MATHEMATICAL PRACTICES

Math Talk How can you use place value to tell why $60 \times 10 = 600$? **Explain.**

- Compare the number of zeros in each factor to the number of zeros in the product. What do you notice?

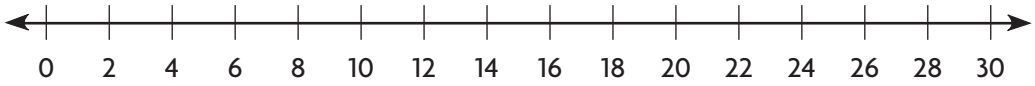
_____

_____

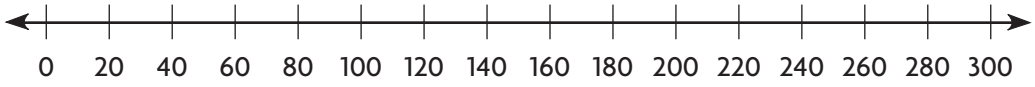
Other Ways

A **Use a number line and a pattern to multiply 15 × 20.**

Draw jumps to show the product.



$15 \times 2 =$ _____



$15 \times 20 =$ _____

B **Use mental math to find 14 × 30.**

Use the halving-and-doubling strategy.

STEP 1 Find half of 14 to make the problem simpler.

Think: To find half of a number, divide by 2.

$14 \div 2 =$ _____

STEP 2 Multiply.

$7 \times 30 =$ _____

STEP 3 Double 210.

Think: To double a number, multiply by 2.

$2 \times 210 =$ _____

So, $14 \times 30 = 420$.

Try This! **Multiply.**

Use mental math to find 12 × 40.

Use place value to find 12 × 40.

Share and Show

1. Find 20×27. Tell which method you chose. **Explain** what happens in each step.

_____

_____

Name _____

Choose a method. Then find the product.

2. 10×12

3. 20×20

4. 40×24

5. 11×60

MATHEMATICAL PRACTICES

Math Talk **Explain** how you can use $30 \times 10 = 300$ to find 30×12.

On Your Own

Choose a method. Then find the product.

6. 70×55

7. 17×30

8. 49×50

9. 10×70

10. 20×29

11. 50×46

12. 30×60

13. 12×90

H.O.T. **Algebra** **Find the unknown digit in the number.**

14. $64 \times 40 = 2{,}56\square$

$\square$ = _____

15. $29 \times 50 = 1{,}\pentagon 50$

$\pentagon$ = _____

16. $3\diamond \times 47 = 1{,}410$

$\diamond$ = _____

Problem Solving REAL WORLD

Use the table for 17–18.

17. How many frames did it take to produce 50 seconds of *Pinocchio*?

Animated Productions

Title	Date Released	Frames per Second
The Enchanted Drawing©	1900	20
Little Nemo©	1911	16
Snow White and the Seven Dwarfs©	1937	24
Pinocchio©	1940	19
The Flintstones™	1960–1966	24

18. Are there fewer frames in 10 seconds of *The Flintstones* or in 14 seconds of *The Enchanted Drawing*? What is the difference in the number of frames?

SHOW YOUR WORK

19. H.O.T. The product of my number and twice my number is 128. What is half my number? **Explain** how you solved the problem.

20. H.O.T. **What's the Error?** Tanya says that the product of a multiple of ten and a multiple of ten will always have only one zero. Is she correct? **Explain**.

21. **Test Prep** Luis jogs 10 miles a week. He bikes 20 miles a week. How far will he have jogged in 26 weeks?

Ⓐ 30 miles Ⓒ 260 miles

Ⓑ 200 miles Ⓓ 520 miles

Name _____

Estimate Products

Essential Question What strategies can you use to estimate products?

UNLOCK the Problem REAL WORLD

The Smith family opens the door of their refrigerator 32 times in one day. There are 31 days in May. About how many times is it opened in May?

- Underline any information you will need.

One Way Use rounding and mental math.

Estimate. 32×31

STEP 1 Round each factor.

32×31

$\downarrow \quad \downarrow$

30×30

STEP 2 Use mental math.

$3 \times 3 = 9$ ← basic fact

$30 \times 30 =$ _____

So, the Smith family opens the refrigerator door about 900 times during the month of May.

MATHEMATICAL PRACTICES

Math Talk Will the actual number of times the refrigerator is opened in a year be greater than or less than 900? **Explain**.

1. On average, a refrigerator door is opened 38 times each day. About how many fewer times in May is the Smith family's refrigerator door opened than the average refrigerator door?

Show your work.

All 24 light bulbs in the Park family's home are CFL light bulbs. Each CFL light bulb uses 28 watts to produce light. About how many watts will the light bulbs use when turned on all at the same time?

Another Way Use mental math and compatible numbers.

Compatible numbers are numbers that are easy to compute mentally.

Estimate. 24×28

STEP 1 Use compatible numbers.

24×28

$\downarrow \quad \downarrow$

25×30 Think: $25 \times 3 = 75$

STEP 2 Use mental math.

$25 \times 3 = 75$

$25 \times 30 =$ _____

So, about 750 watts are used.

Try This! Estimate $26 \times \$79$.

A Round to the nearest ten

$26 \times \$79$

$\downarrow \quad \downarrow$

_____ × _____ = _____

$26 \times \$79$ is about _____.

B Compatible numbers

$26 \times \$79$ Think: How can you use $25 \times 4 = 100$ to help find 25×8?

$\downarrow \quad \downarrow$

$25 \times \$80 =$ _____

$26 \times \$79$ is about _____.

2. **Explain** why $\$2{,}400$ and $\$2{,}000$ are both reasonable estimates.

_____

_____

3. In what situation might you choose to find an estimate rather than an exact answer?

_____

_____

Share and Show MATH BOARD

1. To estimate the product of 62 and 28 by rounding, how would you round the factors? What would the estimated product be?

_____

Name _____

Estimate the product. Choose a method.

2. 96×34

3. $47 \times \$39$

4. 78×72

MATHEMATICAL PRACTICES

Math Talk **Describe** how you know if an estimated product will be greater than or less than the exact answer.

On Your Own

Estimate the product. Choose a method.

5. 41×78

6. 51×73

7. 34×80

8. 84×23

9. $27 \times \$56$

10. 45×22

Practice: Copy and Solve Estimate the product. Choose a method.

11. 61×31

12. 52×68

13. 26×44

14. $57 \times \$69$

15. 55×39

16. 51×81

17. $47 \times \$32$

18. 49×64

H.O.T. Find two possible factors for the estimated product.

19. 2,800

20. 8,100

21. 5,600

22. 2,400

Problem Solving REAL WORLD

SHOW YOUR WORK

23. On average, a refrigerator door is opened 38 times each day. Len has two refrigerators in his house. Based on this average, about how many times in a 3-week period are the refrigerator doors opened?

24. The cost to run a refrigerator is about $57 each year. About how much will it have cost to run by the time it is 15 years old?

25. If Mel opens his refrigerator door 36 times every day, about how many times will it be opened in April? Will the exact answer be more than or less than the estimate? **Explain**.

26. H.O.T. **What's the Question?** The estimated product of two numbers, that are not multiples of ten, is 2,800.

27. **Test Prep** Which is the best estimate for the product 75×23?

Ⓐ 2,600 Ⓒ 1,600

Ⓑ 2,200 Ⓓ 160

Name _____

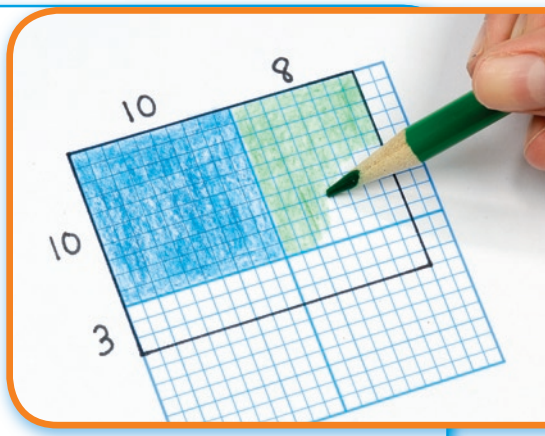
Area Models and Partial Products

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

Investigate

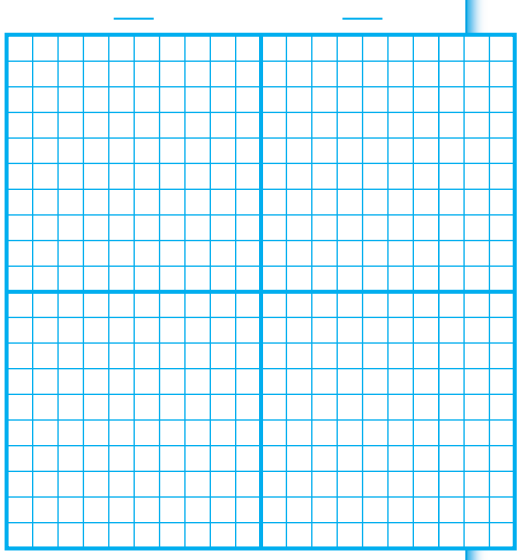
Materials ■ color pencils

How can you use a model to break apart factors and make them easier to multiply?



A. Outline a rectangle on the grid to model 13×18. Break apart the model into smaller rectangles to show factors broken into tens and ones. Label and shade the smaller rectangles. Use the colors below.

B. Find the product of each smaller rectangle. Then, find the sum of the partial products. Record your answers.



_____ = 10×10

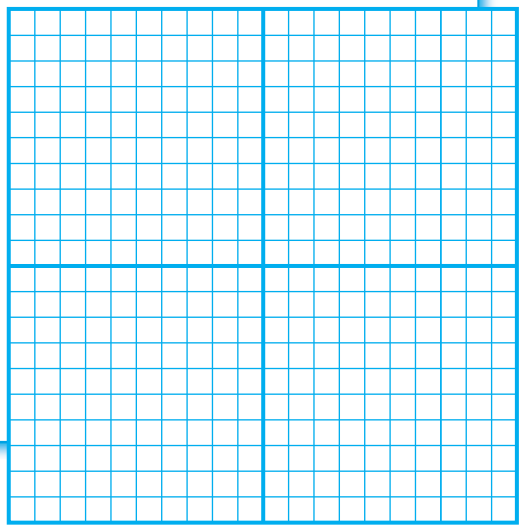
_____ = 10×8

_____ = 3×10

_____ = 3×8

100 + _____ + _____ + _____ = _____

C. Draw the model again. Break apart the whole model to show factors different from those shown the first time. Label and shade the four smaller rectangles and find their products. Record the sum of the partial products to represent the product of the whole model.



_____ + _____ + _____ + _____ = _____

Draw Conclusions

1. **Explain** how you found the total number of squares in the whole model.

2. **Compare** the two models and their products. What can you conclude? **Explain.**

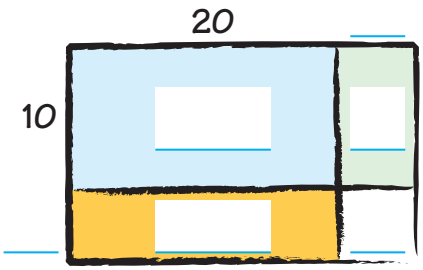
3. **Evaluate** To find the product of 10 and 33, which is the easier computation, $(10 \times 11) + (10 \times 11) + (10 \times 11)$ or $(10 \times 30) + (10 \times 3)$? **Explain.**

Make Connections

You can draw a simple diagram to model and break apart factors to find a product. Find 15×24.

Remember
24 is 2 tens 4 ones.

STEP 1 Draw a model to show 15×24. Break apart the factors into tens and ones to show the partial products.



STEP 2 Write the product for each of the smaller rectangles.

(10 × 2 tens)	(10 × 4 ones)	(5 × 2 tens)	(5 × 4 ones)
(10 × 20)	(10 × 4)	(5 × 20)	(5 × 4)
____	____	____	____

STEP 3 Add to find the product for the whole model.

____ + ____ + ____ + ____ = ____

So, $15 \times 24 = 360$.

The model shows four parts. Each part represents a partial product. The partial products are 200, 40, 100, and 20.

MATHEMATICAL PRACTICES

Math Talk **Explain** how breaking apart the factors into tens and ones makes finding the product easier.

Name _____

Share and Show MATH BOARD

Find the product.

1. $16 \times 19 =$ _____

	10	9
10	100	90
6	60	54

2. $18 \times 26 =$ _____

	20	6
10		
8		

3. $27 \times 39 =$ _____

	30	9
20		
7		

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

4. $14 \times 16 =$ _____

5. $12 \times 11 =$ _____

6. $32 \times 19 =$ _____

7. $23 \times 25 =$ _____

8. Write Math **Explain** how modeling partial products can be used to find the products of greater numbers.

_____

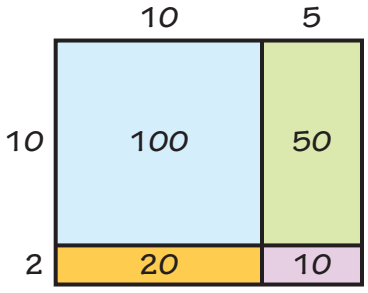
_____

Problem Solving

H.O.T. Sense or Nonsense?

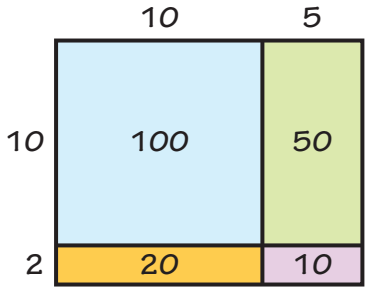
9. Jamal and Kim used different ways to solve 12×15 by using partial products. Whose answer makes sense? Whose answer is nonsense? **Explain** your reasoning.

Jamal's Work



$100 + 20 + 10 = 130$

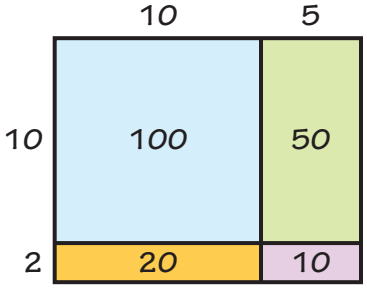
Kim's Work



$120 + 60 = 180$

a. For the answer that is nonsense, write an answer that makes sense.

b. Look at Kim's method. Can you think of another way Kim could use the model to find the product? **Explain**.



FOR MORE PRACTICE:
Standards Practice Book, pp. P55–P56

Name _____

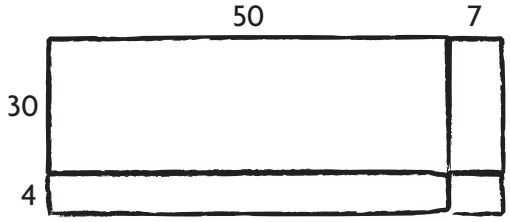
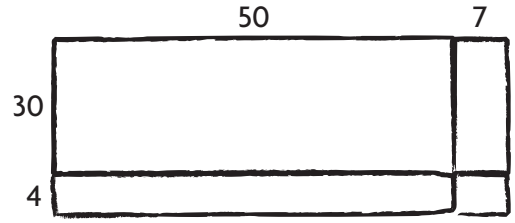
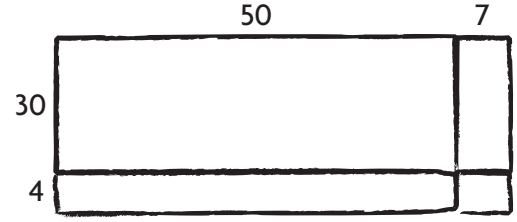
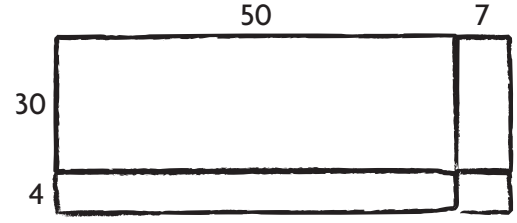
Multiply Using Partial Products

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

UNLOCK the Problem REAL WORLD

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		57 × 34 _____ ← Multiply the tens by the tens. 30 × 5 tens = 150 tens
STEP 2		57 ×34 1,500 _____ ← Multiply the ones by the tens. 30 × 7 ones = 210 ones
STEP 3		57 ×34 1,500 210 _____ ← Multiply the tens by the ones. 4 × 5 tens = 20 tens
STEP 4		57 ×34 1,500 210 200 + _____ ← Multiply the ones by the ones. 4 × 7 ones = 28 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

Math Talk You can write 10 × 4 ones = 40 ones as 10 × 4 = 40. What is another way to write 10 × 3 tens = 30 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 × 20 = _____

THINK	RECORD
STEP 1 Multiply the tens by the tens.	23 × 48 ← 40 × _____ tens = _____ tens
STEP 2 Multiply the ones by the tens.	23 × 48 800 ← 40 × _____ ones = _____ ones
STEP 3 Multiply the tens by the ones.	23 × 48 800 120 ← 8 × _____ tens = _____ tens
STEP 4 Multiply the ones by the ones. Then add the partial products.	23 × 48 800 120 160 + _____ ← 8 × _____ ones = _____ ones

So, 1,104 baskets can be filled.

MATHEMATICAL PRACTICES

Math Talk How do you know your answer is reasonable?

Share and Show

MATH BOARD

1. Find 24 × 34.

	30	4
20	600	80
4	120	16

			3	4	
		×	2	4	

Name _____

Record the product.

2. 12 × 12

3. 31 × 24

4. 25 × 43

5. 37 × 26

MATHEMATICAL PRACTICES

Math Talk **Explain** how to model and record 74 × 25.

On Your Own

Record the product.

6. 54 × 15

7. 87 × 16

8. 62 × 56

9. 49 × 63

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

H.O.T. **Algebra** Find the unknown digits. Complete the problem.

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

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

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

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

Problem Solving REAL WORLD

Use the pictograph for 22–24.

Pounds of Citrus Fruit per Box

Citrus Fruit	Weight per Box (in pounds)
Grapefruit	8 whole, 1 half
Orange	9 whole
Tangelo	9 whole
Tangerine	9 whole, 1 half

Key: Each = 10 pounds.

22. A fruit-packing warehouse is shipping 15 boxes of grapefruit to a store in St. Louis, Missouri. What is the total weight of the shipment?

SHOW YOUR WORK

23. 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. H.O.T. 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. Write Math The product 26×93 is more than 25×93. How much more? **Explain** how you know without multiplying.

27. **Test Prep** Each row of apple trees has 14 trees. There are 16 rows. How many apple trees are there?

Ⓐ 1,340 Ⓒ 184

Ⓑ 224 Ⓓ 124

Name _____

Mid-Chapter Checkpoint

Concepts and Skills

1. Explain how to find 40×50 using mental math.

_____

_____

2. What is the first step in estimating 56×27?

_____

Choose a method. Then find the product.

3. 35×10 _____
4. 19×20 _____
5. 12×80 _____
6. 70×50 _____
7. 58×40 _____
8. 30×40 _____
9. 14×60 _____
10. 20×30 _____
11. 16×90 _____

Estimate the product. Choose a method.

12. 81×38 _____
13. $16 \times \$59$ _____
14. 43×25 _____
15. 76×45 _____
16. $65 \times \$79$ _____
17. 92×38 _____
18. 37×31 _____
19. $26 \times \$59$ _____
20. 54×26 _____
21. 52×87 _____
22. 39×27 _____
23. 63×58 _____

Fill in the bubble completely to show your answer.

24. Ms. Traynor's class is taking a field trip to the zoo. The trip will cost $\$26$ for each student. There are 22 students in her class. Which is the best estimate for the cost of the students' field trip?

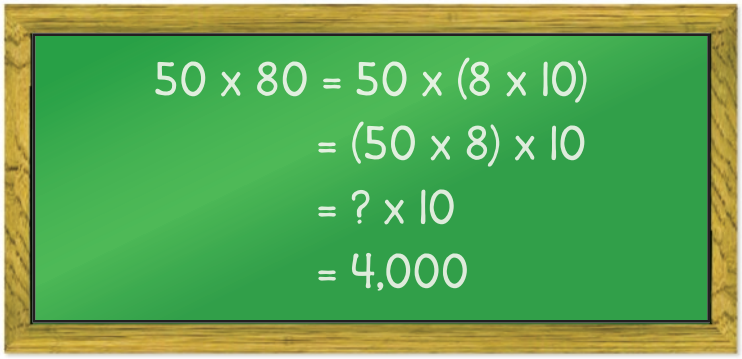
Ⓐ $\$480$

Ⓑ $\$600$

Ⓒ $\$1{,}200$

Ⓓ $\$6{,}000$

25. Tito wrote the following on the board. What is the unknown number?



Ⓐ 40

Ⓑ 58

Ⓒ 400

Ⓓ 4,000

26. Which shows a way to find 15×32?

Ⓐ $(10 \times 3) + (10 \times 2) + (30 \times 1) + (30 \times 50)$

Ⓑ $(10 \times 30) + (10 \times 2) + (50 \times 30) + (50 \times 2)$

Ⓒ $(10 + 30) + (10 + 2) + (30 + 10) + (30 + 5)$

Ⓓ $(10 \times 30) + (10 \times 2) + (5 \times 30) + (5 \times 2)$

27. The cost of a ski-lift ticket is $\$31$. How much will 17 tickets cost?

Ⓐ $\$48$

Ⓑ $\$217$

Ⓒ $\$310$

Ⓓ $\$527$

Name _____

Multiply with Regrouping

Essential Question How can you use regrouping to multiply 2-digit numbers?

UNLOCK the Problem REAL WORLD

By 1914, Henry Ford had streamlined his assembly line to make a Model T Ford car in 93 minutes. How many minutes did it take to make 25 Model Ts?

▲ The first production Model T Ford was assembled on October 1, 1908.

Use place value and regrouping.

Multiply. 93×25 **Estimate.** $90 \times 30 =$ _____

THINK	RECORD
STEP 1 • Think of 93 as 9 tens and 3 ones. • Multiply 25 by 3 ones.	$\begin{array}{r} {\scriptstyle 1} \\ 25 \\ \times\ 93 \\ \hline \end{array}$ ← 3×25
STEP 2 • Multiply 25 by 9 tens.	$\begin{array}{r} {\scriptstyle 4} \\ {\scriptstyle 1} \\ 25 \\ \times\ 93 \\ \hline 75 \end{array}$ ← 90×25
STEP 3 • Add the partial products.	$\begin{array}{r} {\scriptstyle 4} \\ {\scriptstyle 1} \\ 25 \\ \times\ 93 \\ \hline 75 \\ 2{,}250 \\ \hline \end{array}$

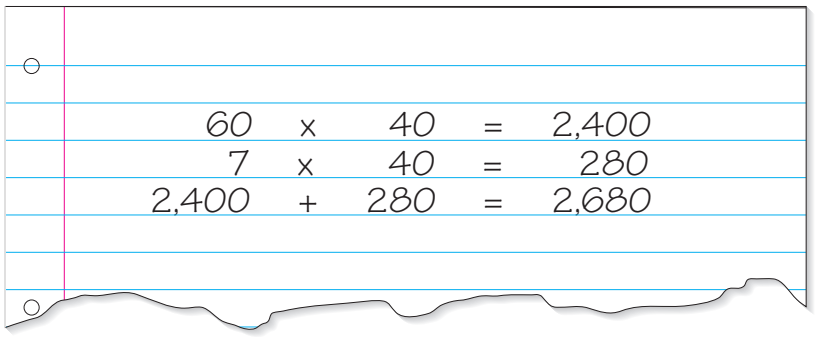
So, 93×25 is 2,325. Since _____ is close to the estimate of _____, the answer is reasonable.

Math Talk MATHEMATICAL PRACTICES

Explain why you will get the same answer whether you multiply 93×25 or 25×93.

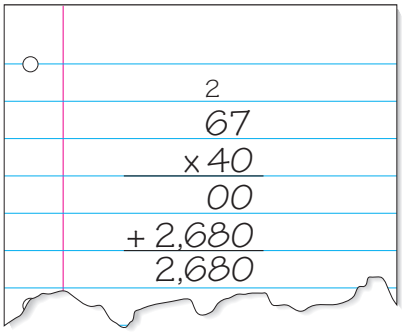
Different Ways to Multiply You can use different ways to multiply and still get the correct answer. Shawn and Patty both solved 67×40 correctly, but they used different ways.

Look at Shawn's paper.



So, Shawn's answer is $67 \times 40 = 2{,}680$.

Look at Patty's paper.



So, Patty also found $67 \times 40 = 2{,}680$.

1. What method did Shawn use to solve the problem?

_____

2. What method did Patty use to solve the problem?

_____

Share and Show

MATH BOARD

1. Look at the problem. Complete the sentences.

Multiply _____ and _____ to get 0.

Multiply _____ and _____ to get 1,620.

Add the partial products.

$0 + 1{,}620 =$ _____

$$\begin{array}{r} {\scriptstyle 4} \\ 27 \\ \times 60 \\ \hline 0 \\ +1{,}620 \\ \hline \end{array}$$

Name _____

Estimate. Then find the product.

2. Estimate: _____

$$\begin{array}{r} 68 \\ \times\ 53 \\ \hline \end{array}$$

3. Estimate: _____

$$\begin{array}{r} 61 \\ \times\ 54 \\ \hline \end{array}$$

4. Estimate: _____

$$\begin{array}{r} 90 \\ \times\ 27 \\ \hline \end{array}$$

MATHEMATICAL PRACTICES

Math Talk **Explain** why you can omit zeros of the first partial product when you multiply 20×34.

On Your Own

Estimate. Then find the product.

5. Estimate: _____

$$\begin{array}{r} 30 \\ \times\ 47 \\ \hline \end{array}$$

6. Estimate: _____

$$\begin{array}{r} 78 \\ \times\ 56 \\ \hline \end{array}$$

7. Estimate: _____

$$\begin{array}{r} 27 \\ \times\ 25 \\ \hline \end{array}$$

Practice: Copy and Solve **Estimate. Then find the product.**

8. 34×65 **9.** $42 \times \$13$ **10.** 60×17 **11.** 62×45 **12.** $57 \times \$98$

13. $92 \times \$54$ **14.** 75×20 **15.** 66×55 **16.** $73 \times \$68$ **17.** 72×40

H.O.T. **Algebra** **Write a rule for the pattern. Use your rule to find the unknown numbers.**

18.

Hours	*h*	5	10	15	20	25
Minutes	*m*	300	600	900		

Rule: _____

19.

Minutes	*m*	12	14	16	18	20
Seconds	*s*	720	840		1,080	

Rule: _____

UNLOCK the Problem REAL WORLD

20. Machine A can label 11 bottles in 1 minute.
Machine B can label 12 bottles in 1 minute.
How many bottles can both machines label in 15 minutes?

Ⓐ 165 Ⓒ 245

Ⓑ 180 Ⓓ 345

a. What do you need to know? _____

_____

b. What numbers will you use? _____

c. Tell why you might use more than one operation to solve the problem.

_____

_____

_____

d. Solve the problem.

e. Fill in the bubble for the correct answer choice above.

21. A toy company makes wooden blocks. A carton holds 85 blocks. How many blocks can 19 cartons hold?

Ⓐ 1,615

Ⓑ 1,575

Ⓒ 1,515

Ⓓ 850

22. A company is packing cartons of candles. Each carton can hold 75 candles. If 50 cartons are packed, how many candles have been packed?

Ⓐ 375

Ⓑ 3,500

Ⓒ 3,550

Ⓓ 3,750

Name ______________________

Choose a Multiplication Method

Essential Question How can you find and record products of two 2-digit numbers?

UNLOCK the Problem REAL WORLD

Did you know using math can help prevent you from getting a sunburn?

The time it takes to burn without sunscreen multiplied by the SPF, or sun protection factor, is the time you can stay in the sun safely with sunscreen.

If today's UV index is 8, Erin will burn in 15 minutes without sunscreen. If Erin puts on lotion with an SPF of 25, how long will she be protected?

- Underline the sentence that tells you how to find the answer.
- Circle the numbers you need to use. What operation will you use?

____

▲ Sunscreen helps to prevent sunburn.

One Way Use partial products to find 15 × 25.

$$\begin{array}{r} 25 \\ \times\ 15 \\ \hline \end{array}$$

☐	← 10 × 2 tens = 20 tens
☐	← 10 × 5 ones = 50 ones
☐	← 5 × 2 tens = 10 tens
+ ☐	← 5 × 5 ones = 25 ones
☐	← Add.

Draw a picture to check your work.

MATHEMATICAL PRACTICES

Math Talk The product is 375. **Explain** what 375 means for Erin.

Another Way Use regrouping to find 15 × 25.

Estimate. 20 × 20 = _____

STEP 1

Think of 15 as 1 ten 5 ones.
Multiply 25 by 5 ones, or 5.

$$\begin{array}{r} {\scriptstyle 2}\,25 \\ \times\ 15 \\ \hline \square \end{array} \leftarrow 5 \times 25$$

STEP 2

Multiply 25 by 1 ten, or 10.

$$\begin{array}{r} {\scriptstyle 2}\,25 \\ \times\ 15 \\ \hline 125 \\ \square \end{array} \leftarrow 10 \times 25$$

STEP 3

Add the partial products.

$$\begin{array}{r} {\scriptstyle 2}\,25 \\ \times\ 15 \\ \hline 125 \\ +\ 250 \\ \hline \square \end{array}$$

Try This! Multiply. 57 × $43

Estimate. 57 × $43

Use partial products.

				$	4	3	
			×		5	7	

Use regrouping.

				$	4	3	
			×		5	7	

1. How do you know your answer is reasonable?

_____

_____

2. Look at the partial products and regrouping methods above.
How are the partial products 2,000 and 150 related to 2,150?

_____

How are the partial products 280 and 21 related to 301?

_____

Name _____

Share and Show

MATH BOARD

1. Find the product.

			5	4	
	×		2	9	

Math Talk MATHEMATICAL PRACTICES

Explain why you begin with the ones place when you use the regrouping method to multiply.

Estimate. Then choose a method to find the product.

2. Estimate: _____

$$\begin{array}{r} 36 \\ \times\ 14 \\ \hline \end{array}$$

3. Estimate: _____

$$\begin{array}{r} 63 \\ \times\ 42 \\ \hline \end{array}$$

4. Estimate: _____

$$\begin{array}{r} 84 \\ \times\ 53 \\ \hline \end{array}$$

5. Estimate: _____

$$\begin{array}{r} 71 \\ \times\ 13 \\ \hline \end{array}$$

On Your Own

Estimate. Then choose a method to find the product.

6. Estimate: _____

$$\begin{array}{r} 34 \\ \times\ 48 \\ \hline \end{array}$$

7. Estimate: _____

$$\begin{array}{r} 19 \\ \times\ 41 \\ \hline \end{array}$$

8. Estimate: _____

$$\begin{array}{r} \$33 \\ \times\ \ 17 \\ \hline \end{array}$$

9. Estimate: _____

$$\begin{array}{r} 28 \\ \times\ 39 \\ \hline \end{array}$$

Practice: Copy and Solve **Estimate. Find the product.**

10. $29 \times \$82$

11. 57×79

12. 80×27

13. $32 \times \$75$

14. 55×48

15. $19 \times \$82$

16. $25 \times \$25$

17. 41×98

H.O.T. **Algebra** **Use mental math to find the number.**

18. $30 \times 14 = 420$, so $30 \times 15 =$ _____.

19. $25 \times 12 = 300$, so $25 \times$ _____ $= 350$.

UNLOCK the Problem REAL WORLD

20. Martin collects stamps. He counted 48 pages in his collector's album. The first 20 pages each have 35 stamps in 5 rows. The rest of the pages each have 54 stamps. How many stamps does Martin have in his album?

a. What do you need to know? _____

_____

b. How will you use multiplication to find the number of stamps? _____

_____

c. Tell why you might use addition and subtraction to help solve the problem.

_____

_____

d. Show the steps to solve the problem.

e. Complete the sentences.

Martin has a total of _____ stamps on the first 20 pages.

There are _____ more pages after the first 20 pages in Martin's album.

There are _____ stamps on the rest of the pages.

There are _____ stamps in the album.

21. Each of the 25 students in a group read for 45 minutes. How many minutes did the group spend reading?

_____

22. **Test Prep** Each row of peach trees has 37 trees. There are 16 rows. How many peach trees are there?

Ⓐ 53

Ⓑ 259

Ⓒ 342

Ⓓ 592

Name _____

Problem Solving • Multiply 2-Digit Numbers

Essential Question How can you use the strategy *draw a diagram* to solve multistep multiplication problems?

UNLOCK the Problem REAL WORLD

During the 2010 Great Backyard Bird Count, an average of 42 bald eagles were counted in each of 20 locations throughout Alaska. In 2009, an average of 32 bald eagles were counted in each of 26 locations throughout Alaska. Based on this data, how many more bald eagles were counted in 2010 than in 2009?

Use the graphic organizer to help you solve the problem.

Read the Problem

What do I need to find?

I need to find _____ bald eagles were counted in 2010 than in 2009.

What information do I need to use?

In 2010, _____ locations counted an average of _____ bald eagles each.

In 2009 _____ locations counted an average of _____ bald eagles each.

How will I use the information?

I can solve simpler problems.

Find the number of bald eagles counted in _____.

Find the number of bald eagles counted in _____.

Then draw a bar model to compare the _____ count to the _____ count.

Solve the Problem

- First, find the total number of bald eagles counted in 2010.

  _____ × _____

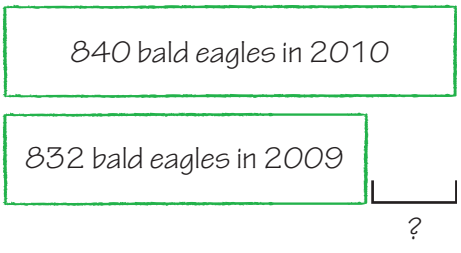
  = _____ bald eagles counted in 2010

- Next, find the total number of bald eagles counted in 2009.

  = _____ × _____

  = _____ bald eagles counted in 2009

- Last, draw a bar model. I need to subtract.



840 − 832 = _____

So, there were _____ more bald eagles counted in 2010 than in 2009.

Try Another Problem

Prescott Valley, Arizona, reported a total of 29 mourning doves in the Great Backyard Bird Count. Mesa, Arizona, reported 20 times as many mourning doves as Prescott Valley. If Chandler reported a total of 760 mourning doves, how many more mourning doves were reported in Chandler than in Mesa?

Mourning dove ▲

Read the Problem	Solve the Problem
What do I need to find?	
What information do I need to use?	760 mourning doves in Chandler 580 mourning doves in Mesa ?
How will I use the information?	

- Is your answer reasonable? **Explain.** _____

_____

_____

MATHEMATICAL PRACTICES

Math Talk **Describe** another way you could solve this problem.

Name _____

Share and Show MATH BOARD

UNLOCK the Problem Tips

- Underline important facts.
- Choose a strategy.
- Use the Problem Solving MathBoard.

1. An average of 74 reports with bird counts were turned in each day in June. An average of 89 were turned in each day in July. How many reports were turned in for both months? (Hint: There are 30 days in June and 31 days in July.)

   First, write the problem for June.

   _____

   Next, write the problem for July.

   _____

   Last, find and add the two products.

   _____ reports were turned in for both months.

SHOW YOUR WORK

2. H.O.T. **What if** an average of 98 reports were turned in each day for the month of June? How many reports were turned in for June? **Describe** how your answer for June would be different.

   _____

   _____

   _____

3. On each of Maggie's bird-watching trips, she has seen at least 24 birds. If she has taken 4 of these trips each year over the past 16 years, at least how many birds has Maggie seen?

   _____

4. Each of 5 bird-watchers reported seeing 15 roseate spoonbills in a day. If they each reported seeing the same number of roseate spoonbills over 14 days, how many would be reported?

   _____

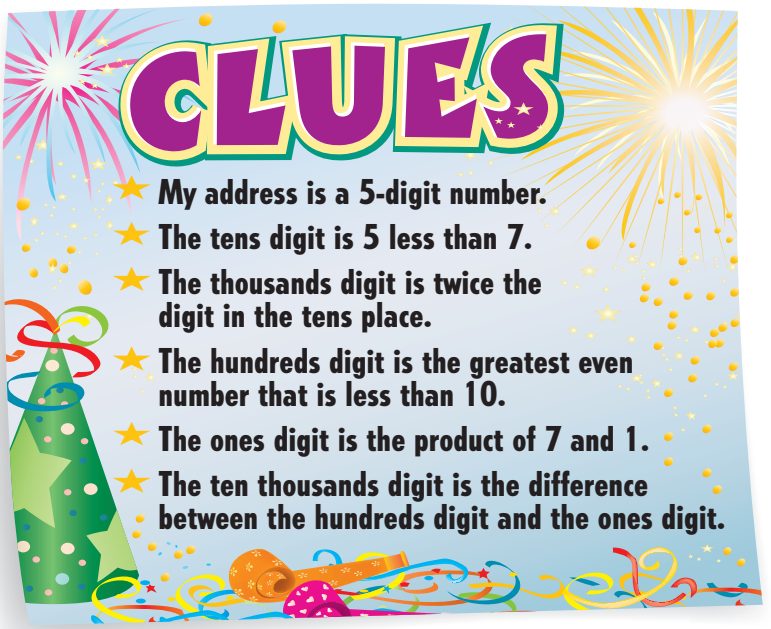
On Your Own

Choose a STRATEGY

- Act It Out
- Draw a Diagram
- Find a Pattern
- Make a Table or List
- Solve a Simpler Problem

5. H.O.T. There are 12 inches in a foot. In September, Mrs. Harris orders 32 feet of ribbon for the Crafts Club. In January, she orders 9 fewer feet. How many inches of ribbon does Mrs. Harris order? **Explain** how you found your answer.

6. Lydia is having a party on Saturday. She decides to write a riddle on her invitations to describe her house number on Cypress Street. Use the clues to find Lydia's address.



SHOW YOUR WORK

7. Nationwide, participants in the 2008 Great Backyard Bird Count reported seeing 778,871 Canada geese and 363,321 American crows. How many more Canada geese were seen than American crows?

8. **Test Prep** Carol is the treasurer of her bird-watching club. The club wants to order shirts for each of the 18 members. If each shirt costs $21, what is the cost for the members' shirts?

Ⓐ $39 Ⓒ $380

Ⓑ $378 Ⓓ $540

FOR MORE PRACTICE:
Standards Practice Book, pp. P63–P64

Name _____

Chapter Review/Test

▶ Concepts and Skills

1. Explain how to find 14×19 by breaking apart the factors into tens and ones and finding the sum of the four partial products.

_____

_____

2. Explain how to find 40×80 using mental math.

_____

Estimate the product. Choose a method.

3. 80×26 _____

4. $19 \times \$67$ _____

5. 43×25 _____

6. 54×83 _____

Estimate. Then find the product.

7. Estimate: _____

$$\begin{array}{r} \$24 \\ \times\ 96 \\ \hline \end{array}$$

8. Estimate: _____

$$\begin{array}{r} 44 \\ \times\ 60 \\ \hline \end{array}$$

9. Estimate: _____

$$\begin{array}{r} 99 \\ \times\ 14 \\ \hline \end{array}$$

10. Estimate: _____

$$\begin{array}{r} 67 \\ \times\ 25 \\ \hline \end{array}$$

11. Estimate: _____

$$\begin{array}{r} 36 \\ \times\ 57 \\ \hline \end{array}$$

12. Estimate: _____

$$\begin{array}{r} \$54 \\ \times\ 29 \\ \hline \end{array}$$

13. Estimate: _____

$$\begin{array}{r} 76 \\ \times\ 38 \\ \hline \end{array}$$

14. Estimate: _____

$$\begin{array}{r} 85 \\ \times\ 46 \\ \hline \end{array}$$

GO Online Assessment Options Chapter Test

Fill in the bubble completely to show your answer.

15. Each month Sid's parents put $75 into his college fund. How much do his parents put in the fund during 2 years?

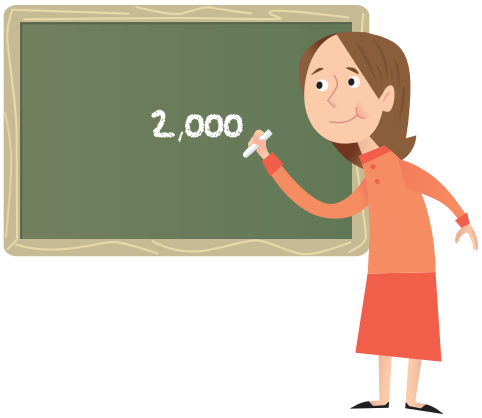
Ⓐ $150

Ⓑ $450

Ⓒ $1,800

Ⓓ $15,300

16. Mrs. Jenks wrote the correct answer to a homework problem on the board below. Which of the following could have been the homework problem?



Ⓐ $5 \times 4{,}000$

Ⓑ 50×400

Ⓒ 50×40

Ⓓ $50 \times 4{,}000$

17. George buys 30 cartons of 18 eggs for the Community Pancake Breakfast. How many eggs does he buy?

Ⓐ 340

Ⓑ 354

Ⓒ 460

Ⓓ 540

Name _____

Fill in the bubble completely to show your answer.

18. Mrs. Sampson donated a carton of pencils for each of the 35 classes at Lancet Elementary School. Each carton holds 64 pencils. Which is the best estimate for the number of pencils Mrs. Sampson donated?

Ⓐ 99

Ⓑ 1,800

Ⓒ 2,400

Ⓓ 2,800

19. The school's athletic department ordered 95 dozen badminton feather shuttles. How many feather shuttles were ordered?

Ⓐ 2,280

Ⓑ 1,140

Ⓒ 1,030

Ⓓ 114

20. Jill sold 35 adult tickets and 48 child tickets for a fund-raising dinner. An adult ticket costs $18 and a child ticket costs $14. How much did Jill collect for the tickets?

Ⓐ $1,354

Ⓑ $1,302

Ⓒ $1,232

Ⓓ $1,102

21. Which shows a way to find 35×74?

Ⓐ $(30 \times 7) + (30 \times 4) + (70 \times 3) + (70 \times 5)$

Ⓑ $(30 \times 70) + (30 \times 4) + (50 \times 70) + (50 \times 4)$

Ⓒ $(30 + 70) + (30 + 4) + (70 + 30) + (70 + 5)$

Ⓓ $(30 \times 70) + (30 \times 4) + (5 \times 70) + (5 \times 4)$

22. New seats are being delivered to the theater. There are 45 new seats for each row in a 15-row section. How many seats are being delivered?

Ⓐ 60

Ⓑ 400

Ⓒ 675

Ⓓ 1,000

Constructed Response

23. Gulfside Gifts has 48 boxes of postcards to sell. There are 24 postcards in each box. If the shop sells 3 boxes of postcards, how many postcards does the shop have left to sell? Explain how you found the answer.

24. Several steps in finding the product of 68 and 34 are shown below. Describe the remaining steps. Use pictures, words, or numbers. Then complete the multiplication.

$$\begin{array}{r} {\scriptstyle 2}\,\not{\scriptstyle 3} \\ 68 \\ \times\ 34 \\ \hline 272 \\ 40 \end{array}$$

Performance Task

25. A city is having a festival in a local park. Alison's Bakery has agreed to donate $1,200 worth of baked goods for the event. The city wants to order 12 loaves of holiday bread, 18 dozen biscuits, 12 dozen bagels, and 14 dozen multigrain rolls.

A Is the cost of the baked goods under the $1,200 donation limit? Use pictures, numbers, or words to explain how you found your answer.

Price List	
Baked Goods	**Group Size**
Holiday Bread	$20
Biscuits	$12/dozen
Bagels	$28/dozen
Multigrain Rolls	$22/dozen

B If yes, what could the city add to the order? If no, what could the city remove from the order?