

Lesson 4

Objective: Interpret and represent patterns when multiplying by 10, 100, and 1,000 in arrays and numerically.

Fluency Practice

Rename the Unit

$$8 \text{ tens} = \underline{80}$$

$$9 \text{ tens} = \underline{90}$$

$$11 \text{ tens} = \underline{110}$$

$$14 \text{ tens} = \underline{140}$$

$$14 \text{ hundreds} = \underline{1,400}$$

$$14 \text{ thousands} = \underline{14,000}$$

$$18 \text{ tens} = \underline{180}$$

$$28 \text{ tens} = \underline{280}$$

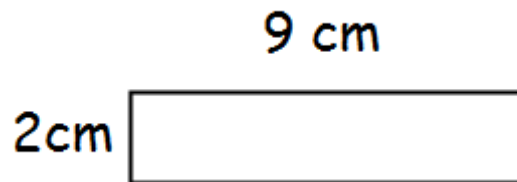
$$28 \text{ hundreds} = \underline{2,800}$$

$$28 \text{ thousands} = \underline{28,000}$$

Group Count by Multiples of 10 and 100

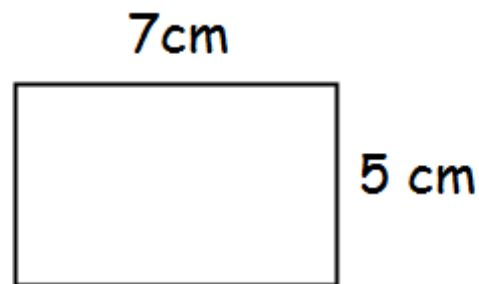
- ♦ Count by threes to 30.
- ♦ Now count by 3 tens. When I raise my hand, stop counting.
- ♦ Count by 4 hundreds
- ♦ Count by 6 hundreds

Find the Area and Perimeter



$$\text{Perimeter} = \underline{22\text{ cm}}$$

$$\text{Area} = \underline{18\text{ sq. cm}} \\ \text{cm}^2$$



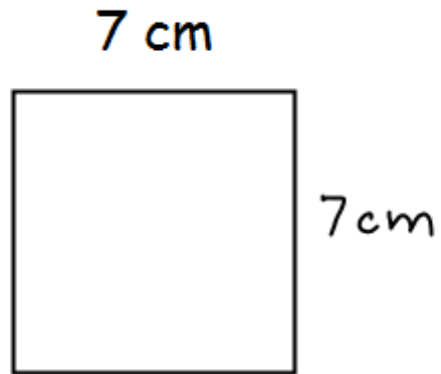
$$\text{Perimeter} = \underline{24\text{ cm}}$$

$$\text{Area} = \underline{35\text{ cm}^2}$$



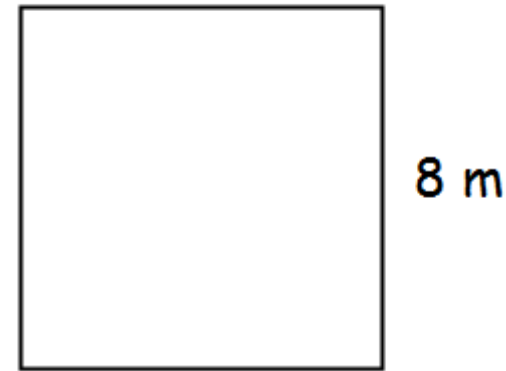
$$\text{Perimeter} = \underline{22\text{ cm}}$$

$$\text{Area} = \underline{24\text{ cm}^2}$$



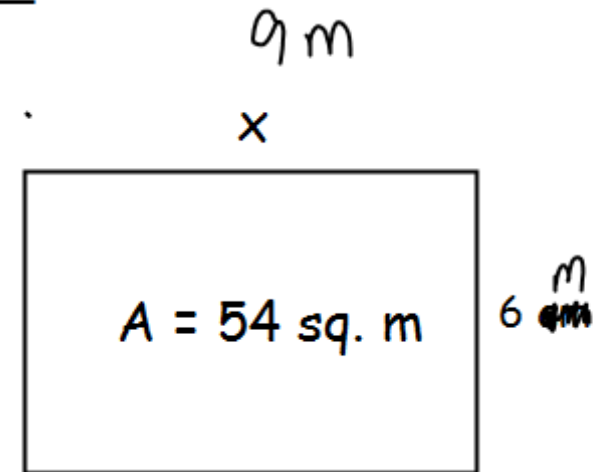
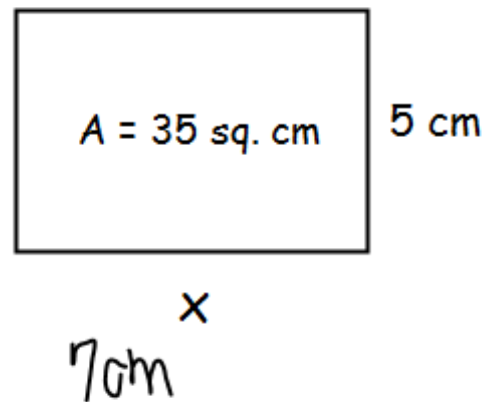
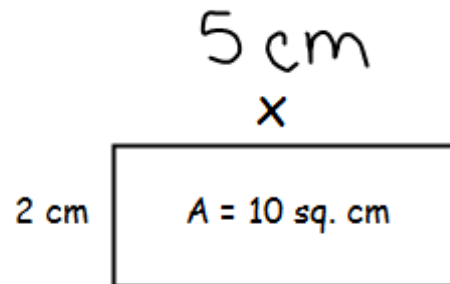
$$\text{Perimeter} = \underline{28 \text{ cm}}$$

$$\text{Area} = \underline{49 \text{ cm}^2}$$



$$\text{Perimeter} = \underline{32 \text{ m}}$$

$$\text{Area} = \underline{64 \text{ m}^2}$$



Application Problem

Samantha received an allowance of \$3 every week. By babysitting, she earned \$30 every week. How much money did Samantha have in four weeks combining her allowance and her babysitting?

w1	w2	w3	w4
\$3	3	3	3

A

w1	w2	w3	w4
\$30	30	30	30

B

$$A = \$3 \times 4 = \$12$$

$$B = \$30 \times 4 = 12 \text{ tens} \\ \$120$$

$$\$120 + 12 = \$132$$

Concept Development

Problem 1: Draw number disks to represent products

when multiplying by a one-digit number.

How many ones do you see?

How many groups of 3 ones do you see?

1

Suppose I wanted to multiply 3 ones by ten instead. How would I do that?

when multiplying by a one-digit number.

			ones
		$\times 10$ 	

$$3 \times 1 = 3$$

$$3 \times 10 = 3 \text{ tens} = 30$$

$$3 \text{ ones} \times 10 = 3 \text{ tens}$$

thousands	hundreds	tens	ones

What if I wanted to multiply that by 10?

$$3 \times 10 = 30 \times 10 =$$

Look at my equation. I started with 3 ones.
What did I multiply 3 ones by to get 3 hundreds?
Turn and talk.

$3 \text{ ones} \times 10 \times 10 = 3 \text{ hundreds}$

thousands	hundreds	tens	ones

$3 \times 100 = 300$

thousands	hundreds	tens	ones

Work with your partner to figure out how to do $3 \times 1,000$.

What is $3 \times 10 \times 10 \times 10$ or $3 \times 1,000$?

$3 \text{ ones} \times 10 \times 10 \times 10 = 3 \text{ thousands}$

thousands	hundreds	tens	ones

$3 \times 1000 = 3000$

thousands	hundreds	tens	ones

How many ones do you see?

How many groups of 4 ones do you see?

Suppose I wanted to multiply 4 ones by ten instead.
How would I do that?

thousands	hundreds	tens	ones
0000		0000	••••

Diagram illustrating the multiplication of 4 ones by 10 to get 4 tens, and then 4 tens by 10 to get 4 hundreds, and finally 4 hundreds by 10 to get 4 thousands. Arrows labeled $\times 10$ show the progression from ones to tens, tens to hundreds, and hundreds to thousands.

What if I wanted to multiply that by 10?

$$4 \times 1 = 4 \text{ ones}$$

$$4 \text{ ones} \times 10 = 4 \text{ tens}$$

$$4 \times 10 = 40$$

$$4 \times 10 \times 10 = 400$$

$$4 \times 100 = 400$$

$$4 \times 10 \times 10 \times 10 = 4,000$$

$$4 \times 1,000 = 4,000$$

Look at my equation. I started with 4 ones.
What did I multiply 4 ones by to get 4 hundreds?
Turn and talk.

Work with your partner to figure out how to do $4 \times 1,000$.

What is $4 \times 10 \times 10 \times 10$ or $4 \times 1,000$?

Problem 2: Draw number disks to represent products when multiplying by a two-digit number.

$$15 \times 10$$



Use number disks to represent 15 and draw 15×10 .

We need to show *times 10* for each of our units.

What is 1 ten $\times 10$? 100

What is 5 ones $\times 10$? 50

15×10 equals? 150

thousands	hundreds	tens	ones
	0	 00000	

Display 22×100 on the board.



With your partner, represent 22×100 using number disks. How can we express your solution strategies as multiplication sentences?

$$2 \text{ tens} \times 100 = 2,000$$

$$2 \text{ ones} \times 100 = 200$$

What is 22×100 ?

$$22 \times 100 = 2,200$$

thousands	hundreds	tens	ones
00	00		

Problem 3: Decomposing multiples of 10 before multiplying.

$$4 \times 20$$

Display 4×20 on the board.

Just like 3×100 could be expressed as $3 \times 10 \times 10$, there are different ways to show 4×20 to help us multiply.

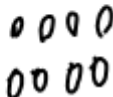

What is another way that I could express 4×20 ?

Discuss with your partner which of these methods would be most helpful to you to solve 4×20 .

$$4 \times 2 \text{ tens}$$

Allow one minute to discuss.

When multiplying with multiples of 10, you can decompose a factor to help you solve. In this example, we expressed 4×20 as $(4 \times 2) \times 10$.

thousands	hundreds	tens	ones
			

$\times 10$

$$4 \times 20 = (4 \times 2) \times 10$$

$$4 \times 20 = 80$$

$$6 \times 400$$

$$(6 \times 4) \times 100$$

$$24 \times 100 = 2,400$$

thousands	hundreds	tens	ones
00	0000	00	0000

Diagram illustrating the relationship between place values:

- An arrow labeled $\times 100$ points from the **tens** column to the **hundreds** column.
- An arrow labeled $\times 100$ points from the **ones** column to the **hundreds** column.

$$4 \times 500$$

4 x 5 hundreds

$$(4 \times 5) \times 100$$

$$20 \times 100 = 2,000$$

$$6 \times 600$$

6 x 6 hundreds

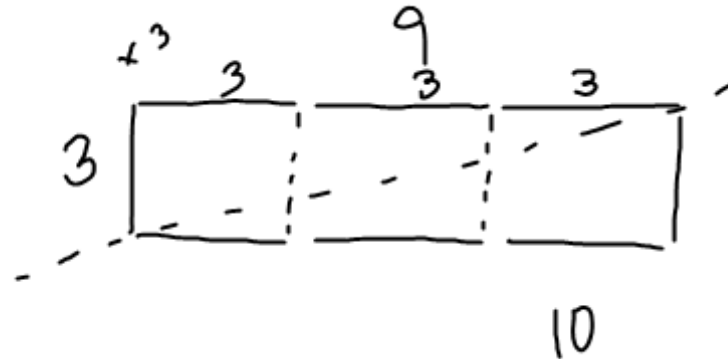
$$(6 \times 6) \times 100 = 3,600$$

thousands	hundreds	tens	ones
		00	
		000	0000 00
00 000	000 000		

Diagram illustrating the multiplication process using place value. A black arrow labeled $\times 100$ points from the tens column to the thousands column. Green arrows show the expansion of the product: from the tens column (00) to the hundreds column (000), and from the ones column (0000 and 00) to the thousands column (00 and 000).

1. A poster is 3 times as long as it is wide. A banner is 5 times as long as it is wide. Both the banner and the poster have perimeters of 24 inches. What are the length and width of the poster and the banner?

Poster -



$$P = 24 \text{ in}$$

$$(L + w) \times 2$$

$$w + L = 12$$

Banner -



$$P = 24 \text{ in}$$

$$135 \times 1,000 = 135,000$$

Hundred Thousand	Ten Thousand	thousands	hundreds	tens	ones
0	000	00000	0	000	00000

Diagram illustrating the multiplication of 135 by 1,000 using place value. The number 135 is represented in the hundreds, tens, and ones columns. Multiplying by 1,000 shifts each digit three places to the left, resulting in 135,000. The diagram shows the original number 135 and the resulting number 135,000 with arrows indicating the shift of three places to the left for each digit.

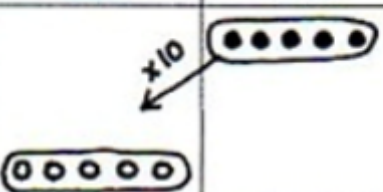
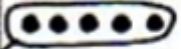
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Date _____

Example:

$$5 \times 10 = \underline{50}$$

$$5 \text{ ones} \times 10 = \underline{5 \text{ tens}}$$


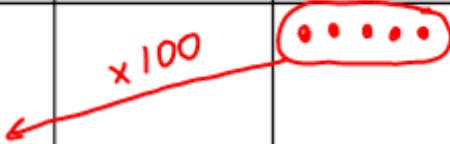

thousands	hundreds	tens	ones
			

Draw number disks and arrows as shown to represent each product.

1. $5 \times 100 = \underline{500}$

$$5 \times 10 \times 10 = \underline{500}$$

$$5 \text{ ones} \times 100 = \underline{5 \text{ hundreds}}$$

thousands	hundreds	tens	ones
			

2. $5 \times 1,000 = \underline{5,000}$

$5 \times 10 \times 10 \times 10 = \underline{5,000}$

$5 \text{ ones} \times 1,000 = \underline{5} \text{ thousands}$

thousands	hundreds	tens	ones
ooooo	$\times 1,000$	

3. Complete the following equations.

a. $6 \times 10 = \underline{60}$

b. $\underline{100} \times 6 = 600$

c. $6,000 = \underline{6} \times 1,000$

d. $10 \times 4 = \underline{40}$

e. $4 \times \underline{100} = 400$

f. $\underline{1,000} \times 4 = 4,000$

g. $1,000 \times 9 = \underline{9,000}$

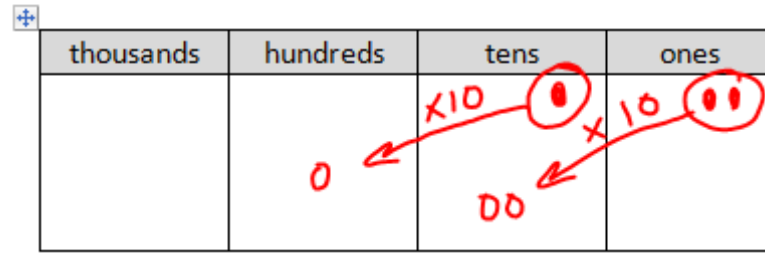
h. $\underline{90} = 10 \times 9$

i. $900 = \underline{9} \times 100$

Draw number disks and arrows as shown to represent each product.

4. $12 \times 10 = \underline{120}$

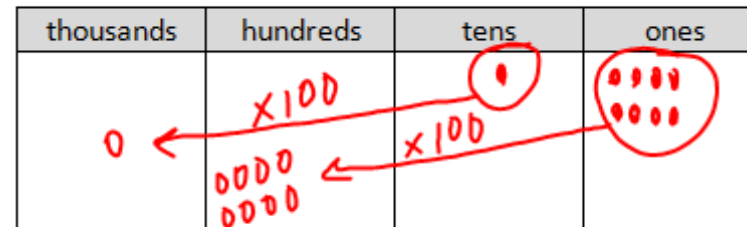
$(1 \text{ ten } 2 \text{ ones}) \times 10 = \underline{1} \text{ hundred}$
 $\underline{2} \text{ tens}$



5. $18 \times 100 = \underline{1,800}$

$18 \times 10 \times 10 = \underline{1,800}$

$(1 \text{ ten } 8 \text{ ones}) \times 100 = \underline{1} \text{ thousand}$
 $\underline{8} \text{ hundred}$



6. $25 \times 1,000 = \underline{25,000}$
 $25 \times 10 \times 10 \times 10 = \underline{25,000}$
 (2 tens 5 ones) $\times 1,000 = \underline{25 \text{ thousands}}$

ten thousands	thousands	hundreds	tens	ones
00	00000		00	11111

Diagram illustrating the multiplication of 25 by 1,000 using place value. The number 25 is represented in the tens and ones columns. The result 25,000 is shown by shifting the digits two places to the left, resulting in 25 in the thousands column and five zeros in the hundreds, tens, and ones columns. Red arrows and labels indicate the shifts: $\times 1,000$ from tens to thousands, and $\times 1,000$ from ones to thousands.

Decompose each multiple of 10, 100, or 1,000 before multiplying.

7. $3 \times 40 = 3 \times 4 \times \underline{10}$
 $= 12 \times \underline{10}$
 $= \underline{120}$

8. $3 \times 200 = 3 \times \underline{2} \times \underline{100}$
 $= \underline{6} \times \underline{100}$
 $= \underline{600}$

9. $4 \times 4,000 = \underline{4} \times \underline{4} \times \underline{1,000}$
 $= \underline{16} \times \underline{1,000}$
 $= \underline{16,000}$

10. $5 \times 4,000 = \underline{5} \times \underline{4} \times \underline{1,000}$
 $= \underline{20} \times \underline{1,000}$
 $= \underline{20,000}$

Name _____

Date _____

1. Complete the following equations.

a. $5 \times 10 = \underline{\hspace{2cm}}$

b. $\underline{\hspace{2cm}} \times 5 = 500$

c. $5,000 = \underline{\hspace{2cm}} \times 1,000$

d. $10 \times 2 = \underline{\hspace{2cm}}$

e. $\underline{\hspace{2cm}} \times 20 = 2,000$

f. $2,000 = 10 \times \underline{\hspace{2cm}}$

g. $100 \times 18 = \underline{\hspace{2cm}}$

h. $\underline{\hspace{2cm}} = 10 \times 32$

i. $4,800 = \underline{\hspace{2cm}} \times 1,000$