Materials

Rulers that measure with inches and centimeters

Pre-Requisite Skills

- Skip-count by a given number.
- Show how to add using a number line.

Number Lines and Hundreds Charts

Lesson 6

VOCABULARY

multiple

skip-counting

hundreds chart

TARGET

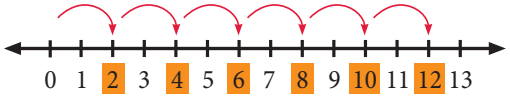
I can use number line models and a hundred chart to solve multiplication problems.

In previous years, you may have skip-counted. **Skip-counting** is when you skip numbers while counting forward and backward. You can skip-count by 2 like this: 2, 4, 6, 8, 10, 12… (and so on). Each number in the list is a multiple of 2. A **multiple** of a number is the product of that number and an integer.

10 is a multiple of 5 because $2 \times 5 = 10$

40 is a multiple of 10 because $4 \times 10 = 40$

Number lines can help you see how to skip-count. The number line below shows skip-counting by 2.



Each shaded square shows a multiple of 2.

Fill in the blanks to skip-count.

By 5 5, 10, 15, 20, 25, 30 ← Multiples of 5

By 3 3, 6, 9, 12, 15, 18 ← Multiples of 3

40 Number Lines and Hundreds Charts A1 Lesson 6

Common Core State Standard

3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

*Multiplication is addressed in **Lessons 5–8** while division is addressed in **Lessons 9–10**.

Learning Progression

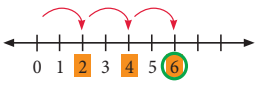
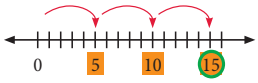
In earlier grades, students have…

- fluently added and subtracted within 100 using strategies based on place value and properties of operations. (2.NBT.5)

In future grades, students will…

- multiply a whole number by a number of up to four digits and multiply two two-digit numbers. (4.NBT.5)

Skip-counting and number lines can both be used to multiply.

	$3 \times 2 =$?	$3 \times 5 =$?
Skip-Counting	2, 4, 6, .. Start counting by 2 and when you get to your third number, you have your answer.	5, 10, 15, .. Start counting by 5 and when you get to your third number, you have your answer.
Number Line	 Start at 0. Make 3 jumps of 2 on the number line. (Hint: $3 \times 2 = 3$ groups of 2) Stop after your third jump.	 Start at 0. Make 3 jumps of 5 on the number line. (Hint: $3 \times 5 = 3$ groups of 5) Stop after your third jump.
	$3 \times 2 = 6$	$3 \times 5 = 15$

Use skip-counting to finish the pattern and answer the problem.

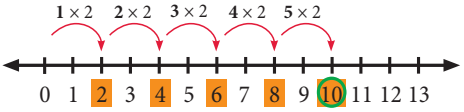
2, 4, 6, 8, 10

5 groups of 2 = 10

$5 \times 2 =$ 10

When using number lines, count your jumps.

$5 \times 2 = 5$ groups of $2 = 5$ jumps by 2



Incorporating the Mathematical Practices

MP 1 This lesson introduces students to new strategies for solving multiplication problems that build conceptual understanding. Have students share whether they solved a problem by drawing groups, writing a repeated addition equation, using an array, using an area model, using a number line or using a hundreds chart. Connect strategies used in **Lessons 4 and 5** to those in this lesson so students have multiple ways to understand and solve multiplication problems.

MP 3 Use the pencil problem at the bottom of page 43 to have students analyze Cai's work and identify the mistake made. In pairs, ask one student to explain the mistake to another and then have the other person use the partial hundreds chart to find 9×3.

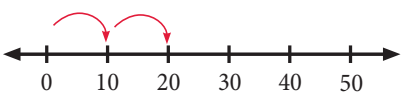
MP 6 This lesson models using a hundreds chart to find 6×5 by skip-counting by 5 six times. Show students they could also skip-count by 6 five times. This is the Commutative Property of Multiplication learned in **Lesson 5**. Would they rather skip-count by 5s or 6s? Both are correct.

Communication Prompt

How can you use a number line or a hundreds chart to find a product?

Number lines do not have to be equally spaced by 1. Sometimes they are equally spaced by 2, 5, 10, 100 or other numbers. This helps when number lines are used with large numbers.

Use a number line to finish the pattern and answer the problem.



10, 20, 30, 40

4 groups of 10 = 40

4 × 10 = 40

A **hundreds chart** is a chart with 10 rows of 10 numbers listed 1 to 100. It can help you multiply. You can easily see patterns on a hundreds chart.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

6 × 5 = ?
Shade multiples of 5. They create a pattern. Look at the sixth number that is shaded.

6 × 5 = 30

If you are skip-counting by 5 or multiplying any number by 5, the shaded numbers help you. Each shaded multiple of 5 is a "group of" 5. If you were to continue shading in multiples of 5, the column that shows numbers with 5 in the ones place would be completely shaded. The column that shows numbers with 0 in the ones place would also be completely shaded.

Teaching Tips

- Practice skip-counting aloud using different values.
- Make a number line outside with sidewalk chalk. Have students skip-count as they jump certain intervals.
- Rulers can be used as number lines. On a 12-inch ruler, the customary measurement side is numbered 1 – 12. The metric measurement side is numbered 1 – 30. Use these as number lines if needed, reminding students each side starts at 0.
- A common mistake that students make with skip-counting on the number line is not starting with the number 0. For example, when skip-counting by 2, if they start with the number 1, their numbers will not represent multiplication by 2.
- The hundreds chart might be hard for students who have trouble spatially, especially when counting by odd numbers as the chart will be shaded with a random looking design. If students have seen patterns with a calendar, where the pattern wraps to the next line, this may be helpful.

Here are the first two rows of a hundreds chart. Shade the multiples of 2 as you skip-count by 2.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Now use the part of the hundreds chart you shaded to find:

$4 \times 2 =$ 8 $5 \times 2 =$ 10 $6 \times 2 =$ 12

$7 \times 2 =$ 14 $8 \times 2 =$ 16 $9 \times 2 =$ 18

Shade the multiples of 4 on the partial hundreds chart as you skip-count by 4.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

Use the partial hundreds chart to find:

$1 \times 4 =$ 4 $3 \times 4 =$ 12 $4 \times 4 =$ 16

$6 \times 4 =$ 24 $7 \times 4 =$ 28 $8 \times 4 =$ 32

Cai used the partial hundreds chart to find $9 \times 3 = 28$. She made a mistake. Explain Cai's mistake and then find 9×3.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

Cai shaded 25 and 28 instead of 24 and 27. She skip-counted by 4 from 21 to 25 instead of 3; $9 \times 3 = 27$.

Name: **Practice**

1. Use skip-counting to finish the pattern and answer the problem.

5, 10, 15, 20, 25

5 groups of 5 = 25

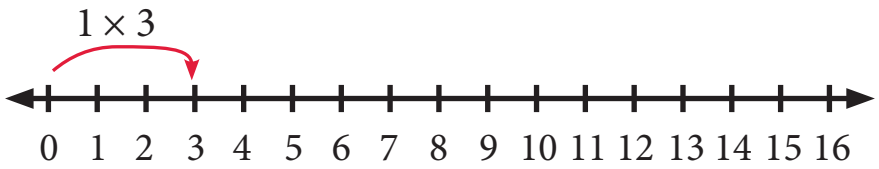
5 × 5 = 25

2. Jerry was given 2 marbles on Monday, 2 marbles on Tuesday and 2 marbles on Wednesday. He saved them each day and wrote the total number of marbles he had in a chart. Fill in the chart with the totals after each day if the pattern continued. How many marbles did he have after 7 days?

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Total Marbles	2	4	6	8	10	12	14

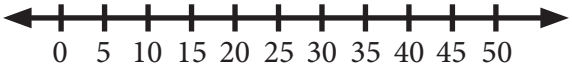
7 × 2 = 14 marbles

3. Mel wanted to use a number line to figure out 4 × 3. She started her work, but did not finish. Help her by drawing her jumps (with arrows) on the number line. Then, solve the problem.



4 × 3 = 12

4. Use the number line to solve 7 × 5.



7 × 5 = 35

5. Shade in multiples of 10 on the hundreds chart using skip-counting by 10.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

6. Use the shaded hundreds chart above to find each product.

$3 \times 10 =$ 30 $6 \times 10 =$ 60

$8 \times 10 =$ 80 $10 \times 10 =$ 100

7. Kimble solved a multiplication problem. His work on a partial hundreds chart is shown below. Which multiplication fact was he solving? Write a sentence to explain how you know your answer is correct.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

$4 \times 5 = 20$ because Kimble shaded the first four multiples of 5. He skip-counted by 5's four times.

8. Use the partial hundreds chart.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

a. Shade the multiples of 2 blue as you skip-count by 2. Shade the multiples of 3 yellow as you skip-count by 3.

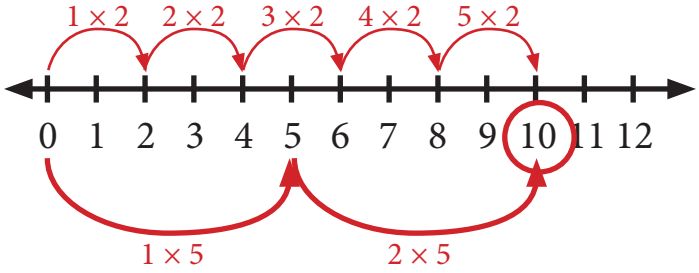
b. Which numbers are shaded both blue and yellow?

6, 12, 18, 24, 30, 36

c. What number do you need to skip-count by in order to only shade the numbers in **part b**?

6

9. Show that $5 \times 2 = 2 \times 5$ using a number line.



10. Brody said he would have to shade the entire hundreds chart if he was showing multiples of 1 until he found 100×1. Do you agree? Use pictures, words and/or numbers to explain your reasoning.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Yes, Brody would be "skip-counting" by 1's so he would need to shade every number from 1 to 100 to show 100×1.