

## The Distributive Property of Multiplication over Addition

The **distributive property of multiplication over addition**,  $a(b + c) = a b + a c$ , says that when a number multiplies an indicated sum (addition expression enclosed in parentheses), the result is the same as when the number multiplies each addend in that sum; for example,  $6 \times (3 + 5) = 6 \times 3 + 6 \times 5$ .

## Game Description and Materials

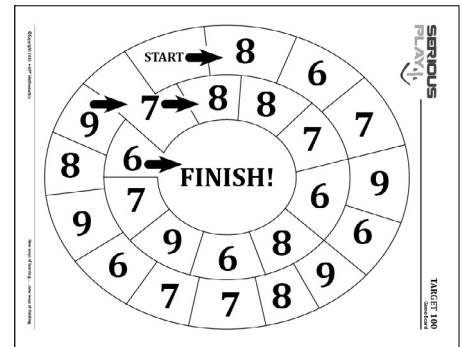
**Target 100** is a game for two or more players that gives students mental math practice using the distributive property as a strategy for multiplying two one-digit numbers. Players decompose one of the numbers into an indicated sum of two addends and use the distributive property to multiply each addend in the sum by the other number. For example,  $7 \times 6 = 7 \times (4 + 2) = 7 \times 4 + 7 \times 2 = 28 + 14 = 42$ .

**Game materials** are one Game Board, one Score Sheet for each player, a six-sided die (not included), a game token for each player (not included), and a marker for each player (not included).

The **object of the game** is to generate a score closest to, but not exceeding, 100.

### Game Board

The Game Board consists of a START space, a FINISH space, and 23 spaces, each of which contains the numbers 6, 7, 8, or 9. These numbers will be the first factor in the game's multiplication expressions.



### Score Sheet

Players use the Score Sheet to record their moves and calculations. The Score Sheet consists of a Work Space and five columns.

- Players use the **Workspace** to list the factor pairs for the products of 6, 7, 8, and 9 so they can easily refer to them during play.
- **Column 1** names the round of play. There may be up to ten rounds.
- In **Column 2**, players record Factor 1 and Factor 2 of the multiplication problem they have decided to solve.
- In **Column 3**, players record their plan for distributing Factor 1. There are spaces for Factor 1 and Factor 2 (decomposed into two addends) and arrows indicating the multiplication of Factor 1 to each of the two addends. The player records the two products in the circles and decides which one to choose.
- In **Column 4**, players record the product they choose.
- In **Column 5**, players record cumulative sums.

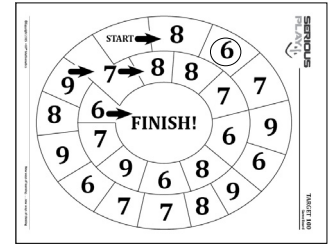
## Getting Ready to Play

Each player gets a Score Sheet. In the Work Space, players record the decomposition of 6, 7, 8, and 9 into addend pairs (except commutative pairs and those involving 0) so that they can refer to them throughout the game. They put their game tokens on the Game Board on START and decide who takes the first turn.

## Let's Play!

**1a.** Player 1 rolls the die and moves that number of spaces on the Game Board.

In the example, the player rolls a 2, moves two places, and lands on 6. 6 is the multiplier.



**1b.** Player 1 uses those numbers (2 and 6) as factors in a multiplication problem: the number on the die (2) becomes Factor 1 (the multiplier); the number on the board (6) becomes Factor 2. The multiplication expression is  $2 \times 6$ . She records the factors in Column 2 on her Score Sheet. Then, she writes Factor 1 (2) in the Column 3, making it ready to distribute to the two addends.

ROUND	FACTOR 1 Die #	FACTOR 2 Board #	DISTRIBUTION PLAN	PRODUCT CHOICE	CUMULA- TIVE SUM
1	x 6	2	$2 \times (\quad + \quad)$		X

**1c.** Player 1 refers to her Work Space and decides which addend pair of 6 ( $1 + 5$ ,  $2 + 4$ , or  $3 + 3$ ) s/he wants to choose, knowing she will be multiplying *one* number in that pair by 2 to get her Round 1 score. In this example, she decides to use 1, so she chooses  $1 + 5$  and records the addend pair in Column 3.

ROUND	FACTOR 1 Die #	FACTOR 2 Board #	DISTRIBUTION PLAN	PRODUCT CHOICE	CUMULA- TIVE SUM
1	x 6	2	$2 \times (\quad + \quad)$		X

**1d.** Player 1 applies the distributive property, recording the two products (2 and 10) in the circles. She chooses one of the products (in this example, she chooses 10) and records the product in Column 4.

ROUND	FACTOR 1 Die #	FACTOR 2 Board #	DISTRIBUTION PLAN	PRODUCT CHOICE	CUMULA- TIVE SUM
1	2	6	$2 \times (\overset{(2)}{1} + \overset{(10)}{5})$	10	X

**2.** Players take turns following the same steps as Player 1.

**3.** As the game progresses, players keep adding their products and recording the cumulative sums in Column 5. Their goal is to get a score close to, but not exceeding, 100. The example shows Player 1's scores for the first three rounds.

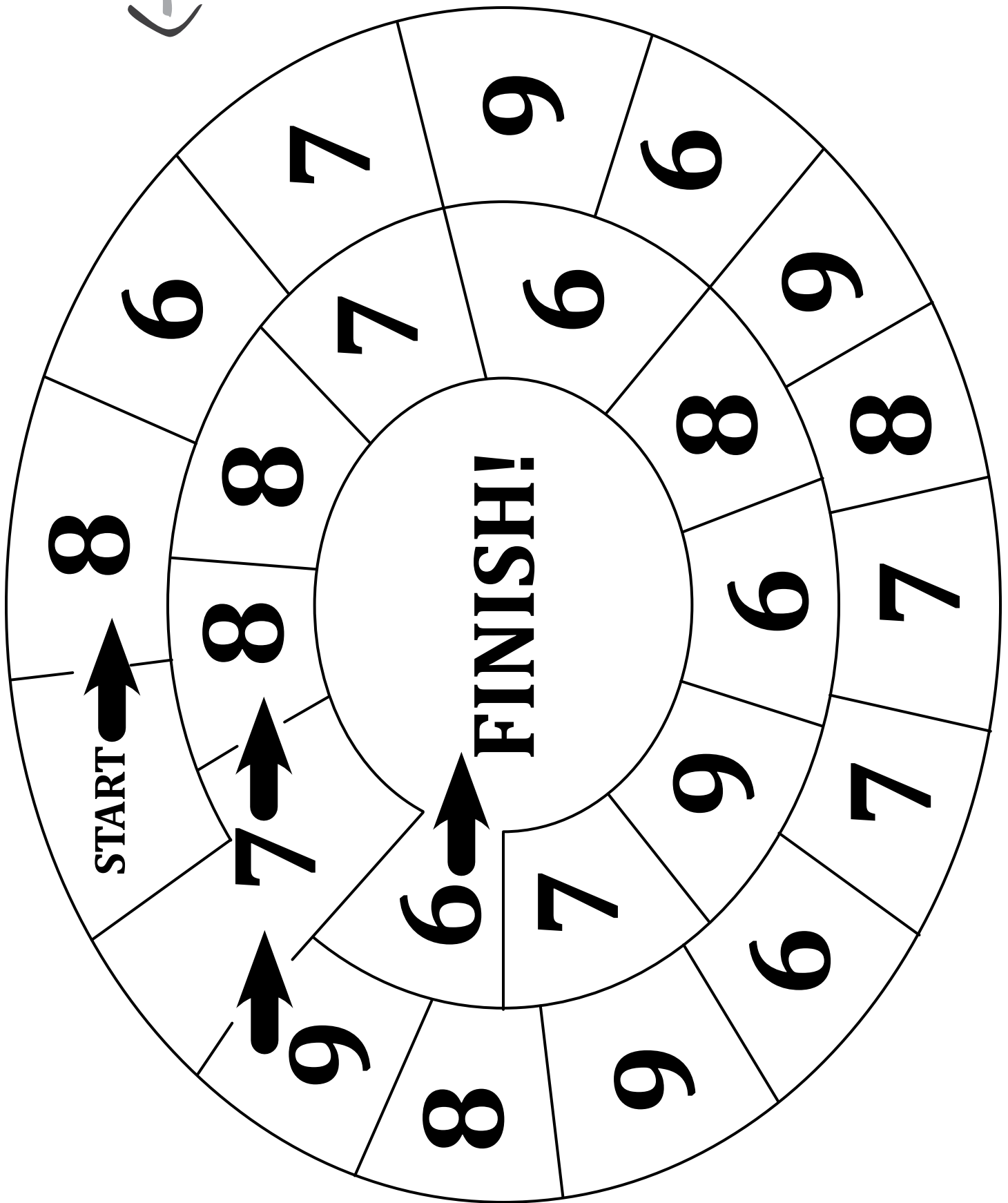
**4.** The game is over when the *first* player reaches FINISH (on the exact roll) or Row 10, whichever occurs first.

ROUND	FACTOR 1 Die #	FACTOR 2 Board #	DISTRIBUTION PLAN	PRODUCT CHOICE	CUMULA- TIVE SUM
1	2	6	$2 \times (\overset{(2)}{1} + \overset{(10)}{5})$	10	X
2	4	9	$4 \times (\overset{(12)}{3} + \overset{(36)}{6})$	12	22
3	3	7	$3 \times (\overset{(9)}{3} + \overset{(21)}{4})$	9	31

## Scoring

The player whose score is closest to 100, but not exceeding 100, is the winner.





Print a Score Sheet for each player. Laminate for repeated use.

Distributive Property of Multiplication over Addition:  $a(b + c) = ab + ac$

### WORK SPACE

6

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

7

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

8

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

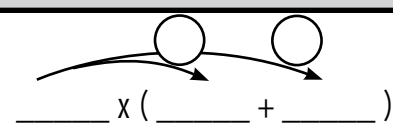
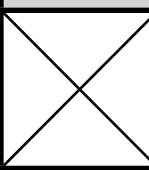
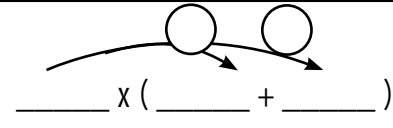
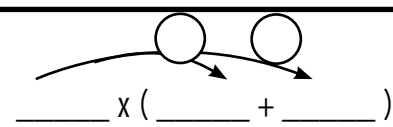


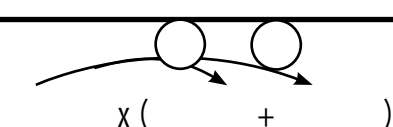


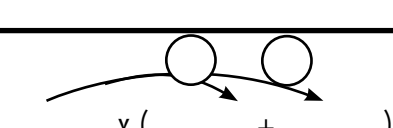
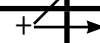

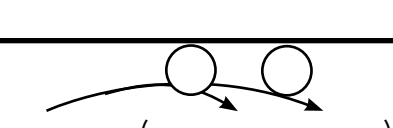
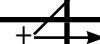

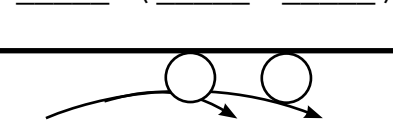
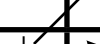

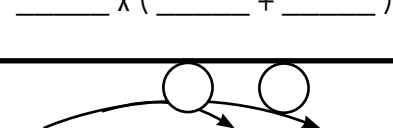
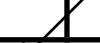

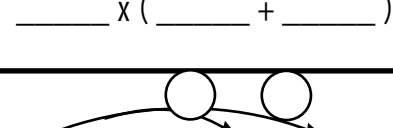
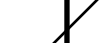

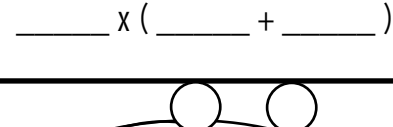


9

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

ROUND	FACTOR 1 x FACTOR 2 Die # x Board #	DISTRIBUTION PLAN	PRODUCT CHOICE	CUMULATIVE SUM
1	____ x ____			
2	____ x ____			
3	____ x ____			
4	____ x ____			
5	____ x ____			
6	____ x ____			
7	____ x ____			
8	____ x ____			
9	____ x ____			
10	____ x ____			

Print a Score Sheet for each player. Laminate for repeated use.

Distributive Property of Multiplication over Addition:  $a(b + c) = ab + ac$

### WORK SPACE

6

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

7

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

8

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

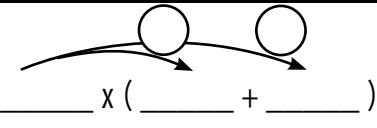
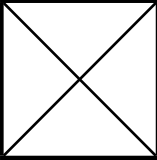
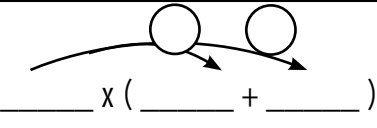
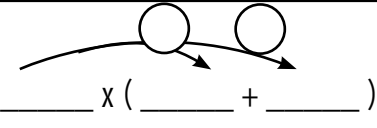


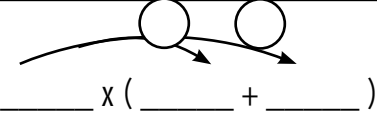


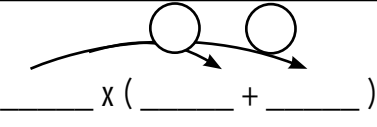


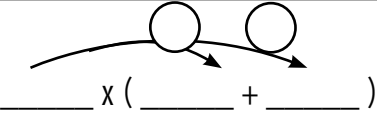


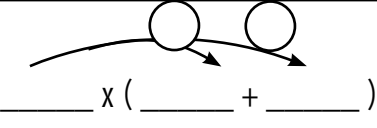


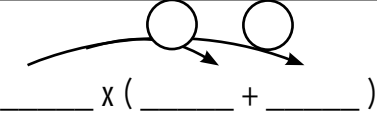


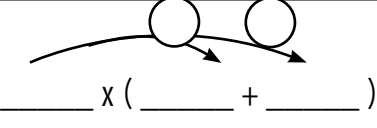


9

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

\_\_\_\_ + \_\_\_\_

ROUND	FACTOR 1 x FACTOR 2 Die # x Board #	DISTRIBUTION PLAN	PRODUCT CHOICE	CUMULATIVE SUM
1	____ x ____			
2	____ x ____			
3	____ x ____			
4	____ x ____			
5	____ x ____			
6	____ x ____			
7	____ x ____			
8	____ x ____			
9	____ x ____			
10	____ x ____	