

**Multiplication Fact Fluency
Built on Understanding**

Presented by
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**Tulare County
Office of Education**

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TCOE Common Core Connect Website: <http://ccss.tcoe.org/>

Raging Rectangles

Building Fluency: products of whole numbers and their relationship to rectangular arrays; relate area to operations of multiplication

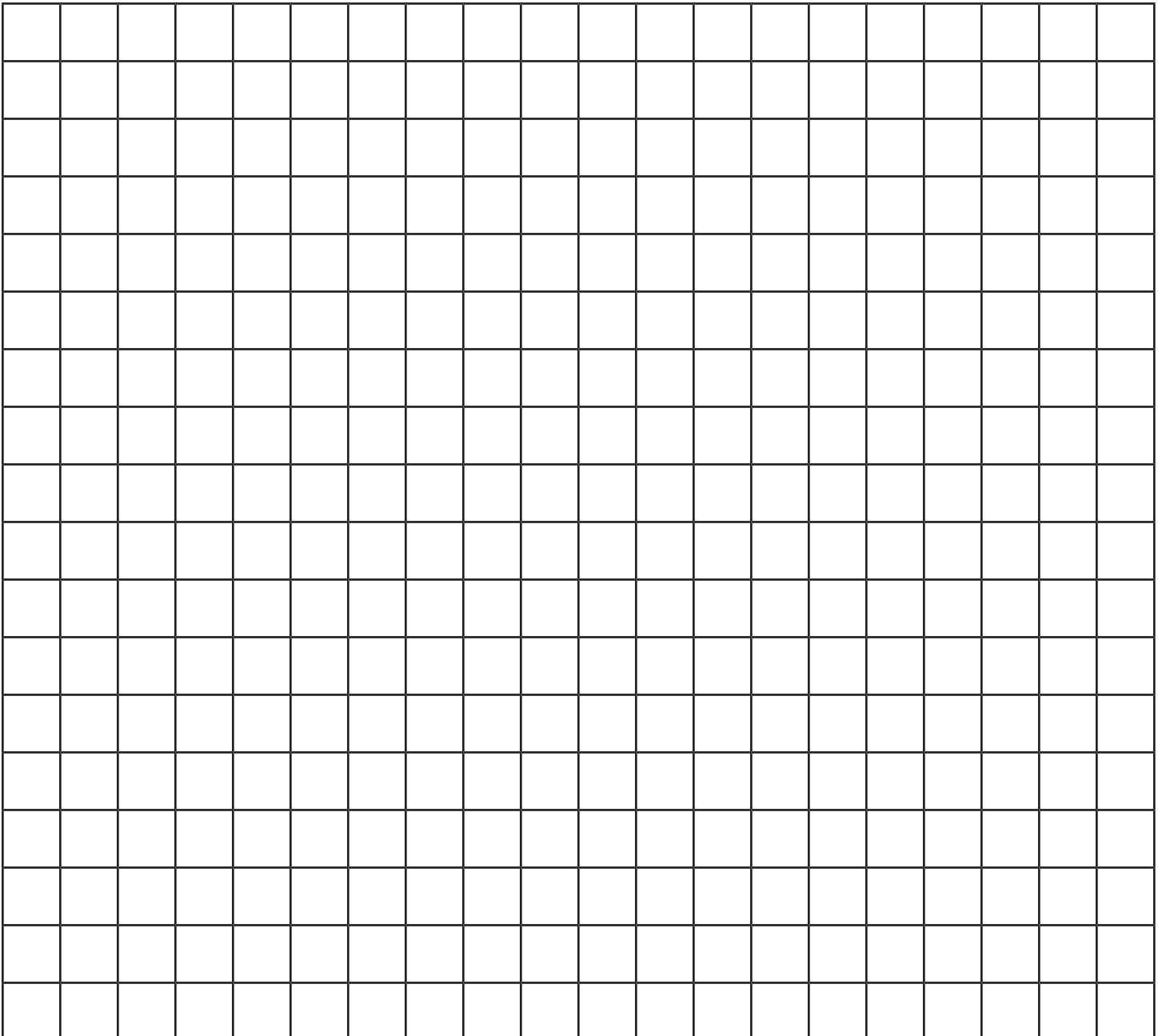
Materials: gameboard, pair of dice, 1 crayon - different color per player

Number of Players: 2

Directions:

1. Each player takes a turn rolling the dice to get two factors.
2. The player outlines and colors a rectangle on the gameboard to match the pair of factors. Example: a roll of 6 and 3 is colored as a 6 x 3 rectangle or a 3 x 6 rectangle.
3. The player writes the equation (area) inside the rectangle.
4. A player loses a turn when the rectangle cannot be drawn on the gameboard.
5. The winner is the player with the most area colored.

Variation/Extension: Students can add the two numbers on the dice for the first factor and then use 2, 5 or 10 as the second factor.



Carolina Clip-It

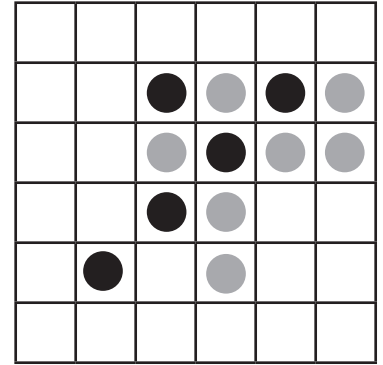
Building Fluency: multiplication facts

Materials: gameboard, 2 paper clips, game markers (approximately 15 of one color per player)

Number of Players: 2

Directions:

1. Player one places paper clips on two numbers at the bottom of the page.
2. Then multiply the two numbers and place a marker on the correct product.
3. Player two can move only one of the paper clips at the bottom of the page.
4. Then multiply the two numbers and place a marker on the correct product.
5. Both paper clips may be placed on the same number.
6. Play continues until one player has 4 markers in a row, horizontally, vertically or diagonally.



Variation/Extension: Students share strategies of how they learned the more difficult multiplication facts.

1	7	15	25	36	54
2	8	16	27	40	56
3	9	18	28	42	63
4	10	20	30	45	64
5	12	21	32	48	72
6	14	24	35	49	81

1 **2** **3** **4** **5** **6** **7** **8** **9**

5.0A Bowling for Numbers

Task

Materials:

- 4 dice per team
- Recording sheet
- Two-minute timer for each turn

Action:

Have students work in groups of 2 - 4. Introduce the game with an example, and then have them play independently. Discussion of "challenging rolls" afterwards can be productive.

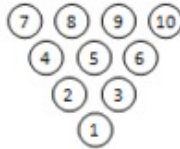


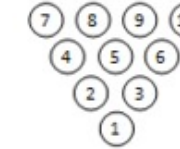
Students roll the 4 dice to generate their seed numbers. They then use those 4 numbers to create as many numbers as they can (1 - 10). Scoring is done as in bowling; numbered "pins" are "knocked down" by creating an expression equal to the number.

The game can be structured in two different ways to assure that students are checking each other's expressions and verifying that they are written as intended:

- a. During a student's turn, have them record just the expressions (not the intended result), and then pass the set to another student (a judge). That judge then computes each expression as written and records which pins were knocked down.
- b. Have the students play in teams. Each team tries to achieve a "strike" (knocking down all of the pins, which is almost always possible). Striving for the strike encourages students to brainstorm strategies for the "difficult" numbers, which leads them to discuss parts of each expression they have created already.

Name: _____

1	2	3	4	5	6	7	8	9	10	Total

<p>Frame 1 equations</p>	
<p>Frame 2 equations</p>	
<p>Frame 3 equations</p>	
<p>Frame 4 equations</p>	



Multiplication Observation Log
3.OA.7, Grades 3 - 6, Quarter: _____

As you observe students learning their multiplication facts during games, practice, and Number Talks. Ask them how they knew a particular fact. Continue to use your log throughout the quarter to track student progress, guide fluency instruction, and work with small groups. If you do not have information on particular facts, use your observation log to guide your use of formative assessments based on particular facts.

Key:

Blank - Phase 1 Counting or counting on	/	One slash - Phase 2 Deriving facts	X	X - Phase 3 Mastery
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Student Name	Foundational Facts					Other Facts					Notes	
	0	1	2	5	10	3	4	6	7	8		9
Ex. Student A	X	X	X	X	X		/	/				Student A is counting by 2's for the 2 facts.
1.												
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												
11.												
12.												

Strategies and Games for Fluency with Multiplication and Division

Number Talk

- If your friend was having trouble remembering this fact, what strategy would you suggest to him or her?
- 8×7

Pepperoni Pizza (Phase 1)

From "Fluency Without Fear: Research Evidence on the Best Ways to Learn Math Facts" by Jo Boaler, 2015, page 13

1. Roll a dice twice and draw pizzas.
 - a. The first roll tells how many pizzas to draw.
 - b. The second roll tells how many pepperonis to put on EACH pizza.
2. Write the number sentence that matches your picture.
3. How many pepperonis in all?

Math Cards (Phase 2)

From "Fluency Without Fear: Research Evidence on the Best Ways to Learn Math Facts" by Jo Boaler, 2015, page 13

1. Lay all of the cards down on a table.
2. Have students take turns picking them. They can pick as many as they can find with the same answer (shown through any representation.)
3. Students explain how they know that the different cards are equivalent.

Memory with Array Cards (Phase 2)

"Three Steps to Mastering Multiplication Facts", Gina Kling and Jennifer Bay-Williams, Teaching Children Mathematics, May 2015, Vol.21, issue 9, <http://www.nctm.org/Publications/Teaching-Children-Mathematics/2015/Vol21/Issue9/Three-Steps-to-Mastering-Multiplication-Facts/>

1. Place 12 array cards (with multiplication expression but not the product) in a 3×4 array. Place the 12 product cards in a separate array next to the first array.
2. Students take turns turning over one array card and one numeral card.
3. If the cards match, the student takes the cards.
4. Continue playing until all of the pairs have been found. The winner is the student with the most pairs.

Multiplication Array Cards

- <https://gfletchy.files.wordpress.com/2015/08/multiplication-array-cards1.pdf>

Top It (Phase 3)

"Three Steps to Mastering Multiplication Facts", Gina Kling and Jennifer Bay-Williams, Teaching Children Mathematics, May 2015, Vol.21, issue 9, <http://www.nctm.org/Publications/Teaching-Children-Mathematics/2015/Vol21/Issue9/Three-Steps-to-Mastering-Multiplication-Facts/>

1. Place students in pairs and give each pair a deck of cards (omitting face cards and using aces as 1).
2. Have each student take half of the deck.
3. Both players turn over two cards and say the product of the two cards.
4. Whoever has the larger product wins the cards.
5. Play continues until time is called. Whoever has the most cards wins.

Differentiation: Use only specific numbers for the deck rather than using all factors 0-10.

Salute! (Phase 3)

Developing and Assessing Fact Fluency, Gina Kling and Jennifer Bay-Williams, NCTM 2015

1. Place students in groups of 3, and give each group a deck of cards (omitting face cards and using aces =1).
2. Two students draw a card without looking at it and place it on their forehead facing outward (so others can see it).
3. The student with no card tells the product. The other 2 players determine the value of their cards.
4. Once both players have done so, they look at their cards and then students rotate roles.

References

- Developing and Assessing Fact Fluency, Amanda Ruch and Gina Kling, and Gina Kling and Jennifer Bay-Williams, NCTM 2015
- Bay-Williams, Jennifer M. and Gina Kling. 2014. Enriching Addition and Subtraction Fact Mastery Through Games. Teaching Children Mathematics, Volume 21, Number 4, 238-247.
- Boaler, Jo. 2015. Fluency Without Fear: Research Evidence on the Best Ways to Learn Math Facts. <https://www.youcubed.org/fluency-without-fear/>
- Kling, Gina and Jennifer M. Bay-Williams. 2014. Assessing Basic Fact Fluency. Teaching Children Mathematics, Volume 20, Number 8, 488-497.
- Kling, Gina and Jennifer M. Bay-Williams. 2015. Three Steps to Mastering Multiplication Facts. Teaching Children Mathematics, Volume 21, Number 9, 548-559.
- Graham Fletcher's blog: <https://gfletchy.com/2015/08/17/not-your-moms-flashcards-conceptual-understanding-of-multiplication/>