The Product Game: Playing the Product Game

Students learn how to play the Product Game. As they play the game, students develop understanding of factors, multiples, and the relationships between them. Winning strategies are discussed.

Materials

- Paper clips (2 per pair of students)
- Colored chips (about 12 each of 2 colors per pair of students), or colored pens, markers, or pencils
- Product Game Rules Activity Sheet (One copy per pair of students)
- Game Board Overhead
- Playing the Product Game Activity Sheet
- Computer with internet connection

Notes to teacher:

In the Product Game, students explore multiples. Before you introduce the game, make sure your students understand what a product is.

We are going to learn to play a new game called the Product Game. What does the word product mean?

In the Factor Game, you start with a number and find its factors. In the Product Game, you start with factors and find their product. The diagram shows the relationship between factors and their product.

When you are satisfied students can give examples of products with understanding, introduce the Product Game.

The best way to explain the rules is to play a game against the class. *Project the Game Board overhead* for students to see.

Distribute a copy of the *Product Game Rules Activity Sheet* to each pair of students.

The Product Game board consists of a list of factors and a grid of products. Two players compete to get four squares in a row—up and down, across, or diagonally.

Explain that the list of numbers at the bottom of the board are factors and that the numbers in the grid are the products that can be made by multiplying any two factors. When you play the

game, use two colors to mark the products; one to mark the class's products and the other to mark your own.

Product Game Rules (board)

1. Player 1 puts a paper clip on a number in the factor list. No square on the product grid is marked with Player 1's color because only one factor has been marked; it takes two factors to make a product.
2. Player 2 puts the other paper clip on any number in the factor list (including the same number marked by Player 1) and then shades or covers the product of the two factors on the product grid.
3. Player 1 moves either one of the paper clips to another number and then shades or covers the new product.
4. Each player, in turn, moves a paper clip and marks a product. If a product is already marked, the player does not get a mark for that turn. The winner is the first player to mark four squares in a row -- up and down, across, or diagonally.

Explore

Have students pair up to play the game. Students can mark products on the product grid with colored markers or pencils, or with colored game chips.

Alternatively, students may use the applet to play the game.

 [Product Game](http://illuminations.nctm.org/Activity.aspx?id=4213)   http://illuminations.nctm.org/Activity.aspx?id=4213   (click on link for applet)

Product Game Rules (applet)

1. Player 1 puts a marker on a number in the factor list. The markers are the green rectangles at the ends of the number line 1-2-3-4-5-6-7-8-9 at the bottom of the applet: a horizontal rectangle at the right and a vertical rectangle at the left. Click and drag a marker to a number in this number line. You can start with either marker. No space on the product grid fills in with Player 1's color because only one factor has been marked; it takes two factors to make a product. (You can fill in names for the players in the applet!)
2. Player 2 puts the other marker on any number in the factor list (including the same number marked by Player 1). The space on the product grid containing the product of the two factors marked is colored in with Player 2's color.
3. Player 1 moves *either one* of the markers to another number and the new product is filled in with Player 1's color.
4. Each player, in turn, moves a marker and the space with the product is marked with the proper color. If a product is already colored, the player does not get a mark for that

turn. The winner is the first player to mark four spaces in a row -- up and down, across, or diagonally.

For either version (board or applet), distribute the *Playing the Product Game Activity Sheet* for students to complete in pairs.

Summarize

Have a class discussion about whether it is better to go first or second. Have students share any strategies they discovered while playing the game. Here are some comments students have made:

- Diaco said it is better to go second, because if you go first, you do not get to make a move on the board.
- Betty said that when you get toward the end of the game, you have to avoid the factors of the numbers your opponent needs.
- Jabe said that if you had to go first, you should choose the number 1 because it gives your opponent fewer choices about where to go to get four in a row.

Go over the follow-up questions with your class. This is especially important, since the word *multiple* is introduced for the first time.

Product Game Rules

NAME _____

Read the following rules before you begin playing The Product Game.

1. Player 1 puts a paper clip on a number in the factor list. No square on the product grid is marked with Player 1's color because only one factor has been marked; it takes two factors to make a product.

2. Player 2 puts the other paper clip on any number in the factor list (including the same number marked by Player 1) and then shades or covers the product of the two factors on the product grid.

3. Player 1 moves *either one* of the paper clips to another number and then shades or covers the new product.

4. Each player, in turn, moves a paper clip and marks a product. If a product is already marked, the player does not get a mark for that turn. The winner is the first player to mark four squares in a row -- up and down, across, or diagonally.

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

1	2	3	4	5	6	7	8	9

The Product Game

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

Factors:

|								
1	2	3	4	5	6	7	8	9

Playing the Product Game

NAME _____

Play the Product Game several times with a partner. Look for interesting patterns and winning strategies. Make notes of your observations.

1. Suppose one of the paper clips is on 5. What products can you make by moving the other paper clip?

   The products you listed are multiples of 5. A **multiple** of a whole number is the product of that number and another whole number.

   If a number is a multiple of 5, then 5 is a factor of that number. These four sentences are all ways of expressing $5 \times 3 = 15$:

   > 5 is a factor of 15.
   > 3 is a factor of 15.
   > 15 is a multiple of 5.
   > 15 is a multiple of 3.
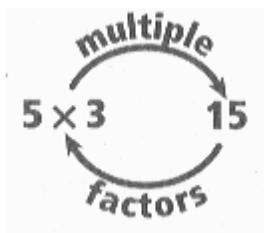
2. List multiples of 5 that are not on the game board.

3. Suppose one of the paper clips is on 3. What products can you make by moving the other paper clip?

4. List five multiples of 3 that are not on the game board.