Focus on Factors

Using factors to multiply whole numbers

2 to 3 players

Purpose

In this game, the students multiply two-digit numbers. 'Two by Two' described on pages 16-19 is the prerequisite for this game.

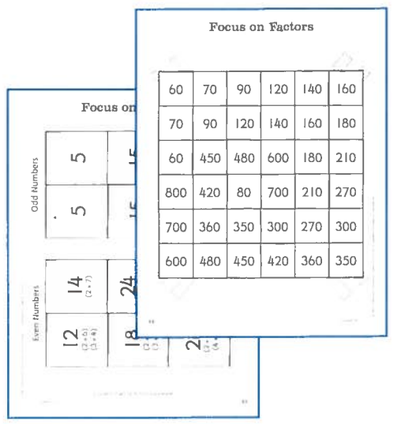
Materials

Each group of players will need

- A 'Focus on Factors' game board (page 22) as shown below.
- One (1) set of 'even' numeral cards. Make two copies of the left-hand grid on page 23 (shown below) onto red paper (or another available color). Cut out and laminate the cards to make one set.
- One (1) set of 'odd' numeral cards. Make two copies of the right-hand grid on page 23 (shown below) onto blue paper (or another available color). Cut out and laminate the cards to make one set.

Each player will need

- Fifteen (15) counters (a different color for each player).



How to Play

The aim is to arrange four counters adjacently in a horizontal, vertical, or diagonal line.

- The cards are shuffled and placed face down in two separate stacks.
- The first player draws one card from each stack and places them side by side. The player uses the factors listed on the cards to help calculate the product of the two numbers. A calculator can be used if an answer is disputed.
- The player claims the product on the game board by covering it with a counter. Although some numbers appear more than once on the game board, only one number can be claimed each turn. If the product is unavailable, the player misses a turn.

Example: Prue draws 18 and 15. She rearranges the factors listed on the cards to calculate the product. (2 x 5) x (9 x 3) = 270.

- The cards are discarded to one side. These are reshuffled and used again as needed.
- The other player(s) has a turn.
- The first player to make a line of four adjacent counters is the winner.

Reading the Research

Research shows that those who are skilled in mental computation use a variety of strategies, involving primarily different forms of distributivity and factoring. They avoid 'carrying', frequently work from left to right, and reduce the demands on their memory by making interim calculations (Sowder, 1992).

Before the Game

Give the students practice choosing and using compatible pairs to multiply. Write four numbers on the board as shown. Challenge the students to rewrite the numbers in a number sentence with brackets to show how they would figure out the product. Make a list of the students' ideas on the board (as shown). Remember there is no one correct strategy. Encourage several students to share a method and to justify its use.

4 8 2 5

(2 x 5) x (8 x 4)

(4 x 5) x (8 x 2)

(8 x 5) x (2 x 4)

Explain the rules of the game using an overhead transparency of the game board. Draw two cards. Invite a volunteer to use a pair of factors listed to help calculate the product. You may want to discuss which pair of factors would make the computation easier.

During the Game

Invite students to verbalize the strategies they use. For example, to calculate 25 x 24, some students may use and rearrange the factors of 24 and 25 to calculate (4 x 5) x (6 x 5). Others may see groups of 100. In doing so, they know 25 x 24 = 600 because 25 x 4 = 100. Alternatively, the students may use the distributive principle to calculate (25 x 20) + (25 x 4).

After the Game

Use the overhead projector to play a game with the class. Use the game to discuss the strategies used by the students and to raise questions such as, *Do you always use the same strategy? Are some strategies easier or more efficient than others? Are any numbers easier to multiply than others? When is it easy to multiply numbers that end in 5?* (When 5 and an even factor can make a multiple of 10.)

Beyond the Game

Change the way in which the game is won. The winner can be the player with the greater number of his or her counters on the game board after a set time or number of rounds.