Two by Two

## Using compatible pairs to multiply

2 players

Purpose

In this game, the students practice choosing and using compatible pairs to find the product of four single-digit numbers. It is an extension of 'Perfect Pairs' described on pages 32-35 in the Red Level (Grades 4–5) book of *Fundamentals*.

Materials

Each pair of players will need

- One (1) set of numeral cards. Make four copies of page 18 (shown below). Cut out and laminate all the cards to make one set.
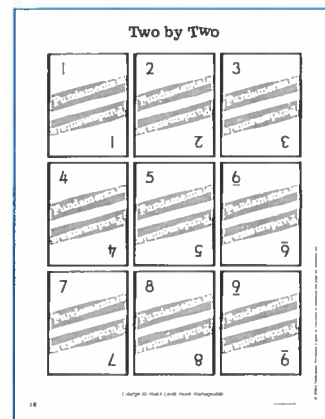
How to Play

The aim is to finish with the greater number of cards.

- The cards are shuffled and dealt face up into four equal stacks.

- The first player calculates the product of the four numbers on the top cards. If he or she is successful and can explain how the product was calculated, the player removes and keeps all four cards. A calculator can be used if an answer is disputed.

  Example: The top four cards show, 6, 8, 2, and 9. Dion calculates that the product is 864. He explains that he multiplied 6 x 9 then doubled the answer. That's 108. 108 x 8 is 864.

- If the player is unsuccessful, the other player has a turn using the same four cards.

- If both players cannot calculate the product of any four cards, one card is removed from the top of one stack and placed underneath.

- Play alternates in this way until all the cards have been removed from the stacks.

- The player with the greater number of cards is the winner.

Reading the Research

Instructional time spent on exploring different mental strategies leads to better understanding of place value, number decomposition, order of operations, and number properties (Sowder, 1992).

Before the Game

Randomly draw four cards from the stack and place them for the students to see (as shown right). Challenge the students to calculate the product and share the mental strategies they use. It is likely that the students will use a range of different strategies. Encourage them to move the cards around to place them in an order that is easier to multiply. For example, with the numbers shown (right), some students may prefer to calculate (2 x 5) x (6 x 9). Explain how 2 and 5 are a nice pair that work together to make the computation easier. Repeat this for other sets of four numbers before explaining the rules of the game.
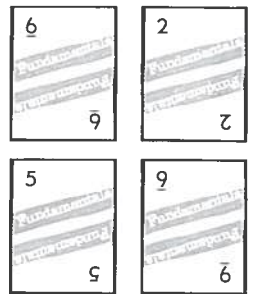
During the Game

Make sure the players share their strategies, particularly for the second stage of the calculation. For example, here are some possible strategies for the four numbers shown above.

Donna: 2 times 5 is 10 and 6 times 9 is 54, so the answer is 10 times 54 which is 540.

Dylan: 2 times 5 times 6 is 60. 6 times 9 is 54 so 60 times 9 must be 540.

Diana: 6 times 5 is 30. 30 times 2 is 60 and 60 times 9 is 540.

After the Game

Lead a discussion about the strategies they used. Did they tend to use the same strategy as their opponent? Did the students use the same strategy for each set of four numbers? What strategy was used most often? What numbers were best suited to making use of compatible pairs? Have the students name any sets of numbers for which neither player could find an easy way to calculate the product mentally. Discuss different ways that they could have figured out the answer.
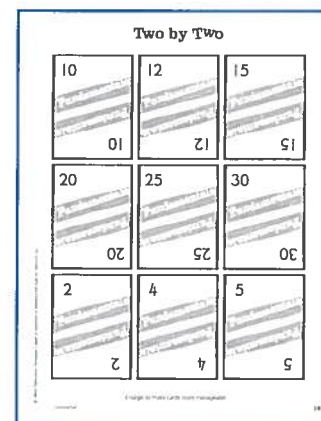
Beyond the Game

- Extend the game by adding another set of cards. Make two copies of page 19 (illustrated). Cut out and laminate all the cards to make a second set. The rules are the same.

- Add two or three copies of a card showing zero (0). Do the students immediately realize that a zero card will give a zero product?