

Choose and Use

Using multiple operations

2 players

Purpose

In this game, students choose from the four operations to try to achieve a target number. The game focuses on the order of operations and the use of brackets.

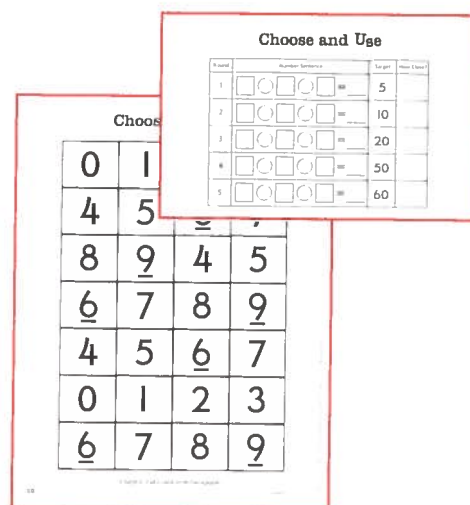
Materials

Each pair of players will need

- One (1) set of numeral cards. Copy page 10 as shown below. Cut out and laminate the cards to make one set.

Each player will need

- A 'Choose and Use' game board shown in the top half of page 11 (illustrated below).



How to Play

The aim is to make a score that is equal to or as close to the target as possible.

- The cards are shuffled and placed face down in a stack.
- The first player draws three cards.
- The player decides how to arrange the three numbers and which operations to use to achieve a score equal to or as close as possible to the target for Round One.
- The player then records the number sentence, using parentheses if necessary, in the space provided on his or her game board. The numbers are written in the boxes and the chosen operations in the circles.
- The player records the answer in the space provided and the difference in the 'How Close?' column.

Example: This game board shows how Kaycie arranged 3, 6, and 9 to win the first round.

$$1 \quad (9 + 6) \div 3 = 5 \quad 5 \quad 0$$

- The cards are discarded to one side. These are reshuffled and used again if needed.
- The other player has a turn.
- The player who is closer to the target at the end of a round is the winner. This is indicated with a ✓. If a round ends in a tie, both players record a win for that round.
- The player who wins the greater number of rounds is the overall 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

Write the numbers 3, 5, and 8 on the board and an empty number sentence as shown. Ask, *What is the greatest number that can be made by arranging these numbers in any order in the boxes and by placing any operations in the circles?* ($120 = 3 \times 5 \times 8$.) Can the students see that $3 \times (5 \times 8)$ is easier to calculate than $(3 \times 5) \times 8$? Ask, *What is the smallest number (not less than zero) that can be made?* ($0 = (3 + 5) - 8$.) The students may suggest using division to make a number that is close to zero. Do they see it is not possible to use division with this example, as the game is restricted to whole numbers?

$$3 \quad 5 \quad 8$$

$$\square \circ \square \circ \square = \underline{\quad}$$

Choose three cards and demonstrate how to aim for the target number (5) in Round One of the game. You may want to call upon students to offer suggestions on how to arrange the numbers and operations.

During the Game

Watch for students who may be restricting themselves to one or two operations. For example, some students may favor addition and subtraction because they find these operations easier. Identify students who may need help with the use of parentheses. Do students see that $(3 + 5) \times 8$ and $3 + (5 \times 8)$ give vastly different answers? (64 and 43 respectively.) Are the students aware that a tie is possible in each round? For example, if the target is 50 and the players score 52 and 48 respectively, that round is tied. Do the students notice that addition and multiplication are helpful if the target is big and that subtraction and division are useful if the target is small?

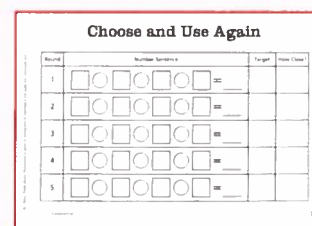
After the Game

Give a target number and ask questions, such as, *What three cards would you like to have if the target was 40? Write a number sentence you could make using your three cards.* The responses will vary, but three possible number sentences the students may write are shown (left). Students may realize that any combination of 10 multiplied by 4 would achieve the target.

$$(8 \times 5) + 0$$

$$2 \times 5 \times 4$$

$$(8 + 2) \times 4$$



Beyond the Game

- Vary the game by allowing students to draw four cards and discard the one they find least useful.
- The students could play the advanced version of the game. Give them a copy of the game board shown on the bottom of page 11 (illustrated). In this game, the players suggest and write achievable targets in the spaces provided. They then draw four cards and choose the best operations to achieve the target.