

ACTIVITY 14

Neighbors

Materials:

- paper
- scraps of paper numbered 1-6 or 1-10 and container
- dice or spinners (appendix)
- transparency of activity master

Overview: Students will enjoy competing against the teacher in this activity. Once they learn the game, they will enjoy playing it in pairs. For homework, they can explore game strategies and game options to maximize their scores!

Vocabulary: operations

PROCEDURE

Skills:

- Problem solving
- Practicing order of operations

1 Draw the game board on the board as the students copy it on paper. Number six scraps of paper one through six (or ten scraps numbered one through ten) and place them in a bag or other container. You may also use a die or spinner.

2 Draw three numbers and have the students use them to create a problem that has one of the game board numbers as its answer. They should mark it out with an “x”. Their goal is to cover the largest possible answer. For example, if the numbers 1, 2, and 3 are chosen, some problems are:

$$1 + 2 + 3 = 6$$

$$(1 + 2) \times 3 = 9$$

$$3! + (2 + 1)! = 12$$

$$(2 + 1)^3 = 27$$

3 Repeat step two. This time, the students must cover a number that is adjacent to their previous answer. For example, if the numbers 3, 4, and 5 are chosen next, they could be used to create these problems:

$$4! + 3! - 5 = 24 + 6 - 5 = 30 - 5 = \mathbf{25}$$

$$4! + 5 \times 3 = 24 + 15 = \mathbf{39}$$

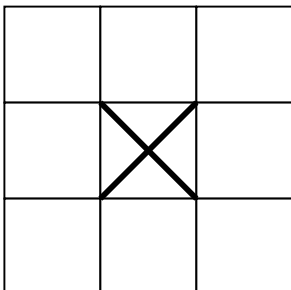
$$4! / 3 \times 5 = 24 / 3 \times 5 = 8 \times 5 = \mathbf{40}$$

The new answer may be a neighbor vertically, horizontally, or diagonally to their previous answer as shown on the left.

Note:

3! means $3 \times 2 \times 1 = 6$

All eight of these empty squares are neighbors and can be used for legal moves for team X.



- 4 Repeat step three. Play may continue for a specified number of rounds. If a player cannot cover an answer within a reasonable time, their score for that round is zero.

- 5 There are three options for ending the game. You may select whichever occurs first.
 - a. Play continues for a specified number of rounds or for a specified time limit.
 - b. Play continues until one player reaches a specified score.
 - c. Play continues until one player has recorded six neighbors. The player who achieves this goal receives a 50 point bonus. The player with the highest score wins.

- 6 Students can also play in pairs or teams. Use one game board for both sides. Each player chooses three numbers and tries to cover a number. If they cannot cover a number, their score is zero for that round. If their opponent can see a way they could have covered a number, they can cover that number. The opponent still takes his or her normal turn. Play can continue for a specified number of rounds or until each side fails to cover a number on successive draws of numbers.



Journal Prompts:



If the numbers three, five, and six are rolled, what is the largest score possible? What is the smallest score? Show how you get these scores. What numbers on the game board are difficult to hit? Why?

Homework:



Give the students three randomly chosen numbers and a new game board. Have them arrange the numbers and use various operations to cover as many numbers on the game board as

possible. They should record the problems they used to cover the numbers.

Good Tip!



You may require that the three numbers selected must be used in the order in which they were selected. This will add difficulty to the game.

Taking a Closer Look: B

Use only two numbers at a time to simplify the operations. In that case, use a 6 x 6 game board numbered one through 36. To make the game more challenging, use four numbers.

Allowing the use of exponents, roots, factorials, and the greatest integer function will add complexity to the game.

Assessment:



Higher scores will tend to indicate that a student is proficient at using operations although some luck is involved. Also, students who are good at operations will usually play longer games since they are able to find more answers on the board.

Neighbors

1	2	3	4	5	6	7	8
36	39	40	42	44	45	48	9
35	84	85	88	90	92	50	10
33	80	128	132	135	96	52	11
32	75	120	144	140	100	54	12
30	72	115	110	108	105	55	14
28	70	66	65	64	63	60	15
27	25	24	22	21	20	18	16