

## ACTIVITY 6

### Materials:

- paper
- two paper clips
- transparency of activity master
- centimeter grid paper

# Four-in-a-Row

**Overview:** Practicing multiplication of integers, variables, and binomials becomes a game in this highly motivational activity. As students use strategy to find four products in a row, they will solve and resolve numerous problems.

**Vocabulary:** integer, absolute value

## PROCEDURE

### Skills:

- Multiplying integers
- Multiplying variables and binomials
- Problem solving

25	30	<del>-35</del>	-40	45	50
-55	-60	36	-42	-48	54
60	-66	-72	49	56	-63
-70	77	84	64	-72	-80
88	96	81	90	-99	-108
100	-110	-120	121	132	144

-5 -6 7 8 -9 -10 11 12

↑ ↑

1 Have the students copy the game board while you draw it on the board (or use a transparency of one of the activity masters). You may wish to make up numbers or problems to create your own game board. However, some thought should be given to this ahead of time. The two games provided on the following pages have been designed to avoid duplicate spaces on the board.

2 The object of the game is to connect four products in a row vertically, horizontally, or diagonally. This is done by choosing the factors of that product.

3 Toss a coin to see which team will begin. The first team selects two factors, marking them with two paper clips, and places an "x" on the corresponding product. For example in the game on the left, the team begins by selecting the negative five and positive seven for a product of negative 35.

$$-5 \times 7 = -35$$

25	30	<del>-35</del>	-40	45	50
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-5 -6 7 8 -9 -10 11 12

↑ ↑

4 Team two may move *one* paper clip to another factor. They draw a circle around their product. Thus team two might choose to move the positive seven to the negative nine to take positive 45.

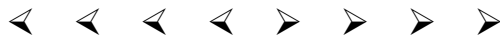
$$-5 \times -9 = -45$$

5 Play alternates between the two teams. After the placement of the two paper clips on the initial move, either one, but not both,

of the paper clips may be moved to a new factor. However, it is permissible to move the two paper clips to the same factor to claim a square number. For example, in step four above, the second player could have moved the clip from the seven to the negative five. This would put both clips on negative five and the player could take positive 25.

$$-5 \times -5 = 25$$

- 6 Once a product has been taken with an “x” or an “o”, it may not be used again.



### Journal Prompts:



A team has asked for your advice. Their *opponent* can win by covering the positive 36. Tell them which moves would be good ones and which moves they should avoid. Explain your reasoning to them.

### Homework:



Give students eight factors or let them choose their own. Have them fill in a six by six grid with the products. These individual game boards can be used to play the game in class the next day.

### Taking a Closer Look: B

You can make custom game boards using fractions, decimals, and percents to combine the practice of these concepts with integers. You could also mix fractions with whole numbers.

For an advanced game, introduce values for  $x$  and  $y$ , then put the products of the factors in the game board. For example, if we let  $x = 3$ , and  $y = -2$ , then:

$$(x + 1)(y - 1) = (3 + 1)(-2 - 1) = (4)(-3) = -12.$$

In this case, the product -12 should appear in the game board.

### Good Tip!



Students can play this game in pairs or teams. Different teams can then use factors that are appropriate to their skill level.

**Assessment:**



As students play their homework game boards in class the following day, their dialogue during the game will lead them to discover and correct their errors.

# Four-in-a-Row: Integers

## Rules:

1. Team one picks two factors by marking them with paper clips. Place an "X" on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.

25	30	-35	-40	45	50
-55	-60	36	-42	-48	54
60	-66	-72	49	56	-63
-70	77	84	64	-72	-80
88	96	81	90	-99	-108
100	-110	-120	121	132	144

-5   -6   7   8   -9   -10   11   12

# Four-in-a-Row: Algebra

Rules:

1. Team one picks two factors by marking them with paper clips. Place an "X" on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.

$x^2$	$xy$	$2x$	$-3x$	$4x$	$-5x$		
$x^2+x$	$xy-x$	$y^2$	$2y$	$-3y$	$4y$		
$-5y$	$xy+y$	$y^2-y$	$4$	$-6$	$8$		
$-10$	$2x+2$	$2y-2$	$9$	$-12$	$15$		
$-3x-3$	$-3y+3$	$16$	$-20$	$4x+4$	$4y-4$		
$25$	$-5x-5$	$-5y+5$	$x^2+2x+1$	$xy-x+y-1$	$y^2+2y+1$		
$x$	$y$	$2$	$-3$	$4$	$-5$	$x+1$	$y-1$

# Four-in-a-Row: Blank

## Rules:

1. Team one picks two factors by marking them with paper clips. Place an "X" on their product on the grid.
2. Team two then moves one paper clip to a new factor and *circles* the new product.
3. Alternate moves, one paper clip at a time, until one team has four marks in a row.
