

Activity #7: *The Battle of the Inequalities***Objective 16: Patterns, Functions, Algebra****Objective 17: Problem Solving and Reasoning**

$$12 \leq x \leq 20$$
$$x = 17$$

This activity provides practice expressing ranges as inequalities.

Description: Using ranges expressed as inequalities, students attempt to guess a number that has been assigned to them.

► Directions

1. Assign a number between zero and one hundred for each student. Use a different number for each student. Tell students that they each have been assigned a unique number that they will try to guess. Do not tell students their numbers.
2. Have students submit a set of five guesses. The guesses should be written as algebraic expressions using inequalities, with x representing the student's number (i.e., $12 \leq x \leq 20$). Write YES or NO beside each guess and return the guesses to the students.
3. Have students submit a new set of five guesses. Write YES or NO beside each guess and return the guesses to the students.
4. Finally, have students submit a set of three guesses. Write YES or NO beside each guess and return the guesses to the students.
5. Then have students submit their final guess in equation form (i.e., $x = 17$).
6. After students have finished the activity, share and discuss the "A Winning Strategy" handout (shown on the following page).

Note: This activity will probably require at least a week to complete, though it will take very little class time. It works well as homework or as an extra-credit project.

Variation: Have students work in teams. One team should select a number. The other team should work together to try to guess the number.

A Winning Strategy

Suppose a student's number is 62.

For the first set of guesses, he or she should write:

Guesses	Teacher's Answers
1. $0 \leq x \leq 29$	No
2. $15 \leq x \leq 44$	No
3. $30 \leq x \leq 59$	No
4. $45 \leq x \leq 74$	Yes
5. $60 \leq x \leq 88$	Yes

(All NOs would indicate that the number is between 89 and 100.)

With the answers given, it can be surmised that the number is between 60 and 74.

For the second set of guesses, he or she should write:

Guesses	Teacher's Answers
1. $60 \leq x \leq 64$	Yes
2. $63 \leq x \leq 66$	No
3. $65 \leq x \leq 68$	No
4. $67 \leq x \leq 70$	No
5. $69 \leq x \leq 72$	No

With the single YES answer, it can be surmised that the number is 60, 61, or 62.

For the third set of guesses, he or she should write:

Guesses	Teacher's Answers
1. $60 \leq x \leq 61$	No
2. $61 \leq x \leq 62$	Yes
3. $62 \leq x$	Yes

The final guess should be: $x = 62$.