PROBLEM-OF-THE-DAY: ALGEBRA 1
WEEK: September 4 to September 7   DAY: Friday

RISD Objective: Provided an algebraic expression with multiple operations (including absolute value operations), students will be able to evaluate that expression when given numerical values for the variables.

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PROBLEM #14

Dumb Donald shot an arrow straight up into the sky. The arrow left the bow at a velocity of 112 feet/second. The following formula, $h = -16t^2 + 112t$, can be used to find how high the arrow is at any time where _t_ is the number of seconds after the arrow was shot and _h_ is the height measured in feet. Use the formula to find the height of the arrow at various seconds after the arrow was released using the table below.

t number of seconds after release	h height of arrow in feet
0 seconds	
1 second	
2 seconds	
3 seconds	
4 seconds	
5 seconds	
6 seconds	
7 seconds	
8 seconds	

A) List all the time pairs when the height is the same.

B) Why are the heights the same at two different times?

C) Guess the time, _t_, when the arrow reaches its highest point.

D) Use your guess and the formula to find how high the arrow went.

E) Explain the value for the height for t = 8 sec.

PROBLEM #14

MODEL SOLUTION #14

t number of seconds after release	h height of arrow in feet
0 seconds	0 feet
1 second	96 feet
2 seconds	160 feet
3 seconds	192 feet
4 seconds	192 feet
5 seconds	160 feet
6 seconds	96 feet
7 seconds	0 feet
8 seconds	-128 feet

A) 0 and 7 seconds
  1 and 6 seconds
  2 and 5 seconds
  3 and 4 seconds

B) The smaller number is the height on the way <u>up</u> and the larger number is the height on the way <u>down</u>.

C) It reaches its highest point at 3 ½ seconds because the arrow is going up at 3 seconds and down at 4 seconds and the heights are the same for both times.

D) $h = -16(3.5)^2 + 112(3.5) = -196 + 392 = 196 ft.$

E) The height is negative because the arrow hit the ground at 7 seconds.

(The values in the table are found by substituting the number of seconds in for t and evaluating.)