

**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.**

<b>t</b> number of seconds after release	<b>h</b> 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.**

## MODEL SOLUTION #14

<b>t</b> number of seconds after release	<b>h</b> 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 up and the larger number is the height on the way down.

C) It reaches its highest point at  $3\frac{1}{2}$  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)  $h = -16(3.5)^2 + 112(3.5) = -196 + 392 = 196ft.$

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.)