The bottle problem

The water level in a bottle is related to the amount of water that's in the bottle.

1. First, let's think about the **quantities** in this problem. A quantity is a thing that you can measure, with numbers and units. Quantities that *change* are called **variables**:

letter	**=**	**everyday words**	**(units)**	$\sim$	**dep or indep**
	=		$\left(\quad\right)$	$\sim$	
	=		$\left(\quad\right)$	$\sim$	

2. Now let's think about **function notation**. If volume is measured in cups and height is measured in inches, what does the equation $h(3) = 5$ mean?

3. Explore the following claim: Steepness of the graph of the function $h(V)$ has something to do with the cross-sectional area of the bottle.

4. What bottle shapes could correspond to a straight-line graph? Do the sides have to be straight?

5. Draw the graph for a pint glass that gets **wider** as you go up, and draw the graph for a volcano vase that gets **narrower** as you go up.

6. What's the deal with a bottle that changes from getting narrower to getting wider? Or one that changes from getting wider to getting narrower?