The bottle problem

Consider plotting height of water in a bottle **as a function of** the volume of the water in the bottle. That is, height is on the vertical axis (dependent variable) and volume is on the horizontal axis (independent variable).
Throughout, consider a **fixed** ΔV.

1. If volume is measured in cups and height is measured in inches, what does the equation $h(3) = 5$ mean?

2. 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.

3. What bottle shapes could correspond to a straight-line graph? (Be creative!)

4. Consider a pint glass that gets **wider** as you go up.

5. Consider 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?