Constant Rates of Change

1. What is the constant rate of change between the amount of water in a cylindrical cup of any size and the height of the water in the cup?

2. Every morning Sally bikes 5.4 miles to the OSU campus. Let $f(t)$ represent the distance (in miles) from home Sally has ridden on a particular morning and let t represent the number of minutes elapsed since Sally left home. Write a description of each calculation in this context.

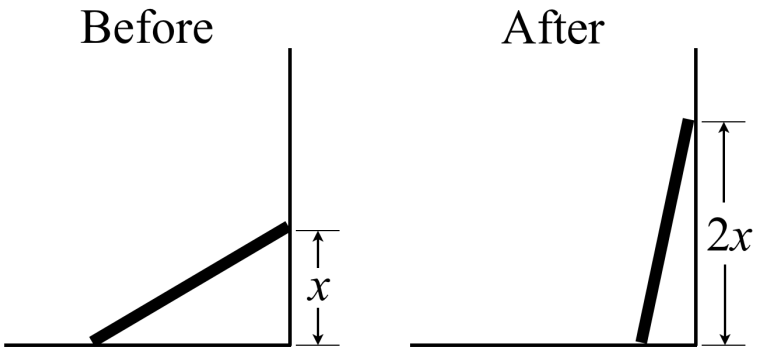
   (a) $f(23) - f(12) =$

   (b) $\dfrac{f(17) - f(5)}{12} =$

   (c) The solution t^* to the equation $f(t^*) = 3.5$

3. A cylindrical cup with radius 1.5 inches is filling with water at a constant rate of 2 cubic inches per second. At what constant rate is the water level rising?

4. Suppose a wooden board is leaning against a wall. Now suppose that the slant of the board is adjusted so that it reaches twice as high on the wall (see the image below).



The slope of the board is:

a. More than twice what it was before
b. Exactly twice what it was before
c. Less than twice what it was before
d. The same as what it was before
e. There is not enough information to answer this question

5. Mara is traveling down Interstate 35 at a constant velocity. For every increase of ten minutes in the number of minutes x since she passed mile marker 174, her distance y from Downtown Oklahoma City decreases by seven miles. Which of the following statements is definitely true?

   a. $\Delta y = -0.7\Delta x$
   b. $y = -0.7x$
   c. $x \approx -1.43y$
   d. Statements (a) and (b) are definitely true
   e. Statements (a), (b), and (c) are definitely true

6. A candle has been burning at a constant rate of 1.25 inches per hour. The candle has been burning for 4 hours and is 5.5 inches tall. What was the length of the candle before it was lit?

   a. 5 inches
   b. 5.5 inches
   c. 6.75 inches
   d. 10.5 inches
   e. 0.5 inches