1-3 Activity

1. Louise swims to the island in the middle of a big lake. When she starts out, she has lots of energy. However, she tires soon and her speed decreases until she reaches the island. Sketch a graph of Louise’s distance from the island as a function of time. Sketch a graph of Louise’s *distance traveled* as a function of time.
2. APC: Activity 1.3.4, but without the function notation: Sketch at least two different possible graphs that satisfy the criteria for the function stated in each part. Make your graphs as significantly different as you can. If it is impossible for a graph to satisfy the criteria, explain why.

a. f is a function defined on [−1, 7] such that f (1) 4 and AV[1,3] −2.

b. g is a function defined on [−1, 7] such that 1(4) 3, AV[0,4] 0.5, and 1 is not always increasing on (0, 4).

c. h is a function defined on [−1, 7] such that h(2) 5, h(4) 3 and AV[2,4] −2.

1. APC: 1.2 Exercises (somehow without function notation):

Let f (t) denote the number of people eating in a restaurant t minutes after 5 PM. Answer the following questions:

a) Which of the following statements best describes the significance of the expression f (4) 21? ⊙ There are 4 people eating at 5:21 PM ⊙ There are 21 people eating at 5:04 PM ⊙ There are 21 people eating at 9:00 PM ⊙ Every 4 minutes, 21 more people are eating ⊙ None of the above 21 Chapter 1 Relating Changing Quantities

b) Which of the following statements best describes the significance of the expression f (a) 20? ⊙ a minutes after 5 PM there are 20 people eating ⊙ Every 20 minutes, the number of people eating has increased by a people ⊙ At 5:20 PM there are a people eating ⊙ a hours after 5 PM there are 20 people eating ⊙ None of the above

c) Which of the following statements best describes the significance of the expression f (20) b? ⊙ Every 20 minutes, the number of people eating has increased by b people ⊙ b minutes after 5 PM there are 20 people eating ⊙ At 5:20 PM there are b people eating ⊙ b hours after 5 PM there are 20 people eating ⊙ None of the above

d) Which of the following statements best describes the significance of the expression n f (t)? ⊙ Every t minutes, n more people have begun eating ⊙ n hours after 5 PM there are t people eating ⊙ n minutes after 5 PM there are t people eating ⊙ t hours after 5 PM there are n people eating ⊙ None of the above

###### 4. MFG: 2.1 Exercises; **17.**

A conical coffee filter is 8.48.4 centimeters tall.

1. Write a formula for the filter's volume in terms of its widest radius (at the top of the filter).
2. Complete the table of values for the volume equation. If you double the radius of the filter, by what factor does the volume increase?

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| rr | 11 | 22 | 33 | 44 | 55 | 66 | 77 | 88 |
| VV | 000 | 000 | 000 | 000 | 000 | 000 | 000 | 000 |

1. If the volume of the filter is 302.4302.4 cubic centimeters, what is its radius?
2. Use your calculator to graph the volume equation. Locate the point on the graph that corresponds to the filter in part (c).

[🔗](https://yoshiwarabooks.org/mfg/nonlinear-models.html#exercise-564)

**18.**

A large bottle of shampoo is 2020 centimeters tall and cylindrical in shape.

1. Write a formula for the volume of the bottle in terms of its radius.
2. Complete the table of values for the volume equation. If you halve the radius of the bottle, by what factor does the volume decrease?

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| rr | 11 | 22 | 33 | 44 | 55 | 66 | 77 | 88 |
| VV | 000 | 000 | 000 | 000 | 000 | 000 | 000 | 000 |

1. What radius should the bottle have if it must hold 240240 milliliters of shampoo? (One milliliter is equal to 1 cubic centimeter.)
2. Use your calculator to graph the volume equation. Locate the point on the graph that corresponds to the bottle in part (c).

5. Given volume formula for cylinder, fix r, then fix h. Describe graphically (or why does graph/table make sense) what happens to V as r changes, as h changes. Which has biggest effect over time? Effect on the volume of doubling r, doubling h.