

Accelerated 7 • Unit 6 Worksheet

Functions and Volume

Name: _____

Date: _____

Part A • Understanding Functions

1. For each rule, decide if it's a function. Explain.

a. Input: a person's birthday. Output: that person's name.

b. Input: a state. Output: its capital city.

c. Input: a number. Output: a number whose square equals it.

2. The function f gives the cost (in \$) of n apples at \$0.75 each.

a. Write a rule: $f(n) =$ _____

b. Find $f(8)$. What does it mean?

c. Solve $f(n) = 6$. What does it mean?

Part B • Representations of Functions

3. Which of these represent linear functions? Which are non-linear? Justify each.

a. $y = 2x - 5$

b. $y = x^2$

c. Table: (1, 3), (2, 6), (3, 12), (4, 24)

d. Graph: a straight line passing through (0, 4) with negative slope

4. Sketch a graph showing distance vs. time for a person who: walks at a steady pace, stops at a bench, then runs back quickly to start. Label your axes.

Part C • Volume — Prisms and Cylinders

5. A cylindrical water tank has radius 3 m and height 5 m.

a. Volume = _____ m^3 (leave answer in terms of π)

b. If the radius is DOUBLED (to 6 m), how does volume change? By what factor?

c. If the height is doubled, how does volume change?

Part D • Cones and Spheres

6. A cone and a cylinder have the SAME base radius ($r = 4 \text{ cm}$) and SAME height ($h = 9 \text{ cm}$).

a. Volume of cylinder:

b. Volume of cone:

c. What is the ratio of cone volume to cylinder volume? Why does that make sense?

7. A spherical balloon has radius 5 cm. It is inflated until its radius is 10 cm.

a. Find both volumes (in terms of π).

b. By what factor did the volume increase?

c. What general rule describes how volume changes when radius is multiplied by k ?

Part E • Thinking Deeply

8. The graph of y vs. x is a straight line. The graph of A (area) vs. r (radius) for a circle is NOT straight. Explain why one is linear and the other isn't. Use the equations to support your answer.

9. Sara claims: "If I double the dimensions of a cube, the volume doubles too." Test her claim with the cube of side 2 cm vs. side 4 cm.

Volume of 2-cm cube: _____ cm^3

Volume of 4-cm cube: _____ cm^3

What actually happens to volume when side is doubled?

Is Sara right? Why not?

10. A piece of paper rolled one way makes a tall, thin cylinder; rolled the other way makes a short, wide cylinder. Do they have the same volume? Use the formula $V = \pi r^2 h$ to explain.

11. A water tank shaped like a cone (vertex down) is being filled at a steady rate. Sketch a graph of WATER HEIGHT vs. TIME. Is it linear? Why or why not?
