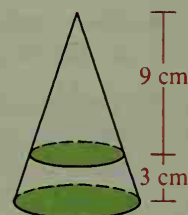
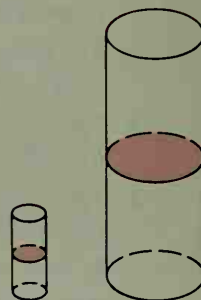


15. A certain kind of string is sold in a ball 6 cm in diameter and in a ball 12 cm in diameter. The smaller ball costs \$1.00 and the larger one costs \$6.50. Which is the better buy?
16. Construction engineers know that the strength of a column is proportional to the area of its cross section. Suppose that the larger of two similar columns is three times as high as the smaller column.
- The larger column is  $\frac{?}{?}$  times as strong as the smaller column.
  - The larger column is  $\frac{?}{?}$  times as heavy as the smaller column.
  - Which can support more, *per pound of column material*, the larger or the smaller column?
17. Two similar pyramids have lateral areas  $8 \text{ ft}^2$  and  $18 \text{ ft}^2$ . If the volume of the smaller pyramid is  $32 \text{ ft}^3$ , what is the volume of the larger pyramid?
18. Two similar cones have volumes  $12\pi$  and  $96\pi$ . If the lateral area of the smaller cone is  $15\pi$ , what is the lateral area of the larger cone?
19. A plane parallel to the base of a cone divides the cone into two pieces. Find the ratios of the following:
- The areas of the shaded circles
  - The lateral area of the top part of the cone to the lateral area of the whole cone
  - The lateral area of the top part of the cone to the lateral area of the bottom part
  - The volume of the top part of the cone to the volume of the whole cone
  - The volume of the top part of the cone to the volume of the bottom part
20. Redraw the figure for Exercise 19, changing the 9 cm and 3 cm dimensions to 10 cm and 4 cm, respectively. Then find the five ratios described in Exercise 19.
21. A pyramid with height 15 cm is separated into two pieces by a plane parallel to the base and 6 cm above it. What are the volumes of these two pieces if the volume of the original pyramid is  $250 \text{ cm}^3$ ?



The purpose of Exercises 22–27 is to prove Theorem 12-11 for some similar solids.

22. Two spheres have radii  $a$  and  $b$ . Prove that the ratio of the areas is  $a^2:b^2$ .
23. Two spheres have radii  $a$  and  $b$ . Prove that the ratio of the volumes is  $a^3:b^3$ .
24. Two similar cones have radii  $r_1$  and  $r_2$  and heights  $h_1$  and  $h_2$ . Prove that the ratio of the volumes is  $h_1^3:h_2^3$ .
25. Two similar cones have radii  $r_1$  and  $r_2$  and slant heights  $l_1$  and  $l_2$ . Prove that the ratio of the lateral areas is  $r_1^2:r_2^2$ .