CHAPTER 10 REVIEW

EXERCISES

1. They have the same formula for volume: $V = BH$.

2. They have the same formula for volume: $V = \frac{1}{3}BH$.

3. 6240 cm^3. The solid is a rectangular prism.

$V = BH = (bh)H = (12 \cdot 20) \cdot 26 = 6240 \text{ cm}^3$

4. 1029π cm^3. The solid is a cylinder with radius 7 cm.

$V = BH = (\pi r^2)H = \pi \cdot (7)^2 \cdot 21 = 1029\pi \text{ cm}^3$

5. 1200 cm^3. The solid is a rectangular prism with a piece missing. First find the area of the base of the solid by subtracting the area of the base of the missing piece from the area of the complete prism. The base of the missing piece is a rectangle with dimensions $(12 - 6)$ cm by $(12 - 8)$ cm, or 6 cm by 4 cm. The base of the complete prism is a square with side length 12 cm. Use these measurements to find the area of the base of the solid.

$B = (12 \cdot 12) - (4 \cdot 6) = 144 - 24 = 120 \text{ cm}^2$

$V = BH = 120 \cdot 10 = 1200 \text{ cm}^3$

6. 32 cm^3. The solid is a square pyramid.

$V = \frac{1}{3}BH = \frac{1}{3}(4 \cdot 4) \cdot 6 = 32 \text{ cm}^3$

7. 100π cm^3. The solid is a cone. Its diameter is 10 cm, so its radius is 5 cm.

$V = \frac{1}{3}BH = \frac{1}{3}(\pi r^2)H = \frac{1}{3}\pi \cdot (5)^2 \cdot 12 = 100\pi \text{ cm}^3$

8. 2250π cm^3. The solid is a hemisphere.

$V = \frac{2}{3}\pi r^3 = \frac{2}{3}\pi \cdot (15)^3 = 2250\pi \text{ cm}^3$

9. $H = 12.8$ cm. The solid is a triangular prism. Each base is a right triangle with shorter leg of length 8 cm and hypotenuse of length 17 cm. Because 8-15-17 is a Pythagorean triple, the length of the longer leg is 15 cm.

$V = BH = \left(\frac{1}{2}bh\right)H$

$768 = \left(\frac{1}{2} \cdot 8 \cdot 15\right)H$

$768 = 60H$

$H = 12.8 \text{ cm}$

10. $h = 7$ cm. The solid is a trapezoidal pyramid.

$V = \frac{1}{3}BH = \frac{1}{3}\left(\frac{1}{2}h(b_1 + b_2)\right)H$

$896 = \frac{1}{3}\left(\frac{1}{2}h(20 + 12)\right) \cdot 24$

$896 = \frac{1}{6}h \cdot 32 \cdot 24$

$896 = 128h$

$h = 7 \text{ cm}$

11. $r = 12$ cm. The solid is a cone.

$V = \frac{1}{3}BH = \frac{1}{3}(\pi r^2)H$

$1728\pi = \frac{1}{3} \cdot \pi \cdot r^2 \cdot 36$

$1728\pi = 12\pi r^2$

$r^2 = 144$

$r = 12 \text{ cm}$

12. $r = 8$ cm. One-fourth of the hemisphere is missing, so the solid is three-fourths of a hemisphere.

$V = \frac{3}{4}\left(\frac{2}{3}\pi r^3\right) = \frac{1}{2}\pi r^3$

$256\pi = \frac{1}{2}\pi r^3$

$r^3 = 512$

$r = \sqrt[3]{512} = 8 \text{ cm}$

13. 960 cm^3. Let a, b, and c represent the three dimensions of a rectangular prism. Then the volume of the prism is abc. If each dimension is doubled, the result will be a larger rectangular prism with dimensions $2a$, $2b$, and $2c$, so the volume of the larger prism will be $(2a)(2b)(2c) = 8abc$, that is, eight times the volume of the original prism. In this case the volume of the original rectangular prism is 120 cm^3, so the volume of the prism obtained by doubling all three dimensions is $8(120) = 960$ cm^3.

20. 52.4% of the box is filled by the ball. $H = 2r$ because the height of the box is the diameter of the ball.

$\frac{V_{\text{sphere}}}{V_{\text{box}}} = \frac{\frac{4}{3}\pi r^3}{(2r)^3} = \frac{\frac{4}{3}\pi r^3}{8r^3} \approx 0.524 = 52.4\%$

21. Approximately 358 yd^3. First find B, the area of the base of the slab floor. This is the area of a 70-by-50 ft rectangle minus the area of a 40-by-15 ft rectangle. $(70 - 30 = 40;\ 50 - 35 = 15)$

$B = 70 \cdot 50 - 40 \cdot 15 = 3500 - 600 = 2900 \text{ ft}^2$

Convert 4 in. to $\frac{1}{3}$ ft and find the volume of cement for one floor.

$V = BH = 2900 \cdot \frac{1}{3} = \frac{2900}{3} \text{ ft}^3$

The volume of ten identical floors is $10\left(\frac{2{,}900}{3} \text{ ft}^3\right) = \frac{29{,}000}{3} \text{ ft}^3$.

Convert this volume from cubic feet to cubic yards.

1 yd = 3 ft, so $1 \text{ yd}^3 = (3 \cdot 3 \cdot 3) \text{ ft}^3 = 27 \text{ ft}^3$

$\frac{29{,}000}{3} \text{ ft}^3 \cdot \frac{1 \text{ yd}^3}{27 \text{ ft}^3} \approx 358 \text{ yd}^3$

Approximately 358 yd^3 of cement will be needed.

22. No. The unused volume is 98π in.^{3}, and the volume of the meatballs is 32π in.^{3}. First find the volume of one meatball. Each meatball has a 1-inch radius.

$V_{\text{meatball}} = \frac{4}{3}\pi \cdot 1^2 = \frac{4}{3}\pi \text{ in.}^3$

The volume of 2 dozen meatballs is $24\left(\frac{4}{3}\pi\right) = 32\pi$ in.^{3}. The unused volume is equal to the volume of a cylinder with radius 7 in. and height 2 in., so $V_{\text{unused}} = \pi \cdot (7)^2 \cdot 2 = 98\pi$ in.^{3}.

The unused volume in the pot is a lot more than the volume of the meatballs, which is the volume of the displaced sauce, so the sauce will not spill over.

28. 160π units^3. The volume of the solid will be the difference between the volumes of two cylinders, with $R = 6$ units and $r = 2$ units, and each with height 5 units.

$V = \pi R^2H - \pi r^2H = \pi \cdot (6)^2 \cdot 5 - \pi \cdot (2)^2 \cdot 5$

$= 180\pi - 20\pi = 160\pi$

The volume of the solid is 160π units^3.

#18 on p 5?

$V = \pi \cdot 4^2 \cdot 2 = 32\pi \text{cm}^3$

lithium