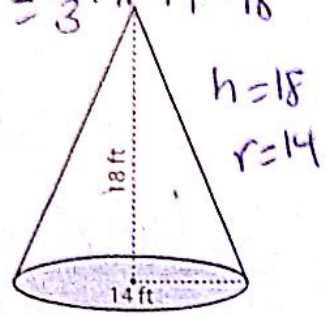


Volume - Mixed Shapes

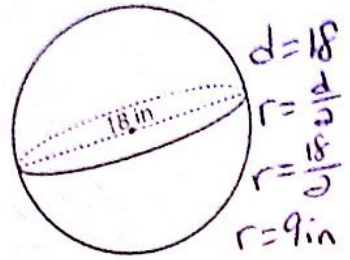
Find the exact volume of each shape.

1) $V = \frac{1}{3} \cdot \pi \cdot r^2 \cdot h$
 $= \frac{1}{3} \cdot \pi \cdot 14^2 \cdot 18$



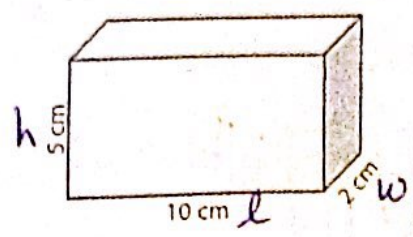
Volume = $1176 \pi \text{ ft}^3$
 $V \approx 3694.51 \text{ ft}^3$

2) $V = \frac{4}{3} \cdot \pi \cdot r^3$
 $V = \frac{4}{3} \cdot \pi \cdot 9^3$



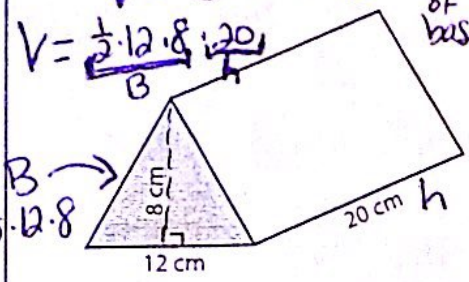
Volume = $972 \pi \text{ in}^3$
 $V \approx 3053.63 \text{ in}^3$

$V = l \cdot w \cdot h$
 $V = 10 \cdot 2 \cdot 5$

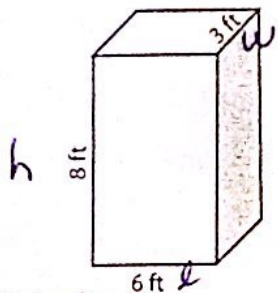


Volume = ~~1000~~ 100 cm^3

4) $V = B \cdot h$ B = area of base
 $V = \frac{1}{2} \cdot 12 \cdot 8 \cdot 20$

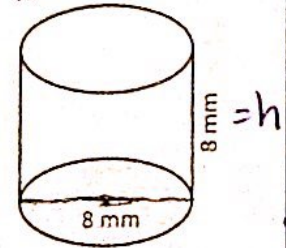


Volume = 960 cm^3



$V = l \cdot w \cdot h$
 $= 6 \cdot 3 \cdot 8$
 Volume = 144 ft^3

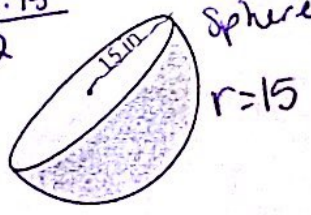
6) $V = \pi \cdot r^2 \cdot h$
 $V = \pi \cdot 4^2 \cdot 8$



Volume = $128 \pi \cdot \text{mm}^3$
 $V \approx 402.12 \text{ mm}^3$

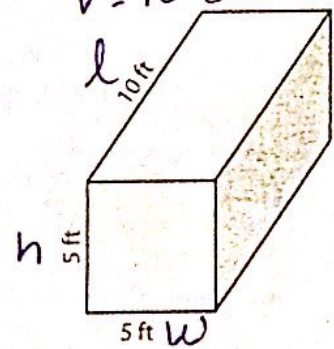
$d = 8 \text{ mm}$
 $r = \frac{d}{2}$
 $r = 4 \text{ mm}$

7) $V = \frac{4}{3} \pi r^3$
 $V = \frac{4}{3} \cdot \pi \cdot 15^3 \cdot \frac{1}{2}$ ← half of sphere



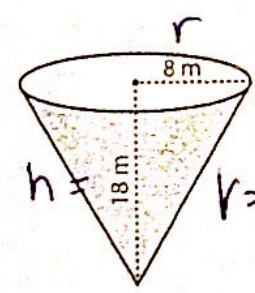
Volume = $2250 \pi \text{ in}^3$
 $V \approx 7068.58 \text{ in}^3$

8) $V = l \cdot w \cdot h$
 $V = 10 \cdot 5 \cdot 5$



Volume = 250 ft^3

9)



$V = \frac{1}{3} \cdot \pi \cdot r^2 \cdot h$
 $V = \frac{1}{3} \cdot \pi \cdot 8^2 \cdot 18$

Volume = $384 \pi \text{ m}^3$
 $V \approx 1206.37 \text{ m}^3$

A/B Level Problems:

10. Layla wants to build a wooden box with a volume of 45 cubic centimeters. She started with a width of 3cm and a height of 3cm. How long should Layla make the box?

$$V = 45 \text{ cm}^3$$

$$w = 3 \text{ cm}$$

$$h = 3 \text{ cm}$$

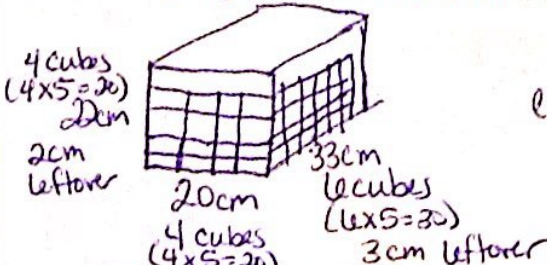
$$V = l \cdot w \cdot h$$

$$45 \text{ cm}^3 = l(3 \text{ cm})(3 \text{ cm})$$

$$45 \text{ cm}^3 = 9 \text{ cm}^2 (l)$$

$$\frac{45 \text{ cm}^3}{9 \text{ cm}^2} = \frac{9 \text{ cm}^2 (l)}{9 \text{ cm}^2} \rightarrow l = 5 \text{ cm}$$

11. After a maximum number of 5-cm plastic cubes are packed into a rectangular box measuring 33 cm by 22 cm by 20 cm, what is the volume of the space left in the box?



$$4 \times 4 \times 6 = 96 \text{ cubes}$$

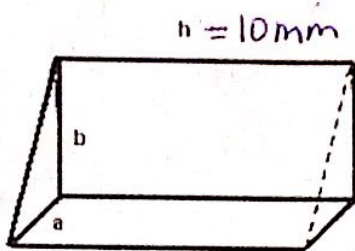
$$\text{each cube's Volume} = (5 \text{ cm})^3 = 125 \text{ cm}^3$$

$$96 \times 125 = 12,000 \text{ cm}^3$$

$$\text{Volume of box} = 33 \text{ cm} (22 \text{ cm}) (20 \text{ cm}) = 14,520 \text{ cm}^3$$

$$14,520 \text{ cm}^3 - 12,000 \text{ cm}^3 = 2,520 \text{ cm}^3 \text{ Leftover}$$

12. The triangular base of a prism is a right triangle of sides a and b = 2a. The height h of the prism is equal to 10 mm and its volume is equal to 40 mm³, find the lengths of the sides a and b of the triangle.



$$V = 40 \text{ mm}^3$$

$$l = a$$

$$w = b = 2a$$

$$h = 10 \text{ mm}$$

$$V = \frac{l \cdot w \cdot h}{2}$$

$$V = \frac{a(2a)(10 \text{ mm})}{2} = 40 \text{ mm}^3$$

$$\frac{20a^2 \text{ mm}}{2} = 40 \text{ mm}^3$$

$$10a^2 \text{ mm} = \frac{40 \text{ mm}^3}{10 \text{ mm}}$$

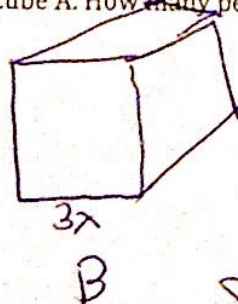
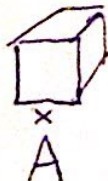
$$\sqrt{a^2} = \sqrt{4 \text{ mm}^2}$$

$$a = 2 \text{ mm}$$

$$b = 2a = 2(2 \text{ mm})$$

$$b = 4 \text{ mm}$$

13. The length of cube B is 3 times the length of cube A. How many percent larger is the volume of cube B than that of cube A?



$$V_A = x^3$$

$$V_B = (3x)^3 = 27x^3$$

cube B is 27 times bigger than cube A

So cube B is 2700% bigger than cube A