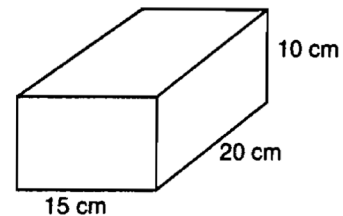


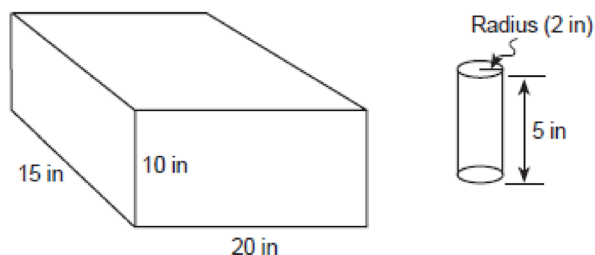
**G.G.12: Volume 2: Know and apply that the volume of a prism is the product of the area of the base and the altitude**

- 1 If the length of a rectangular prism is doubled, its width is tripled, and its height remains the same, what is the volume of the new rectangular prism?
  - 1) double the original volume
  - 2) triple the original volume
  - 3) six times the original volume
  - 4) nine times the original volume
- 2 A box in the shape of a cube has a volume of 64 cubic inches. What is the length of a side of the box?
  - 1)  $21.\bar{3}$  in
  - 2) 16 in
  - 3) 8 in
  - 4) 4 in
- 3 A planned building was going to be 100 feet long, 75 feet deep, and 30 feet high. The owner decides to increase the volume of the building by 10% without changing the dimensions of the depth and the height. What will be the new length of this building?
  - 1) 106 ft
  - 2) 108 ft
  - 3) 110 ft
  - 4) 112 ft
- 4 A fish tank with a rectangular base has a volume of 3,360 cubic inches. The length and width of the tank are 14 inches and 12 inches, respectively. Find the height, in inches, of the tank.
- 5 The dimensions of a brick, in inches, are 2 by 4 by 8. How many such bricks are needed to have a total volume of exactly 1 cubic foot?
- 6 The volume of a rectangular pool is 1,080 cubic meters. Its length, width, and depth are in the ratio 10:4:1. Find the number of meters in each of the three dimensions of the pool.
- 7 Jed bought a generator that will run for 2 hours on a liter of gas. The gas tank on the generator is a rectangular prism with dimensions 20 cm by 15 cm by 10 cm as shown below.

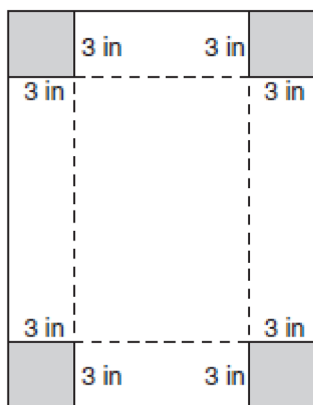


If Jed fills the tank with gas, how long will the generator run? Show how you arrived at your answer. [Note:  $1000 \text{ cm}^3 = 1 \text{ liter}$ ]

- 8 In the accompanying diagram, a rectangular container with the dimensions 10 inches by 15 inches by 20 inches is to be filled with water, using a cylindrical cup whose radius is 2 inches and whose height is 5 inches. What is the maximum number of full cups of water that can be placed into the container without the water overflowing the container?



- 9 Deborah built a box by cutting 3-inch squares from the corners of a rectangular sheet of cardboard, as shown in the accompanying diagram, and then folding the sides up. The volume of the box is 150 cubic inches, and the longer side of the box is 5 inches more than the shorter side. Find the number of inches in the shorter side of the *original* sheet of cardboard.



- 10 A rectangular prism has a length of  $\frac{2x^2 + 2x - 24}{4x^2 + x}$ , a width of  $\frac{x^2 + x - 6}{x + 4}$ , and a height of  $\frac{8x^2 + 2x}{x^2 - 9}$ .

For all values of  $x$  for which it is defined, express, in terms of  $x$ , the volume of the prism in simplest form.

**G.G.12: Volume 2: Know and apply that the volume of a prism is the product of the area of the base and the altitude**

**Answer Section**

1 ANS: 3

$$V_1 = lwh$$

$$V_2 = (2l)(3w)(h)$$

$$V_2 = 6lwh$$

$$V_2 = 6V_1$$

REF: 060103a

2 ANS: 4

$$V = s^3$$

$$64 = s^3$$

$$4 = s$$

REF: 060427a

3 ANS: 3

$$100 \times 10\% = 10; \quad 100 + 10 = 110$$

REF: 010711a

4 ANS:

$$V = lwh$$

$$20. \quad 3360 = (14)(12)(h)$$

$$h = 20$$

REF: 010324a

5 ANS:

$$27. \quad 1 \text{ cubic foot equals } 12^3 \text{ or } 1728 \text{ cubic inches. } \frac{1728}{2 \times 4 \times 8} = 27 \text{ bricks}$$

REF: 069927a

6 ANS:

$$\begin{array}{l} 1080 = 10x \cdot 4x \cdot x \quad 10x \cdot 4x \cdot x \\ 3, 12, 30. \quad 1080 = 40x^3 \quad . \quad 10(3) \times 4(3) \times (3) \\ \quad 3 = x \quad \quad 30 \times 12 \times 3 \end{array}$$

REF: 010030a

7 ANS:

6 hours.  $20 \times 15 \times 10 = 3000 \text{ cm}^3 = 3 \text{ liters}$ . If the generator runs for 2 hours on 1 liter, the generator will run for 6 hours on 3 liters.

REF: spring9832a

8 ANS:

47.  $\frac{10 \times 15 \times 20}{\pi \times 2^2 \times 5} \approx 47.7$ . The question asks how many *full* cups of water can be placed into the container without the water overflowing, so do not round up to 48. The answer is 47.

REF: 010227a

9 ANS:

$$V = lwh$$

$$150 = (w + 5)(w)(3)$$

$$150 = 3w^2 + 15w$$

11.  $3w^2 + 15w - 150 = 0$  . Reject  $w = -10$  as negative width. If the width of the box is 5, adding the

$$w^2 + 5w - 50 = 0$$

$$(w + 10)(w - 5) = 0$$

$$w = 5$$

widths of the cutout squares means the width of the original sheet of cardboard is 11 ( $5 + 3 + 3$ ).

REF: 060331a

10 ANS:

$$4x - 8 \cdot \frac{2(x^2 + x - 12)}{x(4x + 1)} \cdot \frac{(x + 3)(x - 2)}{x + 4} \cdot \frac{2x(4x + 1)}{(x - 3)(x + 3)} = \frac{2(x + 4)(x - 3)}{x} \cdot \frac{(x - 2)}{x + 4} \cdot \frac{2x}{(x - 3)} = 4(x - 2)$$

REF: 060124b