

Name:

Date:

1.

2. The volume of the container is  $60 \times 35 \times 10 = 21000 \text{ cm}^3$ . Only half of it is filled so there is a total of  $21000 \div 2 = 10500 \text{ cm}^3$  of water. Since it is leaking at a rate of  $350 \text{ cm}^3$  per minute, it will take  $10500 \div 350 = \text{30 min}$  to empty the container.

3.

4.

5. We need to find the volume of the container. If we let  $7x$  and  $3x$  be the length and height respectively, keeping the  $7 : 3$  ratio, then we get the following equation:

$$7x = 20 + 3x$$

$$4x = 20$$

$$x = 5$$

This gives us the length, width, and height of the container to be 35 cm, 25 cm, and 15 cm. The volume is  $35 \times 25 \times 15 = 13125 \text{ cm}^3$ . The container is filled with  $\frac{3}{4} \times 13125 = 9843.75 \text{ cm}^3$  of oil. This means the container can contain  $13125 - 9843.75 = \text{3281.25 cm}^3$  more oil.

6.

7.

8. (a) We need to first find the volume of water and the volume of the tank in  $\text{cm}^3$ .  $1 \text{ mL}$  of water =  $1 \text{ cm}^3$  of water. This allows us to convert 5.6 L:

$$5.6 \text{ L} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{1 \text{ cm}^3}{1 \text{ mL}} = 5600 \text{ cm}^3$$

We also know that this was only  $\frac{14}{15}$  of the tank so we can use proportions to get the volume of the tank:

$$\frac{14}{15} = \frac{5600}{V}$$

$$14V = 84000$$

$$V = 6000 \text{ cm}^3$$

This means that the stones offset the volume by a total of  $180 + (6000 - 5600) = 580 \text{ cm}^3$ . The volume of each stone is then  $580 \div 25 = \text{23.2 cm}^3$ .

(b)



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9. (a)

(b)

10. Let's first find the length and width of the carton. Knowing that the height is 20 cm, then we know that  $l \times w = 1200 \div 20 = 60$  where  $l$  and  $w$  are length and width. Using the ratio,  $5 : 3$ , we know that  $3l = 5w$  or  $l = \frac{5w}{3}$ . Plug this into the original equation to get:

$$\begin{aligned}\frac{5w}{3} \cdot w &= 60 \\ 5w^2 &= 180 \\ w^2 &= 36 \\ w &= 6\end{aligned}$$

Now the height, length, and width of the original carton are 20 cm, 10 cm, and 6 cm. Now if we reduce the height by 20%, then the new height is  $20 \times 0.8 = 16$  cm. If we do not change the length then we get the following, where  $x$  is the new width:

$$\begin{aligned}16 \cdot 10 \cdot w &= 1200 \\ 160w &= 1200 \\ w &= 7.5\end{aligned}$$

This means the width is increased by 1.5 cm, which is  $\frac{1.5}{6} \times 100 = \boxed{25\%}$ .