G5-M5-Lesson 8

1. I have a prism with the dimensions of 8 in by 12 in by 20 in. Calculate the volume of the prism, and then give the dimensions of two different prisms that each have $\frac{1}{4}$ of the volume.

To find $\frac{1}{4}$ of the volume, I can use the original prism's volume divided by 4. $\frac{1}{4}$ of $1{,}920\ \text{in}^3$ is equal to $480\ \text{in}^3$.

	Length	Width	Height	Volume
Original Prism	8 in.	12 in.	20 in.	$1{,}920\ \text{in}^3$

I multiply the three dimensions to find the original volume.
$8\ \text{in} \times 12\ \text{in} \times 20\ \text{in} = 1{,}920\ \text{in}^3$

	Length	Width	Height	Volume
Prism 1	2 in.	12 in.	20 in.	$480\ \text{in}^3$

In order to create a volume that is $\frac{1}{4}$ of 1,920, I can change one of the dimensions and keep the others the same.
$\frac{1}{4}$ of $8\ \text{in} = 2\ \text{in}$

$2\ \text{in} \times 12\ \text{in} \times 20\ \text{in} = 480\ \text{in}^3$

	Length	Width	Height	Volume
Prism 2	8 in.	6 in.	10 in.	$480\ \text{in}^3$

Another way I can create a volume that is $\frac{1}{4}$ of 1,920 is to change two of the dimensions and keep the other the same.
$\frac{1}{2}$ of $12\ \text{in} = 6\ \text{in}$
$\frac{1}{2}$ of $20\ \text{in} = 10\ \text{in}$

Kayla's bedroom has a volume of 800 ft^3.
$10\ ft \times 8\ ft \times 10\ ft = 800\ ft^3$

One way to double the volume is to double one dimension and keep the others the same.

2. Kayla's bedroom has the dimensions of 10 ft by 8 ft by 10 ft. Her den has the same height (10 ft) but double the volume. Give two sets of the possible dimensions of the den and the volume of the den.

Length: $10\ ft \times 2 = 20\ ft$

I can double the length, $10\ ft \times 2 = 20$ ft, and keep both the width and the height the same.

Width: $8\ ft$

Height: $10\ ft$

$\text{Volume} = 20\ ft \times 8\ ft \times 10\ ft = 1,600\ ft^3$

1,600 ft^3 is double the original volume of 800 ft^3.

Length: $10\ ft \times 4 = 40\ ft$

Width: $8\ ft \times \frac{1}{2} = 4\ ft$

In order to double the volume, I can also quadruple the length and cut the width in half.

Height: $10\ ft$

$\text{Volume} = 40\ ft \times 4\ ft \times 10\ ft = 1,600\ ft^3$

1,600 ft^3 is double the original volume of 800 ft^3.