

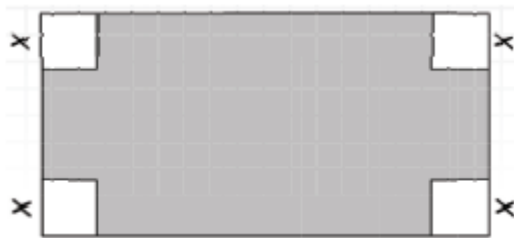
Study Guide and Intervention

Multiplying Linear Functions

Exercises

For questions 1 – 9 use the scenario below.

A cardboard container is constructed by cutting a square out of a rectangular piece of cardboard measuring 20 inches by 40 inches. The sides created are then folded up to form the height of the container.



1. Fill in the table of values based on x , the side length of the removed square. The first 2 lines of the table have been completed for you.

SIDE LENGTH OF SQUARE, IN INCHES, x	WIDTH OF CONTAINER, IN INCHES, $w(x)$	LENGTH OF CONTAINER, IN INCHES, $l(x)$	HEIGHT OF SIDES, IN INCHES, $h(x)$	VOLUME OF CONTAINER, IN CU. IN., $V(x)$
0	20	40	0	0
1	18	38	1	684
2			2	
3			3	
4			4	
5			5	
6			6	
7			7	

2. What type of function is $V(x)$?

3. Write the function $V(x)$.

- Based on the function rule for $V(x)$, what would be the volume of a container if the side length of the removed square is 7.5 inches?
- Write a function $w(x)$ to represent the width of the container based on the side length of the removed square, x .
- Write a function $l(x)$ to represent the length of the container based on the side length of the removed square, x .
- Write a function $h(x)$ to represent the height of the container.
- The volume of any rectangular prism can be found using the formula $V=lwh$ where l represents the length of the base of the prism, w represents the width of the base of the prism, and h represents the height of the prism. Use the function rules for $l(x)$, $w(x)$, and $h(x)$ to write a function rule for finding the volume of a cardboard container based on the side length of the removed square, x . Write in simplified form.

$$V(x) = l(x) \cdot w(x) \cdot h(x)$$

9. What do you notice about the function rules for $V(x)$ in problem 3 and problem 8?

Study Guide and Intervention

Multiplying Linear Functions (cont.)

Exercises

Use the information below to complete questions 10 – 17.

A rectangular prism has a height of x cm. The length of the base is 2 cm less than the height. The width of the base is 3 cm more than the height.

10. Fill in the table of values based on the information in the situation.

HEIGHT OF PRISM, IN CM, x	LENGTH OF BASE OF PRISM, IN CM, $l(x)$	WIDTH OF BASE OF PRISM, IN CM, $w(x)$	LATERAL SURFACE AREA OF PRISM, IN CUBIC CM, $A(x)$
0			0
1			6
2			20
3			42
4			72
5			110
6			156

11. What type of function is $A(x)$?

12. Write the function rule for $A(x)$.

13. Write a function $l(x)$ to represent the length of the base of the prism based on the side length of the height of the prism, x .

14. Write a function $w(x)$ to represent the width of the base of the prism based on the side length of the height of the prism, x .

15. Write a function $h(x)$ to represent the height of the prism.

16. The lateral surface area of a rectangular prism can be found using the formula $A = (2l + 2w)h$, where l represents the length of the base of the prism, w represents the width of the base of the prism, and h represents the height of the prism. Use the function rules for $l(x)$, $w(x)$, and $h(x)$ to write a function rule for $A(x)$. Write the function rule in simplified form.

$$A(x) = (2 \cdot l(x) + 2 \cdot w(x)) \cdot h(x)$$

17. What would be the lateral surface area of a rectangular prism with a height of 10 cm?

Use the functions shown to write the simplest form of the indicated products.

$$\begin{aligned} a(x) &= 2x \\ b(x) &= 10 - 2x \\ c(x) &= 3x + 12 \end{aligned}$$

18. $b(x) \cdot c(x)$

19. $a(x) \cdot c(x)$

20. $a(x) \cdot b(x) \cdot c(x)$