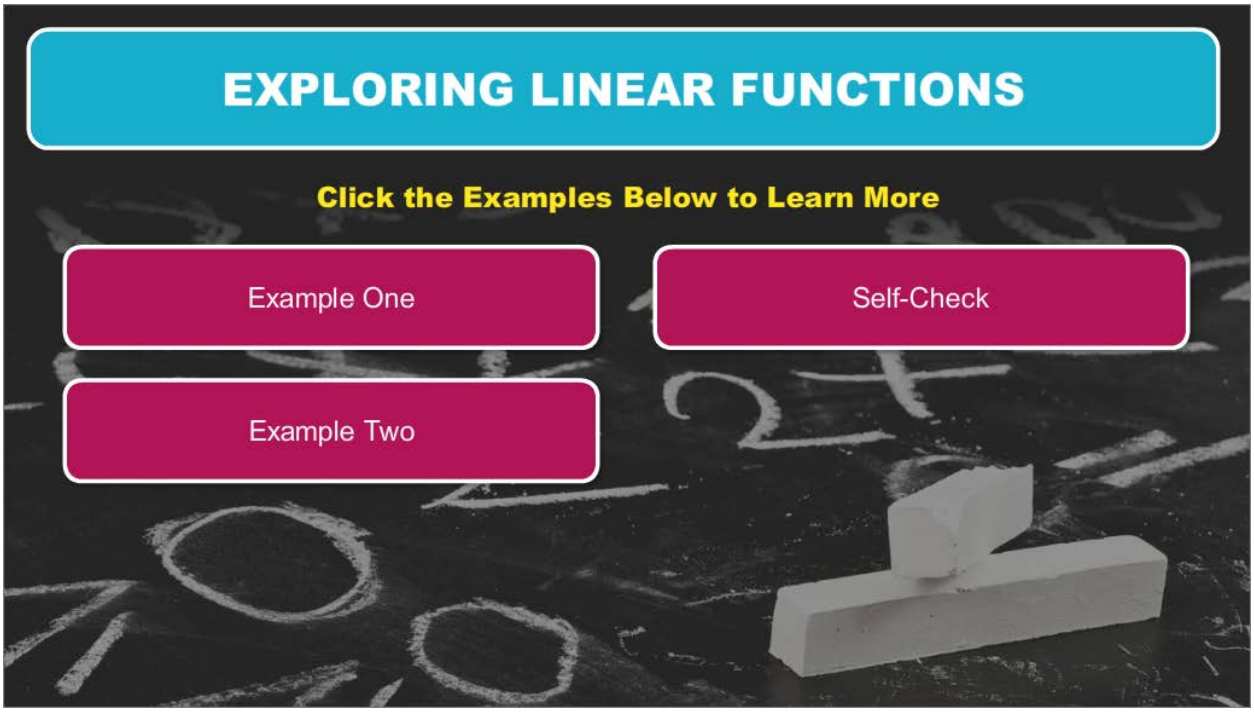
Module 10: Linear and Quadratic Function Families
Topic 1 Content: Exploring Linear Functions Notes

Introduction

Hi there! I'm so glad you could join me for this lesson in Algebra I, where you will investigate the linear function family and discover how transformations of its parent function affect the domain and range.

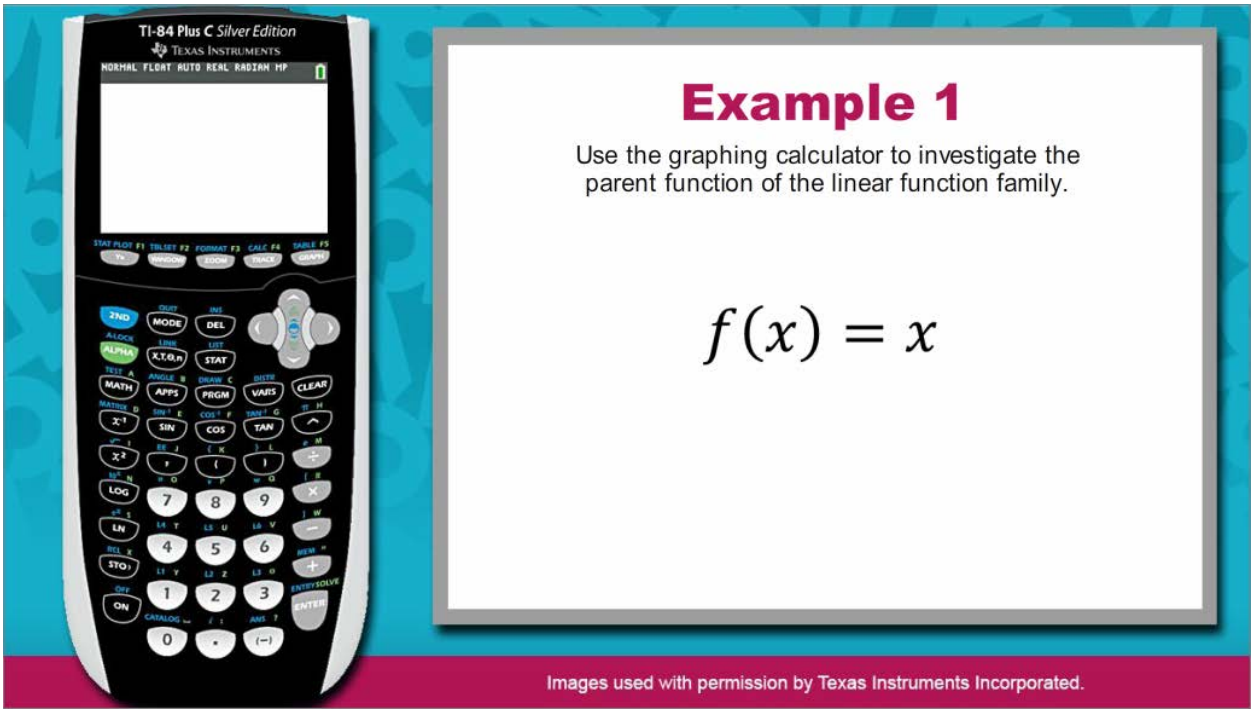
Exploring Linear Functions



Click the examples below to learn more.

- Example One
- Example Two
- Self-Check

Example One

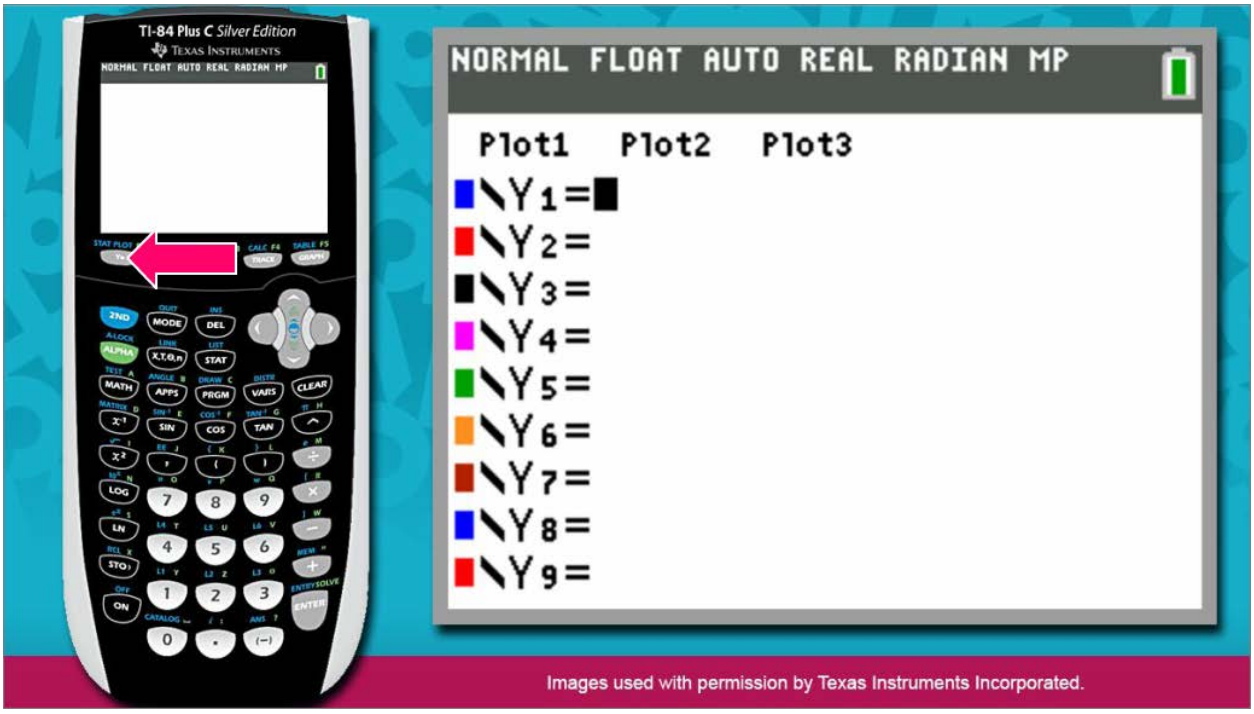


Use the graphing calculator to investigate the parent function of the linear function family.

$$f(x) = x$$

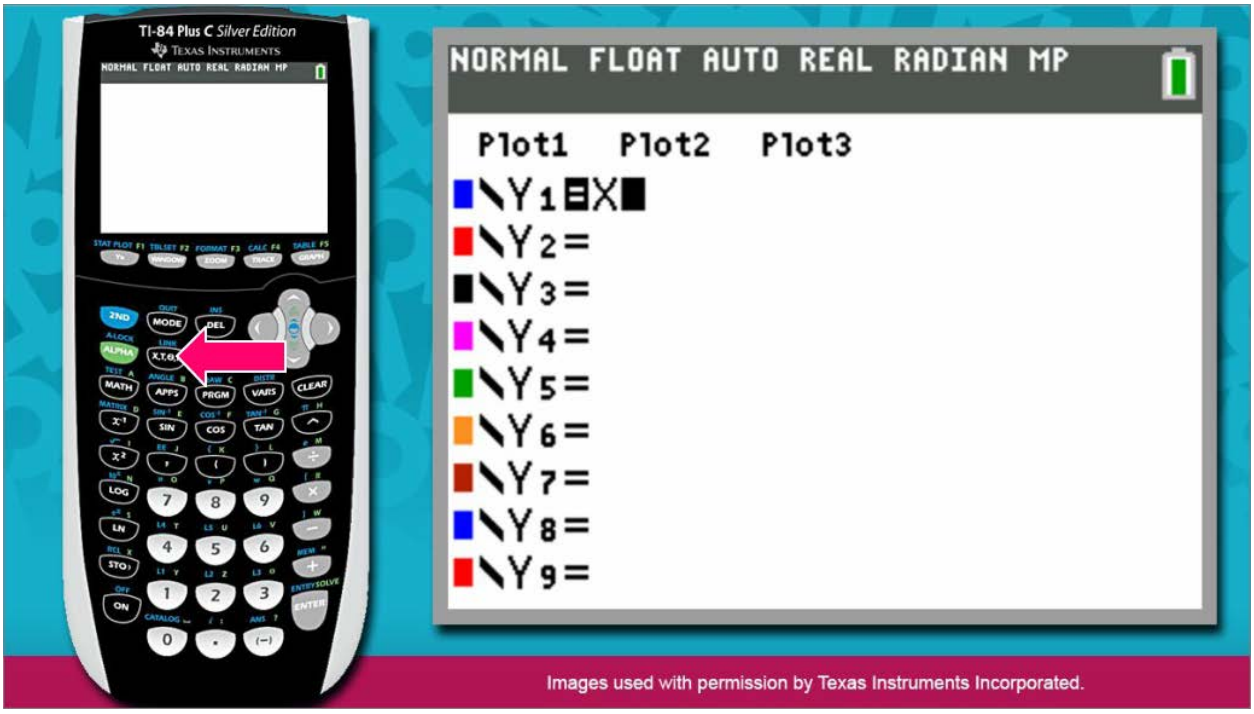
The parent function of the linear function family is $f(x) = x$. Enter this function into the graphing calculator.

Example One (continued)



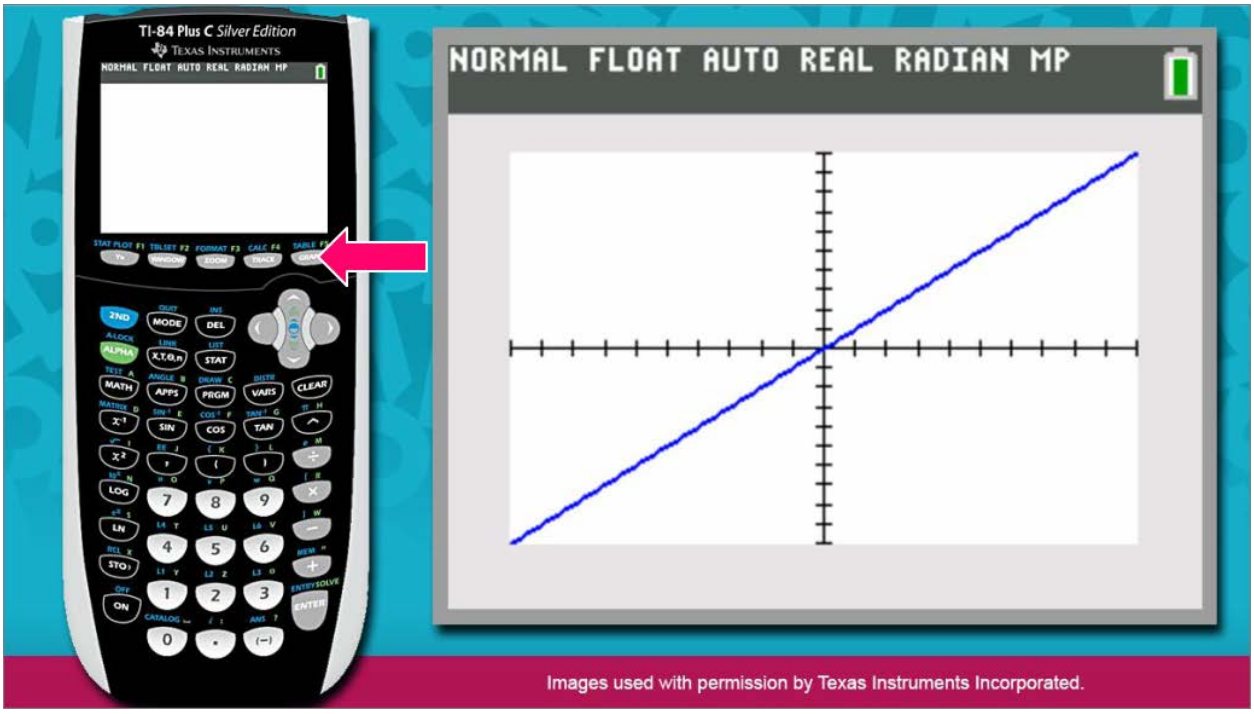
Press the Y= key.

Example One (continued)



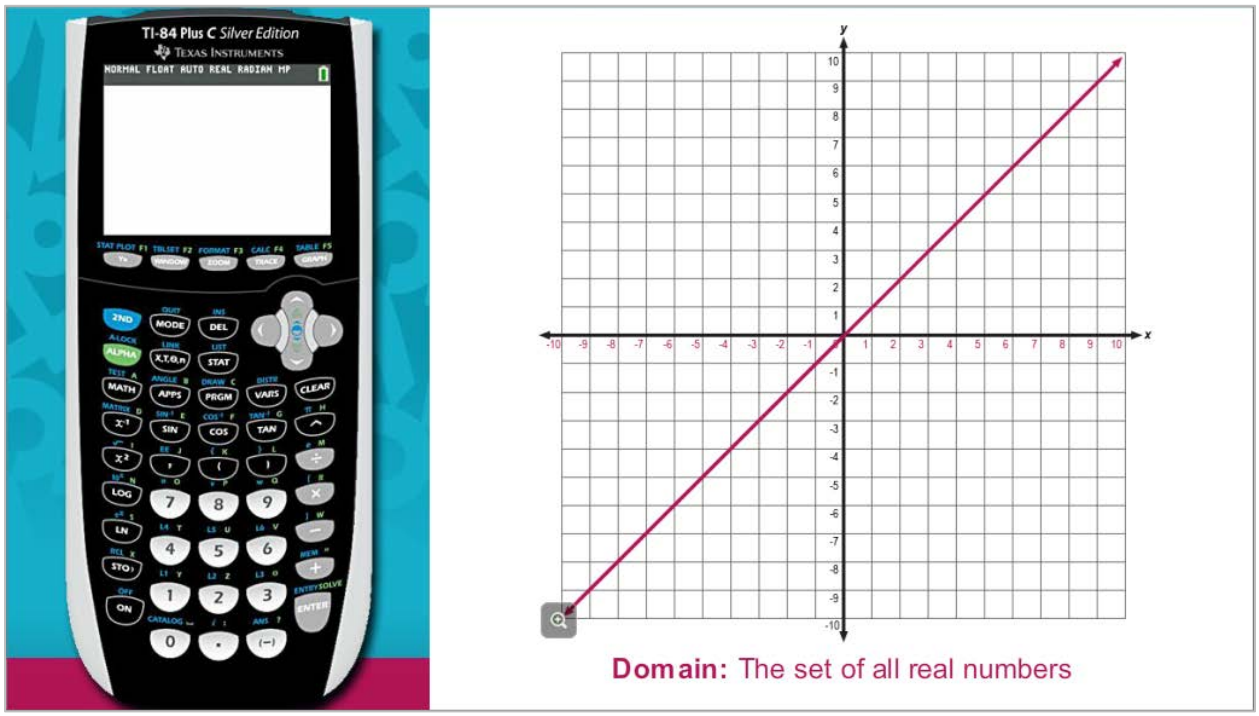
Now, press the x key, located to the right of the green ALPHA key.

Example One (continued)



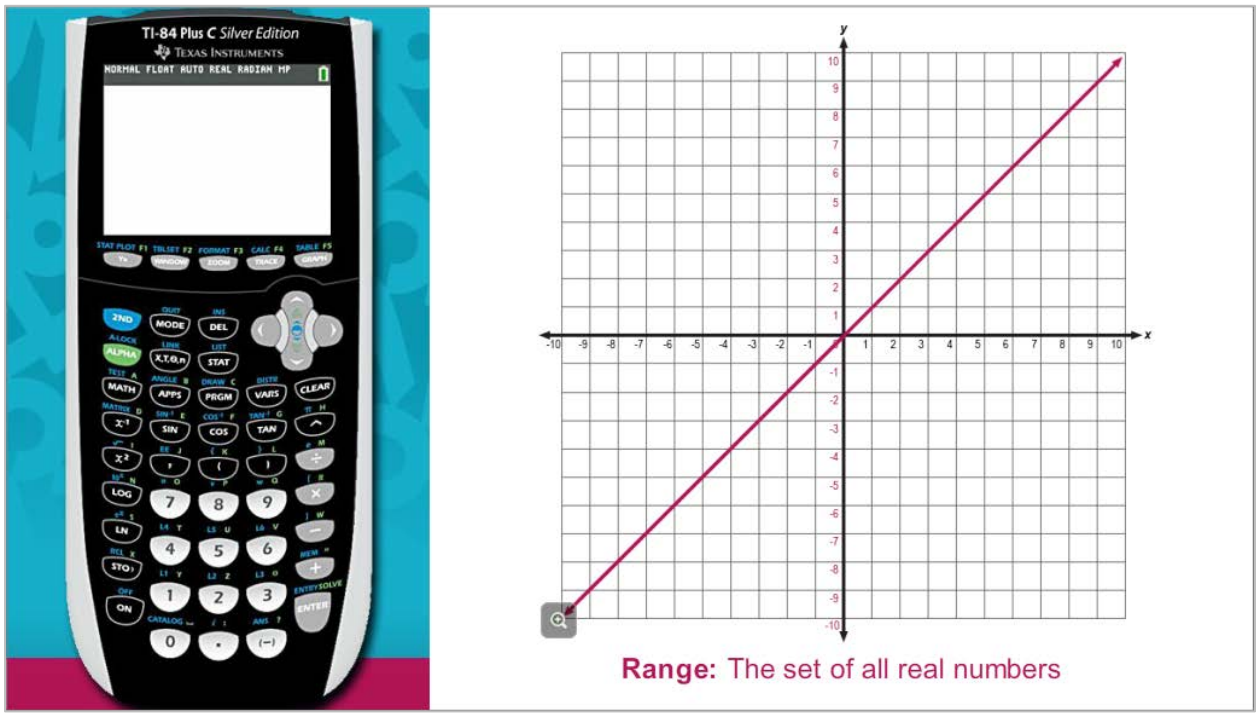
Then, press GRAPH.

Example One (continued)



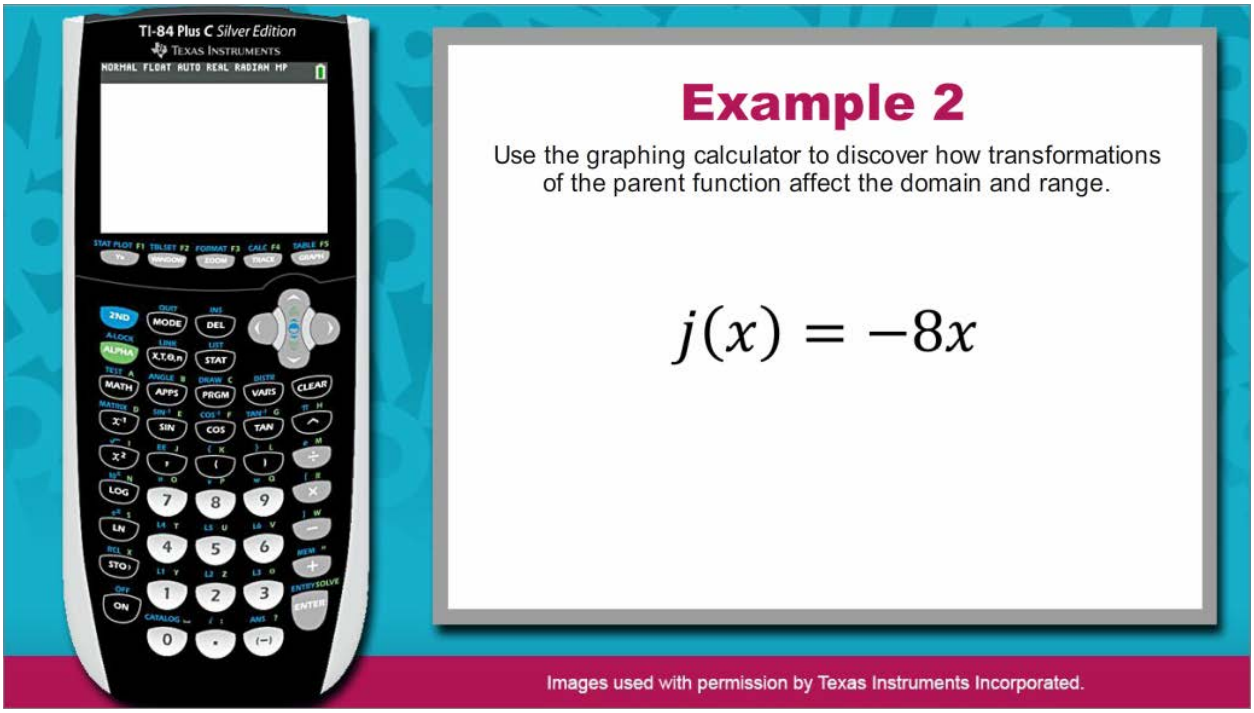
Notice that the function is defined for all values of x. Or in other words, a y-value exists of all values of x – all negative values, 0, and all positive values. Therefore, the domain of the linear parent function is the set of all real numbers.

Example One (continued)



Notice that for the function $f(x) = x$, there exists negative y-values, a y-value of 0, and positive y-values. Therefore, the range of the function is also the set of all real numbers.

Example 2

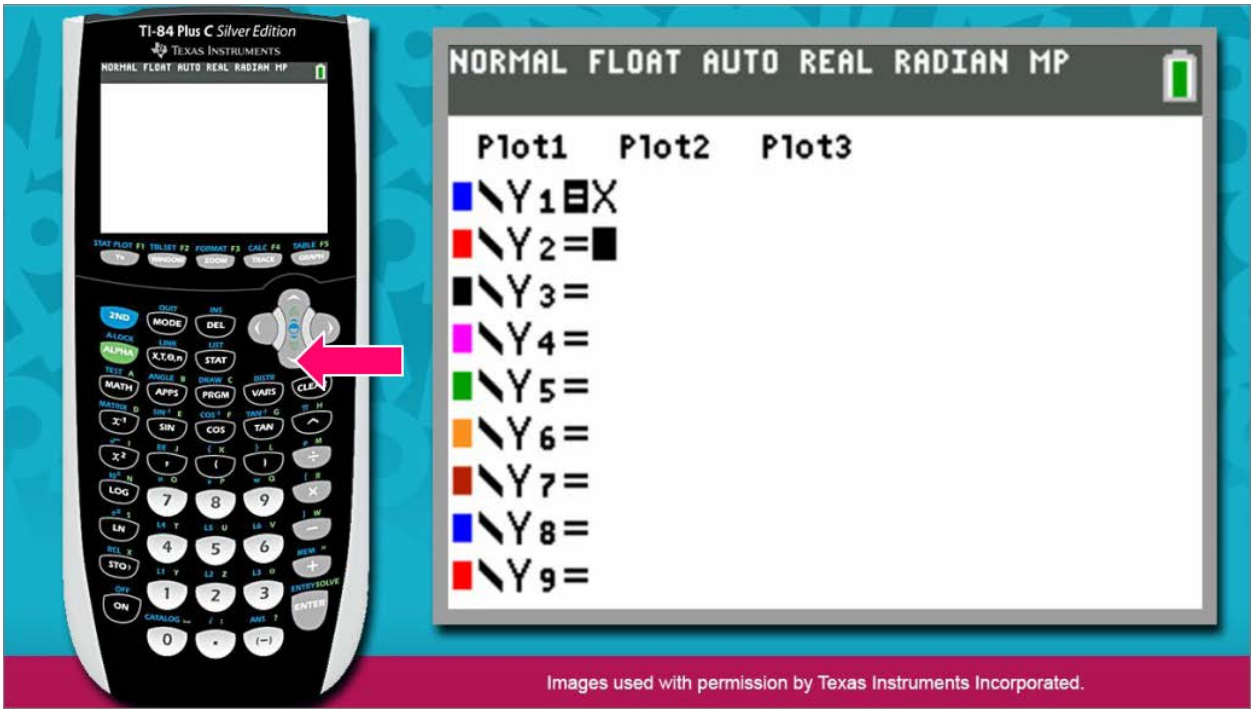


Use the graphing calculator to discover how transformations of the parent function affect the domain and range.

$$j(x) = -8x$$

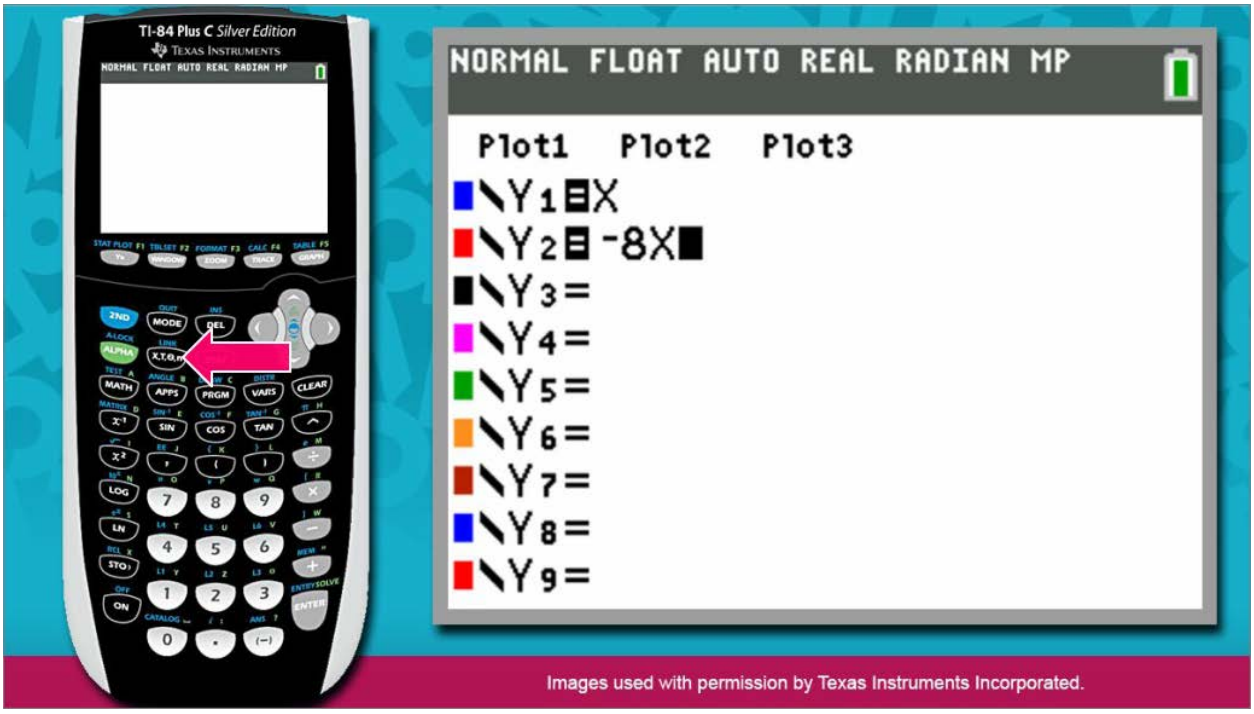
Enter this function into the graphing calculator.

Example 2 (continued)



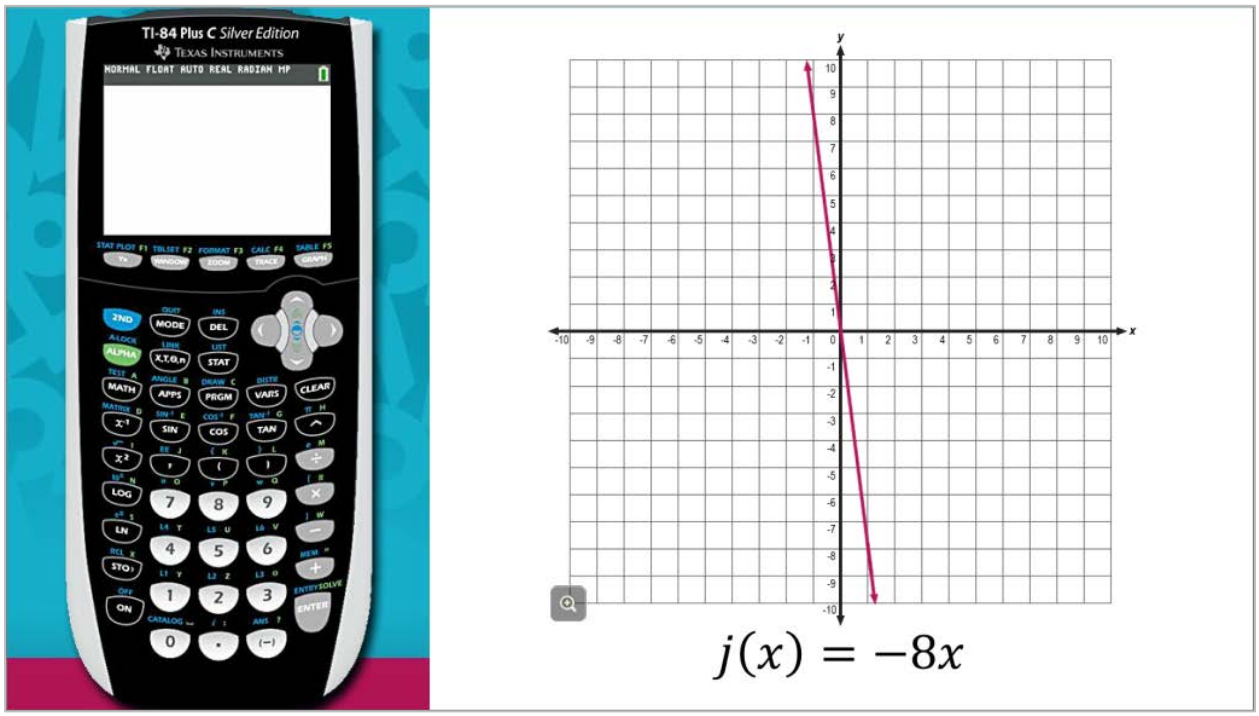
Press the Y= key. Then, press the down arrow so that the cursor is blinking to the right of Y2.

Example 2 (continued)



Now, enter the expression $-8x$ to the right of Y2. Press the negative sign key, located beneath the 3 key. Then, press the 8 key, and then the x key.

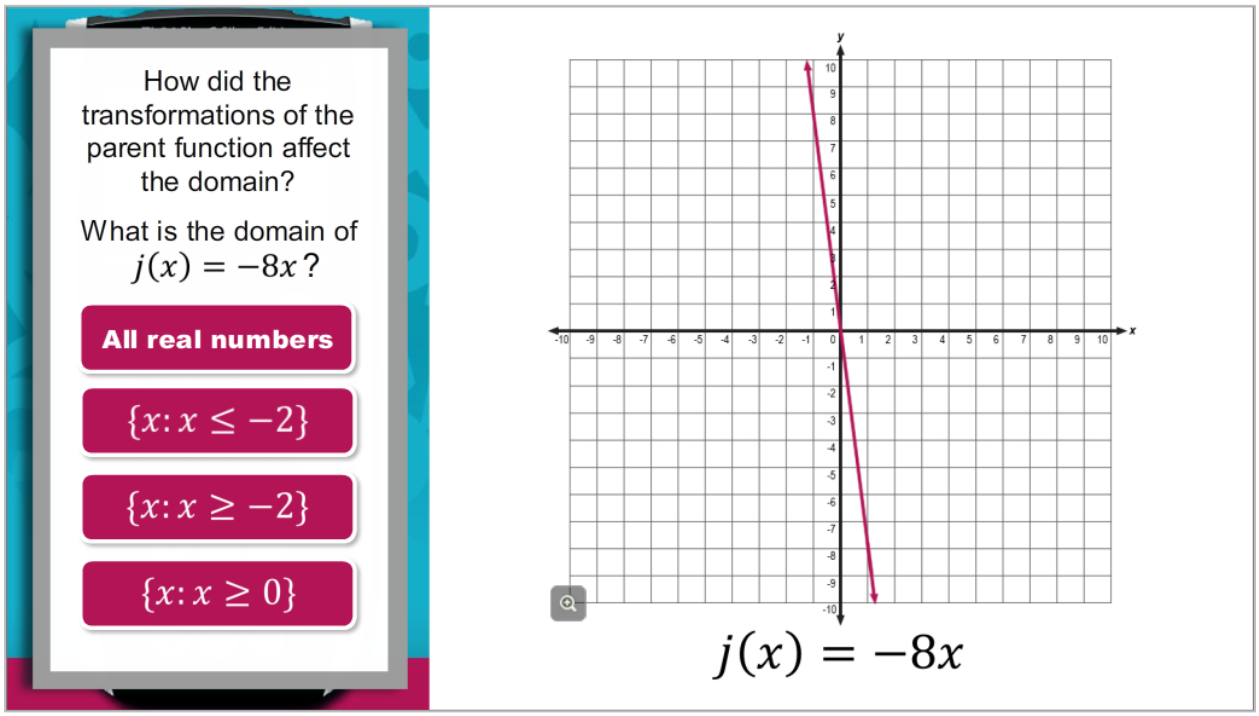
Example 2 (continued)



Now, press GRAPH.

Notice that the function $j(x) = -8x$ represents a composite transformation of the linear parent function. The graph of $j(x)$ represents a reflection of the linear parent function, as well as a stretch by a factor of 8.

Example 2 (continued)

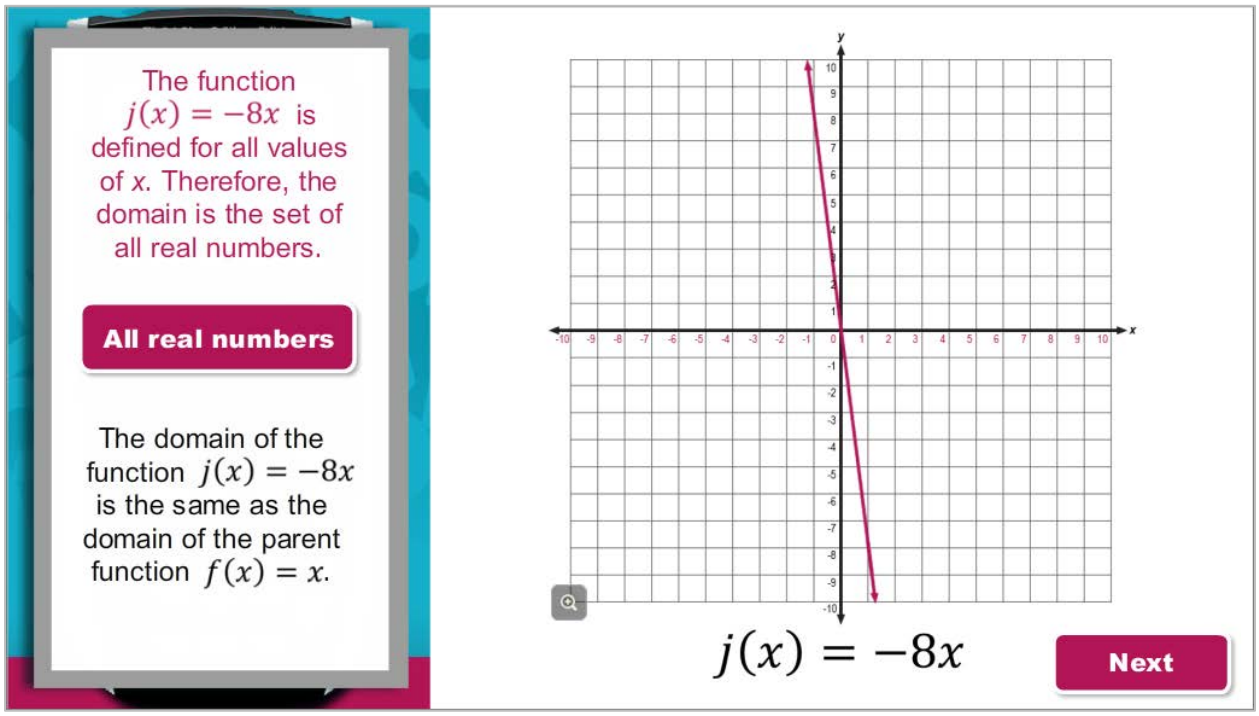


How did the transformations of the parent function affect the domain?

What is the domain of $j(x) = -8x$?

A) all real numbers
B) $\{x: x \leq -2\}$
C) $\{x: x \geq -2\}$
D) $\{x: x \geq 0\}$

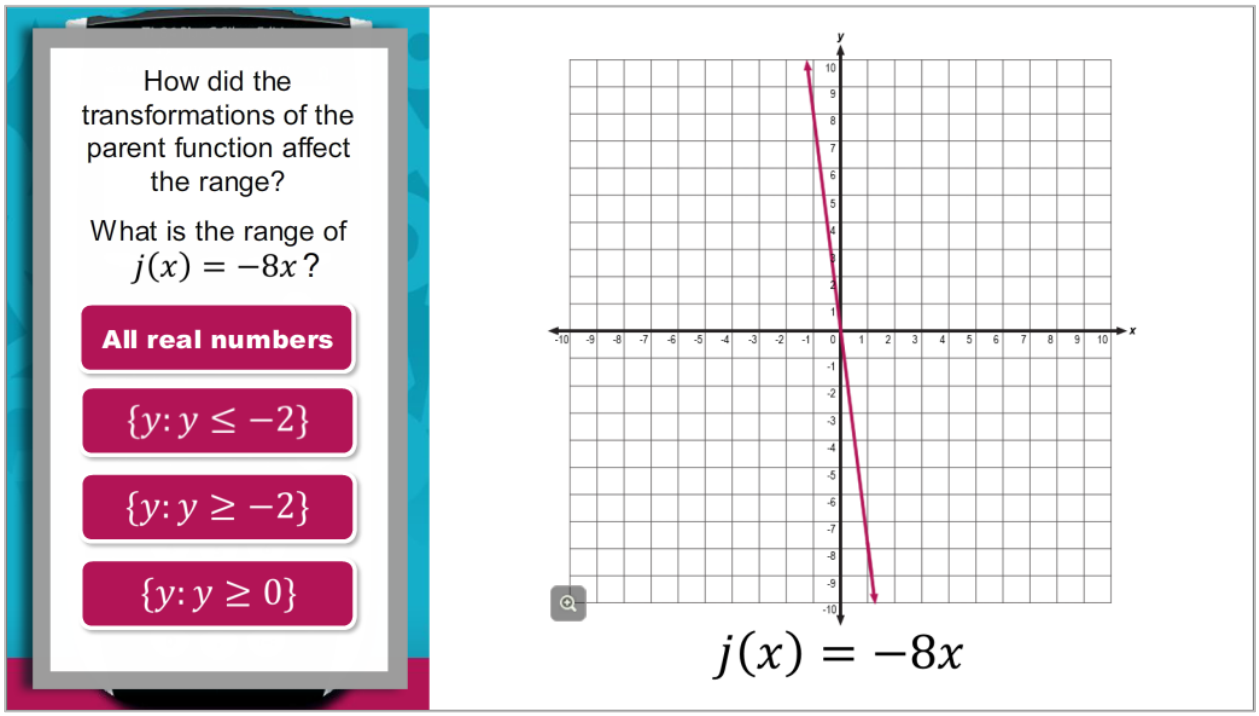
Example 2 (continued)



The function $j(x) = -8x$ is defined for all values of x. Therefore, the domain is the set of all real numbers.

The domain of the function $j(x) = -8x$ is the same as the domain of the parent function $f(x) = x$.

Example 2 (continued)

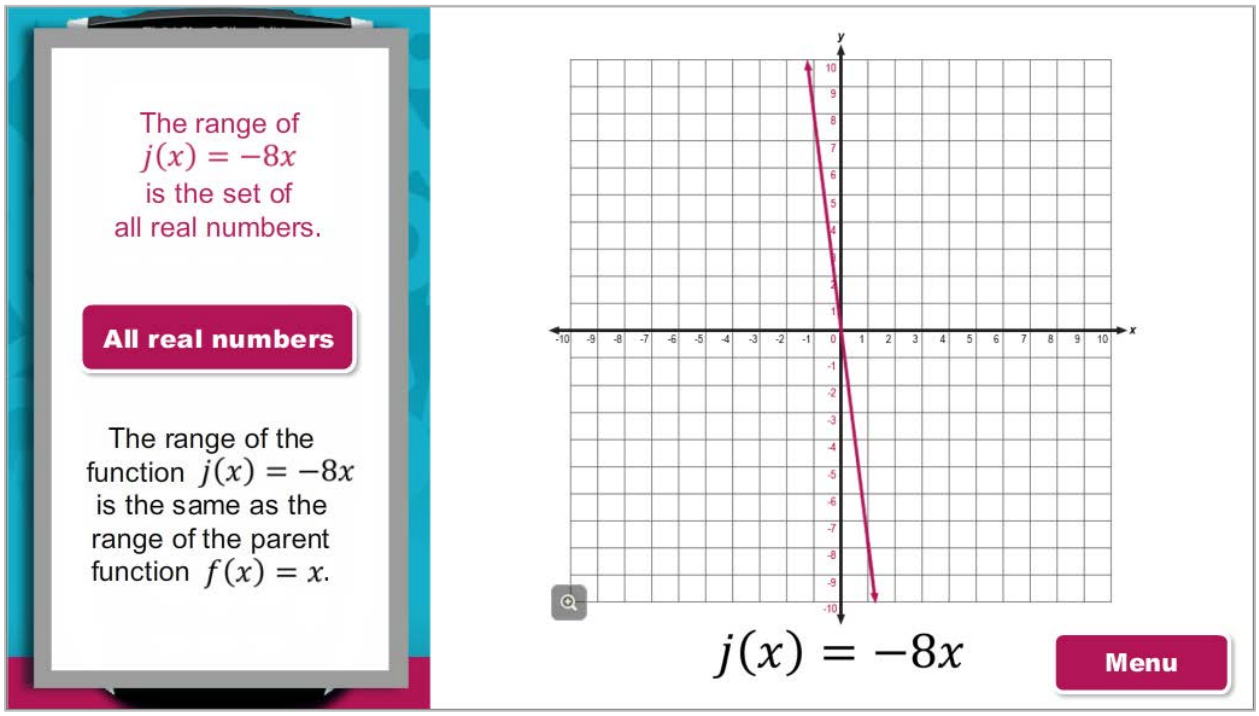


How did the transformations of the parent function affect the range?

What is the range of $j(x) = -8x$?

A) the set of all real numbers
B) $\{y: y \leq -2\}$
C) $\{y: y \geq -2\}$
D) $\{y: y \geq 0\}$

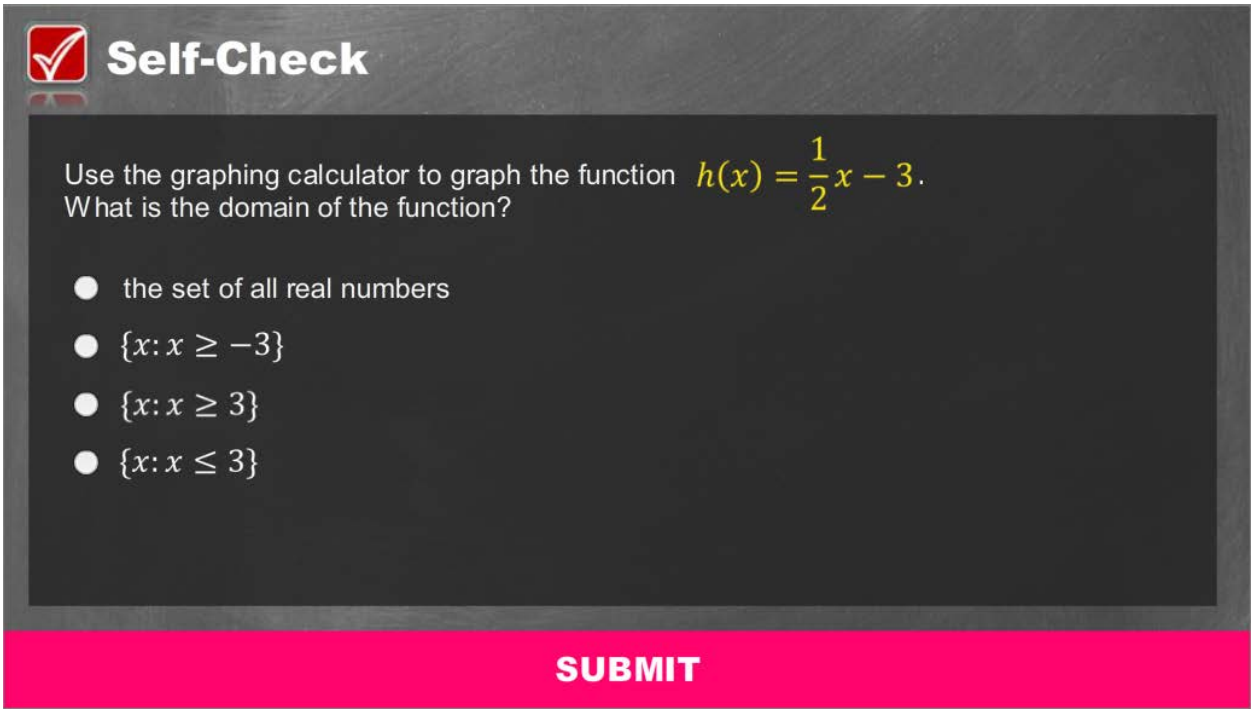
Example 2 (continued)



The range of $j(x) = -8x$ is the set of all real numbers.

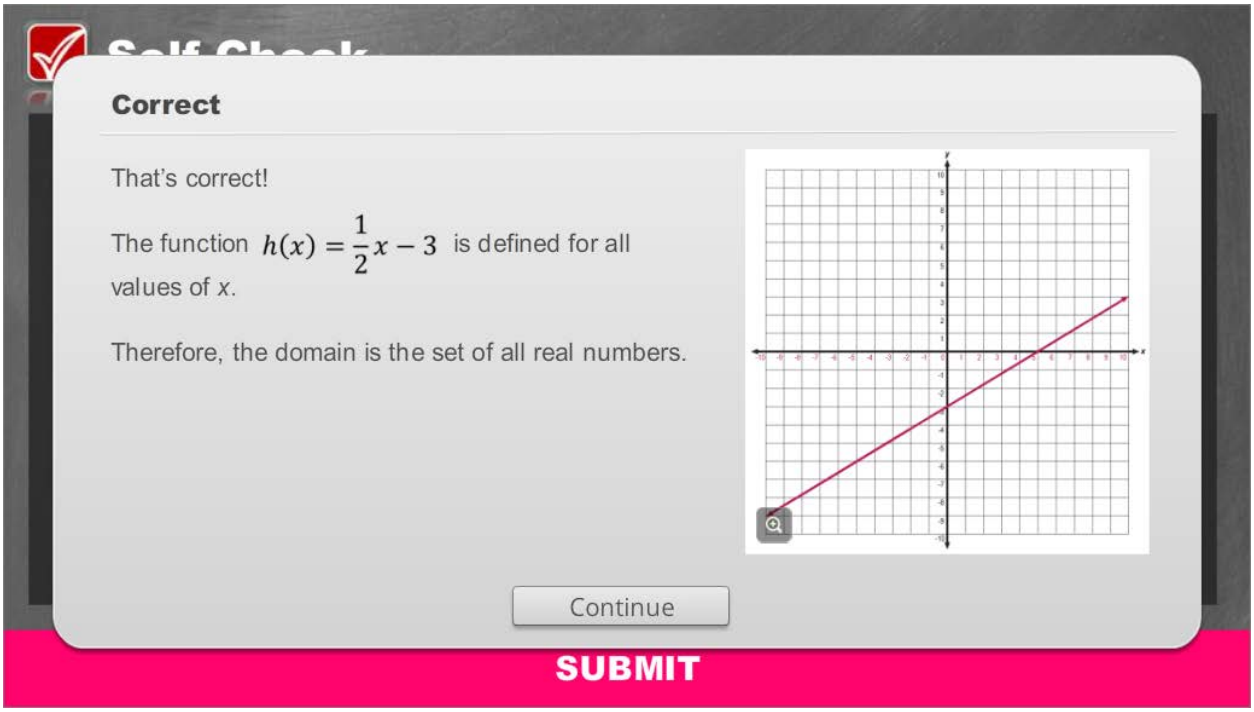
The range of the function $j(x) = -8x$ is the same as the range of the parent function $f(x) = x$.

Self-Check 1



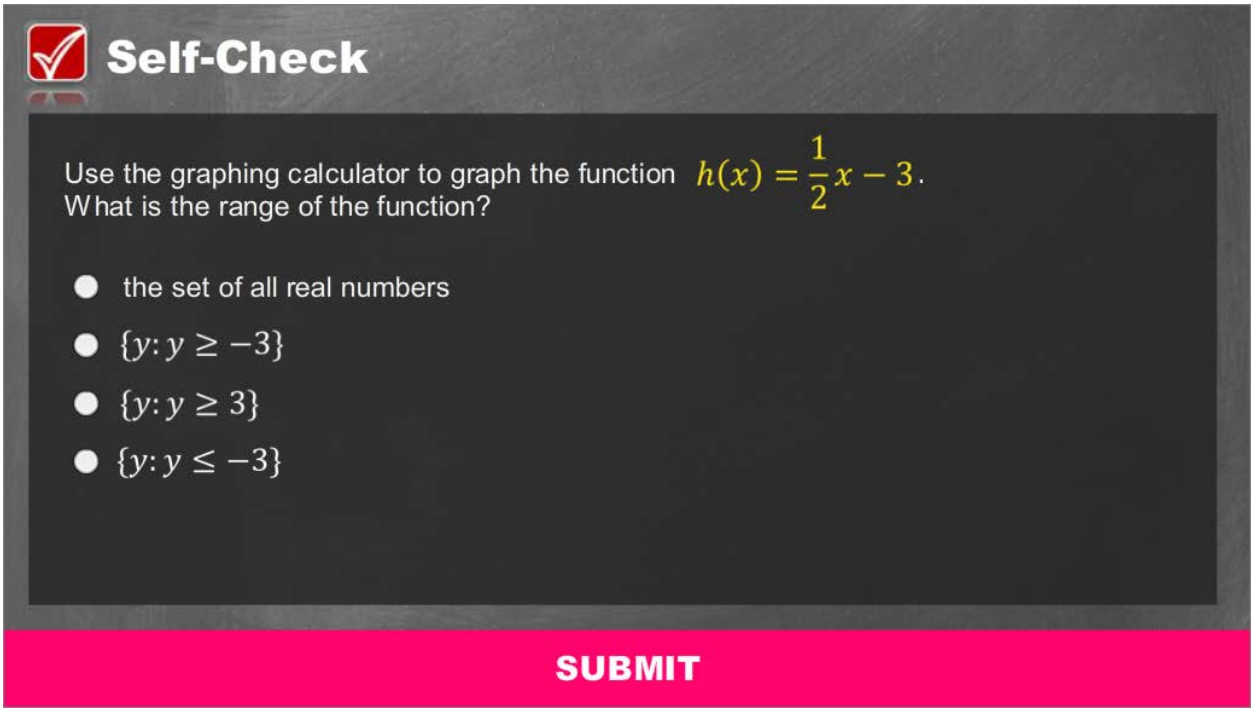
Solve the problem in the image above to check your understanding of the content.

Self-Check 1: Answer



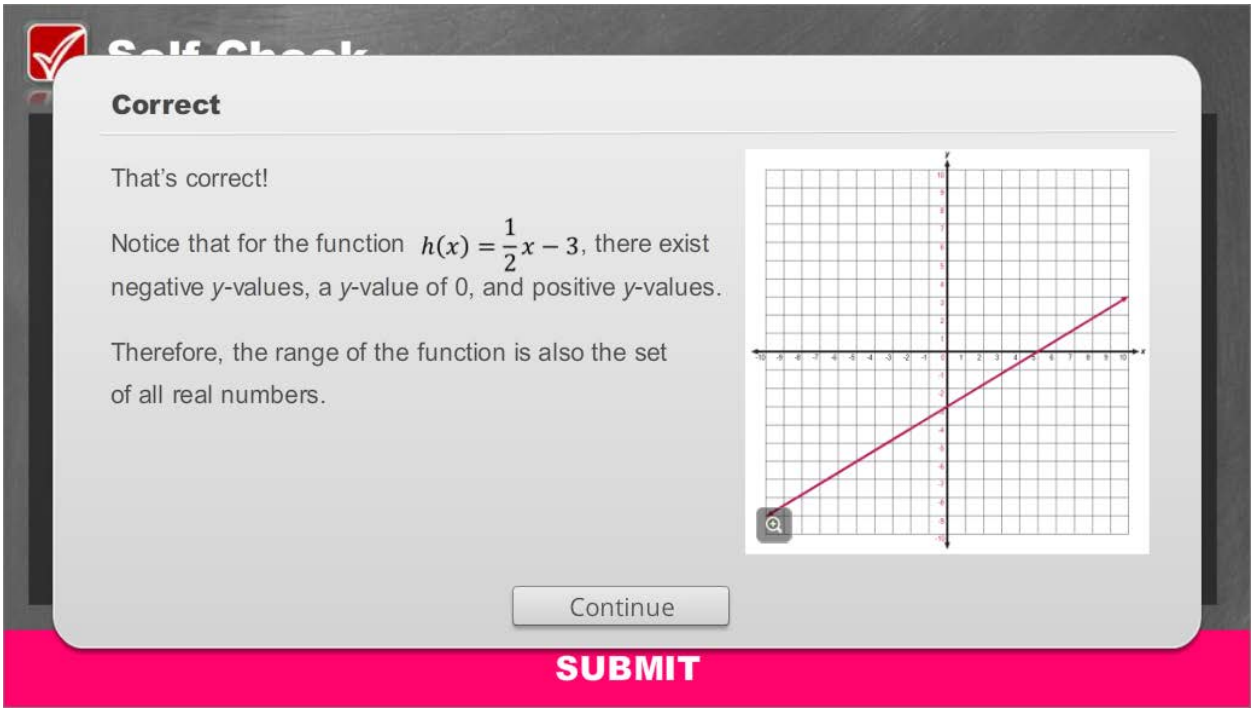
For your reference, the image above shows the correct solution to the self-check problem.

Self-Check 2



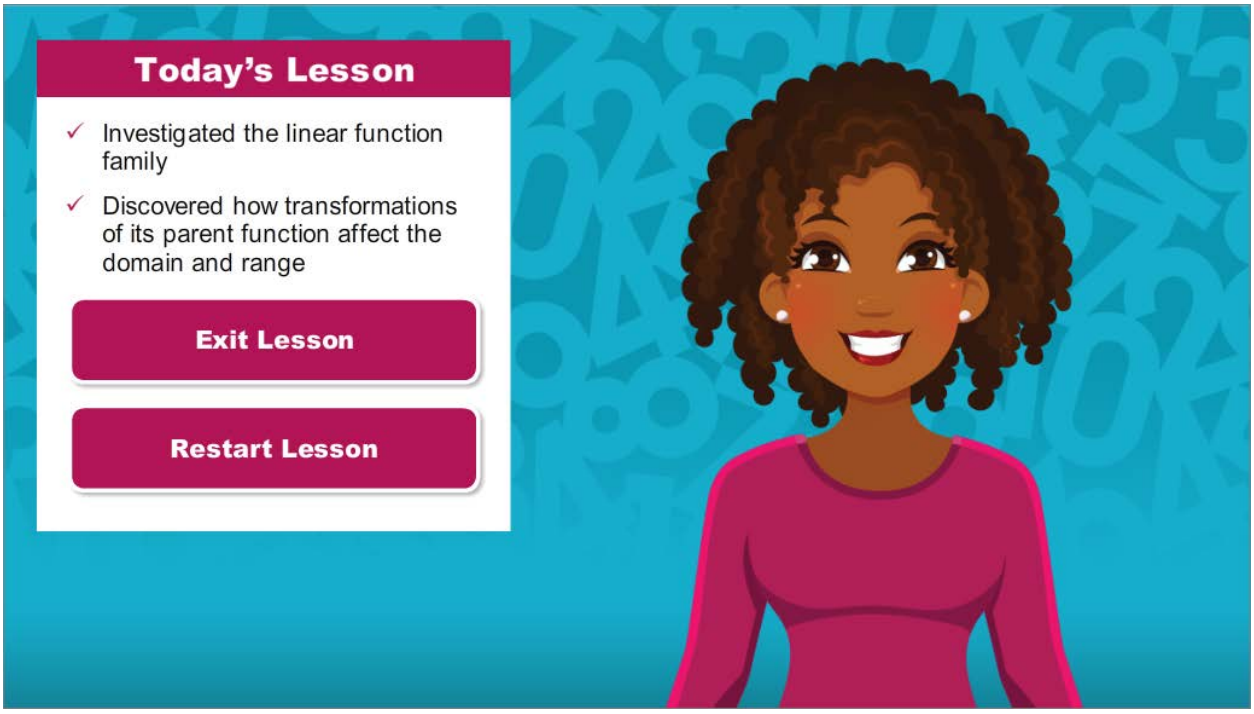
Solve the problem in the image above to check your understanding of the content.

Self-Check 2: Answer



For your reference, the image above shows the correct solution to the self-check problem.

Conclusion



You have reached the conclusion of this lesson where you investigated the linear function family and discovered how transformations of its parent function affect the domain and range.