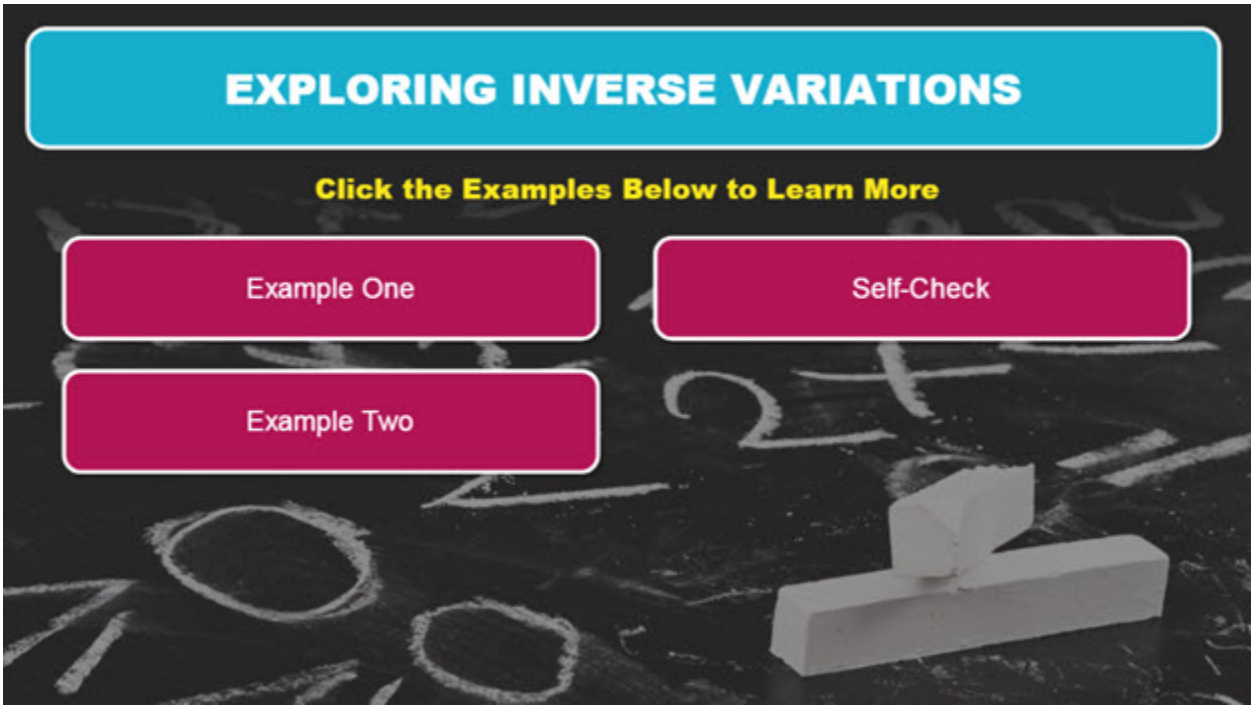
Module 11: Direct and Inverse Variation
Topic 1 Content: Exploring Inverse Variations Notes

Introduction

Hello there! I'm so glad you could join me for this lesson in Algebra I, where you will explore data sets and practical situations that represent inverse variations.

Exploring Inverse Variations



Click the examples below to learn more.

- Example One
- Example Two
- Self-Check

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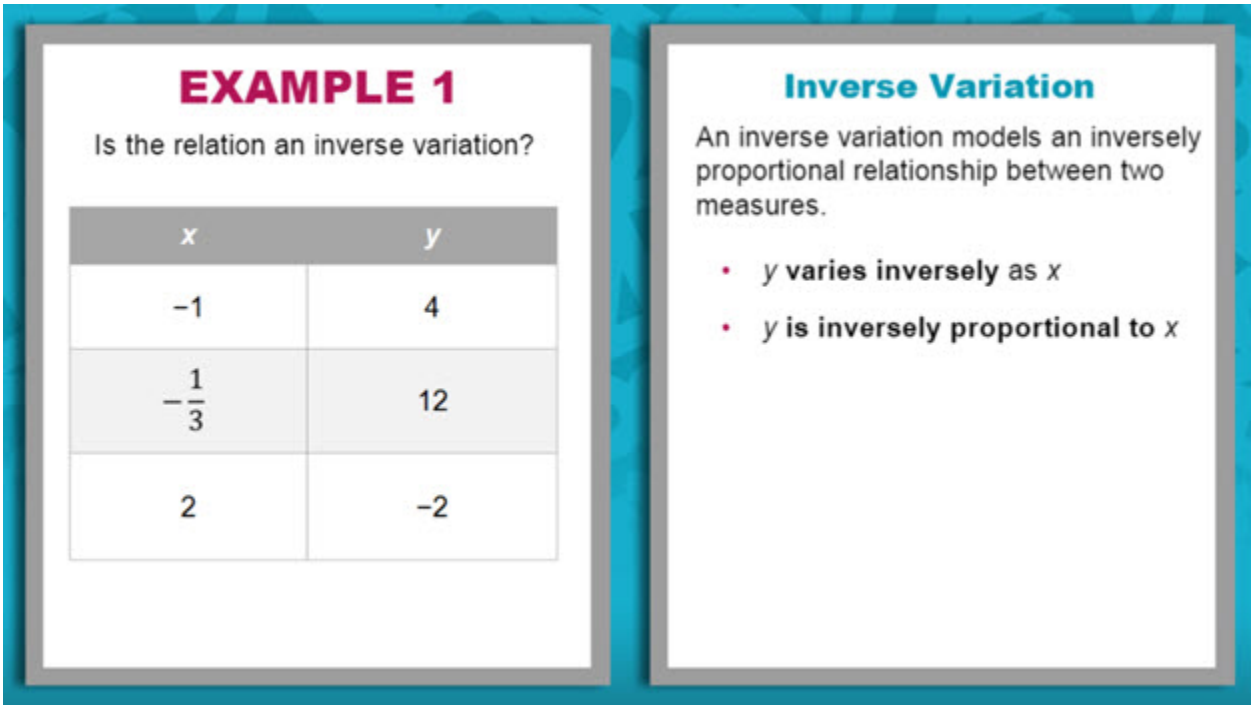
Example One

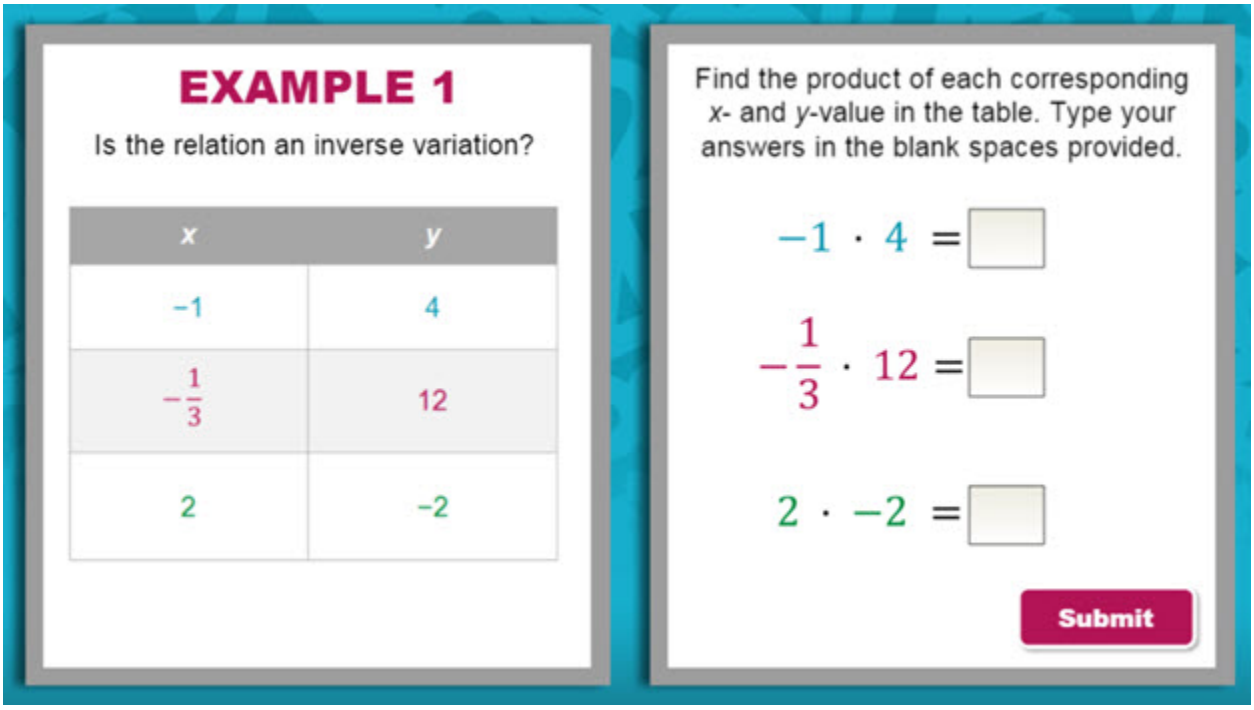


Is the relation an inverse variation?

x	y
$\mathbf{-1}$	4
$\mathbf{-\frac{1}{3}}$	12
$\mathbf{2}$	-2

An inverse variation models an inversely proportional relationship between two measures. When a relation represents an inverse variation, "y varies inversely as x" or in other words, "y is inversely proportional to x."

Example One (continued)



Is the relation an inverse variation?

x	y
-1	4
$-\frac{1}{3}$	12
2	-2

Consider the given relation. You can determine if the relation is an inverse variation by verifying that each product of corresponding x- and y-values is equal.

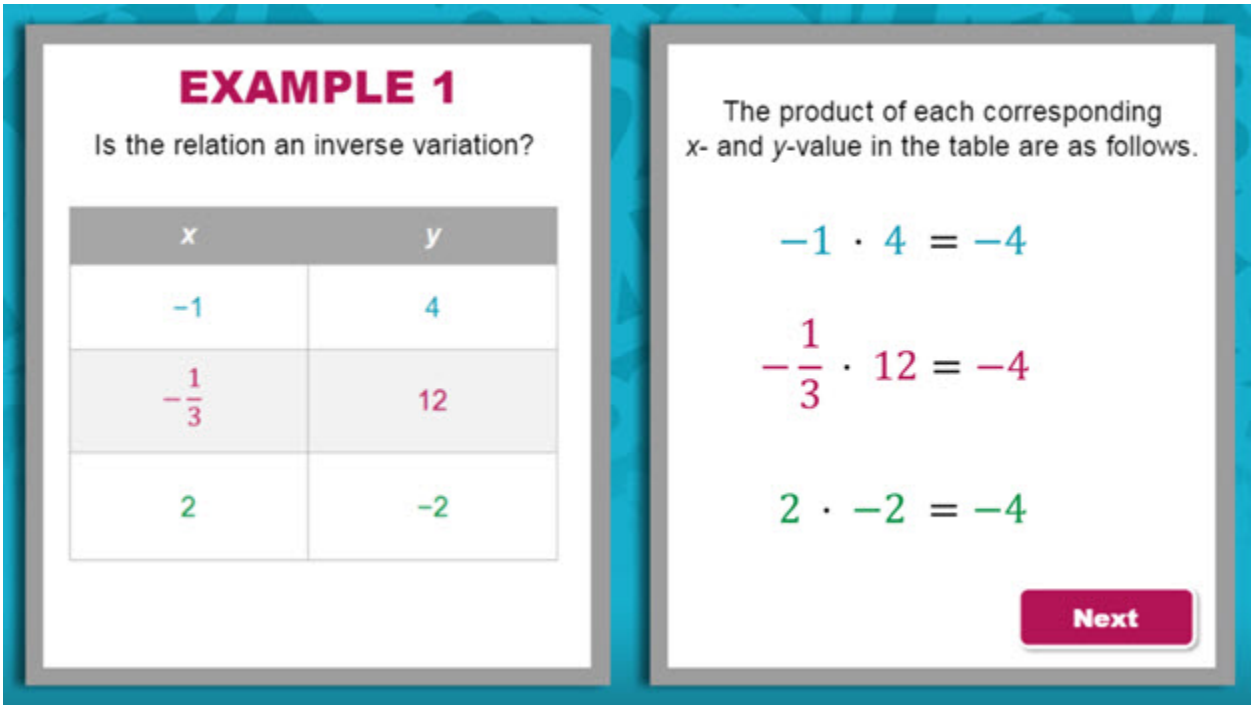
Find the product of each corresponding x- and y-value in the table. Type your answers in the blank spaces provided.

$-1 \cdot 4 = ?$

$-\frac{1}{3} \cdot 12 = ?$

$2 \cdot -2 = ?$

Example One (continued)



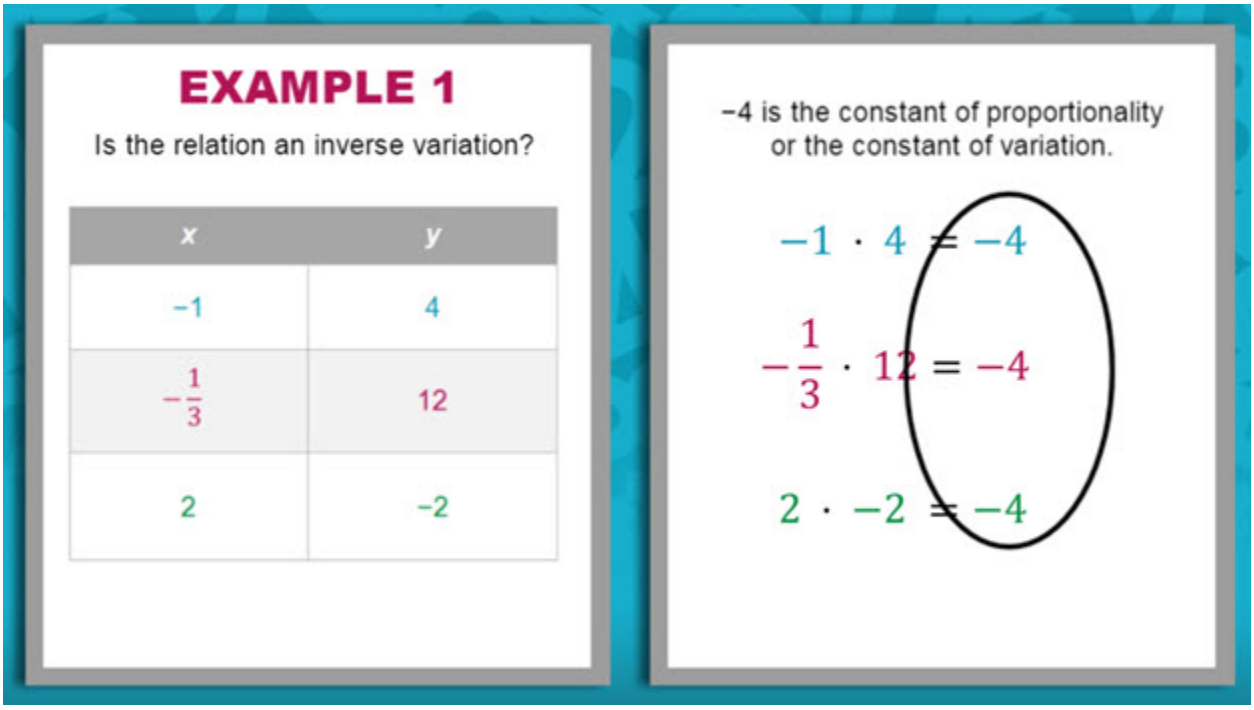
The product of each corresponding x- and y-value in the table are as follows.

$$-1 \cdot 4 = -4$$

$$-\frac{1}{3} \cdot 12 = -4$$

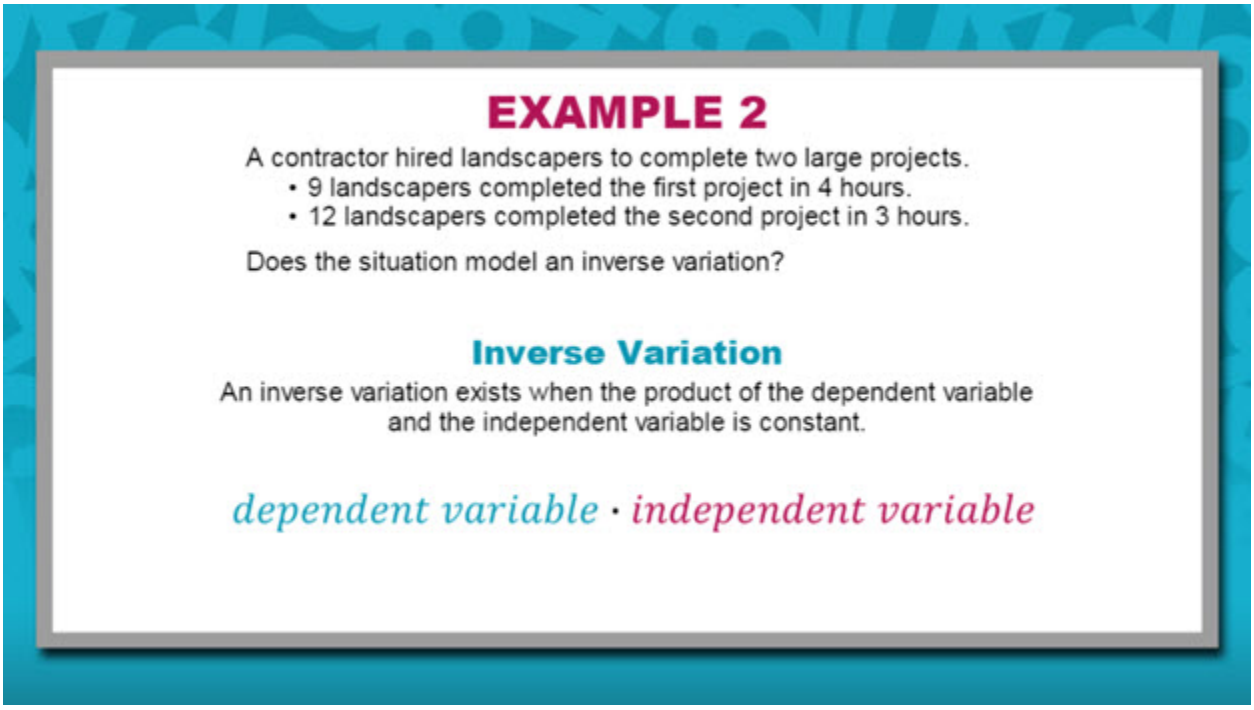
$$2 \cdot -2 = -4$$

Example One (continued)



Notice that each product of corresponding x- and y-values is equal. Therefore, you can conclude that the relation does represent an inverse variation. The value, -4, is referred to as the constant of proportionality or the constant of variation.

Example Two



A contractor hired landscapers to complete two large projects.

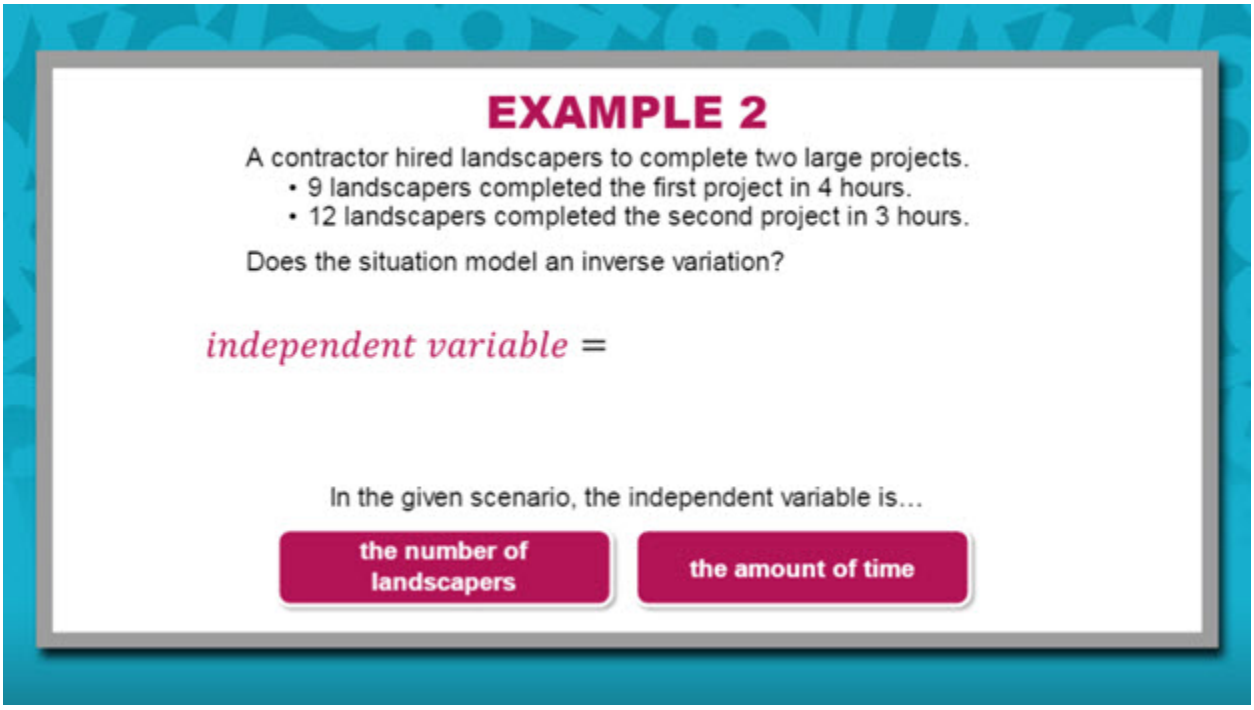
- *9 landscapers completed the first project in 4 hours*
- *12 landscapers completed the second project in 3 hours*

Does the situation model an inverse variation?

An inverse variation exists when the product of the dependent variable and the independent variable is constant.

$$\textit{dependent variable} \cdot \textit{independent variable}$$

Example Two (continued)



A contractor hired landscapers to complete two large projects.

- *9 landscapers completed the first project in 4 hours*
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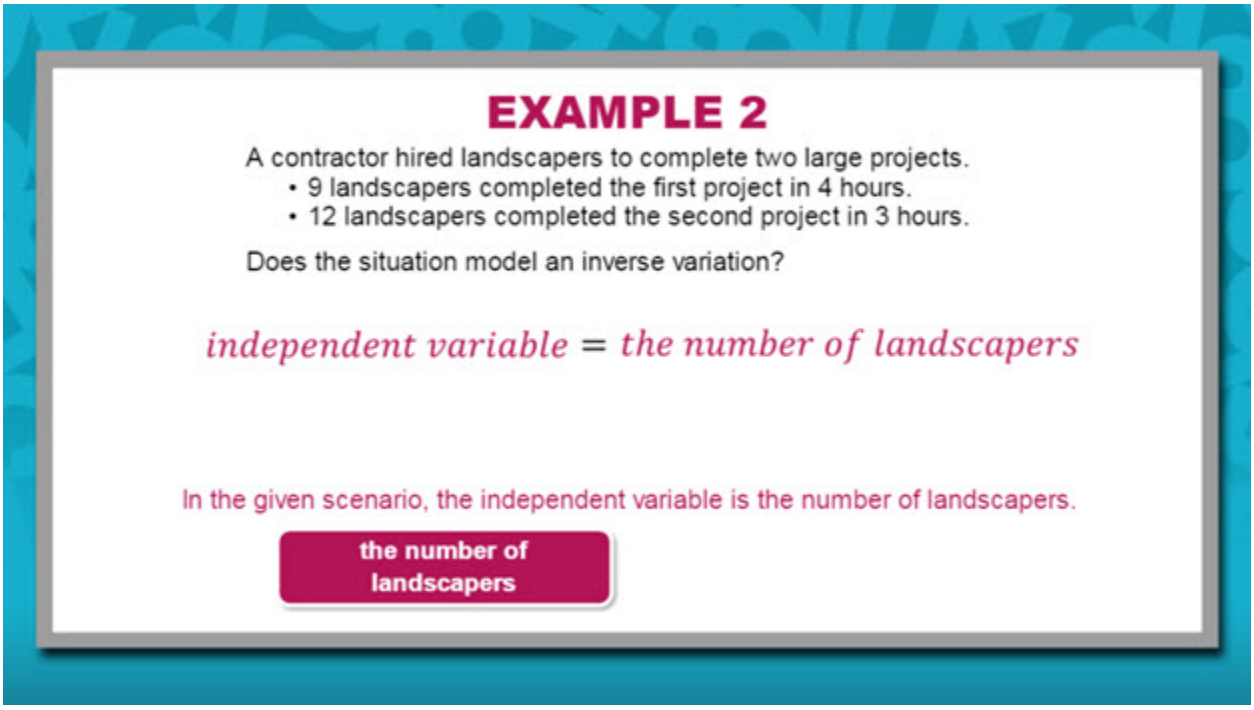
Does the situation model an inverse variation?

In the given scenario, the independent variable is…

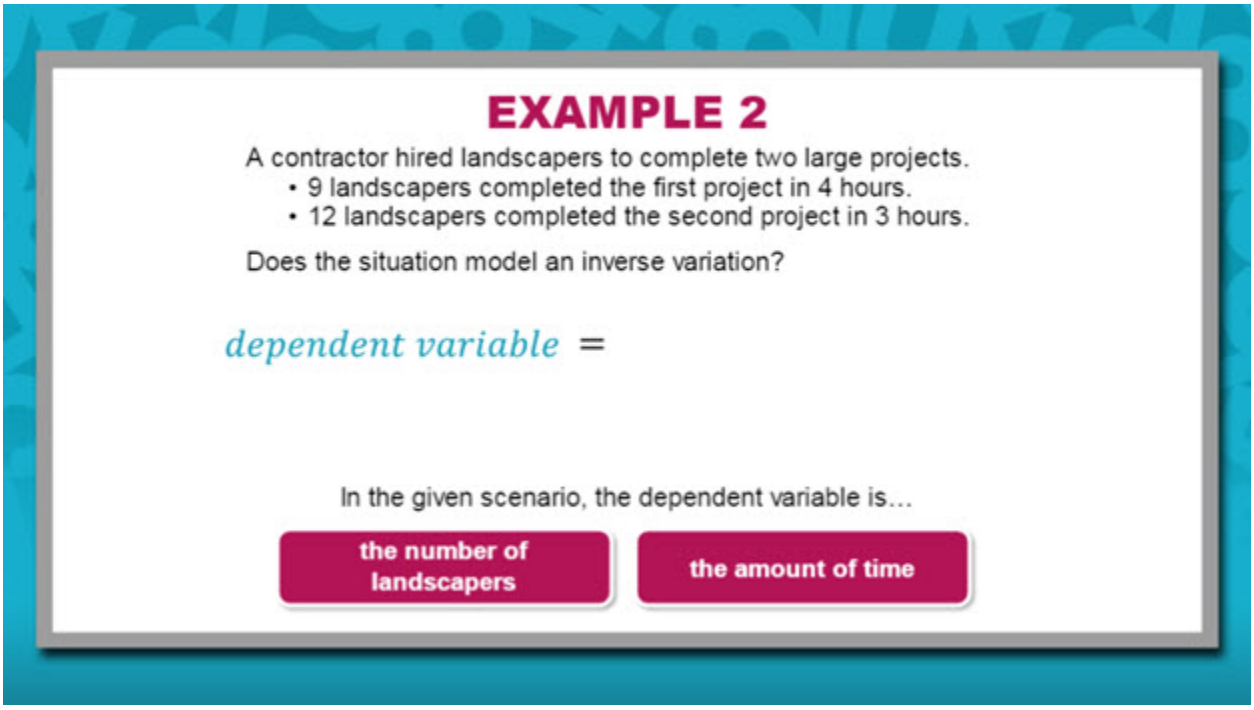
A) the number of landscapers
B) the amount of time

Example Two (continued)



In the given scenario, the independent variable is the number of landscapers.

Example Two (continued)



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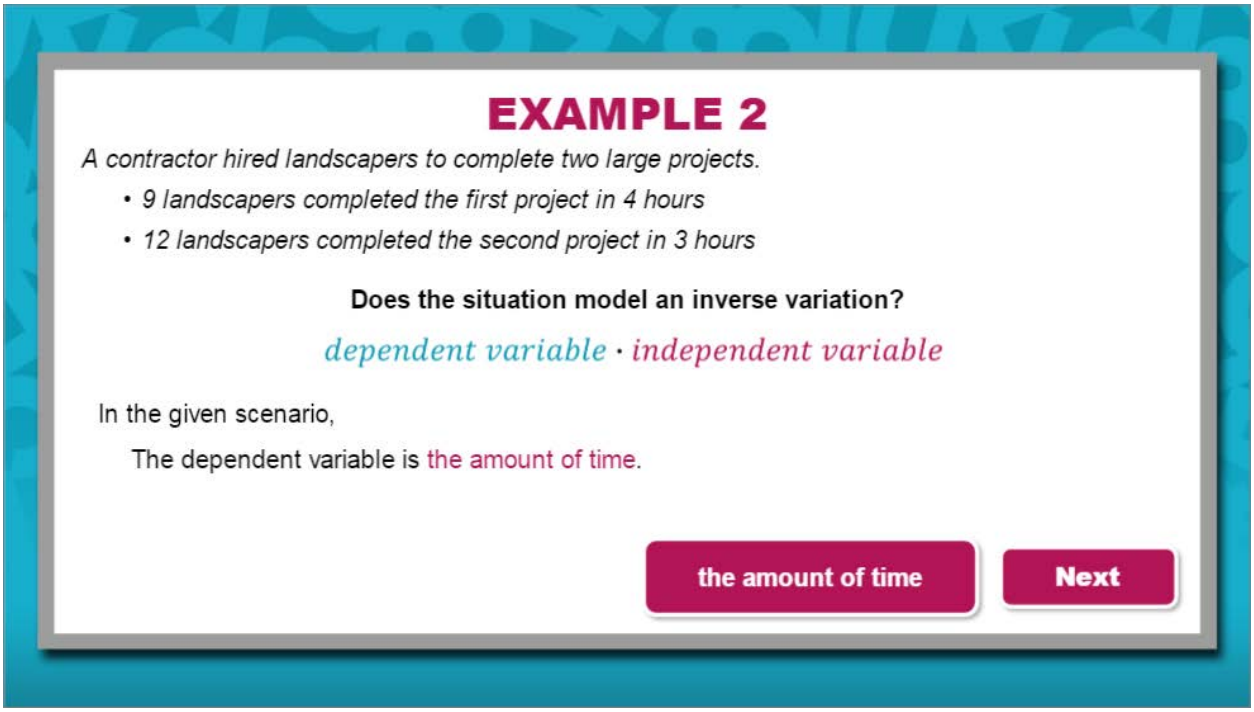
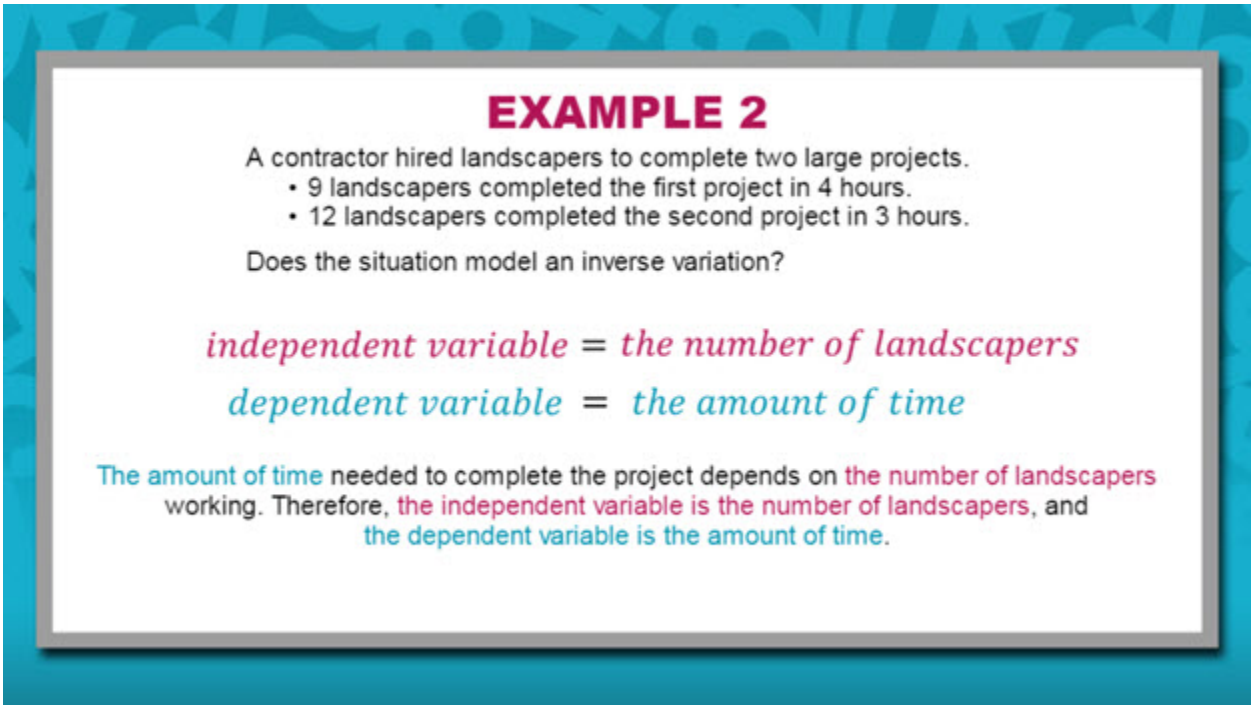
Example Two (continued)



In the given scenario, the dependent variable is the amount of time.

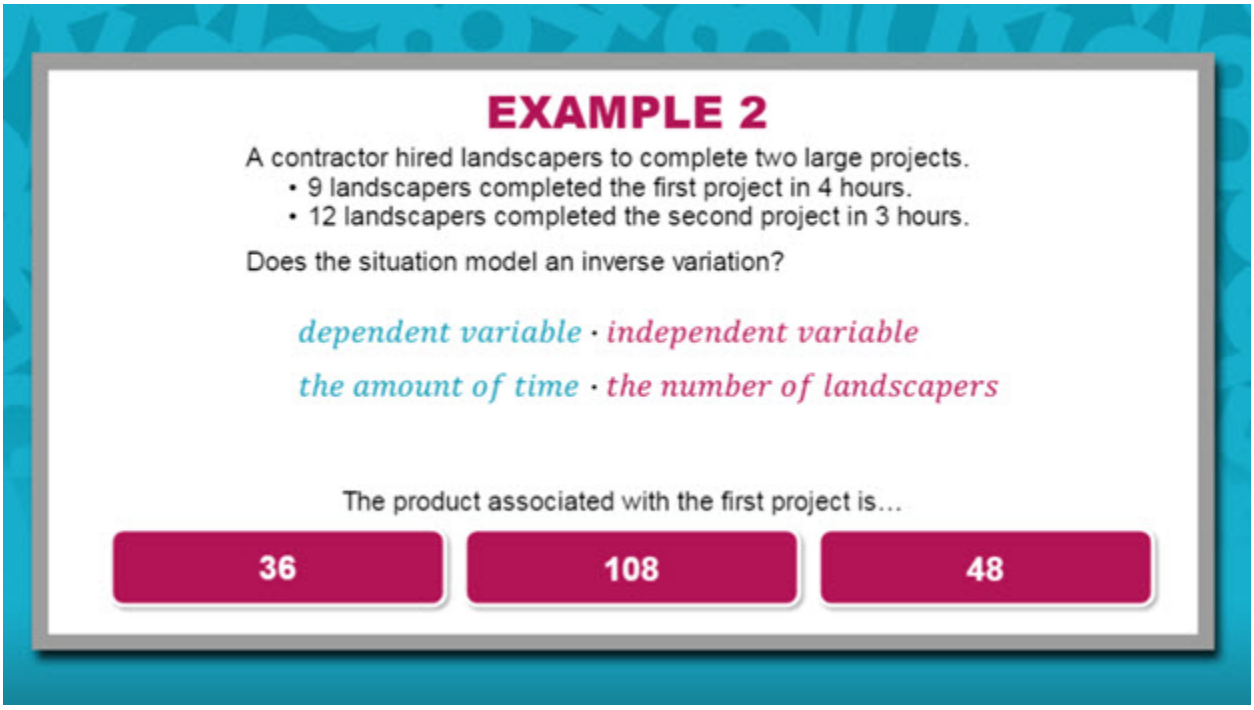
Example Two (continued)



The amount of time needed to complete the project depends on the number of landscapers working. Therefore,

- the independent variable is the number of landscapers; and
- the dependent variable is the amount of time.

Example Two (continued)



A contractor hired landscapers to complete two large projects.

- *9 landscapers completed the first project in 4 hours*
- *12 landscapers completed the second project in 3 hours*

Does the situation model an inverse variation?

$$\textit{dependent variable} \cdot \textit{independent variable}$$

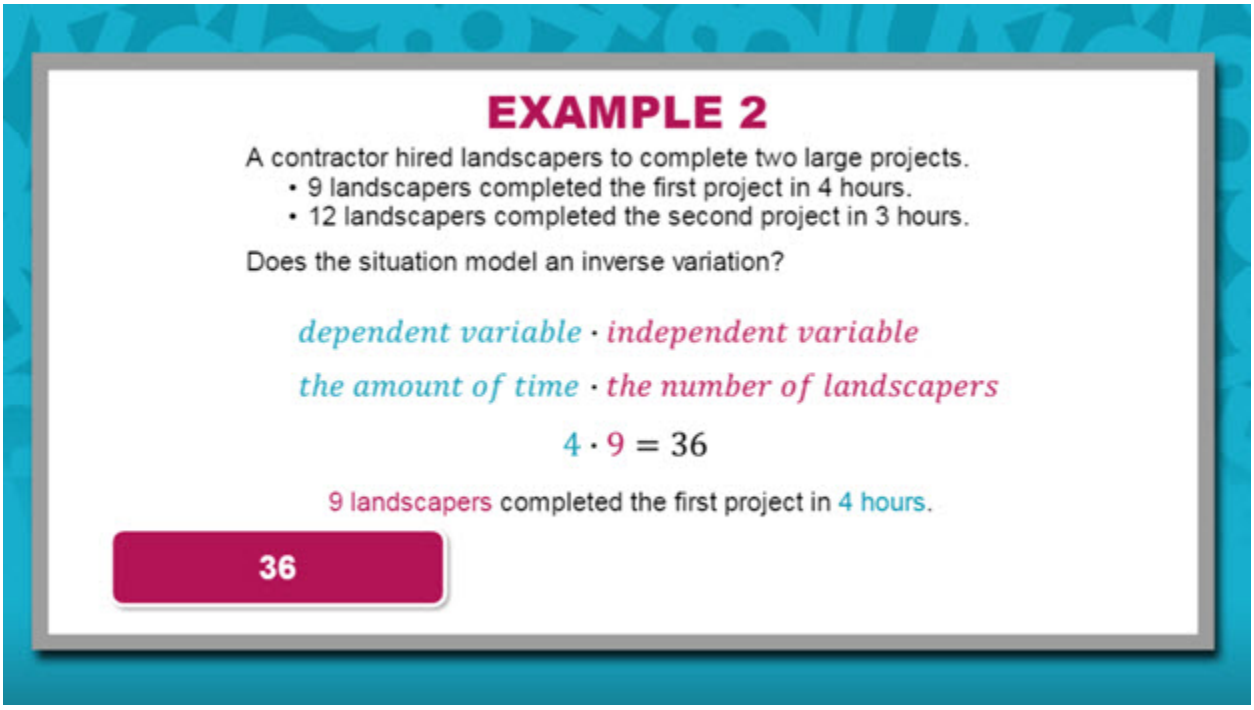
$$\textit{the amount of time} \cdot \textit{the number of landscapers}$$

Now that you know that the dependent variable is the amount of time and the independent variable is the number of landscapers, you can calculate the products.

The product associated with the first project is…

A) 36
B) 108
C) 48

Example Two (continued)



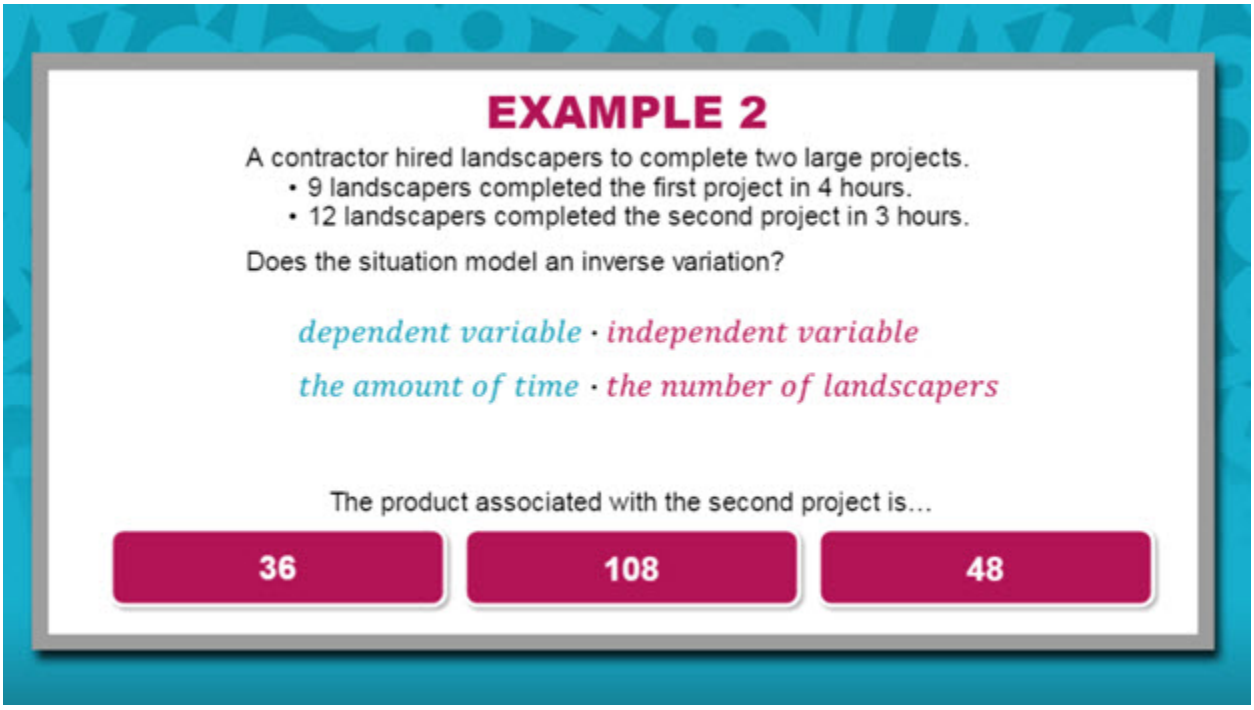
$$\textit{dependent variable} \cdot \textit{independent variable}$$

$$\textit{the amount of time} \cdot \textit{the number of landscapers}$$

$$4 \cdot 9 = 36$$

9 landscapers completed the first project in 4 hours.

Example Two (continued)



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- *9 landscapers completed the first project in 4 hours*
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Does the situation model an inverse variation?

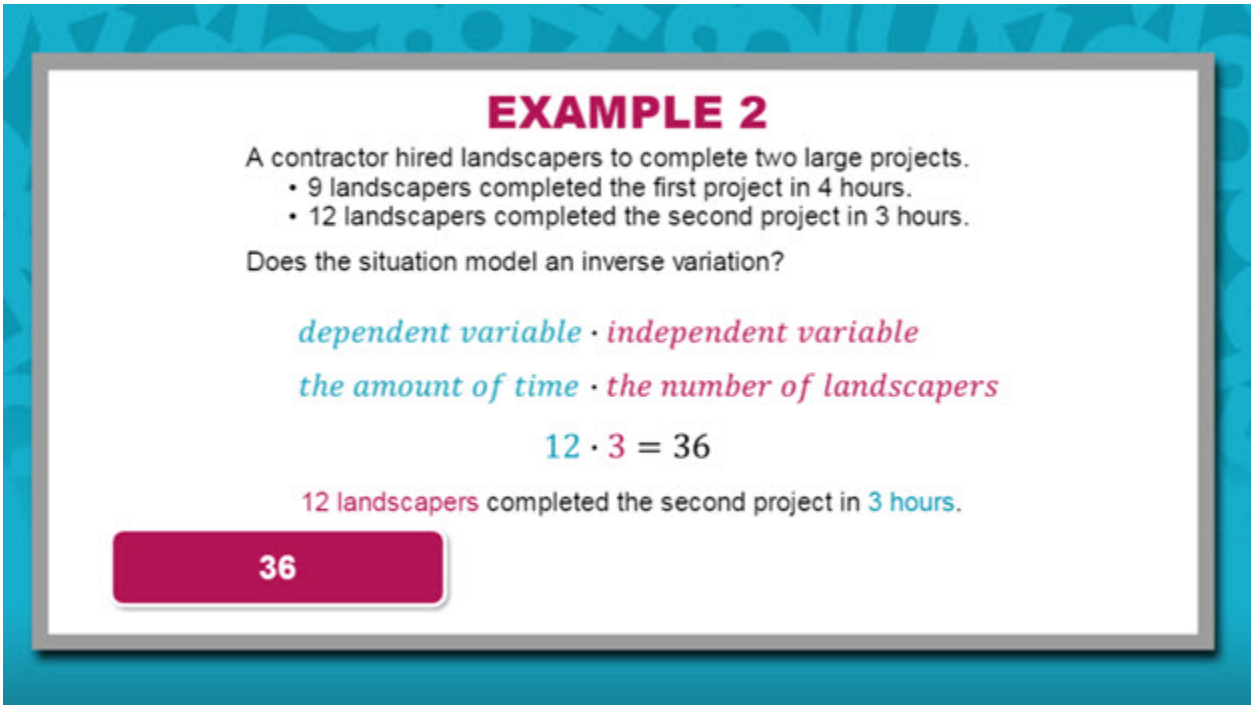
$$\textit{dependent variable} \cdot \textit{independent variable}$$

$$\textit{the amount of time} \cdot \textit{the number of landscapers}$$

The product associated with the second project is…

A) 36
B) 108
C) 48

Example Two (continued)



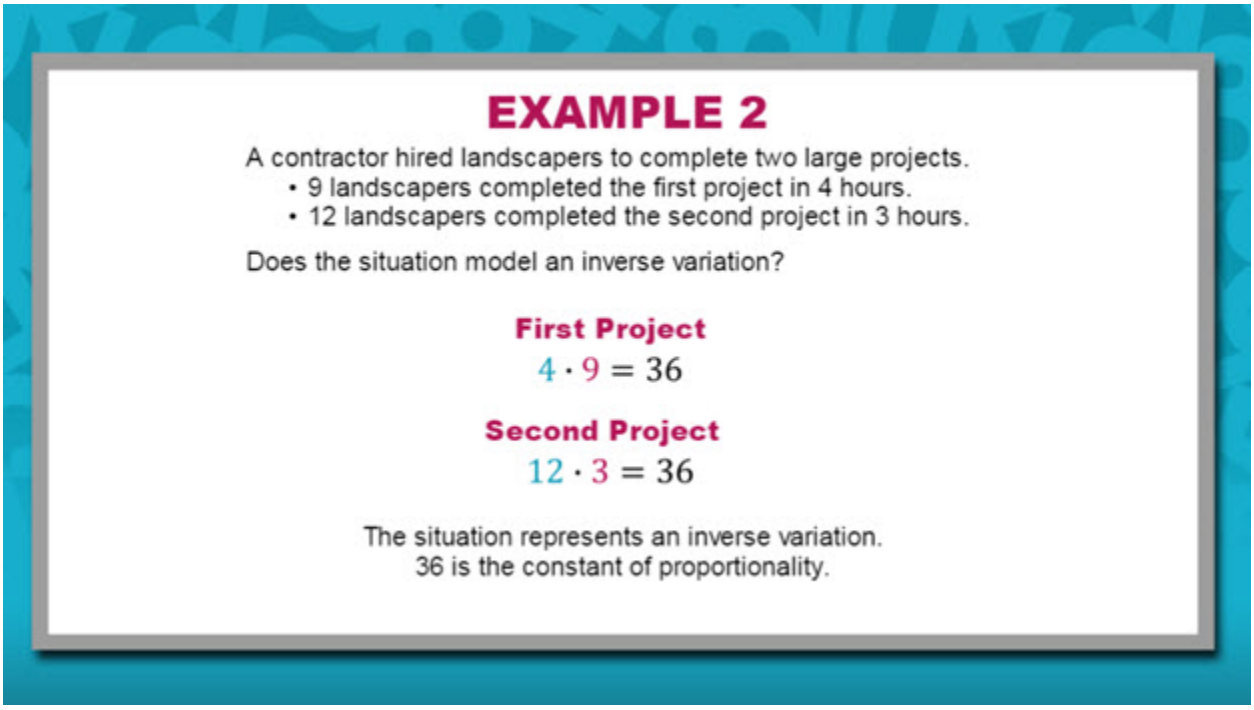
$$\textit{dependent variable} \cdot \textit{independent variable}$$

$$\textit{the amount of time} \cdot \textit{the number of landscapers}$$

$$12 \cdot 3 = 36$$

12 landscapers completed the first project in 3 hours.

Example Two (continued)

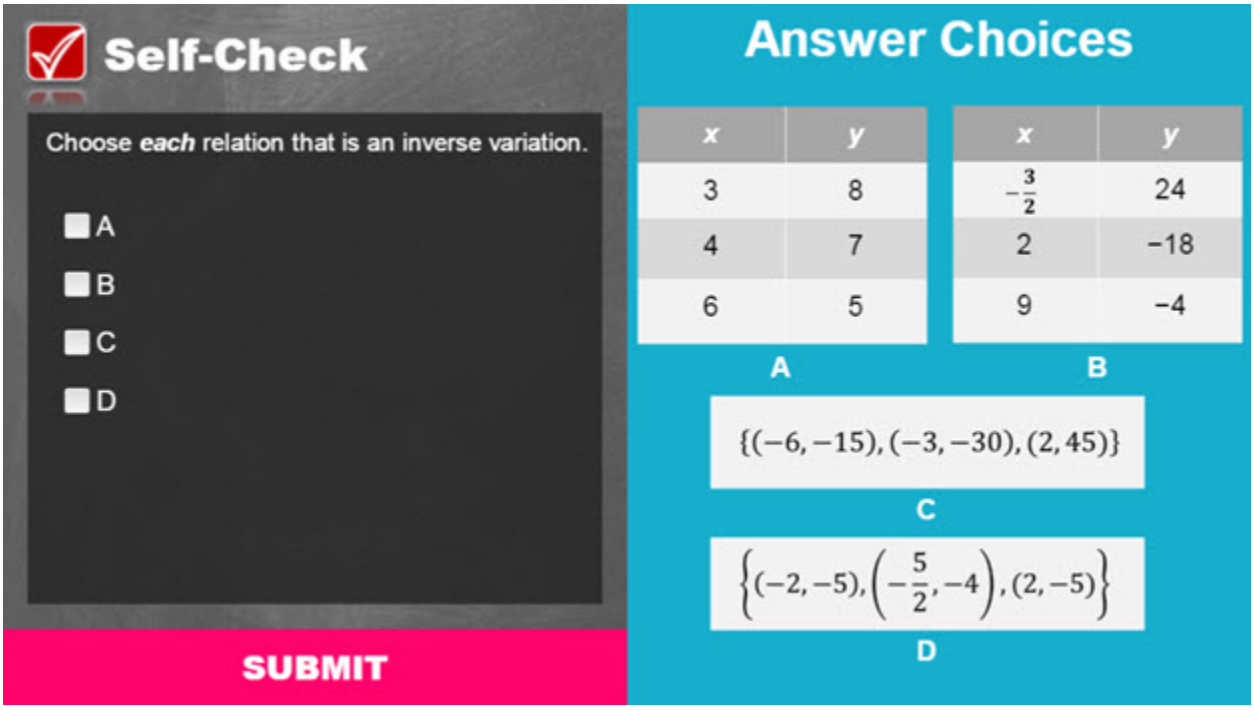


The product that corresponds to the first project is 36.

The product that corresponds to the second project is also 36.

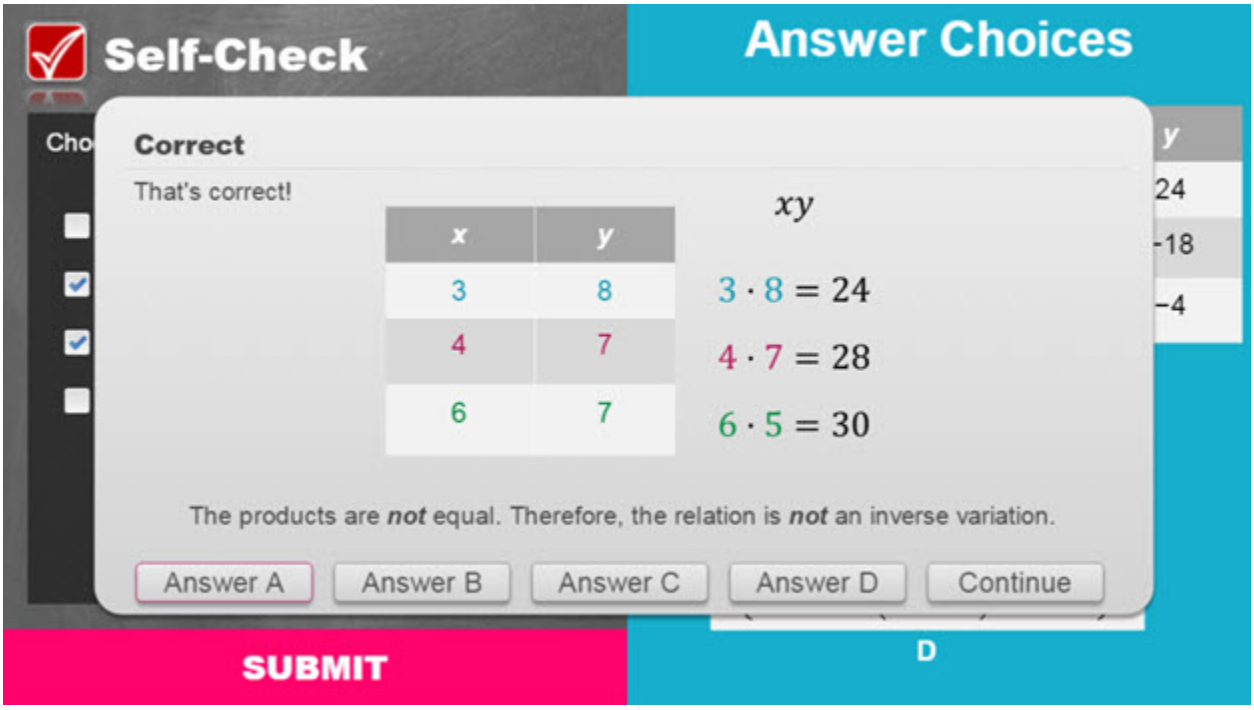
Because the products are equal, you can conclude that the situation represents an inverse variation. The constant of proportionality is 36.

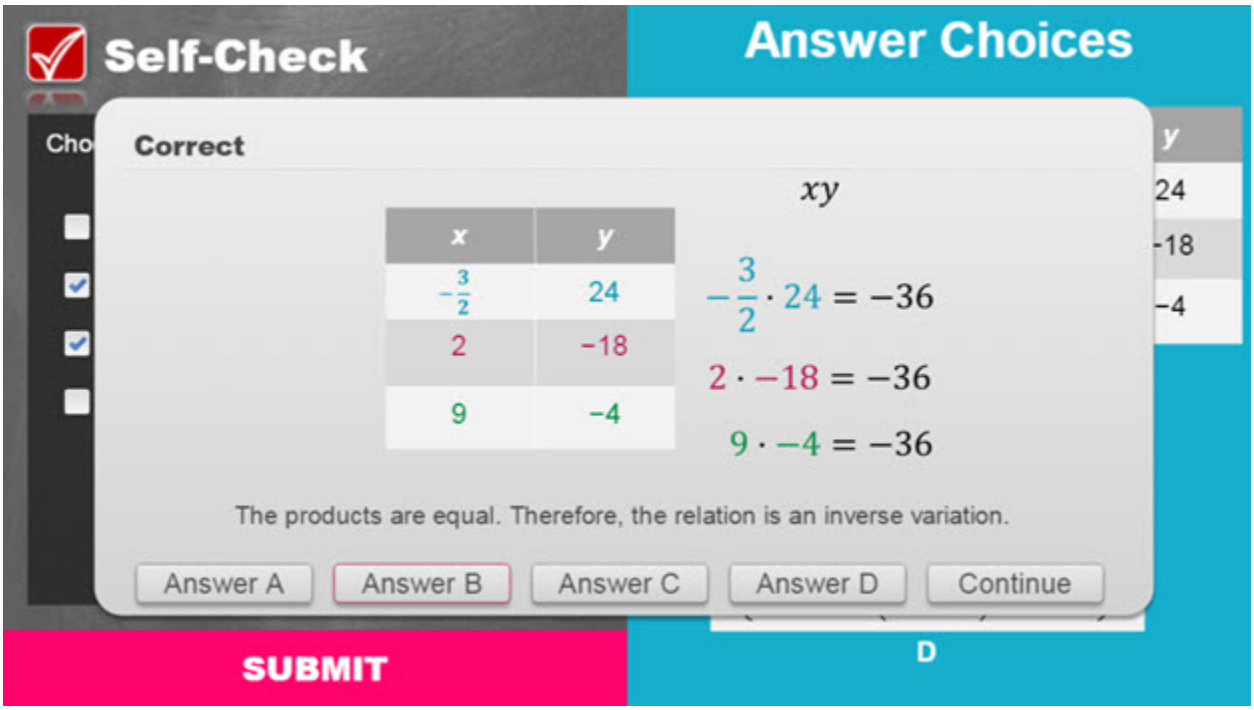
Self-Check 1



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

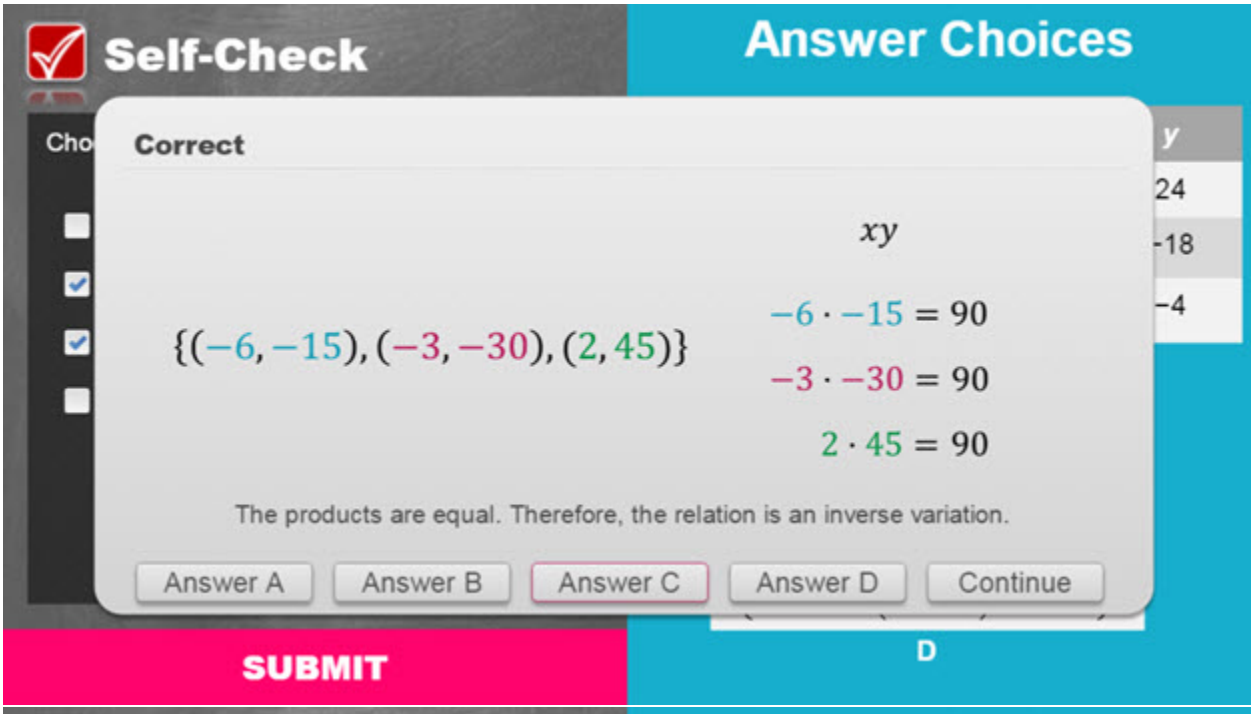
Self-Check 1: Answer

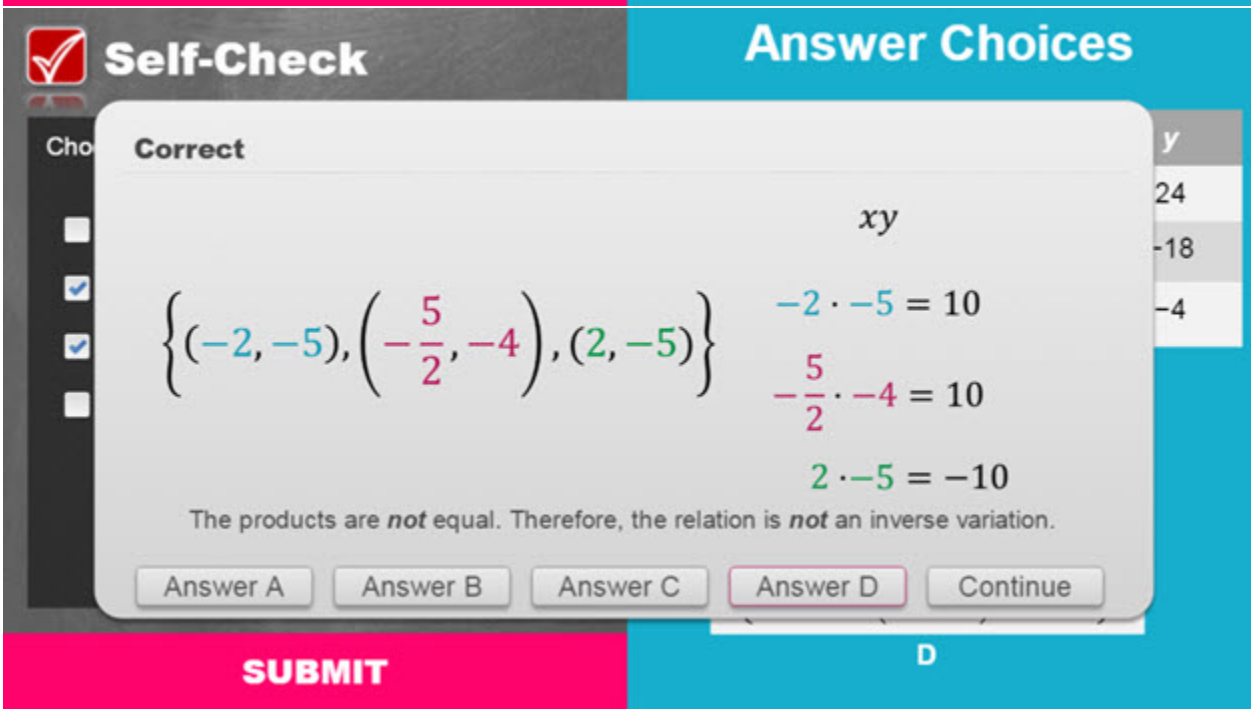




For your reference, the images above show the correct solution to the self-check problem.

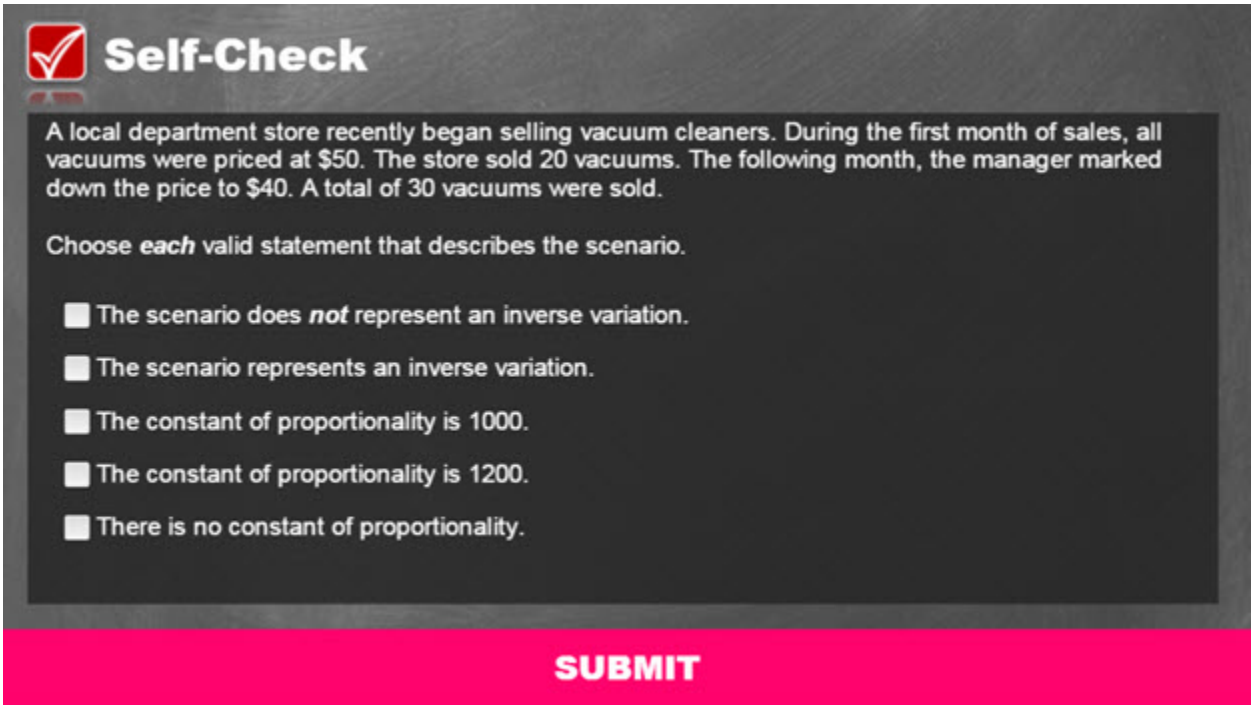
Self-Check 1: Answer (continued)





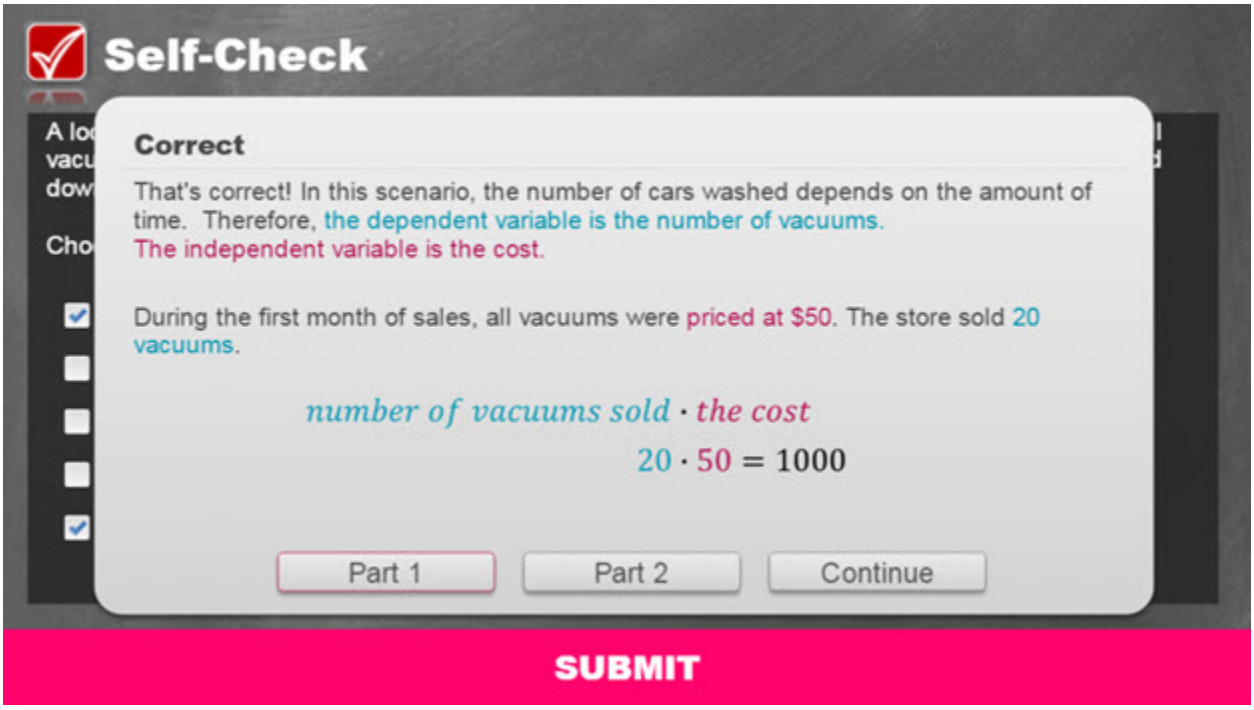
For your reference, the images above show the correct solution to the self-check problem.

Self-Check 2



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

Self-Check 2: Answer



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Conclusion

You have reached the conclusion of this lesson where you explored data sets and practical situations that represent inverse variations.