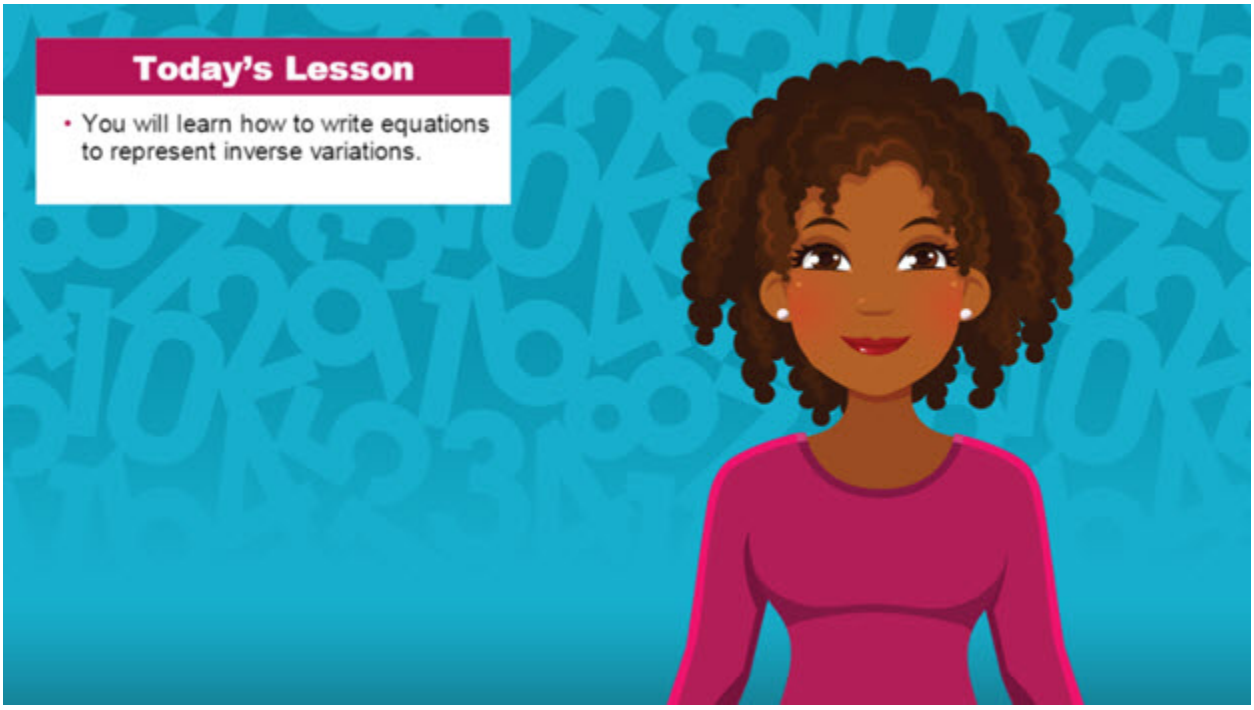
Module 11: Direct and Inverse Variation
Topic 3 Content: Writing Inverse Variation Equations Notes

Introduction



Hi there! I'm so glad you could join me for this lesson in Algebra I. In this lesson, you will learn how to write equations to represent inverse variations.

Module 11: Direct and Inverse Variation
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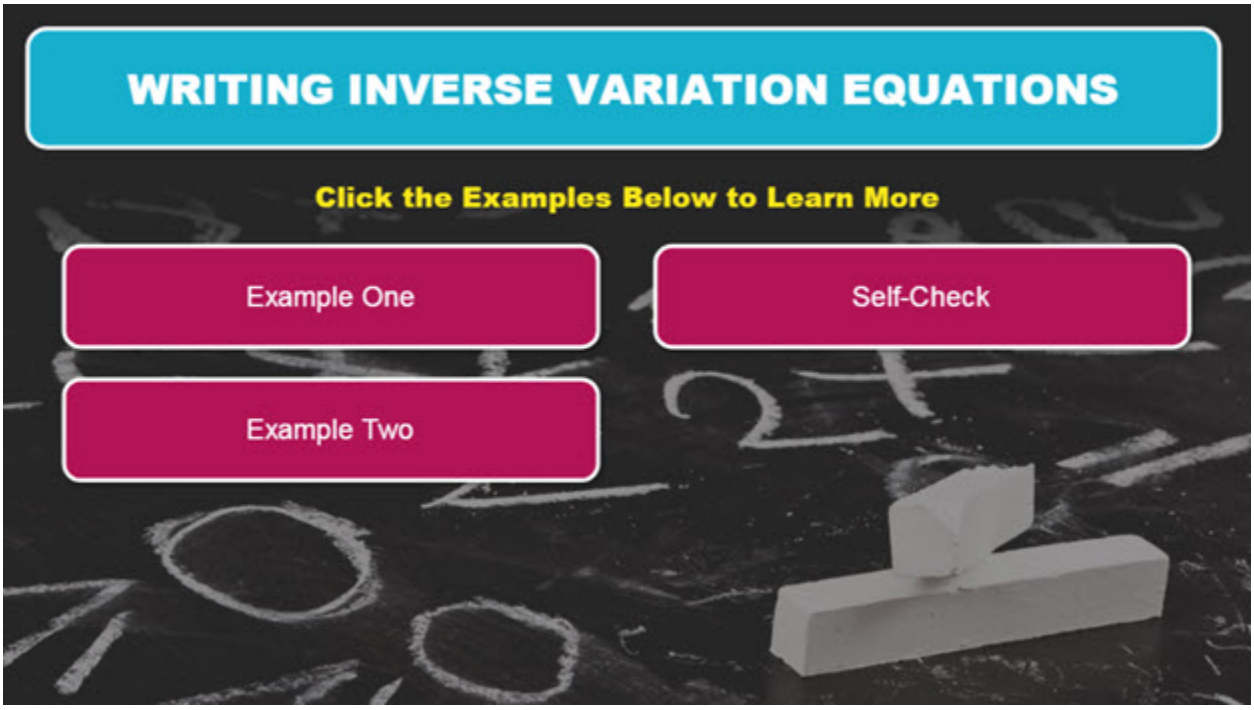
Introduction



Click the examples below to learn more.

- Example One
- Example Two
- Self-Check

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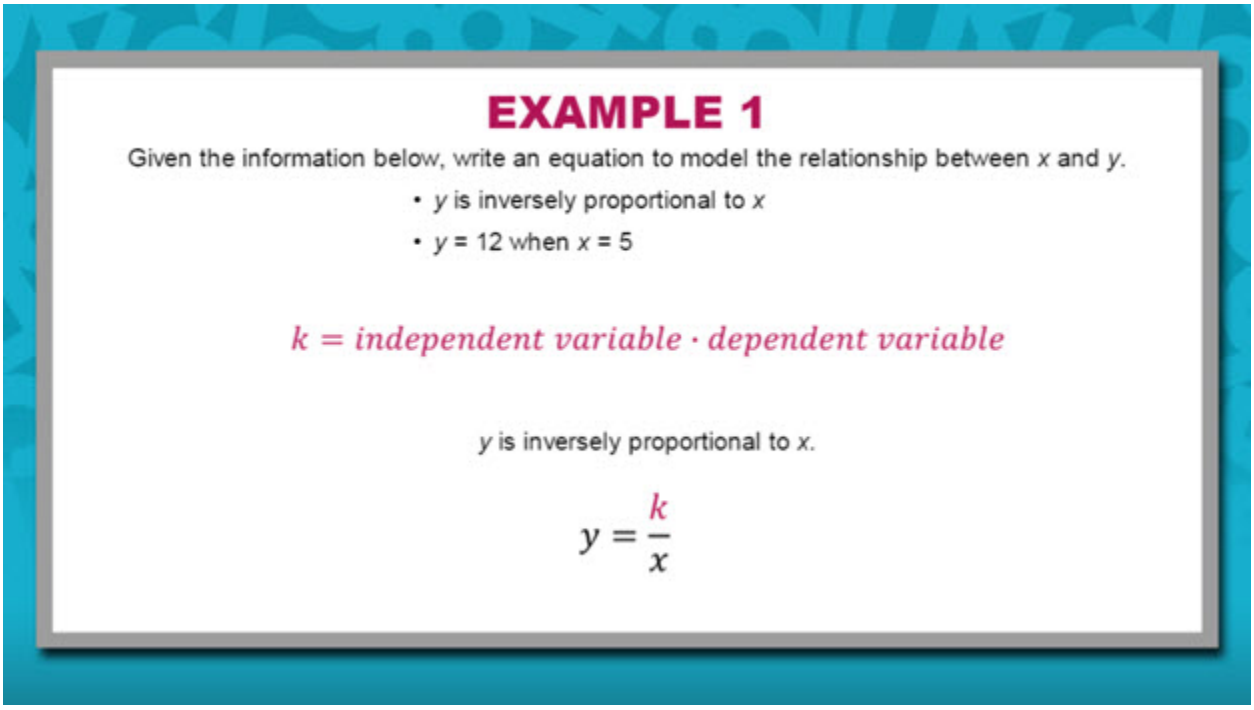
Example One



Given the information below, write an equation to model the relationship between x and y.

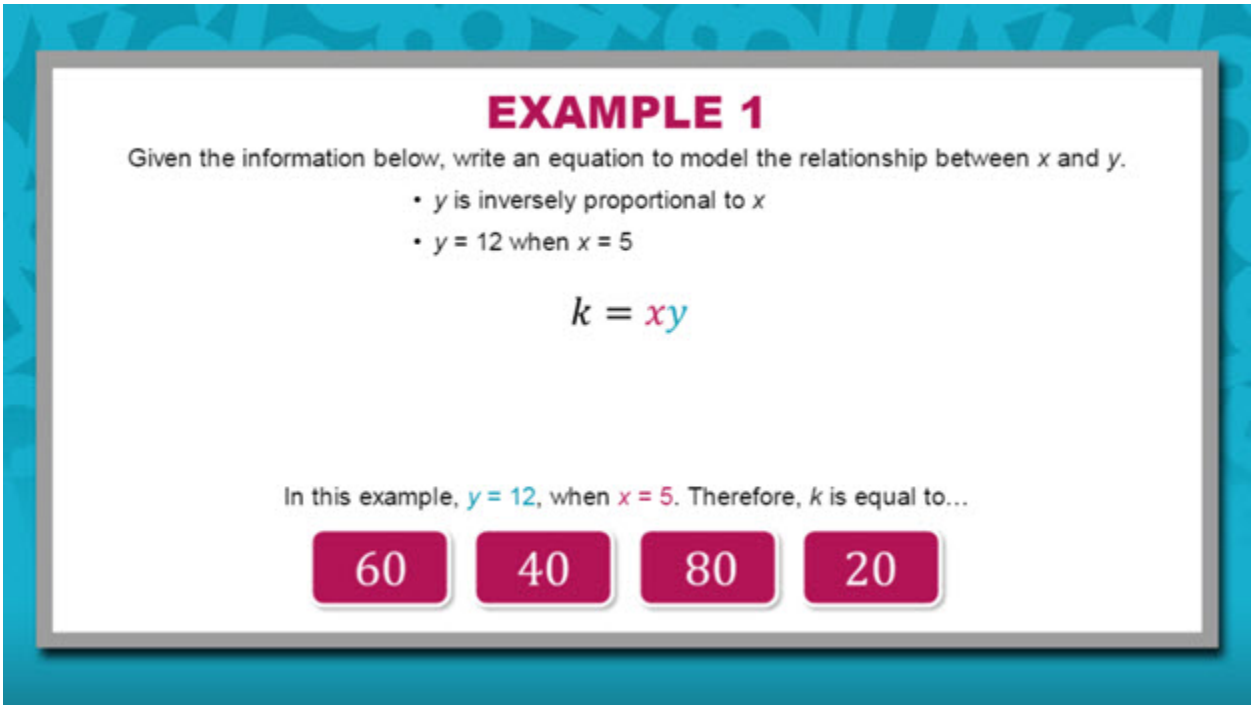
- y is inversely proportional to x
- $y = 12$ when $x = 5$

In an inverse variation, the constant of proportionality, is the product of the dependent variable and the independent variable. The value is represented by the variable, k.

$$k = independent\ variable \cdot dependent\ variable$$

The statement "y is inversely proportional to x" can be modeled by the equation $y = \frac{k}{x}$.

Example One (continued)



Given the information below, write an equation to model the relationship between x and y.

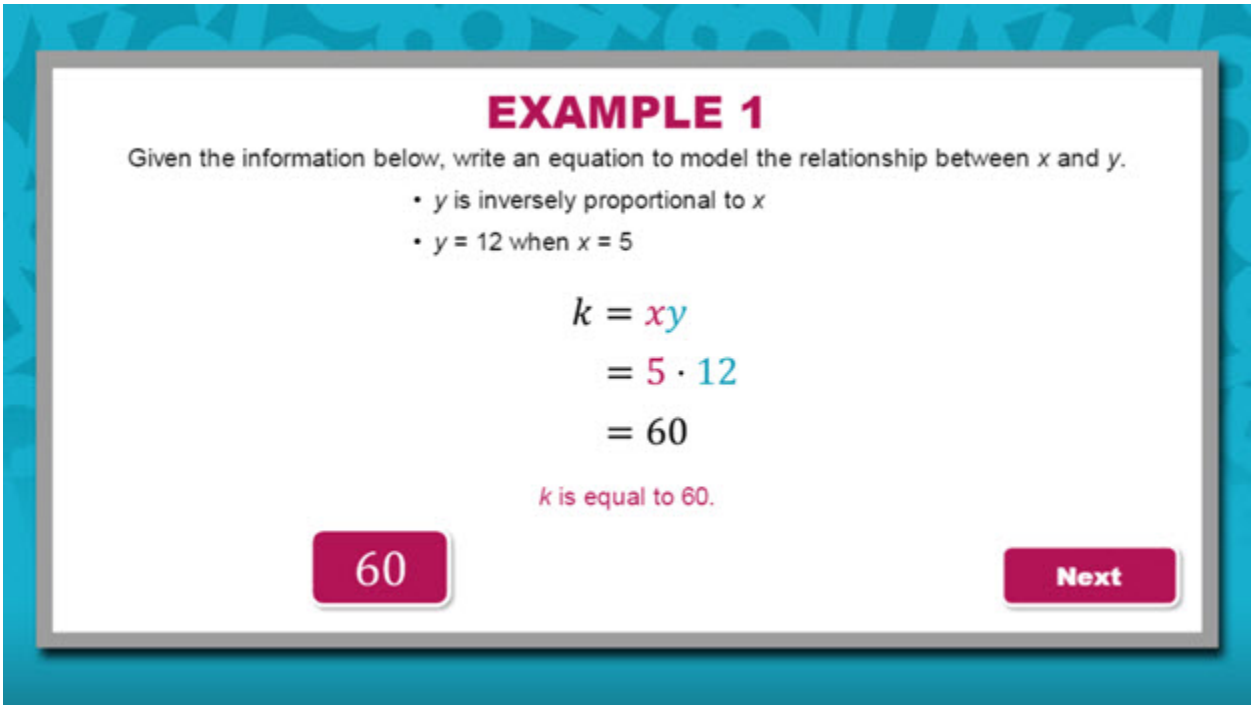
- y is inversely proportional to x
- $y = 12$ when $x = 5$

$$k = xy$$

In this example, $y = 12$, when $x = 5$. Therefore, k is equal to…

A) 60
B) 40
C) 80
D) 20

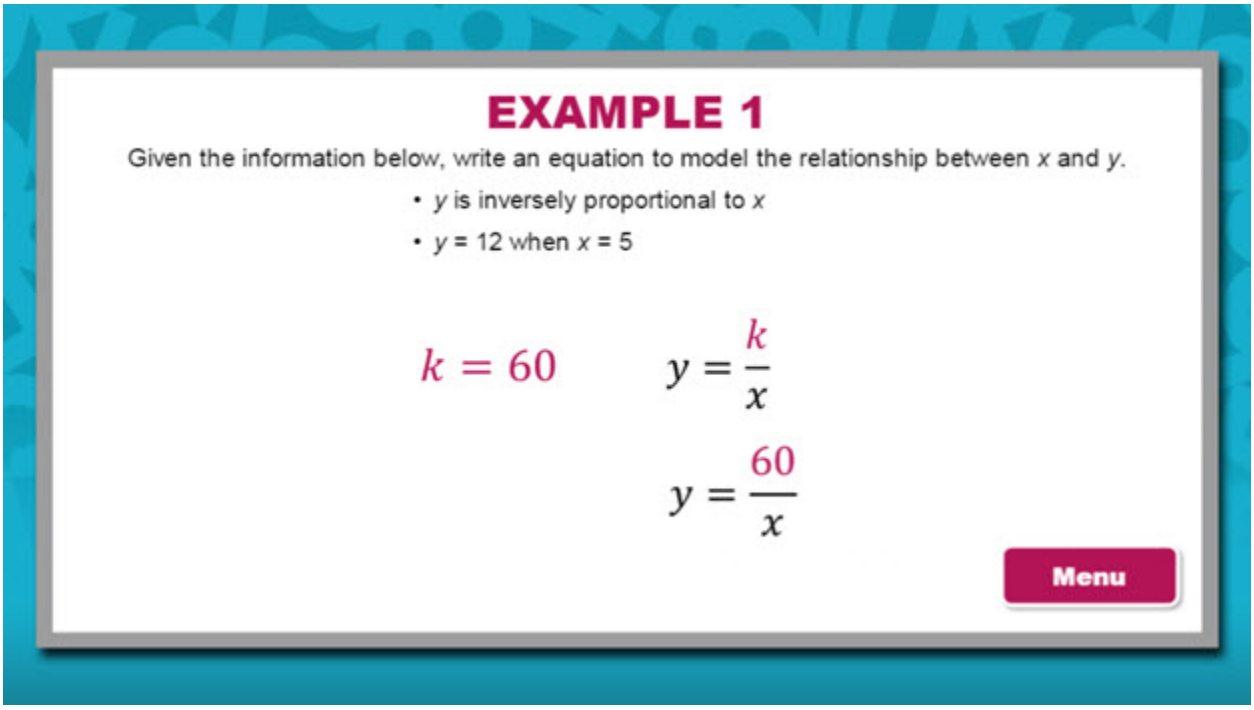
Example One (continued)



$$k = xy$$
$$= 5 \cdot 12$$
$$= 60$$

k is equal to 60.

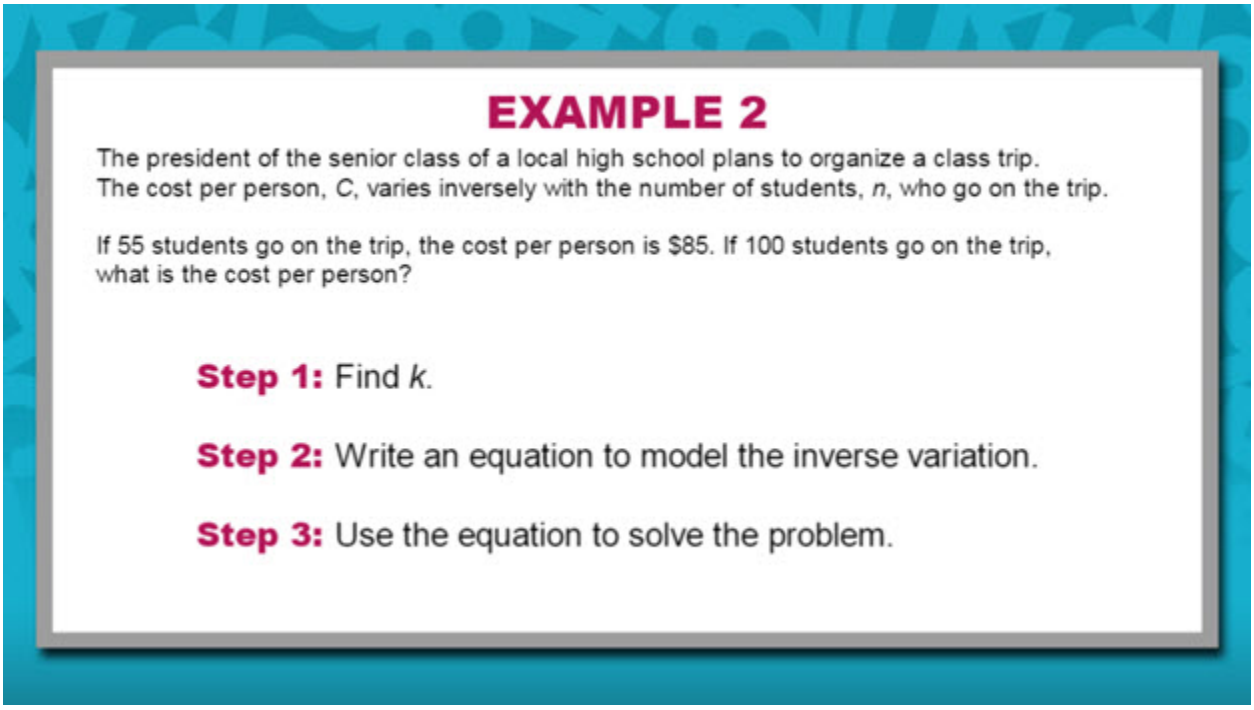
Example One (continued)



Now that you know that $k = 60$, you have the information needed to write the equation.

Substitute 60 for k. The equation to model this inverse variation is $y = \frac{60}{x}$.

Example 2



The president of the senior class of a local high school plans to organize a class trip. The cost per person, C, varies inversely with the number of students, n, who go on the trip.

If 55 students go on the trip, the cost per person is $85.

If 100 students go on the trip, what is the cost per person?

In the given situation, the cost per person, C, varies inversely with the number of students, n, who go on the trip. Therefore, the situation is an inverse variation.

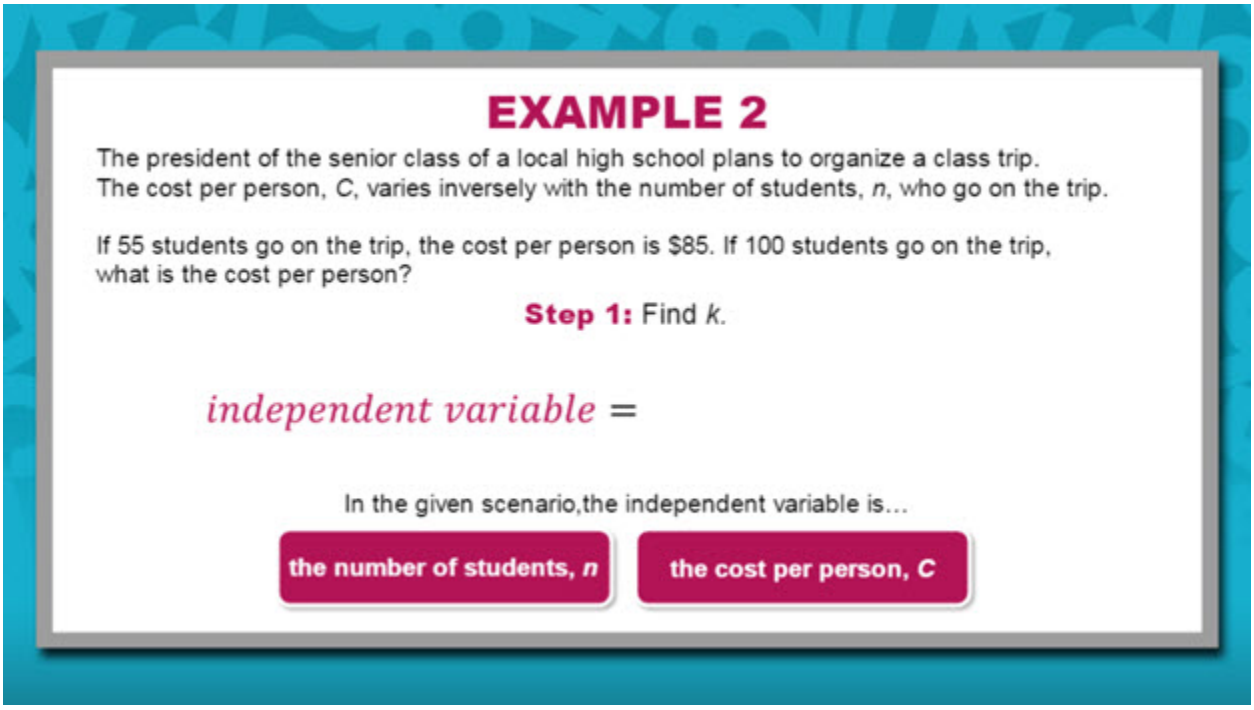
You can use the following steps to solve a practical problem involving an inverse variation:

Step 1: Find k

Step 2: Write an equation to model the inverse variation.

Step 3: Use the equation to solve the problem.

Example 2 (continued)



The president of the senior class of a local high school plans to organize a class trip. The cost per person, C , varies inversely with the number of students, n, who go on the trip.

If 55 students go on the trip, the cost per person is $85.

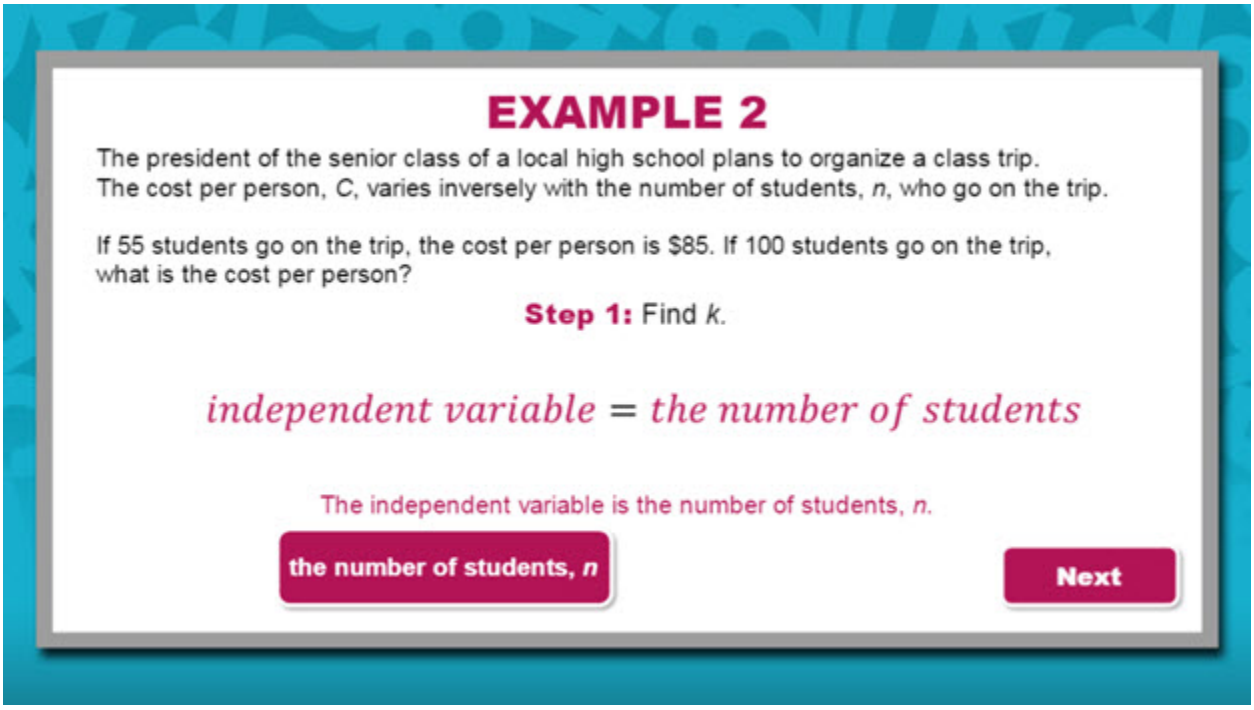
If 100 students go on the trip, what is the cost per person?

Step 1: Find k

In the given scenario, the independent variable is…

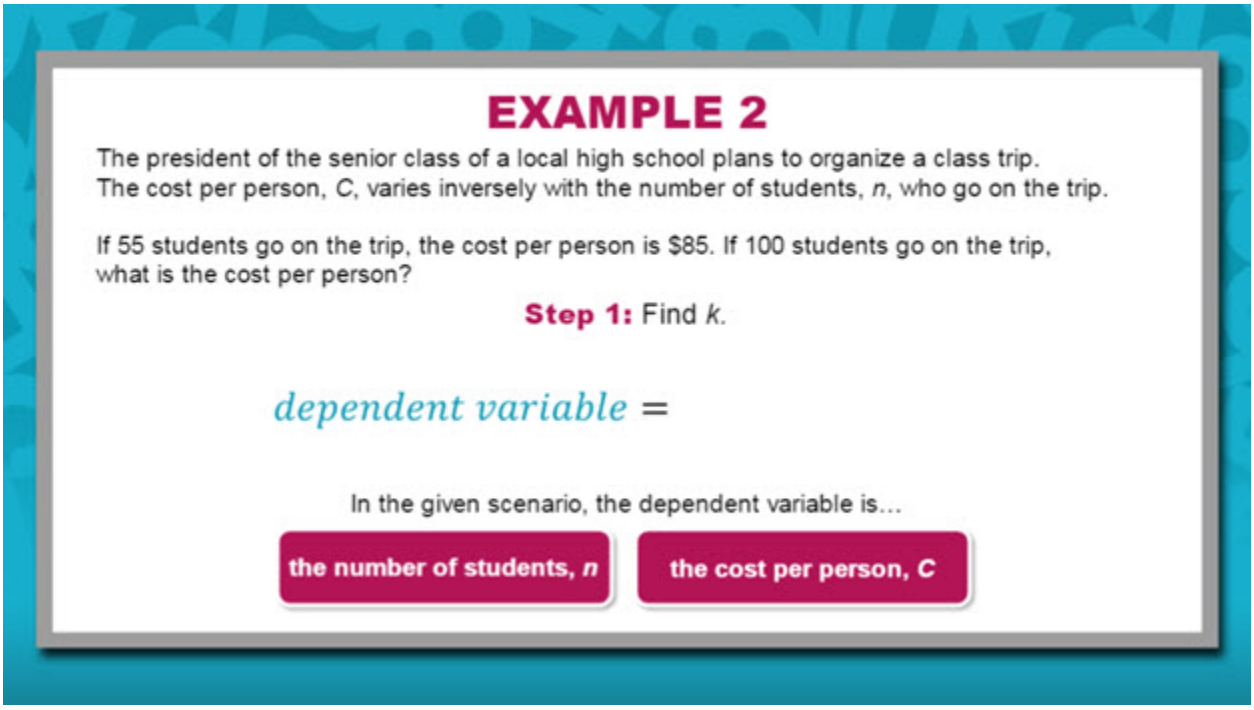
A) the number of students, n
B) the cost per person, C

Example 2 (continued)



The independent variable is the number of students, n.

Example 2 (continued)



The president of the senior class of a local high school plans to organize a class trip. The cost per person, C , varies inversely with the number of students, n, who go on the trip.

If 55 students go on the trip, the cost per person is $85.

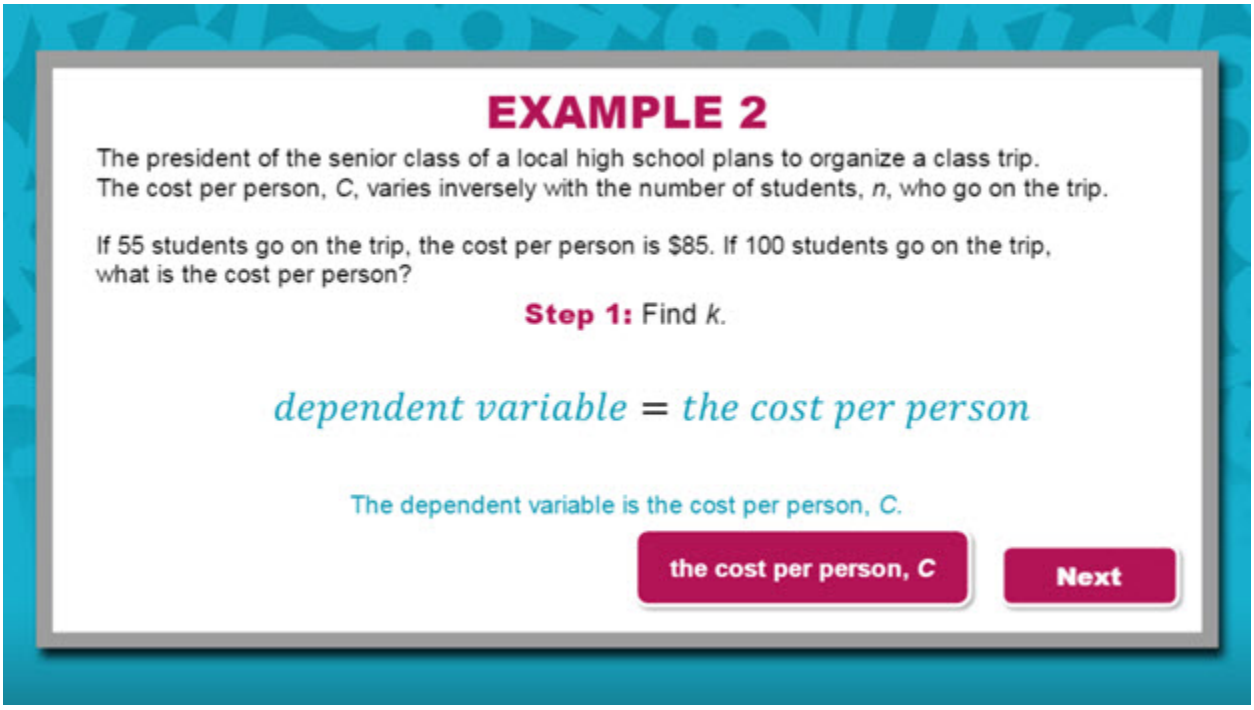
If 100 students go on the trip, what is the cost per person?

Step 1: Find k

In the given scenario, the dependent variable is…

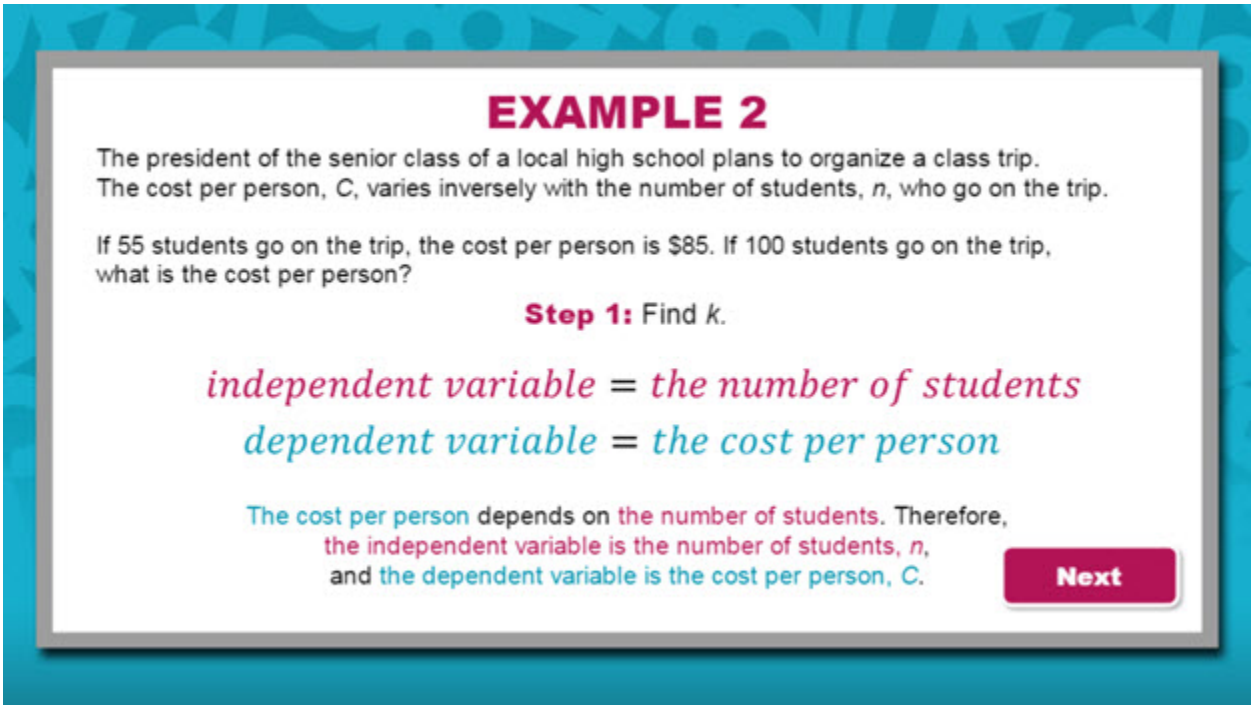
A) the number of students, n
B) the cost per person, C

Example 2 (continued)



The dependent variable is the cost per person, C.

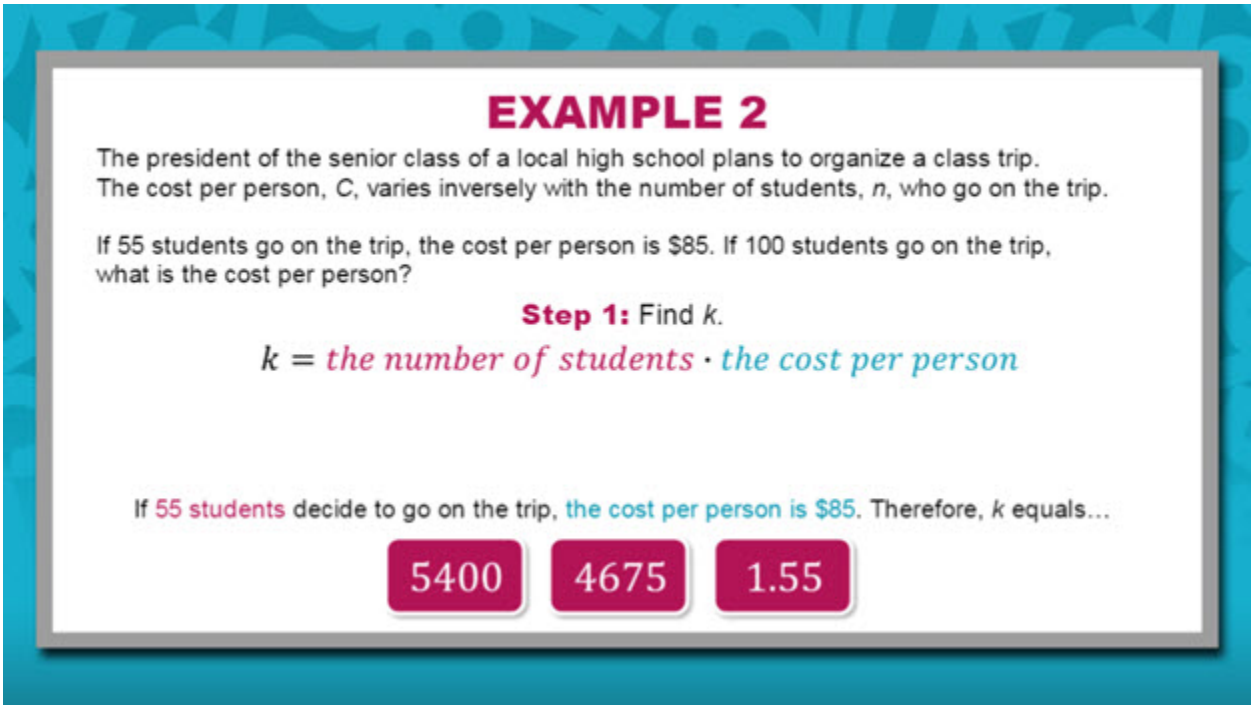
Example 2 (continued)



The cost per person depends on the number of students. Therefore,

- the independent variable is the number of students, n; and
- the dependent variable is the cost per person, C.

Example 2 (continued)



Step 1: Find k

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

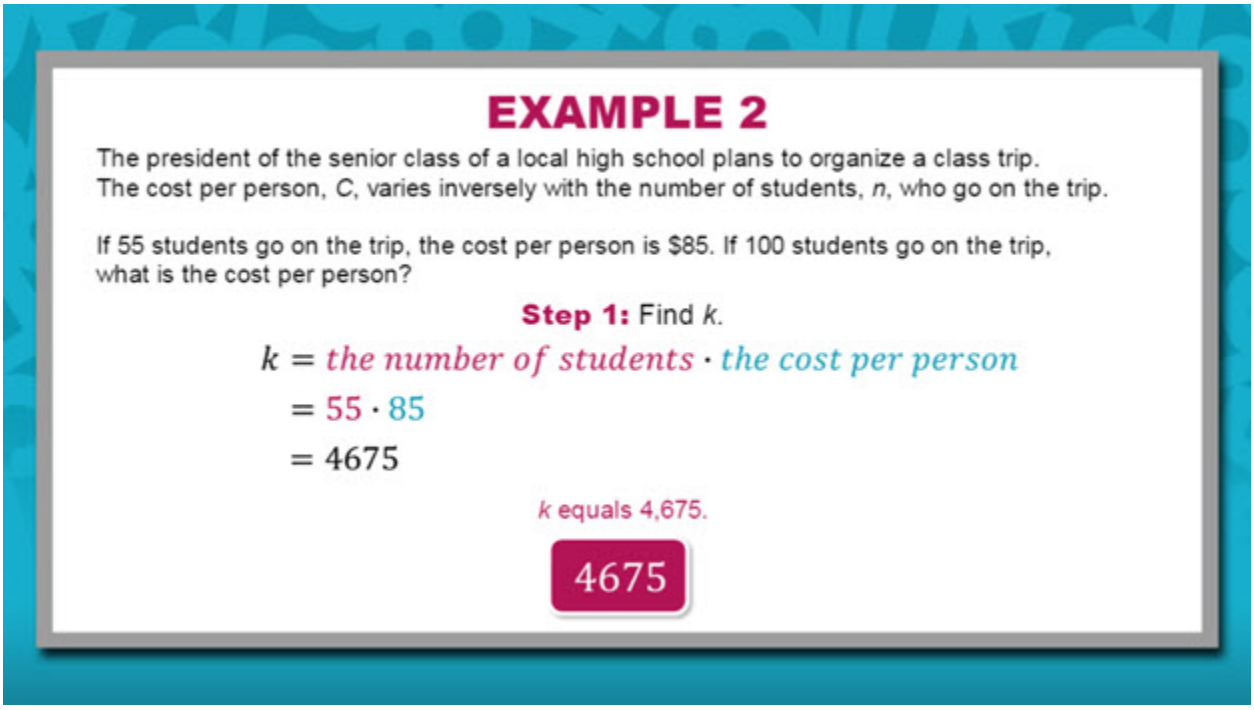
$$k = \textit{the number of students} \cdot \textit{the cost per person}$$

Now that you have identified the independent and dependent variables, you can use the given information to find k.

If 55 students decide to go on the trip, the cost per person is $85. Therefore, k equals…

A) 5400
B) 4675
C) 1.55

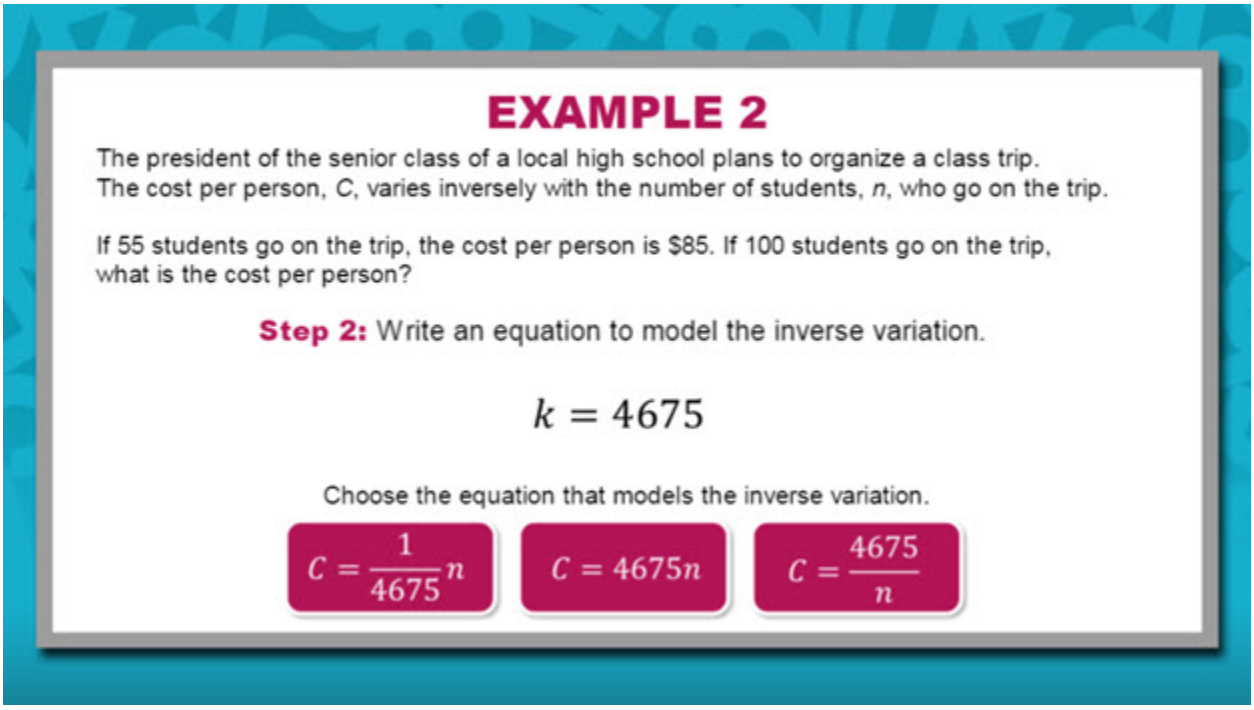
Example 2 (continued)



$$k = \textit{the number of students} \cdot \textit{the cost per person}$$
$$= 55 \cdot 85$$
$$= 4675$$

k equals 4675.

Example 2 (continued)



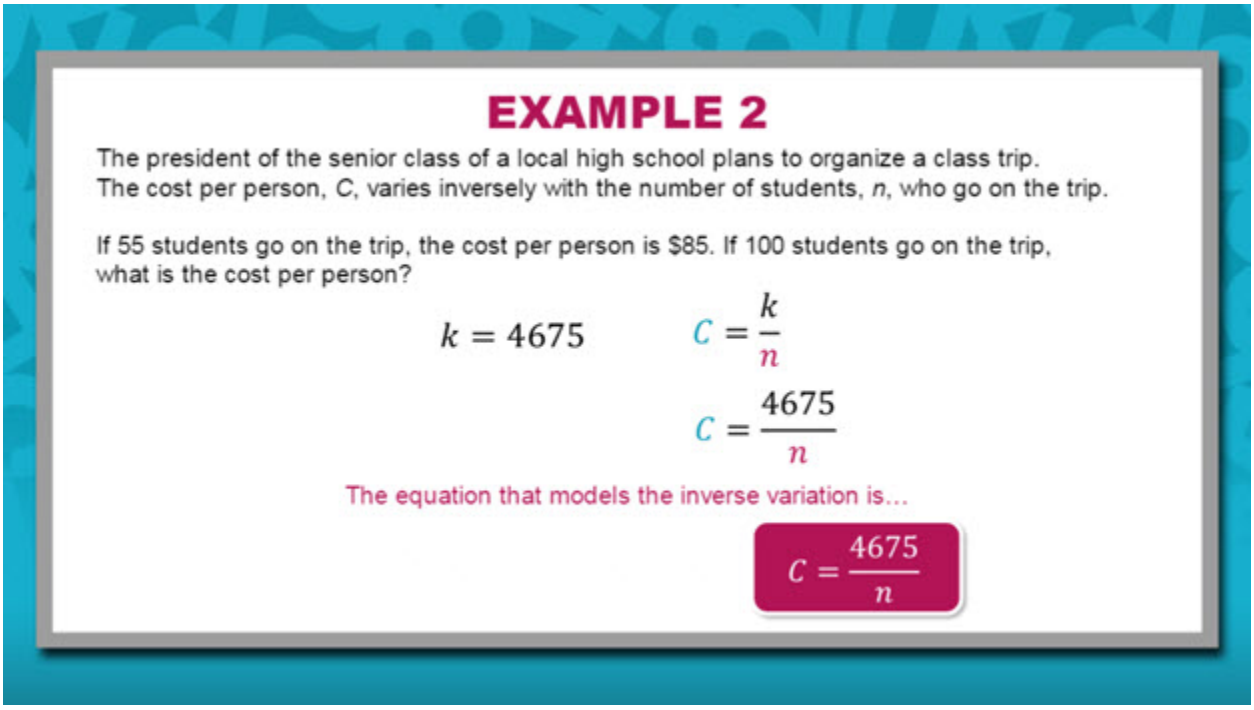
Step 2: Write an equation to model the inverse variation.

Now that you have found that $k = 4675$, you can write an equation to represent the inverse variation.

Choose the equation that models the inverse variation.

A) $C = \frac{1}{4675}n$
B) $C = 4675n$
C) $C = \frac{4675}{n}$

Example 2 (continued)

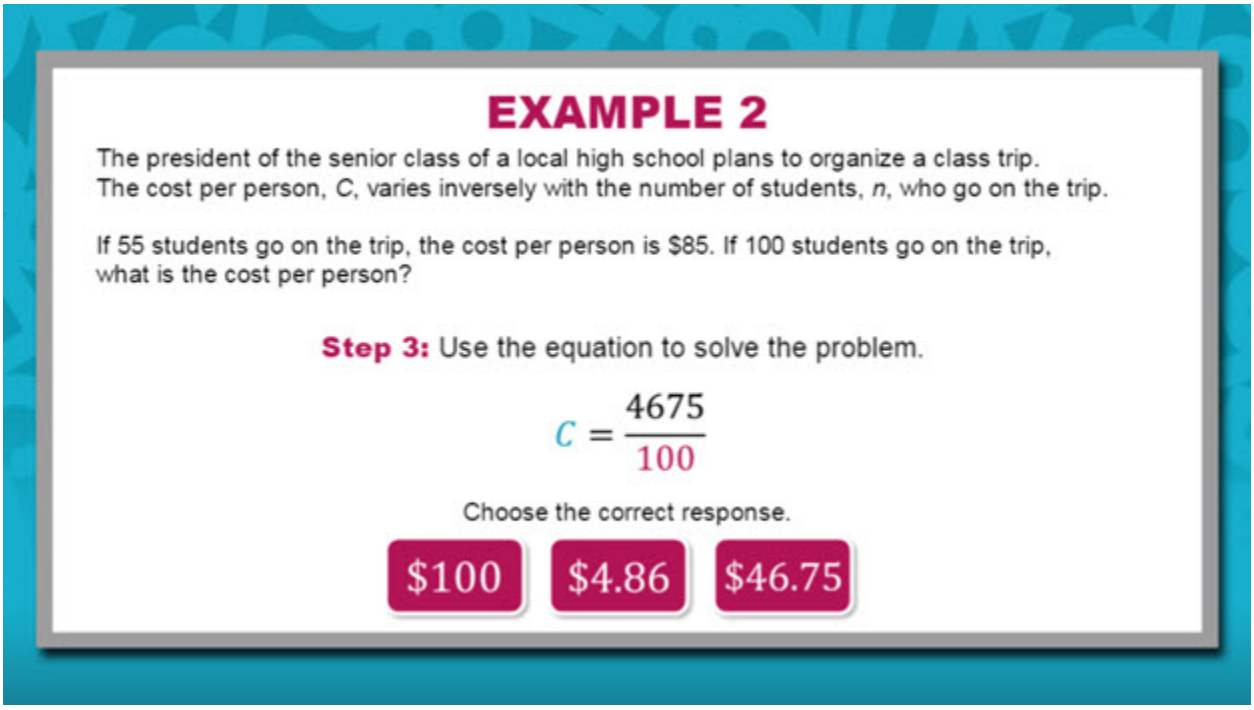


Step 2: Write an equation to model the inverse variation.

$k = 4675$ $\qquad C = \frac{k}{n}$

$C = \frac{4675}{n}$

Example 2 (continued)



Step 3: Use the equation to solve the problem.

$$C = \frac{4675}{n}$$

$$C = \frac{4675}{100}$$

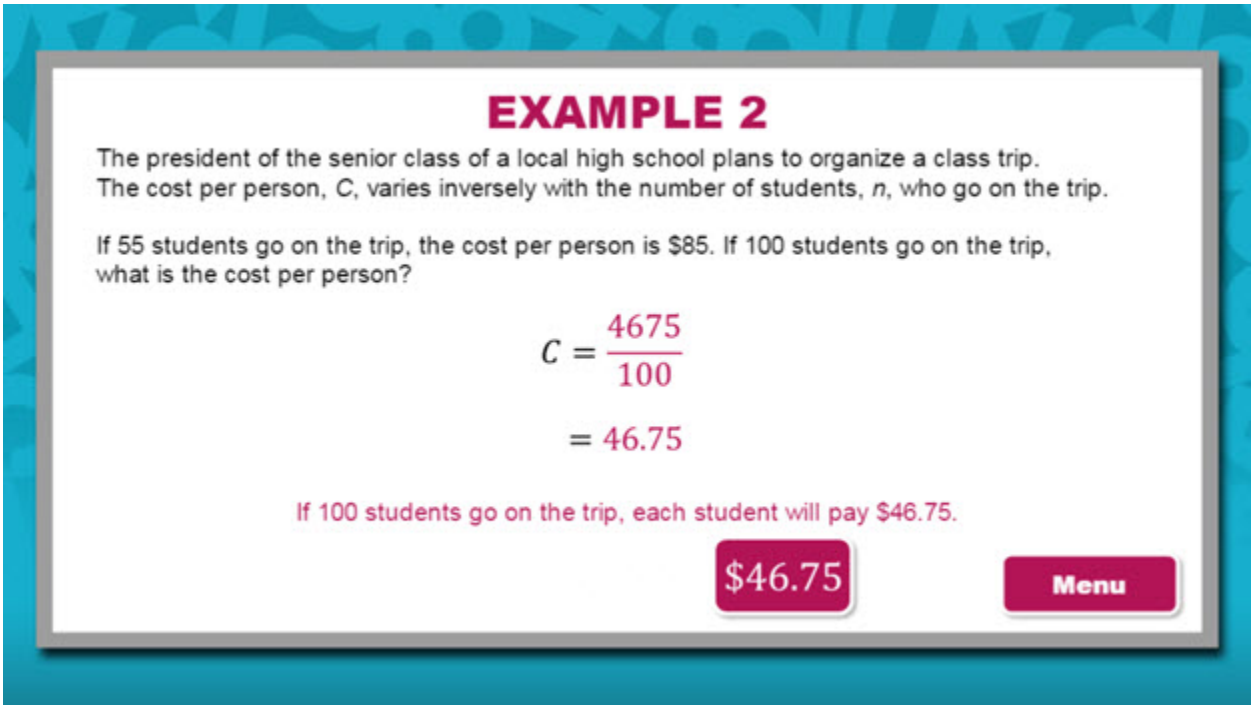
In the equation $C = \frac{4675}{n}$, C represents the cost per person and n represents the number of students.

Substitute 100 for n. Then, evaluate the expression on the right side of the equation.

Choose the correct response.

A) $100
B) $4.68
C) $46.75

Example 2 (continued)

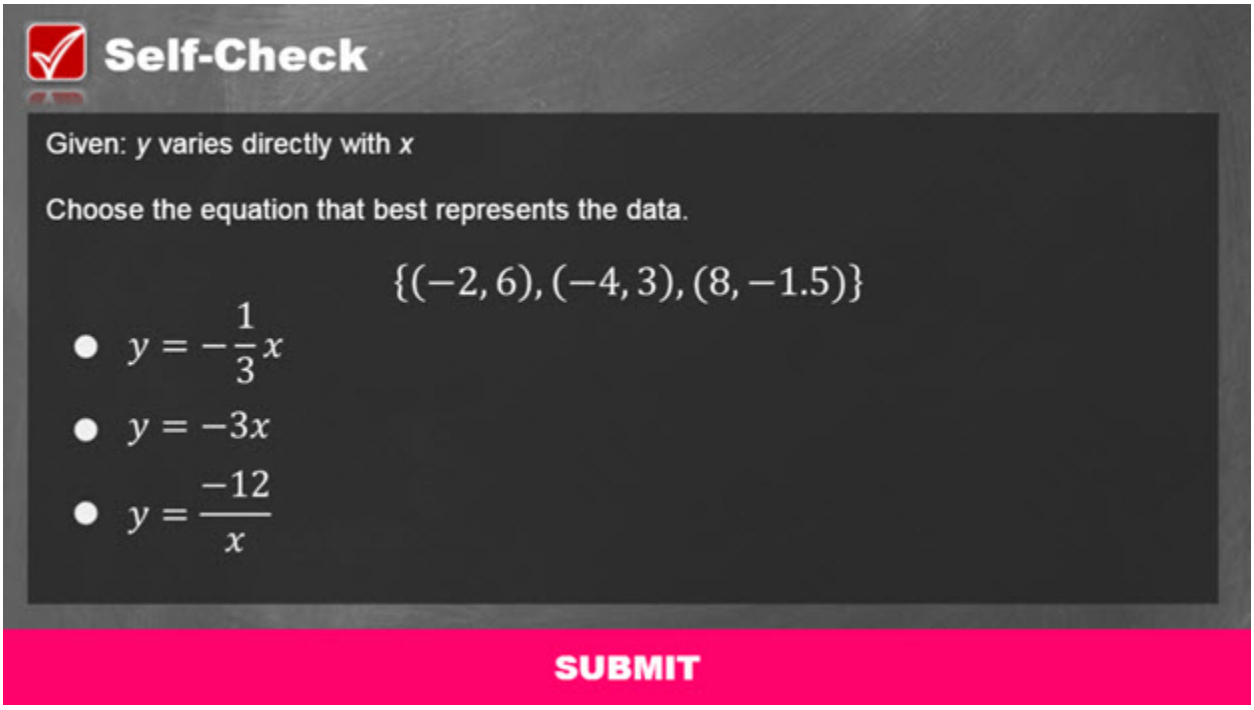


$$C = \frac{4675}{100}$$

$$= 46.75$$

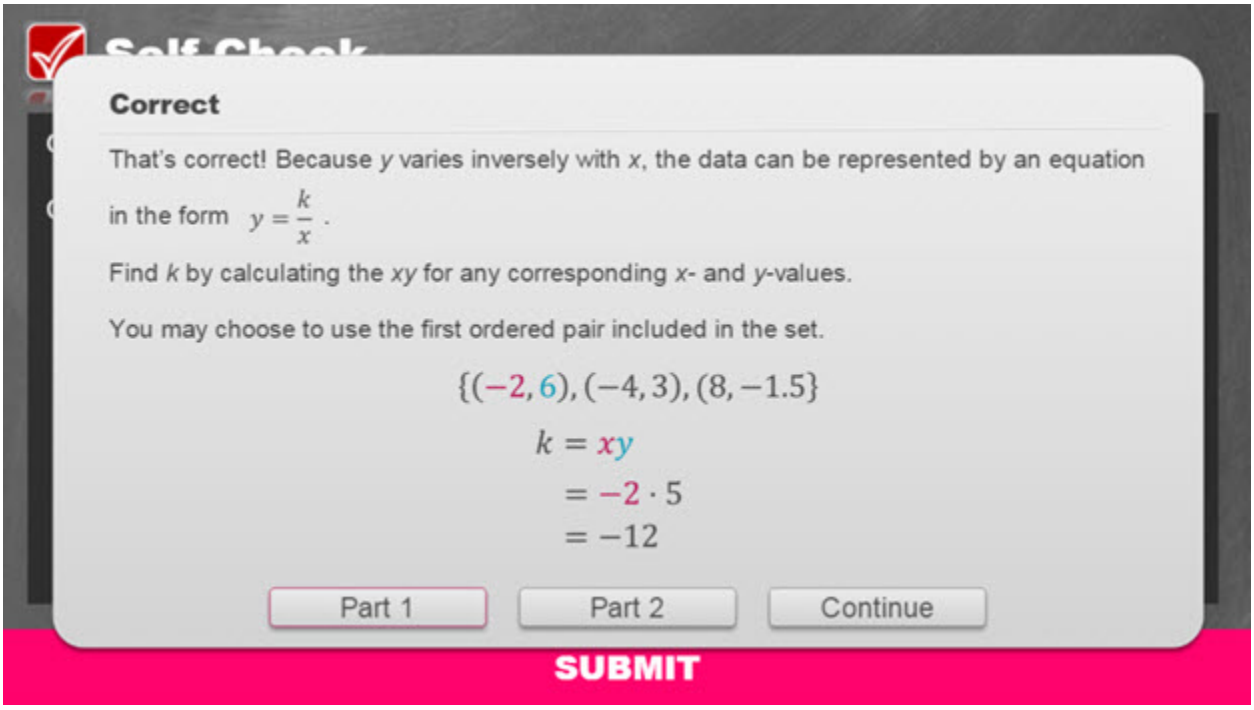
If 100 students go on the trip, each student will pay $46.75.

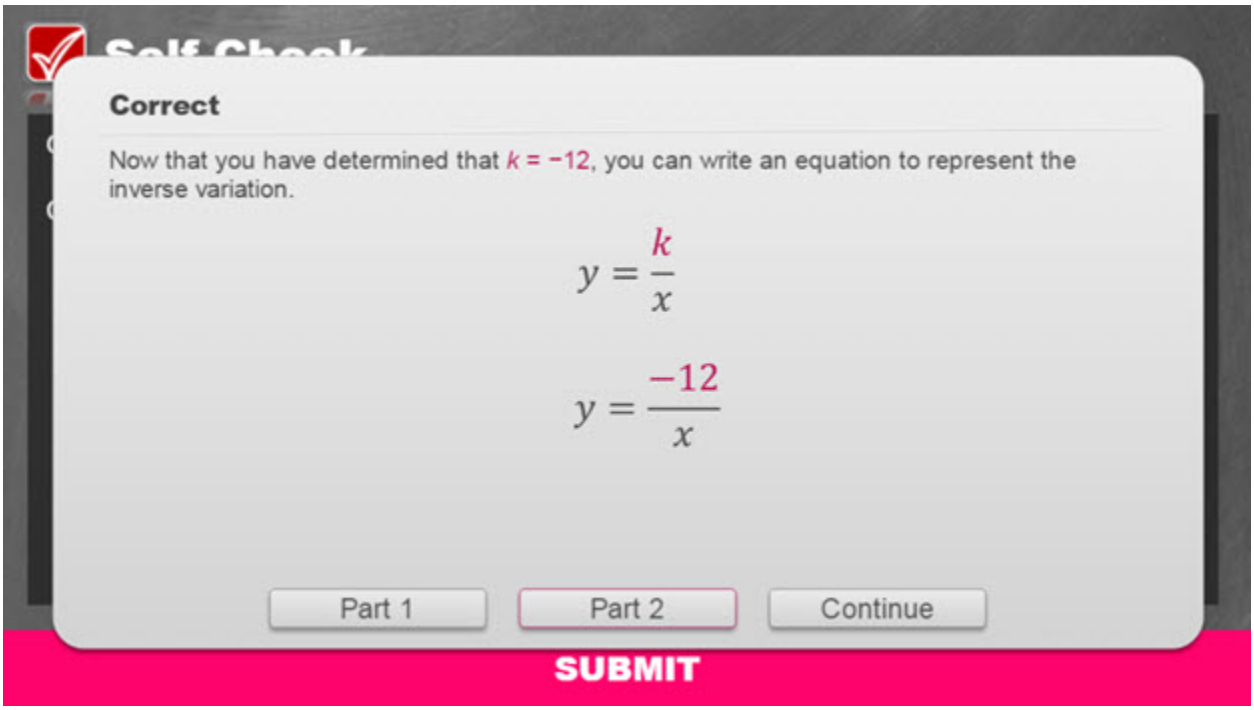
Self-Check 1



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

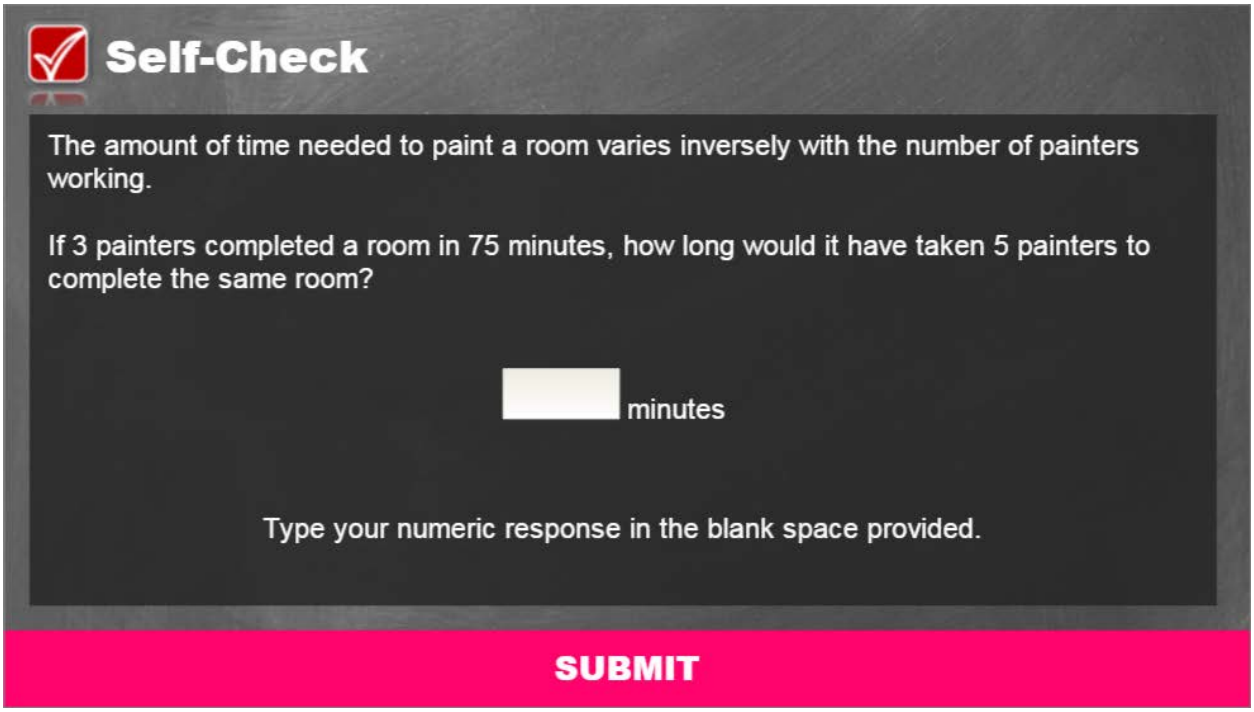
Self-Check 1: Answer





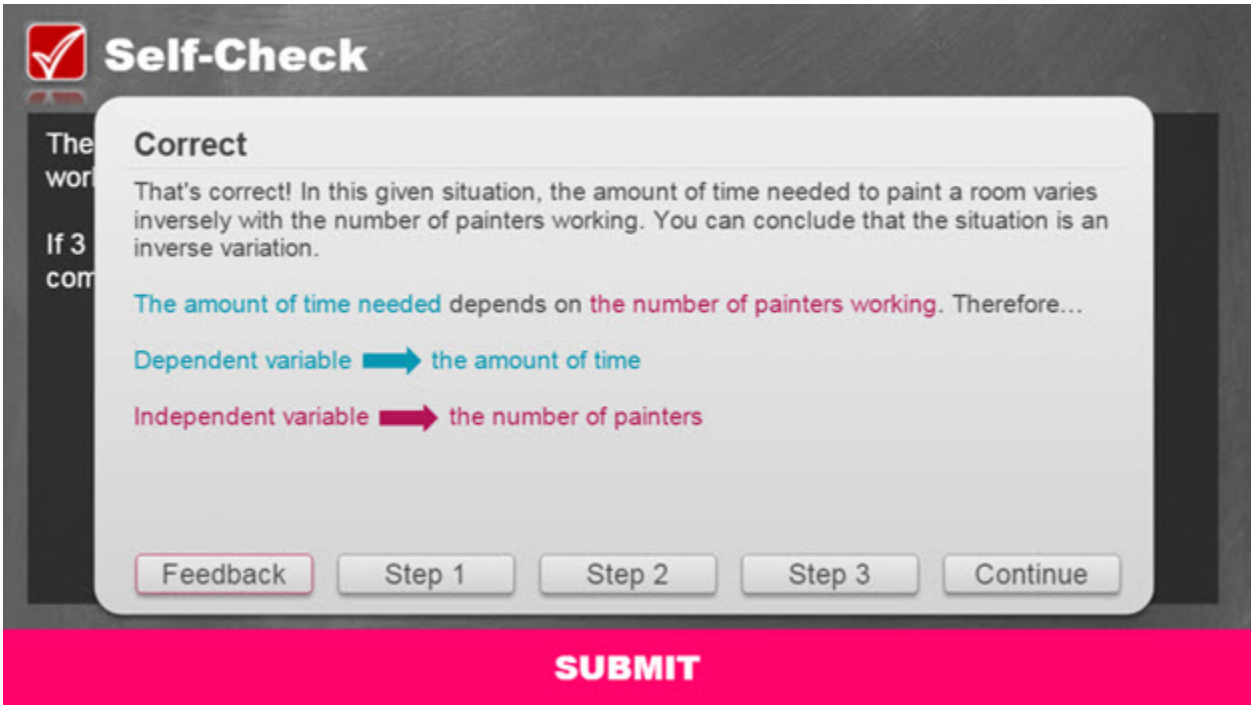
For your reference, the images above show the correct solution to the self-check problem.

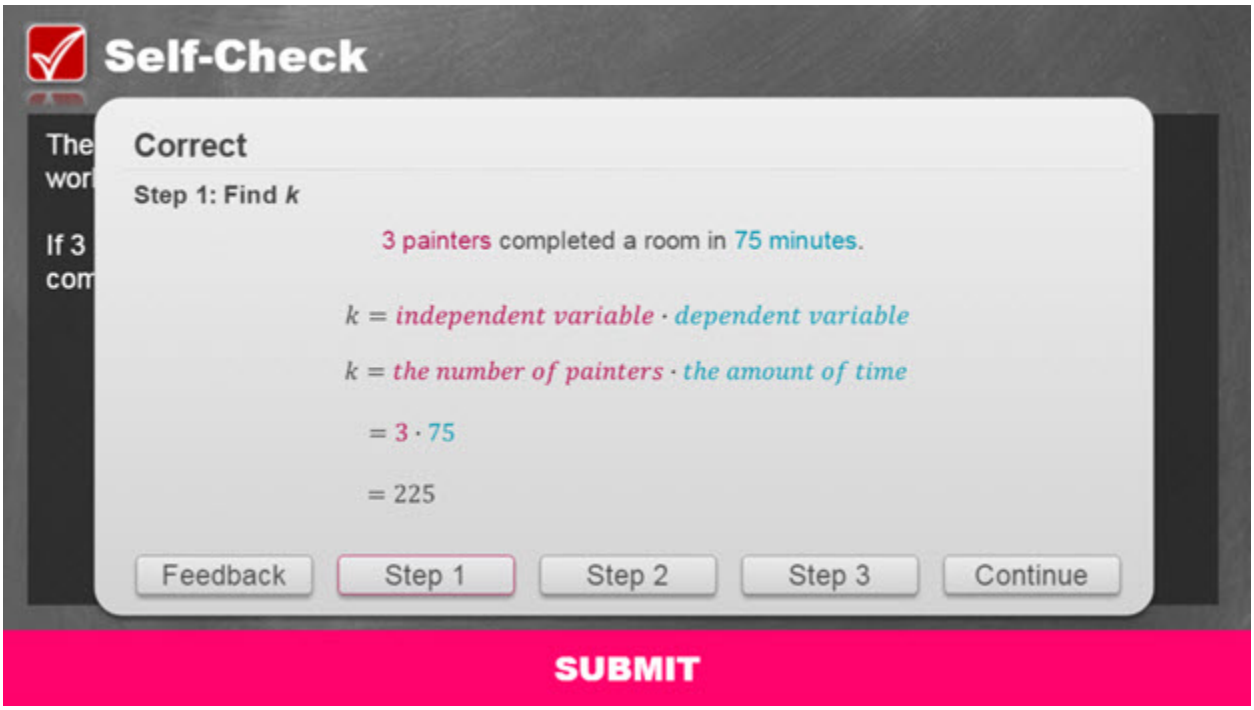
Self-Check 2



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

Self-Check 2: Answer





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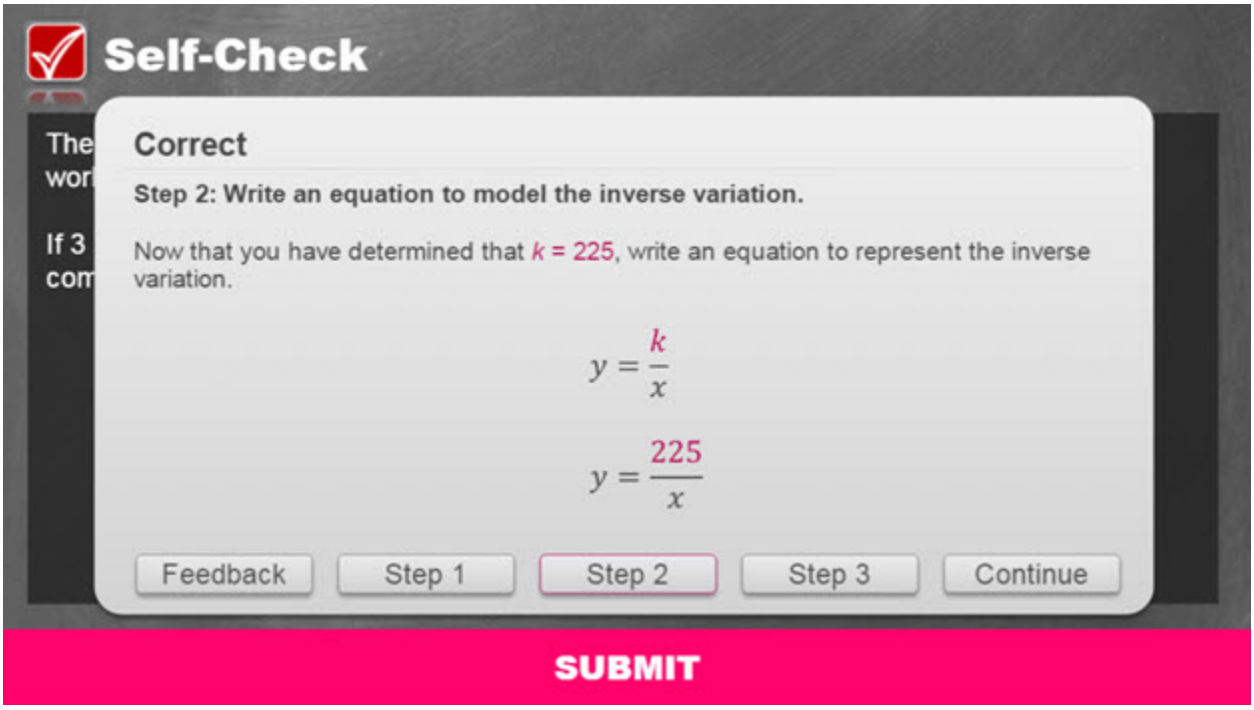
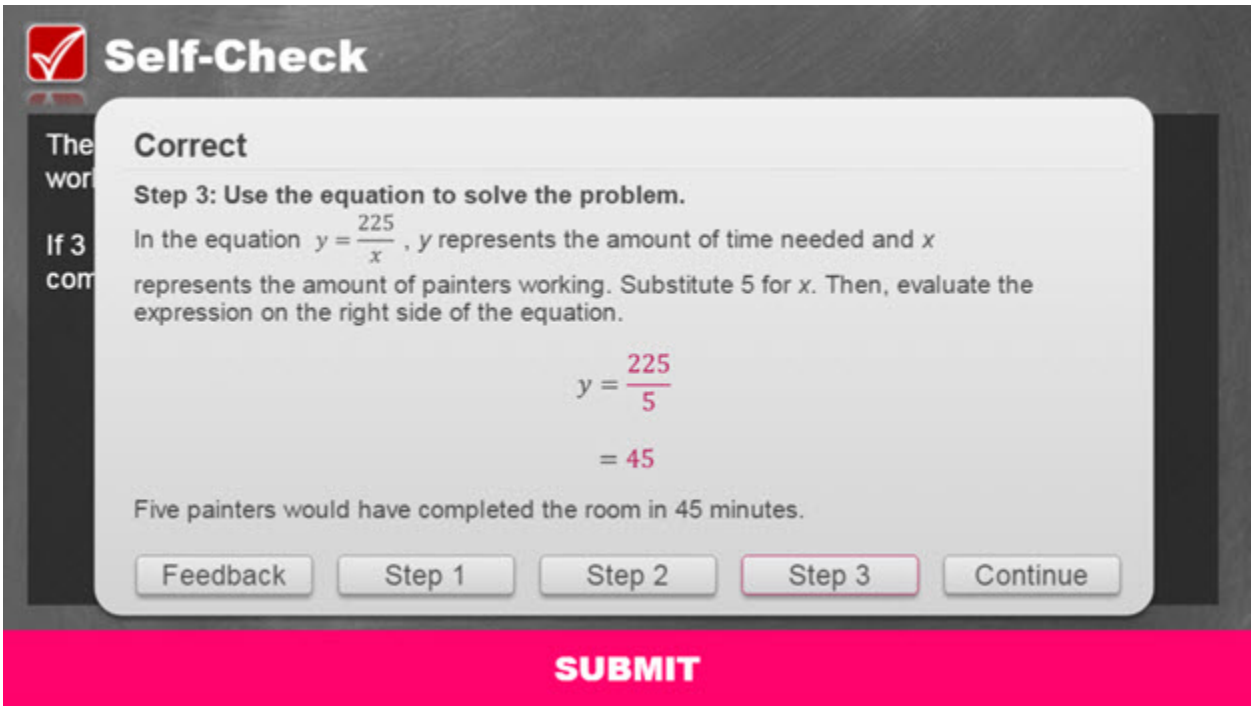
Self-Check 2: Answer (continued)





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

Conclusion

You have reached the conclusion of this lesson where you learned how to write equations to represent inverse variations.