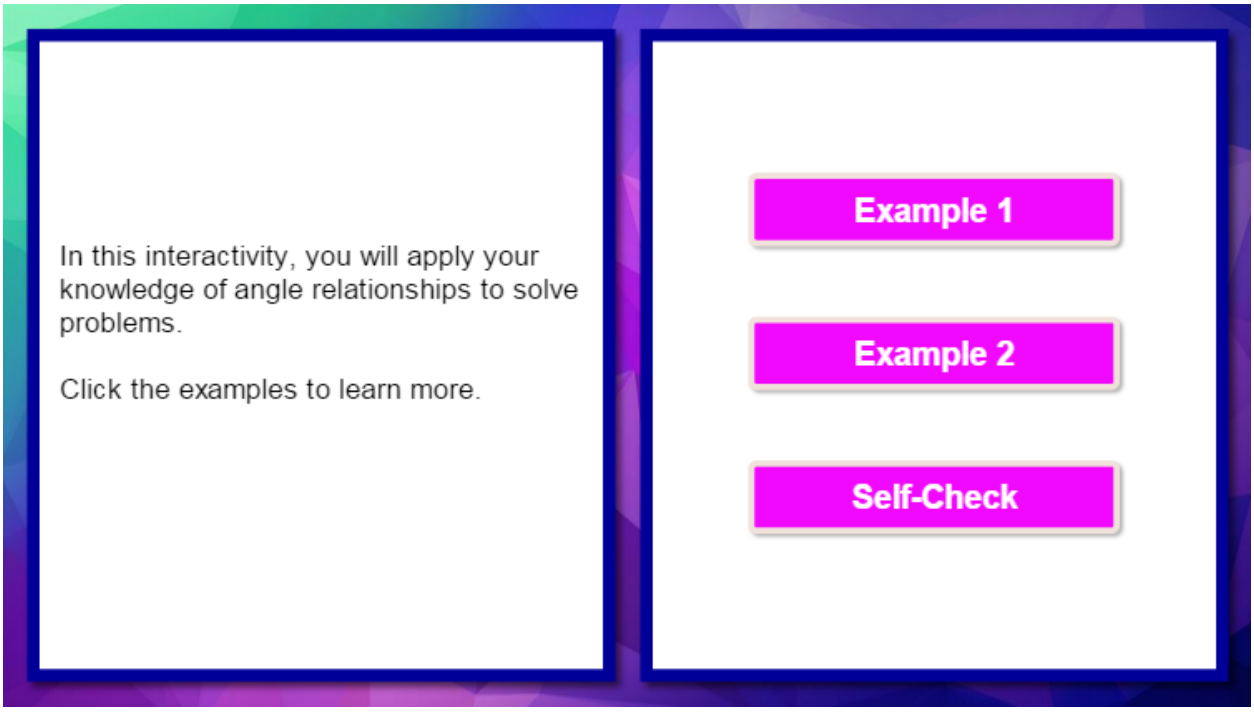
Module 2: Angles Formed by a Transversal Intersecting Parallel Lines

Topic 1 Content: More Applications of Angle Relationships

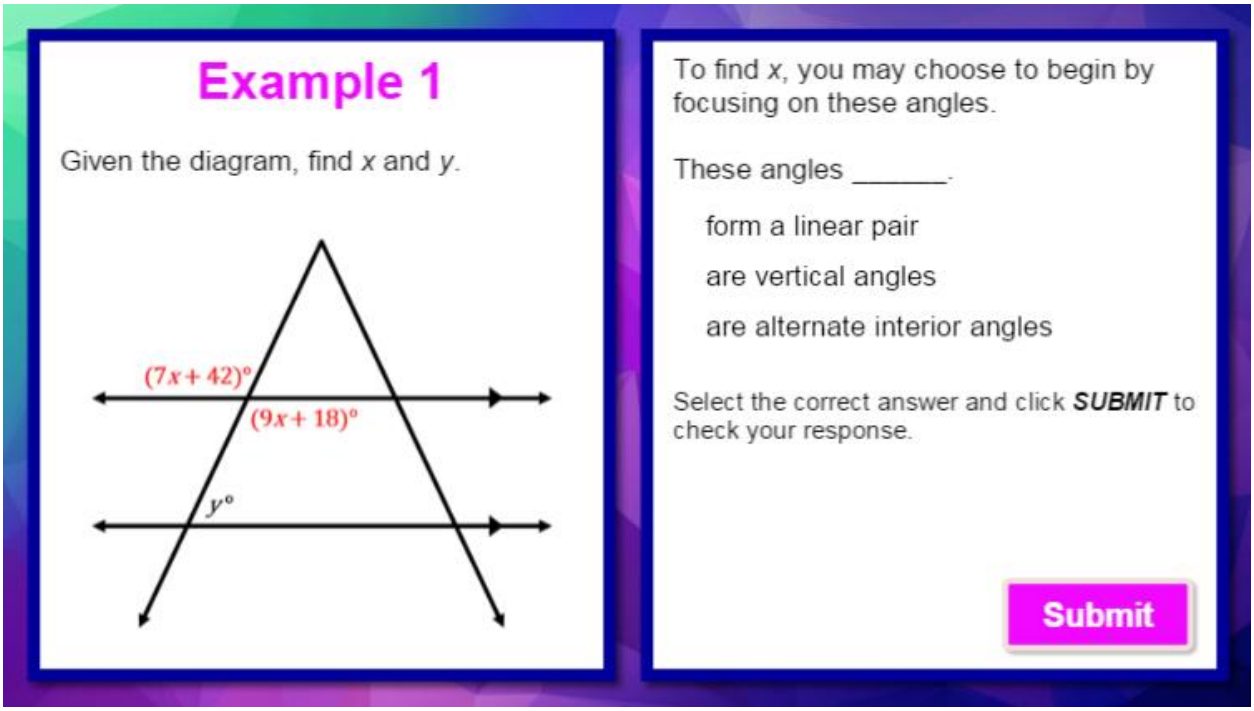
Introduction



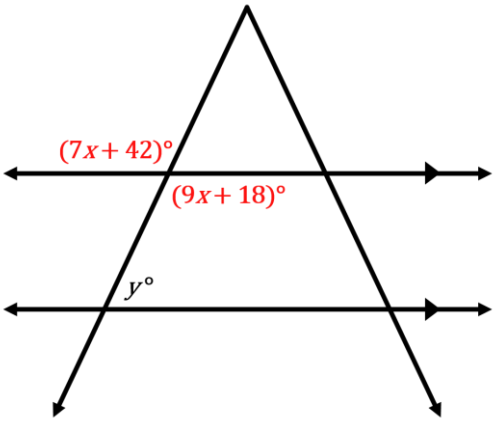
In this interactivity, you will apply your knowledge of angle relationships to solve problems.

Click the examples to learn more.

Example 1



Given the diagram, find x and y.



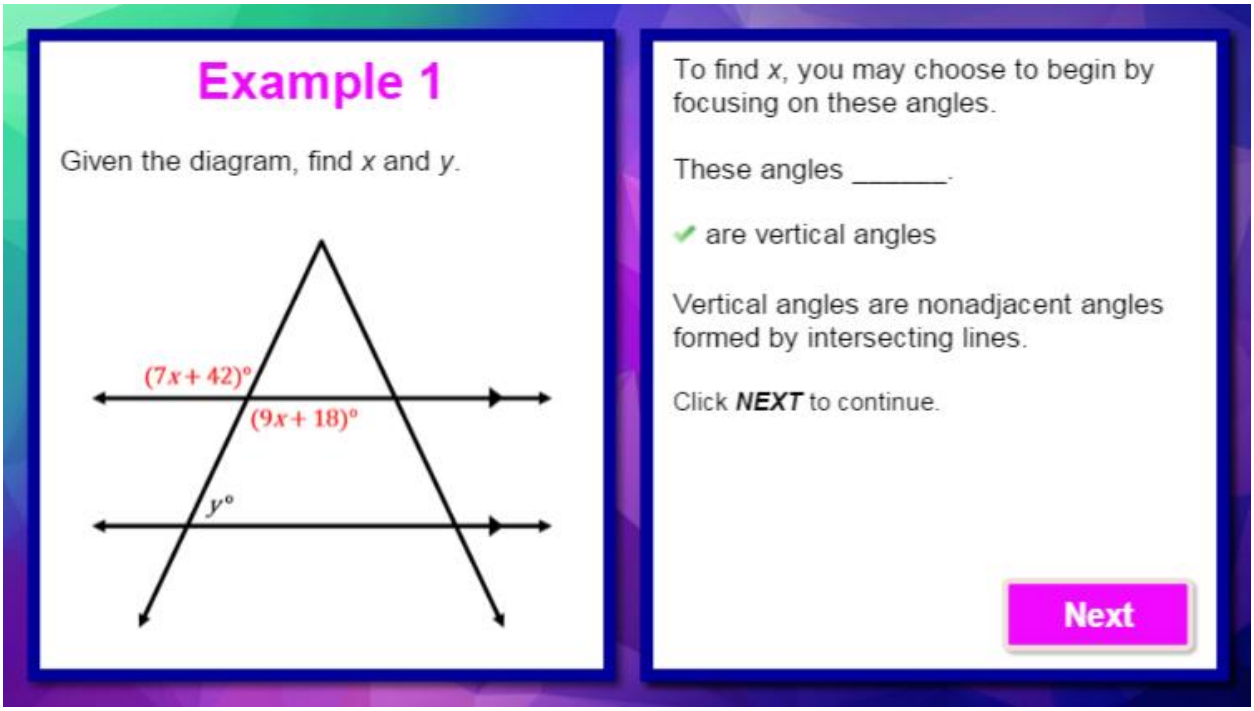
To find x, you may choose to begin by focusing on these angles.

These angles _____.

form a linear pair
are vertical angles
are alternate interior angles

Select the correct answer and click ***SUBMIT*** to check your response.

Example 1 (continued)

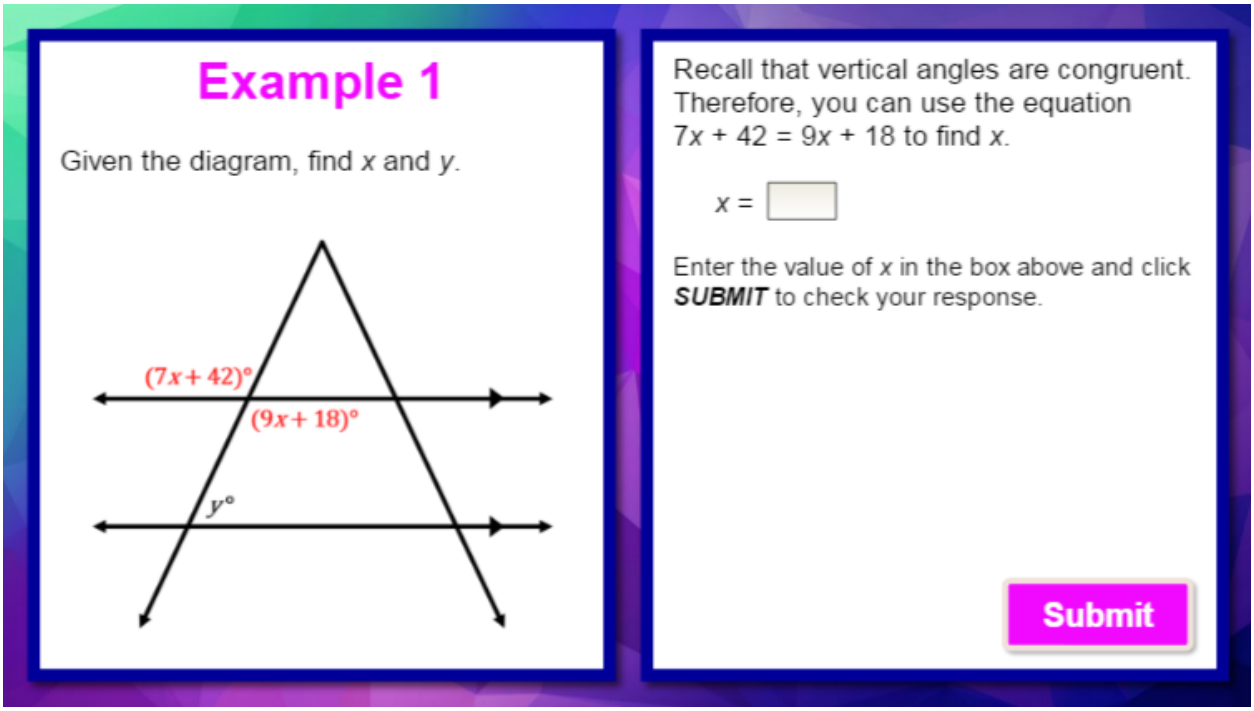


The correct answer is: These angles *are vertical angles*.

Vertical angles are nonadjacent angles formed by intersecting lines.

Click ***NEXT*** to continue.

Example 1 (continued)

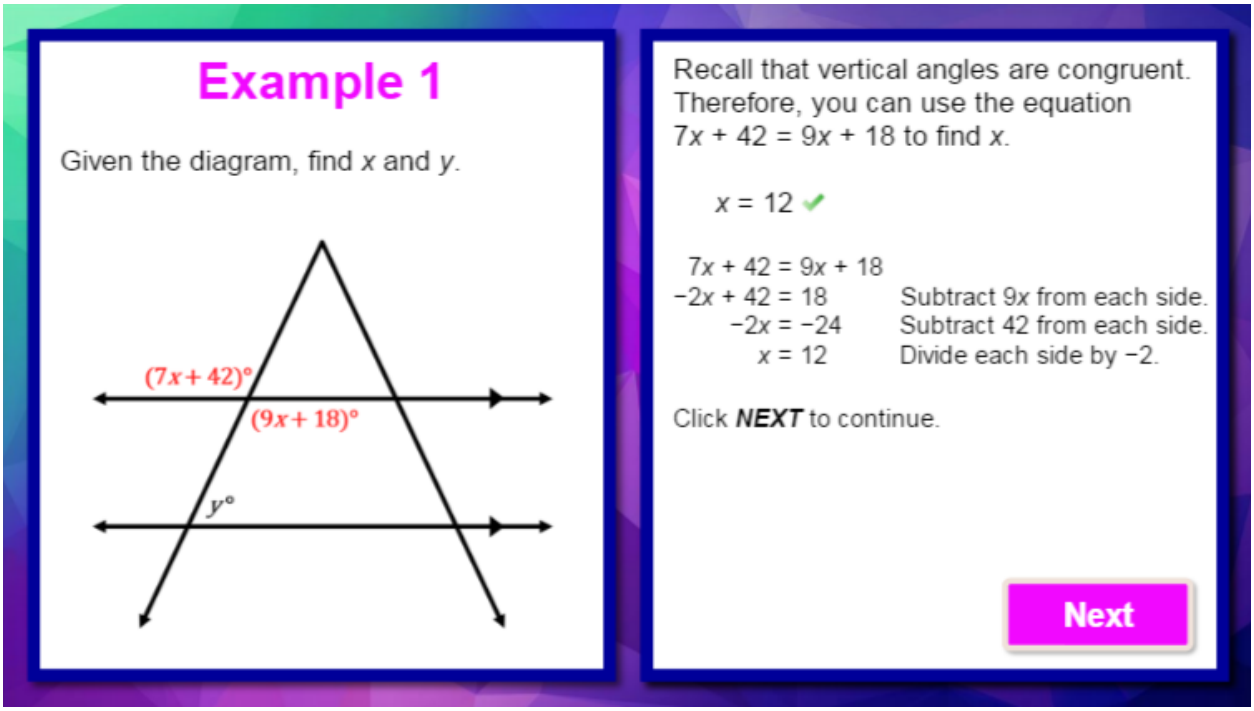


Recall that vertical angles are congruent. Therefore, you can use the equation $7x + 42 = 9x + 18$ to find x.

$x =$ _____

Enter the value of x in the box above and click ***SUBMIT*** to check your response.

Example 1 (continued)

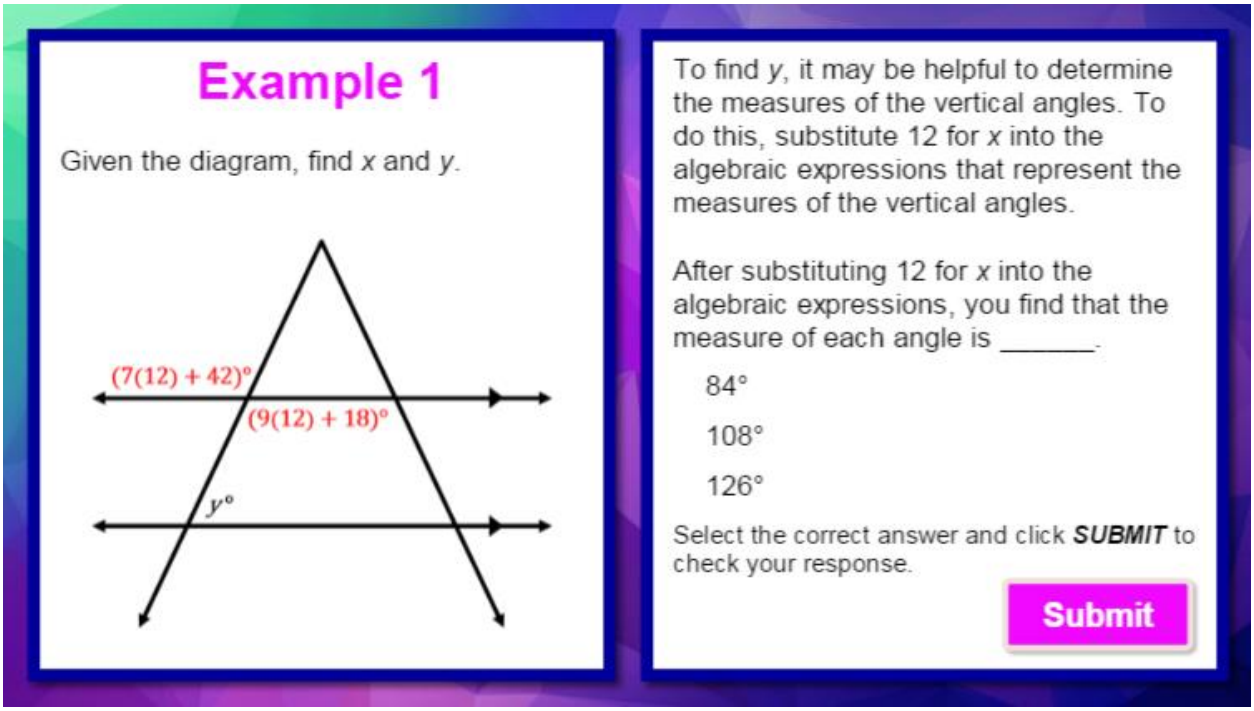


The correct answer is 12.

$$\begin{aligned} 7x+42 &= 9x+18 \\ -2x+42 &= 18 && \text{Subtract } 9x \text{ from each side.} \\ -2x &= -24 && \text{Subtract 42 from each side.} \\ x &= 12 && \text{Divide each side by } -2. \end{aligned}$$

Click ***NEXT*** to continue.

Example 1 (continued)



To find *y*, it may be helpful to determine the measures of the vertical angles. To do this, substitute 12 for *x* into the algebraic expressions that represent the measures of the vertical angles.

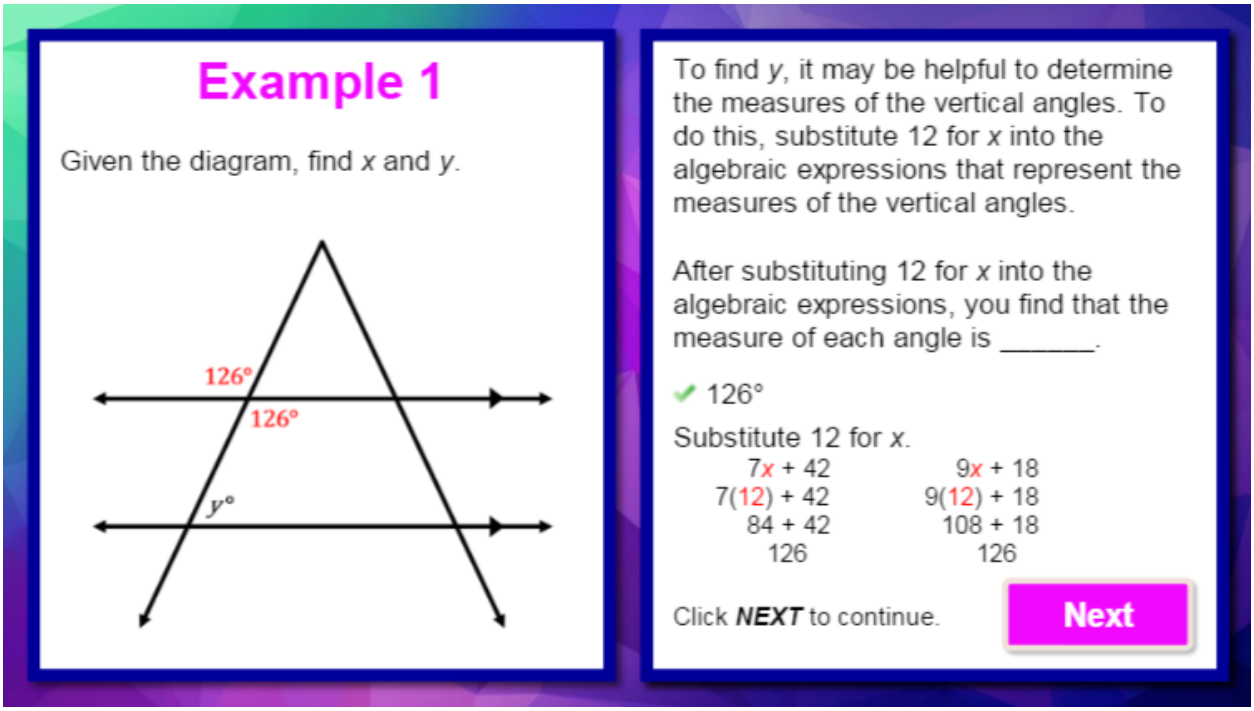
- $7(12) + 42$
- $9(12) + 18$

After substituting 12 for *x* into the algebraic expressions, you find that the measure of each angle is _____.

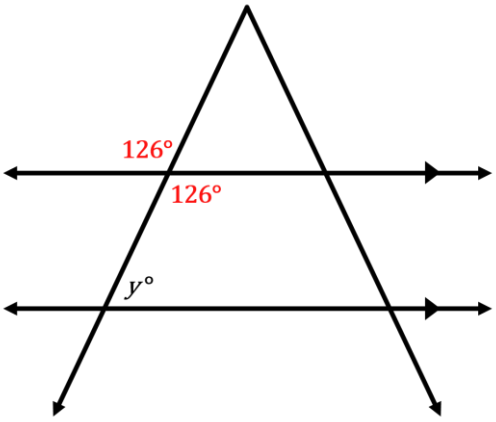
84°
108°
126°

Select the correct answer and click ***SUBMIT*** to check your response.

Example 1 (continued)



The correct answer is 126°.

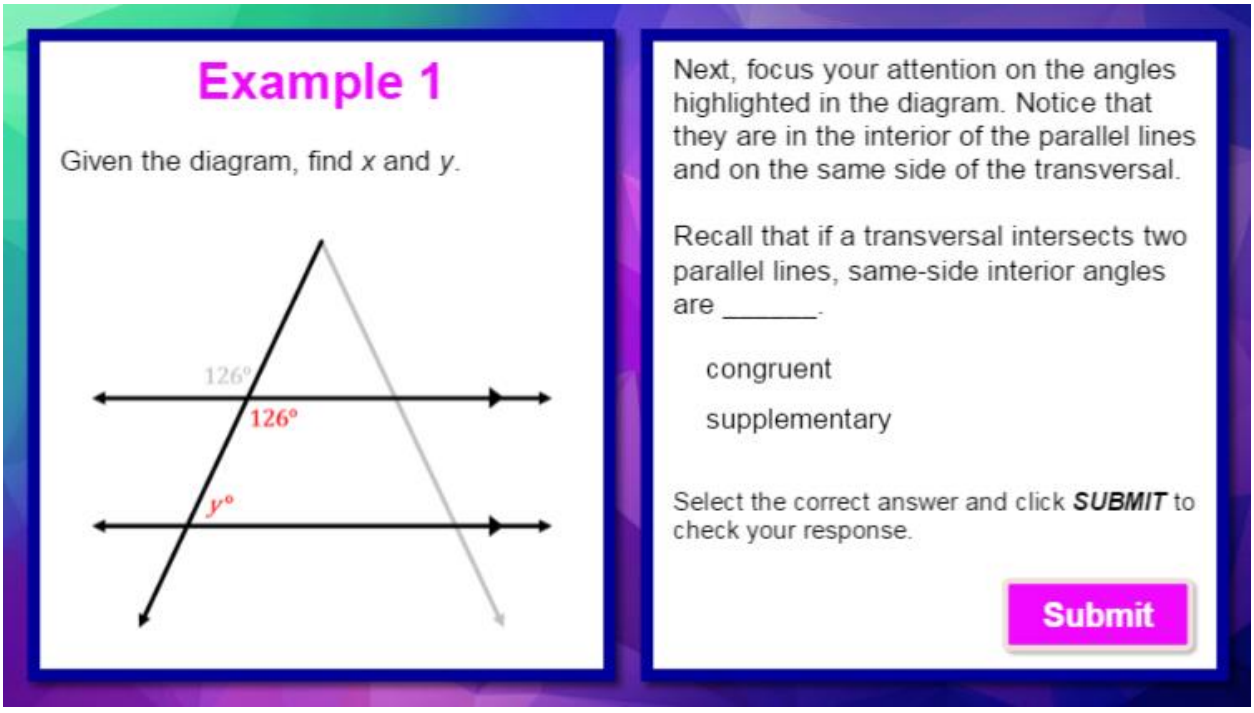


Substitute 12 for x.

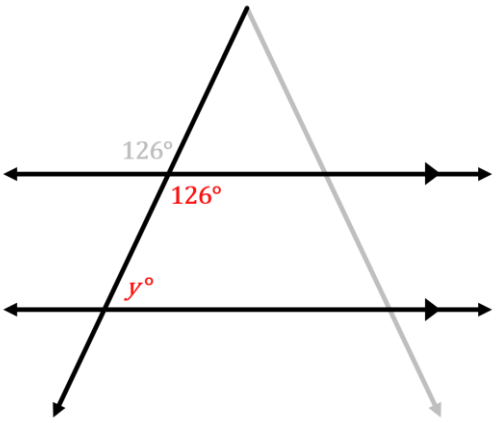
$7x + 42$	$9x + 18$
$7(12) + 42$	$9(12) + 18$
$84 + 42$	$108 + 18$
126	126

Click ***NEXT*** to continue.

Example 1 (continued)



Next, focus your attention on the angles highlighted in the diagram. Notice that they are in the interior of the parallel lines and on the same side of the transversal.

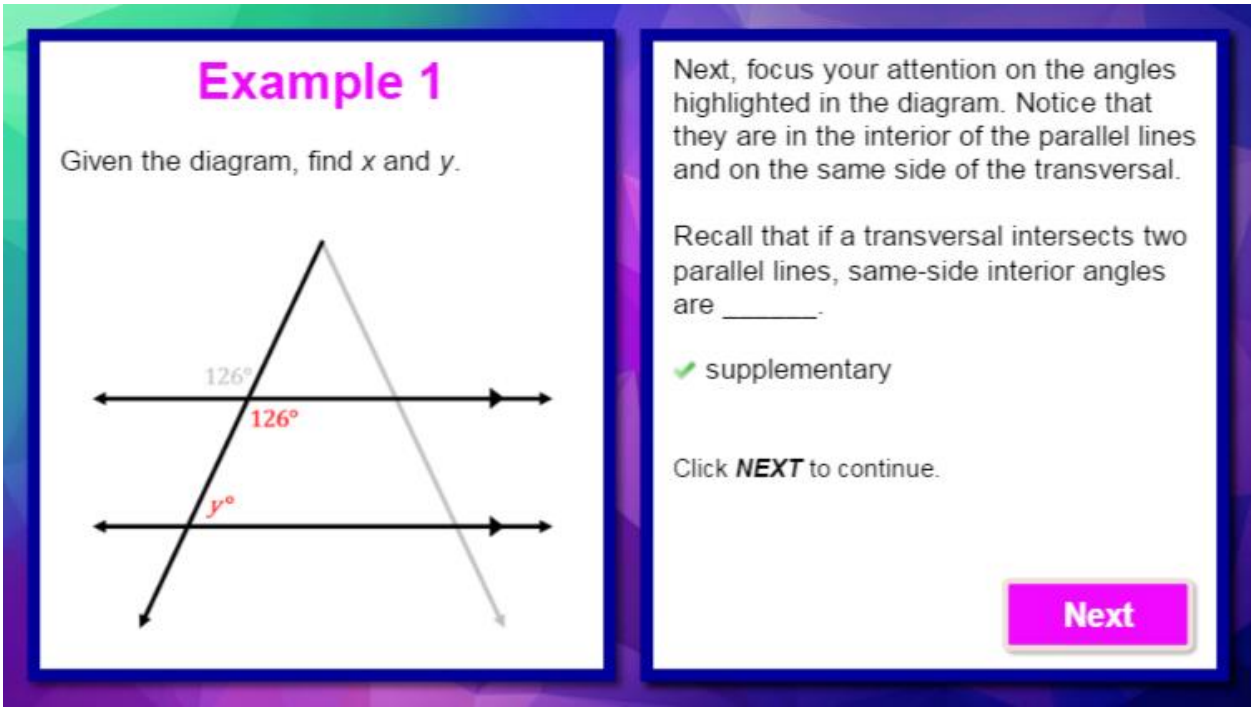


Recall that if a transversal intersects two parallel lines, same-side interior angles are _____.

congruent
supplementary

Select the correct answer and click ***SUBMIT*** to check your response.

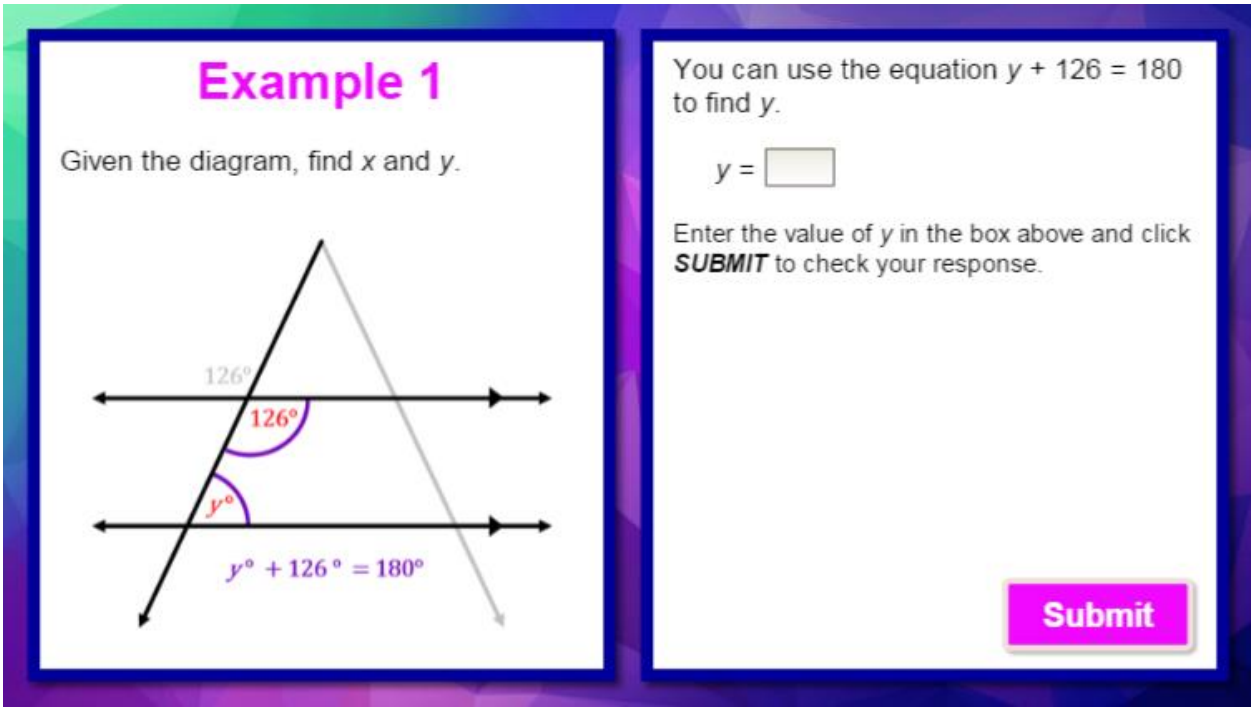
Example 1 (continued)



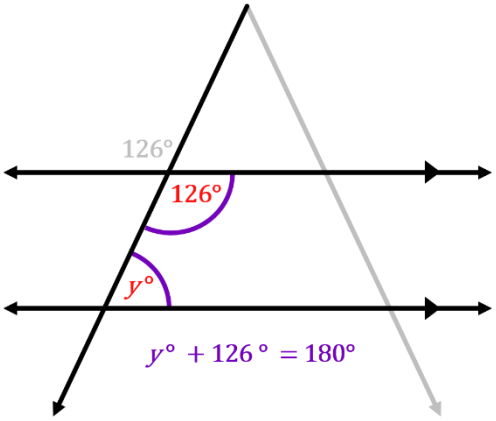
The correct answer is *supplementary*.

Click ***NEXT*** to continue.

Example 1 (continued)



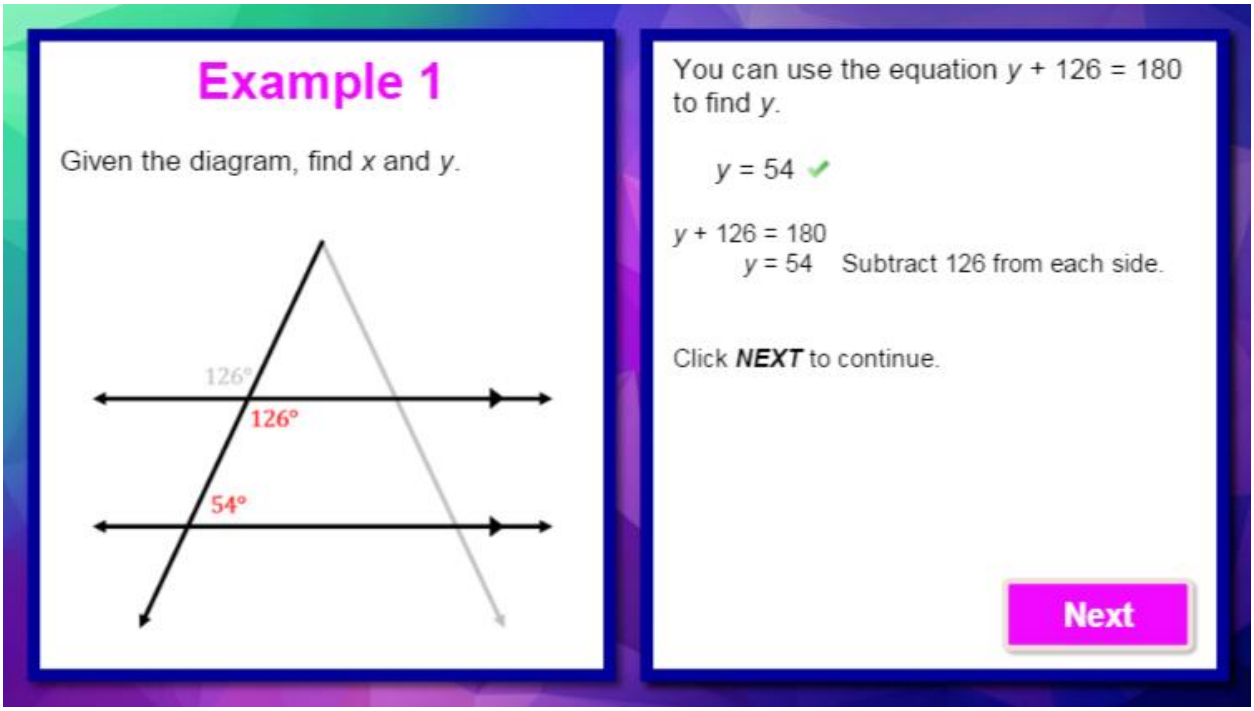
You can use the equation $y + 126 = 180$ to find y.



$y =$ _____

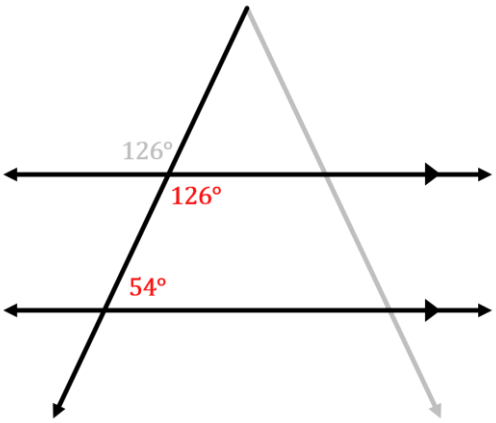
Enter the value of y in the box above and click ***SUBMIT*** to check your response.

Example 1 (continued)



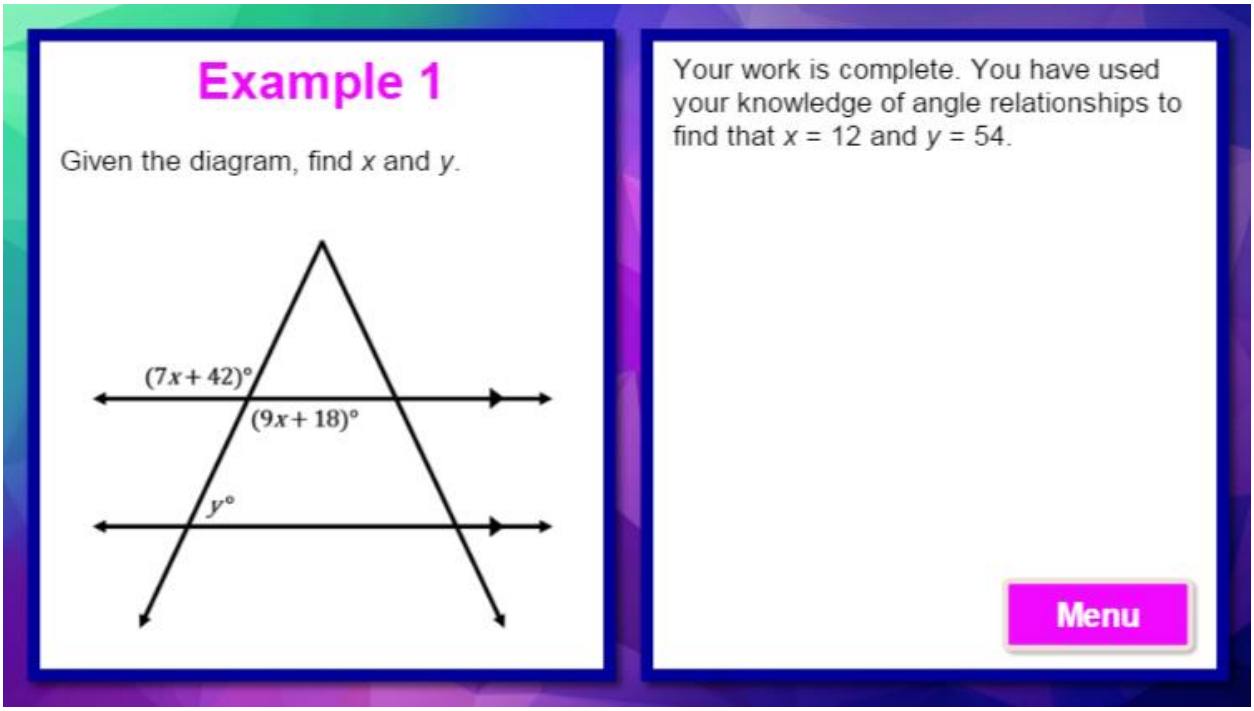
The correct answer is 54.

$$y + 126 = 180$$
$$y = 54 \quad \text{Subtract 126 from each side.}$$

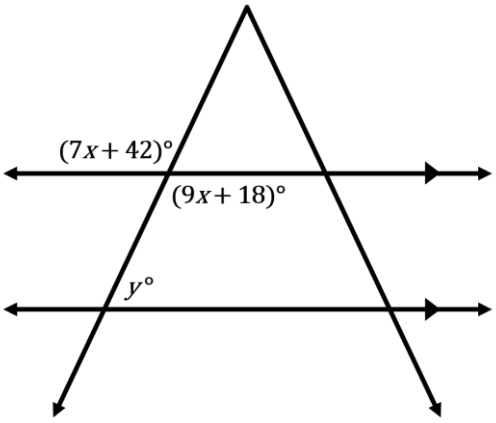


Click ***NEXT*** to continue.

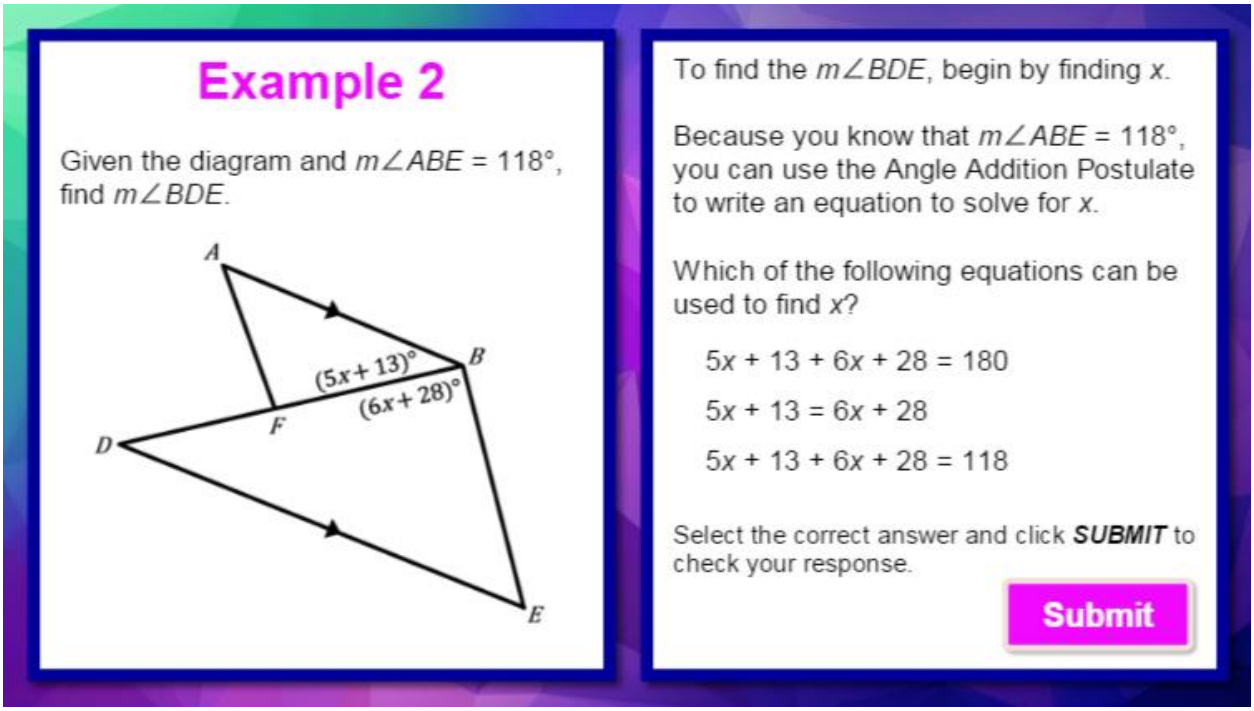
Example 1 (continued)



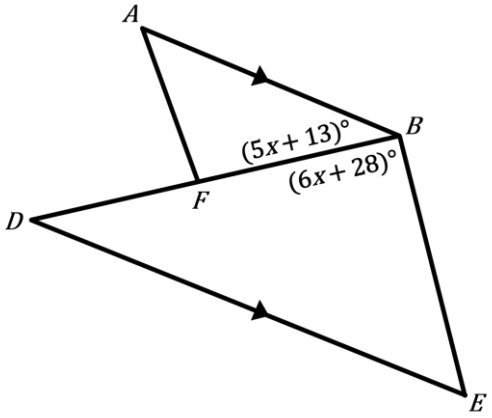
Your work is complete. You have used your knowledge of angle relationships to find that $x = 12$ and $y = 54$.



Example 2



Given the diagram and $m\angle ABE = 118°$, find $m\angle BDE$.



To find the $m\angle BDE$, begin by finding x.

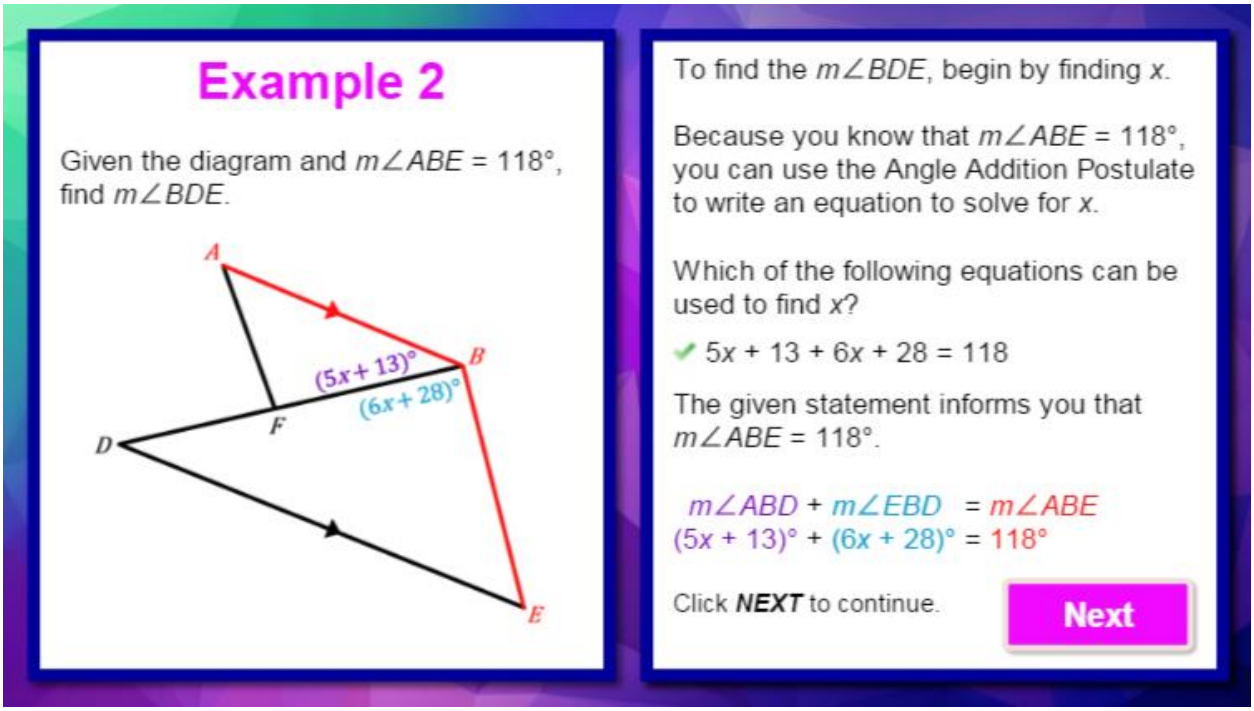
Because you know that $m\angle ABE = 118°$, you can use the Angle Addition Postulate to write an equation to solve for x.

Which of the following equations can be used to find x?

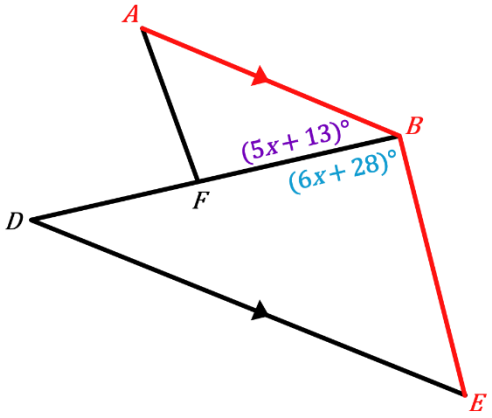
$5x + 13 + 6x + 28 = 180$
$5x + 13 = 6x + 28$
$5x + 13 + 6x + 28 = 118$

Select the correct answer and click ***SUBMIT*** to check your response.

Example 2 (continued)



The correct answer is 118.

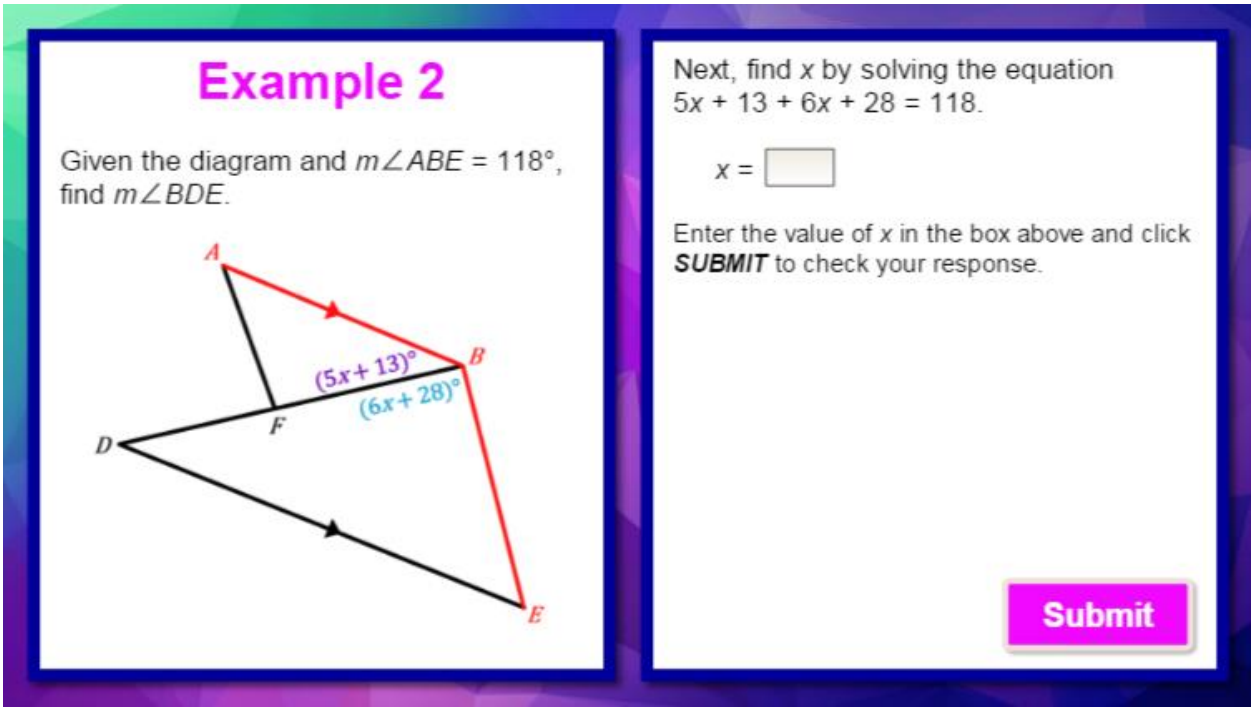


The given statement informs you that $m\angle ABE = 118°$.

$$m\angle ABD + m\angle EBD = m\angle ABE$$
$$(5x + 13)° + (6x + 28)° = 118°$$

Click ***NEXT*** to continue.

Example 2 (continued)

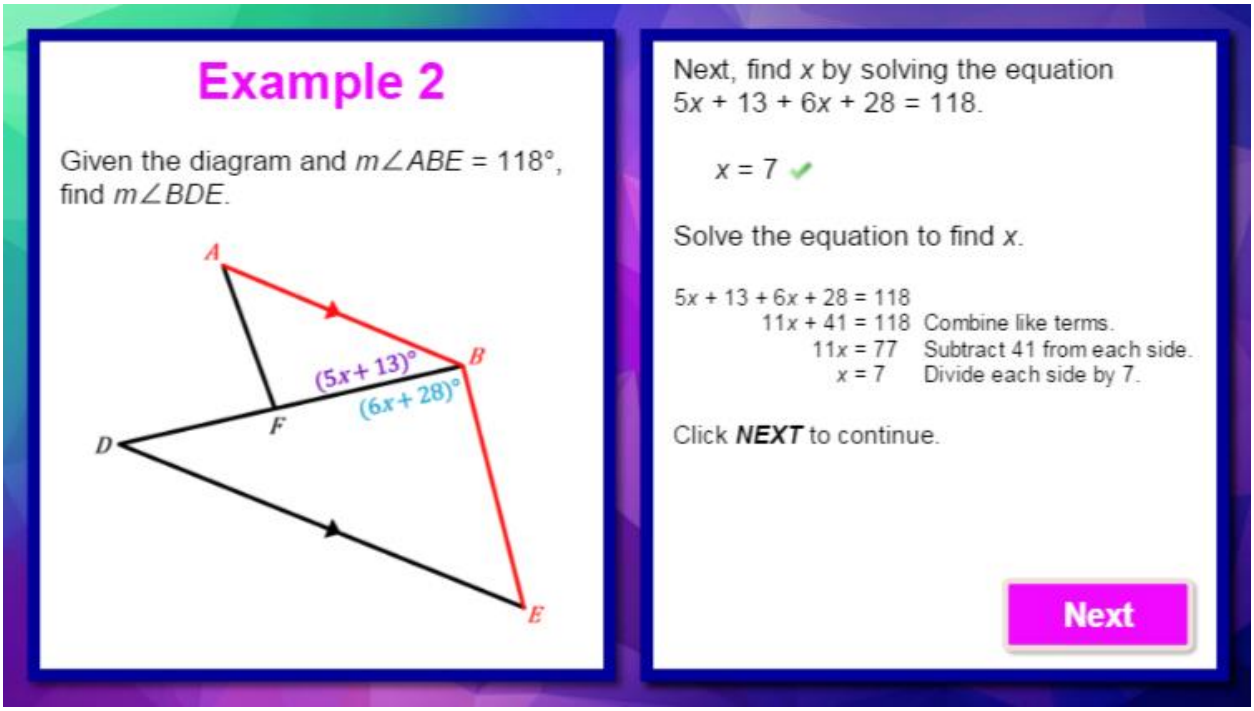


Next, find x by solving the equation $5x + 13 + 6x + 28 = 118$.

$x =$ _____

Enter the value of x in the box above and click ***SUBMIT*** to check your response.

Example 2 (continued)



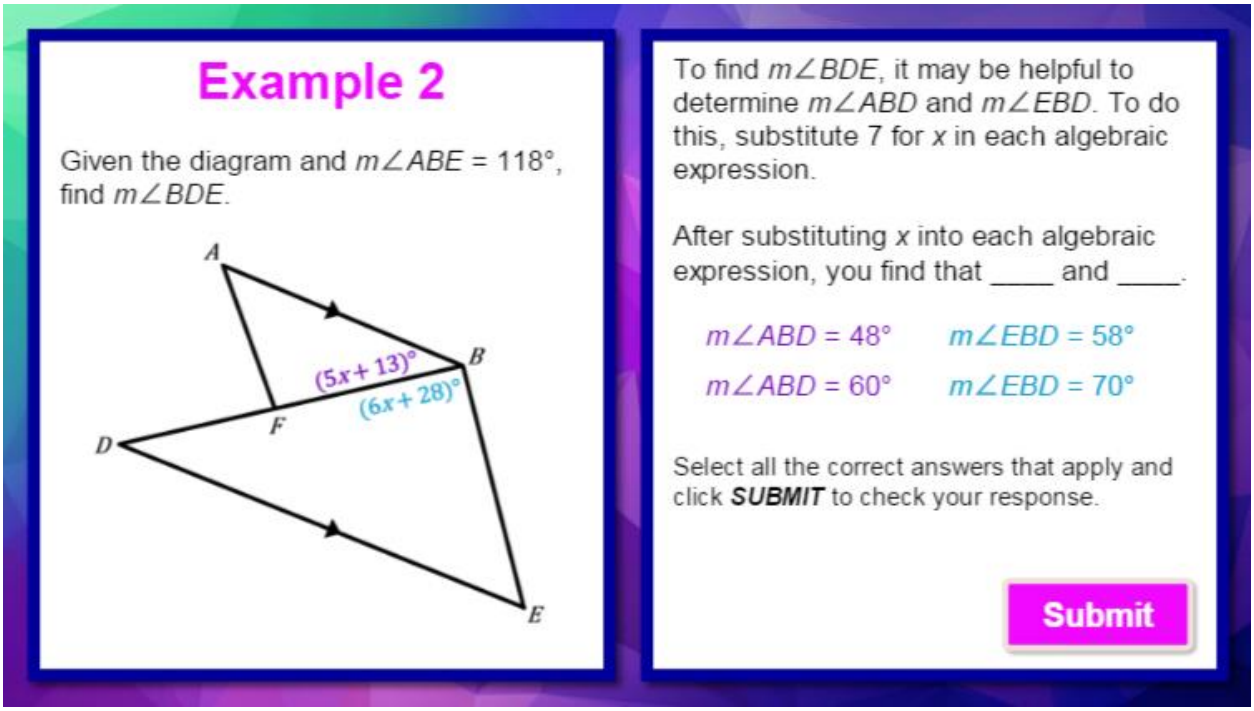
The correct answer is 7.

Solve the equation to find x.

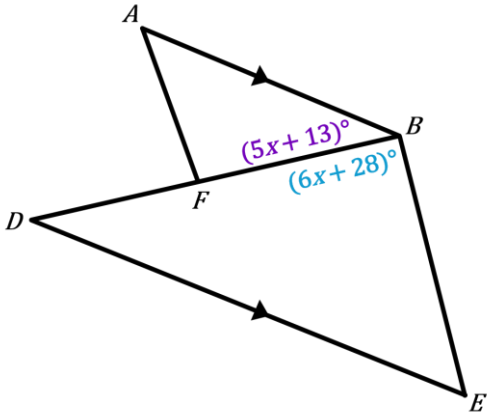
$$\begin{aligned} 5x + 13 + 6x + 28 &= 118 \\ 11x + 41 &= 118 \quad \text{Combine like terms.} \\ 11x &= 77 \quad \text{Subtract 41 from each side.} \\ x &= 7 \quad \text{Divide each side by 7.} \end{aligned}$$

Click ***NEXT*** to continue.

Example 2 (continued)



To find $m\angle BDE$, it may be helpful to determine $m\angle ABD$ and $m\angle EBD$.



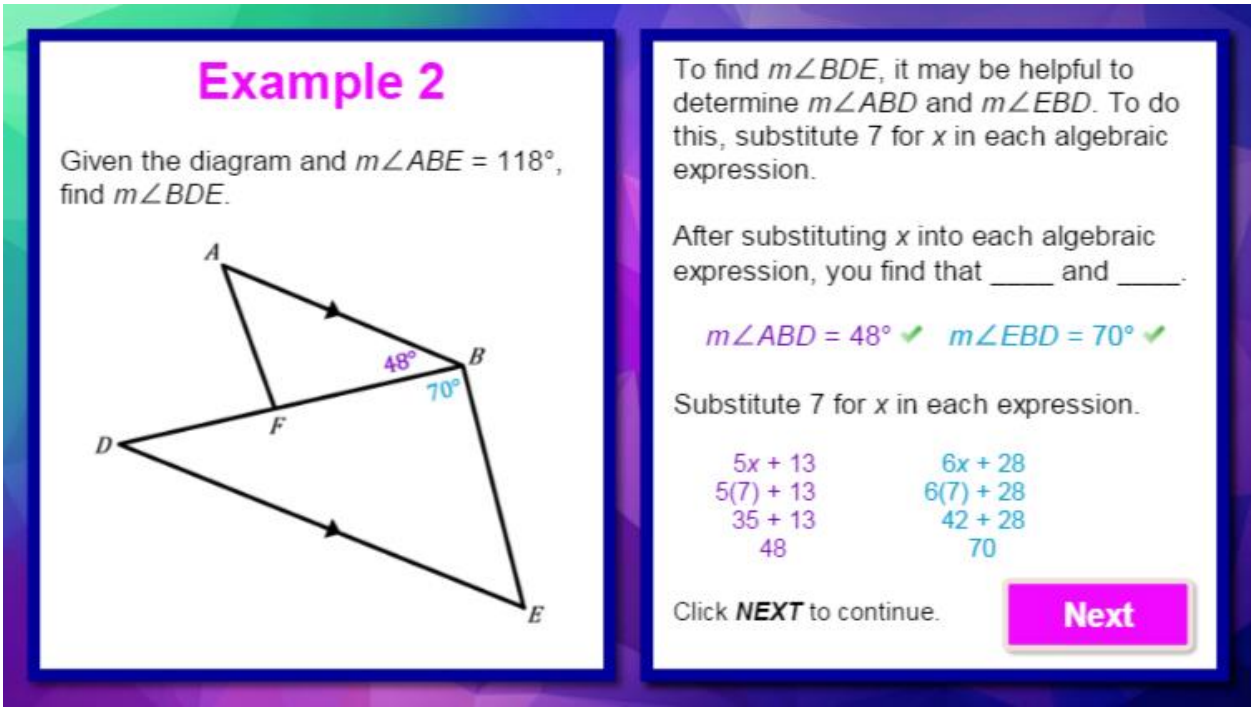
To do this, substitute 7 for x in each algebraic expression.

After substituting x into each algebraic expression, you find that _____ and _____.

$m\angle ABD = 48°$
$m\angle ABD = 60°$
$m\angle EBD = 58°$
$m\angle EBD = 70°$

Select all the correct answers that apply and click ***SUBMIT*** to check your response.

Example 2 (continued)



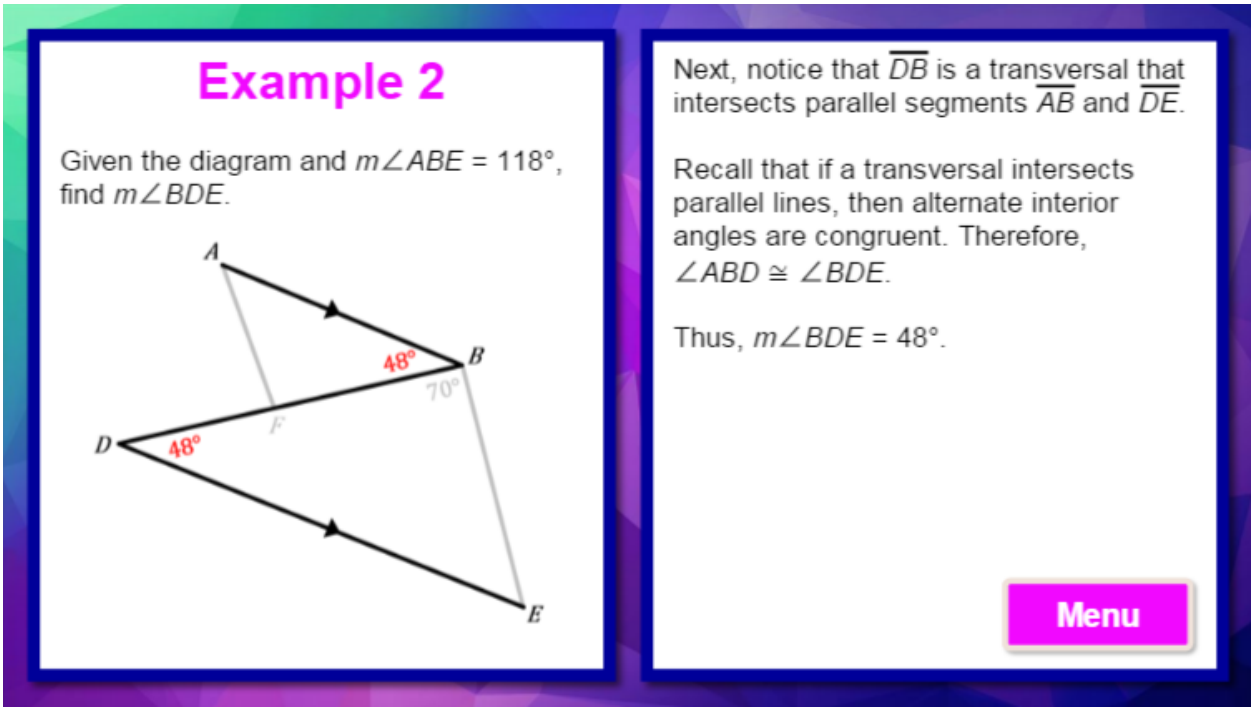
The correct answers are $m\angle ABD = 48°$ and $m\angle EBD = 70°$.

Substitute 7 for x in each expression.

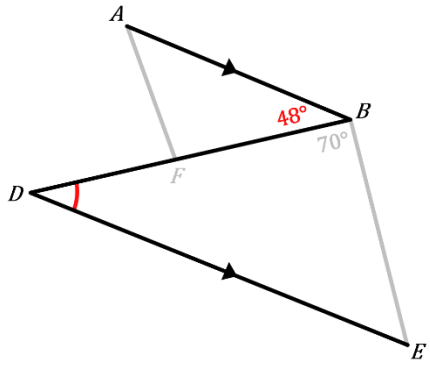
$5x + 13$	$6x + 28$
$5(7) + 13$	$6(7) + 28$
$35 + 13$	$42 + 28$
48	70

Click ***NEXT*** to continue.

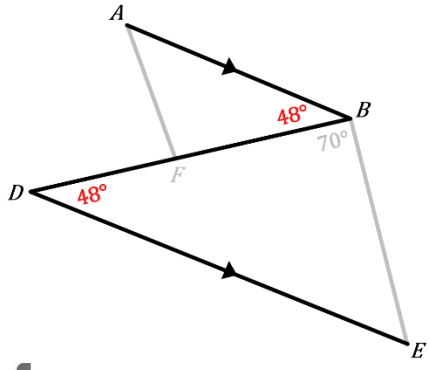
Example 2 (continued)



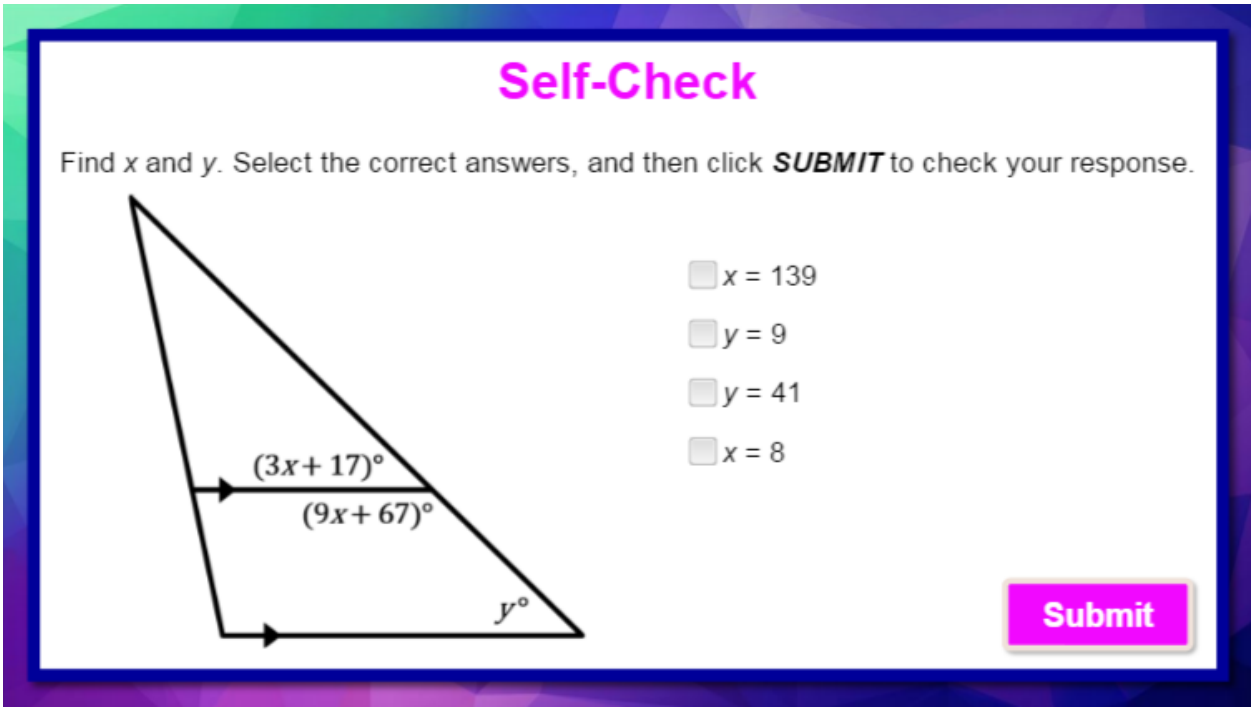
Next, notice that $\overline{DB}$ is a transversal that intersects parallel segments $\overline{AB}$ and $\overline{DE}$.



Recall that if a transversal intersects parallel lines, then alternate interior angles are congruent. Therefore, $\angle ABD \cong \angle BDE$. Thus, $m\angle BDE = 48°$.

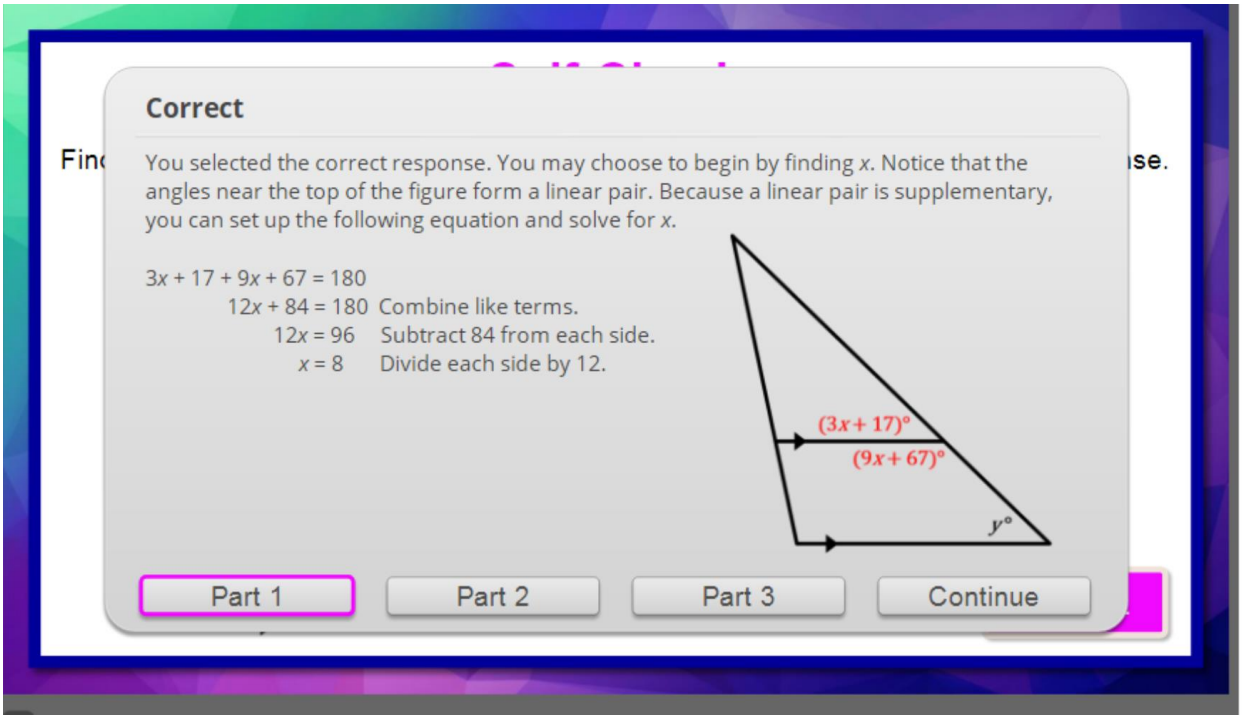


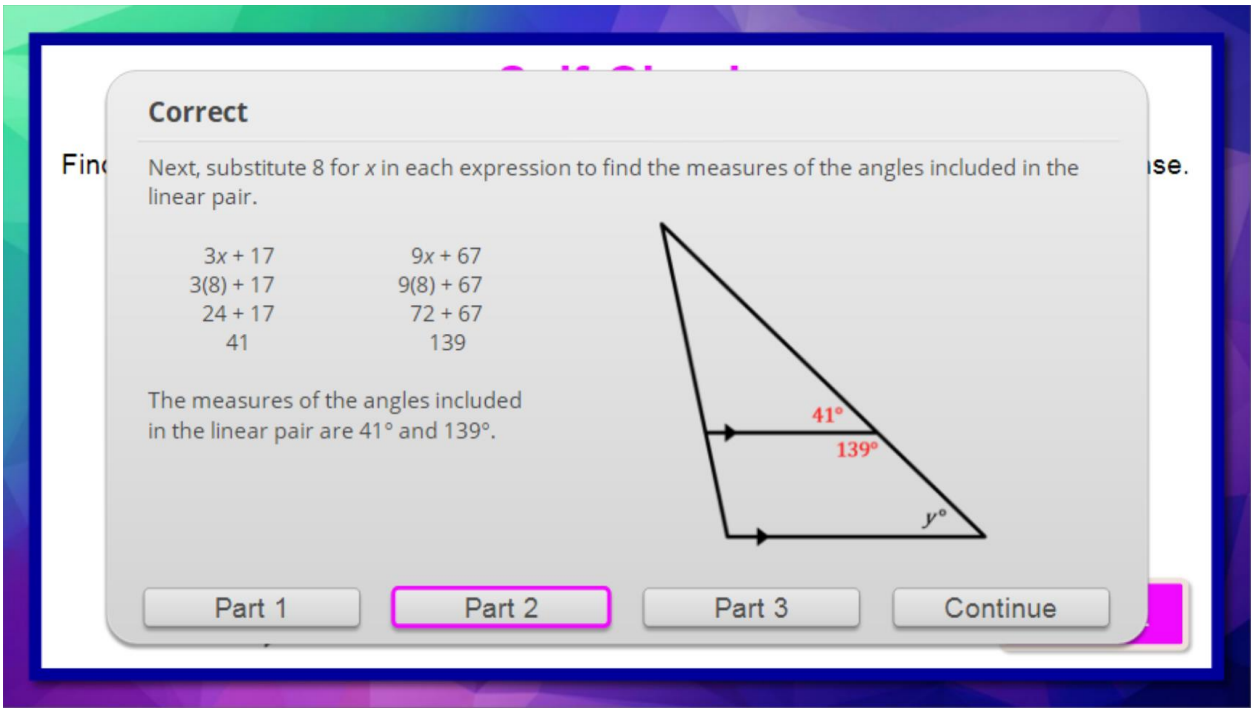
Self-Check



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

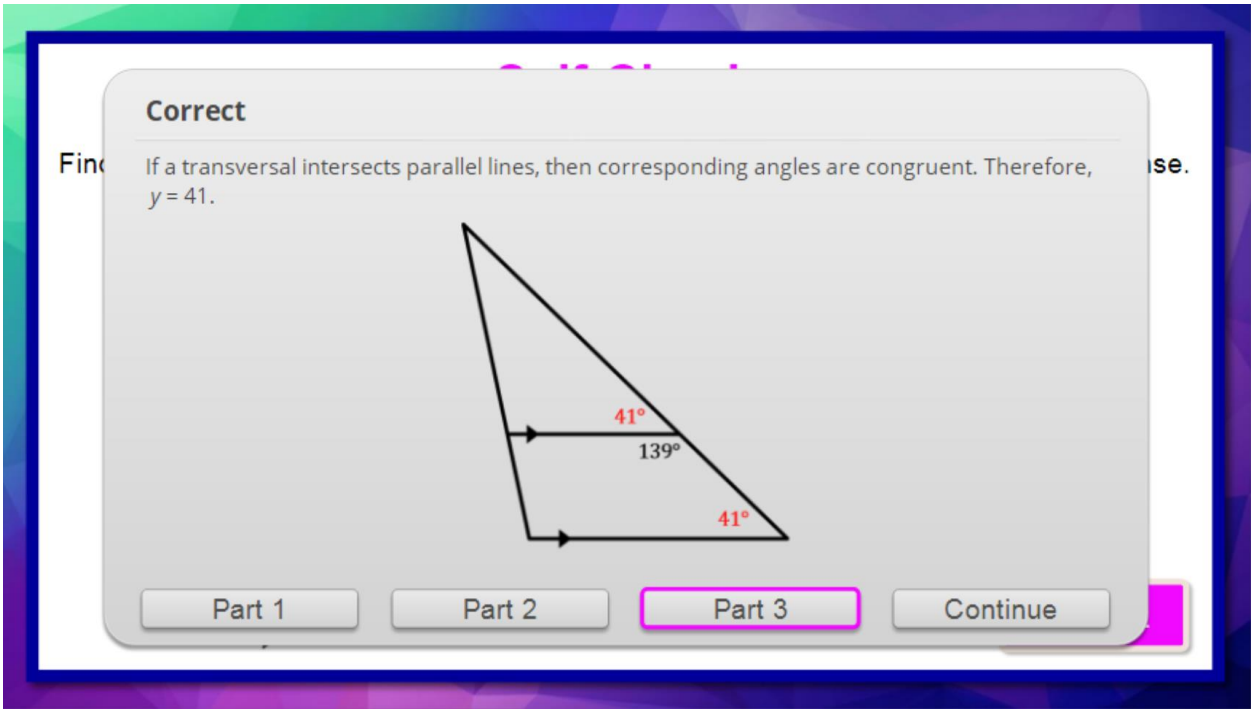
Self-Check: Answer





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

Self-Check: Answer (continued)



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