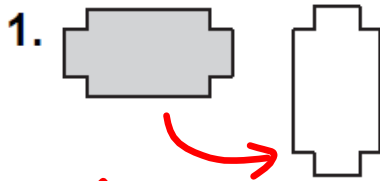


Lesson 2.2: Translations

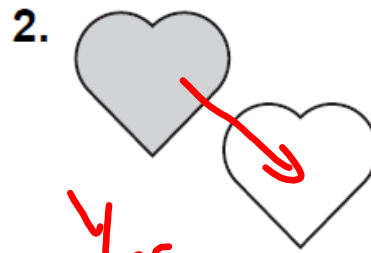
Essential Question

How can you arrange tiles to make a tessellation?

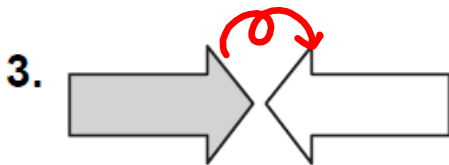
Tell whether the shaded figure is a **translation** of the nonshaded figure.



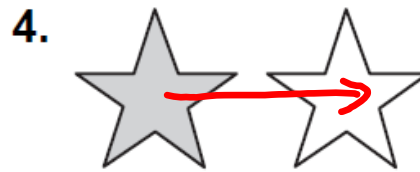
No



Yes

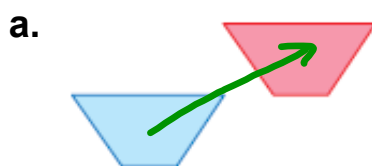


No

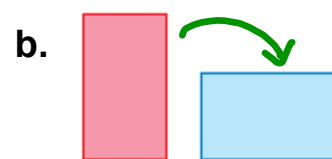


Yes

Tell whether the blue figure is a translation of the red figure.



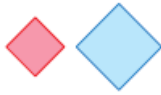
Yes!



No!

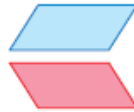
Tell whether the blue figure is a translation of the red figure. Explain.

1.



No, the figures are not congruent.

2.



No, the blue figure is "flipped."

3.



Yes, the figures are congruent and oriented in the same way.

Key Idea

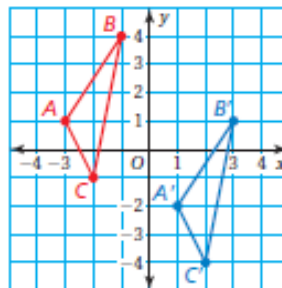
Translations in the Coordinate Plane

Words To translate a figure a units horizontally and b units vertically in a coordinate plane, add a to the x -coordinates and b to the y -coordinates of the vertices.

Positive values of a and b represent translations up and right. Negative values of a and b represent translations down and left.

Algebra $(x, y) \rightarrow (x + a, y + b)$

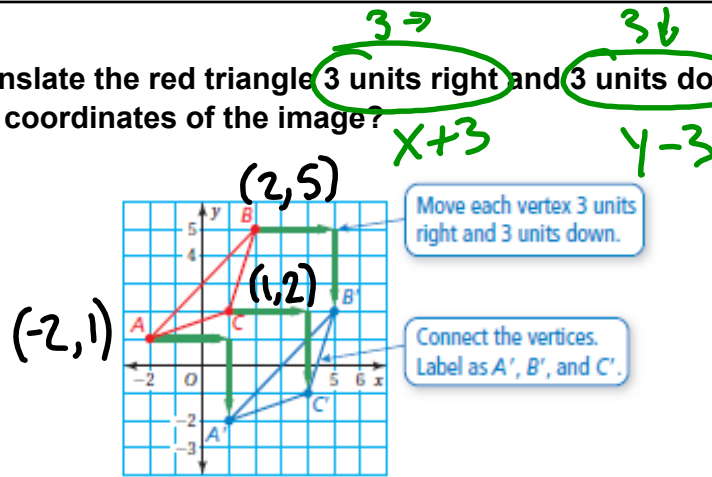
In a translation, the original figure and its image are congruent.



The figure's orientation stays the same!

The figure is ABC , and the image is $A'B'C'$.

Translate the red triangle 3 units right and 3 units down. What are the coordinates of the image?



$$A'(-2+3, 1-3) = (1, -2)$$

$$B'(2+3, 5-3) = (5, 2)$$

$$C'(1+3, 2-3) = (4, -1)$$

4. **WHAT IF?** The red triangle is translated $x-4$ and $y+2$ 4 units left and 2 units up. What are the coordinates of the image?

$$A(-2, 1) \rightarrow A'(-2-4, 1+2) = (-6, 3)$$

$$B(2, 5) \rightarrow B'(2-4, 5+2) = (-2, 7)$$

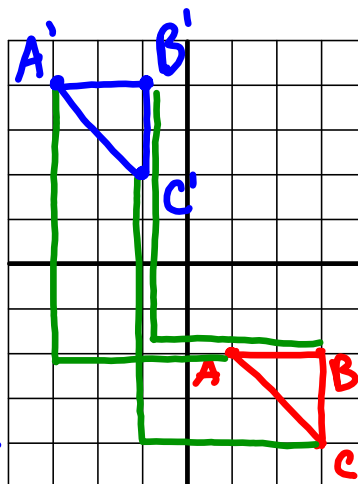
$$C(1, 2) \rightarrow C'(1-4, 2+2) = (-3, 4)$$

The vertices of a square are $A(1, -2)$, $B(3, -2)$, $C(3, -4)$, and $D(1, -4)$. Draw the **figure** and its **image** after a translation 4 units left and 6 units up.

$$x-4 \quad y+6$$

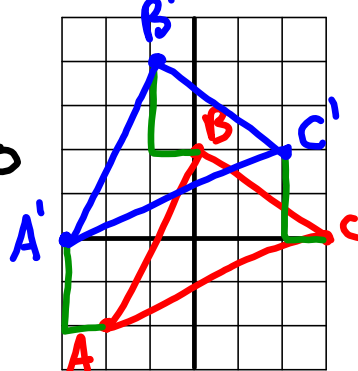
Be sure to use $A'B'C'$ for the image.

The **figure** and the **image** are congruent.



5. The vertices of a triangle are $A(-2, -2)$, $B(0, 2)$, and $C(3, 0)$. Draw the **figure** and its **image** after a translation 1 unit left and 2 units up.

$$x-1 \quad y+2$$



When we are asked to **DRAW**, we don't need to calculate the image's coordinates.