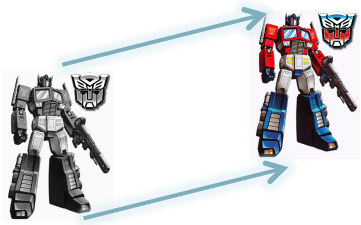
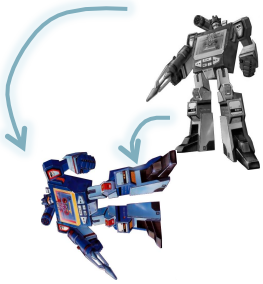
Name_____

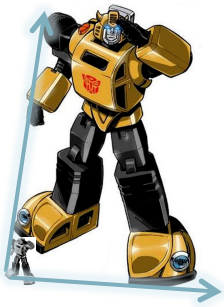
Write your questions here!

Transformations

A transformation is when an image is changed in some way. The change could be a change is size, shape, or position. The following images have been transformed:







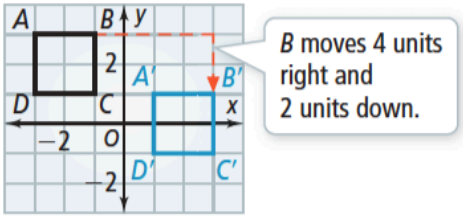
Translations, Reflections and Rotations are called _____ because the image is congruent to the _____.

Translations

take note

Key Concept Translation

The diagram at the right shows a translation in the coordinate plane. Each point of the black square moves 4 units right and 2 units down. Using variables, you can say that each (x, y) pair in the original figure is mapped to (x', y'), where $x' = x + 4$ and $y' = y - 2$. You can use arrow notation to write the following *translation rule*.



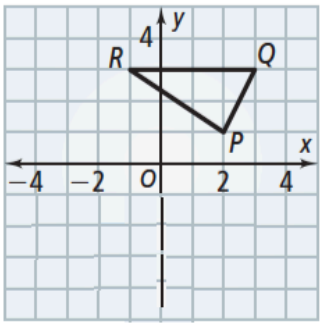
PACKET 8.1: TRANSLATIONS

Write your questions here!

Example 1:

Finding the Image of a Translation

What are the images of the vertices of $\triangle PQR$ for the translation $(x, y) \rightarrow (x - 2, y - 5)$? Graph the image of $\triangle PQR$.



Identify the coordinates of each vertex. Use the translation rule to find the coordinates of each vertex of the image.

$(x, y) \rightarrow (x - 2, y - 5)$

$P(2, 1) \rightarrow$

$Q(3, 3) \rightarrow$

$R(-1, 3) \rightarrow$

To graph the image of $\triangle PQR$, first graph P', Q', and R'. Then draw $\overline{P'Q'}$, $\overline{Q'R'}$, and $\overline{R'P'}$.

What does the rule tell you about the direction each point moves?
$x' = x - 2$ means that each point moves 2 units left. $y' = y - 5$ means that each point moves 5 units down.

There are three ways to write a translation:

_____ or ____ or ____

For example, a translation that moves a point 4 units right and 3 units down can be written as follows:

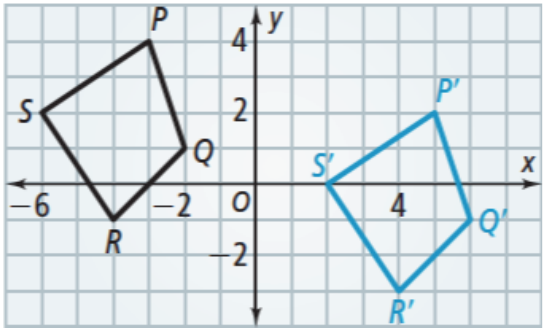
$P(x,y) \rightarrow$ _____ or _____ or _____

(Algebraic Rule) (Shorthand) (Vector notation)

Example 2:

Writing a Rule to Describe a Translation

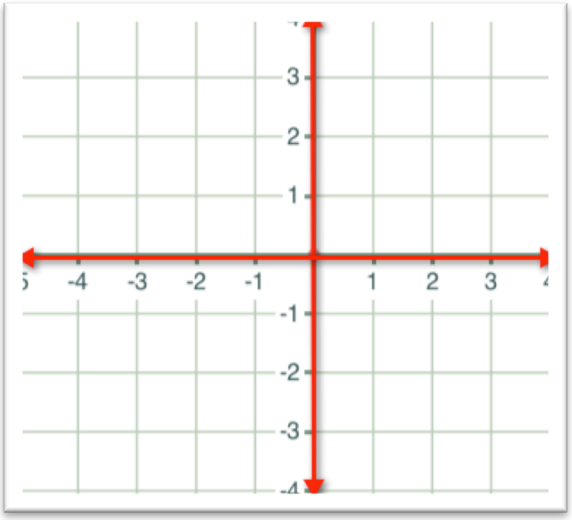
What is a rule that describes the translation $PQRS \rightarrow P'Q'R'S'$?



Write your questions here!

Example 3:

Graph the image of the figure C(1, -2), A(-2, 1) T(-3, -3) using the rule 1 unit left and 2 units up. Then, write the translation rule.



Example 4:

Write an algebraic rule to describe the transformation:

C(2, 1), O(0, 0) L(-5, 4), D(-2, 1)
to
C'(0, 1), O'(-2, 0) L'(-7, 4), D'(-4, 1)

Example 5:

Write an algebraic rule to describe the transformation:

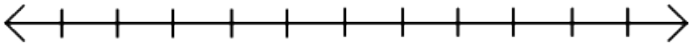
F(5, -2), R(10, 0) E(-5, 12), D(0, -3)
to
F'(23, -16), R'(28, -14) E'(13, -2), D'(18, -17)

Now, summarize your notes here!

Algebra Review

Solve each equation for x!

1. $-2x - 3 > 15$



2. $2x - 5 - 2 = -4 + 3x - 5$

Factor!

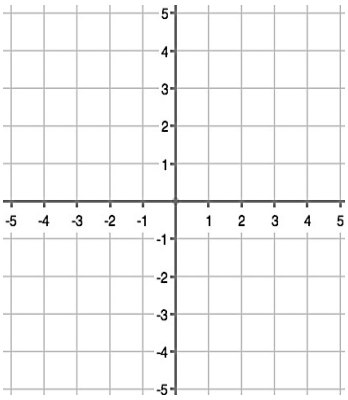
3. $3x^2 + 5x - 12$

Factor!

4. $(x^2 - 9)$

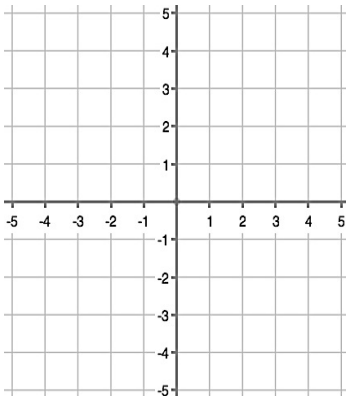
5. Graph the equation:

$2y = 2 - x$



6. Graph the equation:

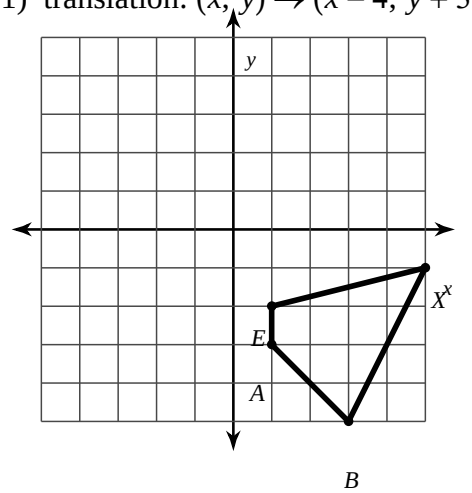
$3x + 2y = 12$



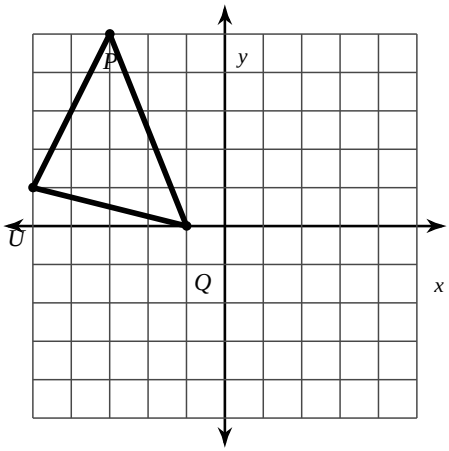
Bist du bereit die Beherrschung-Check meistern? (Translate that!)

Graph and label the image of the figure using the transformation given.

1) translation: $(x, y) \rightarrow (x - 4, y + 3)$



2) translation: $(x, y) \rightarrow (x, y - 2)$



Find the coordinates of the vertices of each figure after the given transformation.

3) translation: 2 units left and 3 units up
$A(4, -5)$, $S(3, -2)$, $E(5, -5)$

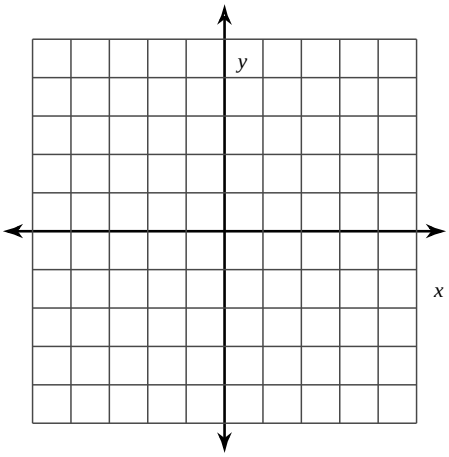
4) translation: 1 unit left and 1 unit up
$D(-4, 0)$, $J(0, 3)$, $H(-1, -1)$

5) translation: 3 units up
$U(4, -3)$, $P(3, 1)$, $S(5, 1)$

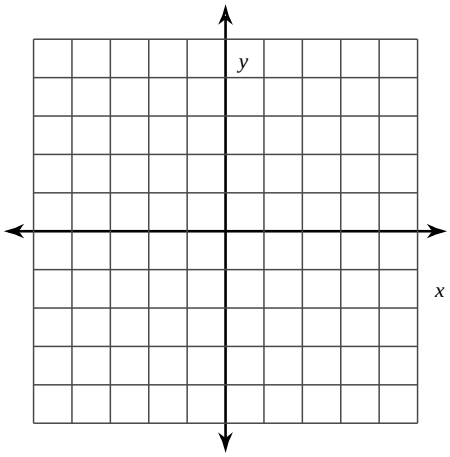
6) translation: 1 unit right and 2 units down
$C(-1, -3)$, $W(2, -2)$, $N(4, -3)$

Graph the image and the preimage of the figure using the transformation given.

7) translation: $(x, y) \rightarrow (x - 5, y + 4)$
$C(2, -3)$, $V(3, 1)$, $R(5, -2)$

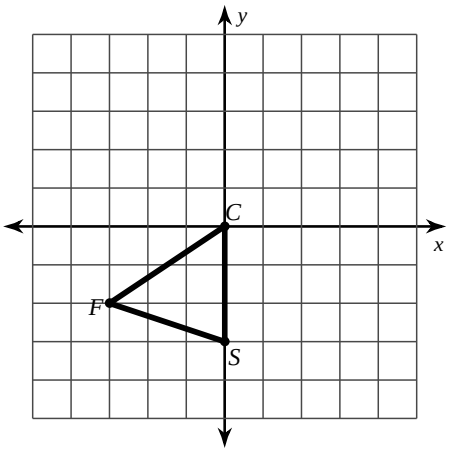


8) translation: $(x, y) \rightarrow (x - 1, y + 4)$
$R(-3, -3)$, $D(0, 1)$, $C(1, 0)$

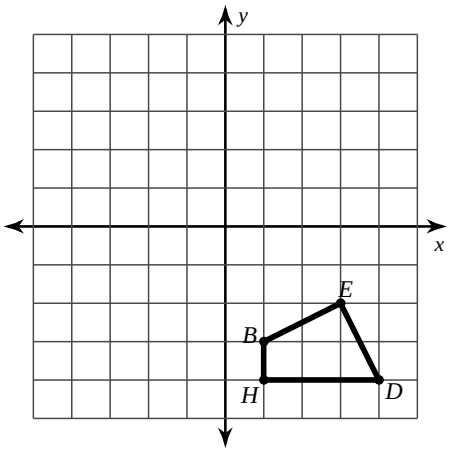


Graph the image of the figure using the transformation given.

9) translation: $(x, y) \rightarrow (x + 3, y)$

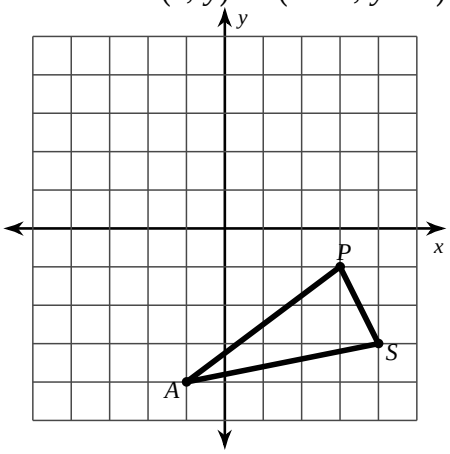


10) translation: $(x, y) \rightarrow (x - 1, y + 5)$

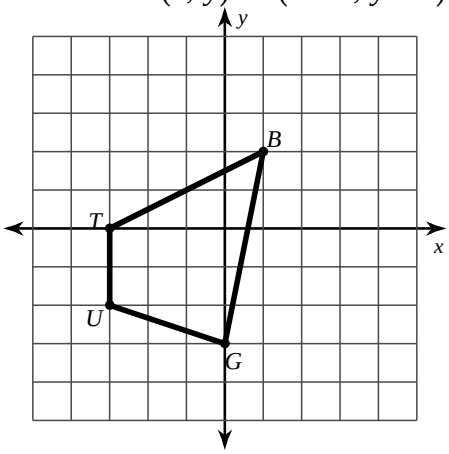


Find the coordinates of the vertices of each figure after the given transformation.

11) translation: $(x, y) \rightarrow (x - 3, y - 1)$



12) translation: $(x, y) \rightarrow (x + 3, y - 2)$

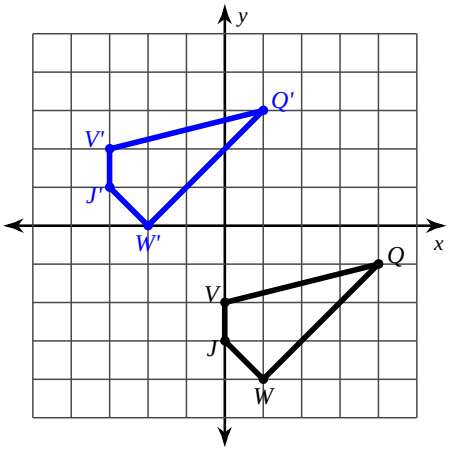


13) translation: $(x, y) \rightarrow (x - 5, y + 4)$
$H(1, -1)$, $W(2, 0)$, $E(4, -5)$, $Y(3, -5)$

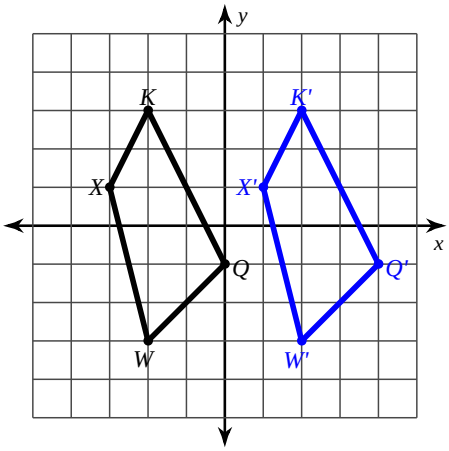
14) translation: $(x, y) \rightarrow (x + 6, y - 3)$
$M(-4, 4)$, $Z(-4, 5)$, $E(-1, 5)$, $K(-1, 3)$

Write an algebraic rule to describe each transformation.

15)



16)



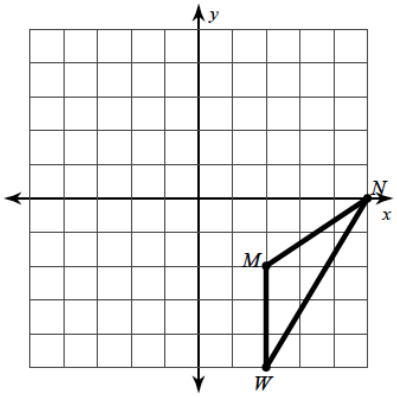
17) $L(-5, -3)$, $X(-4, -1)$, $J(-3, -1)$, $Z(-5, -5)$
to
$L'(-2, -2)$, $X'(-1, 0)$, $J'(0, 0)$, $Z'(-2, -4)$

18) $V(-1, -3)$, $T(-3, 0)$, $B(-3, 1)$, $R(1, -2)$
to
$V'(2, -2)$, $T'(0, 1)$, $B'(0, 2)$, $R'(4, -1)$

8.1 Application and Extension

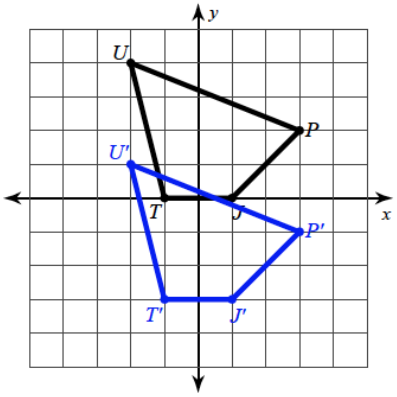
Graph the image of the figure using the transformation given.

1) translation: $(x, y) \rightarrow (x - 2, y + 5)$



Write an algebraic rule to describe each transformation.

2)



3. a. On graph paper draw quadrilateral WARM whose vertices are W(1, -3), A(2, -5), R(6, -4), and M(6, -3).

b. Using the same axes, graph and label quadrilateral W'A'R'M' where W → W' under $T_{-2, 5}$.

c. Using the same axes, graph and label quadrilateral W"A"R"M" where W' → W" under $T_{-4, -2}$.

d. Using your graph, name a single translation that is equivalent to $T_{-2, 5}$ followed by $T_{-4,-2}$.