Transformations – Translations

Notes Section 20.1 Name________________

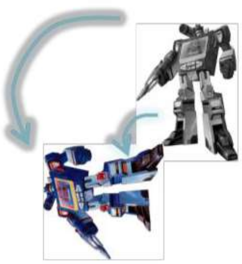
Write your questions here!

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:

Translation

Reflection



Rotation

Dilation

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

Translations

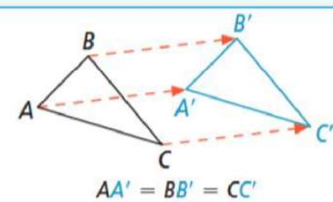
take note

Key Concept **Translation**

A **translation** is a transformation that maps all points of a figure the same distance in the same direction.

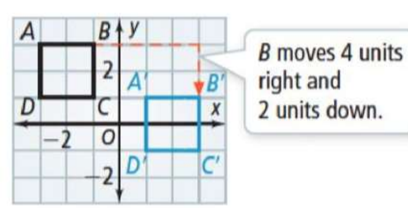
A translation is an isometry.

SLIDE



$AA' = BB' = CC'$

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*.



$(x, y) \rightarrow (x', y')$

$(x, y) \rightarrow (x+4, y-2)$

Transformations – Translations

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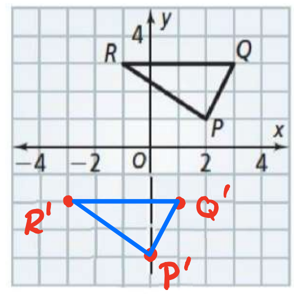
Example 1:

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 $\triangle PQR$.

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.

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

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

$P(2, 1) \rightarrow$ $(2-2, 1-5) = (0,-4)$

$Q(3, 3) \rightarrow$ $(3-2, 3-5) = (1,-2)$

$R(-1, 3) \rightarrow$ $(-1-2, 3-5) = (-3,-2)$

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

There are three ways to write a translation:

$P(x,y) \rightarrow (x+a, y+b)$ or $T_{a,b}$ or $\langle a, b \rangle$

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

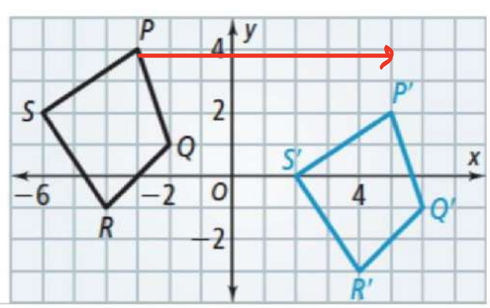
$P(x,y) \rightarrow$ $(x+4, y-3)$ or $T_{(4,-3)}$ or $\langle 4,-3 \rangle$

(Algebraic Rule) (Shorthand) (Vector notation)

Example 2:

Writing a Rule to Describe a Translation

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



$(x,y) \rightarrow (x+8, y-2)$

$T_{8,-2}$

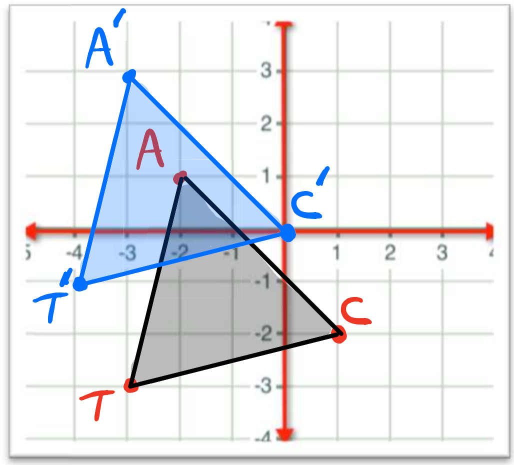
$\langle 8,-2 \rangle$

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.

$\langle -1, 2 \rangle$



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)

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

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)

$\langle 18, -14 \rangle$

Now, summarize your notes here!

Transformations – Translations

G.CO.A.5 Notes Section 20.1 Name________________

Algebra Review

Solve each equation for x!

1. $-2x - 3 > 15$

$-2x > 18$

$x < -9$

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

$2x - 7 = 3x - 9$

$-7 = x - 9$

$2 = x$

Factor!

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

2, 18 4
3, 12

$M = -36$
$A = 5$
$N = -4, 9$

$= \dfrac{(3x-4)(3x+9)}{3}$

$= (3x-4)(x+3)$

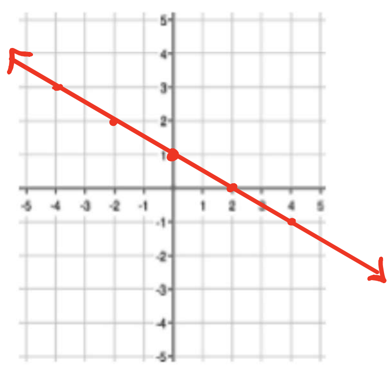
Factor!

4. $(x^2 - 9) = (x-3)(x+3)$

5. Graph the equation:

2y = 2 - x

$y = -\frac{1}{2}x + 1$



6. Graph the equation:

3x + 2y = 12

x-int	y-int
$3x + 2(0) = 12$	$3(0) + 2y = 12$
$3x = 12$	$2y = 12$
$x = 4$	$y = 6$