Cornell Notes

Main Ideas/Questions

Name:_____ Date: _____

9-1 Title of Notes: **Translations**

pre-image
*original figure

Image
*new figure after a transformation

Translation:
(Isometry)

- Involves sliding a figure on the plane
- Is described for any real numbers, h and k, $(x, y) \rightarrow (x', y')$ where $x' = x + h$ and $y' = y + k$

pre-image ↓ ↙ image

EX 1 If A(-1,4) → A'(3,2). Find the mapping of the translation.
(Substitute the pre-image and image coordinates into the equation and solve for h and k.)

$x' = x + h$	$y' = y + k$
$3 = -1 + h$	$2 = 4 + k$
$4 = h$	$-2 = k$

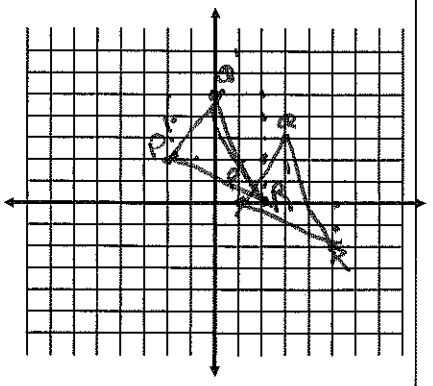
Equation → So that $x' = x+4$ and $y' = y-2$

In mapping notation this would be $(x,y) \rightarrow (x+4, y-2)$. ← function notation

Find the image of (7, 2) under this translation. (7,2) → (11, 0)

EX 2

Use the translation $(x,y) \rightarrow (x-3, y+2)$ to plot the points P(1,0), Q(3,3), and R(5,-2) and their images P', Q', and R'.



P'(-2, 2) Q'(0, 5) R'(2, 0)
Connect P, Q, and R in that order
In another color, connect P', Q', and R' in that order.

Find the slopes of:
$\overleftrightarrow{PQ}, \overleftrightarrow{QR}, \overleftrightarrow{RP}, \overleftrightarrow{P'Q'}, \overleftrightarrow{Q'R'}, and \overleftrightarrow{R'P'}$.

$m\overline{PQ} = \frac{3}{2}$; $m\overline{QR} = \frac{-5}{2}$; $m\overline{RP} = \frac{-2}{4}$;

$m\overline{P'Q'} = \frac{3}{2}$; $m\overline{Q'R'} = \frac{-5}{2}$; $m\overline{R'P'} = \frac{-2}{4}$

Isometry - the figures are the same size after a transformation

What formula would you have to use to prove if any of the lengths are equal? distance Since Translation is isometric are the lengths equal? yes

Cornell Notes Main Ideas/Questions	Name:_____ Date: _____ Title of Notes: **Cont'd**

Under a translation:

1. **Size is preserved - every segment is mapped into a segment congruent to the original segment.**
2. **Shape is preserved - every angle is mapped into an angle congruent to the original angle.**
3. **Image figure is congruent to pre-image figure.**

(Isometric)

Rigid Transformation:

A transformation such that the distance between any points and the measure of any angles are invariant-does not vary, remains the same.

Is a translation a rigid transformation? yes

Are there any fixed points under a translation? no

Practice

A translation is described by $(x,y) \rightarrow (x-1, y+5)$. State the image of the given point.

1. (6,6) → (5, 11)
2. (0,0)
3. (4,-2)

Describe in functional notation the translation which maps the first point into the second point.

$(x,y) \rightarrow (x-5, y-1)$

4. (0,3) → (4,5) $(x,y) \rightarrow (x+4, y+2)$
5. (0,1) → (-5,0)
6. (5,3) → (5,-1) $(x,y) \rightarrow (x, y-4)$
7. (-2,-2) → (2,-2) $(x,y) \rightarrow (x+4, y)$

State the equations of the translation of the plane that map the first point into the second point.

8. (4,1) → (-3,2)
   $x' = x-7$ $y' = y+1$
9. (0,0) → (2,-5)
   $x' = x+2$, $y' = y-5$
10. (3,7) → (6,-5)
    $x' = x+3$ $y = y-12$