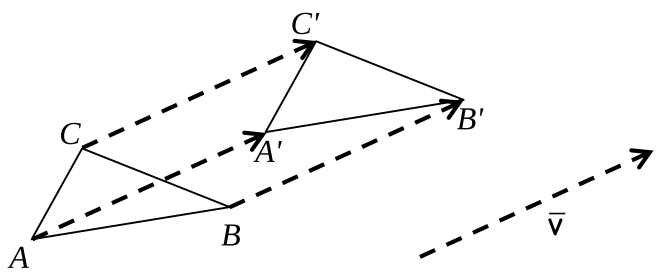
Geometry Notes TG - 3: Translations

Translations

A *translation* is a "slide" of a figure.



In a *translation*, all points in the plane move
- the same direction (parallel)
- the same distance.

The distance and direction may be represented by a "vector:" $\overline{AA'}$, $\overline{BB'}$, $\overline{CC'}$ or just $\bar{v}$.

Properties of Translations:

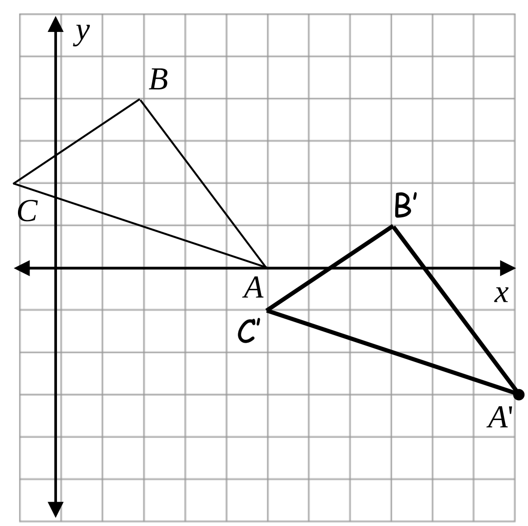
1. For any two points *P* and *Q* and their images *P'* and *Q'*,

   $\overline{PP'} \cong \overline{QQ'}$ and $\overline{PP'} \parallel \overline{QQ'}$

2. Distances are preserved.
3. Angle measures are preserved.

Translations with Coordinates

Ex: ΔABC has vertices at $A(5, 0)$, $B(2, 4)$ and $C(-1, 2)$. A certain translation moves *A* to *A'*. Draw $\Delta A'B'C'$ under that translation.



$A(5, 0) \rightarrow A'(11, -3)$

$B(2, 4) \rightarrow B'(8, 1)$

$C(-1, 2) \rightarrow C'(5, -1)$

In this translation, $P(x, y) \rightarrow P'(x + 6, y - 3)$

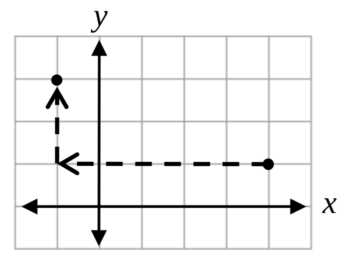
Notation: $T_{6,-3}(x, y) = (x + 6, y - 3)$.

In general, $T_{a,b}(x, y) = (x + a, y + b)$ For translations, think ADDITION.

Right a Up b

Ex: $T_{-5,\,2}(4, 1) = (4 + (-5), 1 + 2) = (-1, 3)$

"Left 5, up 2"



Ex: Consider the transformation $T_{\overline{TJ}}$.

a. What does $T_{\overline{TJ}}$ mean?

The image of T is J and all other points move the same distance and direction. All points move "left 2, up 1."

A	*B*	*C*	*D*	*E*	*F*
G	*H*	*I*	*J*	*K*	*L*
M	*N*	*P*	*Q*	*S*	*T*
U	*V*	*W*	*X*	*Y*	*Z*

b. Find the image of *W*. $W \rightarrow M$

c. Find the image of $\overline{KS}$. $\overline{CI}$

d. Find the *preimage* of $\overline{HI}$. (Work backwards) $\overline{QS}$

e. What is an alternate symbolic notation for this translation? $T_{-2,1}$

Ex: On the same chart above, find

a. $R_J(C) = S$

b. $r_{\overline{CW}}(M) = S$

c. $R_{Q,90°}(D) = N$