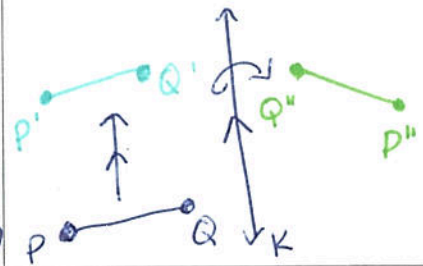
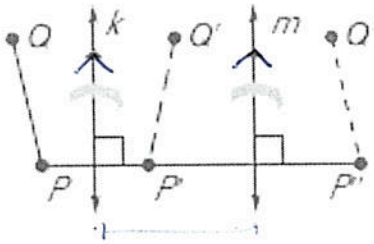
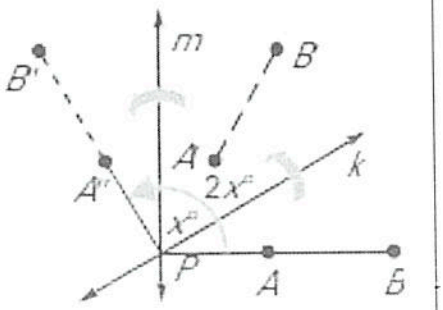
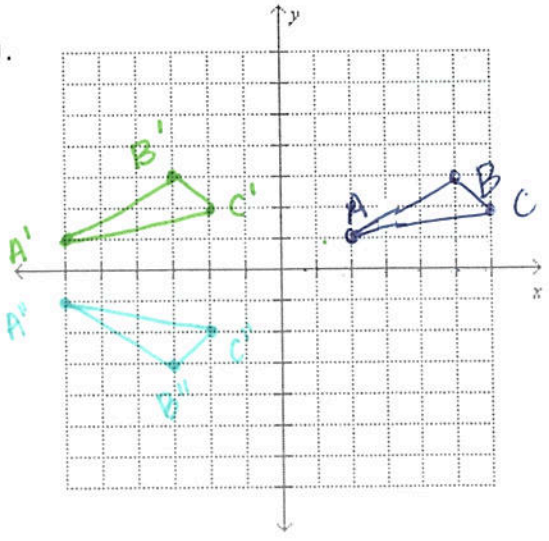
Section Summary: 9.5 Apply compositions of transformations

Key

Term	Definition	Example
glide reflection	a transformation in which every point P is mapped to a point P' by the following steps ① a translation ② a reflection // to the direction of the ~~translation~~	
composition of transformations	When two or more transformations are combined to form a single transformation	
Theorem 9.4 Composition Theorem	**The composition of two (or more) isometries is an isometry.**	
Theorem 9.5 Reflections in Parallel Lines Theorem	**If lines *k* and *m* are parallel, then a reflection in line *k* followed by a reflection in line *m* is the same as a translation.** if P" is the image of P then, ① $\overline{PP"}$ is ⊥ to K and m ② PP" = 2d where d is the distance between K and m	
Theorem 9.6 Reflections in Intersecting Lines Theorem	**If lines *k* and *m* intersect at point *P*, then a reflection in line *k* followed by a reflection in line *m* is the same as a rotation about point *P*.** The angle of rotation is 2x° where x is the measure of the acute or right angle formed by K + m	

Examples:

1. The vertices of ΔABC are A(2,1), B(5,3), and C(6,2). Find the image of ΔABC after the glide reflection.
   - Translation: (x,y) → (x-8, y)
   - Reflection: in the x-axis



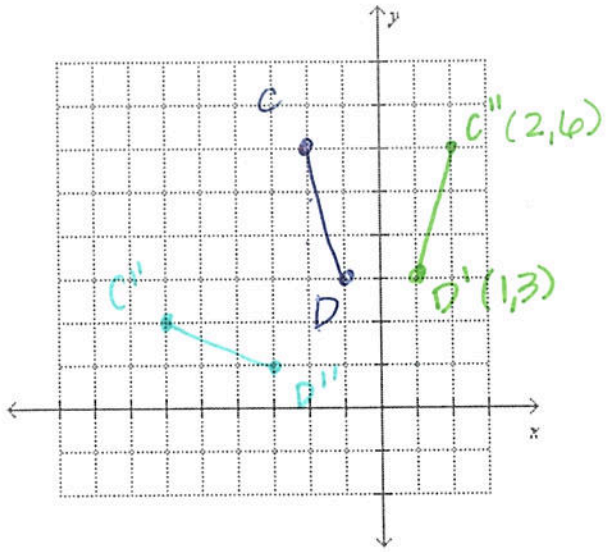
2. The endpoints of $\overline{CD}$ are C(-2,6) and D(-1,3). Graph the image of $\overline{CD}$ after the composition.

* Reflection: in the y-axis
* Rotation: 90° about the origin

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

D" (-3,1)

C" (-6,2)



3. In the diagram, a reflection in line k maps $\overline{GF}$ to G'F'. A reflection in line m maps G'F' to G"F". Also $\overline{FA}$ = 6 and DF' = 3.

a) Name any segments congruent to $\overline{GF}$, $\overline{FA}$, and $\overline{GB}$.

Theorem 9.5 reflections in || lines theorem

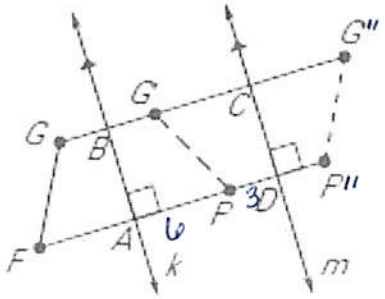
$\overline{GF} \cong \overline{G'F'} \cong \overline{G"F"}$

$\overline{FA} \cong \overline{F'A}$ $\overline{GB} \cong \overline{G'B}$

b) What is the length of GG"?

$GG" = 2d$ $d = 9$

$GG" = 2(9) =$ **18 units**.



4. In the diagram, the figure is reflected in line k. The image is then reflected in line m. Describe a single transformation that maps F to F".

Thm 9.6 reflections in intersecting lines theorem

a rotation of 2(80) or 160° about P.