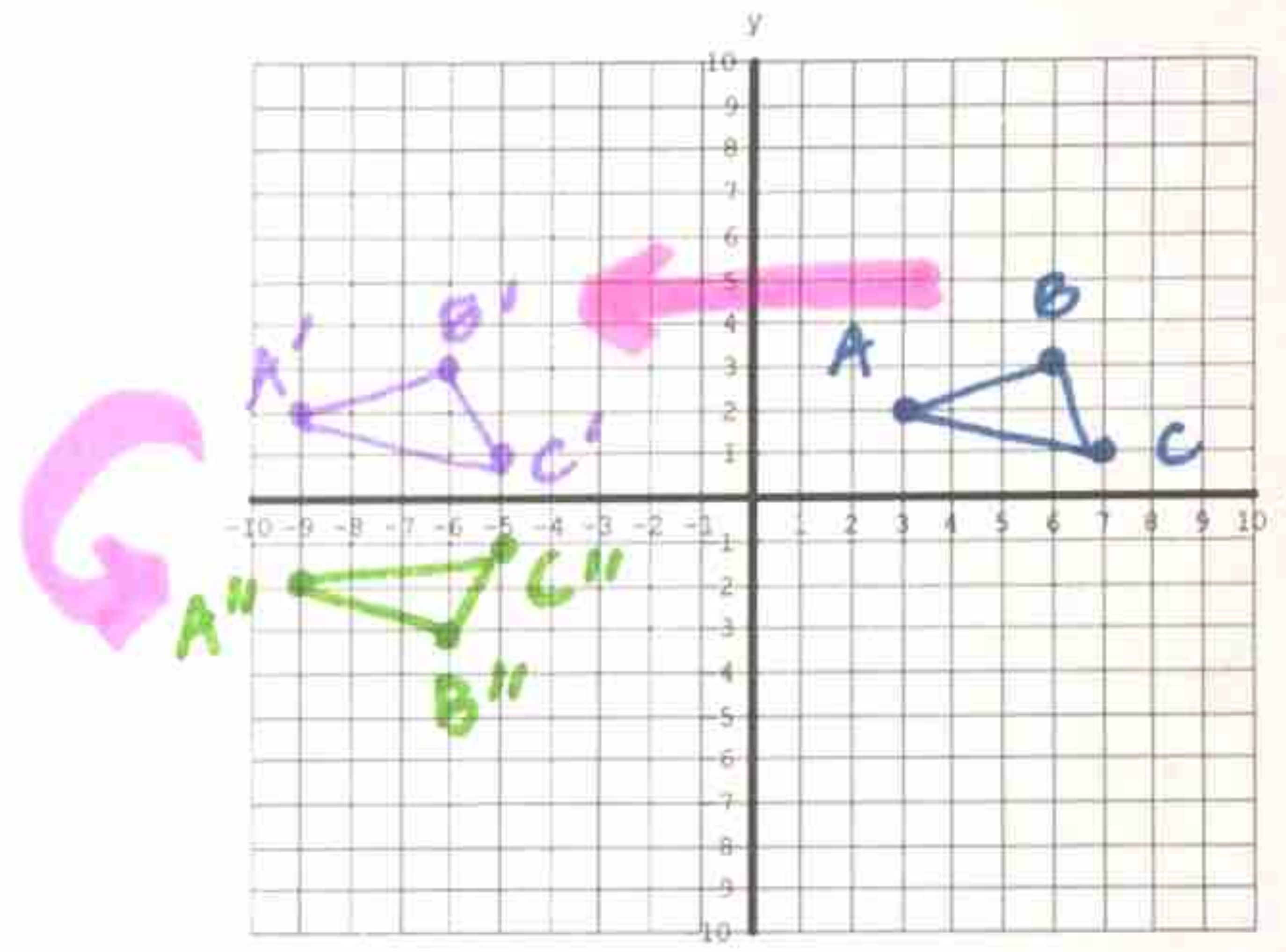
9.5 Apply Compositions of Transformations

glide reflection – a translation followed by a reflection

Ex 1: The vertices of ΔABC are A(3, 2), B(6, 3), C(7, 1). Find the image of ΔABC after the glide reflection.



Translation: (x, y) → (x – 12, y)
Reflection: in the x- axis

A (3,2) → A' (-9,2)
B (6,3) → B' (-6,3)
C (7,1) → C' (-5,1)

composition of transformations - when 2 or more transformations are combined to form a single transformation

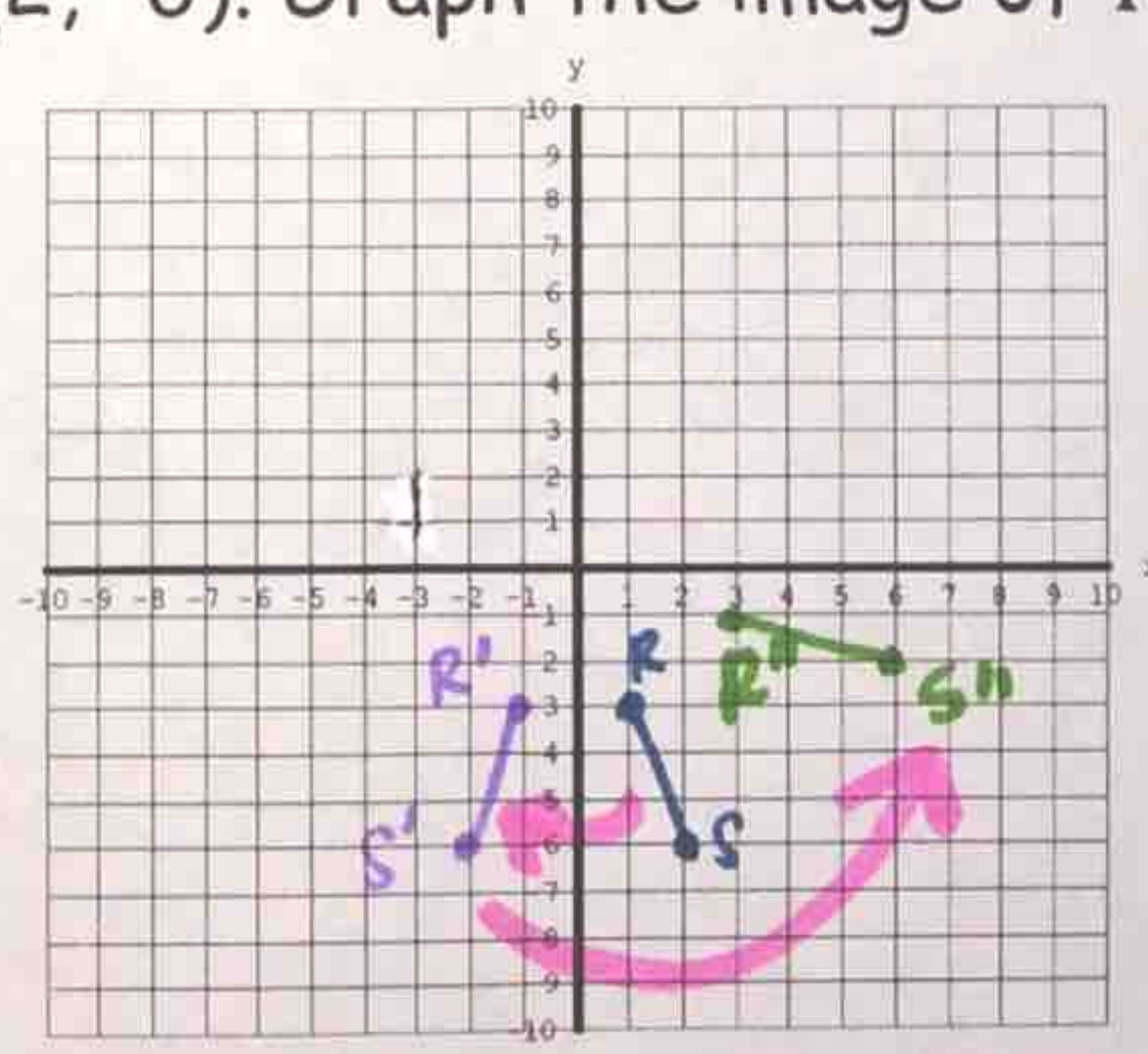
THEOREM *For Your Notebook*

THEOREM 9.4 Composition Theorem

The composition of two (or more) isometries is an isometry.

Proof: Exs. 35–36, p. 614

Ex 2: The endpoints of $\overline{RS}$ are R(1, -3) and S(2, -6). Graph the image of $\overline{RS}$ after the composition.



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

R'(-1,-3) → R''(3,-1)
S'(-2,-6) → S''(6,-2)

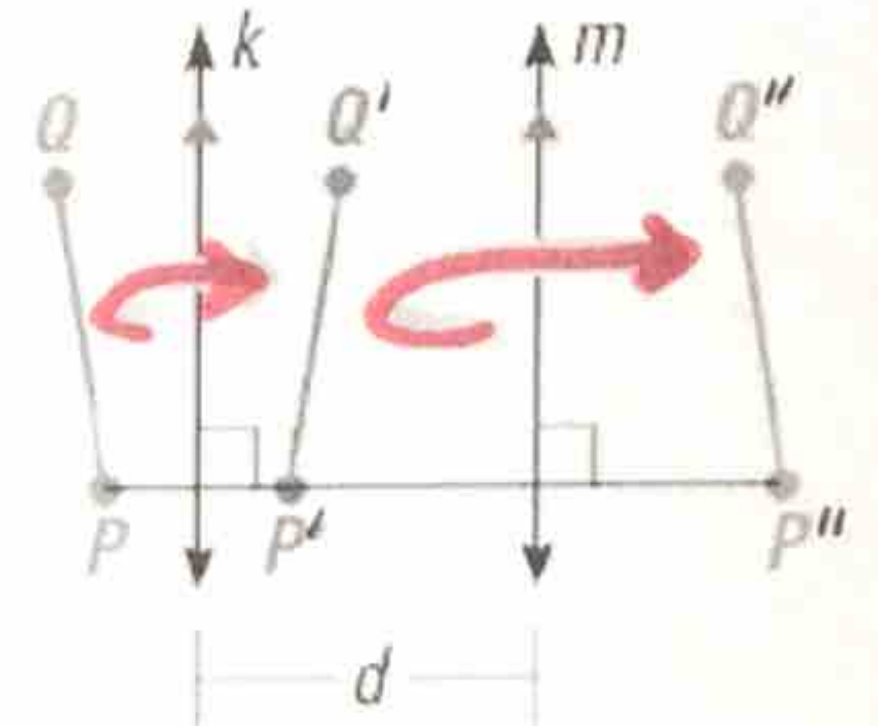
THEOREM *For Your Notebook*

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 perpendicular to k and m, and
2. $PP'' = 2d$, where d is the distance between k and m.



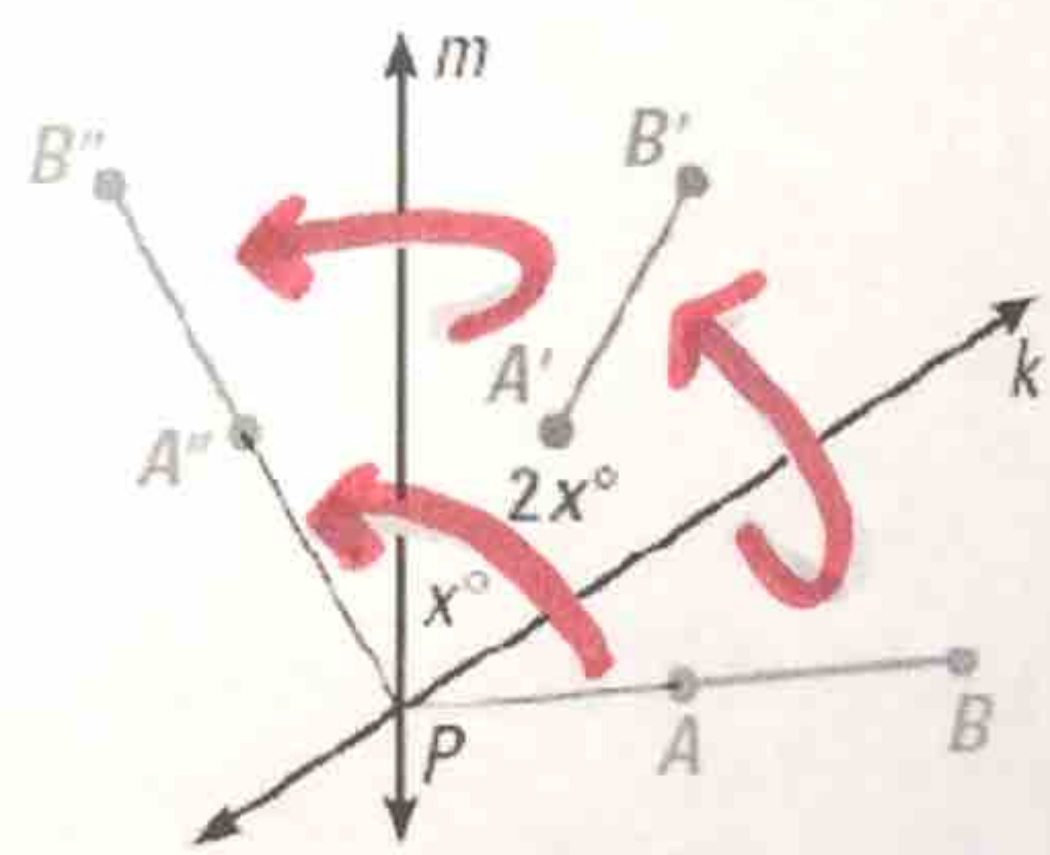
Proof: Ex. 37, p. 614

THEOREM *For Your Notebook*

THEOREM 9.6 Reflections in Intersecting Lines Theorem

If lines k and m intersect at point P, then a reflection in k followed by a reflection in 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 and m.



$m\angle BPB'' = 2x°$

Proof: Ex. 38, p. 614