31. A rotation maps A to A' and B to B'. Construct the center of the rotation. (*Hint*: If the center is O, then $OA = OA'$ and $OB = OB'$.)

32. **a.** Draw a coordinate grid with origin O and plot the points $A(0, 3)$ and $B(4, 1)$.

b. Plot A' and B', the images of A and B by $\mathcal{R}_{O,\,90}$.

c. Compare the slopes of $\overleftrightarrow{AB}$ and $\overleftrightarrow{A'B'}$. What does this tell you about these lines?

d. Without using the distance formula, you know that $A'B' = AB$. State the theorem that tells you this.

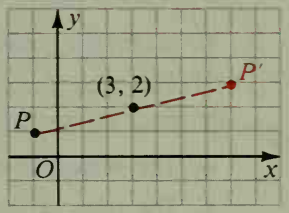
e. What reason supports the conclusion that $\triangle AOB$ and $\triangle A'OB'$ have the same area?

f. Use your graph to find the image of (x, y) by $\mathcal{R}_{O,\,90}$.

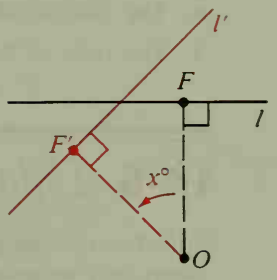
33. Repeat Exercise 32 using $\mathcal{R}_{O,\,270}$.

34. A half-turn about $(3, 2)$ maps P to P'. Where does this half-turn map the following points?

a. P' **b.** $(0, 0)$ **c.** $(3, 0)$
d. $(1, 4)$ **e.** $(-2, 1)$ **f.** (x, y)



35. The rotation $\mathcal{R}_{O,\,x}$ maps line l to line l'. (You can think of rotating $\overline{OF}$, the perpendicular from O to l, through $x°$. Its image will be $\overline{OF'}$.) Show that one of the angles between l and l' has measure x.

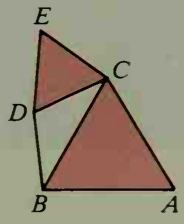


36. $\triangle ABC$ and $\triangle DCE$ are equilateral.

a. What rotation maps A to B and D to E?

b. Why does $AD = BE$?

c. Find the measure of an acute angle between $\overleftrightarrow{AD}$ and $\overleftrightarrow{BE}$. (*Hint*: See Exercise 35.)



37. $\triangle ABC$ and $\triangle DEC$ are isosceles right triangles.

a. What rotation maps B to A and E to D?

b. Why does $AD = BE$?

c. Explain why $\overline{AD} \perp \overline{BE}$. (*Hint*: See Exercise 35.)