For each transformation given in Exercises 5–10:

a. Plot the three points $A(0, 4)$, $B(4, 6)$, and $C(2, 0)$ and their images A', B', and C' under the transformation.

b. State whether the transformation appears to be an isometry.

c. Find the preimage of (12, 6).

5. $T:(x, y) \rightarrow (x + 4, y - 2)$

6. $S:(x, y) \rightarrow (2x + 4, 2y - 2)$

7. $D:(x, y) \rightarrow (3x, 3y)$

8. $H:(x, y) \rightarrow (-x, -y)$

9. $M:(x, y) \rightarrow (12 - x, y)$

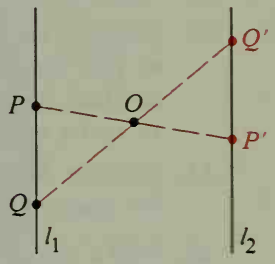
10. $G:(x, y) \rightarrow (-\frac{1}{2}x, -\frac{1}{2}y)$

11. O is a point equidistant from parallel lines l_1 and l_2. A mapping M maps each point P of l_1 to the point P' where $\overrightarrow{PO}$ intersects l_2.

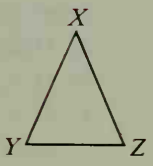
a. Is the mapping a one-to-one mapping of l_1 onto l_2?

b. Does this mapping preserve or distort distance?

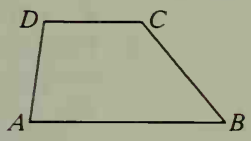
c. If l_1 and l_2 were not parallel, would the mapping preserve distance? Illustrate your answer with a sketch.



12. $\triangle XYZ$ is isosceles with $\overline{XY} \cong \overline{XZ}$. Describe a way of mapping each point of $\overline{XY}$ to a point of $\overline{XZ}$ so that the mapping is an isometry.



B **13.** $ABCD$ is a trapezoid. Describe a way of mapping each point of $\overline{DC}$ to a point of $\overline{AB}$ so that the mapping is one-to-one. Is your mapping an isometry?



14. The red and blue squares are congruent and have the same center O. A mapping maps each point P of the red square to the point P' where $\overrightarrow{OP}$ intersects the blue square.

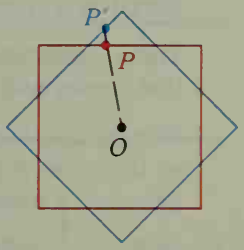
a. Is this mapping one-to-one?

b. Copy the diagram and locate a point X that is its own image.

c. Locate two points R and S on the red square and their images R' and S' on the blue square that have the property that $RS \neq R'S'$.

d. Does this mapping preserve distance?

e. Describe a mapping from the red square onto the blue square that *does* preserve distance.



15. The transformation $T:(x, y) \rightarrow (x + y, y)$ preserves areas of figures even though it does not preserve distances. Illustrate this by drawing a square with vertices $A(2, 3)$, $B(4, 3)$, $C(4, 5)$, and $D(2, 5)$ and its image $A'B'C'D'$. Find the area and perimeter of each figure.