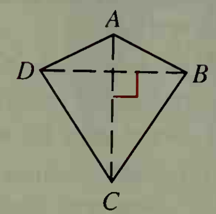
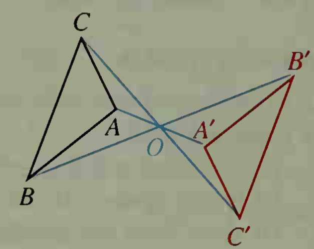
Exercises

For Exercises 1–4 complete proofs using the strategies listed, then state which approach is easiest for you.

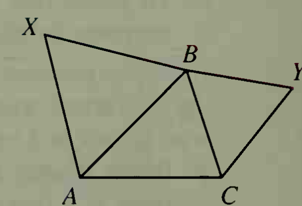
1. Given: $\overline{AC}$ is the perpendicular bisector of $\overline{BD}$.
   Prove: $AD = AB$ and $CD = CB$.
   a. Use a synthetic proof.
   b. Use a reflection.
   c. Use a coordinate proof.



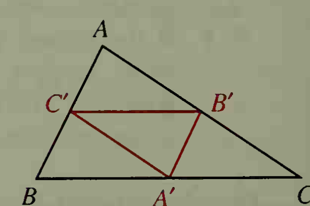
2. Given: O is the midpoint of $\overline{AA'}$, $\overline{BB'}$, and $\overline{CC'}$.
   Prove: $\triangle ABC \cong \triangle A'B'C'$
   a. Use a synthetic proof.
   b. Use a 180° rotation.



3. Equilateral triangles ABX and BCY are constructed on two sides of $\triangle ABC$ as shown. Prove that $AY = XC$.
   a. Use a synthetic proof.
   b. Find the image of $\overline{AY}$ under the rotation $\mathscr{R}_{B,\,-60}$.



4. A', B', and C' are the midpoints of the sides of $\triangle ABC$. Find the ratio of the areas of $\triangle ABC$ and $\triangle A'B'C'$.
   a. Use a synthetic argument.
   b. Use a dilation to map $\triangle ABC$ to $\triangle A'B'C'$. Where is the center of the dilation? What is the scale factor?



For Exercises 5–20 choose the approach that you feel is best suited to each problem.

5. What kind of figure do you get if you join the midpoints of successive sides of a square? Prove your conjecture.
6. What kind of figure do you get if you join the midpoints of successive sides of a rhombus? Prove your conjecture.
7. The successive midpoints of the sides of quadrilateral $ABCD$ are P, Q, R, and S. Prove that $\overline{PR}$ and $\overline{QS}$ bisect each other.
8. You are given the points $A(-4, 1)$, $B(2, 3)$, $C(4, 9)$, and $D(-2, 7)$.
   a. Show that $ABCD$ is a parallelogram with perpendicular diagonals.
   b. What special name is given to $ABCD$?