NAME _____ DATE _____

Challenge: Skills and Applications

For use with pages 102–107

In Exercises 1–4, assume that *B* is the midpoint of $\overline{AC}$, *C* is the midpoint of $\overline{BD}$, and *D* is the midpoint of $\overline{BE}$.

1. If $BC = 7$, find *DE* and *AE.*

2. If $CE = 9$, find *AB* and *AE.*

3. If the coordinate of *A* is 0 and the coordinate of *B* is 4, find the coordinates of *C*, *D*, and *E.*

4. If the coordinate of *B* is 3 and the coordinate of *E* is -9, find the coordinates of *A*, *C*, and *D.*

In Exercises 5–8, assume that *M* is the midpoint of $\overline{UV}$, *X* is the midpoint of $\overline{UM}$, and *Y* is the midpoint of $\overline{XV}$.
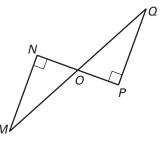
5. If $UV = 16$, find *UX* and *XY.*

6. If $MY = 5$, find *XY* and *UV.*

7. If the coordinate of *X* is 7 and the coordinate of *Y* is 13, find the coordinates of *U*, *M*, and *V.*

8. If the coordinate of *U* is 2 and the coordinate of *M* is -10, find the coordinates of *X*, *Y*, and *V.*
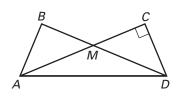
In Exercises 9–11, use the diagram shown. Assume that *O* is the midpoint of $\overline{NP}$, *O* is the midpoint of $\overline{MQ}$, and $\angle N$ and $\angle P$ are right angles.

9. If $MN = 15$ and $OP = 8$, find *NO* and *MO.*

10. If $OP = 28$ and $PQ = 45$, find *MO* and *MQ.*

11. If $MO = 65$ and $NP = 66$, find *PQ* and *MQ.*

12. Write a two-column proof. You may use the Pythagorean theorem as a reason.

   Given: $AD = 13$, $CD = x$, $BD = 12$, $\overline{BD} \cong \overline{AC}$, $\angle C$ is a right angle.

   Prove: $x^2 = 25$