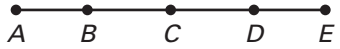
LESSON 1.5

NAME _____ DATE _____

Challenge: Skills and Applications

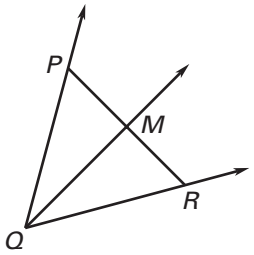
For use with pages 34–42

In Exercises 1–4, *C* is the midpoint of both $\overline{AE}$ and $\overline{BD}$.



1. If $BC = x^2 - 18$ and $CD = x + 2$, find x.
2. If $AC = 2x - 1$ and $AE = x^2 - 2$, find x.
3. Can you be certain that $AB = DE$? Explain.
4. If $AB = 2x + 3$ and $DE = x^2$, what are the possible values of x?
5. Let $\angle PQR$ be an angle, and let M be the midpoint of $\overline{PR}$.

   Can you conclude that $\overrightarrow{QM}$ bisects $\angle PQR$? If so, explain why. If not, sketch a counterexample.



6. Suppose $\overrightarrow{AC}$ bisects $\angle BAD$, $\overrightarrow{AD}$ bisects $\angle BAE$, $\overrightarrow{AE}$ bisects $\angle BAF$. What is the maximum possible measure of $\angle BAC$?
7. Suppose $\overrightarrow{PK}$ bisects $\angle JPL$ and $\overrightarrow{PL}$ bisects $\angle KPM$. If $m\angle JPM = 150°$, find *both* possible measures of $\angle JPK$. Sketch both possible situations.
8. Suppose $\angle AXB \cong \angle BXC \cong \angle CXD \cong \angle DXE \cong \angle EXA$, and $\overrightarrow{XD}$ bisects $\angle AXB$. What is $m\angle AXB$? Sketch this situation.

In Exercises 9–14, use the following information to find the midpoint *M* of $\overline{PQ}$.

If $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ are two points in a three-dimensional coordinate system, then the midpoint of $\overline{AB}$ has coordinates $\left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2}, \frac{z_2 + z_1}{2}\right)$.

9. $P(5, 7, -5)$
   $Q(3, 7, 11)$
10. $P(2, 0, 8)$
    $Q(2, 6, -2)$
11. $P(-3, 2, 7)$
    $Q(-11, 6, 3)$
12. $P(2, 0, 7)$
    $Q(8, -5, 12)$
13. $P(3.4, 1.8, 3.9)$
    $Q(6.2, -4.6, 0.3)$
14. $P(12, 35, 8.7)$
    $Q(1.6, -2.4, 1.9)$