

Exercises

9.3.1 $ABCDEF$ is a regular hexagon with side length 9.

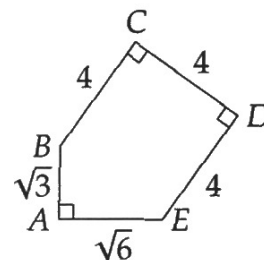
- Find AD .
- Find $[ABCDEF]$.
- ★ Find AC .

9.3.2 Find a formula for the area of a regular hexagon with side length s .

9.3.3 What's wrong with pentagon $ABCDE$ shown at right?

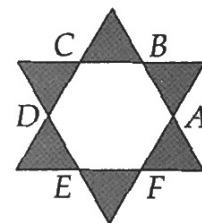
9.3.4 $ABCDEFGH$ is a regular octagon with side length 8. Diagonals \overline{AE} and \overline{CG} meet at X . Point M is the midpoint of \overline{AB} .

- Find the area of $ABCDEFGH$.
- Find XM , the apothem of the octagon.
- Find XC . **Hints:** 22



9.3.5 Points A, B, C, D, E , and F are the vertices of a regular hexagon and also trisect the sides of the large equilateral triangles shown. Given that the area of $ABCDEF$ is 24, what is the total area of the shaded regions? (*Source: MATHCOUNTS*)

9.3.6 We solved Problem 9.8 by extending the sides of a regular octagon to form a square. We didn't, however, prove that we form a square when we connect the points where these extensions meet. Fix this oversight by providing the proof. **Hints:** 564



9.3.7★ In this section we assumed that the long diagonals of a regular hexagon are concurrent. In this problem we fix this oversight by proving that these diagonals are concurrent.

- Let the hexagon be $ABCDEF$ and let point O be the intersection of the bisectors of $\angle A$ and $\angle B$. Prove that $\triangle AOB$ is equilateral.
- Draw \overline{OC} . Prove that $\triangle BOC$ is equilateral.
- Prove that $\triangle COD$ is equilateral and that \overrightarrow{AO} goes through D .
- Prove that the long diagonals of $ABCDEF$ all meet at the same point.