Chapter 14

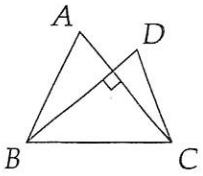
Angle Chasing

The problems that follow will help you learn the art of "angle chasing." These are problems in which you are asked to find the measure of angles. You have many tools at your disposal with which to attack these problems; these are listed below. Whenever you are stuck on a problem which follows, come back to this list and see if there's anything on it which applies to the problem.

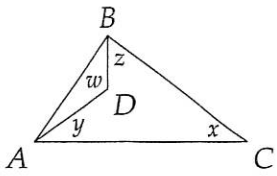
- sum of angles in a triangle
- sum of angles in a quadrilateral
- angles intercepting arcs
- angles which together form a line
- angles around a point
- angles in a right triangle
- inscribed angles subtending the same arc
- angle bisectors
- isosceles triangles
- equilateral triangles
- vertical angles
- similar triangles
- congruent triangles
- parallel lines and angles
- exterior angles
- perpendicular lines

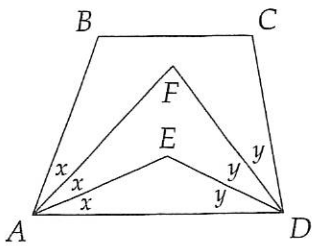
Problems to Solve for Chapter 14

236. ABC is an isosceles triangle such that $AC = BC$. CBD is an isosceles triangle such that $CB = DB$. BD meets AC at a right angle. If $\angle A = 57°$, what is $\angle D$? (MATHCOUNTS 1986)

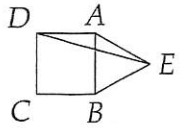


237. In $\triangle ABC$ shown, D is some interior point, and x, y, z, w are the measures of angles in degrees. Solve for x in terms of y, z, and w. (AHSME 1987)



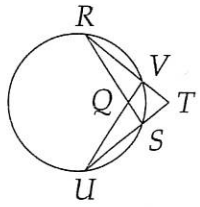


238. In quadrilateral $ABCD$, $\angle ABC = 110°$, $\angle BCD = 100°$, and angles BAD and CDA are trisected as shown. What is the degree measure of $\angle AFD$? (MATHCOUNTS 1991)



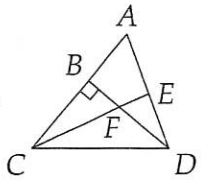
239. In the adjoining figure, $ABCD$ is a square, ABE is an equilateral triangle and point E is outside square $ABCD$. What is the measure of $\angle AED$? (AHSME 1979)

240. In the figure, triangles RTS and UTV are congruent, $\angle R = 36°$, and $\angle T = 42°$. Find $\angle RQV$. (MATHCOUNTS 1989)

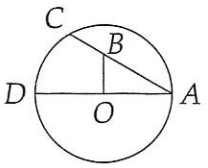


241. In $\triangle ACD$ in the figure, $\angle A = 50°$ and $\angle CFD = 110°$. If CE bisects $\angle ACD$ and DB is the altitude to AC, then find $\angle CDF$. (MAΘ 1987)

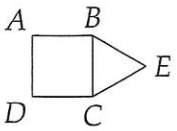
242. Triangle ABC is isosceles with base AC. Points P and Q are respectively on CB and AB such that $AC = AP = PQ = QB$. Find $\angle B$. (AHSME 1961)

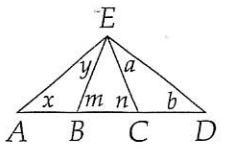


243. In a circle with center O, AD is a diameter, ABC is a chord, $BO = 5$ and $\angle ABO = \overset{\frown}{CD} = 60°$. Find BC. (AHSME 1985)



244. In the drawing, EBC is an equilateral triangle and $ABCD$ is a square. Find the measure of $\angle BED$. (MAΘ 1987)

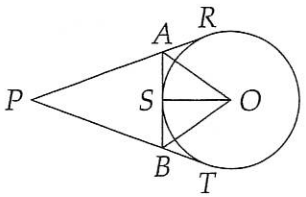




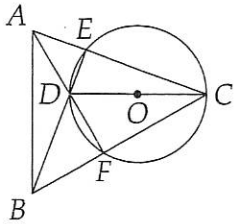
245. In a general triangle ADE (as shown) lines EB and EC are drawn. Show that $x + y + n = a + b + m$. (AHSME 1958)

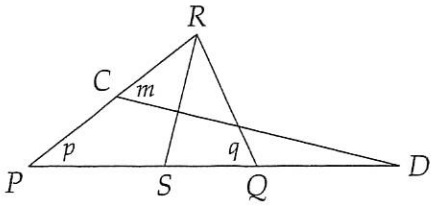
246. Prove that if the midpoints of the sides of a quadrilateral are vertices of a rectangle, then this quadrilateral is orthodiagonal. (M&IQ 1991)

247. Triangle PAB is formed by PR, PT, and AB, all tangent to circle O. If $\angle APB = 40°$, find $\angle AOB$. (AHSME 1956)



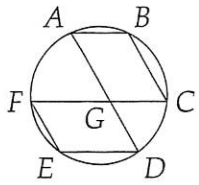
248. In the figure below, O is the center of the circle, $\angle EAD = 40°$ and $\overset{\frown}{ED} = 40°$. Find $\angle DAB$. (MAΘ 1987)





249. Given triangle PQR with RS bisecting $\angle R$, PQ extended to D, and $CD \perp RS$, show that $m = (p + q)/2$. (AHSME 1954)

250. Quadrilaterals $ABCG$ and $FGDE$ are parallelograms. Points A, B, C, D, E, and F are points on the circle. Determine $\widehat{AB} + \widehat{ED}$. (MAΘ 1990)



251. In the figure PA is tangent to semicircle SAR; PB is tangent to semicircle RBT; SRT is a straight line; the arc measures (not lengths!) are indicated in the figure. Show that $\angle APB = c + d$. (AHSME 1955)