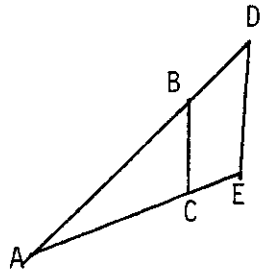
PROBLEMS ON GEOMETRY

I. 2



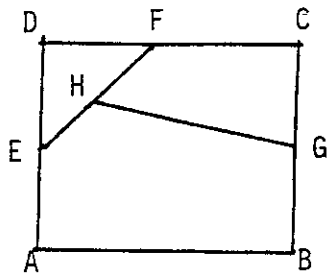
I.2 In the figure if BC is parallel to DE, $|BC| = 3$, $|DE| = 4$ and $|AE| = 10$, then $|CE| =$
(a) 3/2 (b) 2 (c) 5/2 (d) 3 (e) 7/2

I.18 If C is the center of a circle and A and B are points on the circle so that the area of triangle ABC is 1 and $|AB| = 2$, what is the area of sector ABC?
(a) $3(2)^{1/2}/4$ (b) $\pi/2$ (c) $(2)^{1/2}$ (d) $(3)^{1/2}$ (e) π

I.23 Suppose ABC is a triangle such that if AD is the median to side BC then the angle ADB is 90 dg. and $|DB| = 1$. What i the area of ABC? (a) 1 (b) $(2)^{1/2}$ (c) $(2)^{1/2}/2$ (d) $(3)^{1/2}/2$
(e) impossible to determine from the information given

I.26 Let S be a square, C a circle inscribed in S, and E an equilateral triangle inscribed in C. What is the ratio of the area of S to the area of E?
(a) 2 (b) 3 (c) $16/(3)^{1/3}$ (d) 4 (e) $5/(2)^{1/2}$

I. 32



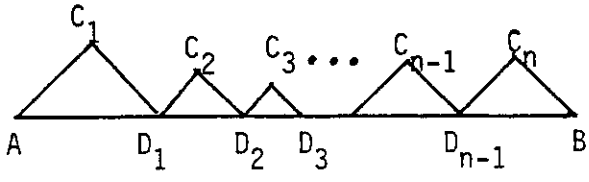
I.32 In the figure ABCD is a rectangle with $|AD| = 6$, $|CD| = 8$, $|DF| = |CG| = |DE| = 3$. If H is the midpoint of EF then $|HG| =$
(a) 7 (b) 8 (c) $2(14)^{1/2}$ (d) $(178)^{1/2}/2$ (e) $4(5)^{1/2} - 3/(2)^{1/2}$

I.43 In the figure, $|AB| = 1$ and angles AC_1D_1, $D_1C_2D_2$, $D_2C_3D_3$,... are right angles, and C_1AD_1, $C_2D_1D_2$,... are 45 dg. angles. If $L = |AC_1| + |C_1D_1| + |D_1C_2| + |C_2D_2| + \ldots$ then for n large

(a) L is close to 1 (b) L is close to 1 only if $A, D_1, D_2, D_3, \ldots,$ B are close together

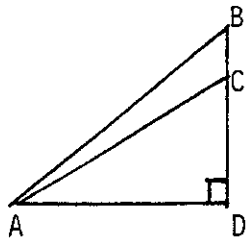
(c) L is close to $(2)^{1/2}$ (d) L is large (e) L is small

I. 43



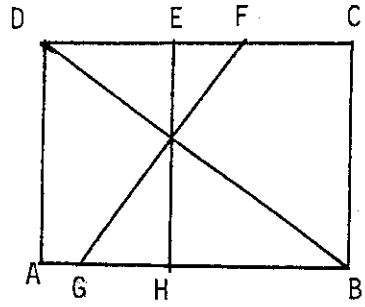
I.44 In the figure if |AB| = 10, angle BAC is 30 dg., angle CAD is 45 dg. and angle ADB is 90 dg., then |AC| =

(a) $5(2)^{1/2}$ (b) $5(3)^{1/2}$ (c) $5((3)^{1/2} - 1)$ (d) $5((2)^{1/2} - 1)$
(e) $5((3)^{1/2} - (2)^{1/2})$



I.45 In the figure ABCD is a rectangle, |DE| = 3, |EF| = 2, |FC| = 2, |AG| = 1; what is |GH|?
(a) 2 (b) 3 (c) 5/2 (d) 12/5 (e) 4

I. 45



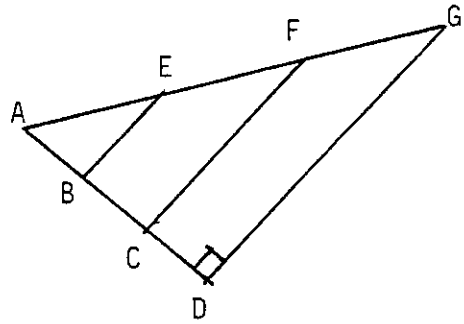
I.46 Chords AB and CD in a circle are perpendicular and intersect at E. If |AE| = 8, |EC| = 4, |ED| = 12, then the length of the diameter of the circle is
(a) $8(5)^{1/2}$ (b) $2(65)^{1/2}$ (c) $4(17)^{1/2}$ (d) $6(7)^{1/2}$ (e) $12(2)^{1/2}$

I.47 ABCD is a quadrilateral inscribed in a circle. If |AB| = 25, |BC| = 39, |CD| = 52, and |AD| = 60, then what is the diameter of the circle?
(a) 65 (b) $45(2)^{1/2}$ (c) $40(3)^{1/2}$ (d) 129/2 (e) $[(85)(91)]^{1/2}$

II.8 The hypotenuse c and one leg a of a right triangle are consecutive integers. Then the area of the triangle is
(a) $a(c + a)^{1/2}/2$ (b) $[(a^2 + c^2)^{1/2} - 1)/2$
(c) $a(c - 1)^{1/2}/2$ (d) $c(a^2 + 1)^{1/2}/2$ (e) $[(c - 1)a]^{1/2}/2$

II.11 In the figure AE = EF = FG and AB = BC = CD. If DG = 5 and ADG is a right angle then EB + FC =
(a) 40/9 (b) 5 (c) 17/3 (d) 6 (e) 31/6

II. 11



II.21 In the figure ADE and ACB are right angles, BE = 4, DC = 3, and DE = 5. Find AD.

(a) 6 (b) $12/(5)^{1/2}$ (c) $15/(7)^{1/2}$ (d) 29/4 (e) $5(2)^{1/2}$

III.8 The altitude and one side of an equilateral triangle differ by 1. What is a possible value for the side?

(a) $2(3)^{1/2}+1$ (b) $3+(2)^{1/2}$ (c) $4-2(3)^{1/2}$

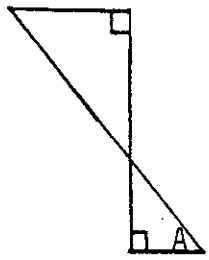
(d) $4(3)^{1/2}+1$ (e) $(3)^{1/2}/2$

III.10 In the figure, for what degree values of angle A does the lower triangle have greater area than the upper triangle?

(a) A > 60 (b) A > 45 (c) A > 30 (d) none

(e) cannot determine from the given information

III. 10



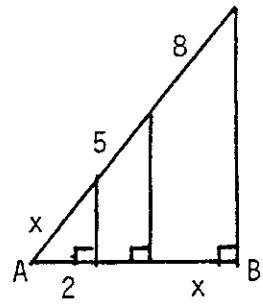
III.19 The length of the common chord of two intersecting circles is 16. If the radii are 10 and 17, a possible value for the distance between the centers of the circles is (a) 21 (b) 24 (c) 16 (d) $(189)^{1/2}$ (e) $(389)^{1/2}$

III.28 A square S1 is inscribed in a circle of radius 1 and a second square S2 is circumscribed about C. The average of the areas of S1 and S2 is

(a) 3 (b) $2+(2)^{1/2}$ (c) $6-\pi$ (d) $(2)^{1/2}+(3)^{1/2}$

(e) $(\pi+3)/2$

IV. 8



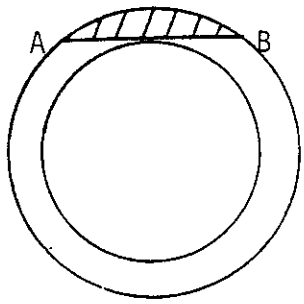
IV.8 In the figure find the length of AB.

(a) 9 (b) 15/2 (c) 17/2 (d) $8+(2)^{1/2}$ (e) $15-(2)^{1/2}$

IV.21 In the figure the distance from A to B is 2; the area of the shaded region is

(a) π (b) 2π (c) 3π (d) $3\pi/2$ (e) 4π

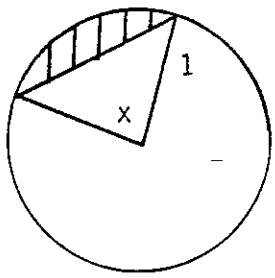
IV. 21



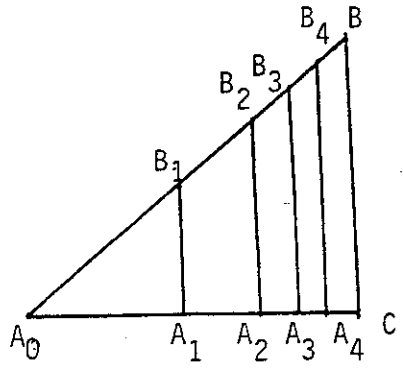
V.16 In the figure if the area of the shaded portion is 1/4 then x = (a) $(2\cos x+1)/2$ (b) $(\sin 2x+1)/2$

(c) $\tan(x/2)$ (d) $\sin x+\cos x$ (e) $\sin x+1/2$

V. 16

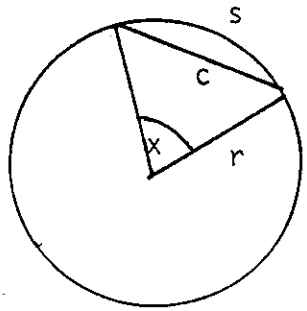


V. 22



V.22 In the figure, $BC = A_0C = 32$ and $A_nC = 2A_{n+1}C$ for $n = 0,1,2,3$. What is the area of the quadrilateral $A_3B_3B_4A_4$?
(a) 11 (b) 39/2 (c) 27 (d) 99/2 (e) 58

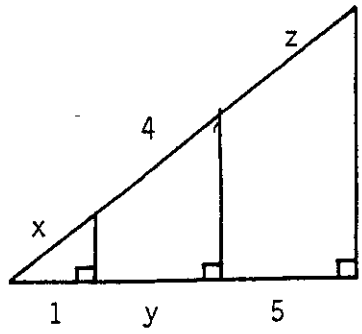
VI. 31



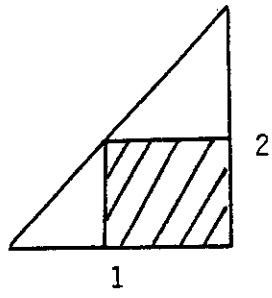
VI.31 In the figure the ratio a/c depends (a) on neither r nor x (b) on both of r and x (c) on r but not on x (d) on x but not on r (e) none of (a),(b),(c),(d).

VI.32 In the figure if x,y,z are all integers then the largest possible value of the product xyz is
(a) 20 (b) 32 (c) 36 (d) 48 (e) 80

VI. 32



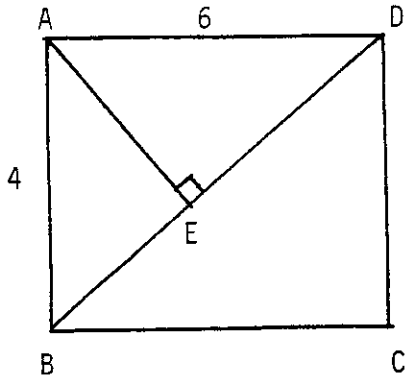
VI. 33



VI.33 In the figure the largest possible area of the shaded rectangle is (a) 1/4 (b) 3/8 (c) 1/2 (d) 3/4 (e) 7/8.

VIII.30 In the figure, ABCD is a rectangle and AE is perpendicular to BC. The length of BE is
(a) $8/(13)^{1/2}$ (b) 3/2 (c) $(6)^{1/2}$ (d) $(17/2)^{1/2}$ (e) $(19)^{1/2}/3$

VIII. 30



IX.18 Starting with a square of area 1, a circle is inscribed in the square and a square is then inscribed in the circle; a circle is inscribed in the resulting square and a square in the circle and the process is repeated for a total of 5 pairs of inscribings. The area of the final square is
(a) $(2)^{1/2}/48$ (b) 29/96 (c) $(924)^{1/2}$ (d) $(5)^{1/2}/64$
(e) 1/32

X.25 Given a triangle with vertices A,B,C, if angle C is 30 degrees, side BC has length 10, and side AB has length 4 then side AC has length (a) $2(21)^{1/2}$ (b) $58^{1/2}$ (c) $(29/3)^{1/2}$ (d) there are two possible values (e) there are no possible values

X.26 Let ABCD be a quadrilateral and let E be a point on side BC and F a point on side AD so that AB, CD and EF are all parallel. If BC = 12, AF = 1 and BE = FD = x then x =
(a) $10^{1/2}$ (b) $2 + 2^{1/2}$ (c) $1 + 3^{1/2}$ (d) 7/2 (e) 3