APPENDIX B - GEOMETRIC FORMULAS
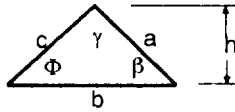
(1) Any triangle:

$A = 1/2 bh$

or: $Sin \gamma = \dfrac{c\, Sin\, \Phi}{a}$
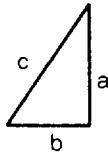
(2) Right triangle:

$a = \sqrt{c^2 - b^2}$

$b = \sqrt{c^2 - a^2}$

$c = \sqrt{a^2 + b^2}$
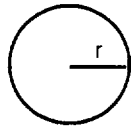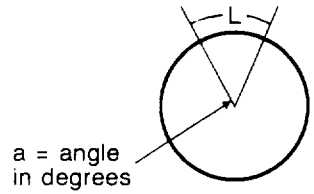
(3) Circle:

$A = \pi r^2$

$A = 0.7854\, D^2$

$C = \pi D$

(4) Segment of circle:

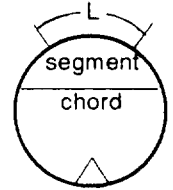$A = \dfrac{\pi r^2 a}{360} - \dfrac{r^2\, Sin\, a}{2}$

$L = \dfrac{2\pi\, ra}{360}$

a = angle in degrees

(5) Segment of circle:

$A = \dfrac{rL}{2} - \dfrac{\pi r^2 a}{360}$
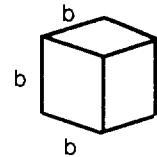
A = area
h = height
b = length of base
c = hypotenuse
C = circumference

V = volume
r = radius
D = diameter
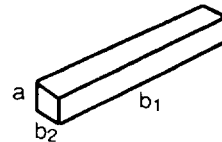π = 3.1416
L = length of arc
K = length of chord

(6) Regular polygons. The area of any regular polygon (all sides equal, all angles equal) is equal to the product of the square of the lengths of one side and the factors. Example problem: Area of a regular octagon having 6-inch sides is 6 x 6 x 4.828, or 173.81 square inches. See factors in table.

POLYGON FACTORS			
No. of sides	Factor	No. of sides	Factor
3	0.433	8	4.828
4	1.000	9	6.182
5	1.720	10	7.694
6	2.598	11	9.366
7	3.634	12	11.196

(7) Rectangle and parallelogram:

$A = ab$

(8) Trapezoid:

$A = 1/2 a(b_1 + b_2)$

(9) Cube:

$V = b^3$

(10) Rectangular parallelepiped
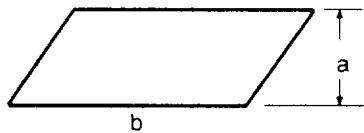
$V = ab_1b_2$

(11) Prism or cylinder:

$V = a \times$ area of base
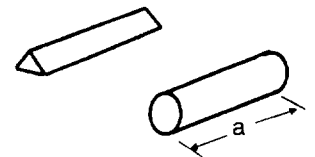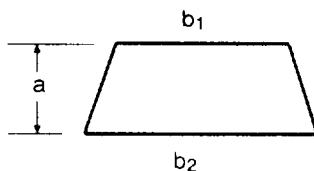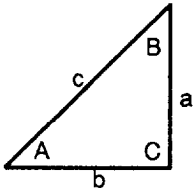
(12) Pyramid or cone:

$V = (1/3)a \times$ area of base
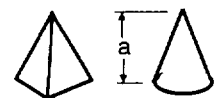
(13) Sphere:

$V = (4/3)\pi r^3 = \dfrac{\pi D^3}{6}$

$A = 4\pi r^2$
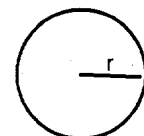
GEOMETRIC FORMULAS (continued)

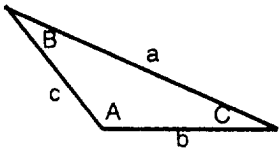$$a^2 = c^2 - b^2 \qquad Sin\,A = \frac{a}{c}$$

$$b^2 = c^2 - a^2 \qquad Cos\,A = \frac{b}{c}$$

$$c^2 = a^2 + b^2 \qquad Tan\,A = \frac{a}{b}$$

Right triangle							
	To find						
Given	A	B	C	a	b	c	area
a,b	$\tan A = \dfrac{a}{b}$	$\tan B = \dfrac{b}{a}$	90			$\sqrt{a^2 + b^2}$	$\dfrac{ab}{2}$
a,c	$\sin A = \dfrac{a}{c}$	$\cos B = \dfrac{a}{c}$	90		$\sqrt{c^2 - a^2}$		$\dfrac{a}{2}\sqrt{c^2 - a^2}$
A,a		90 - A	90		a cot A	$\dfrac{a}{\sin A}$	$\dfrac{a^2 \cot A}{2}$
A,b		90 - A	90	b tan A		$\dfrac{b}{\cos A}$	$\dfrac{b^2 \tan A}{2}$
A,c		90 - A	90	c sin A	c cos A		$\dfrac{c^2 \sin 2A}{2}$

$$\frac{a}{Sin\,A} = \frac{b}{Sin\,B} = \frac{c}{Sin\,C}$$

$$S = \frac{a + b + c}{2}$$

$$a^2 = b^2 + c^2 - 2bc\,Cos\,A$$

$$b^2 = a^2 + c^2 - 2ac\,Cos\,B$$

$$c^2 = a^2 + b^2 - 2ab\,Cos\,C$$

Oblique triangle						
Given	To find					
	A	B	C	b	c	area
a,b,c	$\cos\dfrac{A}{2} = \sqrt{\dfrac{s(s-a)}{bc}}$	$\cos\dfrac{B}{2} = \sqrt{\dfrac{s(s-b)}{ac}}$	$\cos\dfrac{C}{2} = \sqrt{\dfrac{s(s-c)}{ab}}$			$\sqrt{s(s-a)(s-b)(s-c)}$
a,A,B			180 - (A+B)	$\dfrac{a \sin B}{\sin A}$	$\dfrac{a \sin C}{\sin A}$	$\dfrac{a^2 \sin B \sin C}{2 \sin A}$
a,b,A		$\sin B = \dfrac{b \sin A}{a}$			$\dfrac{b \sin C}{\sin B}$	
a,b,c		$\tan A = \dfrac{a \sin C}{b - a \cos C}$			$\sqrt{a^2 + b^2 - 2ab \cos C}$	$\dfrac{ab \sin C}{2}$

B-2 Geometric formulas

GEOMETRIC FORMULAS (continued)

Degree of Angle	Sine	Cosecant	Tangent	Cotangent	Secant	Cosine	Degree of Angle
0	0.000		0.000		1.000	1.000	90
1	0.017	57.30	0.017	57.29	1.000	1.000	89
2	0.035	28.65	0.035	28.64	1.001	0.999	88
3	0.052	19.11	0.052	19.08	1.001	0.999	87
4	0.070	14.34	0.070	14.30	1.002	0.998	86
5	0.087	11.47	0.087	11.43	1.004	0.996	85
6	0.105	9.567	0.105	9.514	1.006	0.995	84
7	0.122	8.206	0.123	8.144	1.008	0.993	83
8	0.139	7.185	0.141	7.115	1.010	0.990	82
9	0.156	6.392	0.158	6.314	1.012	0.988	81
10	0.174	5.759	0.176	5.671	1.015	0.985	80
11	0.191	5.241	0.194	5.145	1.019	0.982	79
12	0.208	4.810	0.213	4.705	1.022	0.978	78
13	0.225	4.445	0.231	4.331	1.026	0.974	77
14	0.242	4.134	0.249	4.011	1.031	0.970	76
15	0.259	3.864	0.268	3.732	1.035	0.966	75
16	0.276	3.628	0.287	3.487	1.040	0.961	74
17	0.292	3.420	0.306	3.271	1.046	0.956	73
18	0.309	3.236	0.325	3.078	1.051	0.951	72
19	0.326	3.072	0.344	2.904	1.058	0.946	71
20	0.342	2.924	0.364	2.747	1.064	0.940	70
21	0.358	2.790	0.384	2.605	1.071	0.934	69
22	0.375	2.669	0.404	2.475	1.079	0.927	68
23	0.391	2.559	0.424	2.356	1.086	0.921	67
24	0.407	2.459	0.445	2.246	1.095	0.914	66
25	0.423	2.366	0.466	2.145	1.103	0.906	65
26	0.438	2.281	0.488	2.050	1.113	0.899	64
27	0.454	2.203	0.510	1.963	1.122	0.901	63
28	0.469	2.130	0.532	1.881	1.133	0.883	62
29	0.485	2.063	0.554	1.804	1.143	0.875	61
30	0.500	2.000	0.577	1.732	1.155	0.866	60
Degree of Angle	Cosine	Secant	Cotangent	Tangent	Cosecant	Sine	Degree of Angle

TRIGONOMETRIC FUNCTIONS

GEOMETRIC FORMULAS (continued)

Degree of Angle	Sine	Cosecant	Tangent	Cotangent	Secant	Cosine	Degree of Angle
31	0.515	1.942	0.601	1.664	1.167	0.857	59
32	0.530	1.887	0.625	1.600	1.179	0.848	58
33	0.545	1.836	0.649	1.540	1.192	0.839	57
34	0.559	1.788	0.675	1.483	1.206	0.829	56
35	0.574	1.743	0.700	1.428	1.221	0.829	55
36	0.588	1.701	0.727	1.376	1.236	0.809	54
37	0.602	1.662	0.754	1.327	1.252	0.799	53
38	0.616	1.624	0.781	1.280	1.269	0.788	52
39	0.629	1.589	0.810	1.235	1.287	0.777	51
40	0.643	1.556	0.839	1.192	1.305	0.766	50
41	0.656	1.542	0.869	1.150	1.325	0.755	49
42	0.669	1.494	0.900	1.111	1.346	0.743	48
43	0.682	1.466	0.933	1.072	1.367	0.731	47
44	0.695	1.440	0.966	1.036	1.390	0.719	46
45	0.707	1.414	1.000	1.100	1.414	0.707	45
Degree of Angle	Cosine	Secant	Cotangent	Tangent	Cosecant	Sine	Degree of Angle

TRIGONOMETRIC FUNCTIONS

B-4 Geometric formulas