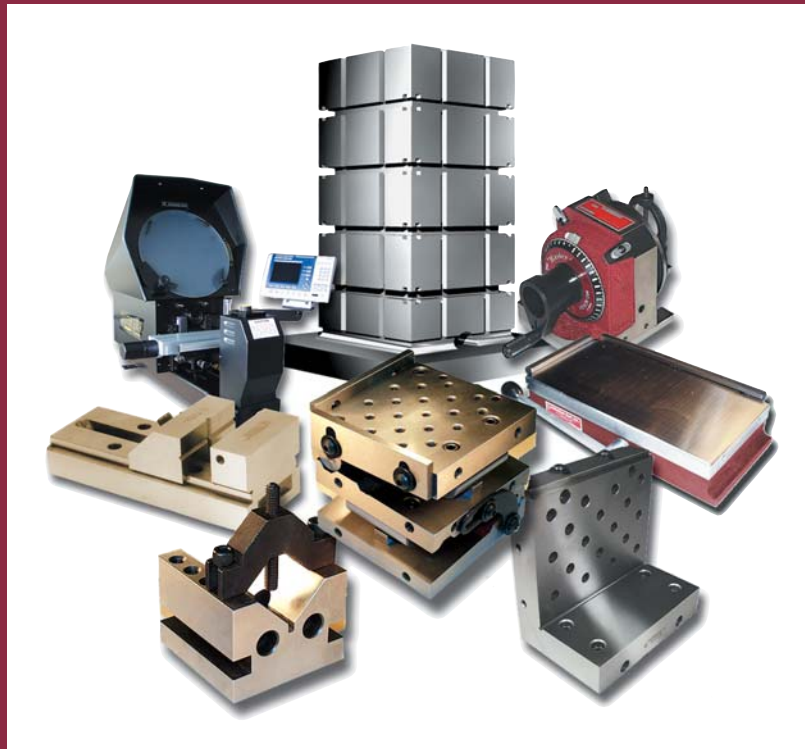


Suburban Tool, Inc.

Taft-Peirce Metrology



PROPERTY OF:

CONSTANTS
FOR SETTING
SINE PLATES, SINE BARS,
SINE VISES, AND OTHER SINE DEVICES

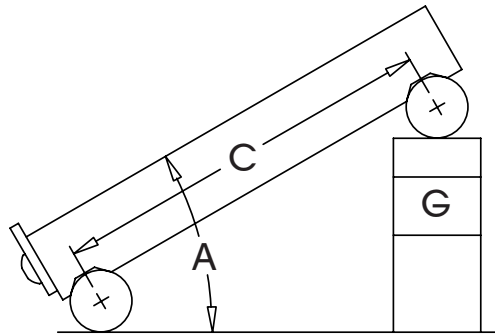


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HOW TO USE A SINE BAR / PLATE



1. To set an angle on any sine device, whether it is a sine bar, sine plate, compound sine plate, or other sine tool, you must first determine the center distance of the device (C) and the angle you wish to set (A).

2. Next, you must look up the 'setting constant' in the appropriate table.

The sine tables provided in this booklet are the basic sizes needed to set an angle on most sine products. For center distances other than those sizes listed, use the appropriate multiple of the constant determined from the basic chart.

For example: to obtain the constant needed to set a 15 degree 12 minute angle on a 10" sine plate, look up the constant in the 5" chart and find 1.310946". Multiply this by 2 and the result is 2.621892"

3. After determining the appropriate constant, assemble a stack of gage blocks (G) equal in size to that constant.

4. Place these gage blocks under the gage block roll of the sine device, and the desired angle is set.

5. Tighten the locking mechanism on those devices that have one, and you're ready to go.

COMPOUND ANGLE COMPENSATION

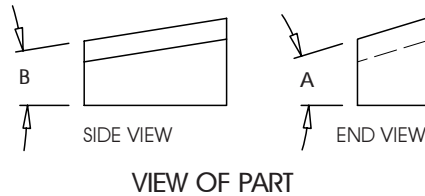
When setting compound angles, it is necessary to compensate for the first angle set in order to correctly set the second angle. To obtain this compensation, refer to the following drawings and procedures.

where:

Angle A = First desired angle

Angle B = Second desired angle

Angle C = True angle setting
required to get angle B



1. Set the first of the desired angles (Angle A) on the top section of your compound sine plate.

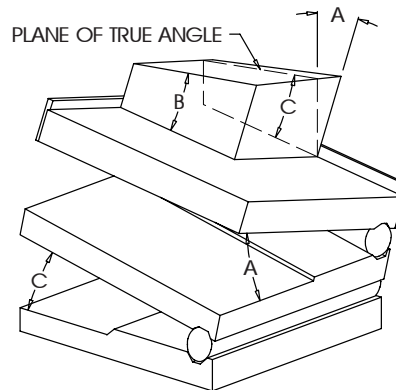
2. Calculate the tangent of the True Angle (Angle C) using the formula:

$$\tan (\text{True Angle } C) = \tan (\text{Angle } B) \times \cos (\text{Angle } A)$$

3. Lookup the True Angle (Angle C) in a table of tangents (or use the inverse tangent function on your calculator).

4. Set the lower section of your compound sine plate, using the proper sine table and the True Angle (Angle C).

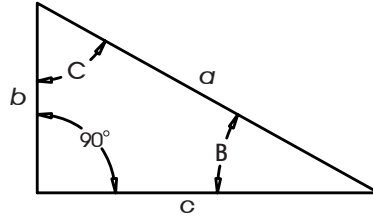
5. Results: The compound sine plate is now set to obtain the desired angles (Angles A & B) in their respective planes.



PART ON COMPOUND SINE PLATE

SOLUTION OF RIGHT-ANGLED TRIANGLES

Sin = Sine
 Cos = Cosine
 Tan = Tangent
 Ctn = Cotangent
 Sec = Secant
 Csc = Cosecant



To Find Angle	FORMULAS	To Find Side	FORMULAS	
B	$B = 90^\circ - C$	a	$\sqrt{b^2 + c^2}$	
B	$\sin B = \frac{b}{a}$	a	$b \times \csc B$	$\frac{b}{\sin B}$
B	$\cos B = \frac{c}{a}$	a	$b \times \sec C$	$\frac{b}{\cos C}$
B	$\tan B = \frac{b}{c}$	a	$c \times \csc C$	$\frac{c}{\sin C}$
B	$\text{Ctn } B = \frac{c}{b}$	a	$c \times \sec B$	$\frac{c}{\cos B}$
B	$\sec B = \frac{a}{c}$	b	$\sqrt{a^2 - c^2}$	
B	$\csc B = \frac{a}{b}$	b	$a \times \cos C$	$\frac{a}{\sec C}$
C	$C = 90^\circ - B$	b	$a \times \sin B$	$\frac{a}{\csc B}$
C	$\sin C = \frac{c}{a}$	b	$c \times \text{Ctn } C$	$\frac{c}{\tan C}$
C	$\cos C = \frac{b}{a}$	b	$c \times \tan B$	$\frac{c}{\text{Ctn } B}$
C	$\tan C = \frac{c}{b}$	c	$\sqrt{a^2 - b^2}$	
C	$\text{Ctn } C = \frac{b}{c}$	c	$a \times \sin C$	$\frac{a}{\csc C}$
C	$\sec C = \frac{a}{b}$	c	$a \times \cos B$	$\frac{a}{\sec B}$
C	$\csc C = \frac{a}{c}$	c	$b \times \tan C$	$\frac{b}{\text{Ctn } C}$
		c	$b \times \text{Ctn } B$	$\frac{b}{\tan B}$

3" SINE BAR CONSTANTS

MIN	0°	1°	2°	3°	4°	5°	6°	7°	8°
0	0.000000	0.052357	0.104698	0.157008	0.209269	0.261467	0.313585	0.365608	0.417519
1	.000873	.053230	.105571	.157879	.210140	.262337	.314453	.366474	.418383
2	.001745	.054102	.106443	.158751	.211010	.263206	.315321	.367340	.419248
3	.002618	.054975	.107315	.159622	.211881	.264075	.316189	.368206	.420112
4	.003491	.055847	.108187	.160494	.212751	.264944	.317057	.369072	.420976
5	.004363	.056720	.109059	.161365	.213622	.265814	.317924	.369938	.421840
6	.005236	.057592	.109931	.162236	.214492	.266683	.318792	.370804	.422704
7	.006109	.058465	.110803	.163108	.215363	.267552	.319660	.371670	.423568
8	.006981	.059337	.111675	.163979	.216233	.268421	.320528	.372536	.424432
9	.007854	.060210	.112547	.164851	.217104	.269290	.321395	.373402	.425295
10	.008727	.061082	.113419	.165722	.217974	.270160	.322263	.374268	.426159
11	.009599	.061955	.114291	.166593	.218844	.271029	.323130	.375134	.427023
12	.010472	.062827	.115163	.167465	.219715	.271898	.323998	.376000	.427887
13	.011345	.063700	.116035	.168336	.220585	.272767	.324866	.376865	.428751
14	.012217	.064572	.116907	.169207	.221455	.273636	.325733	.377731	.429614
15	.013090	.065445	.117779	.170078	.222325	.274505	.326601	.378597	.430478
16	.013963	.066317	.118651	.170950	.223196	.275374	.327468	.379463	.431341
17	.014835	.067190	.119523	.171821	.224066	.276243	.328336	.380328	.432205
18	.015708	.068062	.120395	.172692	.224936	.277112	.329203	.381194	.433069
19	.016581	.068934	.121267	.173563	.225806	.277981	.330070	.382059	.433932
20	.017453	.069807	.122139	.174434	.226677	.278850	.330938	.382925	.434796
21	.018326	.070679	.123011	.175306	.227547	.279718	.331805	.383790	.435659
22	.019198	.071552	.123883	.176177	.228417	.280587	.332672	.384656	.436522
23	.020071	.072424	.124755	.177048	.229287	.281456	.333540	.385521	.437386
24	.020944	.073297	.125627	.177919	.230157	.282325	.334407	.386387	.438249
25	.021816	.074169	.126499	.178790	.231027	.283194	.335274	.387252	.439112
26	.022689	.075041	.127371	.179661	.231897	.284062	.336141	.388118	.439976
27	.023562	.075914	.128243	.180532	.232767	.284931	.337008	.388983	.440839
28	.024434	.076786	.129114	.181404	.233637	.285800	.337875	.389848	.441702
29	.025307	.077658	.129986	.182275	.234507	.286669	.338743	.390713	.442565
30	.026180	.078531	.130858	.183146	.235377	.287537	.339610	.391579	.443428
31	.027052	.079403	.131730	.184017	.236247	.288406	.340477	.392444	.444291
32	.027925	.080276	.132602	.184888	.237117	.289275	.341344	.393309	.445154
33	.028797	.081148	.133474	.185759	.237987	.290143	.342211	.394174	.446017
34	.029670	.082020	.134345	.186630	.238857	.291012	.343078	.395039	.446880
35	.030543	.082893	.135217	.187501	.239727	.291880	.343945	.395904	.447743
36	.031415	.083765	.136089	.188372	.240597	.292749	.344811	.396769	.448606
37	.032288	.084637	.136961	.189242	.241467	.293617	.345678	.397634	.449469
38	.033161	.085510	.137832	.190113	.242336	.294486	.346545	.398499	.450332
39	.034033	.086382	.138704	.190984	.243206	.295354	.347412	.399364	.451194
40	.034906	.087254	.139576	.191855	.244076	.296222	.348279	.400229	.452057
41	.035778	.088126	.140448	.192726	.244946	.297091	.349145	.401094	.452920
42	.036651	.088999	.141319	.193597	.245816	.297959	.350012	.401959	.453782
43	.037524	.089871	.142191	.194468	.246685	.298828	.350879	.402823	.454645
44	.038396	.090743	.143063	.195339	.247555	.299696	.351746	.403688	.455508
45	.039269	.091616	.143934	.196209	.248425	.300564	.352612	.404553	.456370
46	.040141	.092488	.144806	.197080	.249294	.301432	.353479	.405417	.457233
47	.041014	.093360	.145678	.197951	.250164	.302301	.354345	.406282	.458095
48	.041887	.094232	.146549	.198822	.251034	.303169	.355212	.407147	.458958
49	.042759	.095105	.147421	.199692	.251903	.304037	.356078	.408011	.459820
50	.043632	.095977	.148293	.200563	.252773	.304905	.356945	.408876	.460682
51	.044504	.096849	.149164	.201434	.253642	.305773	.357811	.409740	.461545
52	.045377	.097721	.150036	.202305	.254512	.306641	.358678	.410605	.462407
53	.046249	.098593	.150907	.203175	.255381	.307510	.359544	.411469	.463269
54	.047122	.099466	.151779	.204046	.256251	.308378	.360411	.412334	.464131
55	.047995	.100338	.152650	.204917	.257120	.309246	.361277	.413198	.464993
56	.048867	.101210	.153522	.205787	.257990	.310114	.362143	.414062	.465855
57	.049740	.102082	.154393	.206658	.258859	.310982	.363009	.414927	.466717
58	.050612	.102954	.155265	.207528	.259728	.311850	.363876	.415791	.467579
59	.051485	.103826	.156136	.208399	.260598	.312717	.364742	.416655	.468441

3" SINE BAR CONSTANTS

9°	10°	11°	12°	13°	14°	15°	16°	17°	MIN
0.469303	0.520945	0.572427	0.623735	0.674853	0.725766	0.776457	0.826912	0.877115	0
.470165	.521804	.573284	.624589	.675703	.726612	.777300	.827751	.877950	1
.471027	.522663	.574140	.625442	.676554	.727459	.778143	.828590	.878784	2
.471889	.523523	.574997	.626296	.677404	.728306	.778986	.829428	.879618	3
.472751	.524382	.575853	.627149	.678254	.729152	.779828	.830267	.880453	4
0.473613	0.525241	0.576710	0.628002	0.679104	0.729999	0.780671	0.831105	0.881287	5
.474474	.526100	.577566	.628856	.679954	.730845	.781514	.831944	.882121	6
.475336	.526959	.578422	.629709	.680804	.731691	.782356	.832782	.882955	7
.476197	.527818	.579278	.630562	.681654	.732538	.783198	.833621	.883789	8
.477059	.528677	.580135	.631415	.682504	.733384	.784041	.834459	.884623	9
0.477921	0.529536	0.580991	0.632268	0.683353	0.734230	0.784883	0.835297	0.885457	10
.478782	.530395	.581847	.633121	.684203	.735076	.785725	.836135	.886290	11
.479644	.531254	.582703	.633974	.685053	.735922	.786568	.836973	.887124	12
.480505	.532113	.583559	.634827	.685902	.736768	.787410	.837811	.887958	13
.481366	.532972	.584415	.635680	.686752	.737614	.788252	.838649	.888791	14
0.482228	0.533831	0.585271	0.636533	0.687601	0.738460	0.789094	0.839487	0.889625	15
.483089	.534689	.586127	.637386	.688451	.739306	.789936	.840325	.890458	16
.483950	.535548	.586983	.638238	.689300	.740151	.790777	.841163	.891291	17
.484811	.536407	.587838	.639091	.690149	.740997	.791619	.842000	.892125	18
.485673	.537265	.588694	.639944	.690998	.741843	.792461	.842838	.892958	19
0.486534	0.538124	0.589550	0.640796	0.691848	0.742688	0.793302	0.843675	0.893791	20
.487395	.538982	.590405	.641649	.692697	.743534	.794144	.844513	.894624	21
.488256	.539841	.591261	.642501	.693546	.744379	.794986	.845350	.895457	22
.489117	.540699	.592117	.643354	.694395	.745224	.795827	.846187	.896290	23
.489978	.541557	.592972	.644206	.695244	.746070	.796668	.847024	.897122	24
0.490839	0.542416	0.593827	0.645058	0.696093	0.746915	0.797510	0.847861	0.897955	25
.491700	.543274	.594683	.645910	.696941	.747760	.798351	.848699	.898788	26
.492561	.544132	.595538	.646763	.697790	.748605	.799192	.849536	.899620	27
.493421	.544990	.596393	.647615	.698639	.749450	.800033	.850372	.900453	28
.494282	.545849	.597249	.648467	.699488	.750295	.800874	.851209	.901285	29
0.495143	0.546707	0.598104	0.649319	0.700336	0.751140	0.801715	0.852046	0.902117	30
.496003	.547565	.598959	.650171	.701185	.751985	.802556	.852883	.902950	31
.496864	.548423	.599814	.651023	.702033	.752830	.803397	.853719	.903782	32
.497725	.549281	.600669	.651875	.702881	.753674	.804238	.854556	.904614	33
.498585	.550138	.601524	.652726	.703730	.754519	.805078	.855392	.905446	34
0.499446	0.550996	0.602379	0.653578	0.704578	0.755364	0.805919	0.856229	0.906278	35
.500306	.551854	.603234	.654430	.705426	.756208	.806759	.857065	.907110	36
.501167	.552712	.604089	.655281	.706275	.757053	.807600	.857901	.907941	37
.502027	.553570	.604943	.656133	.707123	.757897	.808440	.858738	.908773	38
.502887	.554427	.605798	.656984	.707971	.758741	.809281	.859574	.909605	39
0.503748	0.555285	0.606653	0.657836	0.708819	0.759586	0.810121	0.860410	0.910436	40
.504608	.556142	.607507	.658687	.709667	.760430	.810961	.861246	.911268	41
.505468	.557000	.608362	.659539	.710514	.761274	.811801	.862082	.912099	42
.506328	.557857	.609216	.660390	.711362	.762118	.812641	.862917	.912930	43
.507188	.558715	.610071	.661241	.712210	.762962	.813481	.863753	.913762	44
0.508049	0.559572	0.610925	0.662092	0.713058	0.763806	0.814321	0.864589	0.914593	45
.508909	.560429	.611780	.662943	.713905	.764650	.815161	.865424	.915424	46
.509769	.561287	.612634	.663794	.714753	.765494	.816001	.866260	.916255	47
.510628	.562144	.613488	.664645	.715600	.766337	.816841	.867095	.917086	48
.511488	.563001	.614342	.665496	.716448	.767181	.817680	.867931	.917917	49
0.512348	0.563858	0.615196	0.666347	0.717295	0.768025	0.818520	0.868766	0.918748	50
.513208	.564715	.616051	.667198	.718143	.768868	.819360	.869601	.919578	51
.514068	.565572	.616905	.668049	.718990	.769712	.820199	.870436	.920409	52
.514928	.566429	.617759	.668900	.719837	.770555	.821038	.871272	.921239	53
.515787	.567286	.618613	.669750	.720684	.771398	.821878	.872107	.922070	54
0.516647	0.568143	0.619466	0.670601	0.721531	0.772242	0.822717	0.872942	0.922900	55
.517507	.569000	.620320	.671452	.722378	.773085	.823556	.873776	.923731	56
.518366	.569857	.621174	.672302	.723225	.773928	.824395	.874611	.924561	57
.519226	.570714	.622028	.673152	.724072	.774771	.825234	.875446	.925391	58
.520085	.571570	.622881	.674003	.724919	.775614	.826073	.876281	.926221	59

3" SINE BAR CONSTANTS

MIN	18°	19°	20°	21°	22°	23°	24°	25°	26°
0	0.927051	0.976704	1.026060	1.075104	1.123820	1.172193	1.220210	1.267855	1.315113
1	.927881	.977530	.026880	.075919	.124629	.172997	.221007	.268646	.315898
2	.928711	.978355	.027700	.076733	.125438	.173800	.221804	.269436	.316682
3	.929540	.979179	.028520	.077548	.126247	.174603	.222601	.270227	.317466
4	.930370	.980004	.029340	.078362	.127056	.175406	.223398	.271018	.318250
5	0.931200	0.980829	1.030160	1.079176	1.127864	1.176209	1.224195	1.271808	1.319034
6	.932029	.981654	.030979	.079990	.128673	.177011	.224991	.272598	.319818
7	.932859	.982478	.031799	.080805	.129481	.177814	.225788	.273388	.320601
8	.933688	.983303	.032618	.081619	.130290	.178617	.226584	.274179	.321385
9	.934517	.984127	.033437	.082432	.131098	.179419	.227381	.274969	.322168
10	0.935347	0.984952	1.034256	1.083246	1.131906	1.180221	1.228177	1.275758	1.322951
11	.936176	.985776	.035076	.084060	.132714	.181024	.228973	.276548	.323734
12	.937005	.986600	.035895	.084874	.133522	.181826	.229769	.277338	.324518
13	.937834	.987424	.036714	.085687	.134330	.182628	.230565	.278127	.325301
14	.938663	.988248	.037532	.086501	.135138	.183430	.231361	.278917	.326083
15	0.939491	0.989072	1.038351	1.087314	1.135946	1.184232	1.232157	1.279706	1.326866
16	.940320	.989896	.039170	.088127	.136753	.185033	.232952	.280495	.327649
17	.941149	.990720	.039988	.088941	.137561	.185835	.233748	.281285	.328431
18	.941977	.991543	.040807	.089754	.138368	.186637	.234543	.282074	.329214
19	.942806	.992367	.041625	.090567	.139176	.187438	.235338	.282862	.329996
20	0.943634	0.993190	1.042444	1.091380	1.139983	1.188239	1.236134	1.283651	1.330778
21	.944463	.994014	.043262	.092192	.140790	.189041	.236929	.284440	.331560
22	.945291	.994837	.044080	.093005	.141597	.189842	.237724	.285229	.332342
23	.946119	.995660	.044898	.093818	.142404	.190643	.238519	.286017	.333124
24	.946947	.996483	.045716	.094630	.143211	.191444	.239313	.286805	.333906
25	0.947775	0.997306	1.046534	1.095443	1.144018	1.192245	1.240108	1.287594	1.334687
26	.948603	.998129	.047352	.096255	.144825	.193045	.240903	.288382	.335469
27	.949431	.998952	.048170	.097067	.145631	.193846	.241697	.289170	.336250
28	.950259	.999775	.048987	.097880	.146438	.194646	.242491	.289958	.337031
29	.951086	1.000598	.049805	.098692	.147244	.195447	.243286	.290746	.337812
30	0.951914	1.001421	1.050622	1.099504	1.148050	1.196247	1.244080	1.291533	1.338593
31	.952741	.002243	.051439	.100316	.148856	.197047	.244874	.292321	.339374
32	.953569	.003066	.052257	.101127	.149663	.197848	.245668	.293108	.340155
33	.954396	.003888	.053074	.101939	.150469	.198648	.246462	.293896	.340936
34	.955224	.004710	.053891	.102751	.151274	.199448	.247255	.294683	.341716
35	0.956051	1.005533	1.054708	1.103562	1.152080	1.200247	1.248049	1.295470	1.342497
36	.956878	.006355	.055525	.104374	.152886	.201047	.248842	.296257	.343277
37	.957705	.007177	.056342	.105185	.153692	.201847	.249636	.297044	.344058
38	.958532	.007999	.057158	.105996	.154497	.202646	.250429	.297831	.344838
39	.959359	.008821	.057975	.106807	.155302	.203446	.251222	.298618	.345618
40	0.960186	1.009642	1.058792	1.107618	1.156108	1.204245	1.252015	1.299404	1.346398
41	.961012	.010464	.059608	.108429	.156913	.205044	.252808	.300191	.347177
42	.961839	.011286	.060425	.109240	.157718	.205843	.253601	.300977	.347957
43	.962666	.012107	.061241	.110051	.158523	.206642	.254394	.301764	.348737
44	.963492	.012929	.062057	.110862	.159328	.207441	.255187	.302550	.349516
45	0.964318	1.013750	1.062873	1.111672	1.160133	1.208240	1.255979	1.303336	1.350295
46	.965145	.014571	.063689	.112483	.160938	.209039	.256772	.304122	.351075
47	.965971	.015393	.064505	.113293	.161742	.209837	.257564	.304908	.351854
48	.966797	.016214	.065321	.114104	.162547	.210636	.258356	.305693	.352633
49	.967623	.017035	.066137	.114914	.163351	.211434	.259148	.306479	.353411
50	0.968449	1.017856	1.066952	1.115724	1.164156	1.212233	1.259940	1.307264	1.354190
51	.969275	.018677	.067768	.116534	.164960	.213031	.260732	.308050	.354969
52	.970101	.019497	.068583	.117344	.165764	.213829	.261524	.308835	.355747
53	.970927	.020318	.069399	.118154	.166568	.214627	.262316	.309620	.356526
54	.971752	.021139	.070214	.118963	.167372	.215425	.263107	.310405	.357304
55	0.972578	1.021959	1.071029	1.119773	1.168176	1.216223	1.263899	1.311190	1.358082
56	.973403	.022780	.071844	.120583	.168979	.217020	.264690	.311975	.358860
57	.974229	.023600	.072659	.121392	.169783	.217818	.265482	.312760	.359638
58	.975054	.024420	.073474	.122201	.170587	.218615	.266273	.313545	.360416
59	.975879	.025240	.074289	.123011	.171390	.219413	.267064	.314329	.361194

3" SINE BAR CONSTANTS

27°	28°	29°	30°	31°	32°	33°	34°	35°	MIN
1.361971	1.408415	1.454429	1.500000	1.545114	1.589758	1.633917	1.677579	1.720729	0
.362749	.409185	.455192	.500756	.545862	.590498	.634649	.678302	.721444	1
.363526	.409955	.455955	.501511	.546610	.591238	.635381	.679025	.722159	2
.364304	.410726	.456718	.502267	.547358	.591977	.636112	.679748	.722873	3
.365081	.411496	.457481	.503022	.548105	.592717	.636844	.680471	.723588	4
1.365858	1.412266	1.458244	1.503777	1.548853	1.593456	1.637575	1.681194	1.724302	5
.366635	.413036	.459006	.504532	.549600	.594196	.638306	.681917	.725016	6
.367412	.413805	.459769	.505287	.550347	.594935	.639037	.682640	.725730	7
.368188	.414575	.460531	.506042	.551094	.595674	.639768	.683362	.726443	8
.368965	.415345	.461293	.506797	.551841	.596413	.640498	.684084	.727157	9
1.369741	1.416114	1.462055	1.507551	1.552588	1.597152	1.641229	1.684806	1.727870	10
.370518	.416883	.462817	.508306	.553335	.597890	.641959	.685528	.728584	11
.371294	.417652	.463579	.509060	.554081	.598629	.642690	.686250	.729297	12
.372070	.418421	.464341	.509814	.554827	.599367	.643420	.686972	.730010	13
.372846	.419190	.465102	.510568	.555574	.600105	.644150	.687693	.730723	14
1.373622	1.419959	1.465864	1.511322	1.556320	1.600844	1.644880	1.688415	1.731436	15
.374398	.420728	.466625	.512076	.557066	.601582	.645609	.689136	.732148	16
.375173	.421496	.467386	.512829	.557812	.602319	.646339	.689857	.732861	17
.375949	.422265	.468147	.513583	.558557	.603057	.647068	.690578	.733573	18
.376724	.423033	.468908	.514336	.559303	.603795	.647798	.691299	.734285	19
1.377499	1.423801	1.469669	1.515090	1.560048	1.604532	1.648527	1.692020	1.734997	20
.378275	.424569	.470430	.515843	.560794	.605269	.649256	.692740	.735709	21
.379050	.425337	.471190	.516596	.561539	.606006	.649985	.693461	.736421	22
.379825	.426105	.471951	.517349	.562284	.606744	.650714	.694181	.737132	23
.380599	.426873	.472711	.518101	.563029	.607480	.651442	.694901	.737844	24
1.381374	1.427640	1.473471	1.518854	1.563774	1.608217	1.652171	1.695621	1.738555	25
.382149	.428408	.474232	.519606	.564518	.608954	.652899	.696341	.739266	26
.382923	.429175	.474992	.520359	.565263	.609690	.653627	.697061	.739977	27
.383697	.429942	.475751	.521111	.566007	.610427	.654355	.697780	.740688	28
.384472	.430709	.476511	.521863	.566752	.611163	.655083	.698499	.741398	29
1.385246	1.431476	1.477271	1.522615	1.567496	1.611899	1.655811	1.699219	1.742109	30
.386020	.432243	.478030	.523367	.568240	.612635	.656539	.699938	.742819	31
.386794	.433010	.478789	.524119	.568984	.613371	.657266	.700657	.743529	32
.387567	.433776	.479549	.524870	.569727	.614106	.657993	.701376	.744240	33
.388341	.434543	.480308	.525622	.570471	.614842	.658721	.702094	.744949	34
1.389115	1.435309	1.481067	1.526373	1.571214	1.615577	1.659448	1.702813	1.745659	35
.389888	.436076	.481826	.527124	.571958	.616312	.660175	.703531	.746369	36
.390661	.436842	.482584	.527875	.572701	.617047	.660901	.704249	.747078	37
.391435	.437608	.483343	.528626	.573444	.617782	.661628	.704968	.747788	38
.392208	.438374	.484101	.529377	.574187	.618517	.662355	.705686	.748497	39
1.392981	1.439139	1.484860	1.530128	1.574930	1.619252	1.663081	1.706403	1.749206	40
.393753	.439905	.485618	.530878	.575672	.619987	.663807	.707121	.749915	41
.394526	.440670	.486376	.531629	.576415	.620721	.664533	.707839	.750624	42
.395299	.441436	.487134	.532379	.577157	.621455	.665259	.708556	.751332	43
.396071	.442201	.487892	.533129	.577900	.622189	.665985	.709273	.752041	44
1.396844	1.442966	1.488650	1.533879	1.578642	1.622923	1.666711	1.709990	1.752749	45
.397616	.443731	.489407	.534629	.579384	.623657	.667436	.710707	.753457	46
.398388	.444496	.490165	.535379	.580126	.624391	.668162	.711424	.754165	47
.399160	.445261	.490922	.536129	.580867	.625125	.668887	.712141	.754873	48
.399932	.446026	.491679	.536878	.581609	.625858	.669612	.712857	.755581	49
1.400704	1.446790	1.492436	1.537628	1.582350	1.626591	1.670337	1.713574	1.756288	50
.401475	.447555	.493193	.538377	.583092	.627325	.671062	.714290	.756996	51
.402247	.448319	.493950	.539126	.583833	.628058	.671786	.715006	.757703	52
.403018	.449083	.494707	.539875	.584574	.628791	.672511	.715722	.758410	53
.403789	.449847	.495463	.540624	.585315	.629523	.673235	.716438	.759117	54
1.404561	1.450611	1.496220	1.541372	1.586056	1.630256	1.673960	1.717153	1.759824	55
.405332	.451375	.496976	.542121	.586796	.630988	.674684	.717869	.760531	56
.406103	.452139	.497732	.542870	.587537	.631721	.675408	.718584	.761237	57
.406873	.452902	.498488	.543618	.588277	.632453	.676131	.719299	.761943	58
.407644	.453666	.499244	.544366	.589018	.633185	.676855	.720014	.762650	59

3" SINE BAR CONSTANTS

MIN	36°	37°	38°	39°	40°	41°	42°	43°	44°
0	1.763356	1.805445	1.846984	1.887961	1.928363	1.968177	2.007392	2.045995	2.083975
1	.764062	.806142	.847672	.888639	.929031	.968836	.008040	.046633	.084603
2	.764767	.806839	.848359	.889317	.929700	.969494	.008689	.047271	.085230
3	.765473	.807535	.849047	.889995	.930368	.970152	.009337	.047909	.085858
4	.766179	.808232	.849734	.890673	.931036	.970810	.009985	.048547	.086485
5	1.766884	1.808928	1.850421	1.891350	1.931703	1.971468	2.010632	2.049184	2.087112
6	.767589	.809624	.851108	.892027	.932371	.972126	.011280	.049821	.087738
7	.768294	.810320	.851794	.892705	.933038	.972783	.011927	.050458	.088365
8	.768999	.811016	.852481	.893382	.933706	.973441	.012575	.051095	.088991
9	.769704	.811711	.853167	.894058	.934373	.974098	.013222	.051732	.089618
10	1.770408	1.812407	1.853853	1.894735	1.935040	1.974755	2.013868	2.052369	2.090244
11	.771113	.813102	.854539	.895412	.935706	.975412	.014515	.053005	.090870
12	.771817	.813797	.855225	.896088	.936373	.976068	.015162	.053641	.091495
13	.772521	.814492	.855911	.896764	.937040	.976725	.015808	.054277	.092121
14	.773225	.815187	.856596	.897440	.937706	.977381	.016454	.054913	.092746
15	1.773929	1.815882	1.857282	1.898116	1.938372	1.978037	2.017100	2.055549	2.093371
16	.774633	.816577	.857967	.898792	.939038	.978693	.017746	.056185	.093996
17	.775336	.817271	.858652	.899467	.939704	.979349	.018392	.056820	.094621
18	.776040	.817965	.859337	.900143	.940369	.980005	.019038	.057455	.095246
19	.776743	.818659	.860022	.900818	.941035	.980661	.019683	.058090	.095870
20	1.777446	1.819353	1.860706	1.901493	1.941700	1.981316	2.020328	2.058725	2.096495
21	.778149	.820047	.861391	.902168	.942365	.981971	.020973	.059360	.097119
22	.778852	.820741	.862075	.902843	.943030	.982626	.021618	.059994	.097743
23	.779554	.821434	.862759	.903517	.943695	.983281	.022263	.060628	.098366
24	.780257	.822128	.863443	.904192	.944360	.983936	.022907	.061263	.098990
25	1.780959	1.822821	1.864127	1.904866	1.945024	1.984590	2.023551	2.061896	2.099613
26	.781661	.823514	.864811	.905540	.945689	.985244	.024196	.062530	.100237
27	.782363	.824207	.865494	.906214	.946353	.985899	.024840	.063164	.100860
28	.783065	.824899	.866178	.906888	.947017	.986553	.025483	.063797	.101483
29	.783767	.825592	.866861	.907561	.947680	.987206	.026127	.064431	.102105
30	1.784468	1.826284	1.867544	1.908235	1.948344	1.987860	2.026771	2.065064	2.102728
31	.785170	.826977	.868227	.908908	.949008	.988514	.027414	.065697	.103350
32	.785871	.827669	.868910	.909581	.949671	.989167	.028057	.066329	.103972
33	.786572	.828361	.869592	.910254	.950334	.989820	.028700	.066962	.104594
34	.787273	.829052	.870274	.910927	.950997	.990473	.029343	.067594	.105216
35	1.787974	1.829744	1.870957	1.911599	1.951660	1.991126	2.029985	2.068227	2.105838
36	.788675	.830435	.871639	.912272	.952323	.991779	.030628	.068859	.106459
37	.789375	.831127	.872321	.912944	.952985	.992431	.031270	.069491	.107080
38	.790076	.831818	.873002	.913616	.953647	.993083	.031912	.070122	.107702
39	.790776	.832509	.873684	.914288	.954310	.993736	.032554	.070754	.108322
40	1.791476	1.833200	1.874366	1.914960	1.954972	1.994388	2.033196	2.071385	2.108943
41	.792176	.833891	.875047	.915632	.955634	.995039	.033838	.072016	.109564
42	.792875	.834581	.875728	.916303	.956295	.995691	.034479	.072647	.110184
43	.793575	.835272	.876409	.916975	.956957	.996343	.035120	.073278	.110804
44	.794274	.835962	.877090	.917646	.957618	.996994	.035761	.073909	.111424
45	1.794974	1.836652	1.877770	1.918317	1.958279	1.997645	2.036402	2.074539	2.112044
46	.795673	.837342	.878451	.918988	.958940	.998296	.037043	.075169	.112664
47	.796372	.838032	.879131	.919659	.959601	.998947	.037684	.075800	.113283
48	.797071	.838721	.879811	.920329	.960262	.999597	.038324	.076430	.113903
49	.797769	.839411	.880491	.920999	.960922	2.000248	.038964	.077059	.114522
50	1.798468	1.840100	1.881171	1.921670	1.961583	2.000898	2.039604	2.077689	2.115141
51	.799166	.840789	.881851	.922340	.962243	.001548	.040244	.078318	.115759
52	.799865	.841478	.882531	.923010	.962903	.002198	.040884	.078948	.116378
53	.800563	.842167	.883210	.923679	.963563	.002848	.041523	.079577	.116996
54	.801261	.842856	.883889	.924349	.964222	.003498	.042163	.080205	.117615
55	1.801958	1.843544	1.884568	1.925018	1.964882	2.004147	2.042802	2.080834	2.118233
56	.802656	.844232	.885247	.925688	.965541	.004796	.043441	.081463	.118851
57	.803354	.844921	.885926	.926357	.966201	.005446	.044080	.082091	.119468
58	.804051	.845609	.886604	.927026	.966860	.006094	.044718	.082719	.120086
59	.804748	.846297	.887283	.927694	.967518	.006743	.045357	.083347	.120703

5" SINE BAR CONSTANTS

0°	1°	2°	3°	4°	5°	6°	7°	8°	MIN
0.000000	0.087262	0.174497	0.261680	0.348782	0.435779	0.522642	0.609347	0.695866	0
.001454	.088716	.175951	.263132	.350233	.437228	.524089	.610790	.697306	1
.002909	.090170	.177405	.264585	.351684	.438676	.525535	.612234	.698746	2
.004363	.091625	.178858	.266037	.353135	.440125	.526982	.613677	.700186	3
.005818	.093079	.180312	.267489	.354586	.441574	.528428	.615121	.701626	4
0.007272	0.094533	0.181765	0.268942	0.356036	0.443023	0.529874	0.616564	0.703066	5
.008727	.095987	.183219	.270394	.357487	.444471	.531320	.618007	.704506	6
.010181	.097441	.184672	.271846	.358938	.445920	.532767	.619451	.705946	7
.011636	.098896	.186125	.273299	.360389	.447369	.534213	.620894	.707386	8
.013090	.100350	.187579	.274751	.361839	.448817	.535659	.622337	.708826	9
0.014544	0.101804	0.189032	0.276203	0.363290	0.450266	0.537105	0.623780	0.710265	10
.015999	.103258	.190486	.277655	.364740	.451714	.538551	.625223	.711705	11
.017453	.104712	.191939	.279108	.366191	.453163	.539997	.626666	.713145	12
.018908	.106166	.193392	.280560	.367642	.454611	.541443	.628109	.714584	13
.020362	.107620	.194846	.282012	.369092	.456060	.542889	.629552	.716024	14
0.021817	0.109074	0.196299	0.283464	0.370542	0.457508	0.544334	0.630995	0.717463	15
.023271	.110529	.197752	.284916	.371993	.458956	.545780	.632438	.718902	16
.024725	.111983	.199206	.286368	.373443	.460405	.547226	.633880	.720342	17
.026180	.113437	.200659	.287820	.374894	.461853	.548672	.635323	.721781	18
.027634	.114891	.202112	.289272	.376344	.463301	.550117	.636766	.723220	19
0.029089	0.116345	0.203565	0.290724	0.377794	0.464749	0.551563	0.638208	0.724659	20
.030543	.117799	.205019	.292176	.379245	.466197	.553008	.639651	.726098	21
.031997	.119253	.206472	.293628	.380695	.467646	.554454	.641093	.727537	22
.033452	.120707	.207925	.295080	.382145	.469094	.555899	.642536	.728976	23
.034906	.122161	.209378	.296532	.383595	.470542	.557345	.643978	.730415	24
0.036361	0.123615	0.210831	0.297984	0.385045	0.471990	0.558790	0.645420	0.731854	25
.037815	.125069	.212285	.299436	.386495	.473437	.560235	.646863	.733293	26
.039270	.126523	.213738	.300887	.387945	.474885	.561681	.648305	.734731	27
.040724	.127977	.215191	.302339	.389395	.476333	.563126	.649747	.736170	28
.042178	.129431	.216644	.303791	.390846	.477781	.564571	.651189	.737609	29
0.043633	0.130885	0.218097	0.305243	0.392295	0.479229	0.566016	0.652631	0.739047	30
.045087	.132339	.219550	.306694	.393745	.480676	.567461	.654073	.740485	31
.046541	.133793	.221003	.308146	.395195	.482124	.568906	.655515	.741924	32
.047996	.135247	.222456	.309598	.396645	.483572	.570351	.656957	.743362	33
.049450	.136700	.223909	.311049	.398095	.485019	.571796	.658399	.744800	34
0.050905	0.138154	0.225362	0.312501	0.399545	0.486467	0.573241	0.659840	0.746239	35
.052359	.139608	.226815	.313953	.400995	.487914	.574686	.661282	.747677	36
.053813	.141062	.228268	.315404	.402444	.489362	.576131	.662724	.749115	37
.055268	.142516	.229721	.316856	.403894	.490809	.577575	.664165	.750553	38
.056722	.143970	.231174	.318307	.405344	.492257	.579020	.665607	.751991	39
0.058176	0.145424	0.232627	0.319759	0.406793	0.493704	0.580465	0.667048	0.753429	40
.059631	.146877	.234079	.321210	.408243	.495151	.581909	.668490	.754866	41
.061085	.148331	.235532	.322662	.409693	.496599	.583354	.669931	.756304	42
.062539	.149785	.236985	.324113	.411142	.498046	.584798	.671372	.757742	43
.063994	.151239	.238438	.325564	.412592	.499493	.586243	.672813	.759179	44
0.065448	0.152693	0.239891	0.327016	0.414041	0.500940	0.587687	0.674255	0.760617	45
.066902	.154146	.241343	.328467	.415490	.502387	.589131	.675696	.762054	46
.068357	.155600	.242796	.329918	.416940	.503834	.590576	.677137	.763492	47
.069811	.157054	.244249	.331370	.418389	.505281	.592020	.678578	.764929	48
.071265	.158508	.245702	.332821	.419839	.506728	.593464	.680019	.766366	49
0.072719	0.159961	0.247154	0.334272	0.421288	0.508175	0.594908	0.681460	0.767804	50
.074174	.161415	.248607	.335723	.422737	.509622	.596352	.682901	.769241	51
.075628	.162869	.250060	.337174	.424186	.511069	.597796	.684341	.770678	52
.077082	.164322	.251512	.338625	.425635	.512516	.599240	.685782	.772115	53
.078537	.165776	.252965	.340076	.427085	.513963	.600684	.687223	.773552	54
0.079991	0.167230	0.254417	0.341528	0.428534	0.515409	0.602128	0.688663	0.774989	55
.081445	.168683	.255870	.342979	.429983	.516856	.603572	.690104	.776426	56
.082899	.170137	.257322	.344430	.431432	.518303	.605016	.691544	.777862	57
.084354	.171590	.258775	.345881	.432881	.519749	.606459	.692985	.779299	58
.085808	.173044	.260227	.347331	.434330	.521196	.607903	.694425	.780736	59

5" SINE BAR CONSTANTS

MIN	9°	10°	11°	12°	13°	14°	15°	16°	17°
0	0.782172	0.868241	0.954045	1.039558	1.124755	1.209609	1.294095	1.378187	1.461859
1	.783609	.869673	.955473	.040981	.126172	.211021	.295500	.379585	.463249
2	.785045	.871105	.956900	.042404	.127589	.212432	.296905	.380983	.464640
3	.786482	.872538	.958328	.043826	.129006	.213843	.298309	.382381	.466031
4	.787918	.873970	.959755	.045248	.130423	.215254	.299714	.383778	.467421
5	0.789354	0.875402	0.961183	1.046671	1.131840	1.216664	1.301118	1.385176	1.468811
6	.790790	.876834	.962610	.048093	.133257	.218075	.302523	.386573	.470202
7	.792226	.878265	.964037	.049515	.134673	.219486	.303927	.387971	.471592
8	.793662	.879697	.965464	.050937	.136090	.220896	.305331	.389368	.472982
9	.795098	.881129	.966891	.052359	.137506	.222306	.306735	.390765	.474371
10	0.796534	0.882561	0.968318	1.053781	1.138922	1.223717	1.308139	1.392162	1.475761
11	.797970	.883992	.969745	.055202	.140338	.225127	.309542	.393559	.477151
12	.799406	.885424	.971172	.056624	.141754	.226537	.310946	.394956	.478540
13	.800842	.886855	.972598	.058046	.143170	.227947	.312349	.396352	.479930
14	.802277	.888286	.974025	.059467	.144586	.229357	.313753	.397749	.481319
15	0.803713	0.889718	0.975452	1.060888	1.146002	1.230766	1.315156	1.399145	1.482708
16	.805148	.891149	.976878	.062310	.147418	.232176	.316559	.400541	.484097
17	.806584	.892580	.978304	.063731	.148833	.233586	.317962	.401938	.485486
18	.808019	.894011	.979731	.065152	.150249	.234995	.319365	.403334	.486874
19	.809454	.895442	.981157	.066573	.151664	.236404	.320768	.404729	.488263
20	0.810890	0.896873	0.982583	1.067994	1.153079	1.237814	1.322171	1.406125	1.489651
21	.812325	.898304	.984009	.069415	.154495	.239223	.323573	.407521	.491040
22	.813760	.899734	.985435	.070835	.155910	.240632	.324976	.408917	.492428
23	.815195	.901165	.986861	.072256	.157325	.242041	.326378	.410312	.493816
24	.816630	.902596	.988287	.073677	.158740	.243449	.327781	.411707	.495204
25	0.818065	0.904026	0.989712	1.075097	1.160154	1.244858	1.329183	1.413102	1.496592
26	.819499	.905457	.991138	.076517	.161569	.246267	.330585	.414498	.497979
27	.820934	.906887	.992564	.077938	.162984	.247675	.331987	.415893	.499367
28	.822369	.908317	.993989	.079358	.164398	.249084	.333389	.417287	.500754
29	.823803	.909748	.995414	.080778	.165813	.250492	.334790	.418682	.502142
30	0.825238	0.911178	0.996840	1.082198	1.167227	1.251900	1.336192	1.420077	1.503529
31	.826672	.912608	.998265	.083618	.168641	.253308	.337593	.421471	.504916
32	.828107	.914038	.999690	.085038	.170055	.254716	.338995	.422866	.506303
33	.829541	.915468	1.001115	.086458	.171469	.256124	.340396	.424260	.507690
34	.830975	.916897	.002540	.087877	.172883	.257532	.341797	.425654	.509076
35	0.832410	0.918327	1.003965	1.089297	1.174297	1.258939	1.343198	1.427048	1.510463
36	.833844	.919757	.005390	.090716	.175711	.260347	.344599	.428442	.511849
37	.835278	.921186	.006814	.092136	.177124	.261754	.346000	.429836	.513236
38	.836712	.922616	.008239	.093555	.178538	.263162	.347401	.431229	.514622
39	.838146	.924045	.009663	.094974	.179951	.264569	.348801	.432623	.516008
40	0.839579	0.925475	1.011088	1.096393	1.181364	1.265976	1.350202	1.434016	1.517394
41	.841013	.926904	.012512	.097812	.182778	.267383	.351602	.435409	.518780
42	.842447	.928333	.013936	.099231	.184191	.268790	.353002	.436803	.520165
43	.843881	.929762	.015361	.100650	.185604	.270197	.354402	.438196	.521551
44	.845314	.931191	.016785	.102069	.187017	.271603	.355802	.439589	.522936
45	0.846748	0.932620	1.018209	1.103487	1.188429	1.273010	1.357202	1.440981	1.524321
46	.848181	.934049	.019633	.104906	.189842	.274416	.358602	.442374	.525707
47	.849614	.935478	.021057	.106324	.191255	.275823	.360002	.443767	.527092
48	.851047	.936907	.022480	.107742	.192667	.277229	.361401	.445159	.528477
49	.852481	.938335	.023904	.109161	.194080	.278635	.362801	.446551	.529861
50	0.853914	0.939764	1.025327	1.110579	1.195492	1.280041	1.364200	1.447943	1.531246
51	.855347	.941192	.026751	.111997	.196904	.281447	.365599	.449336	.532630
52	.856780	.942621	.028174	.113415	.198316	.282853	.366998	.450727	.534015
53	.858213	.944049	.029598	.114833	.199728	.284258	.368397	.452119	.535399
54	.859646	.945477	.031021	.116251	.201140	.285664	.369796	.453511	.536783
55	0.861078	0.946905	1.032444	1.117668	1.202552	1.287069	1.371195	1.454903	1.538167
56	.862511	.948333	.033867	.119086	.203964	.288475	.372593	.456294	.539551
57	.863944	.949761	.035290	.120503	.205375	.289880	.373992	.457685	.540935
58	.865376	.951189	.036713	.121921	.206787	.291285	.375390	.459076	.542318
59	.866809	.952617	.038136	.123338	.208198	.292690	.376789	.460468	.543702

5" SINE BAR CONSTANTS

18°	19°	20°	21°	22°	23°	24°	25°	26°	MIN
1.545085	1.627841	1.710101	1.791840	1.873033	1.953656	2.033683	2.113091	2.191856	0
.546468	.629216	.711467	.793198	.874381	.954994	.035012	.114409	.193163	1
.547851	.630591	.712834	.794555	.875730	.956333	.036340	.115727	.194470	2
.549234	.631966	.714200	.795913	.877078	.957671	.037669	.117045	.195777	3
.550617	.633340	.715566	.797270	.878426	.959010	.038997	.118363	.197083	4
1.552000	1.634715	1.716933	1.798627	1.879774	1.960348	2.040325	2.119680	2.198390	5
.553382	.636089	.718298	.799984	.881121	.961686	.041652	.120997	.199696	6
.554765	.637464	.719664	.801341	.882469	.963023	.042980	.122314	.201002	7
.556147	.638838	.721030	.802698	.883816	.964361	.044307	.123631	.202308	8
.557529	.640212	.722395	.804054	.885163	.965698	.045635	.124948	.203613	9
1.558911	1.641586	1.723761	1.805411	1.886510	1.967036	2.046962	2.126264	2.204919	10
.560293	.642960	.725126	.806767	.887857	.968373	.048288	.127580	.206224	11
.561675	.644333	.726491	.808123	.889204	.969710	.049615	.128896	.207529	12
.563056	.645707	.727856	.809479	.890550	.971046	.050942	.130212	.208834	13
.564438	.647080	.729221	.810835	.891897	.972383	.052268	.131528	.210139	14
1.565819	1.648453	1.730585	1.812190	1.893243	1.973719	2.053594	2.132844	2.211443	15
.567200	.649826	.731950	.813546	.894589	.975056	.054920	.134159	.212748	16
.568581	.651199	.733314	.814901	.895935	.976392	.056246	.135474	.214052	17
.569962	.652572	.734678	.816256	.897281	.977728	.057572	.136789	.215356	18
.571343	.653945	.736042	.817611	.898626	.979063	.058897	.138104	.216660	19
1.572724	1.655317	1.737406	1.818966	1.899972	1.980399	2.060223	2.139419	2.217963	20
.574104	.656689	.738770	.820321	.901317	.981734	.061548	.140733	.219267	21
.575485	.658062	.740133	.821675	.902662	.983069	.062873	.142048	.220570	22
.576865	.659434	.741497	.823030	.904007	.984405	.064198	.143362	.221873	23
.578245	.660806	.742860	.824384	.905352	.985739	.065522	.144676	.223176	24
1.579625	1.662177	1.744223	1.825738	1.906696	1.987074	2.066847	2.145989	2.224479	25
.581005	.663549	.745586	.827092	.908041	.988409	.068171	.147303	.225781	26
.582385	.664921	.746949	.828446	.909385	.989743	.069495	.148616	.227083	27
.583764	.666292	.748312	.829799	.910729	.991077	.070819	.149930	.228385	28
.585144	.667663	.749674	.831153	.912073	.992411	.072143	.151243	.229687	29
1.586523	1.669034	1.751037	1.832506	1.913417	1.993745	2.073466	2.152555	2.230989	30
.587902	.670405	.752399	.833859	.914761	.995079	.074790	.153868	.232291	31
.589282	.671776	.753761	.835212	.916104	.996413	.076113	.155181	.233592	32
.590661	.673147	.755123	.836565	.917448	.997746	.077436	.156493	.234893	33
.592039	.674517	.756485	.837918	.918791	.999079	.078759	.157805	.236194	34
1.593418	1.675888	1.757847	1.839270	1.920134	2.000412	2.080081	2.159117	2.237495	35
.594797	.677258	.759208	.840623	.921477	.001745	.081404	.160429	.238795	36
.596175	.678628	.760570	.841975	.922819	.003078	.082726	.161740	.240096	37
.597553	.679998	.761931	.843327	.924162	.004410	.084048	.163052	.241396	38
.598931	.681368	.763292	.844679	.925504	.005743	.085370	.164363	.242696	39
1.600309	1.682737	1.764653	1.846031	1.926846	2.007075	2.086692	2.165674	2.243996	40
.601687	.684107	.766014	.847382	.928188	.008407	.088014	.166985	.245296	41
.603065	.685476	.767374	.848734	.929530	.009739	.089335	.168295	.246595	42
.604443	.686846	.768735	.850085	.930872	.011071	.090657	.169606	.247894	43
.605820	.688215	.770095	.851436	.932213	.012402	.091978	.170916	.249193	44
1.607197	1.689584	1.771455	1.852787	1.933555	2.013733	2.093299	2.172226	2.250492	45
.608575	.690952	.772815	.854138	.934896	.015065	.094619	.173536	.251791	46
.609952	.692321	.774175	.855489	.936237	.016396	.095940	.174846	.253089	47
.611328	.693690	.775535	.856839	.937578	.017726	.097260	.176155	.254388	48
.612705	.695058	.776894	.858190	.938919	.019057	.098581	.177465	.255686	49
1.614082	1.696426	1.778254	1.859540	1.940259	2.020388	2.099901	2.178774	2.256984	50
.615458	.697794	.779613	.860890	.941600	.021718	.101221	.180083	.258281	51
.616835	.699162	.780972	.862240	.942940	.023048	.102540	.181392	.259579	52
.618211	.700530	.782331	.863589	.944280	.024378	.103860	.182700	.260876	53
.619587	.701898	.783690	.864939	.945620	.025708	.105179	.184009	.262174	54
1.620963	1.703265	1.785049	1.866288	1.946959	2.027038	2.106498	2.185317	2.263471	55
.622339	.704633	.786407	.867638	.948299	.028367	.107817	.186625	.264767	56
.623715	.706000	.787766	.868987	.949638	.029696	.109136	.187933	.266064	57
.625090	.707367	.789124	.870336	.950978	.031025	.110455	.189241	.267360	58
.626466	.708734	.790482	.871684	.952317	.032354	.111773	.190548	.268656	59

5° SINE BAR CONSTANTS

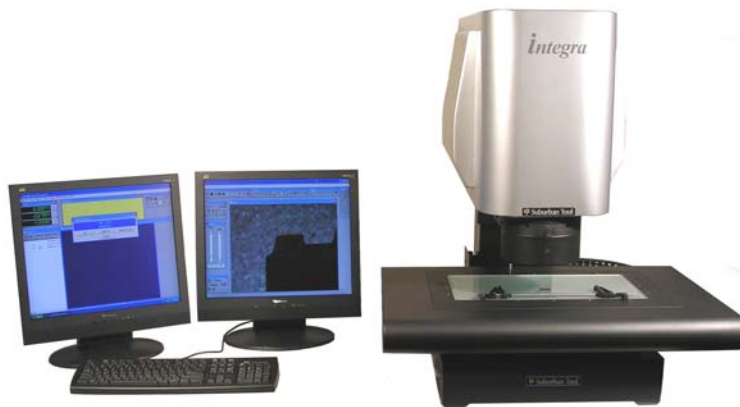
MIN	27°	28°	29°	30°	31°	32°	33°	34°	35°
0	2.269952	2.347358	2.424048	2.500000	2.575190	2.649596	2.723195	2.795965	2.867882
1	.271248	.348642	.425320	.501259	.576437	.650830	.724415	.797170	.869073
2	.272544	.349926	.426592	.502519	.577683	.652063	.725634	.798376	.870265
3	.273839	.351210	.427863	.503778	.578929	.653296	.726854	.799581	.871455
4	.275135	.352493	.429135	.505037	.580175	.654528	.728073	.800786	.872646
5	2.276430	2.353776	2.430406	2.506295	2.581421	2.655761	2.729291	2.801990	2.873836
6	.277725	.355059	.431677	.507554	.582667	.656993	.730510	.803195	.875026
7	.279019	.356342	.432948	.508812	.583912	.658225	.731728	.804399	.876216
8	.280314	.357625	.434218	.510070	.585157	.659457	.732946	.805603	.877406
9	.281608	.358908	.435489	.511328	.586402	.660688	.734164	.806807	.878595
10	2.282902	2.360190	2.436759	2.512585	2.587646	2.661919	2.735382	2.808011	2.879784
11	.284196	.361472	.438029	.513843	.588891	.663151	.736599	.809214	.880973
12	.285490	.362754	.439298	.515100	.590135	.664381	.737816	.810417	.882162
13	.286783	.364036	.440568	.516357	.591379	.665612	.739033	.811620	.883350
14	.288076	.365317	.441837	.517613	.592623	.666842	.740250	.812822	.884538
15	2.289370	2.366598	2.443106	2.518870	2.593866	2.668073	2.741466	2.814025	2.885726
16	.290662	.367879	.444375	.520126	.595110	.669303	.742682	.815227	.886914
17	.291955	.369160	.445644	.521382	.596353	.670532	.743898	.816429	.888101
18	.293248	.370441	.446912	.522638	.597596	.671762	.745114	.817630	.889288
19	.294540	.371722	.448181	.523894	.598838	.672991	.746330	.818832	.890475
20	2.295832	2.373002	2.449449	2.525149	2.600081	2.674220	2.747545	2.820033	2.891662
21	.297124	.374282	.450716	.526404	.601323	.675449	.748760	.821234	.892848
22	.298416	.375562	.451984	.527659	.602565	.676677	.749975	.822434	.894034
23	.299708	.376842	.453252	.528914	.603807	.677906	.751189	.823635	.895220
24	.300999	.378121	.454519	.530169	.605048	.679134	.752404	.824835	.896406
25	2.302290	2.379400	2.455786	2.531423	2.606289	2.680362	2.753618	2.826035	2.897591
26	.303581	.380679	.457053	.532677	.607531	.681590	.754832	.827235	.898776
27	.304872	.381958	.458319	.533931	.608771	.682817	.756045	.828434	.899961
28	.306162	.383237	.459586	.535185	.610012	.684044	.757259	.829633	.901146
29	.307453	.384516	.460852	.536439	.611253	.685271	.758472	.830832	.902331
30	2.308743	2.385794	2.462118	2.537692	2.612493	2.686498	2.759685	2.832031	2.903515
31	.310033	.387072	.463384	.538945	.613733	.687725	.760898	.833230	.904699
32	.311323	.388350	.464649	.540198	.614973	.688951	.762110	.834428	.905882
33	.312612	.389627	.465915	.541450	.616212	.690177	.763322	.835626	.907066
34	.313902	.390905	.467180	.542703	.617452	.691403	.764534	.836824	.908249
35	2.315191	2.392182	2.468445	2.543955	2.618691	2.692629	2.765746	2.838021	2.909432
36	.316480	.393459	.469709	.545207	.619930	.693854	.766958	.839219	.910615
37	.317769	.394736	.470974	.546459	.621168	.695079	.768169	.840416	.911797
38	.319058	.396013	.472238	.547710	.622407	.696304	.769380	.841613	.912980
39	.320346	.397289	.473502	.548962	.623645	.697529	.770591	.842809	.914162
40	2.321634	2.398566	2.474766	2.550213	2.624883	2.698753	2.771802	2.844006	2.915343
41	.322922	.399842	.476030	.551464	.626121	.699978	.773012	.845202	.916525
42	.324210	.401117	.477293	.552715	.627358	.701202	.774222	.846398	.917706
43	.325498	.402393	.478557	.553965	.628596	.702425	.775432	.847593	.918887
44	.326785	.403669	.479820	.555215	.629833	.703649	.776642	.848789	.920068
45	2.328073	2.404944	2.481083	2.556465	2.631070	2.704872	2.777851	2.849984	2.921248
46	.329360	.406219	.482345	.557715	.632306	.706095	.779060	.851179	.922429
47	.330647	.407494	.483608	.558965	.633543	.707318	.780269	.852373	.923609
48	.331933	.408768	.484870	.560214	.634779	.708541	.781478	.853568	.924788
49	.333220	.410043	.486132	.561464	.636015	.709763	.782687	.854762	.925968
50	2.334506	2.411317	2.487394	2.562713	2.637251	2.710986	2.783895	2.855956	2.927147
51	.335792	.412591	.488655	.563961	.638486	.712208	.785103	.857150	.928326
52	.337078	.413865	.489917	.565210	.639722	.713429	.786311	.858343	.929505
53	.338364	.415139	.491178	.566458	.640957	.714651	.787518	.859536	.930683
54	.339649	.416412	.492439	.567706	.642192	.715872	.788726	.860729	.931862
55	2.340934	2.417685	2.493699	2.568954	2.643426	2.717093	2.789933	2.861922	2.933040
56	.342219	.418958	.494960	.570202	.644661	.718314	.791139	.863115	.934218
57	.343504	.420231	.496220	.571449	.645895	.719535	.792346	.864307	.935395
58	.344789	.421504	.497480	.572697	.647129	.720755	.793552	.865499	.936572
59	.346074	.422776	.498740	.573944	.648363	.721975	.794759	.866691	.937749

OTHER PRODUCTS FROM SUBURBAN TOOL

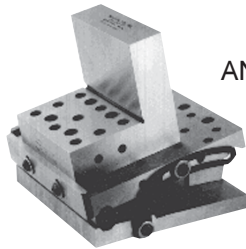
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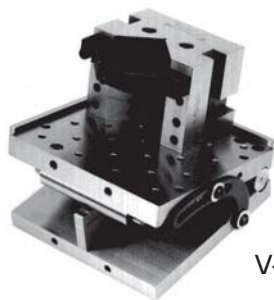
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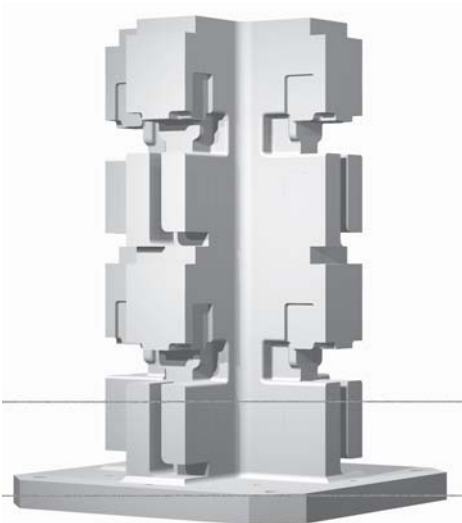
T-TYPE/
WINDOW



SQUARE /
RECTANGULAR



HEXAGONAL /
OCTAGONAL



CUSTOM

5" SINE BAR CONSTANTS

36°	37°	38°	39°	40°	41°	42°	43°	44°	MIN
2.938926	3.009075	3.078307	3.146602	3.213938	3.280295	3.345653	3.409992	3.473292	0
.940103	.010237	.079453	.147732	.215052	.281393	.346734	.411055	.474338	1
.941279	.011398	.080599	.148862	.216166	.282490	.347814	.412119	.475384	2
.942455	.012559	.081745	.149992	.217279	.283587	.348894	.413182	.476429	3
.943631	.013719	.082890	.151121	.218393	.284684	.349974	.414244	.477474	4
2.944806	3.014880	3.084035	3.152250	3.219505	3.285780	3.351054	3.415307	3.478519	5
.945982	.016040	.085179	.153379	.220618	.286876	.352133	.416369	.479564	6
.947157	.017200	.086324	.154508	.221731	.287972	.353212	.417431	.480608	7
.948332	.018360	.087468	.155636	.222843	.289068	.354291	.418492	.481652	8
.949506	.019519	.088612	.156764	.223955	.290163	.355369	.419553	.482696	9
2.950680	3.020678	3.089755	3.157892	3.225066	3.291258	3.356447	3.420614	3.483740	10
.951855	.021837	.090899	.159019	.226177	.292353	.357525	.421675	.484783	11
.953028	.022996	.092042	.160147	.227288	.293447	.358603	.422736	.485826	12
.954202	.024154	.093185	.161273	.228399	.294542	.359680	.423796	.486868	13
.955375	.025312	.094327	.162400	.229510	.295635	.360757	.424855	.487910	14
2.956548	3.026470	3.095470	3.163527	3.230620	3.296729	3.361834	3.425915	3.488952	15
.957721	.027628	.096612	.164653	.231730	.297822	.362910	.426974	.489994	16
.958894	.028785	.097754	.165779	.232840	.298916	.363987	.428033	.491035	17
.960066	.029942	.098895	.166904	.233949	.300008	.365063	.429092	.492076	18
.961238	.031099	.100036	.168030	.235058	.301101	.366138	.430150	.493117	19
2.962410	3.032255	3.101177	3.169155	3.236167	3.302193	3.367213	3.431208	3.494158	20
.963581	.033412	.102318	.170280	.237275	.303285	.368289	.432266	.495198	21
.964753	.034568	.103459	.171404	.238384	.304377	.369363	.433323	.496238	22
.965924	.035724	.104599	.172529	.239492	.305468	.370438	.434381	.497277	23
.967094	.036879	.105739	.173653	.240600	.306559	.371512	.435438	.498317	24
2.968265	3.038034	3.106879	3.174776	3.241707	3.307650	3.372586	3.436494	3.499356	25
.969435	.039190	.108018	.175900	.242814	.308741	.373659	.437550	.500394	26
.970605	.040344	.109157	.177023	.243921	.309831	.374733	.438607	.501433	27
.971775	.041499	.110296	.178146	.245028	.310921	.375806	.439662	.502471	28
.972945	.042653	.111435	.179269	.246134	.312011	.376879	.440718	.503509	29
2.974114	3.043807	3.112573	3.180391	3.247240	3.313100	3.377951	3.441773	3.504546	30
.975283	.044961	.113711	.181513	.248346	.314189	.379023	.442828	.505584	31
.976452	.046114	.114849	.182635	.249452	.315278	.380095	.443882	.506620	32
.977620	.047268	.115987	.183757	.250557	.316367	.381167	.444937	.507657	33
.978789	.048421	.117124	.184878	.251662	.317455	.382238	.445991	.508693	34
2.979957	3.049573	3.118261	3.185999	3.252767	3.318543	3.383309	3.447044	3.509730	35
.981124	.050726	.119398	.187120	.253871	.319631	.384380	.448098	.510765	36
.982292	.051878	.120535	.188240	.254975	.320719	.385450	.449151	.511801	37
.983459	.053030	.121671	.189361	.256079	.321806	.386520	.450204	.512836	38
.984626	.054182	.122807	.190481	.257183	.322893	.387590	.451256	.513871	39
2.985793	3.055333	3.123943	3.191600	3.258286	3.323979	3.388660	3.452308	3.514905	40
.986959	.056484	.125078	.192720	.259389	.325066	.389729	.453360	.515940	41
.988126	.057635	.126213	.193839	.260492	.326152	.390798	.454412	.516974	42
.989292	.058786	.127348	.194958	.261595	.327238	.391867	.455463	.518007	43
.990457	.059936	.128483	.196077	.262697	.328323	.392936	.456514	.519041	44
2.991623	3.061086	3.129617	3.197195	3.263799	3.329408	3.394004	3.457655	3.520074	45
.992788	.062236	.130752	.198313	.264900	.330493	.395072	.458616	.521106	46
.993953	.063386	.131885	.199431	.266002	.331578	.396139	.459666	.522139	47
.995118	.064535	.133019	.200548	.267103	.332662	.397207	.460716	.523171	48
.996282	.065684	.134152	.201666	.268204	.333746	.398274	.461765	.524203	49
2.997447	3.066833	3.135286	3.202783	3.269304	3.334830	3.399340	3.462815	3.525235	50
.998611	.067982	.136418	.203900	.270405	.335914	.400407	.463864	.526266	51
.999774	.069130	.137551	.205016	.271505	.336997	.401473	.464913	.527297	52
3.000938	.070278	.138683	.206132	.272605	.338080	.402539	.465961	.528327	53
.002101	.071426	.139815	.207248	.273704	.339163	.403604	.467009	.529358	54
3.003264	3.072574	3.140947	3.208364	3.274803	3.340245	3.404670	3.468057	3.530388	55
.004427	.073721	.142079	.209479	.275902	.341327	.405735	.469105	.531418	56
.005589	.074868	.143210	.210594	.277001	.342409	.406799	.470152	.532447	57
.006751	.076015	.144341	.211709	.278099	.343491	.407864	.471199	.533476	58
.007913	.077161	.145472	.212824	.279197	.344572	.408928	.472245	.534505	59

100mm SINE BAR CONSTANTS

MIN	0°	1°	2°	3°	4°	5°	6°	7°	8°
0	0.00000	1.74524	3.48995	5.23360	6.97565	8.71557	10.45285	12.18693	13.91731
1	.02909	.77432	.51902	.26264	7.00467	.74455	.48178	.21581	.94612
2	.05818	.80341	.54809	.29169	.03368	.77353	.51070	.24468	.97492
3	.08727	.83249	.57716	.32074	.06270	.80251	.53963	.27355	14.00372
4	.11636	.86158	.60623	.34979	.09171	.83148	.56856	.30241	.03252
5	0.14544	1.89066	3.63530	5.37883	7.12073	8.86046	10.59748	12.33128	14.06132
6	.17453	.91974	.66437	.40788	.14974	.88943	.62641	.36015	.09012
7	.20362	.94883	.69344	.43693	.17876	.91840	.65533	.38901	.11892
8	.23271	.97791	.72251	.46597	.20777	.94738	.68425	.41788	.14772
9	.26180	2.00699	.75158	.49502	.23678	.97635	.71318	.44674	.17651
10	0.29089	2.03608	3.78065	5.52406	7.26580	9.00532	10.74210	12.47560	14.20531
11	.31998	.06516	.80971	.55311	.29481	.03429	.77102	.50446	.23410
12	.34907	.09424	.83878	.58215	.32382	.06326	.79994	.53332	.26289
13	.37815	.12332	.86785	.61119	.35283	.09223	.82885	.56218	.29168
14	.40724	.15241	.89692	.64024	.38184	.12119	.85777	.59104	.32047
15	0.43633	2.18149	3.92598	5.66928	7.41085	9.15016	10.88669	12.61990	14.34926
16	.46542	.21057	.95505	.69832	.43986	.17913	.91560	.64875	.37805
17	.49451	.23965	.98411	.72736	.46887	.20809	.94452	.67761	.40684
18	.52360	.26873	4.01318	.75640	.49787	.23706	.97343	.70646	.43562
19	.55268	.29781	.04224	.78544	.52688	.26602	11.00234	.73531	.46440
20	0.58177	2.32690	4.07131	5.81448	7.55589	9.29499	11.03126	12.76416	14.49319
21	.61086	.35598	.10037	.84352	.58489	.32395	.06017	.79302	.52197
22	.63995	.38506	.12944	.87256	.61390	.35291	.08908	.82186	.55075
23	.66904	.41414	.15850	.90160	.64290	.38187	.11799	.85071	.57953
24	.69813	.44322	.18757	.93064	.67190	.41083	.14689	.87956	.60830
25	0.72721	2.47230	4.21663	5.95967	7.70091	9.43979	11.17580	12.90841	14.63708
26	.75630	.50138	.24569	.98871	.72991	.46875	.20471	.93725	.66585
27	.78539	.53046	.27475	6.01775	.75891	.49771	.23361	.96609	.69463
28	.81448	.55954	.30382	.04678	.78791	.52666	.26252	.99494	.72340
29	.84357	.58862	.33288	.07582	.81691	.55562	.29142	13.02378	.75217
30	0.87265	2.61769	4.36194	6.10485	7.84591	9.58458	11.32032	13.05262	14.78094
31	.90174	.64677	.39100	.13389	.87491	.61353	.34922	.08146	.80971
32	.93083	.67585	.42006	.16292	.90391	.64248	.37812	.11030	.83848
33	.95992	.70493	.44912	.19196	.93290	.67144	.40702	.13913	.86724
34	.98900	.73401	.47818	.22099	.96190	.70039	.43592	.16797	.89601
35	1.01809	2.76309	4.50724	6.25002	7.99090	9.72934	11.46482	13.19681	14.92477
36	.04718	.79216	.53630	.27905	8.01989	.75829	.49372	.22564	.95353
37	.07627	.82124	.56536	.30808	.04889	.78724	.52261	.25447	.98230
38	.10535	.85032	.59442	.33711	.07788	.81619	.55151	.28330	15.01106
39	.13444	.87940	.62347	.36614	.10687	.84514	.58040	.31213	.03981
40	1.16353	2.90847	4.65253	6.39517	8.13587	9.87408	11.60929	13.34096	15.06857
41	.19261	.93755	.68159	.42420	.16486	.90303	.63818	.36979	.09733
42	.22170	.96662	.71065	.45323	.19385	.93197	.66707	.39862	.12608
43	.25079	.99570	.73970	.48226	.22284	.96092	.69596	.42744	.15484
44	.27987	3.02478	.76876	.51129	.25183	.98986	.72485	.45627	.18359
45	1.30896	3.05385	4.79781	6.54031	8.28082	10.01881	11.75374	13.48509	15.21234
46	.33805	.08293	.82687	.56934	.30981	.04775	.78263	.51392	.24109
47	.36713	.11200	.85592	.59836	.33880	.07669	.81151	.54274	.26984
48	.39622	.14108	.88498	.62739	.36778	.10563	.84040	.57156	.29858
49	.42530	.17015	.91403	.65641	.39677	.13457	.86928	.60038	.32733
50	1.45439	3.19922	4.94308	6.68544	8.42576	10.16351	11.89816	13.62919	15.35607
51	.48348	.22830	.97214	.71446	.45474	.19245	.92704	.65801	.38482
52	.51256	.25737	5.00119	.74348	.48373	.22138	.95593	.68683	.41356
53	.54165	.28644	.03024	.77251	.51271	.25032	.98481	.71564	.44230
54	.57073	.31552	.05929	.80153	.54169	.27925	12.01368	.74445	.47104
55	1.59982	3.34459	5.08835	6.83055	8.57067	10.30819	12.04256	13.77327	15.49978
56	.62890	.37366	.11740	.85957	.59966	.33712	.07144	.80208	.52851
57	.65799	.40274	.14645	.88859	.62864	.36605	.10031	.83089	.55725
58	.68707	.43181	.17550	.91761	.65762	.39499	.12919	.85970	.58598
59	.71616	.46088	.20455	.94663	.68660	.42392	.15806	.88850	.61472

100mm SINE BAR CONSTANTS

9°	10°	11°	12°	13°	14°	15°	16°	17°	MIN
15.64345	17.36482	19.08090	20.79117	22.49511	24.19219	25.88190	27.56374	29.23717	0
.67218	.39346	.10945	.81962	.52345	.22041	.91000	.59170	.26499	1
.70091	.42211	.13801	.84807	.55179	.24863	.93810	.61965	.29280	2
.72963	.45075	.16656	.87652	.58013	.27685	.96619	.64761	.32061	3
.75836	.47939	.19510	.90497	.60846	.30507	.99428	.67556	.34842	4
15.78708	17.50803	19.22365	20.93341	22.63680	24.33329	26.02237	27.70352	29.37623	5
.81581	.53667	.25220	.96186	.66513	.36150	.05045	.73147	.40403	6
.84453	.56531	.28074	.99030	.69346	.38971	.07853	.75941	.43183	7
.87325	.59395	.30928	21.01874	.72179	.41792	.10662	.78736	.45963	8
.90197	.62258	.33782	.04718	.75012	.44613	.13469	.81530	.48743	9
15.93069	17.65121	19.36636	21.07561	22.77844	24.47433	26.16277	27.84324	29.51522	10
.95940	.67984	.39490	.10405	.80677	.50254	.19085	.87118	.54302	11
.98812	.70847	.42344	.13248	.83509	.53074	.21892	.89911	.57080	12
16.01683	.73710	.45197	.16091	.86341	.55894	.24699	.92704	.59859	13
.04555	.76573	.48050	.18934	.89172	.58713	.27506	.95497	.62638	14
16.07426	17.79435	19.50903	21.21777	22.92004	24.61533	26.30312	27.98290	29.65416	15
.10297	.82298	.53756	.24619	.94835	.64352	.33118	28.01083	.68194	16
.13167	.85160	.56609	.27462	.97666	.67171	.35925	.03875	.70971	17
.16038	.88022	.59461	.30304	23.00497	.69990	.38730	.06667	.73749	18
.18909	.90884	.62314	.33146	.03328	.72809	.41536	.09459	.76526	19
16.21779	17.93746	19.65166	21.35988	23.06159	24.75627	26.44342	28.12251	29.79303	20
.24650	.96607	.68018	.38829	.08989	.78445	.47147	.15042	.82079	21
.27520	.99469	.70870	.41671	.11819	.81263	.49952	.17833	.84856	22
.30390	18.02330	.73722	.44512	.14649	.84081	.52757	.20624	.87632	23
.33260	.05191	.76573	.47353	.17479	.86899	.55561	.23415	.90408	24
16.36129	18.08052	19.79425	21.50194	23.20309	24.89716	26.58365	28.26205	29.93184	25
.38999	.10913	.82276	.53035	.23138	.92533	.61170	.28995	.95959	26
.41868	.13774	.85127	.55876	.25967	.95350	.63973	.31785	.98734	27
.44738	.16635	.87978	.58716	.28796	.98167	.66777	.34575	30.01509	28
.47607	.19495	.90829	.61556	.31625	25.00984	.69581	.37364	.04284	29
16.50476	18.22355	19.93679	21.64396	23.34454	25.03800	26.72384	28.40153	30.07058	30
.53345	.25215	.96530	.67236	.37282	.06616	.75187	.42942	.09832	31
.56214	.28075	.99380	.70076	.40110	.09432	.77989	.45731	.12606	32
.59082	.30935	20.02230	.72915	.42938	.12248	.80792	.48520	.15380	33
.61951	.33795	.05080	.75754	.45766	.15063	.83594	.51308	.18153	34
16.64819	18.36654	20.07930	21.78593	23.48594	25.17879	26.86396	28.54096	30.20926	35
.67687	.39514	.10779	.81432	.51421	.20694	.89198	.56884	.23699	36
.70556	.42373	.13629	.84271	.54248	.23508	.92000	.59671	.26471	37
.73423	.45232	.16478	.87110	.57075	.26323	.94801	.62458	.29244	38
.76291	.48091	.19327	.89948	.59902	.29137	.97602	.65246	.32016	39
16.79159	18.50949	20.22176	21.92786	23.62729	25.31952	27.00403	28.68032	30.34788	40
.82026	.53808	.25024	.95624	.65555	.34766	.03204	.70819	.37559	41
.84894	.56666	.27873	.98462	.68381	.37579	.06004	.73605	.40331	42
.87761	.59524	.30721	22.01300	.71207	.40393	.08805	.76391	.43102	43
.90628	.62382	.33569	.04137	.74033	.43206	.11605	.79177	.45872	44
16.93495	18.65240	20.36418	22.06974	23.76859	25.46019	27.14404	28.81963	30.48643	45
.96362	.68098	.39265	.09811	.79684	.48832	.17204	.84748	.51413	46
.99228	.70956	.42113	.12648	.82510	.51645	.20003	.87533	.54183	47
17.02095	.73813	.44961	.15485	.85335	.54458	.22802	.90318	.56953	48
.04961	.76670	.47808	.18321	.88159	.57270	.25601	.93103	.59723	49
17.07828	18.79528	20.50655	22.21158	23.90984	25.60082	27.28400	28.95887	30.62492	50
.10694	.82385	.53502	.23994	.93808	.62894	.31198	.98671	.65261	51
.13560	.85241	.56349	.26830	.96633	.65705	.33997	29.01455	.68030	52
.16425	.88098	.59195	.29666	.99457	.68517	.36794	.04239	.70798	53
.19291	.90954	.62042	.32501	24.02280	.71328	.39592	.07022	.73566	54
17.22156	18.93811	20.64888	22.35337	24.05104	25.74139	27.42390	29.09805	30.76334	55
.25022	.96667	.67734	.38172	.07927	.76950	.45187	.12588	.79102	56
.27887	.99523	.70580	.41007	.10751	.79760	.47984	.15371	.81869	57
.30752	19.02379	.73426	.43842	.13574	.82570	.50781	.18153	.84636	58
.33617	.05234	.76272	.46676	.16396	.85381	.53577	.20935	.87403	59

100mm SINE BAR CONSTANTS

MIN	18°	19°	20°	21°	22°	23°	24°	25°	26°
0	30.90170	32.55682	34.20201	35.83679	37.46066	39.07311	40.67366	42.26183	43.83711
1	.92936	.58432	.22935	.86395	.48763	.09989	.70024	.28819	.86326
2	.95702	.61182	.25668	.89110	.51459	.12666	.72681	.31455	.88940
3	.98468	.63932	.28400	.91825	.54156	.15343	.75337	.34090	.91553
4	31.01234	.66681	.31133	.94540	.56852	.18019	.77993	.36725	.94166
5	31.03999	32.69430	34.33865	35.97254	37.59547	39.20695	40.80649	42.39360	43.96779
6	.06764	.72179	.36597	.99968	.62243	.23371	.83305	.41994	.99392
7	.09529	.74928	.39329	36.02682	.64938	.26047	.85960	.44628	44.02004
8	.12294	.77676	.42060	.05395	.67632	.28722	.88615	.47262	.04615
9	.15058	.80424	.44791	.08108	.70327	.31397	.91269	.49895	.07227
10	31.17822	32.83172	34.47521	36.10821	37.73021	39.34071	40.93923	42.52528	44.09838
11	.20586	.85919	.50252	.13534	.75714	.36745	.96577	.55161	.12448
12	.23349	.88666	.52982	.16246	.78408	.39419	.99230	.57793	.15059
13	.26112	.91413	.55712	.18958	.81101	.42093	41.01883	.60425	.17668
14	.28875	.94160	.58441	.21669	.83794	.44766	.04536	.63056	.20278
15	31.31638	32.96906	34.61171	36.24380	37.86486	39.47439	41.07189	42.65687	44.22887
16	.34400	.99653	.63900	.27091	.89178	.50111	.09841	.68318	.25496
17	.37163	33.02398	.66628	.29802	.91870	.52783	.12492	.70949	.28104
18	.39925	.05144	.69357	.32512	.94562	.55455	.15144	.73579	.30712
19	42.686	.07889	.72085	.35222	.97253	.58127	.17795	.76208	.33319
20	31.45448	33.10634	34.74812	36.37932	37.99944	39.60798	41.20445	42.78838	44.35927
21	.48209	.13379	.77540	.40641	38.02634	.63468	.23096	.81467	.38534
22	.50969	.16123	.80267	.43351	.05324	.66139	.25745	.84095	.41140
23	.53730	.18867	.82994	.46059	.08014	.68809	.28395	.86723	.43746
24	.56490	.21611	.85720	.48768	.10704	.71479	.31044	.89351	.46352
25	31.59250	33.24355	34.88447	36.51476	38.13393	39.74148	41.33693	42.91979	44.48957
26	.62010	.27098	.91173	.54184	.16082	.76818	.36342	.94606	.51562
27	.64770	.29841	.93898	.56891	.18770	.79486	.38990	.97233	.54167
28	.67529	.32584	.96624	.59599	.21459	.82155	.41638	.99859	.56771
29	.70288	.35326	.99349	.62306	.24147	.84823	.44285	43.02485	.59375
30	31.73047	33.38069	35.02074	36.65012	38.26834	39.87491	41.46932	43.05111	44.61978
31	.75805	.40810	.04798	.67719	.29522	.90158	.49579	.07736	.64581
32	.78563	.43552	.07523	.70425	.32209	.92825	.52226	.10361	.67184
33	.81321	.46293	.10246	.73130	.34895	.95492	.54872	.12986	.69786
34	.84079	.49034	.12970	.75836	.37582	.98158	.57517	.15610	.72388
35	31.86836	33.51775	35.15693	36.78541	38.40268	40.00825	41.60163	43.18234	44.74990
36	.89593	.54516	.18416	.81246	.42953	.03490	.62808	.20857	.77591
37	.92350	.57256	.21139	.83950	.45639	.06156	.65453	.23481	.80192
38	.95106	.59996	.23862	.86654	.48324	.08821	.68097	.26103	.82792
39	.97863	.62735	.26584	.89358	.51008	.11486	.70741	.28726	.85392
40	32.00619	33.65475	35.29306	36.92061	38.53693	40.14150	41.73385	43.31348	44.87992
41	.03374	.68214	.32027	.94765	.56377	.16814	.76028	.33970	.90591
42	.06130	.70953	.34748	.97468	.59060	.19478	.78671	.36591	.93190
43	.08885	.73691	.37469	37.00170	.61744	.22141	.81313	.39212	.95789
44	.11640	.76429	.40190	.02872	.64427	.24804	.83956	.41832	.98387
45	32.14395	33.79167	35.42910	37.05574	38.67110	40.27467	41.86597	43.44453	45.00984
46	.17149	.81905	.45630	.08276	.69792	.30129	.89239	.47072	.03582
47	.19903	.84642	.48350	.10977	.72474	.32791	.91880	.49692	.06179
48	.22657	.87379	.51070	.13678	.75156	.35453	.94521	.52311	.08775
49	.25411	.90116	.53789	.16379	.77837	.38114	.97161	.54930	.11372
50	32.28164	33.92852	35.56508	37.19079	38.80518	40.40775	41.99801	43.57548	45.13967
51	.30917	.95589	.59226	.21780	.83199	.43436	.42.02441	.60166	.16563
52	.33670	.98325	.61944	.24479	.85880	.46096	.05080	.62784	.19158
53	.36422	34.01060	.64662	.27179	.88560	.48756	.07719	.65401	.21753
54	.39174	.03795	.67380	.29878	.91239	.51416	.10358	.68018	.24347
55	32.41926	34.06531	35.70097	37.32577	38.93919	40.54075	42.12996	43.70634	45.26941
56	.44678	.09265	.72814	.35275	.96598	.56734	.15634	.73251	.29535
57	.47429	.12000	.75531	.37973	.99277	.59393	.18272	.75866	.32128
58	.50180	.14734	.78248	.40671	39.01955	.62051	.20909	.78482	.34721
59	.52931	.17468	.80964	.43369	.04633	.64709	.23546	.81097	.37313

100mm SINE BAR CONSTANTS

27°	28°	29°	30°	31°	32°	33°	34°	35°	MIN
45.39905	46.94716	48.48096	50.00000	51.50381	52.99193	54.46390	55.91929	57.35764	0
.42497	.97284	.50640	.02519	.52874	53.01659	.48830	.94340	.38147	1
.45088	.99852	.53184	.05037	.55367	.04125	.51269	.96751	.40529	2
.47679	47.02419	.55727	.07556	.57859	.06591	.53707	.99162	.42911	3
.50269	.04986	.58270	.10073	.60351	.09057	.56145	56.01572	.45292	4
45.52859	47.07553	48.60812	50.12591	51.62842	53.11521	54.58583	56.03981	57.47672	5
.55449	.10119	.63354	.15107	.65333	.13986	.61020	.06390	.50053	6
.58038	.12685	.65895	.17624	.67824	.16450	.63456	.08798	.52432	7
.60627	.15250	.68436	.20140	.70314	.18913	.65892	.11206	.54811	8
.63216	.17815	.70977	.22655	.72804	.21376	.68328	.13614	.57190	9
45.65804	47.20380	48.73517	50.25170	51.75293	53.23839	54.70763	56.16021	57.59568	10
.68392	.22944	.76057	.27685	.77782	.26301	.73198	.18428	.61946	11
.70979	.25508	.78597	.30199	.80270	.28763	.75632	.20834	.64323	12
.73566	.28071	.81136	.32713	.82758	.31224	.78066	.23239	.66700	13
.76153	.30634	.83674	.35227	.85246	.33685	.80499	.25645	.69076	14
45.78739	47.33197	48.86212	50.37740	51.87733	53.36145	54.82932	56.28049	57.71452	15
.81325	.35759	.88750	.40252	.90219	.38605	.85365	.30453	.73827	16
.83910	.38321	.91288	.42765	.92705	.41064	.87797	.32857	.76202	17
.86496	.40882	.93825	.45276	.95191	.43523	.90228	.35260	.78576	18
.89080	.43443	.96361	.47788	.97676	.45982	.92659	.37663	.80950	19
45.91665	47.46004	48.98897	50.50298	52.00161	53.48440	54.95090	56.40066	57.83323	20
.94248	.48564	49.01433	.52809	.02646	.50898	.97520	.42467	.85696	21
.96832	.51124	.03968	.55319	.05130	.53355	.99950	.44869	.88069	22
.99415	.53683	.06503	.57828	.07613	.55812	55.02379	.47270	.90440	23
46.01998	.56242	.09038	.60338	.10096	.58268	.04807	.49670	.92812	24
46.04580	47.58801	49.11572	50.62846	52.12579	53.60724	55.07236	56.52070	57.95183	25
.07162	.61359	.14105	.65355	.15061	.63179	.09663	.54469	.97553	26
.09744	.63917	.16638	.67863	.17543	.65634	.12091	.56868	.99923	27
.12325	.66474	.19171	.70370	.20024	.68089	.14518	.59267	58.02292	28
.14906	.69031	.21704	.72877	.22505	.70543	.16944	.61665	.04661	29
46.17486	47.71588	49.24236	50.75384	52.24986	53.72996	55.19370	56.64062	58.07030	30
.20066	.74144	.26767	.77890	.27466	.75449	.21795	.66459	.09397	31
.22646	.76700	.29298	.80396	.29945	.77902	.24220	.68856	.11765	32
.25225	.79255	.31829	.82901	.32424	.80354	.26645	.71252	.14132	33
.27804	.81810	.34359	.85406	.34903	.82806	.29069	.73648	.16498	34
46.30382	47.84364	49.36889	50.87910	52.37381	53.85257	55.31492	56.76043	58.18864	35
.32960	.86919	.39419	.90414	.39859	.87708	.33915	.78437	.21230	36
.35538	.89472	.41948	.92918	.42336	.90158	.36338	.80832	.23595	37
.38115	.92026	.44476	.95421	.44813	.92608	.38760	.83225	.25959	38
.40692	.94579	.47005	.97924	.47290	.95058	.41182	.85619	.28323	39
46.43269	47.97131	49.49532	51.00426	52.49766	53.97507	55.43603	56.88011	58.30687	40
.45845	.99683	.52060	.02928	.52241	.99955	.46024	.90403	.33050	41
.48420	48.02235	.54587	.05429	.54717	54.02403	.48444	.92795	.35412	42
.50996	.04786	.57113	.07930	.57191	.04851	.50864	.95187	.37774	43
.53571	.07337	.59639	.10431	.59665	.07298	.53283	.97577	.40136	44
46.56145	48.09888	49.62165	51.12931	52.62139	54.09745	55.55702	56.99968	58.42497	45
.58719	.12438	.64690	.15431	.64613	.12191	.58121	57.02357	.44857	46
.61293	.14987	.67215	.17930	.67085	.14637	.60539	.04747	.47217	47
.63866	.17537	.69740	.20429	.69558	.17082	.62956	.07136	.49577	48
.66439	.20086	.72264	.22927	.72030	.19527	.65373	.09524	.51936	49
46.69012	48.22634	49.74787	51.25425	52.74502	54.21971	55.67790	57.11912	58.54294	50
.71584	.25182	.77310	.27923	.76973	.24415	.70206	.14299	.56652	51
.74156	.27730	.79833	.30420	.79443	.26859	.72621	.16686	.59010	52
.76727	.30277	.82355	.32916	.81914	.29302	.75036	.19073	.61367	53
.79298	.32824	.84877	.35413	.84383	.31744	.77451	.21459	.63724	54
46.81869	48.35370	49.87399	51.37908	52.86853	54.34187	55.79865	57.23844	58.66080	55
.84439	.37916	.89920	.40404	.89322	.36628	.82279	.26229	.68435	56
.87009	.40462	.92441	.42899	.91790	.39069	.84692	.28614	.70790	57
.89578	.43007	.94961	.45393	.94258	.41510	.87105	.30998	.73145	58
.92147	.45552	.97481	.47887	.96726	.43951	.89517	.33381	.75499	59

100mm SINE BAR CONSTANTS

MIN	36°	37°	38°	39°	40°	41°	42°	43°	44°
0	58.77853	60.18150	61.56615	62.93204	64.27876	65.60590	66.91306	68.19984	69.46584
1	.80206	.20473	.58907	.95464	.30104	.62785	.93467	.22111	.48676
2	.82558	.22795	.61198	.97724	.32332	.64980	.95628	.24237	.50767
3	.84910	.25117	.63489	.99983	.34559	.67174	.97789	.26363	.52858
4	.87262	.27439	.65779	63.02242	.36785	.69367	.99948	.28489	.54949
5	58.89613	60.29760	61.68069	63.04500	64.39011	65.71560	67.02108	68.30613	69.57039
6	.91964	.32080	.70359	.06758	.41236	.73752	.04266	.32738	.59128
7	.94314	.34400	.72648	.09015	.43461	.75944	.06424	.34861	.61217
8	.96663	.36719	.74936	.11272	.45685	.78135	.08582	.36984	.63305
9	.99012	.39038	.77224	.13528	.47909	.80326	.10739	.39107	.65392
10	59.01361	60.41356	61.79511	63.15784	64.50132	65.82516	67.12895	68.41229	69.67479
11	.03709	.43674	.81798	.18039	.52355	.84706	.15051	.43350	.69565
12	.06057	.45991	.84084	.20293	.54577	.86895	.17206	.45471	.71651
13	.08404	.48308	.86370	.22547	.56798	.89083	.19361	.47591	.73736
14	.10750	.50624	.88655	.24800	.59019	.91271	.21515	.49711	.75821
15	59.13096	60.52940	61.90939	63.27053	64.61240	65.93458	67.23668	68.51830	69.77905
16	.15442	.55255	.93224	.29306	.63460	.95645	.25821	.53948	.79988
17	.17787	.57570	.95507	.31557	.65679	.97831	.27973	.56066	.82071
18	.20132	.59884	.97790	.33809	.67898	66.00017	.30125	.58184	.84153
19	.22476	.62198	62.00073	.36059	.70116	.02202	.32276	.60300	.86234
20	59.24819	60.64511	62.02355	63.38310	64.72334	66.04386	67.34427	68.62416	69.88315
21	.27163	.66824	.04636	.40559	.74551	.06570	.36577	.64532	.90396
22	.29505	.69136	.06917	.42808	.76767	.08754	.38727	.66647	.92476
23	.31847	.71447	.09198	.45057	.78984	.10936	.40876	.68761	.94555
24	.34189	.73758	.11478	.47305	.81199	.13119	.43024	.70875	.96633
25	59.36530	60.76069	62.13757	63.49553	64.83414	66.15300	67.45172	68.72988	69.98711
26	.38871	.78379	.16036	.51800	.85628	.17481	.47319	.75101	.70.00789
27	.41211	.80689	.18314	.54046	.87842	.19662	.49466	.77213	.02866
28	.43550	.82998	.20592	.56292	.90056	.21842	.51612	.79325	.04942
29	.45889	.85306	.22870	.58537	.92268	.24022	.53757	.81435	.07018
30	59.48228	60.87614	62.25146	63.60782	64.94480	66.26200	67.55902	68.83546	70.09093
31	.50566	.89922	.27423	.63026	.96692	.28379	.58046	.85655	.11167
32	.52904	.92229	.29698	.65270	.98903	.30557	.60190	.87765	.13241
33	.55241	.94535	.31974	.67513	65.01114	.32734	.62333	.89873	.15314
34	.57577	.96841	.34248	.69756	.03324	.34910	.64476	.91981	.17387
35	59.59913	60.99147	62.36522	63.71998	65.05533	66.37087	67.66618	68.94089	70.19459
36	.62249	.61.01452	.38796	.74240	.07742	.39262	.68760	.96195	.21531
37	.64584	.03756	.41069	.76481	.09951	.41437	.70901	.98302	.23601
38	.66918	.06060	.43342	.78721	.12158	.43612	.73041	69.00407	.25672
39	.69252	.08363	.45614	.80961	.14366	.45785	.75181	.02512	.27741
40	59.71586	61.10666	62.47885	63.83201	65.16572	66.47959	67.77320	69.04617	70.29811
41	.73919	.12969	.50156	.85440	.18778	.50131	.79459	.06721	.31879
42	.76251	.15270	.52427	.87678	.20984	.52304	.81597	.08824	.33947
43	.78583	.17572	.54696	.89916	.23189	.54475	.83734	.10927	.36014
44	.80915	.19873	.56966	.92153	.25394	.56646	.85871	.13029	.38081
45	59.83246	61.22173	62.59235	63.94390	65.27598	66.58817	67.88007	69.15131	70.40147
46	.85577	.24473	.61503	.96626	.29801	.60987	.90143	.17232	.42213
47	.87906	.26772	.63771	.98862	.32004	.63156	.92278	.19332	.44278
48	.90236	.29071	.66038	64.01097	.34206	.65325	.94413	.21432	.46342
49	.92565	.31369	.68305	.03332	.36408	.67493	.96547	.23531	.48406
50	59.94893	61.33666	62.70571	64.05566	65.38609	66.69661	67.98681	69.25630	70.50469
51	.97221	.35964	.72837	.07799	.40810	.71828	68.00813	.27728	.52532
52	.99549	.38260	.75102	.10032	.43010	.73994	.02946	.29825	.54594
53	60.01876	.40556	.77366	.12264	.45209	.76160	.05078	.31922	.56655
54	.04202	.42852	.79631	.14496	.47408	.78326	.07209	.34018	.58716
55	60.06528	61.45147	62.81894	64.16728	65.49607	66.80490	68.09339	69.36114	70.60776
56	.08854	.47442	.84157	.18958	.51804	.82655	.11469	.38209	.62835
57	.11179	.49736	.86420	.21189	.54002	.84818	.13599	.40304	.64894
58	.13503	.52029	.88682	.23418	.56198	.86981	.15728	.42398	.66953
59	.15827	.54322	.90943	.25647	.58395	.89144	.17856	.44491	.69011

125mm SINE BAR CONSTANTS

0°	1°	2°	3°	4°	5°	6°	7°	8°	MIN
0.0000	2.1816	4.3624	6.5420	8.7196	10.8945	13.0661	15.2337	17.3966	0
.0364	.2179	.3988	.5783	.7558	.9307	.1022	.2698	.4326	1
.0727	.2543	.4351	.6146	.7921	.9669	.1384	.3058	.4686	2
.1091	.2906	.4715	.6509	.8284	11.0031	.1745	.3419	.5047	3
.1454	.3270	.5078	.6872	.8646	.0394	.2107	.3780	.5407	4
0.1818	2.3633	4.5441	6.7235	8.9009	11.0756	13.2469	15.4141	17.5767	5
.2182	.3997	.5805	.7599	.9372	.1118	.2830	.4502	.6127	6
.2545	.4360	.6168	.7962	.9734	.1480	.3192	.4863	.6487	7
.2909	.4724	.6531	.8325	9.0097	.1842	.3553	.5223	.6846	8
.3272	.5087	.6895	.8688	.0460	.2204	.3915	.5584	.7206	9
0.3636	2.5451	4.7258	6.9051	9.0822	11.2566	13.4276	15.5945	17.7566	10
.4000	.5814	.7621	.9414	.1185	.2929	.4638	.6306	.7926	11
.4363	.6178	.7985	.9777	.1548	.3291	.4999	.6667	.8286	12
.4727	.6542	.8348	7.0140	.1910	.3653	.5361	.7027	.8646	13
.5091	.6905	.8711	.0503	.2273	.4015	.5722	.7388	.9006	14
0.5454	2.7269	4.9075	7.0866	9.2636	11.4377	13.6084	15.7749	17.9366	15
.5818	.7632	.9438	.1229	.2998	.4739	.6445	.8109	.9726	16
.6181	.7996	.9801	.1592	.3361	.5101	.6806	.8470	18.0085	17
.6545	.8359	5.0165	.1955	.3723	.5463	.7168	.8831	.0445	18
.6909	.8723	.0528	.2318	.4086	.5825	.7529	.9191	.0805	19
0.7272	2.9086	5.0891	7.2681	9.4449	11.6187	13.7891	15.9552	18.1165	20
.7636	.9450	.1255	.3044	.4811	.6549	.8252	.9913	.1525	21
.7999	.9813	.1618	.3407	.5174	.6911	.8613	16.0273	.1884	22
.8363	3.0177	.1981	.3770	.5536	.7273	.8975	.0634	.2244	23
.8727	.0540	.2345	.4133	.5899	.7635	.9336	.0994	.2604	24
0.9090	3.0904	5.2708	7.4496	9.6261	11.7997	13.9698	16.1355	18.2963	25
.9454	.1267	.3071	.4859	.6624	.8359	14.0059	.1716	.3323	26
.9817	.1631	.3434	.5222	.6986	.8721	.0420	.2076	.3683	27
1.0181	.1994	.3798	.5585	.7349	.9083	.0781	.2437	.4043	28
.0545	.2358	.4161	.5948	.7711	.9445	.1143	.2797	.4402	29
1.0908	3.2721	5.4524	7.6311	9.8074	11.9807	14.1504	16.3158	18.4762	30
.1272	.3085	.4887	.6674	.8436	12.0169	.1865	.3518	.5121	31
.1635	.3448	.5251	.7037	.8799	.0531	.2227	.3879	.5481	32
.1999	.3812	.5614	.7399	.9161	.0893	.2588	.4239	.5841	33
.2363	.4175	.5977	.7762	.9524	.1255	.2949	.4600	.6200	34
1.2726	3.4539	5.6340	7.8125	9.9886	12.1617	14.3310	16.4960	18.6560	35
.3090	.4902	.6704	.8488	10.0249	.1979	.3671	.5320	.6919	36
.3453	.5266	.7067	.8851	.0611	.2340	.4033	.5681	.7279	37
.3817	.5629	.7430	.9214	.0974	.2702	.4394	.6041	.7638	38
.4180	.5992	.7793	.9577	.1336	.3064	.4755	.6402	.7998	39
1.4544	3.6356	5.8157	7.9940	10.1698	12.3426	14.5116	16.6762	18.8357	40
.4908	.6719	.8520	8.0303	.2061	.3788	.5477	.7122	.8717	41
.5271	.7083	.8883	.0665	.2423	.4150	.5838	.7483	.9076	42
.5635	.7446	.9246	.1028	.2786	.4511	.6200	.7843	.9435	43
.5998	.7810	.9609	.1391	.3148	.4873	.6561	.8203	.9795	44
1.6362	3.8173	5.9973	8.1754	10.3510	12.5235	14.6922	16.8564	19.0154	45
.6726	.8537	6.0336	.2117	.3873	.5597	.7283	.8924	.0514	46
.7089	.8900	.0699	.2480	.4235	.5959	.7644	.9284	.0873	47
.7453	.9263	.1062	.2842	.4597	.6320	.8005	.9644	.1232	48
.7816	.9627	.1425	.3205	.4960	.6682	.8366	17.0005	.1592	49
1.8180	3.9990	6.1789	8.3568	10.5322	12.7044	14.8727	17.0365	19.1951	50
.8543	4.0354	.2152	.3931	.5684	.7406	.9088	.0725	.2310	51
.8907	.0717	.2515	.4294	.6047	.7767	.9449	.1085	.2669	52
.9271	.1081	.2878	.4656	.6409	.8129	.9810	.1446	.3029	53
.9634	.1444	.3241	.5019	.6771	.8491	15.0171	.1806	.3388	54
1.9998	4.1807	6.3604	8.5382	10.7133	12.8852	15.0532	17.2166	19.3747	55
2.0361	.2171	.3967	.5745	.7496	.9214	.0893	.2526	.4106	56
.0725	.2534	.4331	.6107	.7858	.9576	.1254	.2886	.4466	57
.1088	.2898	.4694	.6470	.8220	.9937	.1615	.3246	.4825	58
.1452	.3261	.5057	.6833	.8582	13.0299	.1976	.3606	.5184	59

125mm SINE BAR CONSTANTS

MIN	9°	10°	11°	12°	13°	14°	15°	16°	17°
0	19.5543	21.7060	23.8511	25.9890	28.1189	30.2402	32.3524	34.4547	36.5465
1	.5902	.7418	.8868	26.0245	.1543	.2755	.3875	.4896	.5812
2	.6261	.7776	.9225	.0601	.1897	.3108	.4226	.5246	.6160
3	.6620	.8134	.9582	.0957	.2252	.3461	.4577	.5595	.6508
4	.6979	.8492	.9939	.1312	.2606	.3813	.4928	.5945	.6855
5	19.7339	21.8850	24.0296	26.1668	28.2960	30.4166	32.5280	34.6294	36.7203
6	.7698	.9208	.0652	.2023	.3314	.4519	.5631	.6643	.7550
7	.8057	.9566	.1009	.2379	.3668	.4871	.5982	.6993	.7898
8	.8416	.9924	.1366	.2734	.4022	.5224	.6333	.7342	.8245
9	.8775	22.0282	.1723	.3090	.4376	.5577	.6684	.7691	.8593
10	19.9134	22.0640	24.2080	26.3445	28.4731	30.5929	32.7035	34.8040	36.8940
11	.9493	.0998	.2436	.3801	.5085	.6282	.7386	.8390	.9288
12	.9851	.1356	.2793	.4156	.5439	.6634	.7736	.8739	.9635
13	20.0210	.1714	.3150	.4511	.5793	.6987	.8087	.9088	.9982
14	.0569	.2072	.3506	.4867	.6147	.7339	.8438	.9437	37.0330
15	20.0928	22.2429	24.3863	26.5222	28.6500	30.7692	32.8789	34.9786	37.0677
16	.1287	.2787	.4220	.5577	.6854	.8044	.9140	35.0135	.1024
17	.1646	.3145	.4576	.5933	.7208	.8396	.9491	.0484	.1371
18	.2005	.3503	.4933	.6288	.7562	.8749	.9841	.0833	.1719
19	.2364	.3861	.5289	.6643	.7916	.9101	33.0192	.1182	.2066
20	20.2722	22.4218	24.5646	26.6998	28.8270	30.9453	33.0543	35.1531	37.2413
21	.3081	.4576	.6002	.7354	.8624	.9806	.0893	.1880	.2760
22	.3440	.4934	.6359	.7709	.8977	31.0158	.1244	.2229	.3107
23	.3799	.5291	.6715	.8064	.9331	.0510	.1595	.2578	.3454
24	.4157	.5649	.7072	.8419	.9685	.0862	.1945	.2927	.3801
25	20.4516	22.6007	24.7428	26.8774	29.0039	31.1215	33.2296	35.3276	37.4148
26	.4875	.6364	.7785	.9129	.0392	.1567	.2646	.3624	.4495
27	.5234	.6722	.8141	.9484	.0746	.1919	.2997	.3973	.4842
28	.5592	.7079	.8497	.9839	.1100	.2271	.3347	.4322	.5189
29	.5951	.7437	.8854	27.0195	.1453	.2623	.3698	.4671	.5535
30	20.6310	22.7794	24.9210	27.0550	29.1807	31.2975	33.4048	35.5019	37.5882
31	.6668	.8152	.9566	.0904	.2160	.3327	.4398	.5368	.6229
32	.7027	.8509	.9922	.1259	.2514	.3679	.4749	.5716	.6576
33	.7385	.8867	25.0279	.1614	.2867	.4031	.5099	.6065	.6922
34	.7744	.9224	.0635	.1969	.3221	.4383	.5449	.6413	.7269
35	20.8102	22.9582	25.0991	27.2324	29.3574	31.4735	33.5800	35.6762	37.7616
36	.8461	.9939	.1347	.2679	.3928	.5087	.6150	.7110	.7962
37	.8819	23.0297	.1704	.3034	.4281	.5439	.6500	.7459	.8309
38	.9178	.0654	.2060	.3389	.4634	.5790	.6850	.7807	.8655
39	.9536	.1011	.2416	.3744	.4988	.6142	.7200	.8156	.9002
40	20.9895	23.1369	25.2772	27.4098	29.5341	31.6494	33.7550	35.8504	37.9348
41	21.0253	.1726	.3128	.4453	.5694	.6846	.7900	.8852	.9695
42	.0612	.2083	.3484	.4808	.6048	.7197	.8251	.9201	38.0041
43	.0970	.2441	.3840	.5162	.6401	.7549	.8601	.9549	.0388
44	.1329	.2798	.4196	.5517	.6754	.7901	.8951	.9897	.0734
45	21.1687	23.3155	25.4552	27.5872	29.7107	31.8252	33.9301	36.0245	38.1080
46	.2045	.3512	.4908	.6226	.7461	.8604	.9651	.0594	.1427
47	.2404	.3869	.5264	.6581	.7814	.8956	34.0000	.0942	.1773
48	.2762	.4227	.5620	.6936	.8167	.9307	.0350	.1290	.2119
49	.3120	.4584	.5976	.7290	.8520	.9659	.0700	.1638	.2465
50	21.3478	23.4941	25.6332	27.7645	29.8873	32.0010	34.1050	36.1986	38.2811
51	.3837	.5298	.6688	.7999	.9226	.0362	.1400	.2334	.3158
52	.4195	.5655	.7044	.8354	.9579	.0713	.1750	.2682	.3504
53	.4553	.6012	.7399	.8708	.9932	.1065	.2099	.3030	.3850
54	.4911	.6369	.7755	.9063	30.0285	.1416	.2449	.3378	.4196
55	21.5270	23.6726	25.8111	27.9417	30.0638	32.1767	34.2799	36.3726	38.4542
56	.5628	.7083	.8467	.9771	.0991	.2119	.3148	.4073	.4888
57	.5986	.7440	.8823	28.0126	.1344	.2470	.3498	.4421	.5234
58	.6344	.7797	.9178	.0480	.1697	.2821	.3848	.4769	.5580
59	.6702	.8154	.9534	.0835	.2050	.3173	.4197	.5117	.5925

125mm SINE BAR CONSTANTS

18°	19°	20°	21°	22°	23°	24°	25°	26°	MIN
38.6271	40.6960	42.7525	44.7960	46.8258	48.8414	50.8421	52.8273	54.7964	0
.6617	.7304	.7867	.8299	.8595	.8749	.8753	.8602	.8291	1
.6963	.7648	.8208	.8639	.8932	.9083	.9085	.8932	.8617	2
.7309	.7991	.8550	.8978	.9269	.9418	.9417	.9261	.8944	3
.7654	.8335	.8892	.9317	.9606	.9752	.9749	.9591	.9271	4
38.8000	40.8679	42.9233	44.9657	46.9943	49.0087	51.0081	52.9920	54.9597	5
.8346	.9022	.9575	.9996	47.0280	.0421	.0413	53.0249	.9924	6
.8691	.9366	.9916	45.0335	.0617	.0756	.0745	.0579	55.0250	7
.9037	.9709	43.0257	.0674	.0954	.1090	.1077	.0908	.0577	8
.9382	41.0053	.0599	.1014	.1291	.1425	.1409	.1237	.0903	9
38.9728	41.0396	43.0940	45.1353	47.1628	49.1759	51.1740	53.1566	55.1230	10
39.0073	.0740	.1281	.1692	.1964	.2093	.2072	.1895	.1556	11
.0419	.1083	.1623	.2031	.2301	.2427	.2404	.2224	.1882	12
.0764	.1427	.1964	.2370	.2638	.2762	.2735	.2553	.2209	13
.1109	.1770	.2305	.2709	.2974	.3096	.3067	.2882	.2535	14
39.1455	41.2113	43.2646	45.3048	47.3311	49.3430	51.3399	53.3211	55.2861	15
.1800	.2457	.2987	.3386	.3647	.3764	.3730	.3540	.3187	16
.2145	.2800	.3329	.3725	.3984	.4098	.4062	.3869	.3513	17
.2491	.3143	.3670	.4064	.4320	.4432	.4393	.4197	.3839	18
.2836	.3486	.4011	.4403	.4657	.4766	.4724	.4526	.4165	19
39.3181	41.3829	43.4352	45.4742	47.4993	49.5100	51.5056	53.4855	55.4491	20
.3526	.4172	.4692	.5080	.5329	.5434	.5387	.5183	.4817	21
.3871	.4515	.5033	.5419	.5666	.5767	.5718	.5512	.5142	22
.4216	.4858	.5374	.5757	.6002	.6101	.6049	.5840	.5468	23
.4561	.5201	.5715	.6096	.6338	.6435	.6381	.6169	.5794	24
39.4906	41.5544	43.6056	45.6435	47.6674	49.6769	51.6712	53.6497	55.6120	25
.5251	.5887	.6397	.6773	.7010	.7102	.7043	.6826	.6445	26
.5596	.6230	.6737	.7111	.7346	.7436	.7374	.7154	.6771	27
.5941	.6573	.7078	.7450	.7682	.7769	.7705	.7482	.7096	28
.6286	.6916	.7419	.7788	.8018	.8103	.8036	.7811	.7422	29
39.6631	41.7259	43.7759	45.8127	47.8354	49.8436	51.8367	53.8139	55.7747	30
.6976	.7601	.8100	.8465	.8690	.8770	.8697	.8467	.8073	31
.7320	.7944	.8440	.8803	.9026	.9103	.9028	.8795	.8398	32
.7665	.8287	.8781	.9141	.9362	.9437	.9359	.9123	.8723	33
.8010	.8629	.9121	.9479	.9698	.9770	.9690	.9451	.9049	34
39.8355	41.8972	43.9462	45.9818	48.0033	50.0103	52.0020	53.9779	55.9374	35
.8699	.9314	.9802	46.0156	.0369	.0436	.0351	54.0107	.9699	36
.9044	.9657	44.0142	.0494	.0705	.0769	.0682	.0435	56.0024	37
.9388	.9999	.0483	.0832	.1040	.1103	.1012	.0763	.0349	38
.9733	42.0342	.0823	.1170	.1376	.1436	.1343	.1091	.0674	39
40.0077	42.0684	44.1163	46.1508	48.1712	50.1769	52.1673	54.1418	56.0999	40
.0422	.1027	.1503	.1846	.2047	.2102	.2003	.1746	.1324	41
.0766	.1369	.1844	.2183	.2383	.2435	.2334	.2074	.1649	42
.1111	.1711	.2184	.2521	.2718	.2768	.2664	.2401	.1974	43
.1455	.2054	.2524	.2859	.3053	.3101	.2994	.2729	.2298	44
40.1799	42.2396	44.2864	46.3197	48.3389	50.3433	52.3325	54.3057	56.2623	45
.2144	.2738	.3204	.3535	.3724	.3766	.3655	.3384	.2948	46
.2488	.3080	.3544	.3872	.4059	.4099	.3985	.3711	.3272	47
.2832	.3422	.3884	.4210	.4394	.4432	.4315	.4039	.3597	48
.3176	.3764	.4224	.4547	.4730	.4764	.4645	.4366	.3921	49
40.3520	42.4107	44.4563	46.4885	48.5065	50.5097	52.4975	54.4694	56.4246	50
.3865	.4449	.4903	.5222	.5400	.5429	.5305	.5021	.4570	51
.4209	.4791	.5243	.5560	.5735	.5762	.5635	.5348	.4895	52
.4553	.5133	.5583	.5897	.6070	.6095	.5965	.5675	.5219	53
.4897	.5474	.5922	.6235	.6405	.6427	.6295	.6002	.5543	54
40.5241	42.5816	44.6262	46.6572	48.6740	50.6759	52.6625	54.6329	56.5868	55
.5585	.6158	.6602	.6909	.7075	.7092	.6954	.6656	.6192	56
.5929	.6500	.6941	.7247	.7410	.7424	.7284	.6983	.6516	57
.6273	.6842	.7281	.7584	.7744	.7756	.7614	.7310	.6840	58
.6616	.7183	.7620	.7921	.8079	.8089	.7943	.7637	.7164	59

125mm SINE BAR CONSTANTS

MIN	27°	28°	29°	30°	31°	32°	33°	34°	35°
0	56.7488	58.6839	60.6012	62.5000	64.3798	66.2399	68.0799	69.8991	71.6971
1	.7812	.7160	.6330	.5315	.4109	.2707	.1104	.9293	.7268
2	.8136	.7481	.6648	.5630	.4421	.3016	.1409	.9594	.7566
3	.8460	.7802	.6966	.5944	.4732	.3324	.1713	.9895	.7864
4	.8784	.8123	.7284	.6259	.5044	.3632	.2018	70.0196	.8161
5	56.9107	58.8444	60.7601	62.6574	64.5355	66.3940	68.2323	70.0498	71.8459
6	.9431	.8765	.7919	.6888	.5667	.4248	.2627	.0799	.8757
7	.9755	.9086	.8237	.7203	.5978	.4556	.2932	.1100	.9054
8	57.0078	.9406	.8555	.7517	.6289	.4864	.3237	.1401	.9351
9	.0402	.9727	.8872	.7832	.6600	.5172	.3541	.1702	.9649
10	57.0726	59.0047	60.9190	62.8146	64.6912	66.5480	68.3845	70.2003	71.9946
11	.1049	.0368	.9507	.8461	.7223	.5788	.4150	.2303	72.0243
12	.1372	.0688	.9825	.8775	.7534	.6095	.4454	.2604	.0540
13	.1696	.1009	61.0142	.9089	.7845	.6403	.4758	.2905	.0837
14	.2019	.1329	.0459	.9403	.8156	.6711	.5062	.3206	.1135
15	57.2342	59.1650	61.0777	62.9717	64.8467	66.7018	68.5367	70.3506	72.1431
16	.2666	.1970	.1094	63.0032	.8777	.7326	.5671	.3807	.1728
17	.2989	.2290	.1411	.0346	.9088	.7633	.5975	.4107	.2025
18	.3312	.2610	.1728	.0660	.9399	.7940	.6279	.4408	.2322
19	.3635	.2930	.2045	.0973	.9710	.8248	.6582	.4708	.2619
20	57.3958	59.3250	61.2362	63.1287	65.0020	66.8555	68.6886	70.5008	72.2915
21	.4281	.3570	.2679	.1601	.0331	.8862	.7190	.5308	.3212
22	.4604	.3890	.2996	.1915	.0641	.9169	.7494	.5609	.3509
23	.4927	.4210	.3313	.2229	.0952	.9476	.7797	.5909	.3805
24	.5250	.4530	.3630	.2542	.1262	.9783	.8101	.6209	.4101
25	57.5573	59.4850	61.3946	63.2856	65.1572	67.0090	68.8404	70.6509	72.4398
26	.5895	.5170	.4263	.3169	.1883	.0397	.8708	.6809	.4694
27	.6218	.5490	.4580	.3483	.2193	.0704	.9011	.7109	.4990
28	.6541	.5809	.4896	.3796	.2503	.1011	.9315	.7408	.5287
29	.6863	.6129	.5213	.4110	.2813	.1318	.9618	.7708	.5583
30	57.7186	59.6448	61.5529	63.4423	65.3123	67.1625	68.9921	70.8008	72.5879
31	.7508	.6768	.5846	.4736	.3433	.1931	.99224	.8307	.6175
32	.7831	.7087	.6162	.5049	.3743	.2238	.0528	.8607	.6471
33	.8153	.7407	.6479	.5363	.4053	.2544	.0831	.8907	.6766
34	.8475	.7726	.6795	.5676	.4363	.2851	.1134	.9206	.7062
35	57.8798	59.8046	61.7111	63.5989	65.4673	67.3157	69.1437	70.9505	72.7358
36	.9120	.8365	.7427	.6302	.4982	.3463	.1739	.9805	.7654
37	.9442	.8684	.7743	.6615	.5292	.3770	.2042	71.0104	.7949
38	.9764	.9003	.8060	.6928	.5602	.4076	.2345	.0403	.8245
39	58.0087	.9322	.8376	.7240	.5911	.4382	.2648	.0702	.8540
40	58.0409	59.9641	61.8692	63.7553	65.6221	67.4688	69.2950	71.1001	72.8836
41	.0731	.9960	.9007	.7866	.6530	.4994	.3253	.1300	.9131
42	.1053	60.0279	.9323	.8179	.6840	.5300	.3556	.1599	.9427
43	.1374	.0598	.9639	.8491	.7149	.5606	.3858	.1898	.9722
44	.1696	.0917	.9955	.8804	.7458	.5912	.4160	.2197	73.0017
45	58.2018	60.1236	62.0271	63.9116	65.7767	67.6218	69.4463	71.2496	73.0312
46	.2340	.1555	.0586	.9429	.8077	.6524	.4765	.2795	.0607
47	.2662	.1873	.0902	.9741	.8386	.6830	.5067	.3093	.0902
48	.2983	.2192	.1217	64.0054	.8695	.7135	.5370	.3392	.1197
49	.3305	.2511	.1533	.0366	.9004	.7441	.5672	.3691	.1492
50	58.3626	60.2829	62.1848	64.0678	65.9313	67.7746	69.5974	71.3989	73.1787
51	.3948	.3148	.2164	.0990	.9622	.8052	.6276	.4287	.2082
52	.4269	.3466	.2479	.1302	.9930	.8357	.6578	.4586	.2376
53	.4591	.3785	.2794	.1615	66.0239	.8663	.6880	.4884	.2671
54	.4912	.4103	.3110	.1927	.0548	.8968	.7181	.5182	.2965
55	58.5234	60.4421	62.3425	64.2239	66.0857	67.9273	69.7483	71.5481	73.3260
56	.5555	.4740	.3740	.2550	.1165	.9579	.7785	.5779	.3554
57	.5876	.5058	.4055	.2862	.1474	.9884	.8087	.6077	.3849
58	.6197	.5376	.4370	.3174	.1782	68.0189	.8388	.6375	.4143
59	.6518	.5694	.4685	.3486	.2091	.0494	.8690	.6673	.4437

125mm SINE BAR CONSTANTS

36°	37°	38°	39°	40°	41°	42°	43°	44°	MIN
73.4732	75.2269	76.9577	78.6650	80.3485	82.0074	83.6413	85.2498	86.8323	0
.5026	.2559	.9863	.6933	.3763	.0348	.6683	.2764	.8584	1
.5320	.2849	77.0150	.7216	.4041	.0622	.6954	.3030	.8846	2
.5614	.3140	.0436	.7498	.4320	.0897	.7224	.3295	.9107	3
.5908	.3430	.0722	.7780	.4598	.1171	.7494	.3561	.9369	4
73.6202	75.3720	77.1009	78.8063	80.4876	82.1445	83.7763	85.3827	86.9630	5
.6495	.4010	.1295	.8345	.5155	.1719	.8033	.4092	.9891	6
.6789	.4300	.1581	.8627	.5433	.1993	.8303	.4358	87.0152	7
.7083	.4590	.1867	.8909	.5711	.2267	.8573	.4623	.0413	8
.7377	.4880	.2153	.9191	.5989	.2541	.8842	.4888	.0674	9
73.7670	75.5170	77.2439	78.9473	80.6267	82.2815	83.9112	85.5154	87.0935	10
.7964	.5459	.2725	.9755	.6544	.3088	.9381	.5419	.1196	11
.8257	.5749	.3010	79.0037	.6822	.3362	.9651	.5684	.1456	12
.8550	.6038	.3296	.0318	.7100	.3635	.9920	.5949	.1717	13
.8844	.6328	.3582	.0600	.7377	.3909	84.0189	.6214	.1978	14
73.9137	75.6617	77.3867	79.0882	80.7655	82.4182	84.0459	85.6479	87.2238	15
.9430	.6907	.4153	.1163	.7932	.4456	.0728	.6744	.2498	16
.9723	.7196	.4438	.1445	.8210	.4729	.0997	.7008	.2759	17
74.0016	.7486	.4724	.1726	.8487	.5002	.1266	.7273	.3019	18
.0309	.7775	.5009	.2007	.8765	.5275	.1535	.7538	.3279	19
74.0602	75.8064	77.5294	79.2289	80.9042	82.5548	84.1803	85.7802	87.3539	20
.0895	.8353	.5580	.2570	.9319	.5821	.2072	.8066	.3799	21
.1188	.8642	.5865	.2851	.9596	.6094	.2341	.8331	.4059	22
.1481	.8931	.6150	.3132	.9873	.6367	.2609	.8595	.4319	23
.1774	.9220	.6435	.3413	81.0150	.6640	.2878	.8859	.4579	24
74.2066	75.9509	77.6720	79.3694	81.0427	82.6913	84.3146	85.9124	87.4839	25
.2359	.9797	.7005	.3975	.0704	.7185	.3415	.9388	.5099	26
.2651	76.0086	.7289	.4256	.0980	.7458	.3683	.9652	.5358	27
.2944	.0375	.7574	.4536	.1257	.7730	.3951	.9916	.5618	28
.3236	.0663	.7859	.4817	.1534	.8003	.4220	86.0179	.5877	29
74.3528	76.0952	77.8143	79.5098	81.1810	82.8275	84.4488	86.0443	87.6137	30
.3821	.1240	.8428	.5378	.2087	.8547	.4756	.0707	.6396	31
.4113	.1529	.8712	.5659	.2363	.8820	.5024	.0971	.6655	32
.4405	.1817	.8997	.5939	.2639	.9092	.5292	.1234	.6914	33
.4697	.2105	.9281	.6220	.2915	.9364	.5560	.1498	.7173	34
74.4989	76.2393	77.9565	79.6500	81.3192	82.9636	84.5827	86.1761	87.7432	35
.5281	.2681	.9849	.6780	.3468	.9908	.6095	.2024	.7691	36
.5573	.2970	78.0134	.7060	.3744	83.0180	.6363	.2288	.7950	37
.5865	.3257	.0418	.7340	.4020	.0451	.6630	.2551	.8209	38
.6157	.3545	.0702	.7620	.4296	.0723	.6898	.2814	.8468	39
74.6448	76.3833	78.0986	79.7900	81.4572	83.0995	84.7165	86.3077	87.8726	40
.6740	.4121	.1270	.8180	.4847	.1266	.7432	.3340	.8985	41
.7031	.4409	.1553	.8460	.5123	.1538	.7700	.3603	.9243	42
.7323	.4696	.1837	.8739	.5399	.1809	.7967	.3866	.9502	43
.7614	.4984	.2121	.9019	.5674	.2081	.8234	.4129	.9760	44
74.7906	76.5272	78.2404	79.9299	81.5950	83.2352	84.8501	86.4391	88.0018	45
.8197	.5559	.2688	.9578	.6225	.2623	.8768	.4654	.0277	46
.8488	.5846	.2971	.9858	.6500	.2894	.9035	.4916	.0535	47
.8779	.6134	.3255	80.0137	.6776	.3166	.9302	.5179	.0793	48
.9071	.6421	.3538	.0416	.7051	.3437	.9568	.5441	.1051	49
74.9362	76.6708	78.3821	80.0696	81.7326	83.3708	84.9835	86.5704	88.1309	50
.9653	.6995	.4105	.0975	.7601	.3978	85.0102	.5966	.1566	51
.9944	.7283	.4388	.1254	.7876	.4249	.0368	.6228	.1824	52
75.0234	.7570	.4671	.1533	.8151	.4520	.0635	.6490	.2082	53
.0525	.7856	.4954	.1812	.8426	.4791	.0901	.6752	.2339	54
75.0816	76.8143	78.5237	80.2091	81.8701	83.5061	85.1167	86.7014	88.2597	55
.1107	.8430	.5520	.2370	.8976	.5332	.1434	.7276	.2854	56
.1397	.8717	.5802	.2649	.9250	.5602	.1700	.7538	.3112	57
.1688	.9004	.6085	.2927	.9525	.5873	.1966	.7800	.3369	58
.1978	.9290	.6368	.3206	.9799	.6143	.2232	.8061	.3626	59

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