

LoopSheet Cxy
SpiroChart Collection 1.6

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This spreadsheet follows the pattern made by one circle rolling inside or outside another. User may change X
Loops are kept smooth.

CHANGE THESE

1	<--Major Radius (NON-ZERO)
7	<--NON-ZERO INTEGER. The two boxes to the left together hold a simplified fraction representing
30	<--NON-ZERO INTEGER.
0.6	<--Loop Radius. ANY VALUE. Loops formed when absolute value of this number is (1) greater tha
30	<--X-rotation (degrees).
0	<--Y-rotation (degrees).

Rotate X and Y same amount to spin entire figure around the center.

CALCULATED VALUES (DON'T TOUCH)

0.233333 <--Minor Radius (NON-ZERO). Positive tracks outside major circle. Negative tracks inside.

3.5 <--This number allows entire pattern to be completed with 721 points.

theta	X plot	Y plot	X rotate	Y rotate
0	1.833	0.000	1.588	0.000
3.5	1.800	0.266	1.426	0.266
7	1.703	0.511	1.219	0.511
10.5	1.553	0.719	0.985	0.719
14	1.362	0.875	0.742	0.875
17.5	1.150	0.970	0.511	0.970
21	0.936	1.002	0.310	1.002
24.5	0.741	0.974	0.154	0.974
28	0.580	0.897	0.054	0.897
31.5	0.468	0.784	0.013	0.784
35	0.413	0.655	0.030	0.655
38.5	0.415	0.529	0.095	0.529
42	0.471	0.424	0.196	0.424
45.5	0.569	0.357	0.314	0.357
49	0.695	0.342	0.431	0.342
52.5	0.829	0.384	0.526	0.384
56	0.953	0.483	0.583	0.483
59.5	1.047	0.635	0.589	0.635
63	1.095	0.827	0.535	0.827

66.5	1.085	1.042	0.419	1.042
70	1.013	1.263	0.245	1.263
73.5	0.878	1.469	0.026	1.469
77	0.687	1.641	-0.226	1.641
80.5	0.452	1.762	-0.489	1.762
84	0.192	1.823	-0.746	1.823
87.5	-0.076	1.818	-0.975	1.818
91	-0.331	1.747	-1.160	1.747
94.5	-0.553	1.619	-1.289	1.619
98	-0.728	1.446	-1.353	1.446
101.5	-0.845	1.245	-1.354	1.245
105	-0.899	1.036	-1.296	1.036
108.5	-0.892	0.838	-1.191	0.838
112	-0.831	0.671	-1.055	0.671
115.5	-0.731	0.548	-0.907	0.548
119	-0.608	0.479	-0.766	0.479
122.5	-0.482	0.468	-0.652	0.468
126	-0.372	0.512	-0.579	0.512
129.5	-0.296	0.603	-0.558	0.603
133	-0.267	0.727	-0.595	0.727
136.5	-0.295	0.865	-0.688	0.865
140	-0.381	0.998	-0.829	0.998
143.5	-0.522	1.107	-1.006	1.107
147	-0.708	1.175	-1.200	1.175
150.5	-0.923	1.188	-1.394	1.188
154	-1.150	1.139	-1.566	1.139
157.5	-1.369	1.026	-1.699	1.026
161	-1.560	0.854	-1.778	0.854
164.5	-1.705	0.634	-1.794	0.634
168	-1.793	0.381	-1.744	0.381
171.5	-1.816	0.114	-1.630	0.114
175	-1.772	-0.146	-1.462	-0.146
178.5	-1.668	-0.381	-1.254	-0.381
182	-1.514	-0.573	-1.025	-0.573
185.5	-1.327	-0.710	-0.794	-0.710
189	-1.124	-0.786	-0.581	-0.786
192.5	-0.927	-0.799	-0.403	-0.799
196	-0.754	-0.757	-0.275	-0.757
199.5	-0.621	-0.670	-0.203	-0.670
203	-0.540	-0.555	-0.190	-0.555
206.5	-0.516	-0.431	-0.231	-0.431
210	-0.548	-0.317	-0.317	-0.317
213.5	-0.631	-0.231	-0.431	-0.231
217	-0.751	-0.190	-0.555	-0.190

220.5	-0.891	-0.203	-0.670	-0.203
224	-1.032	-0.275	-0.757	-0.275
227.5	-1.156	-0.403	-0.799	-0.403
231	-1.242	-0.581	-0.786	-0.581
234.5	-1.278	-0.794	-0.710	-0.794
238	-1.253	-1.025	-0.573	-1.025
241.5	-1.164	-1.254	-0.381	-1.254
245	-1.013	-1.462	-0.146	-1.462
248.5	-0.809	-1.630	0.114	-1.630
252	-0.567	-1.744	0.381	-1.744
255.5	-0.304	-1.794	0.634	-1.794
259	-0.040	-1.778	0.854	-1.778
262.5	0.204	-1.699	1.026	-1.699
266	0.411	-1.566	1.139	-1.566
269.5	0.567	-1.394	1.188	-1.394
273	0.664	-1.200	1.175	-1.200
276.5	0.698	-1.006	1.107	-1.006
280	0.674	-0.829	0.998	-0.829
283.5	0.601	-0.688	0.865	-0.688
287	0.496	-0.595	0.727	-0.595
290.5	0.374	-0.558	0.603	-0.558
294	0.258	-0.579	0.512	-0.579
297.5	0.164	-0.652	0.468	-0.652
301	0.110	-0.766	0.479	-0.766
304.5	0.109	-0.907	0.548	-0.907
308	0.165	-1.055	0.671	-1.055
311.5	0.280	-1.191	0.838	-1.191
315	0.448	-1.296	1.036	-1.296
318.5	0.656	-1.354	1.245	-1.354
322	0.888	-1.353	1.446	-1.353
325.5	1.126	-1.289	1.619	-1.289
329	1.348	-1.160	1.747	-1.160
332.5	1.536	-0.975	1.818	-0.975
336	1.675	-0.746	1.823	-0.746
339.5	1.752	-0.489	1.762	-0.489
343	1.764	-0.226	1.641	-0.226
346.5	1.711	0.026	1.469	0.026
350	1.600	0.245	1.263	0.245
353.5	1.445	0.419	1.042	0.419
357	1.263	0.535	0.827	0.535
360.5	1.073	0.589	0.635	0.589
364	0.895	0.583	0.483	0.583
367.5	0.747	0.526	0.384	0.526
371	0.643	0.431	0.342	0.431

374.5	0.594	0.314	0.357	0.314
378	0.602	0.196	0.424	0.196
381.5	0.665	0.095	0.529	0.095
385	0.774	0.030	0.655	0.030
388.5	0.913	0.013	0.784	0.013
392	1.067	0.054	0.897	0.054
395.5	1.214	0.154	0.974	0.154
399	1.336	0.310	1.002	0.310
402.5	1.415	0.511	0.970	0.511
406	1.439	0.742	0.875	0.742
409.5	1.399	0.985	0.719	0.985
413	1.295	1.219	0.511	1.219
416.5	1.130	1.426	0.266	1.426
420	0.917	1.588	0.000	1.588
423.5	0.670	1.692	-0.266	1.692
427	0.409	1.731	-0.511	1.731
430.5	0.153	1.704	-0.719	1.704
434	-0.077	1.617	-0.875	1.617
437.5	-0.265	1.481	-0.970	1.481
441	-0.400	1.312	-1.002	1.312
444.5	-0.474	1.129	-0.974	1.129
448	-0.487	0.951	-0.897	0.951
451.5	-0.445	0.798	-0.784	0.798
455	-0.361	0.685	-0.655	0.685
458.5	-0.250	0.624	-0.529	0.624
462	-0.132	0.619	-0.424	0.619
465.5	-0.025	0.672	-0.357	0.672
469	0.051	0.773	-0.342	0.773
472.5	0.082	0.910	-0.384	0.910
476	0.058	1.067	-0.483	1.067
479.5	-0.026	1.224	-0.635	1.224
483	-0.169	1.361	-0.827	1.361
486.5	-0.360	1.461	-1.042	1.461
490	-0.588	1.509	-1.263	1.509
493.5	-0.833	1.494	-1.469	1.494
497	-1.077	1.415	-1.641	1.415
500.5	-1.300	1.273	-1.762	1.273
504	-1.483	1.078	-1.823	1.078
507.5	-1.612	0.843	-1.818	0.843
511	-1.679	0.587	-1.747	0.587
514.5	-1.679	0.331	-1.619	0.331
518	-1.616	0.093	-1.446	0.093
521.5	-1.501	-0.109	-1.245	-0.109
525	-1.347	-0.260	-1.036	-0.260

528.5	-1.172	-0.353	-0.838	-0.353
532	-0.997	-0.385	-0.671	-0.385
535.5	-0.840	-0.359	-0.548	-0.359
539	-0.719	-0.287	-0.479	-0.287
542.5	-0.646	-0.184	-0.468	-0.184
546	-0.630	-0.066	-0.512	-0.066
549.5	-0.670	0.045	-0.603	0.045
553	-0.763	0.132	-0.727	0.132
556.5	-0.896	0.177	-0.865	0.177
560	-1.055	0.169	-0.998	0.169
563.5	-1.220	0.102	-1.107	0.102
567	-1.371	-0.025	-1.175	-0.025
570.5	-1.491	-0.205	-1.188	-0.205
574	-1.562	-0.427	-1.139	-0.427
577.5	-1.573	-0.672	-1.026	-0.672
581	-1.520	-0.924	-0.854	-0.924
584.5	-1.402	-1.160	-0.634	-1.160
588	-1.227	-1.362	-0.381	-1.362
591.5	-1.007	-1.515	-0.114	-1.515
595	-0.760	-1.608	0.146	-1.608
598.5	-0.504	-1.635	0.381	-1.635
602	-0.261	-1.598	0.573	-1.598
605.5	-0.048	-1.504	0.710	-1.504
609	0.118	-1.366	0.786	-1.366
612.5	0.229	-1.202	0.799	-1.202
616	0.278	-1.031	0.757	-1.031
619.5	0.270	-0.873	0.670	-0.873
623	0.211	-0.745	0.555	-0.745
626.5	0.115	-0.662	0.431	-0.662
630	0.000	-0.633	0.317	-0.633
633.5	-0.115	-0.662	0.231	-0.662
637	-0.211	-0.745	0.190	-0.745
640.5	-0.270	-0.873	0.203	-0.873
644	-0.278	-1.031	0.275	-1.031
647.5	-0.229	-1.202	0.403	-1.202
651	-0.118	-1.366	0.581	-1.366
654.5	0.048	-1.504	0.794	-1.504
658	0.261	-1.598	1.025	-1.598
661.5	0.504	-1.635	1.254	-1.635
665	0.760	-1.608	1.462	-1.608
668.5	1.007	-1.515	1.630	-1.515
672	1.227	-1.362	1.744	-1.362
675.5	1.402	-1.160	1.794	-1.160
679	1.520	-0.924	1.778	-0.924

682.5	1.573	-0.672	1.699	-0.672
686	1.562	-0.427	1.566	-0.427
689.5	1.491	-0.205	1.394	-0.205
693	1.371	-0.025	1.200	-0.025
696.5	1.220	0.102	1.006	0.102
700	1.055	0.169	0.829	0.169
703.5	0.896	0.177	0.688	0.177
707	0.763	0.132	0.595	0.132
710.5	0.670	0.045	0.558	0.045
714	0.630	-0.066	0.579	-0.066
717.5	0.646	-0.184	0.652	-0.184
721	0.719	-0.287	0.766	-0.287
724.5	0.840	-0.359	0.907	-0.359
728	0.997	-0.385	1.055	-0.385
731.5	1.172	-0.353	1.191	-0.353
735	1.347	-0.260	1.296	-0.260
738.5	1.501	-0.109	1.354	-0.109
742	1.616	0.093	1.353	0.093
745.5	1.679	0.331	1.289	0.331
749	1.679	0.587	1.160	0.587
752.5	1.612	0.843	0.975	0.843
756	1.483	1.078	0.746	1.078
759.5	1.300	1.273	0.489	1.273
763	1.077	1.415	0.226	1.415
766.5	0.833	1.494	-0.026	1.494
770	0.588	1.509	-0.245	1.509
773.5	0.360	1.461	-0.419	1.461
777	0.169	1.361	-0.535	1.361
780.5	0.026	1.224	-0.589	1.224
784	-0.058	1.067	-0.583	1.067
787.5	-0.082	0.910	-0.526	0.910
791	-0.051	0.773	-0.431	0.773
794.5	0.025	0.672	-0.314	0.672
798	0.132	0.619	-0.196	0.619
801.5	0.250	0.624	-0.095	0.624
805	0.361	0.685	-0.030	0.685
808.5	0.445	0.798	-0.013	0.798
812	0.487	0.951	-0.054	0.951
815.5	0.474	1.129	-0.154	1.129
819	0.400	1.312	-0.310	1.312
822.5	0.265	1.481	-0.511	1.481
826	0.077	1.617	-0.742	1.617
829.5	-0.153	1.704	-0.985	1.704
833	-0.409	1.731	-1.219	1.731

836.5	-0.670	1.692	-1.426	1.692
840	-0.917	1.588	-1.588	1.588
843.5	-1.130	1.426	-1.692	1.426
847	-1.295	1.219	-1.731	1.219
850.5	-1.399	0.985	-1.704	0.985
854	-1.439	0.742	-1.617	0.742
857.5	-1.415	0.511	-1.481	0.511
861	-1.336	0.310	-1.312	0.310
864.5	-1.214	0.154	-1.129	0.154
868	-1.067	0.054	-0.951	0.054
871.5	-0.913	0.013	-0.798	0.013
875	-0.774	0.030	-0.685	0.030
878.5	-0.665	0.095	-0.624	0.095
882	-0.602	0.196	-0.619	0.196
885.5	-0.594	0.314	-0.672	0.314
889	-0.643	0.431	-0.773	0.431
892.5	-0.747	0.526	-0.910	0.526
896	-0.895	0.583	-1.067	0.583
899.5	-1.073	0.589	-1.224	0.589
903	-1.263	0.535	-1.361	0.535
906.5	-1.445	0.419	-1.461	0.419
910	-1.600	0.245	-1.509	0.245
913.5	-1.711	0.026	-1.494	0.026
917	-1.764	-0.226	-1.415	-0.226
920.5	-1.752	-0.489	-1.273	-0.489
924	-1.675	-0.746	-1.078	-0.746
927.5	-1.536	-0.975	-0.843	-0.975
931	-1.348	-1.160	-0.587	-1.160
934.5	-1.126	-1.289	-0.331	-1.289
938	-0.888	-1.353	-0.093	-1.353
941.5	-0.656	-1.354	0.109	-1.354
945	-0.448	-1.296	0.260	-1.296
948.5	-0.280	-1.191	0.353	-1.191
952	-0.165	-1.055	0.385	-1.055
955.5	-0.109	-0.907	0.359	-0.907
959	-0.110	-0.766	0.287	-0.766
962.5	-0.164	-0.652	0.184	-0.652
966	-0.258	-0.579	0.066	-0.579
969.5	-0.374	-0.558	-0.045	-0.558
973	-0.496	-0.595	-0.132	-0.595
976.5	-0.601	-0.688	-0.177	-0.688
980	-0.674	-0.829	-0.169	-0.829
983.5	-0.698	-1.006	-0.102	-1.006
987	-0.664	-1.200	0.025	-1.200

990.5	-0.567	-1.394	0.205	-1.394
994	-0.411	-1.566	0.427	-1.566
997.5	-0.204	-1.699	0.672	-1.699
1001	0.040	-1.778	0.924	-1.778
1004.5	0.304	-1.794	1.160	-1.794
1008	0.567	-1.744	1.362	-1.744
1011.5	0.809	-1.630	1.515	-1.630
1015	1.013	-1.462	1.608	-1.462
1018.5	1.164	-1.254	1.635	-1.254
1022	1.253	-1.025	1.598	-1.025
1025.5	1.278	-0.794	1.504	-0.794
1029	1.242	-0.581	1.366	-0.581
1032.5	1.156	-0.403	1.202	-0.403
1036	1.032	-0.275	1.031	-0.275
1039.5	0.891	-0.203	0.873	-0.203
1043	0.751	-0.190	0.745	-0.190
1046.5	0.631	-0.231	0.662	-0.231
1050	0.548	-0.317	0.633	-0.317
1053.5	0.516	-0.431	0.662	-0.431
1057	0.540	-0.555	0.745	-0.555
1060.5	0.621	-0.670	0.873	-0.670
1064	0.754	-0.757	1.031	-0.757
1067.5	0.927	-0.799	1.202	-0.799
1071	1.124	-0.786	1.366	-0.786
1074.5	1.327	-0.710	1.504	-0.710
1078	1.514	-0.573	1.598	-0.573
1081.5	1.668	-0.381	1.635	-0.381
1085	1.772	-0.146	1.608	-0.146
1088.5	1.816	0.114	1.515	0.114
1092	1.793	0.381	1.362	0.381
1095.5	1.705	0.634	1.160	0.634
1099	1.560	0.854	0.924	0.854
1102.5	1.369	1.026	0.672	1.026
1106	1.150	1.139	0.427	1.139
1109.5	0.923	1.188	0.205	1.188
1113	0.708	1.175	0.025	1.175
1116.5	0.522	1.107	-0.102	1.107
1120	0.381	0.998	-0.169	0.998
1123.5	0.295	0.865	-0.177	0.865
1127	0.267	0.727	-0.132	0.727
1130.5	0.296	0.603	-0.045	0.603
1134	0.372	0.512	0.066	0.512
1137.5	0.482	0.468	0.184	0.468
1141	0.608	0.479	0.287	0.479

1144.5	0.731	0.548	0.359	0.548
1148	0.831	0.671	0.385	0.671
1151.5	0.892	0.838	0.353	0.838
1155	0.899	1.036	0.260	1.036
1158.5	0.845	1.245	0.109	1.245
1162	0.728	1.446	-0.093	1.446
1165.5	0.553	1.619	-0.331	1.619
1169	0.331	1.747	-0.587	1.747
1172.5	0.076	1.818	-0.843	1.818
1176	-0.192	1.823	-1.078	1.823
1179.5	-0.452	1.762	-1.273	1.762
1183	-0.687	1.641	-1.415	1.641
1186.5	-0.878	1.469	-1.494	1.469
1190	-1.013	1.263	-1.509	1.263
1193.5	-1.085	1.042	-1.461	1.042
1197	-1.095	0.827	-1.361	0.827
1200.5	-1.047	0.635	-1.224	0.635
1204	-0.953	0.483	-1.067	0.483
1207.5	-0.829	0.384	-0.910	0.384
1211	-0.695	0.342	-0.773	0.342
1214.5	-0.569	0.357	-0.672	0.357
1218	-0.471	0.424	-0.619	0.424
1221.5	-0.415	0.529	-0.624	0.529
1225	-0.413	0.655	-0.685	0.655
1228.5	-0.468	0.784	-0.798	0.784
1232	-0.580	0.897	-0.951	0.897
1235.5	-0.741	0.974	-1.129	0.974
1239	-0.936	1.002	-1.312	1.002
1242.5	-1.150	0.970	-1.481	0.970
1246	-1.362	0.875	-1.617	0.875
1249.5	-1.553	0.719	-1.704	0.719
1253	-1.703	0.511	-1.731	0.511
1256.5	-1.800	0.266	-1.692	0.266
1260	-1.833	0.000	-1.588	0.000
1263.5	-1.800	-0.266	-1.426	-0.266
1267	-1.703	-0.511	-1.219	-0.511
1270.5	-1.553	-0.719	-0.985	-0.719
1274	-1.362	-0.875	-0.742	-0.875
1277.5	-1.150	-0.970	-0.511	-0.970
1281	-0.936	-1.002	-0.310	-1.002
1284.5	-0.741	-0.974	-0.154	-0.974
1288	-0.580	-0.897	-0.054	-0.897
1291.5	-0.468	-0.784	-0.013	-0.784
1295	-0.413	-0.655	-0.030	-0.655

1298.5	-0.415	-0.529	-0.095	-0.529
1302	-0.471	-0.424	-0.196	-0.424
1305.5	-0.569	-0.357	-0.314	-0.357
1309	-0.695	-0.342	-0.431	-0.342
1312.5	-0.829	-0.384	-0.526	-0.384
1316	-0.953	-0.483	-0.583	-0.483
1319.5	-1.047	-0.635	-0.589	-0.635
1323	-1.095	-0.827	-0.535	-0.827
1326.5	-1.085	-1.042	-0.419	-1.042
1330	-1.013	-1.263	-0.245	-1.263
1333.5	-0.878	-1.469	-0.026	-1.469
1337	-0.687	-1.641	0.226	-1.641
1340.5	-0.452	-1.762	0.489	-1.762
1344	-0.192	-1.823	0.746	-1.823
1347.5	0.076	-1.818	0.975	-1.818
1351	0.331	-1.747	1.160	-1.747
1354.5	0.553	-1.619	1.289	-1.619
1358	0.728	-1.446	1.353	-1.446
1361.5	0.845	-1.245	1.354	-1.245
1365	0.899	-1.036	1.296	-1.036
1368.5	0.892	-0.838	1.191	-0.838
1372	0.831	-0.671	1.055	-0.671
1375.5	0.731	-0.548	0.907	-0.548
1379	0.608	-0.479	0.766	-0.479
1382.5	0.482	-0.468	0.652	-0.468
1386	0.372	-0.512	0.579	-0.512
1389.5	0.296	-0.603	0.558	-0.603
1393	0.267	-0.727	0.595	-0.727
1396.5	0.295	-0.865	0.688	-0.865
1400	0.381	-0.998	0.829	-0.998
1403.5	0.522	-1.107	1.006	-1.107
1407	0.708	-1.175	1.200	-1.175
1410.5	0.923	-1.188	1.394	-1.188
1414	1.150	-1.139	1.566	-1.139
1417.5	1.369	-1.026	1.699	-1.026
1421	1.560	-0.854	1.778	-0.854
1424.5	1.705	-0.634	1.794	-0.634
1428	1.793	-0.381	1.744	-0.381
1431.5	1.816	-0.114	1.630	-0.114
1435	1.772	0.146	1.462	0.146
1438.5	1.668	0.381	1.254	0.381
1442	1.514	0.573	1.025	0.573
1445.5	1.327	0.710	0.794	0.710
1449	1.124	0.786	0.581	0.786

1452.5	0.927	0.799	0.403	0.799
1456	0.754	0.757	0.275	0.757
1459.5	0.621	0.670	0.203	0.670
1463	0.540	0.555	0.190	0.555
1466.5	0.516	0.431	0.231	0.431
1470	0.548	0.317	0.317	0.317
1473.5	0.631	0.231	0.431	0.231
1477	0.751	0.190	0.555	0.190
1480.5	0.891	0.203	0.670	0.203
1484	1.032	0.275	0.757	0.275
1487.5	1.156	0.403	0.799	0.403
1491	1.242	0.581	0.786	0.581
1494.5	1.278	0.794	0.710	0.794
1498	1.253	1.025	0.573	1.025
1501.5	1.164	1.254	0.381	1.254
1505	1.013	1.462	0.146	1.462
1508.5	0.809	1.630	-0.114	1.630
1512	0.567	1.744	-0.381	1.744
1515.5	0.304	1.794	-0.634	1.794
1519	0.040	1.778	-0.854	1.778
1522.5	-0.204	1.699	-1.026	1.699
1526	-0.411	1.566	-1.139	1.566
1529.5	-0.567	1.394	-1.188	1.394
1533	-0.664	1.200	-1.175	1.200
1536.5	-0.698	1.006	-1.107	1.006
1540	-0.674	0.829	-0.998	0.829
1543.5	-0.601	0.688	-0.865	0.688
1547	-0.496	0.595	-0.727	0.595
1550.5	-0.374	0.558	-0.603	0.558
1554	-0.258	0.579	-0.512	0.579
1557.5	-0.164	0.652	-0.468	0.652
1561	-0.110	0.766	-0.479	0.766
1564.5	-0.109	0.907	-0.548	0.907
1568	-0.165	1.055	-0.671	1.055
1571.5	-0.280	1.191	-0.838	1.191
1575	-0.448	1.296	-1.036	1.296
1578.5	-0.656	1.354	-1.245	1.354
1582	-0.888	1.353	-1.446	1.353
1585.5	-1.126	1.289	-1.619	1.289
1589	-1.348	1.160	-1.747	1.160
1592.5	-1.536	0.975	-1.818	0.975
1596	-1.675	0.746	-1.823	0.746
1599.5	-1.752	0.489	-1.762	0.489
1603	-1.764	0.226	-1.641	0.226

1606.5	-1.711	-0.026	-1.469	-0.026
1610	-1.600	-0.245	-1.263	-0.245
1613.5	-1.445	-0.419	-1.042	-0.419
1617	-1.263	-0.535	-0.827	-0.535
1620.5	-1.073	-0.589	-0.635	-0.589
1624	-0.895	-0.583	-0.483	-0.583
1627.5	-0.747	-0.526	-0.384	-0.526
1631	-0.643	-0.431	-0.342	-0.431
1634.5	-0.594	-0.314	-0.357	-0.314
1638	-0.602	-0.196	-0.424	-0.196
1641.5	-0.665	-0.095	-0.529	-0.095
1645	-0.774	-0.030	-0.655	-0.030
1648.5	-0.913	-0.013	-0.784	-0.013
1652	-1.067	-0.054	-0.897	-0.054
1655.5	-1.214	-0.154	-0.974	-0.154
1659	-1.336	-0.310	-1.002	-0.310
1662.5	-1.415	-0.511	-0.970	-0.511
1666	-1.439	-0.742	-0.875	-0.742
1669.5	-1.399	-0.985	-0.719	-0.985
1673	-1.295	-1.219	-0.511	-1.219
1676.5	-1.130	-1.426	-0.266	-1.426
1680	-0.917	-1.588	0.000	-1.588
1683.5	-0.670	-1.692	0.266	-1.692
1687	-0.409	-1.731	0.511	-1.731
1690.5	-0.153	-1.704	0.719	-1.704
1694	0.077	-1.617	0.875	-1.617
1697.5	0.265	-1.481	0.970	-1.481
1701	0.400	-1.312	1.002	-1.312
1704.5	0.474	-1.129	0.974	-1.129
1708	0.487	-0.951	0.897	-0.951
1711.5	0.445	-0.798	0.784	-0.798
1715	0.361	-0.685	0.655	-0.685
1718.5	0.250	-0.624	0.529	-0.624
1722	0.132	-0.619	0.424	-0.619
1725.5	0.025	-0.672	0.357	-0.672
1729	-0.051	-0.773	0.342	-0.773
1732.5	-0.082	-0.910	0.384	-0.910
1736	-0.058	-1.067	0.483	-1.067
1739.5	0.026	-1.224	0.635	-1.224
1743	0.169	-1.361	0.827	-1.361
1746.5	0.360	-1.461	1.042	-1.461
1750	0.588	-1.509	1.263	-1.509
1753.5	0.833	-1.494	1.469	-1.494
1757	1.077	-1.415	1.641	-1.415

1760.5	1.300	-1.273	1.762	-1.273
1764	1.483	-1.078	1.823	-1.078
1767.5	1.612	-0.843	1.818	-0.843
1771	1.679	-0.587	1.747	-0.587
1774.5	1.679	-0.331	1.619	-0.331
1778	1.616	-0.093	1.446	-0.093
1781.5	1.501	0.109	1.245	0.109
1785	1.347	0.260	1.036	0.260
1788.5	1.172	0.353	0.838	0.353
1792	0.997	0.385	0.671	0.385
1795.5	0.840	0.359	0.548	0.359
1799	0.719	0.287	0.479	0.287
1802.5	0.646	0.184	0.468	0.184
1806	0.630	0.066	0.512	0.066
1809.5	0.670	-0.045	0.603	-0.045
1813	0.763	-0.132	0.727	-0.132
1816.5	0.896	-0.177	0.865	-0.177
1820	1.055	-0.169	0.998	-0.169
1823.5	1.220	-0.102	1.107	-0.102
1827	1.371	0.025	1.175	0.025
1830.5	1.491	0.205	1.188	0.205
1834	1.562	0.427	1.139	0.427
1837.5	1.573	0.672	1.026	0.672
1841	1.520	0.924	0.854	0.924
1844.5	1.402	1.160	0.634	1.160
1848	1.227	1.362	0.381	1.362
1851.5	1.007	1.515	0.114	1.515
1855	0.760	1.608	-0.146	1.608
1858.5	0.504	1.635	-0.381	1.635
1862	0.261	1.598	-0.573	1.598
1865.5	0.048	1.504	-0.710	1.504
1869	-0.118	1.366	-0.786	1.366
1872.5	-0.229	1.202	-0.799	1.202
1876	-0.278	1.031	-0.757	1.031
1879.5	-0.270	0.873	-0.670	0.873
1883	-0.211	0.745	-0.555	0.745
1886.5	-0.115	0.662	-0.431	0.662
1890	0.000	0.633	-0.317	0.633
1893.5	0.115	0.662	-0.231	0.662
1897	0.211	0.745	-0.190	0.745
1900.5	0.270	0.873	-0.203	0.873
1904	0.278	1.031	-0.275	1.031
1907.5	0.229	1.202	-0.403	1.202
1911	0.118	1.366	-0.581	1.366

1914.5	-0.048	1.504	-0.794	1.504
1918	-0.261	1.598	-1.025	1.598
1921.5	-0.504	1.635	-1.254	1.635
1925	-0.760	1.608	-1.462	1.608
1928.5	-1.007	1.515	-1.630	1.515
1932	-1.227	1.362	-1.744	1.362
1935.5	-1.402	1.160	-1.794	1.160
1939	-1.520	0.924	-1.778	0.924
1942.5	-1.573	0.672	-1.699	0.672
1946	-1.562	0.427	-1.566	0.427
1949.5	-1.491	0.205	-1.394	0.205
1953	-1.371	0.025	-1.200	0.025
1956.5	-1.220	-0.102	-1.006	-0.102
1960	-1.055	-0.169	-0.829	-0.169
1963.5	-0.896	-0.177	-0.688	-0.177
1967	-0.763	-0.132	-0.595	-0.132
1970.5	-0.670	-0.045	-0.558	-0.045
1974	-0.630	0.066	-0.579	0.066
1977.5	-0.646	0.184	-0.652	0.184
1981	-0.719	0.287	-0.766	0.287
1984.5	-0.840	0.359	-0.907	0.359
1988	-0.997	0.385	-1.055	0.385
1991.5	-1.172	0.353	-1.191	0.353
1995	-1.347	0.260	-1.296	0.260
1998.5	-1.501	0.109	-1.354	0.109
2002	-1.616	-0.093	-1.353	-0.093
2005.5	-1.679	-0.331	-1.289	-0.331
2009	-1.679	-0.587	-1.160	-0.587
2012.5	-1.612	-0.843	-0.975	-0.843
2016	-1.483	-1.078	-0.746	-1.078
2019.5	-1.300	-1.273	-0.489	-1.273
2023	-1.077	-1.415	-0.226	-1.415
2026.5	-0.833	-1.494	0.026	-1.494
2030	-0.588	-1.509	0.245	-1.509
2033.5	-0.360	-1.461	0.419	-1.461
2037	-0.169	-1.361	0.535	-1.361
2040.5	-0.026	-1.224	0.589	-1.224
2044	0.058	-1.067	0.583	-1.067
2047.5	0.082	-0.910	0.526	-0.910
2051	0.051	-0.773	0.431	-0.773
2054.5	-0.025	-0.672	0.314	-0.672
2058	-0.132	-0.619	0.196	-0.619
2061.5	-0.250	-0.624	0.095	-0.624
2065	-0.361	-0.685	0.030	-0.685

2068.5	-0.445	-0.798	0.013	-0.798
2072	-0.487	-0.951	0.054	-0.951
2075.5	-0.474	-1.129	0.154	-1.129
2079	-0.400	-1.312	0.310	-1.312
2082.5	-0.265	-1.481	0.511	-1.481
2086	-0.077	-1.617	0.742	-1.617
2089.5	0.153	-1.704	0.985	-1.704
2093	0.409	-1.731	1.219	-1.731
2096.5	0.670	-1.692	1.426	-1.692
2100	0.917	-1.588	1.588	-1.588
2103.5	1.130	-1.426	1.692	-1.426
2107	1.295	-1.219	1.731	-1.219
2110.5	1.399	-0.985	1.704	-0.985
2114	1.439	-0.742	1.617	-0.742
2117.5	1.415	-0.511	1.481	-0.511
2121	1.336	-0.310	1.312	-0.310
2124.5	1.214	-0.154	1.129	-0.154
2128	1.067	-0.054	0.951	-0.054
2131.5	0.913	-0.013	0.798	-0.013
2135	0.774	-0.030	0.685	-0.030
2138.5	0.665	-0.095	0.624	-0.095
2142	0.602	-0.196	0.619	-0.196
2145.5	0.594	-0.314	0.672	-0.314
2149	0.643	-0.431	0.773	-0.431
2152.5	0.747	-0.526	0.910	-0.526
2156	0.895	-0.583	1.067	-0.583
2159.5	1.073	-0.589	1.224	-0.589
2163	1.263	-0.535	1.361	-0.535
2166.5	1.445	-0.419	1.461	-0.419
2170	1.600	-0.245	1.509	-0.245
2173.5	1.711	-0.026	1.494	-0.026
2177	1.764	0.226	1.415	0.226
2180.5	1.752	0.489	1.273	0.489
2184	1.675	0.746	1.078	0.746
2187.5	1.536	0.975	0.843	0.975
2191	1.348	1.160	0.587	1.160
2194.5	1.126	1.289	0.331	1.289
2198	0.888	1.353	0.093	1.353
2201.5	0.656	1.354	-0.109	1.354
2205	0.448	1.296	-0.260	1.296
2208.5	0.280	1.191	-0.353	1.191
2212	0.165	1.055	-0.385	1.055
2215.5	0.109	0.907	-0.359	0.907
2219	0.110	0.766	-0.287	0.766

2222.5	0.164	0.652	-0.184	0.652
2226	0.258	0.579	-0.066	0.579
2229.5	0.374	0.558	0.045	0.558
2233	0.496	0.595	0.132	0.595
2236.5	0.601	0.688	0.177	0.688
2240	0.674	0.829	0.169	0.829
2243.5	0.698	1.006	0.102	1.006
2247	0.664	1.200	-0.025	1.200
2250.5	0.567	1.394	-0.205	1.394
2254	0.411	1.566	-0.427	1.566
2257.5	0.204	1.699	-0.672	1.699
2261	-0.040	1.778	-0.924	1.778
2264.5	-0.304	1.794	-1.160	1.794
2268	-0.567	1.744	-1.362	1.744
2271.5	-0.809	1.630	-1.515	1.630
2275	-1.013	1.462	-1.608	1.462
2278.5	-1.164	1.254	-1.635	1.254
2282	-1.253	1.025	-1.598	1.025
2285.5	-1.278	0.794	-1.504	0.794
2289	-1.242	0.581	-1.366	0.581
2292.5	-1.156	0.403	-1.202	0.403
2296	-1.032	0.275	-1.031	0.275
2299.5	-0.891	0.203	-0.873	0.203
2303	-0.751	0.190	-0.745	0.190
2306.5	-0.631	0.231	-0.662	0.231
2310	-0.548	0.317	-0.633	0.317
2313.5	-0.516	0.431	-0.662	0.431
2317	-0.540	0.555	-0.745	0.555
2320.5	-0.621	0.670	-0.873	0.670
2324	-0.754	0.757	-1.031	0.757
2327.5	-0.927	0.799	-1.202	0.799
2331	-1.124	0.786	-1.366	0.786
2334.5	-1.327	0.710	-1.504	0.710
2338	-1.514	0.573	-1.598	0.573
2341.5	-1.668	0.381	-1.635	0.381
2345	-1.772	0.146	-1.608	0.146
2348.5	-1.816	-0.114	-1.515	-0.114
2352	-1.793	-0.381	-1.362	-0.381
2355.5	-1.705	-0.634	-1.160	-0.634
2359	-1.560	-0.854	-0.924	-0.854
2362.5	-1.369	-1.026	-0.672	-1.026
2366	-1.150	-1.139	-0.427	-1.139
2369.5	-0.923	-1.188	-0.205	-1.188
2373	-0.708	-1.175	-0.025	-1.175

2376.5	-0.522	-1.107	0.102	-1.107
2380	-0.381	-0.998	0.169	-0.998
2383.5	-0.295	-0.865	0.177	-0.865
2387	-0.267	-0.727	0.132	-0.727
2390.5	-0.296	-0.603	0.045	-0.603
2394	-0.372	-0.512	-0.066	-0.512
2397.5	-0.482	-0.468	-0.184	-0.468
2401	-0.608	-0.479	-0.287	-0.479
2404.5	-0.731	-0.548	-0.359	-0.548
2408	-0.831	-0.671	-0.385	-0.671
2411.5	-0.892	-0.838	-0.353	-0.838
2415	-0.899	-1.036	-0.260	-1.036
2418.5	-0.845	-1.245	-0.109	-1.245
2422	-0.728	-1.446	0.093	-1.446
2425.5	-0.553	-1.619	0.331	-1.619
2429	-0.331	-1.747	0.587	-1.747
2432.5	-0.076	-1.818	0.843	-1.818
2436	0.192	-1.823	1.078	-1.823
2439.5	0.452	-1.762	1.273	-1.762
2443	0.687	-1.641	1.415	-1.641
2446.5	0.878	-1.469	1.494	-1.469
2450	1.013	-1.263	1.509	-1.263
2453.5	1.085	-1.042	1.461	-1.042
2457	1.095	-0.827	1.361	-0.827
2460.5	1.047	-0.635	1.224	-0.635
2464	0.953	-0.483	1.067	-0.483
2467.5	0.829	-0.384	0.910	-0.384
2471	0.695	-0.342	0.773	-0.342
2474.5	0.569	-0.357	0.672	-0.357
2478	0.471	-0.424	0.619	-0.424
2481.5	0.415	-0.529	0.624	-0.529
2485	0.413	-0.655	0.685	-0.655
2488.5	0.468	-0.784	0.798	-0.784
2492	0.580	-0.897	0.951	-0.897
2495.5	0.741	-0.974	1.129	-0.974
2499	0.936	-1.002	1.312	-1.002
2502.5	1.150	-0.970	1.481	-0.970
2506	1.362	-0.875	1.617	-0.875
2509.5	1.553	-0.719	1.704	-0.719
2513	1.703	-0.511	1.731	-0.511
2516.5	1.800	-0.266	1.692	-0.266
2520	1.833	0.000	1.588	0.000

and Y rotation to make shape oblong in different directions.

the ratio of radius of the moving circle (top NON-ZERO integer) to the radius of the fixed central circle (bottom I

n absolute value of Minor Radius calculated below when the Minor Radius is positive, or (2) less than absolute '

NON-ZERO integer).

value of Minor Radius, when Minor Radius is neg.