

sin(θ°)	0.0 °	0.1 °	0.2 °	0.3 °	0.4 °	0.5 °	0.6 °	0.7 °	0.8 °	0.9 °	1.0 °	
0 °	0.00000	0.0017453	0.0034907	0.0052360	0.0069813	0.0087265	0.010472	0.012217	0.013962	0.015707	0.017452	89 °
1 °	0.017452	0.019197	0.020942	0.022687	0.024432	0.026177	0.027922	0.029666	0.031411	0.033155	0.034899	88 °
2 °	0.034899	0.036644	0.038388	0.040132	0.041876	0.043619	0.045363	0.047106	0.048850	0.050593	0.052336	87 °
3 °	0.052336	0.054079	0.055822	0.057564	0.059306	0.061049	0.062791	0.064532	0.066274	0.068015	0.069756	86 °
4 °	0.069756	0.071497	0.073238	0.074979	0.076719	0.078459	0.080199	0.081939	0.083678	0.085417	0.087156	85 °
5 °	0.087156	0.088894	0.090633	0.092371	0.094108	0.095846	0.097583	0.099320	0.10106	0.10279	0.10453	84 °
6 °	0.10453	0.10626	0.10800	0.10973	0.11147	0.11320	0.11494	0.11667	0.11840	0.12014	0.12187	83 °
7 °	0.12187	0.12360	0.12533	0.12706	0.12880	0.13053	0.13226	0.13399	0.13572	0.13744	0.13917	82 °
8 °	0.13917	0.14090	0.14263	0.14436	0.14608	0.14781	0.14954	0.15126	0.15299	0.15471	0.15643	81 °
9 °	0.15643	0.15816	0.15988	0.16160	0.16333	0.16505	0.16677	0.16849	0.17021	0.17193	0.17365	80 °
10 °	0.17365	0.17537	0.17708	0.17880	0.18052	0.18224	0.18395	0.18567	0.18738	0.18910	0.19081	79 °
11 °	0.19081	0.19252	0.19423	0.19595	0.19766	0.19937	0.20108	0.20279	0.20450	0.20620	0.20791	78 °
12 °	0.20791	0.20962	0.21132	0.21303	0.21474	0.21644	0.21814	0.21985	0.22155	0.22325	0.22495	77 °
13 °	0.22495	0.22665	0.22835	0.23005	0.23175	0.23345	0.23514	0.23684	0.23853	0.24023	0.24192	76 °
14 °	0.24192	0.24362	0.24531	0.24700	0.24869	0.25038	0.25207	0.25376	0.25545	0.25713	0.25882	75 °
15 °	0.25882	0.26050	0.26219	0.26387	0.26556	0.26724	0.26892	0.27060	0.27228	0.27396	0.27564	74 °
16 °	0.27564	0.27731	0.27899	0.28067	0.28234	0.28402	0.28569	0.28736	0.28903	0.29070	0.29237	73 °
17 °	0.29237	0.29404	0.29571	0.29737	0.29904	0.30071	0.30237	0.30403	0.30570	0.30736	0.30902	72 °
18 °	0.30902	0.31068	0.31233	0.31399	0.31565	0.31730	0.31896	0.32061	0.32227	0.32392	0.32557	71 °
19 °	0.32557	0.32722	0.32887	0.33051	0.33216	0.33381	0.33545	0.33710	0.33874	0.34038	0.34202	70 °
20 °	0.34202	0.34366	0.34530	0.34694	0.34857	0.35021	0.35184	0.35347	0.35511	0.35674	0.35837	69 °
21 °	0.35837	0.36000	0.36162	0.36325	0.36488	0.36650	0.36812	0.36975	0.37137	0.37299	0.37461	68 °
22 °	0.37461	0.37622	0.37784	0.37946	0.38107	0.38268	0.38430	0.38591	0.38752	0.38912	0.39073	67 °
23 °	0.39073	0.39234	0.39394	0.39555	0.39715	0.39875	0.40035	0.40195	0.40355	0.40514	0.40674	66 °
24 °	0.40674	0.40833	0.40992	0.41151	0.41310	0.41469	0.41628	0.41787	0.41945	0.42104	0.42262	65 °
25 °	0.42262	0.42420	0.42578	0.42736	0.42894	0.43051	0.43209	0.43366	0.43523	0.43680	0.43837	64 °
26 °	0.43837	0.43994	0.44151	0.44307	0.44464	0.44620	0.44776	0.44932	0.45088	0.45243	0.45399	63 °
27 °	0.45399	0.45554	0.45710	0.45865	0.46020	0.46175	0.46330	0.46484	0.46639	0.46793	0.46947	62 °
28 °	0.46947	0.47101	0.47255	0.47409	0.47562	0.47716	0.47869	0.48022	0.48175	0.48328	0.48481	61 °
29 °	0.48481	0.48634	0.48786	0.48938	0.49090	0.49242	0.49394	0.49546	0.49697	0.49849	0.50000	60 °
30 °	0.50000	0.50151	0.50302	0.50453	0.50603	0.50754	0.50904	0.51054	0.51204	0.51354	0.51504	59 °
31 °	0.51504	0.51653	0.51803	0.51952	0.52101	0.52250	0.52399	0.52547	0.52696	0.52844	0.52992	58 °
32 °	0.52992	0.53140	0.53288	0.53435	0.53583	0.53730	0.53877	0.54024	0.54171	0.54317	0.54464	57 °
33 °	0.54464	0.54610	0.54756	0.54902	0.55048	0.55194	0.55339	0.55484	0.55630	0.55775	0.55919	56 °
34 °	0.55919	0.56064	0.56208	0.56353	0.56497	0.56641	0.56784	0.56928	0.57071	0.57215	0.57358	55 °
35 °	0.57358	0.57501	0.57643	0.57786	0.57928	0.58070	0.58212	0.58354	0.58496	0.58637	0.58779	54 °
36 °	0.58779	0.58920	0.59061	0.59201	0.59342	0.59482	0.59622	0.59763	0.59902	0.60042	0.60182	53 °
37 °	0.60182	0.60321	0.60460	0.60599	0.60738	0.60876	0.61015	0.61153	0.61291	0.61429	0.61566	52 °
38 °	0.61566	0.61704	0.61841	0.61978	0.62115	0.62251	0.62388	0.62524	0.62660	0.62796	0.62932	51 °
39 °	0.62932	0.63068	0.63203	0.63338	0.63473	0.63608	0.63742	0.63877	0.64011	0.64145	0.64279	50 °
40 °	0.64279	0.64412	0.64546	0.64679	0.64812	0.64945	0.65077	0.65210	0.65342	0.65474	0.65606	49 °
41 °	0.65606	0.65738	0.65869	0.66000	0.66131	0.66262	0.66393	0.66523	0.66653	0.66783	0.66913	48 °
42 °	0.66913	0.67043	0.67172	0.67301	0.67430	0.67559	0.67688	0.67816	0.67944	0.68072	0.68200	47 °
43 °	0.68200	0.68327	0.68455	0.68582	0.68709	0.68835	0.68962	0.69088	0.69214	0.69340	0.69466	46 °
44 °	0.69466	0.69591	0.69717	0.69842	0.69966	0.70091	0.70215	0.70339	0.70463	0.70587	0.70711	45 °
	1.0 °	0.9 °	0.8 °	0.7 °	0.6 °	0.5 °	0.4 °	0.3 °	0.2 °	0.1 °	0.0 °	cos(θ°)

$\sin(\theta^\circ)$	0.0 °	0.1 °	0.2 °	0.3 °	0.4 °	0.5 °	0.6 °	0.7 °	0.8 °	0.9 °	1.0 °	
45 °	0.70711	0.70834	0.70957	0.71080	0.71203	0.71325	0.71447	0.71569	0.71691	0.71813	0.71934	44 °
46 °	0.71934	0.72055	0.72176	0.72297	0.72417	0.72537	0.72657	0.72777	0.72897	0.73016	0.73135	43 °
47 °	0.73135	0.73254	0.73373	0.73491	0.73610	0.73728	0.73846	0.73963	0.74080	0.74198	0.74314	42 °
48 °	0.74314	0.74431	0.74548	0.74664	0.74780	0.74896	0.75011	0.75126	0.75241	0.75356	0.75471	41 °
49 °	0.75471	0.75585	0.75700	0.75813	0.75927	0.76041	0.76154	0.76267	0.76380	0.76492	0.76604	40 °
50 °	0.76604	0.76717	0.76828	0.76940	0.77051	0.77162	0.77273	0.77384	0.77494	0.77605	0.77715	39 °
51 °	0.77715	0.77824	0.77934	0.78043	0.78152	0.78261	0.78369	0.78478	0.78586	0.78694	0.78801	38 °
52 °	0.78801	0.78908	0.79016	0.79122	0.79229	0.79335	0.79441	0.79547	0.79653	0.79758	0.79864	37 °
53 °	0.79864	0.79968	0.80073	0.80178	0.80282	0.80386	0.80489	0.80593	0.80696	0.80799	0.80902	36 °
54 °	0.80902	0.81004	0.81106	0.81208	0.81310	0.81412	0.81513	0.81614	0.81714	0.81815	0.81915	35 °
55 °	0.81915	0.82015	0.82115	0.82214	0.82314	0.82413	0.82511	0.82610	0.82708	0.82806	0.82904	34 °
56 °	0.82904	0.83001	0.83098	0.83195	0.83292	0.83389	0.83485	0.83581	0.83676	0.83772	0.83867	33 °
57 °	0.83867	0.83962	0.84057	0.84151	0.84245	0.84339	0.84433	0.84526	0.84619	0.84712	0.84805	32 °
58 °	0.84805	0.84897	0.84989	0.85081	0.85173	0.85264	0.85355	0.85446	0.85536	0.85627	0.85717	31 °
59 °	0.85717	0.85806	0.85896	0.85985	0.86074	0.86163	0.86251	0.86340	0.86427	0.86515	0.86603	30 °
60 °	0.86603	0.86690	0.86777	0.86863	0.86949	0.87036	0.87121	0.87207	0.87292	0.87377	0.87462	29 °
61 °	0.87462	0.87546	0.87631	0.87715	0.87798	0.87882	0.87965	0.88048	0.88130	0.88213	0.88295	28 °
62 °	0.88295	0.88377	0.88458	0.88539	0.88620	0.88701	0.88782	0.88862	0.88942	0.89021	0.89101	27 °
63 °	0.89101	0.89180	0.89259	0.89337	0.89415	0.89493	0.89571	0.89649	0.89726	0.89803	0.89879	26 °
64 °	0.89879	0.89956	0.90032	0.90108	0.90183	0.90259	0.90334	0.90408	0.90483	0.90557	0.90631	25 °
65 °	0.90631	0.90704	0.90778	0.90851	0.90924	0.90996	0.91068	0.91140	0.91212	0.91283	0.91355	24 °
66 °	0.91355	0.91425	0.91496	0.91566	0.91636	0.91706	0.91775	0.91845	0.91914	0.91982	0.92050	23 °
67 °	0.92050	0.92119	0.92186	0.92254	0.92321	0.92388	0.92455	0.92521	0.92587	0.92653	0.92718	22 °
68 °	0.92718	0.92784	0.92849	0.92913	0.92978	0.93042	0.93106	0.93169	0.93232	0.93295	0.93358	21 °
69 °	0.93358	0.93420	0.93483	0.93544	0.93606	0.93667	0.93728	0.93789	0.93849	0.93909	0.93969	20 °
70 °	0.93969	0.94029	0.94088	0.94147	0.94206	0.94264	0.94322	0.94380	0.94438	0.94495	0.94552	19 °
71 °	0.94552	0.94609	0.94665	0.94721	0.94777	0.94832	0.94888	0.94943	0.94997	0.95052	0.95106	18 °
72 °	0.95106	0.95159	0.95213	0.95266	0.95319	0.95372	0.95424	0.95476	0.95528	0.95579	0.95630	17 °
73 °	0.95630	0.95681	0.95732	0.95782	0.95832	0.95882	0.95931	0.95981	0.96029	0.96078	0.96126	16 °
74 °	0.96126	0.96174	0.96222	0.96269	0.96316	0.96363	0.96410	0.96456	0.96502	0.96547	0.96593	15 °
75 °	0.96593	0.96638	0.96682	0.96727	0.96771	0.96815	0.96858	0.96902	0.96945	0.96987	0.97030	14 °
76 °	0.97030	0.97072	0.97113	0.97155	0.97196	0.97237	0.97278	0.97318	0.97358	0.97398	0.97437	13 °
77 °	0.97437	0.97476	0.97515	0.97553	0.97592	0.97630	0.97667	0.97705	0.97742	0.97778	0.97815	12 °
78 °	0.97815	0.97851	0.97887	0.97922	0.97958	0.97992	0.98027	0.98061	0.98096	0.98129	0.98163	11 °
79 °	0.98163	0.98196	0.98229	0.98261	0.98294	0.98325	0.98357	0.98389	0.98420	0.98450	0.98481	10 °
80 °	0.98481	0.98511	0.98541	0.98570	0.98600	0.98629	0.98657	0.98686	0.98714	0.98741	0.98769	9 °
81 °	0.98769	0.98796	0.98823	0.98849	0.98876	0.98902	0.98927	0.98953	0.98978	0.99002	0.99027	8 °
82 °	0.990268	0.990509	0.990748	0.990983	0.991216	0.991445	0.991671	0.991894	0.992115	0.992332	0.992546	7 °
83 °	0.992546	0.992757	0.992966	0.993171	0.993373	0.993572	0.993768	0.993961	0.994151	0.994338	0.994522	6 °
84 °	0.994522	0.994703	0.994881	0.995056	0.995227	0.995396	0.995562	0.995725	0.995884	0.996041	0.996195	5 °
85 °	0.996195	0.996345	0.996493	0.996637	0.996779	0.996917	0.997053	0.997185	0.997314	0.997441	0.997564	4 °
86 °	0.997564	0.997684	0.997801	0.997916	0.998027	0.998135	0.998240	0.998342	0.998441	0.998537	0.998630	3 °
87 °	0.998630	0.998719	0.998806	0.998890	0.998971	0.9990482	0.9991228	0.9991944	0.9992629	0.9993284	0.9993908	2 °
88 °	0.9993908	0.9994502	0.9995066	0.9995599	0.9996101	0.9996573	0.9997015	0.9997426	0.9997807	0.9998157	0.9998477	1 °
89 °	0.9998477	0.9998766	0.9999025	0.9999254	0.9999452	0.9999619	0.9999756	0.9999863	0.9999939	0.9999985	1.0000000	0 °
	1.0 °	0.9 °	0.8 °	0.7 °	0.6 °	0.5 °	0.4 °	0.3 °	0.2 °	0.1 °	0.0 °	$\cos(\theta^\circ)$