WGS84 Ellipsoid - radius v latitude

Enter degrees & decimal degrees in pink box in columns B & C. Read out radius in Km in column D green box

Columns E-Q show intermediate calculations

Latitude degrees	Minutes & decimals	Radius Km (1/Sq Rt of Col P)	deg dec	Radians	Sine	sin2	a2	1/a2	b2	1/b2	1/a2-1/b2	g x j	g-k	Sq Rt	
51	**12.940**	**6365.1172**	51.21567	0.8939	0.7795	0.6076	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-1E-10	2.47E-08	0.000157	
0	0.000	6378.1370	0.00000	0.0000	0	0	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	0	2.46E-08	0.000157	
5	0.000	6377.9737	5.00000	0.0873	0.0872	0.0076	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-1E-12	2.46E-08	0.000157	
10	0.000	6377.4890	10.00000	0.1745	0.1736	0.0302	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-5E-12	2.46E-08	0.000157	
15	0.000	6376.6977	15.00000	0.2618	0.2588	0.067	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-1E-11	2.46E-08	0.000157	
20	0.000	6375.6243	20.00000	0.3491	0.342	0.117	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-2E-11	2.46E-08	0.000157	
25	0.000	6374.3017	25.00000	0.4363	0.4226	0.1786	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-3E-11	2.46E-08	0.000157	
30	0.000	6372.7706	30.00000	0.5236	0.5	0.25	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-4E-11	2.46E-08	0.000157	
35	*13.280*	*6371.0000*	*35.22133*	*0.6147*	*0.5767*	*0.3326*	*40680632*	*2.458E-08*	*40408299.8*	*2.4747E-08*	*-1.66E-10*	*-6E-11*	*2.46E-08*	*0.00016*	*FAI sphere 6371 km*
35	0.000	6371.0778	35.00000	0.6109	0.5736	0.329	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-5E-11	2.46E-08	0.000157	
40	0.000	6369.2752	40.00000	0.6981	0.6428	0.4132	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-7E-11	2.47E-08	0.000157	
45	0.000	6367.4177	45.00000	0.7854	0.7071	0.5	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-8E-11	2.47E-08	0.000157	
50	0.000	6365.5618	50.00000	0.8727	0.766	0.5868	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-1E-10	2.47E-08	0.000157	
55	0.000	6363.7639	55.00000	0.9599	0.8192	0.671	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-1E-10	2.47E-08	0.000157	
60	0.000	6362.0783	60.00000	1.0472	0.866	0.75	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-1E-10	2.47E-08	0.000157	
65	0.000	6360.5560	65.00000	1.1345	0.9063	0.8214	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-1E-10	2.47E-08	0.000157	
70	0.000	6359.2427	70.00000	1.2217	0.9397	0.883	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-1E-10	2.47E-08	0.000157	
75	0.000	6358.1781	75.00000	1.3090	0.9659	0.933	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-2E-10	2.47E-08	0.000157	
80	0.000	6357.3940	80.00000	1.3963	0.9848	0.9698	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-2E-10	2.47E-08	0.000157	
85	0.000	6356.9139	85.00000	1.4835	0.9962	0.9924	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-2E-10	2.47E-08	0.000157	
90	0.000	6356.7523	90.00000	1.5708	1	1	40680632	2.4582E-08	40408299.8	2.4747E-08	-1.657E-10	-2E-10	2.47E-08	0.000157	

Data basis: Formula from Prof Peter Ryder (ex IGC President), MS Excel program by Ian Strachan (Chairman IGC GFA Committee)

a WGS84 Equator	6378.1370	km	WGS84 definition	Formula:	r = 1 divided by Sq Root of [1/a2 - (1/a2 - 1/b2) sin2Lat]
b N-S Radius	6356.7523	km	WGS84 definition	Key:	a = equatorial radius, b = polar radius, r = intermediate radius
Degrees per radian	57.295780	Deg	180 over Pi		a2 = a squared; b2 = b squared; sin2 = sine squared