

Formula for the eccentricity of an ellipse:  $e = \sqrt{a^2 - b^2} / a$ , where a and b are the major and minor axes

Average radius of earth's orbit is 149.6 million km

### Parameters of earth's orbit under differing eccentricities

eccentricity	a	b	c	a-major axis (millions of km)	b-minor axis (millions of km)	offset of foci	perihelion (millions of km)	aphelion (millions of km)	
0	1	1	0	149.60	149.60	0.00	149.6	149.6	
0.0045	1.000005	0.999995	0.004472	149.60	149.60	0.67	148.9	150.3	
<b>0.0063</b>	<b>1.00001</b>	<b>0.99999</b>	<b>0.006325</b>	<b>149.60</b>	<b>149.60</b>	<b>0.95</b>	<b>148.7</b>	<b>150.5</b>	minimum
0.0077	1.000015	0.999985	0.007746	149.60	149.60	1.16	148.4	150.8	
0.0089	1.00002	0.99998	0.008944	149.60	149.60	1.34	148.3	150.9	
0.0100	1.000025	0.999975	0.01	149.60	149.60	1.50	148.1	151.1	
0.0110	1.00003	0.99997	0.010954	149.60	149.60	1.64	148.0	151.2	
<b>0.0118</b>	1.000035	0.999965	0.011832	149.61	149.59	1.77	147.8	151.4	
0.0126	1.00004	0.99996	0.012649	149.61	149.59	1.89	147.7	151.5	
0.0134	1.000045	0.999955	0.013416	149.61	149.59	2.01	147.6	151.6	
0.0141	1.00005	0.99995	0.014142	149.61	149.59	2.12	147.5	151.7	
0.0148	1.000055	0.999945	0.014832	149.61	149.59	2.22	147.4	151.8	
0.0155	1.00006	0.99994	0.015492	149.61	149.59	2.32	147.3	151.9	
0.0161	1.000065	0.999935	0.016125	149.61	149.59	2.41	147.2	152.0	
<b>0.0167</b>	<b>1.00007</b>	<b>0.99993</b>	<b>0.016733</b>	<b>149.61</b>	<b>149.59</b>	<b>2.50</b>	<b>147.1</b>	<b>152.1</b>	now
0.0173	1.000075	0.999925	0.017321	149.61	149.59	2.59	147.0	152.2	
0.0179	1.00008	0.99992	0.017889	149.61	149.59	2.68	146.9	152.3	
0.0184	1.000085	0.999915	0.018439	149.61	149.59	2.76	146.8	152.4	
0.0190	1.00009	0.99991	0.018974	149.61	149.59	2.84	146.8	152.4	
0.0195	1.000095	0.999905	0.019494	149.61	149.59	2.92	146.7	152.5	
0.0200	1.0001	0.9999	0.02	149.61	149.59	2.99	146.6	152.6	
0.0283	1.0002	0.9998	0.028284	149.63	149.57	4.23	145.4	153.8	
0.0346	1.0003	0.9997	0.034641	149.64	149.56	5.18	144.4	154.8	
0.0400	1.0004	0.9996	0.04	149.66	149.54	5.98	143.6	155.6	
0.0447	1.0005	0.9995	0.044721	149.67	149.53	6.69	142.9	156.3	
0.0490	1.0006	0.9994	0.04899	149.69	149.51	7.33	142.3	156.9	
0.0529	1.0007	0.9993	0.052915	149.70	149.50	7.92	141.7	157.5	
0.0565	1.0008	0.9992	0.056569	149.72	149.48	8.46	141.1	158.1	
<b>0.0599</b>	<b>1.0009</b>	<b>0.9991</b>	<b>0.06</b>	<b>149.73</b>	<b>149.47</b>	<b>8.98</b>	<b>140.6</b>	<b>158.6</b>	maximum
0.0632	1.001	0.999	0.063246	149.75	149.45	9.46	140.1	159.1	
0.0663	1.0011	0.9989	0.066332	149.76	149.44	9.92	139.7	159.5	
0.0692	1.0012	0.9988	0.069282	149.78	149.42	10.36	139.2	160.0	
0.0720	1.0013	0.9987	0.072111	149.79	149.41	10.79	138.8	160.4	
0.0747	1.0014	0.9986	0.074833	149.81	149.39	11.20	138.4	160.8	
0.0773	1.0015	0.9985	0.07746	149.82	149.38	11.59	138.0	161.2	
0.0799	1.0016	0.9984	0.08	149.84	149.36	11.97	137.6	161.6	
0.0823	1.0017	0.9983	0.082462	149.85	149.35	12.34	137.3	161.9	
0.0847	1.0018	0.9982	0.084853	149.87	149.33	12.69	136.9	162.3	
0.0870	1.0019	0.9981	0.087178	149.88	149.32	13.04	136.6	162.6	
0.0893	1.002	0.998	0.089443	149.90	149.30	13.38	136.2	163.0	
0.0915	1.0021	0.9979	0.091652	149.91	149.29	13.71	135.9	163.3	
0.0936	1.0022	0.9978	0.093808	149.93	149.27	14.03	135.6	163.6	
0.0957	1.0023	0.9977	0.095917	149.94	149.26	14.35	135.3	163.9	
0.0977	1.0024	0.9976	0.09798	149.96	149.24	14.66	134.9	164.3	
0.0998	1.0025	0.9975	0.1	149.97	149.23	14.96	134.6	164.6	