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Research Paper

Study of the Orbit of Planet Venus- Refined

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Kindly note that all the positions mentioned below are based on Tropical Zodiac, except when specified.

Data of Heliocentric position of Venus (after interval of every 2922 days) are analysed to understand Orbital Period of Venus, as below:

Sl	Date	Venus Position Helio Centric	Degree Cumulative	Degree Moved	Days per Orbit (360 Degree)
1	18-01-2012	30.01666667	0.016666667		
2	18-01-2020	31.53333333	4681.533333	4681.516667	224.6964
3	18-01-2028	33.08333333	9363.083333	4681.55	224.6948
4	18-01-2036	34.61666667	14044.61667	4681.533333	224.6956
5	18-01-2044	36.15	18726.15	4681.533333	224.6956
6	18-01-2052	37.68333333	23407.68333	4681.533333	224.6956
7	18-01-2060	39.21666667	28089.21667	4681.533333	224.6956
8	18-01-2068	40.76666667	32770.76667	4681.55	224.6948
9	18-01-2076	42.28333333	37452.28333	4681.516667	224.6964
				Average Days	224.6956

Orbital period of Venus is 224.6956 days

Calculation of Semi Major axis of Venus by using fixed formula
(Source- Mr Anil Kumar via YouTube) (based on Kepler's Relation):

Log (Semi major Axis) (in million KM) = 2/3 X (0.7 + Log (Orbital Period in Days)
Log 224.6956 = 2.3515945681
2/3 x (0.7 + 2.3515945681)
= 2.0343963787
Log (2.0343963787) million KM
Semi Major Axis of Venus = 108242142

Orbital properties of Venus are studied by using three different methods, as below:

1. Orbit of Venus using Inferior Conjunction:

Semi Major (SM) Axis Yr 2026 (KM)	108208215
Orbital Period (Days)	224.6956
Daily Degree (DD) at SM Axis (360 / 224.6956)	1.602167555
Sqrt of DD at SM Axis	1.265767575
SM Axis X sqrt of DD at SM Axis	136966450

Orbital Radius of Venus at given point =
(SM Axis) X (SqRt of Daily Degree at SM Axis) / (SqRt of Nett Daily Degree at given point)

Inferior Conjunction Date	Tropical Position Degree	Earth Daily Degree	Venus Retrograde Daily Degree	Venus Nett Daily Degree	Sq. Root of Nett Daily Degree Movement	Venus Radius KM	Venus Helio Centric Degree
20-03-2033	0.4	0.993690474	0.633333333	1.627023807	1.275548434	107378478	180
20-04-1929	29.8	0.977482993	0.633333333	1.610816326	1.269179391	107917329	210
20-05-2068	60.6	0.962518897	0.633333333	1.59585223	1.26327045	108422112	241
22-06-1956	90.8	0.954357521	0.625	1.579357521	1.256724919	108986818	271
25-07-2087	123.1	0.955508314	0.616666667	1.572174981	1.25386402	109235490	303
22-08-1991	149.2	0.963416478	0.616666667	1.580083145	1.257013582	108961790	329
24-09-1879	180.6	0.9781935	0.616666667	1.594860167	1.262877732	108455828	1
24-10-2026	210.8	0.996073318	0.608333333	1.604406651	1.266651748	108132681	31
22-11-1930	239.7	1.009348072	0.608333333	1.617681405	1.27188105	107688097	60
20-12-2085	268.9	1.018272864	0.608333333	1.626606197	1.275384725	107392262	89
21-01-1982	301	1.017704081	0.616666667	1.634370748	1.278425104	107136859	121
18-02-1886	330.1	1.00963152	0.633333333	1.642964853	1.281781906	106856283	150

Aphelion (AH) KM	109235490
Perihelion (PH) KM	106856283
AH -PH	2130535
AH + PH	215843101
Eccentricity	0.0110102
Aphelion Position	303 Degree Heliocentric
Perihelion Position	150 Degree Heliocentric

2. Orbit of Venus using Greatest Elongation (Eastern- Evening):

Orbital radius of Venus = Sin theta of greatest elongation X Earth's orbital Radius at that point

Sl	Date	Venus Position Tropical Degree	Greatest Elongation Degree	Earth Axis KM	Sin theta	Venus Axis KM	Venus Helio Centric Degree
1	03-04-1988	59.63333333	45.83333333	149584416	0.717316081	107299307	150
2	05-05-2127	90.46666667	45.46666667	150929215	0.712842556	107588767	180
3	04-06-2023	118.9333333	45.33333333	151810805	0.711208572	107969146	209
4	07-07-1911	149.8666667	45.46666667	152142580	0.712842556	108453706	240
5	05-08-2058	179.1166667	45.75	151806162	0.716301943	108739049	269
6	08-09-1946	211.6166667	46.21666667	150812053	0.721961534	108880501	302
7	06-10-2101	239.75	46.58333333	149578255	0.726374775	108649871	330

8	06-11-1997	270.9	47.01666667	148353842	0.731552056	108528558	1
9	06-12-1893	301.9666667	47.25	147507707	0.734322509	108318230	32
10	02-01-2049	330.2	47.2	147157102	0.733729865	107973561	60
11	02-02-1945	0.633333333	46.86666667	147465546	0.729764641	107615141	91
12	03-03-2092	30.36666667	46.38333333	148395790	0.723971229	107434282	120

Aphelion (AH) KM	**108880501**
Perihelion (PH) KM	**107299307**
Semi Major Axis	**108089904**
AH -PH	**1581194**
AH + PH	**216179808**
Eccentricity	**0.007314254**
Aphelion Position	**302 Degree Heliocentric**
Perihelion Position	**150 Degree Heliocentric**

3. Orbit of Venus using Heliocentric Data:

Semi Major (SM) Axis 2026 KM	108208215
Daily Degree (DD) at SM Axis	1.603401412
Sqrt of DD at SM Axis	1.266254876
SM Axis X sqrt of DD at SM Axis	137019180

Orbital Radius of Venus at given point =
(SM Axis) X (SqRt of Daily Degree at SM Axis) / (SqRt of Nett Daily Degree at given point)

Sl	Venus Position Heliocentric (Degree)	Venus Daily Degree Movement	Venus Orbital Axis KM
1	1	1.590816406	108635391
2	32	1.599319763	108346207
3	62	1.607483	108070751
4	91	1.616666612	107763361
5	122	1.623809306	107526089
6	151	1.625510204	107469818
7	182	1.618027347	107718038
8	211	1.605782449	108127960
9	241	1.592517143	108577367
10	272	1.583333408	108891800
11	301	1.580952245	108973773
12	331	1.583333265	108891804

Orbital axis of Venus is Calculated from Multiplication of Semimajor Axis with Root of Average Daily Degree (Average of Perihelion & Aphelion) & its division by Root of respective Daily Degree Movement.

Venus	Position Heliocentric (Degree)	Daily Degree Movement	Root of Daily Degree	Orbital Axis (KM)
Semi Major Axis		**1.603401412**	**1.266254876**	**108208215**

Perihelion (Yr 2025)	147	1.625510204		
Perihelion (Yr 2026)	146	1.626190817		
Perihelion Average	**146.5**	**1.625850511**	**1.275088433**	**107458570**
Aphelion (Yr 2025)	299	1.580952381		
Aphelion (Yr 2026)	299	1.580952245		
Aphelion Average	**299**	**1.580952313**	**1.257359262**	**108973770**

Eccentricity is calculated by using below formula;
e = Radius (Aphelion – Perihelion)/ Radius (Aphelion + Perihelion)
e = (108973770 – 107458570) / (108973770 + 107458570)

Also, Eccentricity is calculated by using below formula;
e = Angular Movement [Root (Perihelion) – Root (Aphelion)] Divided by
Angular Movement [Root (Perihelion) + Root (Aphelion)]
e = 1.275088433 – 1.257359262 / 1.275088433 + 1.257359262
Eccentricity of Venus = 0.0070008

Currently:

Aphelion of Venus is at 5 Degree Makar (Sidereal), near star Altair
Perihelion of Venus is at 2 Degree Singh (Sidereal), near star Regulus.

Note: Results of above 1st & 2nd methods are limited by availability of data in 02 digits below decimal, at the time of event (Inferior Conjunction / Greatest Elongation) & hence the results are approximate. Since, the 3rd one of the above methods is based on direct, refined heliocentric data, hence the results are more accurate.

Data Sources:
www.astro.com
www.astro-seek.com