Star Position Calculations

The Big Dipper

Version 1.0

2007-03-26

http://hethrael.com/big-dipper/

Email me with any questions or comments. (See the web page for my email address)

This spreadsheet calculates the position of stars on a scale to fit them inside a room.

Notes for using this spreadsheet:

In OpenOffice.org, choose View | Value Highlighting (or press Ctrl+F8) to turn user-entered numbers blue.

For the bearing entry, 0 is North, 90 is East, 180 is South, and 270 is West.

An orange background means the object falls outside of the room, i.e. it has a negative in a "From Corner" column or a positive in a "From Opposite Corner" or "From Ceiling" column.

If your ceiling is flat, all values in the ceiling height column will be the same. Otherwise, ceiling height is the height of the ceiling at that X, Y coordinate.

The charts do not automatically match the size of the room. Their widths, heights, and axes maximum scales must be manually changed if you change the size of the room.

If you want to use units other than light years and inches, enter the units on the parameters sheet.

Notes unnecessary for using this spreadsheet:

The RA and Dec of the Earth are meaningless; the equally meaningless azimuthal values simply look nicer with the values of RA and Dec given.

There are hidden columns that show intermediate calculations.

The azimuthal and bearing coordinate systems are left-handed. All other coordinate systems are right-handed. (Right-handed: 7° is 1° to the left of 6°; the X and Y axes are as you would see a standard graph lying on the floor, X pointing to the right and Y forward. Left-handed: 7° is 1° to the right of 6°; the X and Y axes are swapped. The Z axis points up in both systems.)

The positive X axis of the azimuthal Cartesian coordinate system points North. The azimuthal rotated Cartesian coordinate system points toward the bearing entered. They will match if the bearing is 0.

The azimuthal Cartesian coordinate system is calculated from the polar equatorial coordinates using trigonometry. The azimuthal rotated Cartesian coordinate system uses matrix multiplication and Euler angles to convert the Cartesian equatorial coordinates. The transformation matrix is hidden on the parameters sheet.

Parameters

	h	m	s
LST	22	57	8
	°	′	″
Latitude	46	46	55
	h	**m**	**s**
Time Zone Offset	-6	0	0
	°	′	″
Bearing	325	0	0

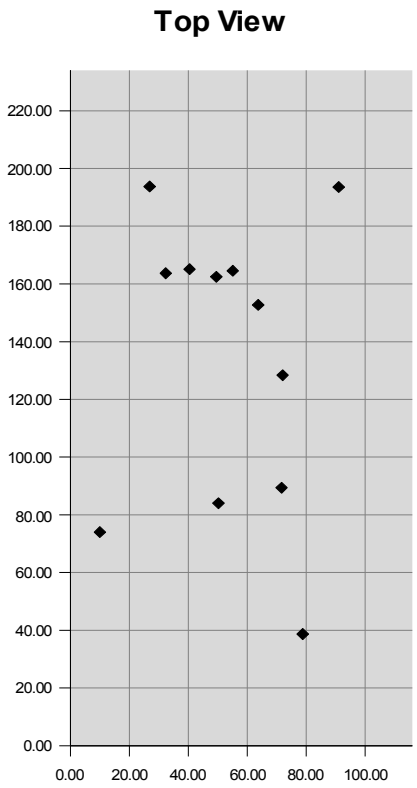
Units	ly		in
Scale	86.03	:	106

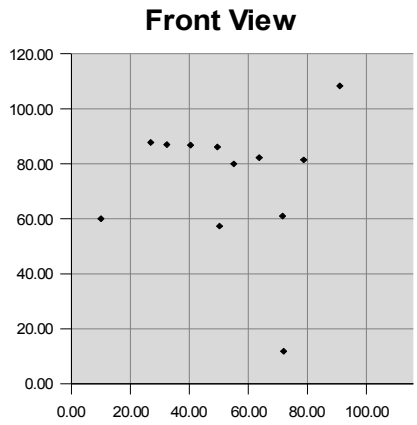
	X (W)	Y (L)
Room Dimensions	116	234

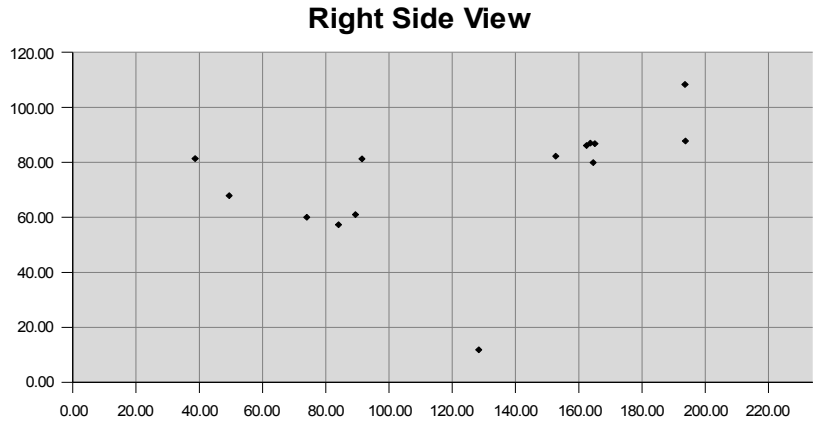
Coordinates

		Geocentric Equatorial								From Corner			From Opposite Corner	
	Dist.	RA				Dec								
Object	**ly**	**h**	**m**	**s**	**rad**	**°**	**′**	**″**	**rad**	**x′ in**	**y′ in**	**z′ in**	**x″ in**	**y″ in**
Alkaid	100.70	13	47	50	3.6121	49	16	43	0.8601	26.86	193.74	87.78	-89.14	-40.26
Mizar	78.16	13	24	13	3.5091	54	53	22	0.9580	32.33	163.69	87.03	-83.67	-70.31
Alioth	80.94	12	54	21	3.3787	55	55	21	0.9760	40.41	165.10	86.83	-75.59	-68.90
Megrez	81.44	12	15	47	3.2105	56	59	39	0.9947	49.50	162.48	86.08	-66.50	-71.52
Phecda	83.69	11	54	12	3.1163	53	39	22	0.9365	55.04	164.58	79.97	-60.96	-69.42
Merak	79.42	11	2	16	2.8897	56	20	42	0.9834	63.66	152.75	82.23	-52.34	-81.25
Dubhe	123.64	11	4	10	2.8980	61	42	49	1.0771	91.03	193.59	108.35	-24.97	-40.41
Earth	0.00	0	0	0	0.0000	90	0	0	1.5708	10.00	74.00	60.00	-106.00	-160.00
Castor	51.55	7	35	2	1.9855	31	52	25	0.5563	71.61	89.40	60.96	-44.39	-144.60
Pollux	33.72	7	45	44	2.0321	28	0	35	0.4889	50.23	84.04	57.36	-65.77	-149.96
Regulus	77.49	10	8	44	2.6561	11	56	4	0.2083	71.97	128.37	11.84	-44.03	-105.63
Vega	25.30	18	37	10	4.8746	38	47	20	0.6770	-4.66	91.45	81.26	-120.66	-142.55
Aldebaran	65.11	4	36	18	1.2056	16	31	23	0.2884	78.78	38.70	81.41	-37.22	-195.30
Fomalhaut	25.07	22	58	1	6.0127	-29	35	10	-0.4959	-7.04	49.48	67.89	-123.04	-184.52

Ceiling Height	From Ceiling
in	z″ in
99.31	-11.54
102.02	-14.99
106.02	-19.20
110.53	-24.45
113.28	-33.31
120.00	-37.77
120.00	-11.65
90.96	-30.96
120.00	-59.04
110.89	-53.53
120.00	-108.16
83.69	-2.43
120.00	-38.59
82.51	-14.62


Top View
220.00
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
0.00
20.00
40.00
60.00
80.00
100.00


Front View
120.00
100.00
80.00
60.00
40.00
20.00
0.00
0.00
20.00
40.00
60.00
80.00
100.00


Right Side View
120.00
100.00
80.00
60.00
40.00
20.00
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
220.00