

Name _____

Finding the Shapley Center of the Milky Way Plotting Globular Clusters

In the early part of the twentieth century, Harlow Shapley used the positions of globular clusters to determine the true size and shape of our home galaxy, the Milky Way. In order to find the distances to each of these clusters, RR Lyræ variables were used. These stars have a distinct relation between their period of pulsation, and their absolute magnitudes. Once the absolute magnitude is known, the apparent magnitude can be used to determine the distance to these clusters. Using some fancy, three dimensional geometry, the x, y, and z coördinates of the clusters can be calculated.

On the following pages, you have a list of the positions of approximately one hundred globular clusters. The units for this table are kpc, or kiloparsecs. The positions are given as the x, y, and z coördinates of these clusters. The first column gives the NGC catalog number of each cluster. The x axis is in a line between us and the center of the galaxy. The z axis goes up and down out of the plane of our galaxy. And the y axis is perpendicular to the other two.

There are two plots to be made. The first is in the x-z plane. This will give you the 'side view' of the cluster distribution. When you finish this first plot, you will notice that the center of the distribution of clusters is not centered on the Sun. Make your best guess as to the location of the center of the clusters and mark that spot on your plot.

How far away from the Sun, (in kpc), is the center of the cluster distribution?

How would you describe the relative number of clusters above the plane of the galaxy as opposed to below the plane?

Next, you will plot the y-z plane. This is the view from the Sun, looking toward the center of our galaxy. Use the correct page for this second plot. When you finish this plot, you should have a pretty symmetric distribution.

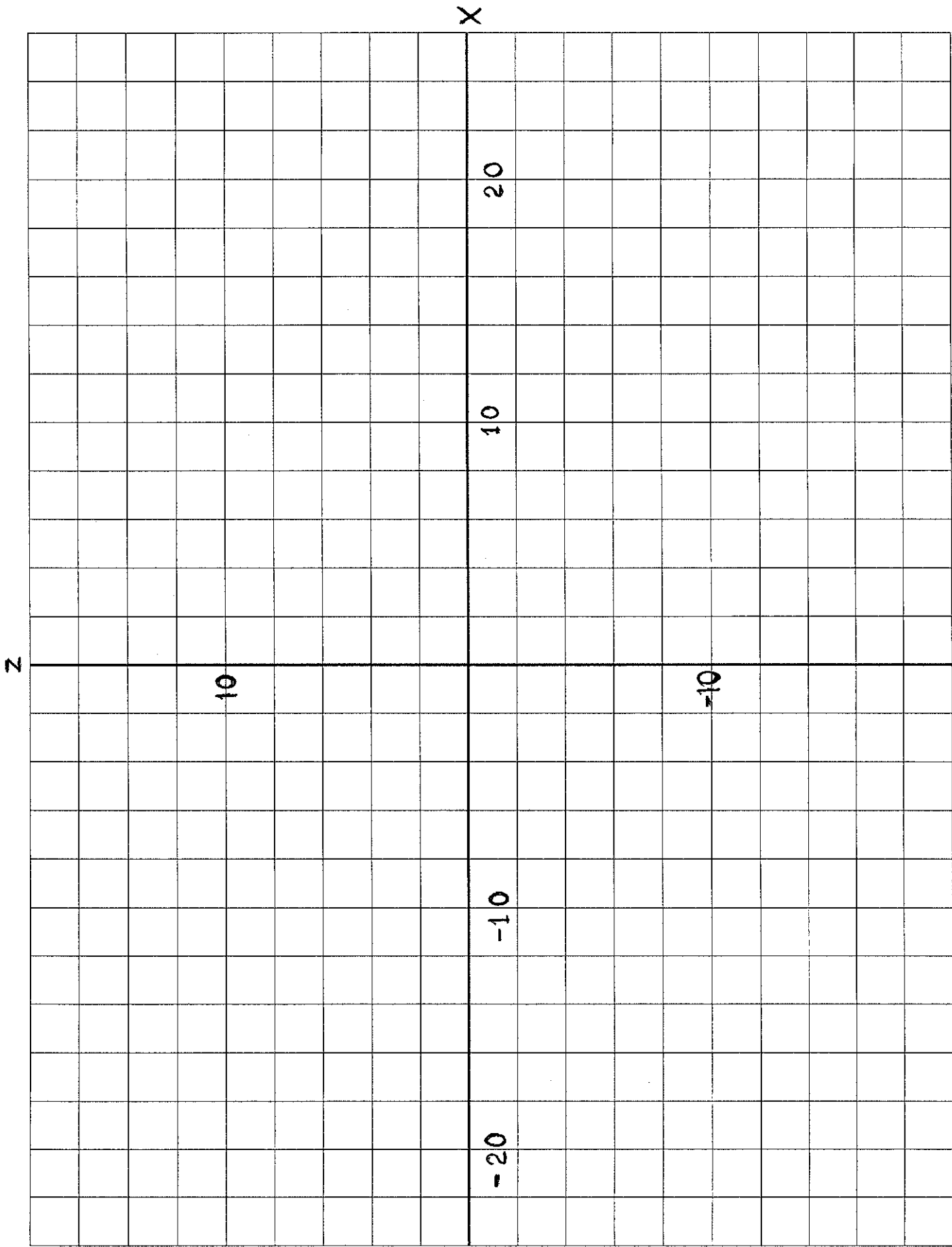
Describe the distribution of clusters in this view. You may not find an equal number of clusters in each of the four quadrants.

Determine if the center of the distribution of clusters is at the origin of your y and z axes.

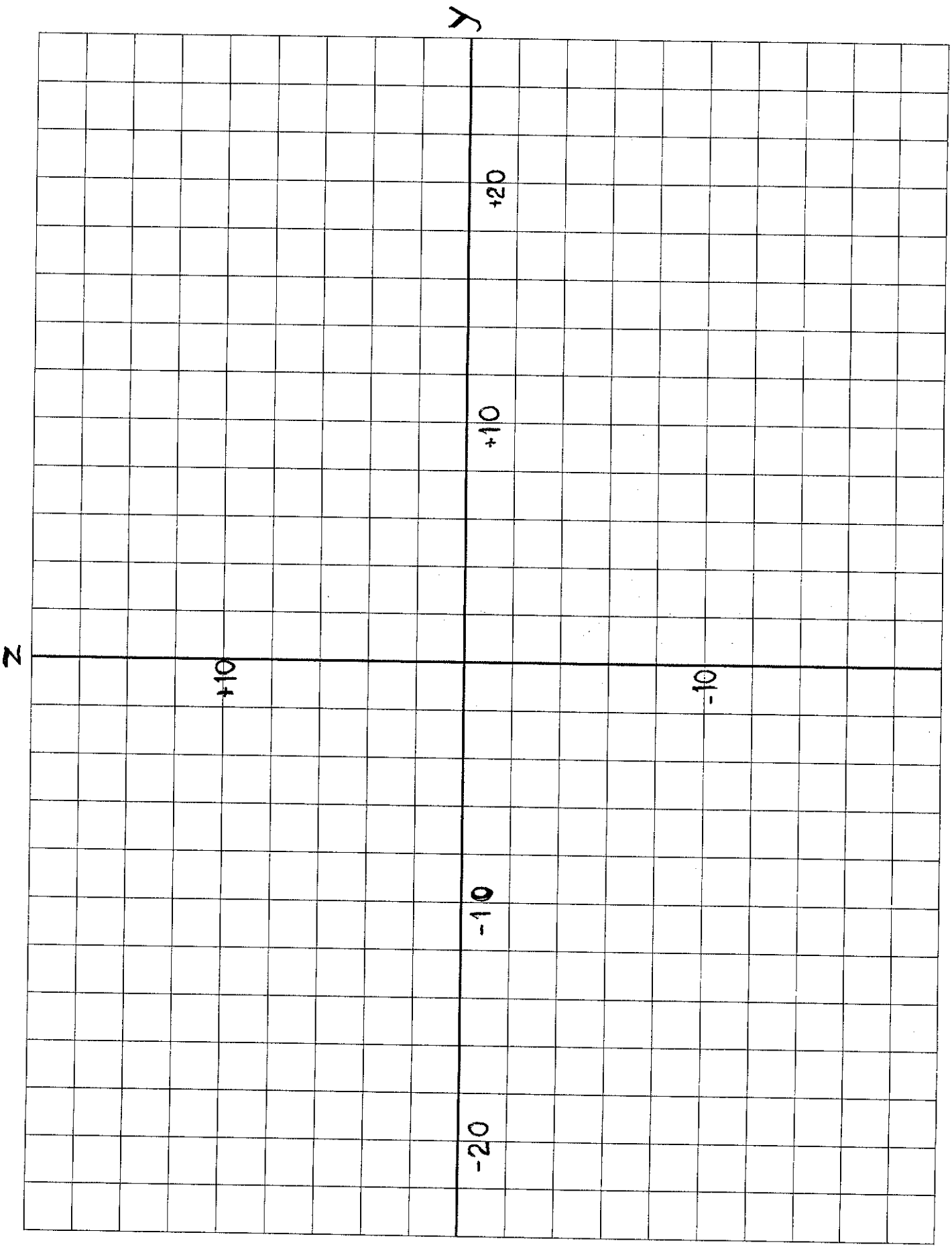
	X	y	Z
6341	3.17	8.00	6.01
6352	6.80	-2.31	-0.90
6356	16.20	1.91	2.94
6362	7.86	-5.39	-3.02
6388	13.86	-3.56	-1.68
6402	7.85	3.06	2.22
6440	7.52	1.02	0.50
6441	10.39	-1.30	-1.00
6522	15.08	0.26	-1.03
6541	7.31	-1.38	-1.46
6624	14.23	0.69	-1.97
6626	7.15	0.98	-0.71
6637	10.31	0.30	-1.88
6638	18.64	2.58	-2.38
6652	16.28	0.43	-3.28
6656	3.23	0.56	-0.44
6681	18.52	0.93	-4.11
6712	9.91	4.68	-0.82
6715	21.15	2.04	-5.26
6723	12.02	0.03	-3.74
6752	7.89	-3.44	-4.13
6779	5.45	10.55	1.73
6809	6.27	0.98	-2.74
6838	3.62	5.50	-0.53
6934	13.92	17.91	-7.78

8.6797 -1.457 0.46567

	X	y	Z
104	3.79	-5.22	-6.44
288	-0.01	0.01	-14.04
362	5.21	-8.47	-10.39
1851	-6.13	-12.85	-9.99
1904	-9.81	-9.64	-7.41
2808	2.28	-10.53	-2.16
3201	0.97	-7.79	1.20
4372	4.54	-7.71	-1.57
4590	4.79	-8.44	7.06
4833	4.77	-7.19	-1.21
5139	5.07	-6.24	2.15
5272	2.00	1.82	13.54
5286	9.00	-10.15	2.54
5466	3.16	2.85	14.48
5694	20.99	-11.33	13.70
5824	26.00	-13.45	11.89
5897	11.39	-3.48	6.97
5904	6.53	0.45	6.96
5927	5.24	-3.46	0.54
5986	13.50	-5.74	3.47
6093	11.79	-1.51	4.21
6101	7.48	-6.78	-2.86
6121	3.29	-0.52	0.96
6139	13.60	-4.32	1.76
6171	9.64	0.58	4.11
6205	3.48	5.92	5.96
6218	6.55	1.84	3.36
6254	7.06	1.91	3.11
6266	10.35	-1.16	1.33
6273	7.49	-0.38	1.24
6284	19.68	-0.54	3.48
6293	10.78	-0.44	1.51
6304	9.06	-0.67	0.86
6316	13.71	-0.68	1.39
6333	8.91	0.86	1.69



X-Z plane



y-z plane

