

Laboratory 1: INTRODUCTIONS TO VOYAGER II

Table 1

El Paso, TX

Date: April 9, 2011

	Sun	Moon
Rise	6: 45 AM	10:44 AM
Set	7:31 PM	12:26 AM

Table 2 (ANSWER please)

Planet Symbol	Planet Name	Planet Symbol	Planet Name
♀		♃	
♀		♄	
♂		♅	
♃		♆	

#7 (ANSWER please)

7a. Does the Sun return to the same place after one trip around the sky?

7b. Do the Mon and planets return to the same place in the sky after 24 hours?

Table 3

Arabic Name	Flamsteed	Bright Star	SAO
Sirius	96 Cma	HR 2491	151881

Canopus	32 Col	HR 2326	234480
Altair	78 Gem	HR 7557	125122
Arcturus	49 Boo	HR 5340	100944
Betelgeuse	116 Ori	HR 2061	113271
Aldebaran	255 Tau	HR 1457	94027
Vega	103 Agr	HR 7001	67174
Antares	12 Sco A	HR 6134	184415

Table 5

Object	New Galactic	Type	Distance
M42	NGC 1976	Bright Nebula	460 pc
M76	NGC 650	Planetary Nebula	1100 pc
M44	NGC 2623	Open Cluster	160 pc
M13	NGC 6205	Globular Cluster	7200 pc
M81	NGC 3031	Spiral Galaxy	1400 Mega pc

Table 6 (ANSWER please)

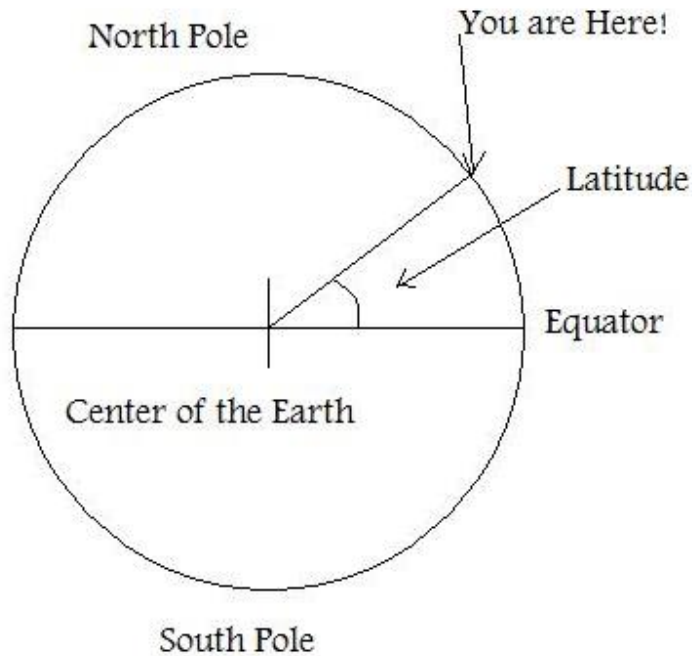
Yes or No, do these objects belong in the Milky Way. Use tables.

Object	Member of the Milky Way
M42	Yes / No
M76	Yes / No
M44	Yes / No
M13	Yes / No
M81	Yes / No

Questions:

1. Explain what Flamsteed and SAO are.
2. What does NGC stand for?
3. What does *pc* stand for?

Laboratory 2: WHERE ARE WE?



Problem #1

How many degrees of latitude are there between the Equator and the North Pole?

How many degrees of latitude are there between the Equator and the South Pole?

If you express your position in degrees of latitude, how would you tell someone whether you were north of the equator or south of it?

Problem #2 (Fill In)

Place	Latitude	Longitude
Southern tip of Florida, USA		
Center of Australia		
Southern tip of Baja California		
Southern tip of South America		

Problem #3

The location of El Paso, TX USA is:

Latitude _____

Longitude _____

Problem #4

What is right ascension and declination?

Laboratory 3: NAVIGATING THE SOLAR SYSTEM

Problem 1 (Fill in and Calculate)

$$a^3 = P^2$$

$$a = (a^3)^{1/3}$$

Planet	Perihelion (AU)	Apehlon (AU)	Semi-major axis (a) (AU)	(a) ³	Period (Years)
Mercury	0.31	0.47			0.243
Venus	0.720	0.726			0.615
Earth	0.98	1.02			1
Mars	1.38	1.66			1.87
Jupiter	4.95	5.46			11.89

Problem 2 (Fill in the calculation using data from Problem 1)

$$a_{sc} = (\text{perihelion} + 1) / 2$$

$$e_{sc} = (\text{perihelion} - 1) / 2(a_{sc}) = e$$

$$P_{sc} = [a_{sc}^3]^{1/2}$$

$$x = 180 [1 - (P_{sc} / \text{perihelion})]$$

$$y = 180 - x$$

Planet	a _{sc} (AU)	P _{sc} (yrs)	e	x	y
Mars					
Jupiter					

Question:

What does perihelion and aphelion mean?

Laboratory 4: TELESCOPE

Name three main types of telescopes:

- 1.
- 2.
- 3.

Name four reflector telescope designs:

- 1.
- 2.
- 3.
- 4.

What is the difference of demagnification and magnification?

Which type of telescope has the greater advantage over the others?

Laboratory 5: HUBBLE LAW

Table 2

	Galaxy Name	Magnitude	Distance	<i>v</i>
1	NGC 6503	10.9	21 Mpc	305 km/sec
2	NGC 1068 in Cetu	9.5	14.0 Mpc	1134 km/sec
3	NGC 1433 in Horologium	10.7	20 Mpc	889 km/sec
4	NGC 628 in Pisces	9.7	16 Mpc	798 km/sec
5	NGC 3184	10.4	19 Mpc	604 km/sec
6	NGC 7793 in Sculptor	9.7	16 Mpc	236 km/sec
7	NGC 7331 in Pegasus	10.3	19 Mpc	1105 km/sec
8	IC 342 in Cornu	9.1	10 Mpc	229 km/sec
9	NGC 6946 in Capricorn	9.7	16 Mpc	338 km/sec
10	NGC 3938 in Leo	9.0	10 Mpc	451 km/sec
11	NGC 3938 in Ursa Major	10.9	21 Mpc	838 km/sec
12	NGC 1808 in Columba	10.7	20 Mpc	782 km/sec
13	NGC 5194 in Canes Venatici	9.0	10 Mpc	573 km/sec
14	NGC 1313 in Retina	9.4	12 Mpc	254 km/sec
15	NGC 6744 in Perseus	9.0	10 Mpc	717 km/sec

Plot graph and find two points that fit in the best fit line.

On the y-axis is velocity (*v*) and on the x-axis is the distance

Find Hubble Constant (H_0)

$$H_0 = \text{rise/run} = (y_1 - y_2) / (x_1 - x_2) = \text{_____ km/s/Mpc}$$

Find time (*t*)

$$t = 1/H_0 = \text{_____ years}$$

What is the importance of the Hubble Constant?