

# Make Up Lab Exercise for ASTR114

This is an on-line laboratory exercise.

- 1) GO TO the following URL using your Netscape web browser:  
<http://amazing-space.stsci.edu/hdf-top-level.html>
- 2) Click on the "Stellar Statistician" button.
- 3) Enter your name and an estimate for the first question.  
What was your estimate? \_\_\_\_\_
- 4) Continue on-line as prompted.  
Enter your estimate that you put in next \_\_\_\_\_
- 5) Enter here the calculated number that the computer  
got for you, for your entire image: \_\_\_\_\_
- 6) Continue with the lab and write here, the total number  
of galaxies in the universe calculated using your own estimate: \_\_\_\_\_
- 7) What is the number given for total number of galaxies, as  
estimated by the scientists: \_\_\_\_\_
- 8) How similar or different is your estimate when compared with the astronomers'  
estimate? If your estimate is different, explain why you think it is different.
  
- 9) Continue on to activity #2.
- 10) Enter your name on screen and choose a camera scene to continue.
- 11) Classify the objects as noted.
- 12) Copy the Astronomer's Chart with correct answers (a table with all of the  
numbers) below.
  
- 13) Continue on to Activity #3.
- 14) Enter your name and continue with the activity.
- 15) Place the objects in your estimated order as suggested.
- 16) What is the **correct** order, nearest to farthest, according to the astronomers:  
  
\_\_\_\_\_
- 17) Examine the movie showing the distances as calculated by the astronomers.
- 18) Explain how a galaxy can appear smaller yet closer than another galaxy that  
appears larger yet is further away.

19) Continue on to Activity #4.

20) What does the color of a galaxy indicate?

21) What does the shape of a galaxy indicate?

22) Why is it advantageous to have a telescope above the atmosphere?

23) Examine the "oddball" galaxy. What do the astronomers believe it to be and why?

24) Now go to the following web site:

<http://www.astro.washington.edu/labs/clearinghouse/labs/Curvature/curvature.html>

25) Read the page and answer the questions below:

26) What possible shapes could you see as the cube passed through Flatland? If you put yourself back in our 3-dimensional universe, what would a 4-dimensional sphere look like if it passed it through our space?

27) Name three ways in which you would be able to tell (maybe with the help of another 2-dimensional Spherelander) that your universe is positively curved?

28) What is the curvature of the surface in the given image and how did you determine it?

29) How might you use two beams of light to figure out what the curvature of our universe is?

30) What dominates the local curvature? Is it flat, positive or negative? What is the evidence?