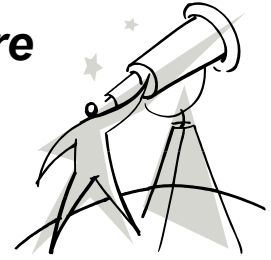


Where No Telescope Has Gone Before ***Expert Group Instructions***



1. You will be divided into 5 groups. Each group will become experts in one part of the information presented in the article *Where No Telescope Has Gone Before*:

http://science.msfc.nasa.gov/headlines/y2001/ast07jun_1.htm

2. By yourself, read the entire article once. You may use a highlighter or take notes on the paper copy.

3. Re-read the article to find the answers to the questions for your group:

! Group 1 –

1. What are examples of objects in the universe that the human eye can not see?

2. What tools have astronomers developed to 'see' some of these invisible objects?

3. Scientists at Marshall Space Flight Center have just developed a new tool for observing. What is it?

! Group 2 –

4. What is Cygnus X-1?

5. How did NASA astronomers get their x-ray telescope out beyond the Earth's atmosphere?

6. Why are these pictures so exciting?

! Group 3 –

7. What do these hard x-rays reveal?

8. Why is focusing x-rays difficult?

9. What does 'signal to noise' mean?

‡ **Group 4 –**

10. How do NASA scientists make the new x-ray mirrors?

11. Besides focusing x-ray photons, what else were the astronomers trying to prove?

12. What would you need to make a HERO?

‡ **Group 5 –**

13. What new discoveries do you think astronomers will make with HERO?

14. If you had a hard x-ray telescope in your classroom, what kind of pictures do you think that you could get?

15. If you had a space ship, what would you want in terms of standard detection equipment besides a window and radar? Why?

4. As a group, discuss the answers to the three questions you have been assigned. Come to a **consensus** (this means you all agree) on the answers.

5. Each group will get **3** blank overhead transparencies, one for each question & answer. Write the question and the answer to the question on the transparency. Answers must be complete and descriptive; no one word answers!

6. Each group will present their information to the rest of class, so that we can all benefit from each others new knowledge.

7. After the presentations are finished, everyone answer these two questions in your *Space Journal*:

1. Why is this kind of scientific research important to us?
2. Why is it important that we study & learn about this type of scientific research?