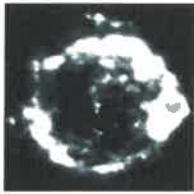


Activity 4. Make a Radio Image at home.

You will need: 7 different color crayons

Radio waves are emitted by planets in our solar system, chemicals in comets and in the Milky Way Galaxy, supernovae, and by other galaxies and distant quasars. These radio waves travel through space just like light, and radio telescopes can collect them. Astronomers often convert these signals into pictures.

Here are three "radio pictures" showing:



A supernova remnant



A galaxy



The Moon

They look like photographs don't they? But radio waves are invisible! So, how do scientists make "radio pictures" of the objects in the Universe? With radio telescopes. The dish of a radio telescope is made of metal and has a parabolic shape. Radio waves emitted by an object, hit the surface of the dish, and bounce. Because the dish's shape, the waves all bounce up to the telescope's focal point. The radio waves are focused there. At the focal point, the radio waves enter a sensitive receiver. The receiver amplifies the waves and converts them into a signal that can be stored in a computer. Astronomers use computers to turn this information into pictures. If our eyes were designed to see radio waves instead of light, the picture is what we would see.

Try this: Color the data sheets on the next 2 pages, and you can make a radio picture! Notice all the little squares? Let's call each one of these squares a pixel. Each pixel stores information about the radio waves coming from a point in space. The pixel beside it stores information from the very next spot in space, and so on. A radio telescope scans across an object, and receives radio waves from each little spot in space around that object. Some spots may have stronger radio waves coming from them than others. This information is stored in pixels. The computer turns this information into numbers. For example, if radio waves are weak at a particular position, a small number would be recorded in the pixel. If no radio waves were coming from that spot, the computer would put a zero in that pixel.

Astronomers may spend hours, or even days, scanning an object in order to have all the information they need. It may take them weeks to process the data to put accurate numbers in all of the pixels. But once they have all the numbers, they are ready to make a picture. An astronomer will assign a color to each number. Then, the computer replaces the numbers with colors, and a picture of the radio source results!

You try it! Just pick some nice colors (you'll need 7 different colors) and color by number. What kind of object do you have? Does it look like any of the ones shown above?

Make your own color key:

0= _____

4= _____

1= _____

5= _____

2= _____

6= _____

3= _____

Radio Image 1

0	0	0	4	4	4	4	5	5	5	4	0	0	0	0	0	0	0	0	0	4	4	4	5	4	4	0	0	0	0		
0	0	4	4	4	4	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	5	4	4	0	0	0		
0	4	4	4	4	4	5	5	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	4	4	5	4	0	0	0		
0	4	4	4	4	4	0	0	0	0	4	4	4	4	4	5	5	4	4	0	0	0	0	0	4	4	5	4	0	0		
4	4	4	4	0	0	0	0	4	4	4	4	5	5	4	6	6	5	0	4	0	0	0	0	0	4	4	5	0	0		
4	4	4	0	0	0	0	4	4	4	5	5	4	4	5	6	6	5	5	4	4	0	0	0	0	0	4	4	5	5		
4	4	4	0	0	0	0	4	4	5	5	4	4	4	4	4	4	4	4	5	4	4	4	0	0	0	0	0	0	0		
4	4	0	0	0	0	4	5	4	4	0	0	0	0	0	0	0	4	4	4	5	4	4	0	0	0	0	0	0	0		
4	4	0	0	0	0	4	5	5	0	0	0	0	0	0	0	0	0	4	4	4	5	5	4	0	0	0	0	0	0		
4	4	0	0	0	4	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	6	6	4	4	4	0	0	
4	4	0	0	4	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5	4	4	4	4	0	0	0		
4	4	0	0	5	4	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5	4	4	4	0	0	0		
4	4	0	0	4	4	5	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	4	5	6	4	4	0	0		
4	0	0	4	5	4	5	0	0	0	0	0	0	3	2	2	3	3	3	0	0	0	0	0	4	6	4	4	4	0		
4	0	4	4	5	5	0	0	0	0	0	3	3	2	0	2	3	4	4	4	4	4	4	0	0	0	4	6	6	4	0	
4	0	4	4	5	5	0	0	0	0	0	2	2	2	0	0	2	3	4	4	4	4	4	4	0	0	0	4	4	4	4	
4	4	0	4	5	5	0	0	0	0	0	2	2	0	0	0	0	2	3	4	4	4	4	0	0	0	0	0	4	4	4	
4	4	0	0	4	4	5	0	0	0	0	2	0	0	0	0	0	2	2	0	4	4	4	4	0	0	0	0	4	4	4	
4	4	0	0	4	4	0	0	0	0	2	2	2	0	4	4	0	2	2	0	0	0	4	4	5	0	0	0	4	4	4	
4	4	0	0	4	4	4	0	0	0	3	3	2	0	4	4	0	0	2	0	0	0	0	4	5	4	0	0	4	4	4	
4	4	0	0	0	4	4	4	0	0	0	3	2	0	0	0	2	2	2	0	0	0	0	5	4	4	0	0	4	4	4	
4	4	4	0	0	4	4	4	0	0	0	2	2	2	2	0	2	2	0	0	0	4	5	4	4	0	0	0	4	4	4	
4	4	4	0	0	0	4	4	0	0	0	0	3	3	2	2	2	0	0	0	0	5	4	4	4	0	0	0	4	4	4	
4	4	4	0	0	0	4	4	4	0	0	0	0	0	0	2	2	3	3	0	0	0	0	5	5	4	4	0	0	4	4	4
4	4	4	0	0	0	0	4	4	0	0	0	0	0	0	2	2	3	3	0	0	0	0	4	4	5	4	0	0	4	4	4
4	4	4	4	0	0	0	4	4	0	0	0	0	0	5	5	4	4	0	0	0	0	4	4	4	4	0	0	4	4	4	
4	4	4	4	0	0	0	4	5	5	5	4	4	4	5	4	5	4	5	0	0	0	0	6	5	4	0	0	0	5	5	4
0	5	4	4	4	0	0	0	4	4	5	5	5	4	0	0	0	0	0	0	4	6	5	4	0	0	0	4	5	4	4	
0	5	5	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5	6	6	5	0	0	0	0	4	5	4	4	
0	5	6	5	4	0	0	0	0	0	0	0	0	0	0	0	0	4	4	6	5	5	4	0	0	0	0	4	5	6	4	
0	4	6	5	4	4	0	0	0	0	0	0	0	0	0	0	0	4	4	6	5	5	0	0	0	0	4	4	5	6	4	
0	0	6	6	5	5	4	4	4	4	4	4	4	5	4	4	4	0	0	4	4	4	5	5	0	0	0	4	4	6	6	
0	0	0	6	4	5	4	4	4	4	4	4	4	5	5	4	4	4	4	4	0	0	0	0	0	4	4	4	4	5	0	
0	0	0	0	6	5	4	4	5	4	4	4	4	5	5	4	4	4	4	0	0	0	0	0	0	5	5	4	4	0	0	
0	0	0	0	0	5	4	4	5	5	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	5	5	6	4	0	0	
0	0	0	0	0	0	0	0	4	5	4	0	0	4	4	0	0	0	0	0	0	0	0	0	0	5	6	6	4	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5	6	6	4	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	5	5	6	4	4	4	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	4	4	5	6	6	4	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	4	4	4	5	5	5	4	4	4	0	0	0	0	0	
0	0	0	0	0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	4	4	4	4	0	0	0	0	0	0	

