

What does the universe look like?

The challenge

It's a big universe out there. What does it look like? Use the telescope to image *different kinds* of objects in the night sky: the Moon, a planet such as Jupiter or Saturn, a "nebula" such as the Orion nebula, and one or two galaxies.

Then create a "group portrait" of the universe. In a group portrait, the tallest people are usually in the back. In your group portrait of the universe, try arranging your images from the closest to the furthest object. Or from the youngest to the oldest. Or from the smallest to the largest.

The purpose of this activity is to get you thinking about "what's out there." Be sure to save your images for future explorations.



Part 1: Using the telescope

It's easy to use the MicroObservatory telescopes to image everything from the Moon to distant galaxies.

For exposure times and other information, you can refer to the Observer's Manual, or use the guidelines here. You can also look at images in the Image Archive, and just click on Info to find out the exposure times, filters, etc. that the observer used.

A QUICK-GUIDE TO SETTINGS FOR THE TELESCOPES

	Time of day	Select target using...	Exposure time	Filter
Moon	Day or night	Pull-down menu	0.1 - 0.5 sec.	Grey
Planets	Night	Pull-down menu	0.1 - 1 sec.	Clear
Stars	Night	Coordinates	0.1 - 10 sec.	Clear
Nebula	Night	Menu or coords	45 - 60 sec.	Clear
Galaxies	Night	Menu or coords	45 - 60 sec.	Clear
Asteroid/comet	Night	Coordinates	15 - 60 sec.	Clear

Part 2: Making sense of your images

Your images are a snapshot in time. But the "cosmic cast of characters" that you have assembled are part of the ongoing story of the universe. What kinds of stories do your images tell? What kinds of questions do they raise for you?

Here are a few questions to start you thinking about your images. Add your own questions as well.



The Moon:

Which direction is the Sun in your image? Why do you think that?

Is the Moon giving off its own light, or does it only reflect light?

What do you think caused the craters on the Moon?

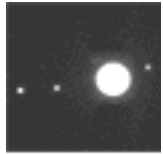
Why isn't the Earth covered with craters too? (See the Moon exploration.)

A tough one: If the Moon craters are from impacts, then why are there mountains in the centers of some of the craters?

Why did you have to use a deep grey filter to image the Moon?

A science fiction program on TV claimed that the Moon landing was faked. Their "evidence": no stars are visible in the background of the astronauts' pictures. Why are there no stars in the background of *your* Moon images?

What are some of your questions about the Moon?



Jupiter:

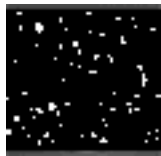
If Jupiter (or Saturn) is a big planet, why does it appear so much smaller than our Moon?

Why don't you see any stars in the image of Jupiter?

Can you detect any of Jupiter's moons in your image?

If you took several exposures of Jupiter over time, would you expect to see the moons moving?

What is the source of light for Jupiter and its moons? Why do we see them?



The Stars:

Why do the stars appear only as tiny dots and not larger disks, like our Sun?

A tough one: Then why are some of the dots wider than others? Are those stars larger?

Could I ever see planets around those distant stars, using the telescope?

Do the stars emit their own light, or are they reflecting light from some other source?

In ancient times, people thought the stars were on a giant sphere, all at the same distance from Earth. Do you think that the stars are all at the same distance from Earth? Can you tell whether they are just by looking at your images?

What would it look like if you live near the center of one of the globular clusters of stars?

Do you see more stars in certain directions of the sky than others? Why do think?



Nebulae

The word "nebulae" (plural of "nebula") means "objects that appear fuzzy." Does that seem a good description of the object in your image?

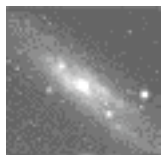
How do the nebulae in your images compare in size to the Moon's image?

If the nebula appears as large as the Moon, then why don't we see it at night by eye?

How does your exposure time for the nebula compare to the exposure time for the Moon?

Tough one: Does the nebula glow with its own light, or reflected light (or maybe both)?

Why do you think there are so few nebulae compared to stars?



Galaxies:

Does your galaxy image also contain stars in the field of view?

Which do you think is further away, the galaxy or the stars? Why?
Can you tell from your image?

If the galaxies are further away than stars in our own galaxy, then why do they appear so large?

Why can't you see the individual stars in the galaxies that you've imaged?

Why do the galaxies have such different shapes?

Are the galaxies all the same distance? If not, how far out do they go?

When you look at a galaxy, are you looking at a place where other creatures live? Why do think this?
