



VIII. Exploring Mars: Oh Water, where Art Thou?

(Finding out about water on Mars.)



The Earthlings among us are familiar with how Earth looks from space. As a refresher, or for our Martian friends, See [Earth from Space](#). Two thirds of Earth is water.

What would Earth look like without water? (See [Earth without Water](#)).

How would you describe the continents (green and brown)? High, low, bumpy, flat, etc.?

The blue and light green colors represent depth below sea level (the darker the color, the deeper the surface is below sea level). Without water what features of the ocean basin would you see?

Where are most of the really deep areas of ocean located?

Based on the coloration do you think these areas are relatively flat or not? Explain your answer.

Now let's take a look at [Mars from MOLA \(Mars Orbiter Laser Altimeter\)](#). Describe the similarities and differences you see between Mars and Earth.

What do you think the flat blue area on Mars might represent? _____

Some scientists think there may have been an ocean once on Mars. Describe where you think it may have been and explain why you think so.



Compare the flat area of the Mars MOLA image with the [false color map of Mars](#). The deep blue area is soil enriched in Hydrogen.

Where is water ice located on Mars? _____

Relate the areas of the MOLA image where hydrogen is in the soil on Mars to the location of the deep blue flat areas of the previous image.

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So what does this Hydrogen map mean? Let's look at the [NASA article](#) about it.
How much water ice may exist on Mars? _____



This is pretty exciting! Scientists have some other bits of evidence that suggests Mars was once a water planet. Put on your detective hat and let's start looking at the clues.

4

Watch this [movie](#) showing seasonal changes in the polar ice caps on Mars.

How deep is the "ice" at the north pole? _____ South pole? _____

Do you remember from a previous lesson why one would be much deeper than the other? Explain why.

Carbon Dioxide ice cannot stack up very high. Since the ice at the poles is stacked high, scientists think that the ice is water ice, not Carbon Dioxide ice.

5

Compare this image of [Grand Canyon National Park](#) with this photograph from [Holden Crater on Mars](#).

What similarities do you see?

What differences?

6

See [Grand Canyon Geology](#) and information about the [Kaibab Limestone](#).

What type of environment created the rocks? _____

How do you know? _____

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7. Sedimentary rocks include limestone, sandstone and shale. These rocks usually form layers.

Do the layers of rock at [Holden Crater](#) look similar? _____

What type of rock might these be? _____

8

Look at this photograph of the Thaumasia region on Mars

(<http://www.msss.com/http/ps/channels/net2.gif>)

Describe what you see in the upper left of the image and move lower and to the right (you should see something that has a tree-like pattern on its side). Sketch it below.

Now compare this to a river in Iceland

(<http://www.und.edu/instruct/mineral/101intro/slides/rivers/slide27.htm>)

How are these images similar?

What inference can you make based on these images?



8. Compare this photo of [Nirgal Vallis](#) on Mars with this image of the [Colorado River](#).

How are they similar? _____

How are they different? _____

Measure the length of Nirgal Vallis shown. How long is it in km? _____

Does the “river” begin on the left or right side of the image? _____
(HINT: Rivers get wider as they move downstream.)

Look in an atlas and measure the section of the Colorado River shown in the image above. How long is it in km? _____



Using the image of [Nirgal Vallis](#) look at the craters.

Is Nirgal Vallis older or younger than most of the craters right beside it? _____

How can you tell? (HINT: Do you see anything that interferes with the smooth, flowing pattern of the Nirgal Vallis?)



Was there ever an ocean on Mars? Go to [The Case of the Missing Mars Water](#) and scroll down to the section on Signs of Heavy Flooding

How much water might have flowed through the channels in the Northern Lowlands?

What evidence is there for a giant ocean in Mars’ past?

If you want to learn more about water on Mars see [Mars: Follow the Water](#) and [Sedimentary Mars](#).



Could there be water on the surface of Mars for the humans to use? _____

What is the [evidence](#)? _____

Want to be a Martian Sun-Times reporter? Write a story using the facts you have learned in this lesson. Choose one of the styles of reporting that your teacher gave you. [Email it to us!](#)