



# *Planet Designer: Retro Planet Red*

Name:

Part 1

Open the computer interactive, “Planet Designer: Retro Planet Red.” After viewing the “Briefing” and “MAVEN Mission,” collect data for the table below in the “Mars Stats” and “Snapshot” section of the interactive.

Mass	
Radius	
Density	
Distance from the Sun	
Albedo	
Description of Color	
Atmospheric Pressure (bars)	
Description of Atmospheric Thickness	
Greenhouse Strength	
Average Surface Temperature (Kelvin)	
Description of Atmospheric Constituents	

In your lab book, answer the following questions:

- 1.1 Compare these values to the planet you designed in “Planet Designer: Kelvin Climb.” How do they compare with the planet you designed? Describe any differences you see.
  
- 1.2 Which of these aspects of Mars affect its surface temperature, and why?



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## Part 2

Click on the “Next” button to enter the “Makeover” section. Click on “Today’s Sun.” Adjust the “Atmospheric Thickness” and “Greenhouse Strength” until liquid water is possible on Mars’ surface. Find at least three different scenarios where liquid water is present. Try both low and high pressures.

Atmospheric Pressure	Greenhouse Strength	Surface Temperature	Description of Climate

In your lab book, answer the following questions:

2.3. If you have not already, create a scenario where conditions allow for Earth-like temperatures (near or at 287 Kelvin). List the atmospheric pressure, and describe the greenhouse strength.

2.4. Explain how Mars would differ from Earth if they both had the same temperature.



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## Part 3

Still working in the “Makeover” section, click on “Faint Young Sun.” 3.8 billion years ago, the Sun was only 70% as bright as it is today. Adjust the “Atmospheric Thickness” and “Greenhouse Strength” until liquid water is possible on Mars’ surface. Find at least three different scenarios where liquid water is present. Try both low and high pressures.

Atmospheric Pressure	Greenhouse Strength	Surface Temperature	Description of Climate

In your lab book, answer the following questions:

- 3.1. Compare the *highest* atmospheric pressure you found in the table above with the atmospheric pressure of Mars today (from part 1). (Hint: You will have to divide to compare the values).
- 3.2. Compare the *lowest* atmospheric pressure you found in the table above with the atmospheric pressure of Mars today (from part 1).
- 3.3. How do the highest and lowest atmospheric pressures from the table above compare with Earth’s (1 bar)? (Hint: You will have to divide to compare the values).
- 3.4. Discuss your findings with a neighbor, and write a conclusion about the atmospheric pressure and greenhouse strength needed for Mars to maintain liquid water on the surface 3.8 billion years ago.