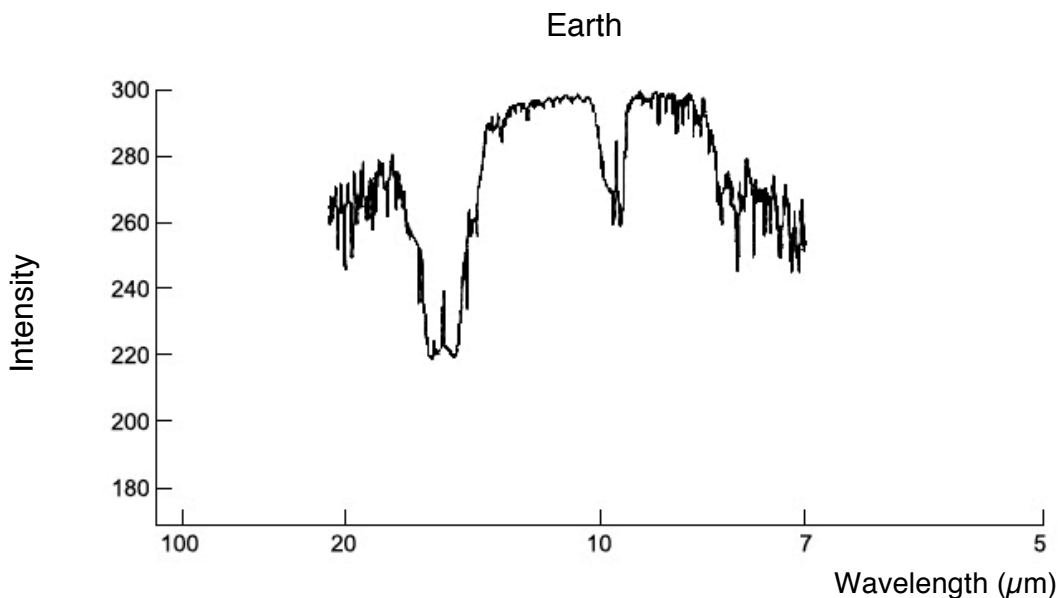
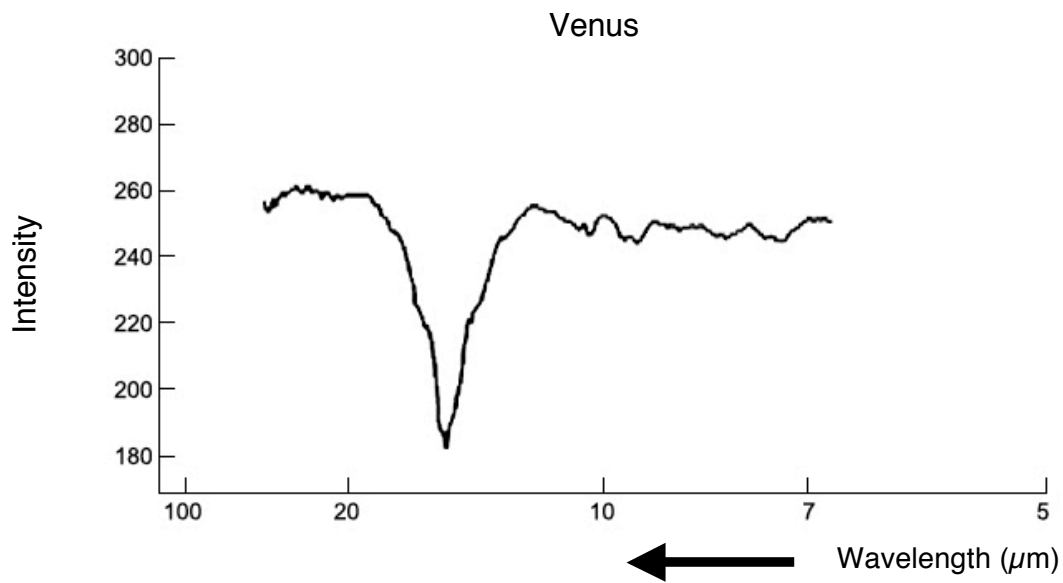
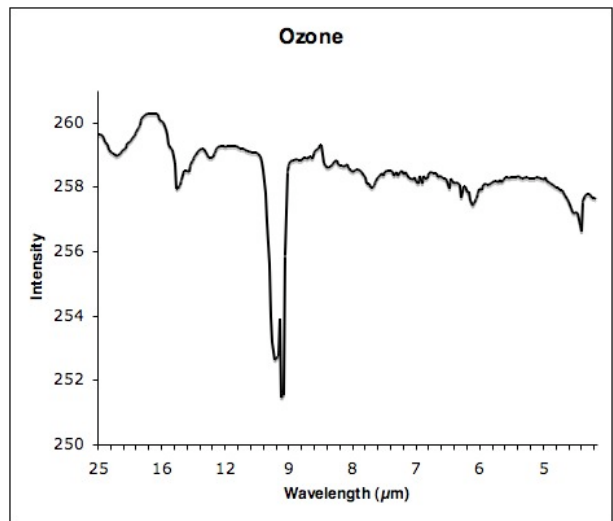
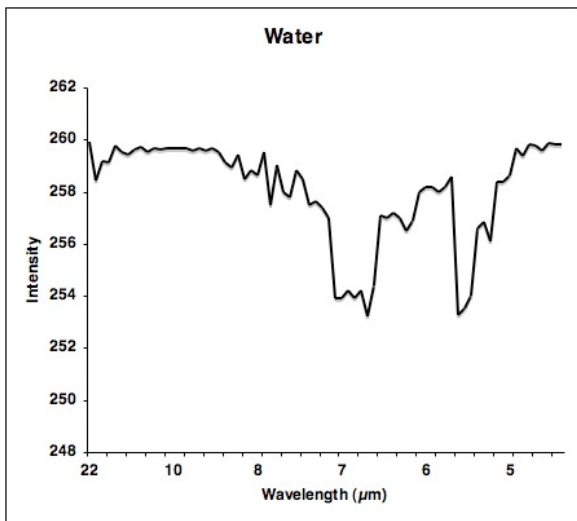
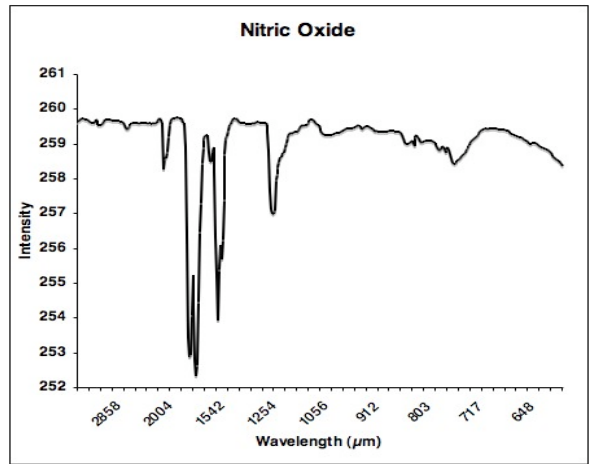
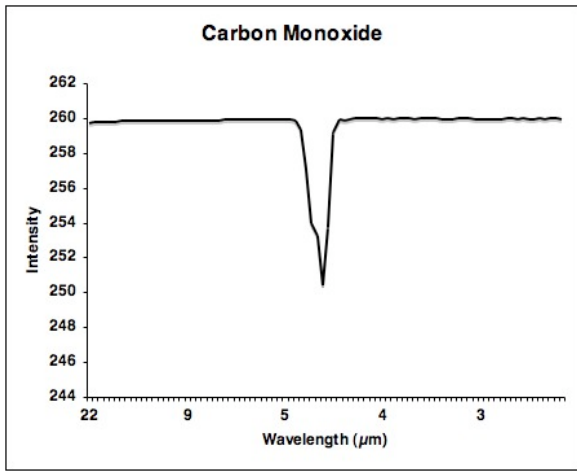
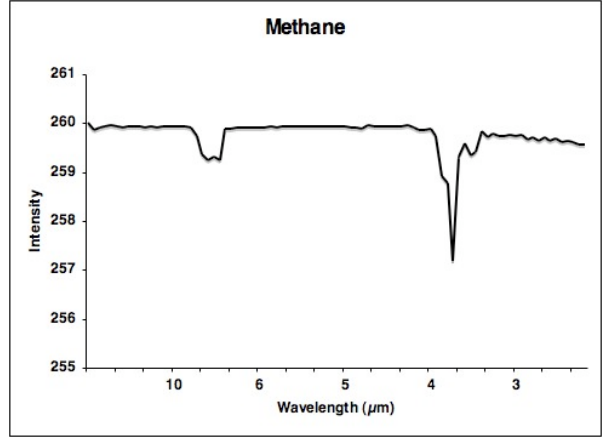
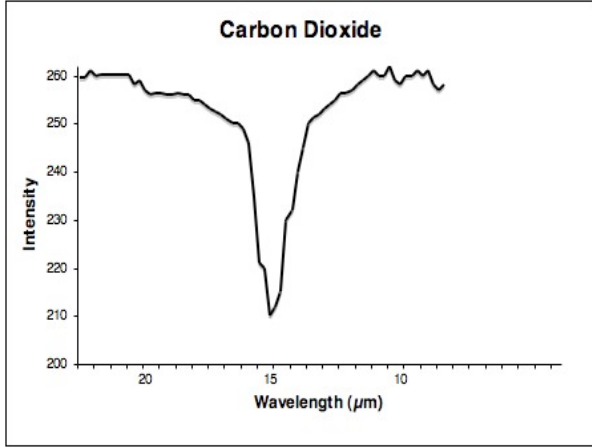


Student directions

Part 1

First, let's compare the spectra of Venus and Earth. The spectrum of Venus was taken from the Venera 15 spacecraft with an instrument called the Infrared Fourier Spectrometer in the 1980s. The spectrum of Earth was taken by the Nimbus 4 spacecraft which orbited Earth in the 1970s. Compare the dips in the spectra with known elements on the following page. Be sure to look at the scale very carefully.





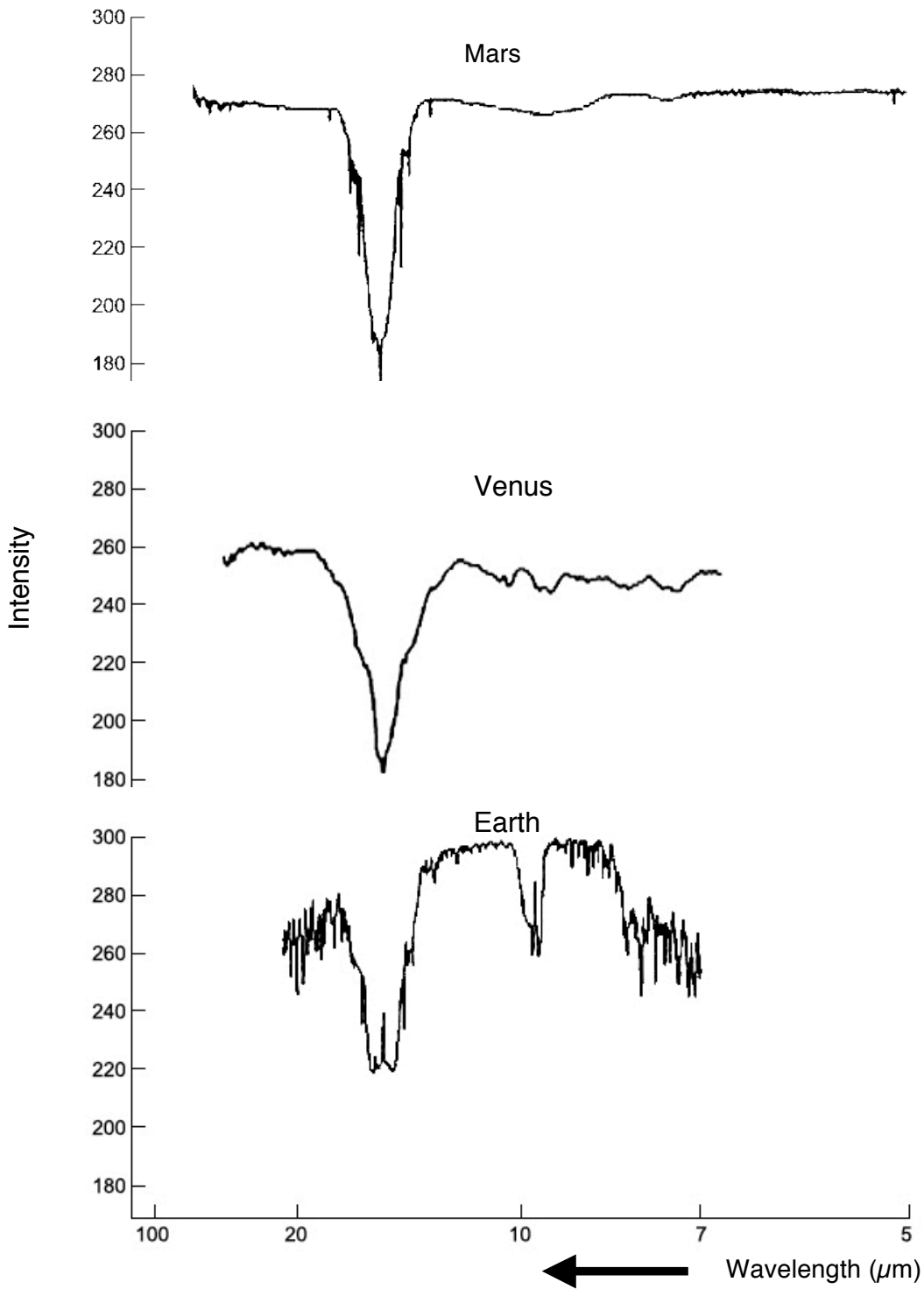


Goldilocks and the Three Planets

5. Now, let's do some math! Venus has 90 times more atmosphere than Earth does. About 97% of the total mass of Venus' atmosphere is Carbon Dioxide, but only 0.04% of the total mass of Earth's atmosphere is Carbon Dioxide.
- Write an expression for the amount of Carbon Dioxide in the Earth's atmosphere using ' m_e ' for the mass of Earth's atmosphere.
 - Write an expression for the mass of Venus' atmosphere using ' m_e '.
 - Write an expression for the amount of Carbon Dioxide in Venus' atmosphere using the expression from part b.
 - Compare the amount of Carbon Dioxide in Venus' atmosphere to the amount in Earth's atmosphere by dividing the expression from part c by the expression from part a. Round your answer.
6. Using the value from part d above, fill in this blank: Venus has _____ times more Carbon Dioxide than Earth.
7. Venus is very very hot! It can get up to 900 °F at the surface, hot enough to melt lead!! What conjectures can you make about the cause of Venus' hot temperature?

Part 2

Now, let's look at the spectrum of Mars compared to Earth and Venus. The spectrum of Mars was taken by the Mariner 9 spacecraft in the 1970s.





Goldilocks and the Three Planets

Put an X in the table below with the substances you know are definitely present.

	Carbon Monoxide	Nitric Oxide	Methane	Water	Ozone	Carbon Dioxide
Venus						
Earth						
Mars						

- Let's compare Mars and Earth. Mars' atmosphere is much thinner than Earth's, about 0.95% of Earth's atmosphere. About 95% of Mars' atmosphere is Carbon Dioxide. Remember, only 0.04% of the Earth's atmosphere is Carbon dioxide.
 - Write an expression for the mass of Mars' atmosphere using ' m_e '
 - Write an expression for the amount of Carbon Dioxide in Mars' atmosphere using the expression from part a.
 - Compare the amount of Carbon Dioxide in Mars' atmosphere to the amount in Earth's atmosphere by dividing the expression from part b by the expression from part a from part 1.
- Using the value from part c above, fill in this blank: Mars has _____ times more Carbon Dioxide than Earth.
- Even though Mars has more Carbon Dioxide than Earth, it has a much colder average surface temperature of about -70°F . Clearly, Mars has more Carbon Dioxide than Earth, but much less than Venus. Why do you think Mars' temperature is so much lower than Earth's? What factors can affect a planet's temperature? Brainstorm with a peer.