Film
Atmosphere

Objectives
• Discoveries of atmospheres in the solar system
• Atmosphere and weather
• Atmospheres of terrestrial planets

Questions
1. How thick (in miles) is the atmosphere on Earth according to the film? How thick is it according to the textbook?

2. What will happen when you leave the atmosphere behind?
   Your blood will ______ because __________________________________________
   You will feel no sensation of falling because _________________________________
   You will have a silent fall because _________________________________________

3. Why is the atmosphere essential for our existence on Earth? Give at least three reasons.

4. How did people in the 18th century figure out that Venus has an atmosphere?

5. Why is Venus’ atmosphere called a “crushing inferno”?

6. Which of the following does NOT describe the weather on Venus?
   A. Sulfuric rain
   B. Constant Lightning
   C. Desert-like
   D. Cloudy

7. Which of the following does NOT describe the weather on Mars
   A. Cloudy
   B. Desert-like
   C. May have giant dust storm
   D. Red sky at noon, blue sky at sunset

8. Which planet has the most unpredictable weather, among Venus, Earth, and Mars?

9. Match the following
   A. Venus       a. Virtually no greenhouse effect
   B. Earth       b. The right amount of greenhouse effect
   C. Mars        c. Run-away greenhouse effect

10. How do we know that the “Great Red Spot” on Jupiter is more than 300 years old?
How many Earth can fit into the “Great Red Spot”? 

11, What is the terminal fall velocity of the Galileo Probe that dived into Jupiter’s atmosphere? How does it compare with average terminal free-fall velocity on Earth?

12, How did we slightly contaminate Jupiter’s atmosphere?

**Advanced Questions**

1. Make a sketch showing the structure of Earth’s atmosphere (the location and thickness of thermosphere, mesosphere, stratosphere, troposphere). How does temperature change with altitude in each region? Which region is unique to the Earth amongst the terrestrial planet?

2. What is greenhouse effect? Name three greenhouse gases. Where have you experienced greenhouse effect? Name at least three occasions.

3. Give an example for each of the following electromagnetic radiations in our life
   Gamma ray
   X-ray
   ultraviolet
   infrared
   microwaves
   radio waves

**Keys**

1. In the film, it was stated that for man the Earth’s atmosphere is 60,000 ft (18.3 km) thick because human blood boils at this height. According to the textbook, the atmosphere extends to nearly 100 km above the surface.

2. You feel no sensation of falling because there is no reference for your motion (As in the movie “Aviator”)
   You will have a silent fall because there is not air around you to produce any sound.

3. We need the oxygen to breath. We need the greenhouse effect from carbon dioxide and water vapor to warm up the atmosphere and surface. We need the wind from circulation of air to homogenize temperature around the globe. We need the rain from precipitation of water vapor to drink and to cultivate plants.

4. People observed the transit of Venus across the Sun and saw a thick halo around Venus.

5. Venus has high surface pressure (nearly 100 times that of the Earth) and high surface temperature (hot enough to melt lead), hence it is called a “crushing inferno”.

6, C

7, A

8, Earth

9, Ac, Bb, Ca

10, Galileo saw the “Great Red Spot” more than 300 year ago. It is still there today. Two to three Earths can fit into the spot.

11, 60 km/s, several times that of the average terminal free-fall velocity on Earth.

12, The Galileo probe that dived into the Jovian atmosphere became part of the atmosphere.