

Astronomy 2020 – Space Astronomy & Exploration Fall 2020

Homework #5

Due: Nov. 9, 2020

In questions 1-3 below, choose the best answer. Then explain your reasoning in a few complete sentences. Why is your answer correct?

1. (2 pts). Recent evidence suggests that Mars once had a global magnetic field. Assuming this is true, which of the following could explain why Mars today lacks a global magnetic field like that of Earth?
 - a) Mars rotates much slower than Earth.
 - b) Mars's interior has cooled so much its molten core layer no longer undergoes convection.
 - c) The Martian core is made of rock, while Earth's core is made of metal.
 - d) Mars is too far from the Sun to have a global magnetic field.

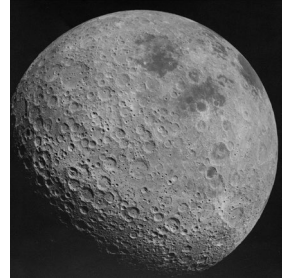
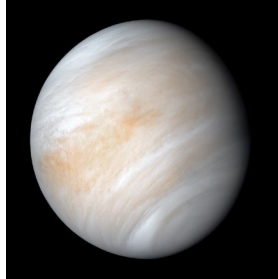
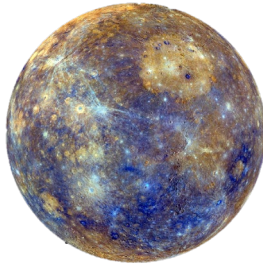
2. (2 pts). Why does Venus have such a great difference in temperature between its "no atmosphere" temperature and its actual temperature?
 - a. It has a slow rotation.
 - b. It is so close to the Sun.
 - c. It has a large amount of greenhouse gases in its atmosphere.
 - d. It has a high level of volcanic activity.
 - e. It has no cooling effects from oceans.

3. (2 pts). Volcanism is more likely on a planet that
 - a. is closer to the Sun.
 - b. is struck often by meteors and solar system debris.
 - c. has high internal temperatures.
 - d. doesn't have an atmosphere or oceans.

4. (6 pts). Discuss a human mission to Mars. Be sure to list the references where you obtained information to answer this question.
 - a. (2 pts). Describe the orbital trajectory needed to get to Mars. Assume that Hohmann transfer orbits will be used.
 - b. (1 pt). Estimate how long it will take to get to Mars. Justify your answer.
 - c. (1 pt). Why would astronauts be forced to spend about a year on the surface of Mars before returning?
 - d. (2 pts). What resources will be available on Mars to help astronauts to "live off the land" and what will need to be brought from Earth?



5. (3 pts). How do the size and chemical composition of a planet determine its internal temperature?
6. (3 pts). Explain why Mercury, Venus, and the Moon do not have significant erosion. Relate erosional activity to the planetary formation properties.



7. (3 pts). Earth and Venus both presumably had similar gases outgassed from their volcanoes. Briefly explain how their atmospheres ended up so different.