

ASTR1050
Fall 2025

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Due Date: 29 September, 11:59 PM

1. List three reasons why Mars does not have a substantial atmosphere today.
2. Why can't liquid water exist on Mars today?
3. What are some similarities between Earth and Mars?
 - (a) Similar rotation rate.
 - (b) Seasons.
 - (c) Liquid water (albeit, at different epochs).
 - (d) All of the above.
4. Mars orbits the Sun with semi-major axis $a = 1.52$ AU and eccentricity $e = 0.093$. Calculate the Aphelion (*i.e.* furthest distance from the Sun) and Perihelion (*i.e.* shortest distance to the Sun) for Mars.
5. Mercury orbits the Sun with semi-major axis $a = 0.39$ AU and orbital eccentricity $e = 0.206$. Calculate the Aphelion and Perihelion of Mercury's orbit.
6. Venus has perihelion of $P_e = 0.71496$ AU and aphelion $A_p = 0.72504$ AU. What is the eccentricity of Venus?
7. Why does the surface temperature of Mercury vary as drastically as it does?
8. Despite being the second planet from the Sun, Venus shows the highest surface temperature of any planet in the Solar System. Why?
9. Why do Jupiter and Saturn have strong magnetic fields, but Uranus and Neptune do not?
 - (a) Jupiter and Saturn have sufficient equatorial rotational velocities while Uranus and Neptune do not.
 - (c) Jupiter and Saturn have liquid-metallic hydrogen in their cores while Uranus and Neptune do not.
 - (b) Jupiter and Saturn are hot enough to produce magnetic fields while Uranus and Neptune are not.
 - (d) Jupiter and Saturn have liquid iron in their cores while Uranus and Neptune do not.
10. Describe the seasons on Uranus.