

# The Aerothermodynamics of Artemis II Reentry

Aerospace Engineering · Answer Key · 12 Questions

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**1. What is the region between the shock wave and the capsule surface called?**

- A) The boundary layer
- B) The shock layer**
- C) The plasma film
- D) The stagnation zone

**2. Which equations are used to derive shock jump relations for normal shock waves?**

- A) Navier-Stokes Equations
- B) Bernoulli's Equations
- C) Rankine-Hugoniot Equations**
- D) Maxwell's Equations

**3. At Mach 32, why is the real gas temperature (8,000-10,000 K) lower than the perfect gas prediction (60,000 K)?**

- A) Energy is lost to friction
- B) Energy is used for dissociation and ionization**
- C) The heat shield absorbs the energy
- D) The air is thinner at high altitudes

**4. What are the two primary sources of heating for the vehicle during reentry?**

- A) Convective and Radiative**
- B) Frictional and Chemical
- C) Solar and Nuclear
- D) Magnetic and Kinetic

**5. Which heating source dominates during the lunar reentry of Artemis II?**

- A) Convective heating
- B) Radiative heating**
- C) Frictional heating
- D) Conductive heating

**6. What is the name of the relation used to determine convective heat flux at the stagnation point?**

- A) Reynolds relation
- B) Fay-Riddell relation**
- C) Stefan-Boltzmann law
- D) Newton's law of cooling

7. How does convective heat transfer scale with velocity according to the text?

- A) Linearly
- B) Square of velocity

**C) Third-power of velocity**

- D) Inversely

8. Why is a blunt capsule geometry preferred over a sharp-nosed design for reentry?

- A) To increase fuel efficiency
- B) To reduce weight

**C) To manage heat by pushing the shock wave farther away**

- D) To increase subsonic speed

9. What is the approximate drag coefficient ( $C_d$ ) for Orion at hypersonic speeds?

- A) 0.5
- B) 0.9

**C) 1.3**

- D) 2.1

10. What is the peak predicted deceleration force (g-force) for the Artemis II crew?

- A) 2g
- B) 4g**
- C) 8g
- D) 12g

11. How does the Artemis II reentry profile differ from Artemis I?

- A) Artemis II uses a skip trajectory

**B) Artemis II uses a lofted guidance profile with a single reentry**

- C) Artemis II enters at a lower Mach number
- D) Artemis II uses parachutes earlier

12. What caused the heat shield damage on Artemis I?

- A) Extreme cold in space
- B) Micrometeoroid impacts

**C) Gas trapped in the ablator escaping during the skip phase**

- D) Improper parachute deployment