Artemis II Crew to Face 3,000°C During Re-Entry

Description

The Artemis II crew is set to return to Earth after completing their successful mission to the Moon. The four astronauts travelled a record distance of 406,771 kilometres away from Earth during their journey.

Their return will involve a high-speed re-entry into Earth's atmosphere, with a planned splashdown in the Pacific Ocean off the California coast at around 8 pm local time on April 10. This final stage presents significant challenges but is made safer by advanced technology in their spacecraft.

The Orion capsule is expected to travel at more than 11 km/s (about 40,000 km/h) upon re-entry—much faster than a typical passenger jet. This rapid speed results in very high kinetic energy, which must be reduced to ensure a safe landing. To slow down, the spacecraft will use a controlled descent through the upper atmosphere, leveraging aerodynamic drag.

During re-entry, the Orion capsule will experience extremely high temperatures, reaching over 10,000°C. A shock wave will surround the spacecraft, temporarily blocking radio signals and cutting off communication with the astronauts.

To cope with the extreme conditions, the spacecraft is equipped with a thermal protection system that insulates against heat. This system allows the craft to withstand high temperatures while maintaining a manageable heat shield surface temperature of around 3,000°C.

Engineers reviewed the heat shield from the previous Artemis I mission, which lost material upon re-entry. For Artemis II, they have adjusted the spacecraft's trajectory to minimise risks. Following these careful preparations, the mission team looks forward to their safe return.

Vocabulary List:

1. **splashdown** //ˈsplæʃˌdaʊn// (noun): landing of a spacecraft in the sea
2. **trajectory** //trəˈdʒɛktəri// (noun): the path something follows through the air
3. **aerodynamic** //ˌɛroʊdaɪˈnæmɪk// (adjective): designed to move well through the air
4. **kinetic** //kɪˈnɛtɪk// (adjective): energy from movement of an object
5. **insulates** //ˈɪnsəˌleɪts// (verb): keeps heat or cold from passing through
6. **minimise** //ˈmɪnəˌmaɪz// (verb): make something smaller or less likely

Comprehension Questions

Multiple Choice

1. How far did the Artemis II crew travel away from Earth?

   Option: 406,771 kilometres
   Option: 500,000 kilometres
   Option: 350,000 kilometres
   Option: 450,000 kilometres

2. What is the planned splashdown location for Artemis II?

   Option: Atlantic Ocean
   Option: Gulf of Mexico
   Option: Pacific Ocean
   Option: Mediterranean Sea

3. At what speed is the Orion capsule expected to travel upon re-entry?

   Option: 11 km/s
   Option: 15 km/s
   Option: 20 km/s
   Option: 25 km/s

4. What temperature can the Orion capsule reach during re-entry?

   Option: 5,000°C
   Option: 8,000°C
   Option: 10,000°C
   Option: 12,000°C

5. What type of system is used to protect the Orion capsule from heat?

   Option: Radiation shield
   Option: Thermal protection system
   Option: Sound barrier
   Option: Pressure control system

6. How fast is 11 km/s in terms of km/h?

   Option: 30,000 km/h
   Option: 40,000 km/h
   Option: 50,000 km/h
   Option: 60,000 km/h

True-False

7. The Artemis II crew is returning to Earth after a mission to Mars.

8. During re-entry, the Orion capsule will face extremely high temperatures.

9. The planned splashdown time for Artemis II is 8 am local time.

10. The spacecraft will use a controlled descent to slow down during re-entry.

11. Engineers have not made any adjustments for Artemis II's trajectory.

12. The Orion capsule can block radio signals during re-entry due to a shock wave.

Gap-Fill

13. The Artemis II crew travelled a distance of _____ kilometres away from Earth.

14. The splashdown of Artemis II is planned to occur in the _____ Ocean.

15. The Orion capsule is expected to travel at more than _____ km/s upon re-entry.

16. During re-entry, temperatures can reach over _____ °C.

17. The thermal protection system allows the capsule to withstand a maximum heat shield surface temperature of around _____ °C.

18. The spacecraft is equipped with advanced technology to cope with _____ conditions during re-entry.

Answer

Multiple Choice: 1. 406,771 kilometres 2. Pacific Ocean 3. 11 km/s 4. 10,000°C 5. Thermal protection system 6. 40,000 km/h
True-False: 7. False 8. True 9. False 10. True 11. False 12. True
Gap-Fill: 13. 406,771 14. Pacific 15. 11 16. 10,000 17. 3,000 18. extreme

CATEGORY

1. Sci/Tech - LEVEL4

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7. Level 4
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