

Europa Mission Research Assignment 1

Use the website below to read about Europa and answer the questions. Use the sub-headlines to help you.

<https://solarsystem.nasa.gov/moons/jupiter-moons/europa/in-depth/>

Introduction

1. What did the Voyager spacecrafts that were sent out in 1979 tell scientists about the surface of Europa?

2. Describe the thin water plumes that have been discovered on Europa.

Potential for Life

3. What are astrobiologists, and what do they believe about the possibility of life on Europa?

4. What type of life form might be found on Europa?

Size and Distance

5. How does Europa compare in size and brightness to Earth's moon?

6. How long does it take light from the Sun to reach Europa?

Orbit and Rotation

7. Europa orbits Jupiter every _____ days, and Jupiter takes _____ Earth days to orbit the Sun.
8. Why don't Jupiter and its moons experience as extreme seasons as other planets do?
9. Describe Europa's orbit and what effects it has.

Structure

10. Name 2 ways Europa is similar to Earth, and 2 ways it is different from Earth.
11. Evidence of an internal _____ is strong, but can't be confirmed yet.

Formation

12. Name 3 other moons of Jupiter.
13. How did these four moons likely form?
14. Why are the Galilean satellites of Jupiter sometimes called a "mini solar system?"

Surface

15. Europa's water-ice surface is crisscrossed by _____.

16. What is the reddish-brown material on Europa's surface believed to be made up of?

17. NASA's spacecraft called _____ explored the Jupiter system between _____ and _____, which revealed strange pits and domes.

18. What is "chaos terrain?"

Atmosphere

19. What did NASA researchers discover about Europa in 2013?

Magnetosphere

20. What do scientists believe to be the cause of a magnetic field within Europa?

ANSWER KEY

Introduction

1. What did the Voyager spacecrafts sent out in 1979 tell scientists about the surface of Europa?

Europa might contain liquid water, and that there might be an ocean.

2. Describe the thin water plumes that have been discovered on Europa.

They are being ejected 100 miles above Europa's surface.

Potential for Life

3. What are astrobiologists, and what do they believe about the possibility of life on Europa?

Astrobiologists are scientists who study the origin, evolution, and future of life in the universe.

They believe Europa has abundant water the right chemical elements, but they're not sure about an energy source.

4. What type of life form might be found on Europa?

It may look like microbes, or something more complex.

Size and Distance

5. How does Europa compare in size and brightness to Earth's moon?

It is 90 percent of the size of Earth's moon (so it's a little smaller), and it is a lot brighter (reflects 5.5 times the sunlight as Earth's moon does).

6. How long does it take light from the Sun to reach Europa?

It takes about 45 minutes.

Orbit and Rotation

7. Europa orbits Jupiter every 3.5 days, and Jupiter takes 4,333 Earth days to orbit the Sun.

8. Why don't Jupiter and its moons experience as extreme seasons as other planets do?

Jupiter spins nearly upright.

9. Describe Europa's orbit and what effects it has.

The orbit is elliptical (slightly stretched out from circular), which causes the distance from Jupiter to vary. So, the moon's near side feels Jupiter's gravity more strongly than its far side. This creates tides that stretch and relax the moon's surface.

Structure

10. Name 2 ways Europa is similar to Earth, and 1 way it is different from Earth.

Similar: It has an iron core, a rocky mantle, and an ocean of salty water.

Different: Europa's ocean lies below a shell of ice 10-15 miles thick.

11. Evidence of an internal **ocean** is strong, but can't be confirmed yet.

Formation

12. Name 3 other moons of Jupiter.

Io, Ganymede, and Callisto

13. How did these four moons likely form?

They likely formed out of leftover material after Jupiter condensed from the initial cloud of gas and dust surrounding the Sun.

14. Why are the Galilean satellites of Jupiter sometimes called a "mini solar system?"

They formed from the leftovers of Jupiter similar to how Earth and other planets formed from gas and dust left over from the formation of our Sun.

Surface

15. Europa's water-ice surface is crisscrossed by **long, linear fractures**.

16. What is the reddish-brown material on Europa's surface believed to be made up of?

It likely contains salts and sulfur compounds that have been mixed with water ice and modified by radiation.

17. NASA's spacecraft called **Galileo** explored the Jupiter system between **1995** and **2003**, which revealed strange pits and domes.

18. What is "chaos terrain?"

It is a region where broken, blocky landscapes were covered in reddish material. They could be places where the surface collapsed above lens-shaped lakes embedded within the ice.

Atmosphere

19. What did NASA researchers discover about Europa in 2013?

They found evidence that Europa might be actively venting water into space.

Magnetosphere

20. What do scientists believe to be the cause of a magnetic field within Europa?

The cause would be a global ocean of salty water.