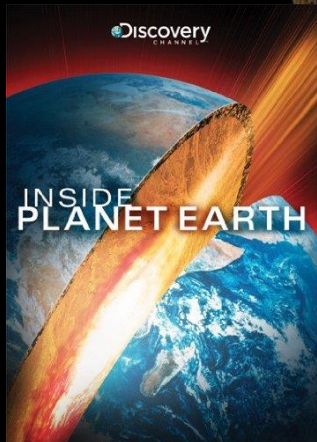


Inside Planet Earth: Surface to Center



Section 1: Introduction

1. What percentage of the Earth cannot be accessed by humans? **99%**
2. **True** or False: It would be easier to invent something to travel to the sun compared to the core.
3. Studying the inside of the core could give us clues as to how and why **life** exists.
4. **True** or False: There is more water below the Earth than in all the oceans.

***What are two other interesting things you learned from this section?
Write them on the page below the worksheet.***

Section 2: Gravity & Energy

1. Where does gravity come from? **Earth's dense interior, the core**
2. What does the force of gravity do for us?
 - a. **Protection from meteorites**
 - b. **Absorbs lethal radiation**
 - c. **Insulates Earth from freezing temperatures of space**
 - d. **Gives us the air that we breath**
3. No gravity, no **atmosphere**. No atmosphere, no **life**.
4. True or **False**: The sun gives us all of our energy.
5. What are the pieces of evidence for the earth's internal energy?
Volcanoes, mountain ranges, caves

6. What can fit inside the large chamber of the Carlsbad Caverns? **A jumbo jet**
7. Stalactites grow upward/**downward** (choose one).
8. Stalagmites grow **upward**/downward (choose one).
9. What happens to the temperature as you go deeper beneath the earth's surface? **It increases**

***What are two other interesting things you learned from this section?
Write them on the page below the worksheet.***

Section 3: 1000 feet below Earth

1. How long are the crystals that formed here? **40 feet long**
2. How did these crystals form? **An underground lake was boiled by magma. Crystals grew from the minerals that were dissolved in the water.**
3. There are **seven** massive sections that make up the Earth's crust. These sections are known as **plates**.
4. In the 1960s, it was discovered that the earth's internal energy can move continents. What evidence do we observe at the Earth's surface that tells us the crust is in motion? **Mountains (collisions between the plates).**

***What are two other interesting things you learned from this section?
Write them on the page below the worksheet.***

Section 4: 1.5 Miles Below

1. Coal is the fossilized remains of a super **forest**.
2. Pangea was a super **continent** located by the equator.
3. How did the giant forests affect the atmosphere? **Sucked up CO₂ and pumped out oxygen.**
4. What did the high oxygen levels do to Earth's creatures? **Super-sized them**
5. What role did energy from inner Earth play in the formation of Pangea? **It reshaped the landmasses**

***What are two other interesting things you learned from this section?
Write them on the page below the worksheet.***

Section 5: 2.5 Miles Below Ground

1. Temperatures in the mines are **130** degrees Fahrenheit.
2. Why are bacteria deep in the Earth's crust do interesting to scientists? **These bacteria could help explain the origins of life. It could be possible that life started below ground.**
3. The bacteria have been undisturbed for **billions** of years.
4. What was the deepest hole ever drilled? **7.5 miles**
5. How old are the rocks in Australia? **3.5 billion years old**
6. What built the stromatolites? **Bacteria**

7. How did life from inside the Earth reach the surface? **Propelled by forces from within the Earth.**
8. How did oxygen help turn the seas blue? **The oxygen bonded with dissolved iron in H₂O. Then, the iron oxide floated to the bottom and resulted in the oceans turning from a green color to blue.**

***What are two other interesting things you learned from this section?
Write them on the page below the worksheet.***

Section 6: 25 -30 miles below ground

1. There is **20** times more oxygen trapped in **iron** ore than floating in the atmosphere.
2. True or **False**: The mantle is liquid.
3. How can we access mantle rock? **Find areas where it has been forced to the surface.**
4. What did they compare the consistency of mantle rock to? **Fudge**
5. The ability of the mantle to “flow” is extremely important. If the mantle was unable to flow, what would be some negative consequences we would encounter?
 - a. No plate movement**
 - b. No mountain ranges**
 - c. No major ocean basins**

6. The pressure in the mantle is **50,000** times greater than what we feel at the surface.

***What are two other interesting things you learned from this section?
Write them on the page below the worksheet.***

Section 7: 100 miles below ground

1. What precious material is found here? **Diamond**
2. How did diamonds get to where they are today? **Violent prehistoric eruptions triggered by Earth's internal heat. Volcanic eruptions, 1 billion years ago.**
3. Why do geologists like the “flaws” in diamonds? **They are fragments of primitive mantle that are trapped inside the diamond.**
4. True or **False**: All diamonds from across the world are identical in composition.

***What are two other interesting things you learned from this section?
Write them on the page below the worksheet.***

Section 8: 200 miles below ground

1. What devastating phenomenon originates at this level? **Earthquakes**
2. What can the waves from earthquakes tell us? **They can tell us about the world sealed deep within the Earth's crust.**
3. Seismic data can tell us the **shapes** of certain features inside of the Earth.
4. **Convection** currents of hot solid rock move continuously throughout the **mantle**.
5. How does energy from the core move our continents? **Heat from the core rises through the mantle, causing the plates to shift.**

6. Which plates have a greater density? Continental or **Oceanic**
(choose one)

7. If all underground water came to the surface, how high would sea levels rise? **2.5 miles above the peak of Mt. Everest.**

8. What is the Ring of Fire? **Area of explosive volcanoes that is located where the Pacific Plate dives into the mantle.**

***What are two other interesting things you learned from this section?
Write them on the page below the worksheet.***

Section 9: 1500 miles below ground

1. What do plumes from the mantle create? **Hotspot volcanoes**
2. Measured from the ocean floor, where is the tallest volcano in the world located? **Hawaii**
3. Why/How do island chains form? **The mantle plume stays in one place constantly pumping out magma. While this is going on, the plate above it is moving.**
4. How many destructive eruptions have occurred at Yellowstone? **3**
5. Yellowstone is actually a giant **volcano**.

6. What would happen if the Yellowstone volcano erupted? **Billions of tons of ash would be shot into the air, it would block out the sun, and we would be put into a volcanic winter.**

***What are two other interesting things you learned from this section?
Write them on the page below the worksheet.***

Section 10: 1800 miles below ground

1. The outer core is larger than the **moon**.
2. **True** or False: Seismic waves allow scientists to “see” the outer core.
3. Earth’s core produces a **magnetic** field.
4. **True** or False: Scientists are able to generate a magnetic field in the laboratory setting.
5. What does the magnetic field protect us from? **The sun**
6. Explain how the magnetic field protect us . **The magnetic field creates a “magnetic bubble” that keeps the solar wind and radiation from reaching the Earth’s surface.**

7. What do auroras show us? **Bright lights in the sky. They show a battle that is going on between the core and solar radiation.**
8. Why were the astronauts exposed to the cosmic rays? **They were at the edge of the safety shield created by Earth's magnetic field.**
9. What are the shape of the columns formed in the core? **Helix, Helical**

What are two other interesting things you learned from this section?

Write them on the page below the worksheet.

Section 11: 2500 miles below ground

1. Due to the iron, there are also **electrical** currents in the core.
2. Without **heat & rotation**, the core wouldn't generate a magnetic field.
3. Over the past century, the strength of Earth's magnetic field has decreased by **10** percent.
4. What is the South Atlantic Anomaly? **A weak area in our magnetic field**
5. What happens during a "reversal"? **North and South poles switch**
6. Where can we find evidence of reversals that have occurred in the past? **Inside cooled lava. The crystals line up with the magnetic fields.**

Section 11: 2500 miles below ground

7. During a reversal, we would lose protection from the magnetic field for several **months**.

***What are two other interesting things you learned from this section?
Write them on the page below the worksheet.***

Section 12: 3160 miles below ground

1. Why is the material solid in the inner core? **Immense amount of pressure**
2. The inner core is **growing** at a rate of 1 **millimeter** per year.
3. True or **False**: We know exactly what the surface of the inner core looks like.
4. One day, the inner core will **freeze** solid.
5. What happened to the heavier materials during planetary formation?
They sank to the bottom/center of the newly formed planets.
6. How large was the object that made the crater in Arizona? **300-400 ft**
- 7. Water** once flowed on the surface of Mars.

Section 12: 3160 miles below ground

8. Mars' magnetic field is weak, but its **crust** is very magnetized.
9. Why did Mars' magnetic field collapse? **Its core froze solid**
10. Mars core only lasted a few hundred **million** years.
11. Compared to Earth, why did Mars core cool so quickly? **Because Mars is only half the size of Earth.**

What are two other interesting things you learned from this section?

Write them on the page below the worksheet.

Section 13: 3960 miles below ground

1. Temperatures in the inner core reach **12000** degrees Fahrenheit. This is hotter than the surface of the **sun**.
2. There is no **gravity** in the center of the Earth.

***What are two other interesting things you learned from this section?
Write them on the page below the worksheet.***

Conclusion

Review the ***Interesting Information*** you wrote down for each section of the video AND/OR the facts presented in the video.

What would you choose as the 5 most interesting things you learned? Highlight the **MOST INTERESTING** fact/tidbit of all and label as 1st and go on to highlight/label through 5th place.

Be prepared to share your results with the class.