A Solar System Is Born

PES-U1-02 · Online version

Name: _____ **Class:** _____

Objective: Explain how gravity pulled a cloud of gas and dust into the Sun and the planets.
EQ: Where did Earth come from?

Part A · Vocabulary

Draw a line from each word to its meaning. Click a dot, then click the matching dot.

nebula nebulosa (ES) · سديم (AR) · nébuleuse (FR)	●	Growing bigger by adding pieces that crash in and stick
gravity gravedad (ES) · الجاذبية (AR) · gravité (FR)	●	A huge cloud of gas and dust in space
accretion acreción (ES) · التراكم (AR) · accrétion (FR)	●	A large, round object in space that travels around a star
planet planeta (ES) · كوكب (AR) · planète (FR)	●	The pull that every bit of matter has on other matter

Part B · Read

Look at your hand. The calcium in your bones and the iron in your blood are very old. They were here before Earth was. About 4.6 billion years ago, there was no Sun and no Earth. There was only a huge, cold cloud of gas and dust in space. A cloud of gas and dust in space is called a **nebula**. Most of the gas was hydrogen and helium. The dust was tiny bits of rock, metal, and ice.

Every bit of matter pulls on every other bit of matter. This pull is called **gravity**. In the nebula, gravity slowly pulled the gas and dust closer together. As the cloud shrank, it spun faster, and it flattened into a spinning disk, like pizza dough tossed in the air. Most of the gas fell into the center. There it got so hot and so crowded that fusion began. The Sun was born.

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Out in the disk, bits of dust bumped into each other and stuck together. The clumps grew bigger as more pieces crashed into them and stuck. Growing bigger by adding pieces is called **accretion**. Over millions of years, the clumps grew into planets. Near the hot young Sun, ice could not stay frozen, so only rock and metal were left to build with. That is why the inner planets, like Earth, are small and rocky. Far from the Sun, it was cold enough for ice, so the outer planets grew huge and pulled in gas. They became giants like Jupiter. Pieces that never joined a planet are still out there as asteroids and comets.

How do we know the age of all this? Some space rocks fall to Earth as meteorites, and the oldest are about 4.6 billion years old. So the rocks under New York City, the water in the harbor, and the iron in your blood all came from that same cloud.

Part C · Complete the Sentences

Type a word from the word bank in boxes 1–4. For box 5, choose the best ending from the menu.

gravity **nebula** **Sun** **accretion**

First, [1] pulled the gas and dust of the [2] together. Most of the gas fell to the center and became the [3]. In the disk, bits of dust stuck together and grew by [4]. Earth is small and rocky because [5].

Part D · Constructed Response

About 4.6 billion years ago there was only a cloud of gas and dust. Explain how it became the Sun and Earth. **Use the words *gravity* and *accretion* in your answer.** You may use the sentences from Part C to help you.

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Exit Ticket

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Click the circle next to the best answer for each question.

1. What is a nebula?

- ◯ A) The path a planet takes around a star
- ◯ B) A huge cloud of gas and dust in space
- ◯ C) The hot center of the Sun
- ◯ D) A planet made mostly of ice

2. What is gravity?

- ◯ A) The heat that comes from the Sun
- ◯ B) A cloud of gas and dust in space
- ◯ C) The spinning of a planet
- ◯ D) The pull that every bit of matter has on other matter

3. Which of these is an example of accretion?

- ◯ A) A snowball gets bigger as it rolls through snow
- ◯ B) An ice cube melts in the sun
- ◯ C) A rock breaks into small pieces
- ◯ D) A balloon pops and shrinks

4. When you drop a pencil, it falls to the floor. What makes it fall?

- ◯ A) Air pushes it down
- ◯ B) Heat from the Sun pulls it down
- ◯ C) Gravity pulls it toward Earth
- ◯ D) Accretion makes it heavier

5. The morpheme *cre* means to grow. Which word most likely means to grow larger?

- ◯ A) Increase
- ◯ B) Release
- ◯ C) Erase
- ◯ D) Please

6. According to the passage, what was most of the gas in the nebula?

- ◯ A) Iron and rock
- ◯ B) Oxygen and carbon dioxide
- ◯ C) Hydrogen and helium
- ◯ D) Water vapor

7. According to the passage, about how old is our solar system?

- ◯ A) About 4.6 billion years
- ◯ B) About 10,000 years
- ◯ C) About 46 million years
- ◯ D) About 4,600 years

8. According to the passage, what happened to most of the gas in the nebula?

- ◯ A) It fell to the center and became the Sun
- ◯ B) It escaped into empty space
- ◯ C) It became Earth's oceans
- ◯ D) It turned into asteroids and comets

9. According to the passage, why are the inner planets small and rocky?

- ◯ A) They formed before there was any gas
- ◯ B) Near the hot Sun, only rock and metal stayed solid
- ◯ C) Gravity does not work near the Sun
- ◯ D) Comets crashed into them and broke them

10. Scientists find a meteorite that is about 4.6 billion years old. What does this best show?

- ◯ A) Earth formed from one meteorite last year
- ◯ B) Earth and the meteorite formed at about the same time
- ◯ C) Meteorites are much younger than Earth
- ◯ D) The Sun formed long after the planets

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