

Gravity Builds Worlds

Trace how gravity forms space objects and guides their paths.

SC.8.E.5.4 "Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline details that show gravity gathering material to form stars, planets, or solar systems, and circle details that show gravity affecting an object's motion.

From Cloud to Orbit

- ① Gravity is a force that pulls every object with mass toward every other object with mass. Its strength increases when masses are larger and decreases when objects are farther apart. In a cold cloud of gas and dust, tiny bits attract one another. Over millions of years, gravity gathers this material into denser clumps. As a clump gains mass, its pull grows stronger, drawing in more nearby material. This process can build the dense center of a future star.
- ② Near the center, the clump becomes hotter and more compressed. If enough mass collects, nuclear fusion begins, and a star is born. Material left in a flattened disk around the young star also feels gravity. Dust grains collide and stick, then gravity helps larger pieces pull in smaller ones. These growing bodies become planets and moons. Gravity therefore helps organize a solar system from scattered material, rather than leaving the gas, dust, and rocks spread widely through space.
- ③ After formation, gravity continues to determine motion. A planet has forward motion, while the star's gravity pulls it inward. The result is an orbit, a curved path in which the planet continually falls toward the star but keeps moving forward. Moons orbit planets for the same reason. Gravity also keeps most solar-system objects bound to the Sun. An object moving too slowly may fall inward, while one moving fast enough can travel in a wider orbit or, if fast enough, escape.

2 ANSWER WITH EVIDENCE Use the passage

1 How does gravity help a cloud of gas and dust begin forming a star?

2 How does gravity help planets form in the disk around a young star?

3 Why does a planet orbit a star instead of moving in a straight line?

4 According to the passage, how do mass and distance affect the strength of gravity?

3 YOUR TURN Your own words

Create two labeled sketches of an imaginary young solar system. In Panel 1, show gravity gathering gas, dust, and rocks into a star and a planet. In Panel 2, show the planet's forward motion and the star's inward gravitational pull that produce an orbit.

PART 1 • READ AND MARK

Underline details that show gravity gathering material to form stars, planets, or solar systems, and circle details that show gravity affecting an object's motion. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	How does gravity help a cloud of gas and dust begin forming a star?	Gravity pulls bits of gas and dust together into denser clumps. As a clump gains mass, its stronger gravity draws in more material and can build a future star's dense center.
2	How does gravity help planets form in the disk around a young star?	Gravity helps larger pieces pull in smaller pieces after dust grains collide and stick. The growing bodies become planets and moons.
3	Why does a planet orbit a star instead of moving in a straight line?	The planet keeps moving forward, while the star's gravity pulls it inward. Together, these motions produce a curved orbit.
4	According to the passage, how do mass and distance affect the strength of gravity?	Gravity is stronger when masses are larger. It is weaker when objects are farther apart.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Panel 1: Arrows show gas and dust being pulled into a dense star, while smaller clumps join to form a planet. Panel 2: A planet has a forward arrow along its path and an inward arrow pointing toward the star, showing why it follows an orbit.

Accept equivalent descriptions that accurately connect gravity to gathering matter during formation and to inward pull plus forward motion during orbit. Student sketches should include both formation and motion, with arrows or labels showing gravity's role.