

Gravity Evidence File

Use observations and data to build a scientific argument.

MS-PS2-4 "Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each claim about gravity, circle the evidence that supports a claim, and write a 1 beside any sentence that explains how evidence supports a claim.

Following the Pull

- ① Gravity is an interaction between objects with mass. It pulls each object toward the other object, so the interaction is attractive, not a push apart. Earth and the Moon show this idea in motion. The Moon moves forward, but Earth's pull bends its path into an orbit around Earth. At the same time, the Moon pulls on Earth. This mutual pull helps explain why both objects move around a shared point in space, even though Earth moves much less because it has far more mass.
- ② Digital simulations can compare interactions while keeping distance the same. In one model, two objects placed the same distance apart had an interaction strength of 2 units when one object had a mass of 1 unit and the other had a mass of 2 units. When the first object's mass changed to 3 units, the strength became 6 units. The direction stayed toward the other object in both trials. This evidence supports a claim that a larger interacting mass can produce a stronger gravitational interaction.
- ③ Solar-system charts give another kind of evidence, but good arguments must notice more than one variable. Jupiter has about 318 times Earth's mass, yet Jupiter is also much farther from the Sun. A chart shows Jupiter's orbital period is about 11.9 Earth years, while Earth's is 1 year. These facts show that the Sun and each planet interact attractively, because both planets remain in orbit. However, this chart alone cannot fairly compare interaction strengths caused by planet mass, since the planets are at different distances from the Sun.

2 ANSWER WITH EVIDENCE Use the passage

- 1 Use the Earth-Moon example to make a claim about whether gravity is attractive. Include one piece of evidence from the example.

- 2 Which change in the simulation is evidence that mass affects gravitational interaction strength? Explain what happened to the strength.

- 3 How does the direction of the interaction in both simulation trials support the claim that gravity is attractive?

- 4 Why can the Jupiter-Earth chart not fairly show whether the planet with more mass has the stronger interaction with the Sun?

3 YOUR TURN Your own words

A simulation keeps distance the same in both trials. Trial A uses masses of 2 units and 4 units, with an interaction strength of 8 units. Trial B uses masses of 5 units and 4 units, with an interaction strength of 20 units, and the interaction points toward the other object in both trials. Write exactly three sentences that make a claim about gravity, use both trials as evidence, and explain how the evidence supports your claim.

PART 1 • READ AND MARK

Underline each claim about gravity, circle the evidence that supports a claim, and write a 1 beside any sentence that explains how evidence supports a claim. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Use the Earth-Moon example to make a claim about whether gravity is attractive. Include one piece of evidence from the example.	Gravity is attractive because Earth pulls the Moon into an orbit, and the Moon also pulls on Earth.
2	Which change in the simulation is evidence that mass affects gravitational interaction strength? Explain what happened to the strength.	One object's mass changed from 1 unit to 3 units while distance stayed the same. The interaction strength increased from 2 units to 6 units.
3	How does the direction of the interaction in both simulation trials support the claim that gravity is attractive?	The interaction pointed toward the other object in both trials, showing that the objects pulled toward each other rather than pushed apart.
4	Why can the Jupiter-Earth chart not fairly show whether the planet with more mass has the stronger interaction with the Sun?	Jupiter and Earth are different distances from the Sun, so distance is another variable that could affect the interaction.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Gravitational interactions are attractive and become stronger when an interacting object's mass increases. In both trials, the objects pulled toward each other, which is evidence of attraction. At the same distance, the 2-unit and 4-unit masses had a strength of 8 units, while the 5-unit and 4-unit masses had a strength of 20 units, so increasing one mass was linked to a stronger interaction.

Accept equivalent claims that gravity pulls objects together and that greater mass is linked to stronger interaction when distance is controlled. For the open task, require a claim, accurate use of both data points, and reasoning that connects the evidence to the claim.