Why time slows down in Interstellar

Visual lesson



That can't be real... can it?

On movie night, Sam watched Interstellar with his mom. An astronaut dad flew far into space — and when he came back, his daughter had grown up more than he had! Sam paused the screen. "That can't be real... can it?"





The trampoline trick

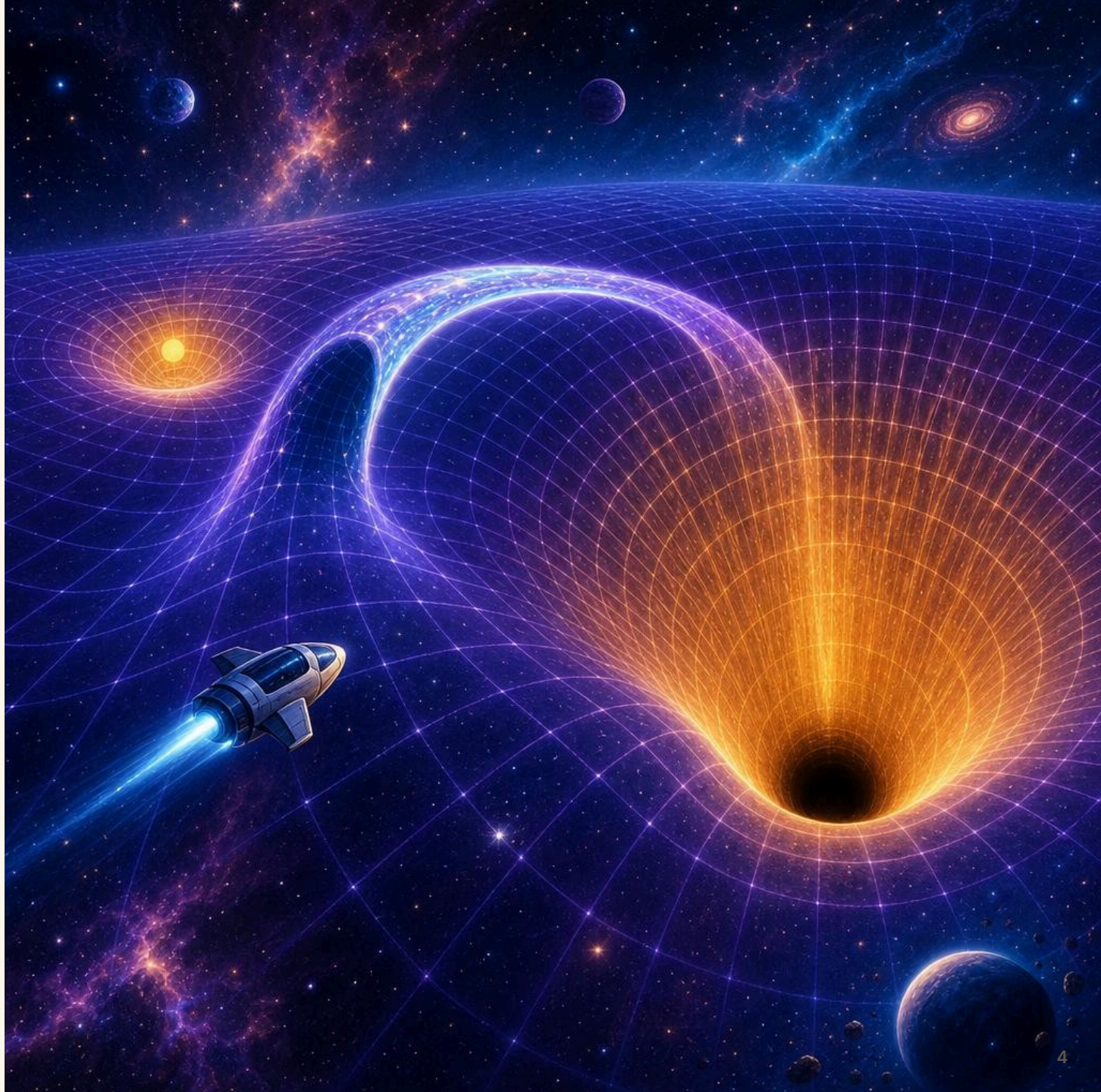
At the park, Mom set the soccer ball in the middle of the trampoline, and the stretchy surface sank into a dip. "That dip works like gravity — the pull that heavy things make in space." Sam rolled an acorn along the edge, and it curled down toward the ball.

> **TALK ABOUT IT**
> What would a heavier ball do?

The deepest dip there is

"In the movie," Mom said, "the astronauts fly through a wormhole — a shortcut tunnel through space — and on the other side waits a black hole." A black hole is so heavy it makes the deepest dip there is. The deeper the dip, the harder everything nearby gets pulled.

TALK ABOUT IT
Find the deepest dip.





Whose watch races ahead?

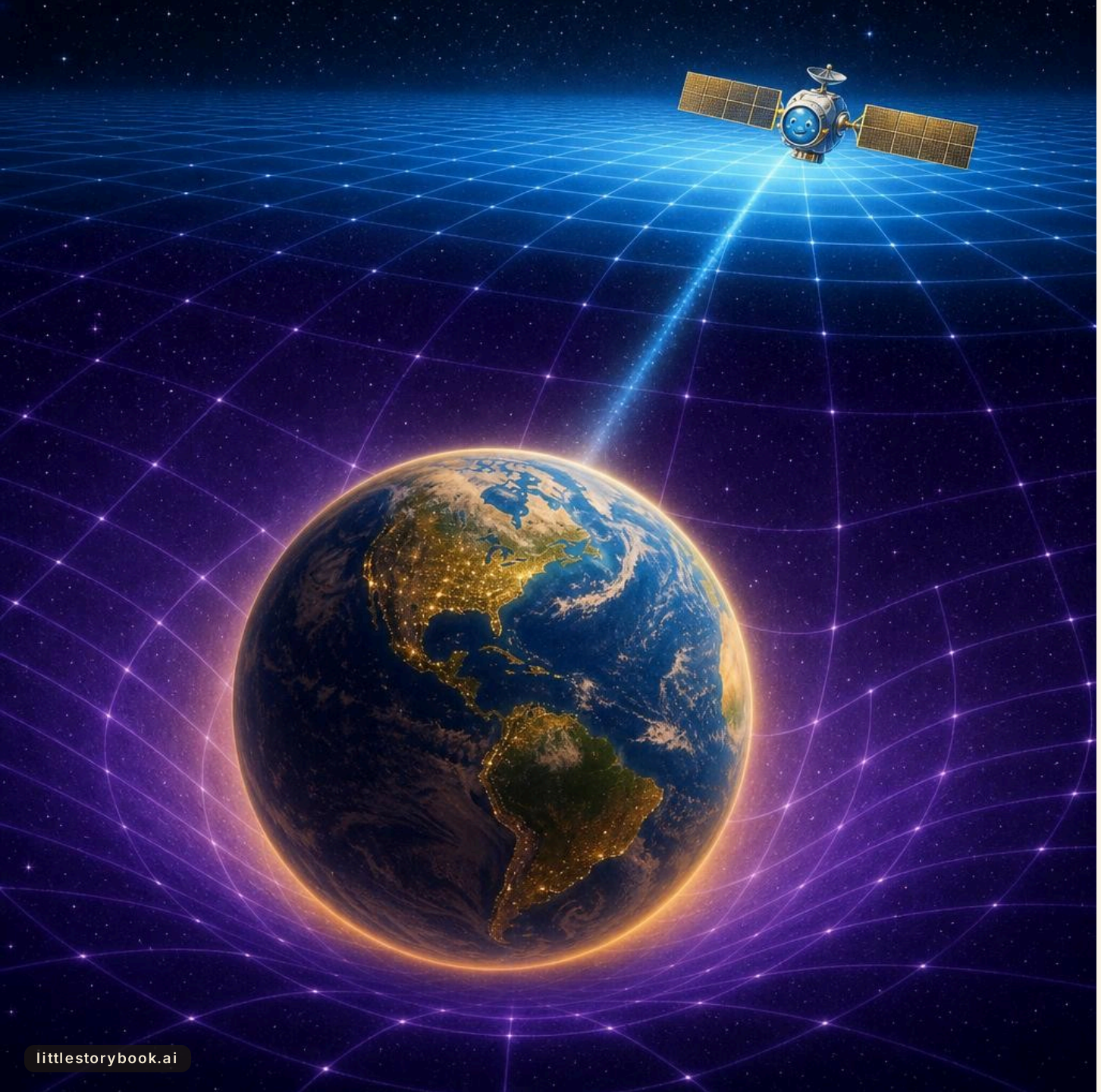
"Now the strange part," Mom said. "Deep in a heavy dip, time itself slows down — scientists call this time dilation." The astronaut lands on a planet close to the black hole, so his watch ticks slow. Back on Earth, his daughter has a watch too. Guess: whose watch races ahead?

> **TALK ABOUT IT**
> Guess: whose watch races ahead?

Big pull, slow clock!

The daughter's! Far from the deep dip, her time ticks at normal speed, so it zooms past his slow one. One hour on that planet equals seven whole years back home — that's why the dad returns to a grown-up girl. Sam's eyes went wide: "Big pull, slow clock!"





Real satellites prove it

"But I thought time was the same everywhere," Sam frowned. "Almost everyone thinks that," Mom said, "and real satellites prove it isn't. GPS satellites fly far from Earth's dip, so their clocks tick a tiny bit faster — engineers correct them every single day, or your map would point to the wrong street."

> **TALK ABOUT IT**
> Why do GPS satellite clocks tick a tiny bit faster than clocks down here on Earth?

Build your own gravity dip

That evening, with Dad's help, Sam stretched a blanket flat and tight and set the heavy ball in the middle. He rolled a marble across — it curved into the dip, circling the ball like a planet circling a star. Then Dad folded two far corners together: "Look — a wormhole shortcut, just like the movie."

> **TALK ABOUT IT**
> Find the wormhole shortcut Dad made.





Say it with Sam

At bedtime, Sam explained it back: heavy things make dips, a black hole makes the deepest dip, and deep in a dip, clocks run slow — so one hour for the astronaut became years for his daughter. The movie is a story, but the time science is real. Say it with him: "Big pull, slow clock!"

Check your wonder

1 **What happens to a clock deep in a heavy gravity dip?**

- **A.** It ticks slower
- **B.** It ticks faster
- **C.** It ticks the same as everywhere

2 **Why did the astronaut's daughter grow up more than he did?**

- **A.** His clock near the black hole ticked slow
- **B.** The wormhole made him younger
- **C.** She just ate more healthy food

3 **GPS satellites fly high above Earth, far from Earth's dip. Their clocks...**

- **A.** Tick a tiny bit faster than clocks on Earth
- **B.** Tick slower than clocks on Earth
- **C.** Tick exactly the same as clocks on Earth

ANSWERS 1-A 2-A 3-A

1. Yes! Big pull, slow clock — deep in the dip, time itself slows down. 2. Exactly — one hour on that planet equaled seven whole years back home, so her time raced ahead of his. 3. Right! Engineers correct those clocks every single day — real proof the dip changes the clock.

THE END

Visual lesson



Put your child in this story

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