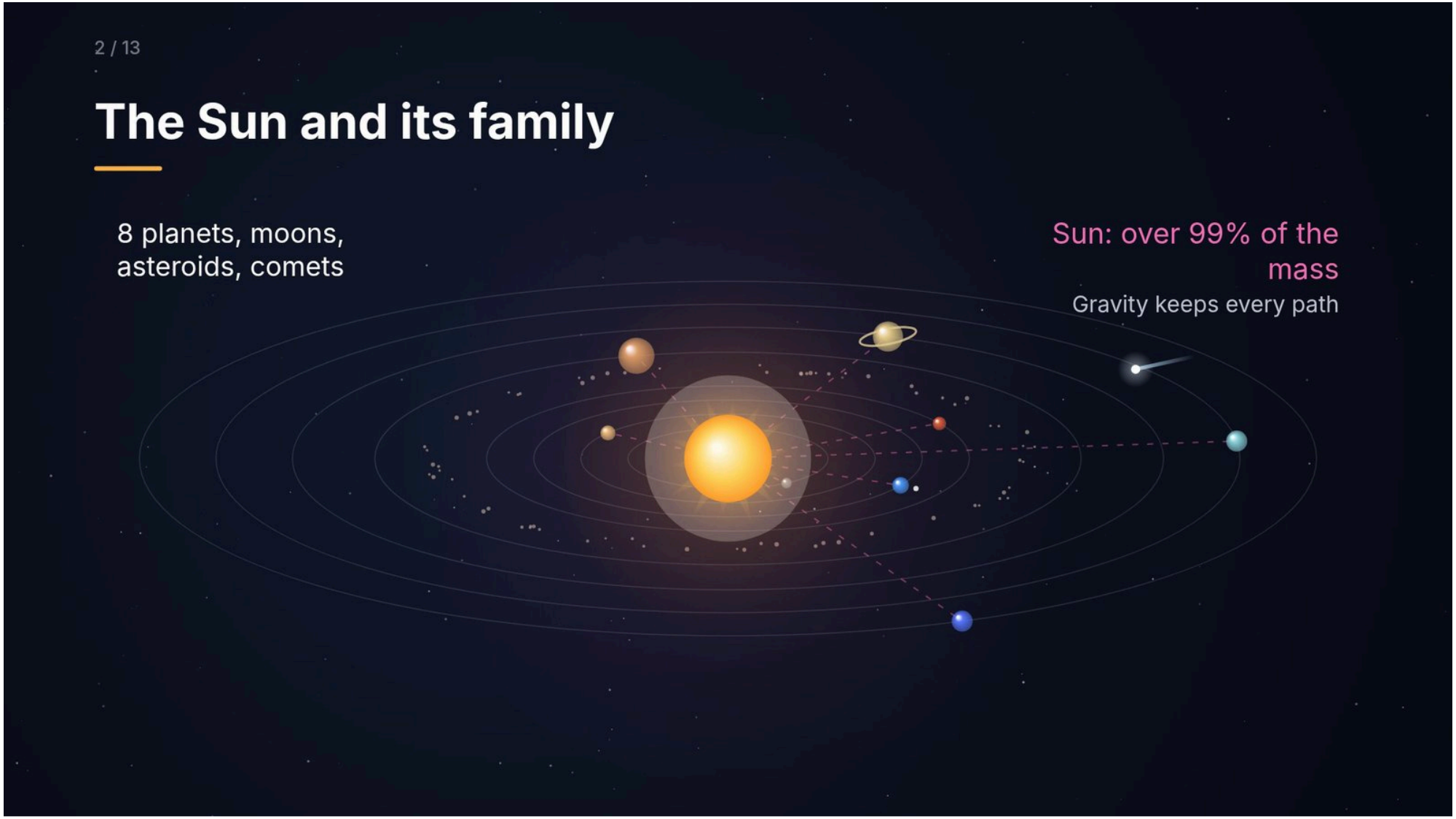


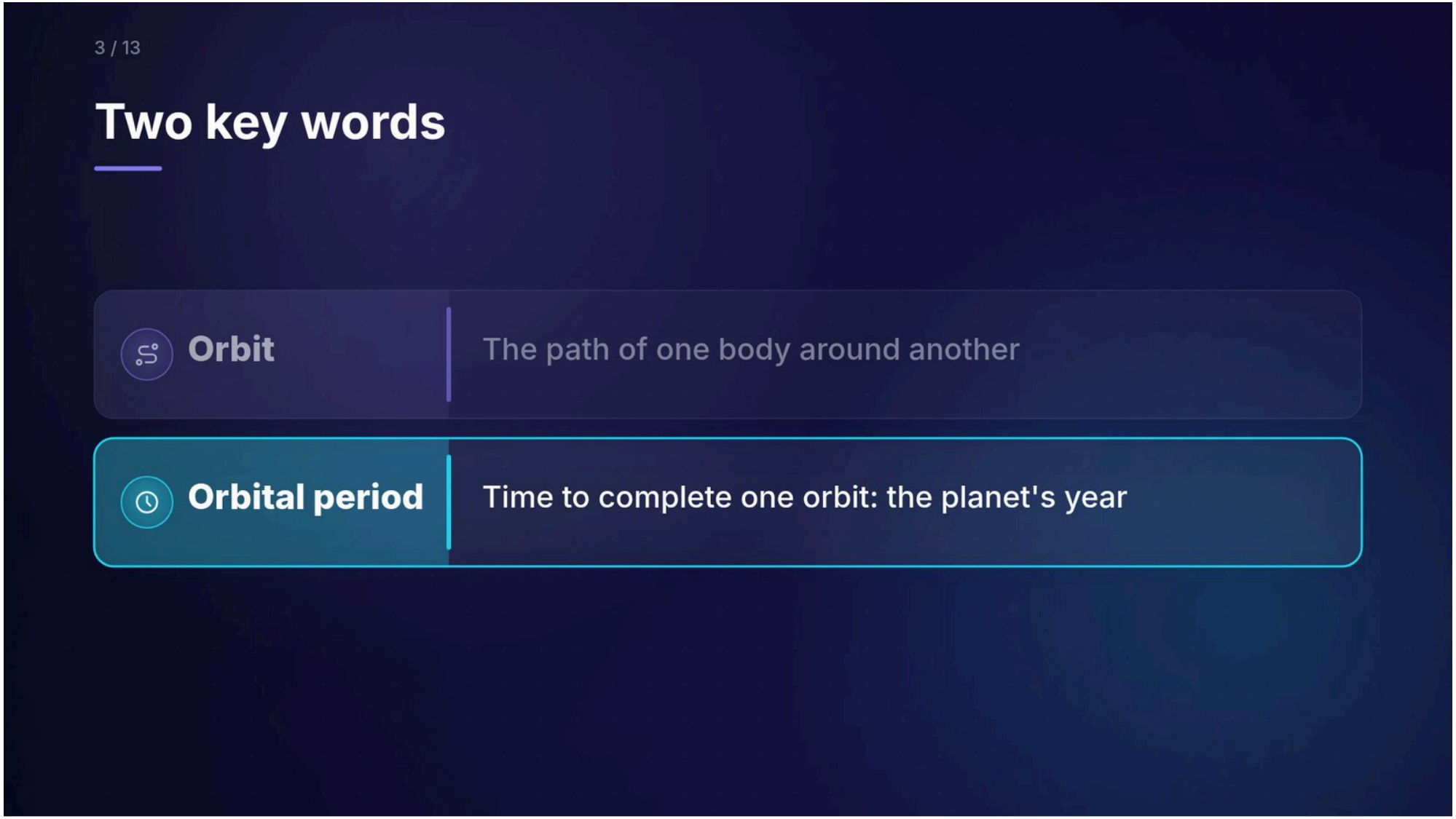

1 / 13 · The solar system

Welcome to the solar system. By the end of this video, you'll know how planets move, how astronomers measure huge distances, and why the farther a planet is from the Sun, the longer its year.



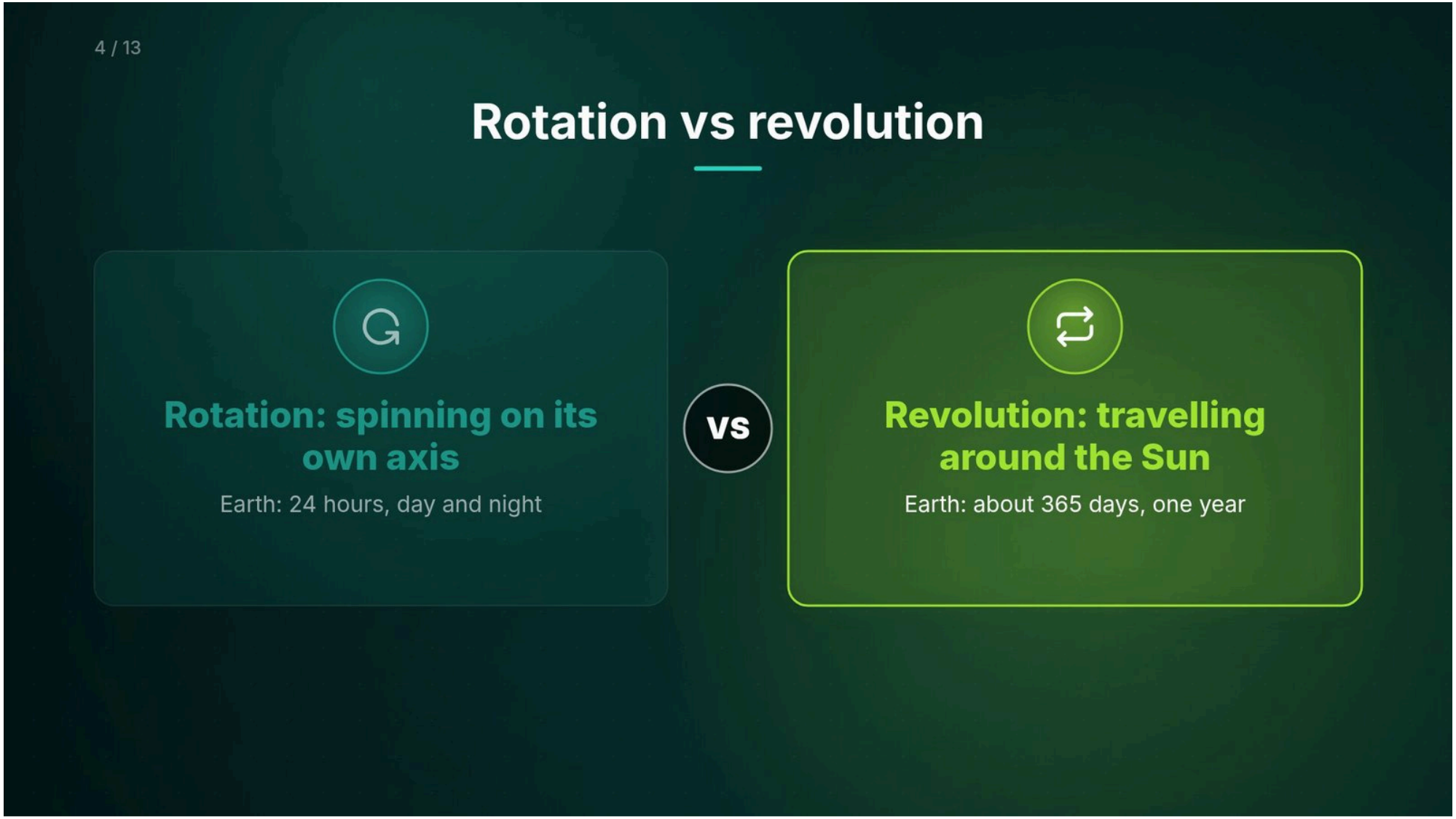

2 / 13 · What the solar system is

The solar system is the Sun and everything that travels around it. That includes eight planets, plus their moons, asteroids and comets. The Sun holds more than 99 percent of all the mass, and its gravity keeps every planet on its path.



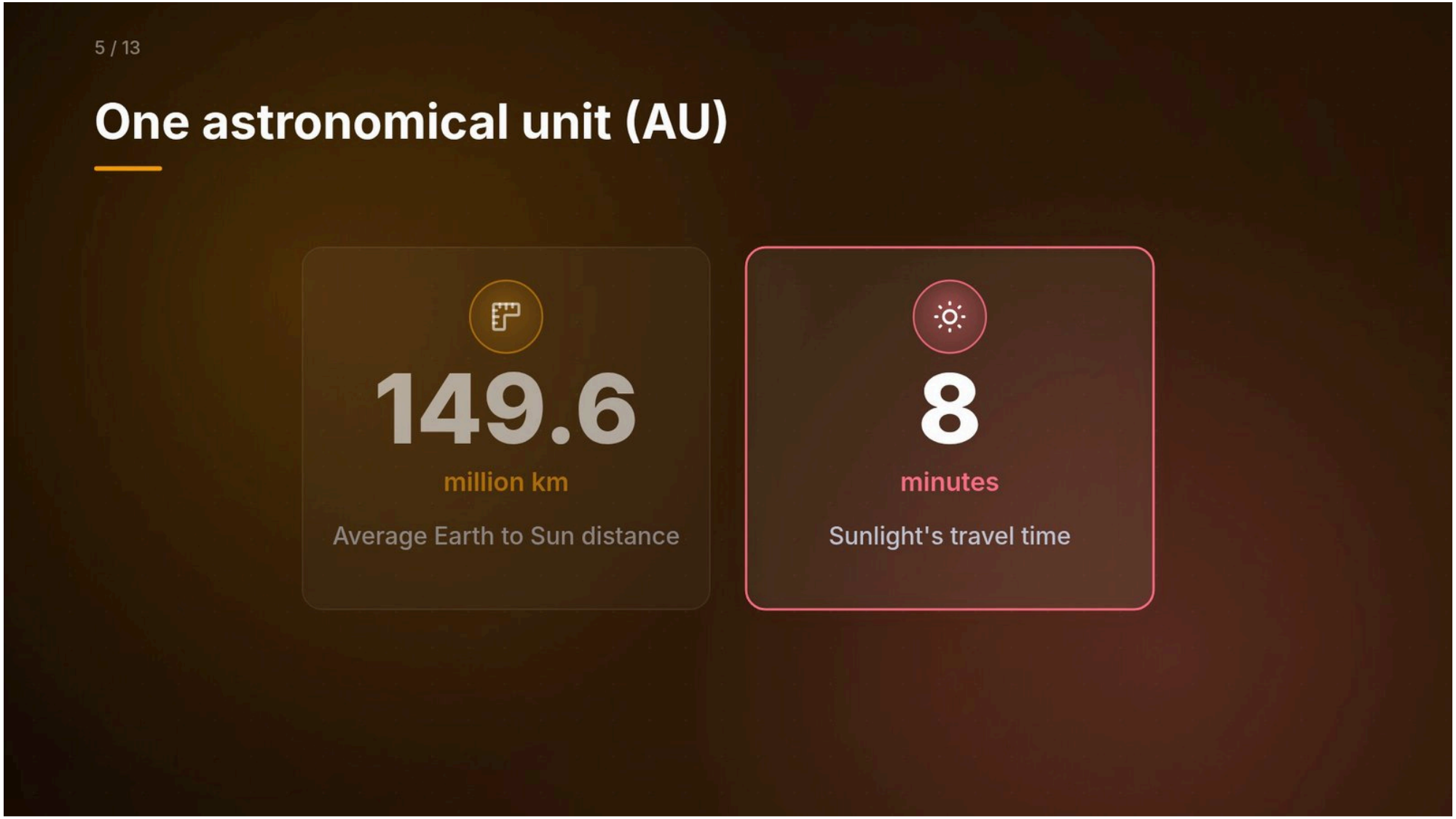

3 / 13 · Orbit and orbital period

Two words will come up again and again. A planet's orbit is its path around the Sun. Its orbital period is the time it takes to go around once, and that is the planet's year.




4 / 13 · Two kinds of motion

Every planet moves in two ways at once. Rotation is spinning on its own axis: one turn of Earth takes 24 hours and gives us day and night. Revolution is travelling around the Sun: one trip takes Earth about 365 days, and that's our year.



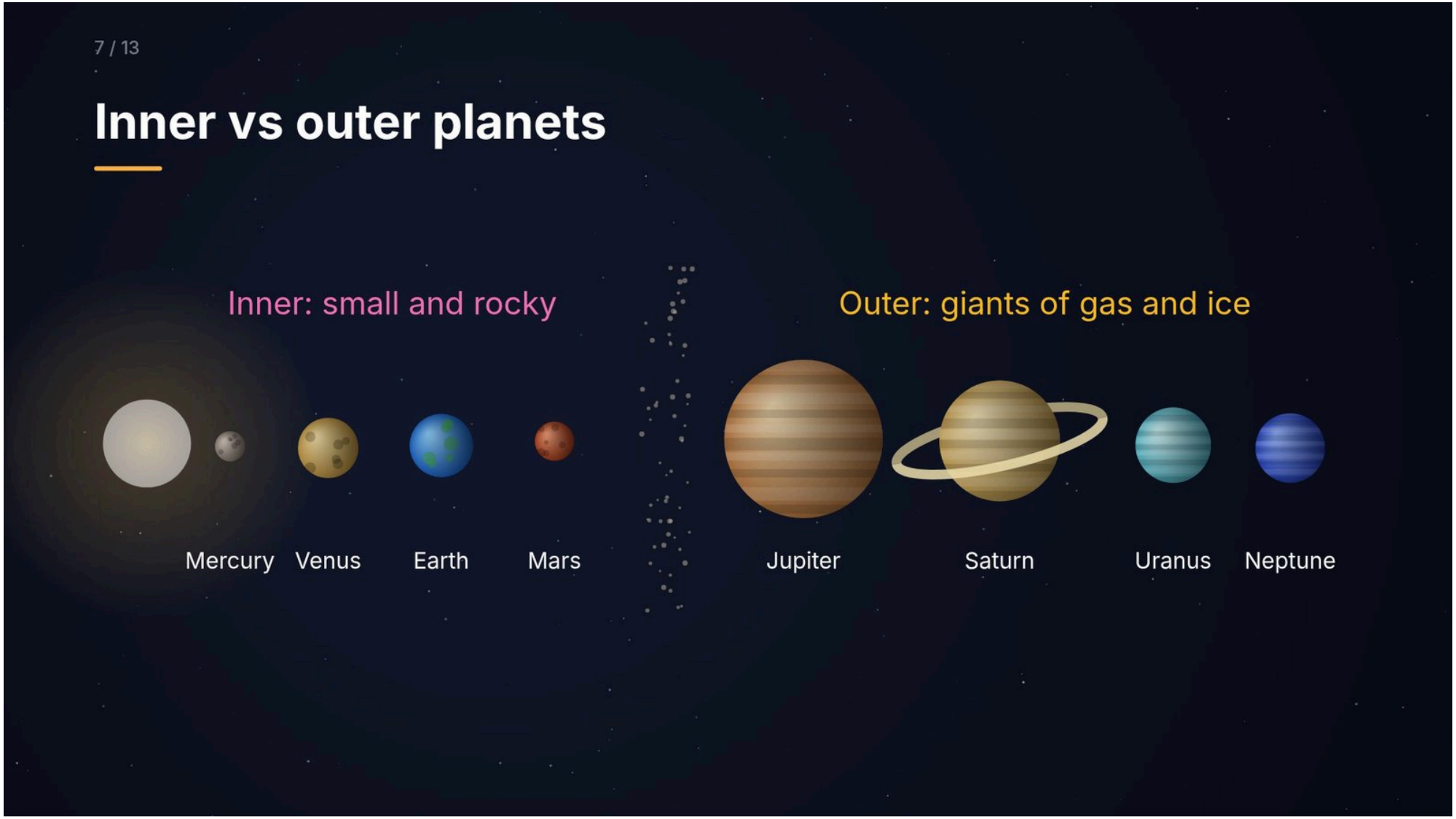

5 / 13 · The astronomical unit

Kilometres get clumsy at this scale, so astronomers use the astronomical unit, or AU. One AU is the average Earth to Sun distance, about 149.6 million kilometres. Sunlight takes a little over 8 minutes to cross it.



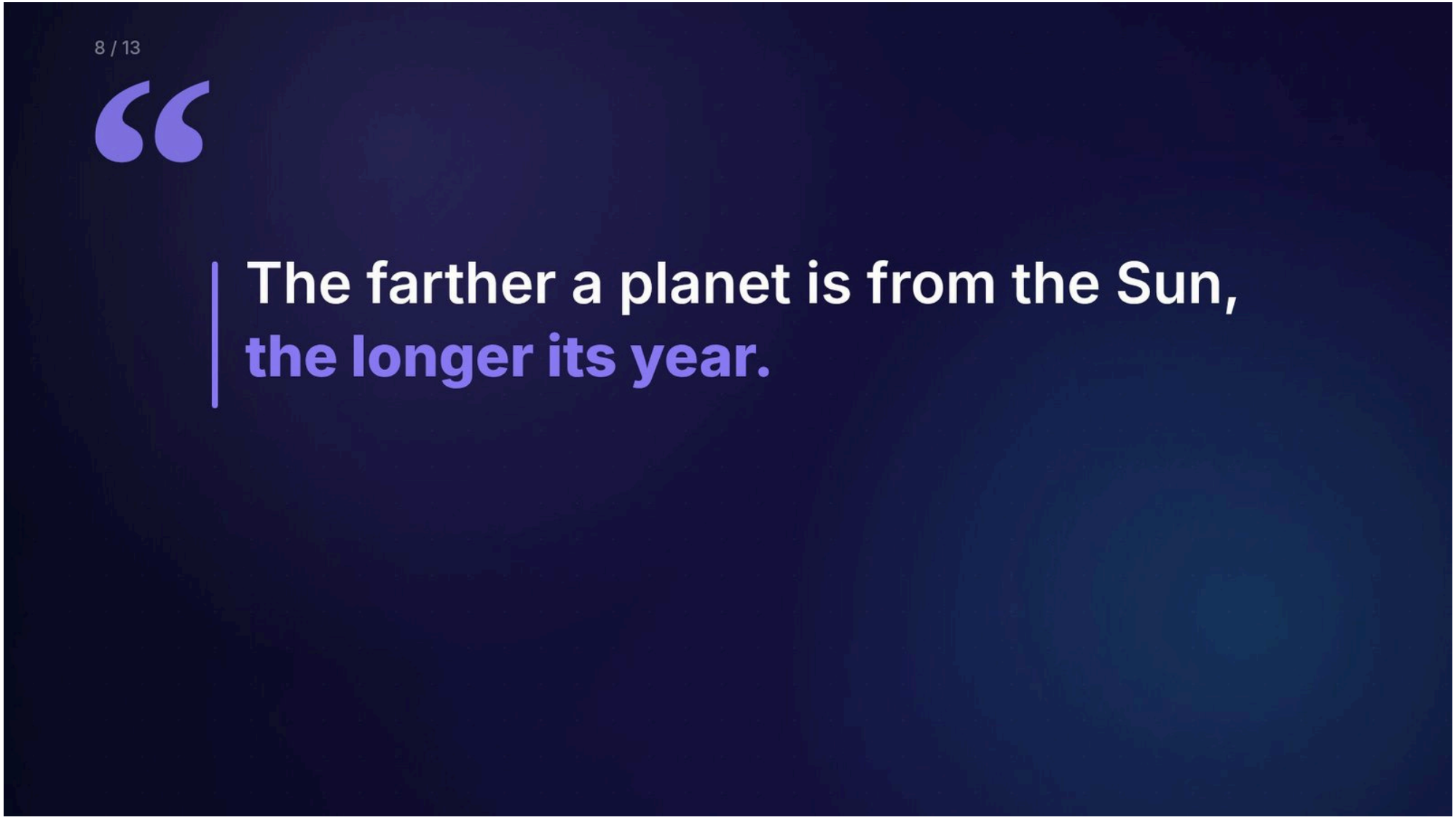

6 / 13 · The eight planets

Here are the eight planets, from the innermost outward. Mercury sits at 0.39 AU and circles the Sun in just 88 days. Venus, Earth and Mars follow, out to 1.52 AU. Then come Jupiter and Saturn, taking 11.9 and 29.5 years. Far out, Uranus needs 84 years and Neptune 165.




7 / 13 · Inner and outer planets

The planets fall into two families. The four inner planets, Mercury, Venus, Earth and Mars, are small and rocky. The four outer planets, Jupiter, Saturn, Uranus and Neptune, are giants made mostly of gas and ice.



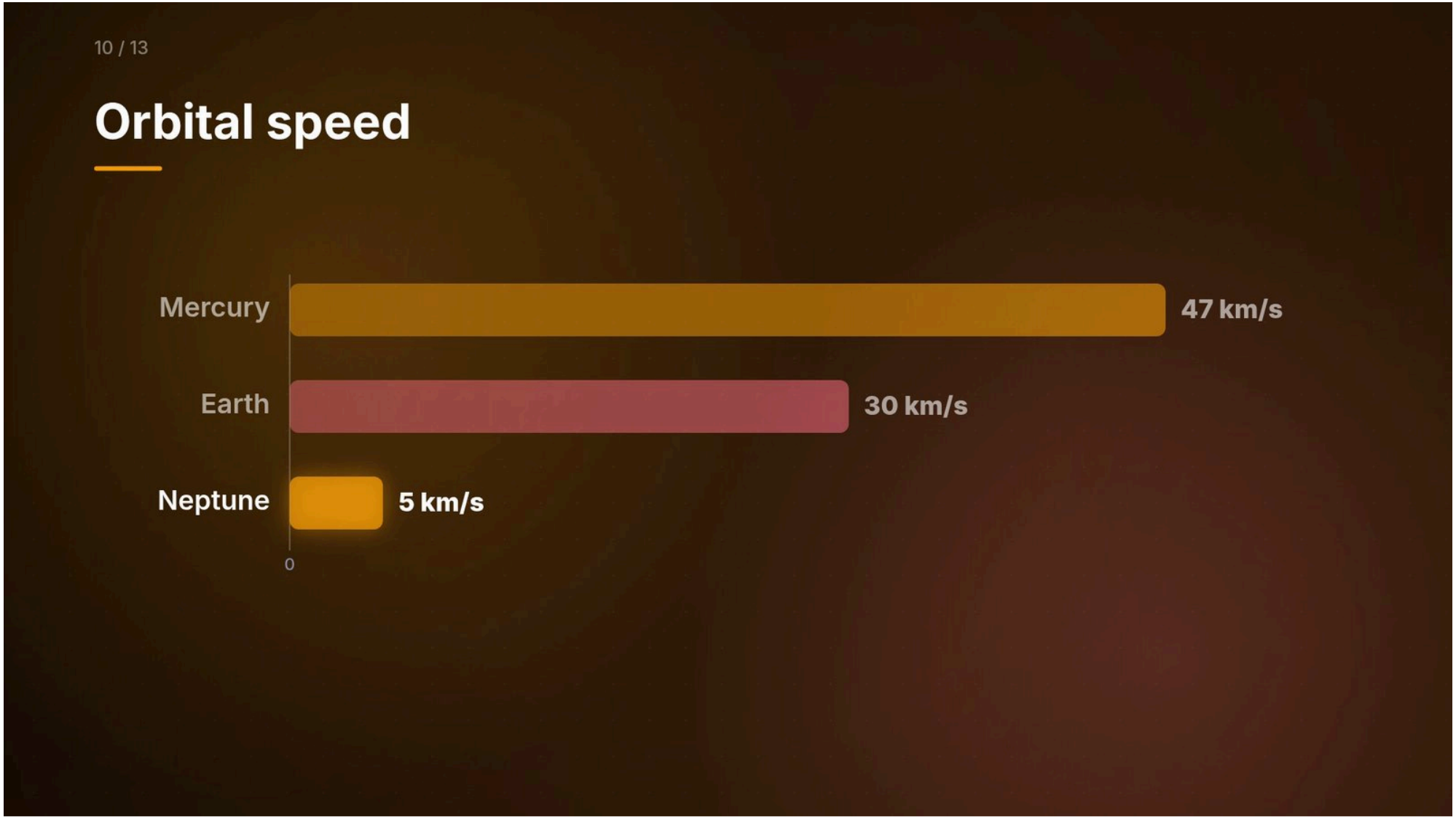

8 / 13 · The big pattern

Look down that list and one pattern jumps out. The farther a planet is from the Sun, the longer its year. Let's see why that happens.



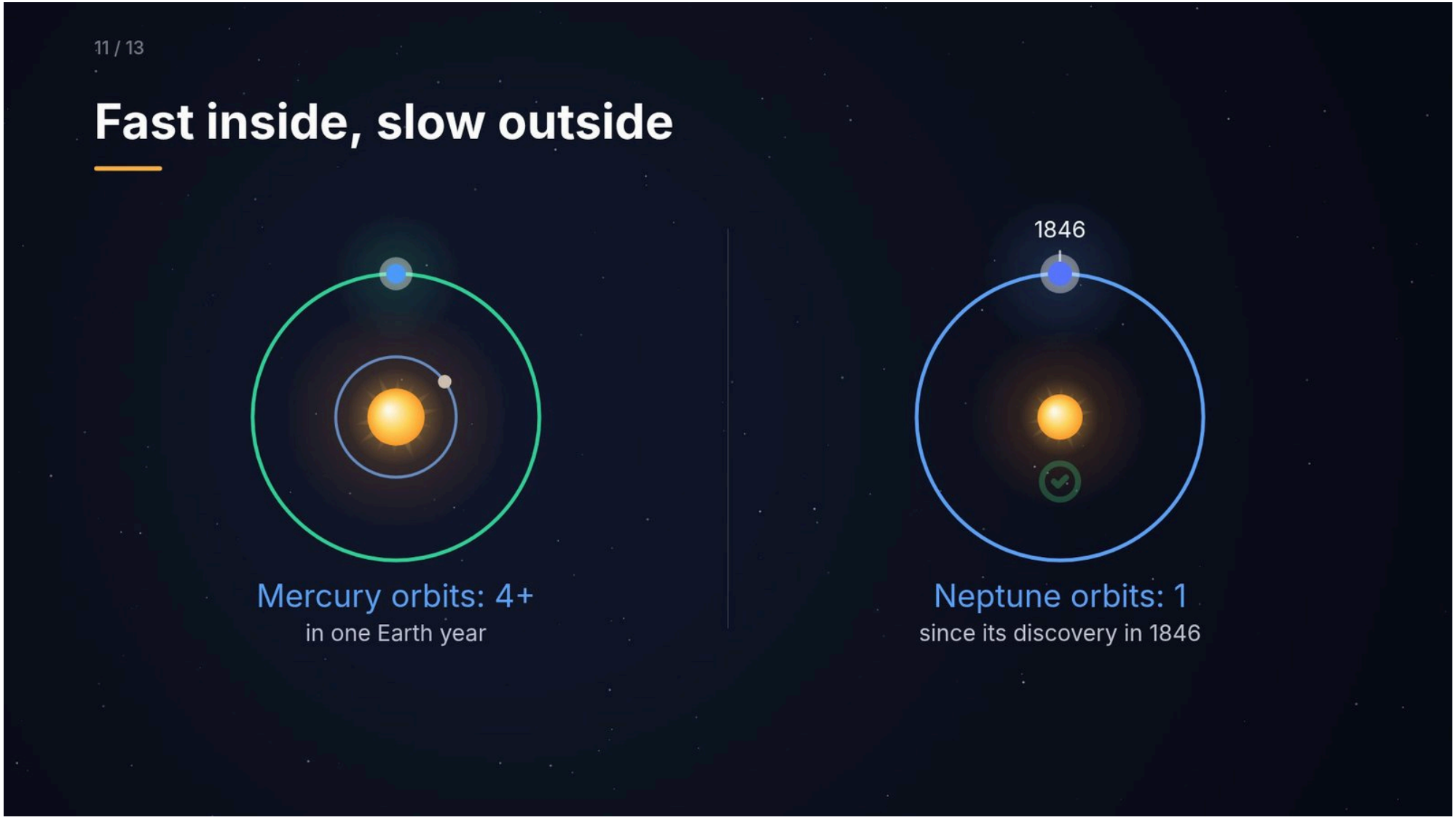

9 / 13 · Two reasons

There are two reasons. First, a longer path: a planet farther out has a bigger circle to travel, and Neptune's orbit is about 30 times as wide as Earth's. Second, a slower speed: the Sun's pull is weaker far away, so distant planets move more slowly.



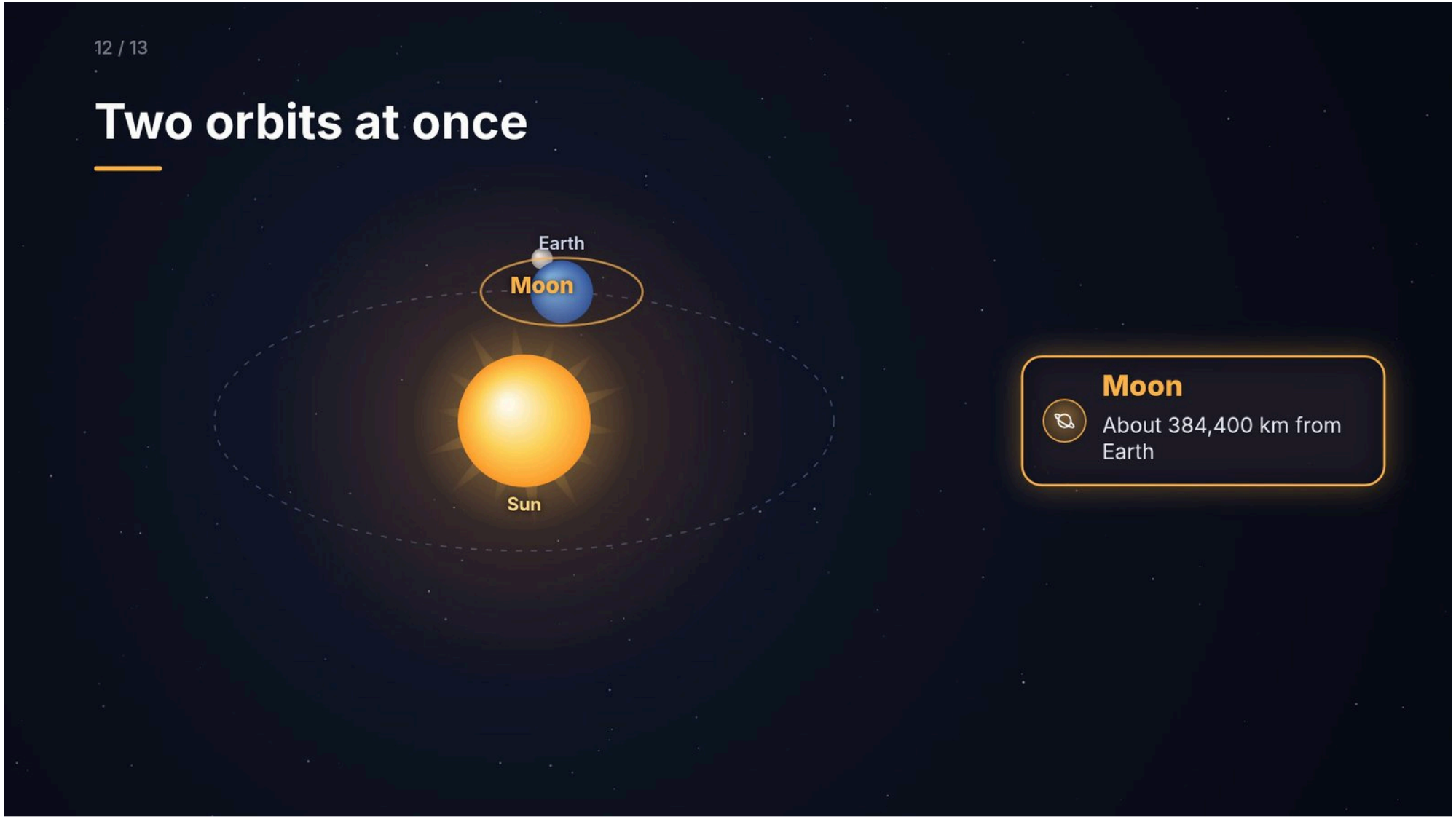

10 / 13 · Orbital speeds

How much slower are the distant planets? Mercury races along at about 47 kilometres per second. Earth moves at about 30. Neptune crawls at only about 5.




11 / 13 · A huge difference

Put a longer path and a slower speed together and the gap is huge. Mercury goes around the Sun more than four times in one Earth year. Neptune has completed only one orbit since it was discovered in 1846.




12 / 13 · Earth and its Moon

A moon orbits a planet the same way a planet orbits the Sun. Earth goes around the Sun once every 365 days. Meanwhile the Moon, about 384,400 kilometres away, circles Earth roughly every 27 days, riding along on Earth's yearly trip.




13 / 13 · Recap

Let's recap. The Sun holds over 99 percent of the mass and steers every planet. Rotation gives us days, while revolution gives us years. One AU is about 149.6 million kilometres. And the farther out a planet is, the longer its year.