

# CTYI Spring 2024 - Astronomy - Relativity Thought Experiments

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## 1 Spaceship Twins

Imagine we have two twins. One stays on Earth, and the other goes on a super-fast spaceship adventure. When the traveling twin returns, do they have the same age as the one who stayed on Earth? Why or why not?

## 2 Gravity and Giant Jumps

Picture a giant on Earth who takes enormous jumps. Would time pass differently for the giant high up in the air compared to when they're on the ground? How might this be related to gravity?

## 3 Race to the Stars

Imagine two friends racing towards a distant star. One friend takes a spaceship, and the other travels on a super-speedy space scooter. When they return, would they have aged the same amount? Why or why not?

## 4 Bending Space with Books

Place a heavy book on a soft surface like a mattress. It creates a little dip. Now, imagine space is like that mattress. If you put a heavy object in space, how might it bend or warp the space around it?

## 5 Time on Different Planets

If you could visit other planets in our solar system, how might the gravity on each planet affect the passage of time for you? Compare, for example, a day on Earth to a day on Jupiter or Mars.

## 6 Race with Light

Light is incredibly fast. If you could have a race with a beam of light, would you be able to win? Why or why not? What makes light so speedy?

## 7 Magic Cosmic Clock

Picture a magical clock that ticks differently depending on where it is in the universe. How might this magical clock tick on a fast spaceship, on Earth, or near a massive planet?