



Teacher Guide

Happy Birthday, Space Traveler!

Key idea: The length of a year varies from planet to planet because each planet takes a different amount of time to orbit the Sun.

Time: 20 minutes

Objective

Students calculate and compare their ages on Earth to their ages on other planet in the solar system (and the dwarf planet Pluto). Students apply their observations to understanding the movement of the planets around the Sun and the differences in their orbits.

Do the activity

Give students the *Happy Birthday, Space Traveler!* Student Handout. Ask them to read “Age is just a number,” about how the length of a year varies from planet to planet. They will calculate their age on the other planets in our solar system and on the dwarf planet Pluto. Then they will answer interpretation questions about differences in the planets’ orbits.

Answer key

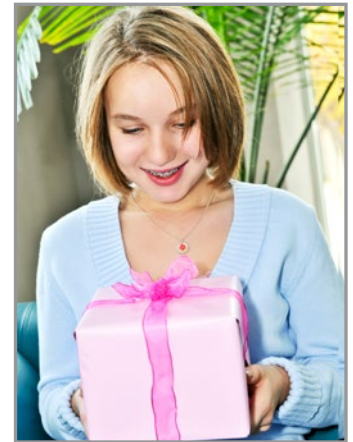
1. Multiply your age by 365. This product is your age on Earth in days. You will use this age to calculate your age on the other planets. *[Sample answer for a 13-year-old Earthling: 4,745 days (13 x 365 days = 4,745 days old on Earth)]*
2. The table shows the length of a year, in Earth days, on the other planets in our solar system. To find your age on each planet, divide your Earth age in days by the number of days in the planet’s year. The quotient is your age in years on that planet. Calculate your age on each planet and enter it in the table. *[Sample calculation for a 13-year-old Earthling’s age on Mercury:
 $4,745 \text{ days} \div 88 \text{ days/1 year on Mercury} = 4,745 \text{ days} \times 1 \text{ year on Mercury} / 88 \text{ days} = 53.92 \text{ years old on Mercury}$]*

STANDARDS ALIGNMENT

NGSS MS-ESS1.B.1: Earth and the Solar System: The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.

CCSS M.7.EE: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

W.6-8.1: Write arguments to support claims with clear reasons and relevant evidence.



Sample answers (for a 13-year-old Earthling)

Planet	Length of year	Your age in years on planet
Mercury	88 Earth days	53.92
Venus	225 Earth days	21.09
Earth	365 Earth days	13
Mars	687 Earth days	6.91
Jupiter	4,380 Earth days	1.08
Saturn	10,585 Earth days	0.45
Uranus	30,660 Earth days	0.15
Neptune	60,225 Earth days	0.08
Pluto	90,520 Earth days	0.05

Interpret the results

1. On which planet (or dwarf planet) in our solar system would you be youngest? What would your age be on that planet? *[I would be youngest on the dwarf planet Pluto. (Sample calculation: A 13-year-old Earthling would be 0.05 years old in Pluto years. $13 \text{ years} = 4,745 \text{ days}$. $4,745 \text{ days} \div 90,520 \text{ days/1 year on Pluto} = 4,745 \text{ days} \times 1 \text{ year on Pluto}/90,520 \text{ days} = 0.05 \text{ years old on Pluto}]$*
2. On which planet (or dwarf planet) in our solar system would you be oldest? What would your age be on that planet? *[I would be oldest on Mercury. (A 13-year-old Earthling would be almost 54 years old in Mercury years. $13 \text{ years} = 4,745 \text{ days}$. $4,745 \text{ days} \div 88 \text{ days/1 year on Mercury} = 4,745 \text{ days} \times 1 \text{ year on Mercury}/88 \text{ days} = 53.92 \text{ years old on Mercury}]$*
3. How does your age on a planet relate to the orbit of the planet? *[I am younger on a planet if the planet takes a longer time to orbit the Sun and older if the planet takes a shorter time. The farther a planet is from the Sun, the longer it takes to complete its orbit, so the longer its year is. Fewer of these long years have elapsed in the time since I was born, and so I would be younger. The closer a planet is to the Sun, the less time it takes to make its orbit, so the shorter its year is. A lot of these short years have elapsed in the time since I was born, and so I would be older.]*