

MATHCOUNTS[®] Problem of the Week Archive

Planet Rotations & Revolutions – September 12, 2022

Problems & Solutions

This table shows how long it takes each of 8 planets to rotate around its own axis and to revolve around the sun. Days and years refer to Earth days and Earth years, respectively.

Planet	Rotation Period	Revolution Period
Mercury	58.6 days	87.97 days
Venus	243 days	224.7 days
Earth	0.99 day	365.26 days
Mars	1.03 days	1.88 years
Jupiter	0.41 day	11.86 years
Saturn	0.45 day	29.46 years
Uranus	0.72 day	84.01 years
Neptune	0.67 day	164.79 ears

Curtis's age is 15 Earth years old. What is Curtis's age equivalent to in Saturn years? Express your answer as a decimal to the nearest hundredth.

Curtis's age in Saturn years refers to the number of revolutions of Saturn around the sun. According to the table, it takes 29.46 Earth years for Saturn to revolve around the Sun. That means the 15 Earth years that Curtis has been alive would not have been enough time for Saturn to revolve around the Sun even once. We can divide Curtis's age in Earth years by 29.46 to determine his age in Saturn years. So, Curtis's age is $15/29.46 \approx 0.51$ Saturn years.

If Maya and her sister are 3 years apart in age in Earth years, how many Mercury years are they apart in age? Express your answer as a decimal to the nearest tenth.

*According to the table, it takes Mercury 87.97 Earth days to make one revolution around the Sun, which is $87.97/365.26 \approx 0.24$ of an Earth year. So, 3 Earth years equates to $3/0.24 = 12.5$ Mercury years. Therefore, Maya and her sister are **12.5** Mercury years apart in age.*

During a recent space mission, Joy explores Mars and collects samples for 3 Mars days. What percent of a Mars year passed during Joy's time on Mars? Express your answer as a decimal to the nearest hundredth of a percent.

Three Mars days is $3 \times 1.03 = 3.09$ Earth days. A Mars year is 1.88 times the number of Earth days in an Earth year, or $1.88 \times 365.26 = 686.6888$ Earth days. So, Joy's time on Mars accounts for $(3.09/686.6888) \times 100 \approx 0.45\%$ of a Mars year.

A Venus day (its rotation period) is longer than a Venus year (its revolution period). What percent of a Venus day is a Venus year? Express your answer as a decimal to the nearest hundredth of a percent.

A Venus year is $(224.7/243) \times 100 \approx 92.47\%$ of a Venus day.

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If Maya and her sister are 3 years apart in age in Earth years, how many Mercury years are they apart in age? Express your answer as a decimal to the nearest tenth.

During a recent space mission, Joy explores Mars and collects samples for 3 Mars days. What percent of a Mars year passed during Joy's time on Mars? Express your answer as a decimal to the nearest hundredth of a percent.

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