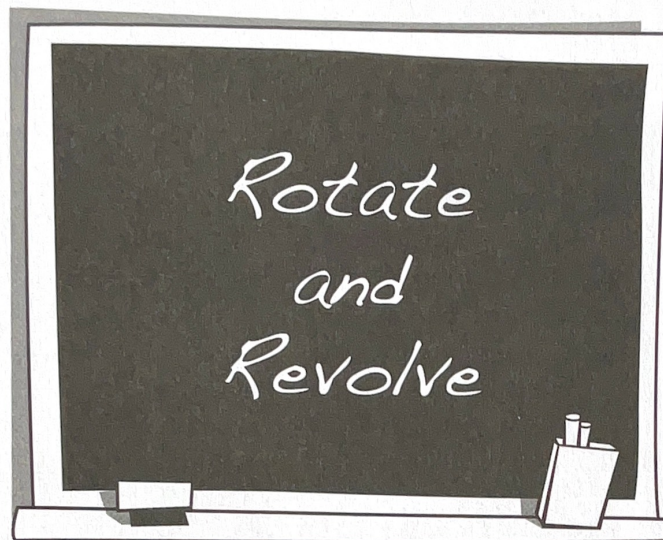


The Two Rs



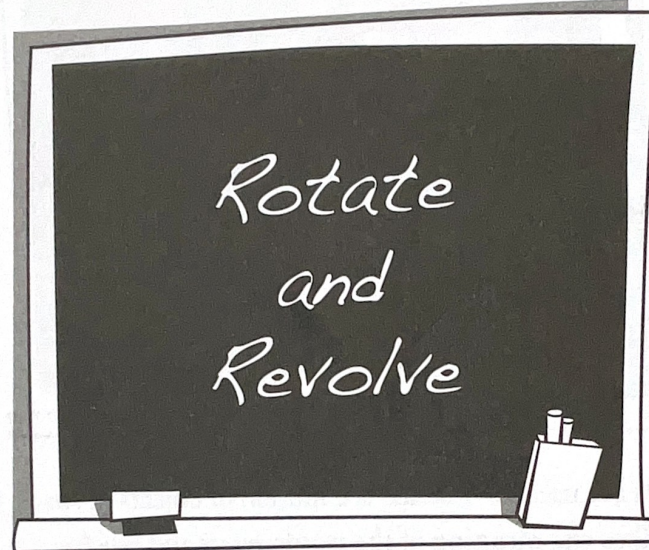
Different words are used to describe the motion of objects in space. Circle the answer that best describes the meaning of the words *rotate* and *revolve*.

- A *rotate* means spin; *revolve* means spin
- B *rotate* means spin; *revolve* means orbit
- C *rotate* means orbit; *revolve* means orbit
- D *rotate* means orbit; *revolve* means spin

Explain how these words describe Earth's motion. You may use a diagram to support your explanation.

The Two Rs

Teacher Notes



Purpose

The purpose of this word use probe is to elicit students' ideas about two commonly confused words in astronomy—*rotate* and *revolve*. The probe is designed to find out if students can conceptually distinguish between the two terms and how they use the terms to describe Earth's motions.

Related Concepts

Day-night cycle

Earth: orbit, seasons, spin

Explanation

The best answer is B: *rotate* means spin; *revolve* means orbit. More specifically, *rotate* means to spin around a central axis and *revolve* means to go in a circle, or orbit, around a central location. Rotation is used to describe the day-night cycle. Revolution is used to describe Earth's annual path around the Sun.

Administering the Probe

This probe is best used after students have encountered the words *rotate* or *rotation* and *revolve* or *revolution*. This probe can be given during instruction on Earth's motions in space to formatively assess students' understanding of the terminology used in the unit. It can also be given months after the ideas have been taught to determine how well students retain their understanding of the terminology and the difference between the two motions. However, the intent of this probe is not to emphasize vocabulary over conceptual understanding. Because these two words often get in the way of conceptual understanding, the probe is used to determine if students understand these words related to the motions they describe. However, be aware that students can give correct definitions without conceptual understanding. If students can describe Earth's motions accurately but misuse the words, this is less problematic than if students know the words but cannot accurately describe

the motions. The concept is more important than the terminology. Data may reveal that the concept needs to be taught (or re-taught) before students are asked to associate the word with the concept. A Frayer Model can also be used as a formative assessment classroom technique (FACT) to determine whether students conceptually understand the meaning of these words (Keeley 2008).

Related Ideas in Benchmarks for Science Literacy (AAAS 2009)

3–5 The Universe

- ★ The Earth is one of several planets that orbit the Sun, and the Moon orbits around the Earth.

3–5 The Earth

- ★ The rotation of the Earth on its axis every 24 hours produces the night-and-day cycle. To people on Earth, this turning of the planet makes it seem as though the Sun, Moon, planets, and stars are orbiting the Earth once a day.

6–8 The Universe

- Nine planets of very different size, composition, and surface features move around the Sun in nearly circular orbits. *[Note: This benchmark was written before Pluto was reclassified.]*

Related Ideas in National Science Education Standards (NRC 1996)

5–8 Earth in the Solar System

- Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the Moon, and eclipses.

Related Research

- Although there was no formal research found specifically related to students' meaning for these two words, in the authors' experiences there have been numerous instances of students' (and teachers') confusion between these two terms. Teachers are encouraged to conduct their own classroom research related to these terms and share their findings on the Uncovering Student Ideas website: www.uncoveringstudentideas.org.

Suggestions for Instruction and Assessment

- Dozens of websites include comments on the difficulty that students experience when trying to distinguish between these two terms and then remember the distinction. Even scientists sometimes use the words interchangeably, and some dictionary websites give these two terms as syn-

★ Indicates a strong match between the ideas elicited by the probe and a national standard's learning goal.