

The Science Behind Equinox Myths

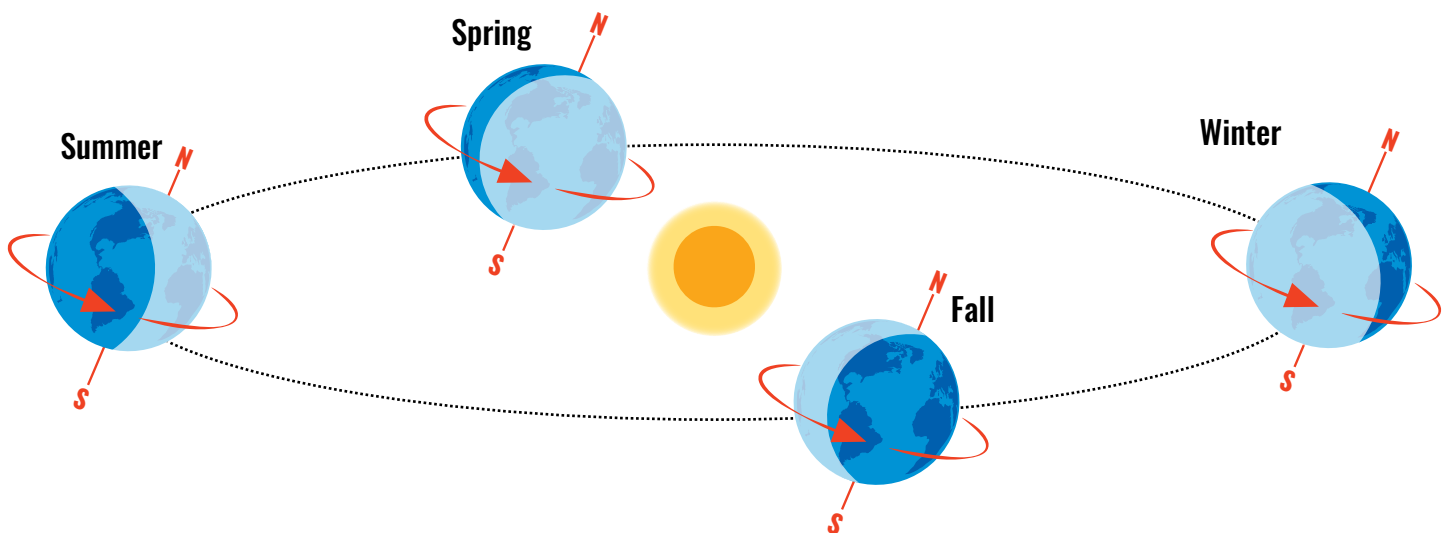
Each year, during the spring and fall equinoxes, a number of “things to do that only work during an equinox” make an appearance. In 2020, the fall equinox is on Tuesday, September 22. In this series of experiments, you will have a chance to scientifically test the truth or fiction of these popular myths.

What is an equinox?

The seasons are a result of the Earth spinning on a tilted axis. It's tilted about 23.4 degrees off vertical. The tilt means for half of the year, the North Pole is pointed toward the sun and for the other half, the North Pole points away from the sun. Of course, this means the South Pole does the exact opposite. During the equinoxes, the sun is centered directly above the equator.

Fun fact: seasons are NOT impacted by how close Earth is to the sun. In fact, because of its elliptical orbit, the Earth is closest to the sun in January, when it's the Northern hemisphere winter, and farthest from the sun in July. It's all about the tilt, baby!

Probably the most popular stories you hear around the equinox involve balancing an object, and eggs are usually the top object that supposedly balances. The story goes that the best time (sometimes the only time) of the year to balance an egg on its tip is the day of the equinox. Another variation is that you can only balance a broom on its bristles during the equinox. Well, the good news is these are easily testable!

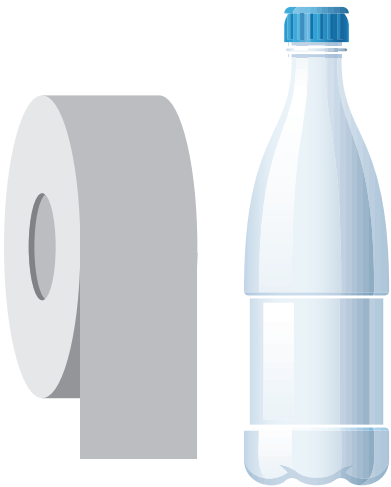




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What You'll Need

- Several raw eggs
- Standard broom with bristles
- Duct tape or other strong tape
- Small plastic bottle of water



What You'll Do

Activity 1: The Egg

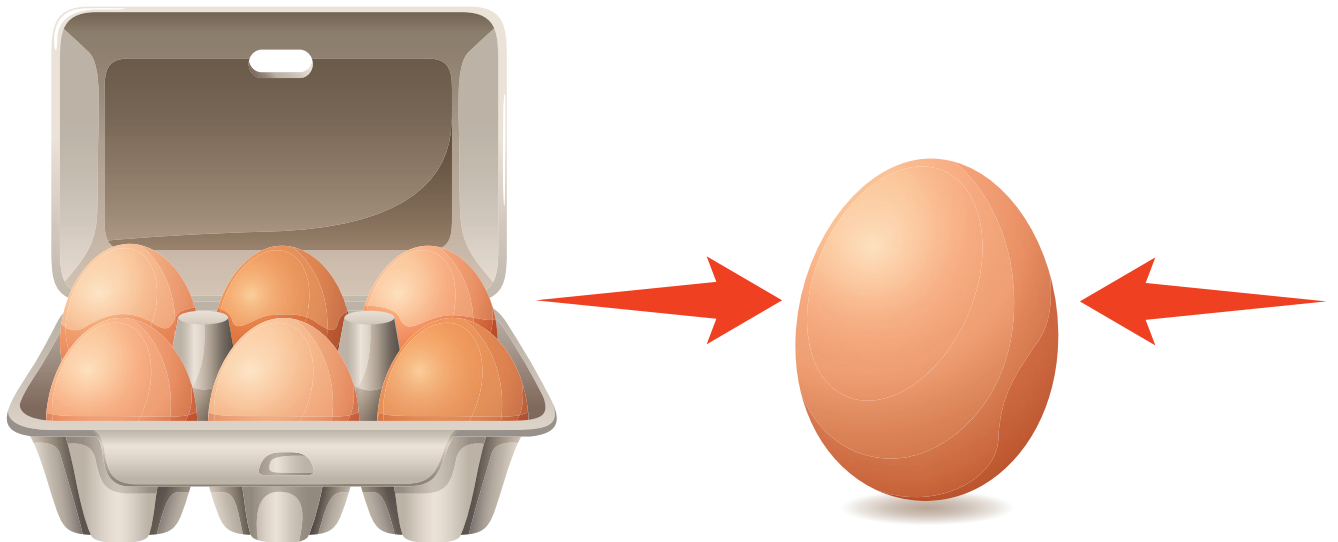
The idea that an egg could balance on the day of the equinox comes from a mistaken belief that because the sun and moon are equidistant from Earth, the pull of gravity is equalized and therefore an egg is less likely to fall over.

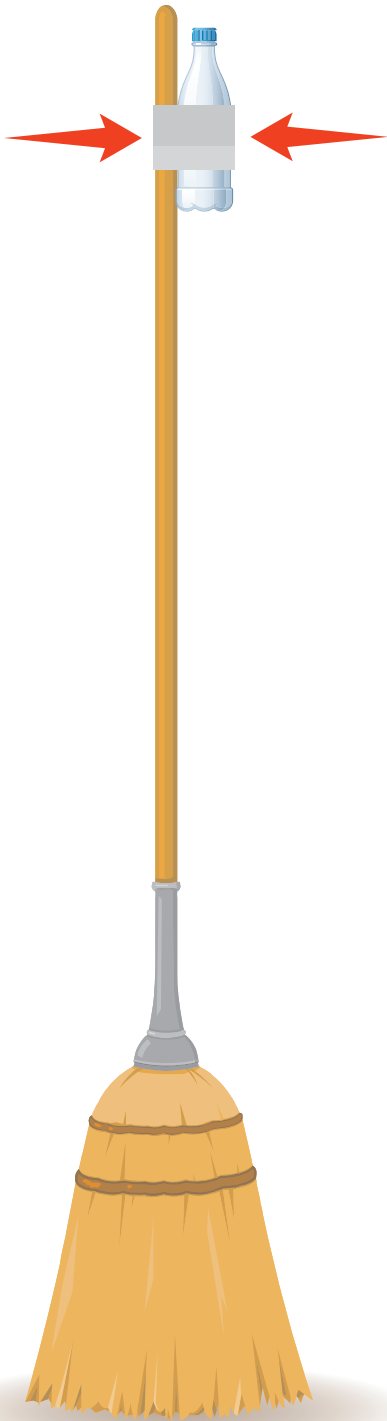
To test this hypothesis, grab several eggs. Of course, you must do this on the actual equinox (September 22, 2020) to determine if it impacts them falling over. Each egg is unique and some will be more likely to balance. Try balancing each egg on its wider end as well as on its narrower end. This may take a number of tries!

Then, to test that it is the only day you can balance an egg, what should you do? That's right, keep trying to balance eggs any other day of the year!

What Happened

Egg balancing takes practice and patience. But there is no gravitational change during the equinox that will help you balance an egg, and it is as easy (or as difficult) to balance an egg on any day of the year.





Activity 2: The Broom

Next, test your broom-balancing skills on the equinox, and then compare your broom-balance success on several other non-equinox days. What do you observe?

Getting a broom to balance on its bristles has to do with where the broom's center of mass is located. The center of mass of an object is sometimes referred to as its balance point, or the point where the object's mass seems to be concentrated.

You can find the broom's center of mass by clasping your hands together with palms touching and your index fingertips pointed forward. Lay the broom horizontally across your extended fingers. The point at which the broom balances is where its center of mass is located. Mark this point with a piece of tape.

What do you observe? You should notice that it balances horizontally close to where the bristles are located. In order to balance, an object's center of mass needs to be directly over its base of support.

Now try to balance the broom on its bristles vertically. What do you observe?

As long as the center of mass of the broom is kept directly over its base, it is likely to remain balanced. If you move the broom's center of mass, it becomes much more difficult to keep it directly above the base of the broom and thus the broom topples over.

You can test this for yourself by adding weight to the broom handle. Try taping a small plastic water bottle to the top of the broom handle. Balance the broom again horizontally across your fingers to find its center of mass. Mark the new balance point with a piece of tape. Now try balancing the broom vertically again. What happens? It should be much more difficult to keep it upright than before!

Center of mass is an important concept for a variety of reasons, and has more practical applications than broom balancing. For example, race cars are built low to the ground on purpose. Because their center of mass is low, it helps keep them from flipping over no matter how fast they travel around the track.

Although balancing absolutely has to do with gravity working against your center of mass, it has nothing to do with the equinox!