



HOW DO GLOW STICKS WORK?

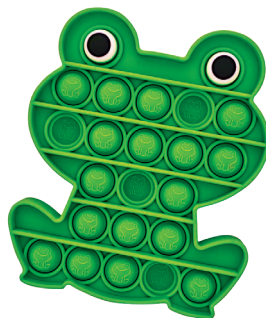
Most glow sticks, aside from the kind that rely on batteries, are made of **a tube within a tube**. There's the plastic outer tube that you see, which holds certain liquid chemicals and fluorescent dye. Then there's a thin glass tube inside it, which holds another kind of chemical.

To make the stick glow, you bend it, which cracks open the inner glass tube. (**That's the snap sound you may hear.**)

Chemicals inside the glass tube are then free to mix with chemicals that were in the outer tube, and—**abracadabra!**—**the magical glow show begins!** As the substances combine, a chemical reaction happens that gives off energy as light. The color depends on which dyes were used in the stick. It's a totally tubular process!



HOW DO YOU CHOOSE WHICH TOY TO PLAY WITH THE MOST?



WHAT WOULD IT BE LIKE IF YOUR FAVORITE TOY COULD TALK?



WHAT'S SPECIAL ABOUT YOUR FAVORITE STUFFED ANIMAL?



What kinds of pool toys might an octopus want to play with?



Would you rather design toys or test them?



WHAT IS HELIUM?

When you pop a floating balloon and **a gas with no color and no odor hisses out**, it's good to wonder what it might be!

Helium is a chemical element, one of the basic building blocks of matter. So we can't make helium at home by mixing other elements together. **In our everyday experience, helium is a gas.** The tiny particles that make it up are always moving around, bouncing off one another and off other objects.

Helium is lighter than the other gases that make up the air around us, which is why a helium balloon rises into the air. When a balloon full of helium is held on a string, **Earth's gravity pulls harder on the surrounding air than it does on the balloon.** So, air is always slipping down under the balloon, pushing it upward. Which comes in handy for party decorations!



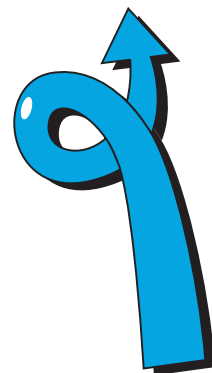
WHAT'S THE MOST IMPORTANT THING TO HAVE AT A PARTY?



IF YOU WERE GOING TO A COSTUME PARTY, WHAT COSTUME WOULD YOU WEAR?



IF YOU WERE PLANNING A PARTY FOR A PET, WHAT WOULD IT INCLUDE?



What's your favorite thing about celebrating someone else's birthday?



Which of these can a balloon be filled with—air, sound, water, shadows?



Highlights



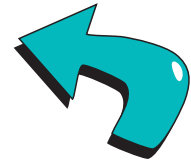
HOW DOES A ROCKET GO INTO SPACE?

3, 2, 1... BLASTOFF! The power for a rocket or spacecraft comes from its fire, which is a **chemical reaction called combustion**. That's the process of combining fuel with oxygen to give off energy. It's what happens in the engine of a car—but on a much bigger scale in a rocket! To go into space, **the craft needs a lot of oomph**, which it gets by combusting rocket fuel.

At liftoff, the process of combustion makes a lot of gases expand very quickly. Rockets underneath the spaceship known as thrusters are **shaped to force those expanding gases downward and outward**. As they force out the gases, the thrusters get pushed in the opposite direction. As they go up, **they take the spaceship with them and away from Earth's gravity**.



If people could live in outer space, would you want to?



IF YOU COULD ASK AN ASTRONAUT THREE QUESTIONS, WHAT WOULD YOU ASK?



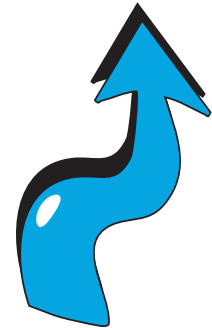
Why do you think we sometimes see the Moon during the day?



IF NO SPACECRAFT HAD EVER BEEN SENT INTO OUTER SPACE, WHAT THINGS WOULDN'T WE KNOW?



Does the Moon change size? What makes you think that?



WHICH ANIMAL DO YOU THINK WOULD MAKE THE BEST ASTRONAUT? WHY?





HOW DO BASKETBALLS BOUNCE?

Something that bounces has a special quality of materials that we call elasticity. A material is elastic if it returns to its original shape after being pulled, bent, or squeezed. A basketball is elastic because it is tightly packed with air inside. And, like other gases, **air is elastic.**

The air inside a basketball always **pushes outward in all directions** against the inside of the ball. When you drop the ball onto a hard floor, both the ball itself and the air inside it get flattened or squeezed a little by the impact. (The floor does, too!)

The squeezed air, under greater pressure, pushes out with greater force, returning the ball to its round shape. The rebounding ball “pushes off” the floor—**which you see as a bounce** . . . or a slam dunk!

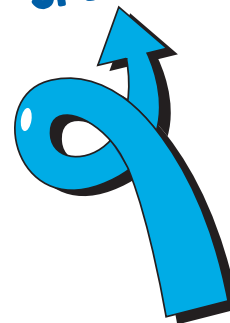


How is your family like a sports team?

HOW CAN WHAT YOU LEARN IN SCIENCE HELP YOU IN SPORTS?



WOULD A RUBBER BALL BOUNCE HIGHER IF YOU DROPPED IT FROM SHOULDER HEIGHT OR WAIST HEIGHT?



Which beach ball would bounce higher—one that is fully inflated or one that has less air inside?



When you bounce a ball, can you predict where it will go? Why or why not?



Which sports don't use a ball?





WHY DOES A CLOCK ONLY GO TO 12:00?

Thousands of years ago in what is now the Middle East, **people valued the number 12**. Historians think it may have related to Moon cycles or star movements. Around the same time, people were using an early kind of clock called a sundial. **Some ancient sundials had markings dividing the path of the shadow into 12 parts, from sunrise to sunset.**

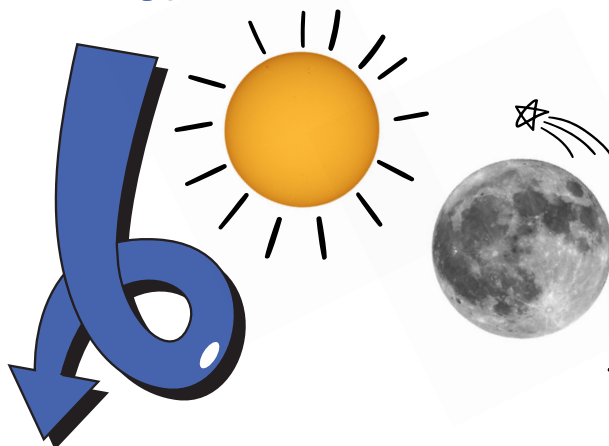
As people found ways to keep time in the dark, nighttime was divided into 12 parts too. **This created a 24-hour day.** It wasn't a super accurate system, since the number of hours in the day versus the night varies with the time of year.

Eventually, people created much more accurate methods of tracking time—but they kept the framework of the 24-hour day.

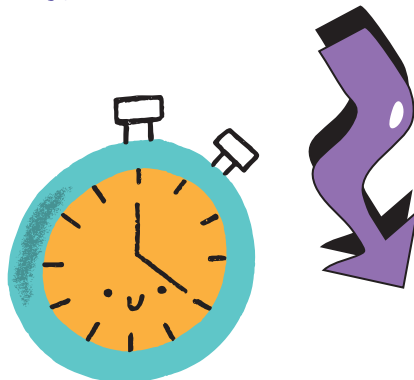
Fast-forward to now! Some countries, like the United States, **divide a 24-hour day into two 12-hour blocks**. Many other countries use a 24-hour time system. Yet even in places that use 24-hour time, people use clocks with 12 divisions. Although 24-hour clockfaces do exist, they can be hard to read because the numbers are squished—it's, um, a **real time crunch!**



WITHOUT LOOKING AT A CLOCK, HOW MIGHT YOU TELL WHAT TIME OF DAY IT IS?



If you could freeze time, what would you do?



What might make a clock stop running?



DOES ANYTHING GET YOUNGER AS TIME GOES ON? WHY OR WHY NOT?



WHY WOULD IT BE DIFFICULT TO COUNT HOW MANY TIMES A DAY YOU BLINK?



How can you tell that something is old?





HOW DO AIRPLANES STAY IN THE SKY?



The key to keeping an airplane flying is the wings. As the jet engines or propellers move the plane forward, **the wing splits the air**. Some air flows fast over the wing and the rest flows under it slowly.

Here is where the experts disagree. Some say that the faster flow of air over the wing lowers the air pressure above it. Then the higher pressure of the slow-moving air underneath pushes upward on the wing.

But other scientists say the explanation is simpler than that: **the plane flies because the wing is set at an angle that pushes downward on the air.**



WHAT DO YOU LIKE TO DO DURING CAR RIDES?



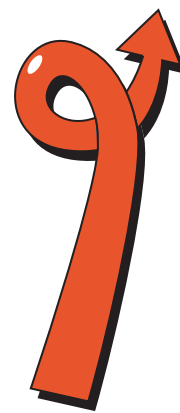
How does a unicyclist steer the unicycle?



WHAT COULD YOU SEE FROM AN AIRPLANE THAT YOU CAN'T SEE FROM THE GROUND?



What do you think will be different about cars by the time you are old enough to drive?



What keeps a train on the tracks?