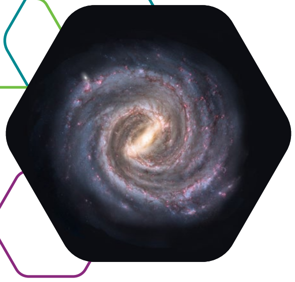


EXPLORING THE UNIVERSE
Star Formation

Try this!

1

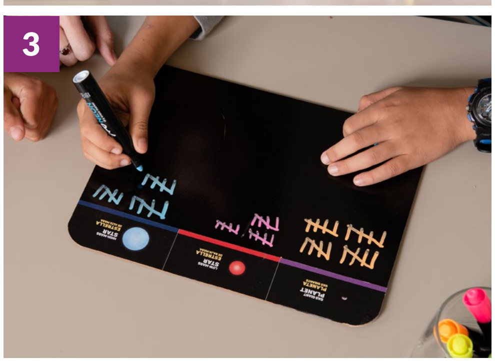
Start the 30-second timer. Use the hair dryer to see how much gas and dust—represented by the balls—you can collect in the clear container before the timer runs out.

Space isn't empty. Gas and dust move around in space, sometimes clumping together to form objects.

2

Pour the balls from the clear container into the measuring tube to see what kind of space object you formed. The more balls collected, the greater the mass. Did you collect enough matter to form a planet? A star?

3



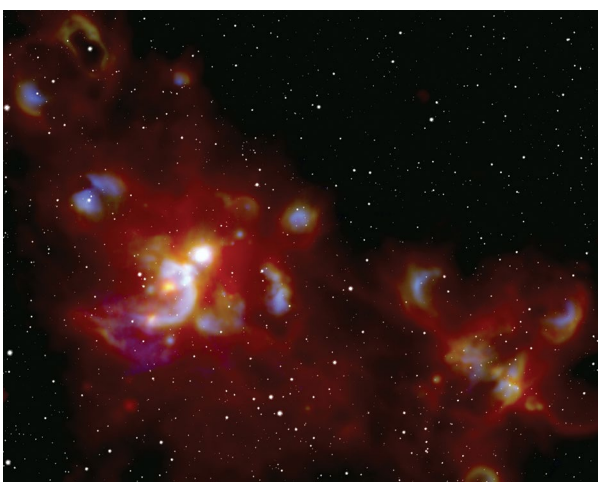
Record your data. Add a tick mark or sticker to the category of space object you made. How many others made the same object as you? How many made a different object? Check back later—did the relative numbers of objects change throughout the day?

The space between stars, planets, and other large objects is not empty—it contains gas and dust.

Stars are born when huge amounts of gas and dust clump together. Clouds of gas and dust—called *nebulas*—left over from past cosmic events like supernova explosions can be found throughout the universe. If the density of gas and dust clumping together becomes high enough, a star can form. **The more gas and dust that clump together, the higher the new star's mass!** Most known stars range from less massive and cooler *red dwarf stars* to more massive and very hot *blue stars*.

A newly formed star called S106 IR is shrouded in dust at the center of this image captured by the Hubble Space Telescope.

In our "wire basket" model of space, the balls represent gas and dust particles. Turbulence in space (the hair dryer in our model), including shockwaves from nearby explosions, causes parts of these clouds to become denser. In our model, density is represented by the number of balls collected in the clear container. With more and more matter in the clump, gravitational forces increase. The resulting pressure of the squeezed clump dramatically raises the temperature of its core. Eventually, this process releases enormous amounts of energy through *nuclear fusion,* and the new star begins to shine.



The youngest stars in this image of the stellar nursery WS1, taken by SOFIA, are in the bright ball near the center.

NASA scientists use telescopes to learn more about how stars form. The size, color, and temperature of a new star is mostly determined by how much matter is available in the *star-forming nebula* where it is born. To learn more about conditions inside these regions of space, also known as *stellar nurseries,* scientists can record infrared light that pierces through the gas and dust. Telescopes located above Earth's infrared-blocking atmosphere give scientists the best view. For example, NASA's SOFIA telescope, which flies on a modified Boeing 747, allows scientists to capture infrared light from young stars. By riding on an airplane, SOFIA can be more easily repaired and upgraded than a space telescope. SOFIA can even be operated in person by scientists along for the ride, making it one of NASA's most versatile observatories.