ACTIVITY 2: Oh Say, Can You See?

Astronomers refer to the faintest stars — the ones you can see without the help of telescopes or other tools — as Limiting Magnitude, or Naked Eye Limiting Magnitude (NELM). The darker the night sky, the more stars you can see. The more stars you can see, the higher the number of the NELM.

In the citizen science project Globe at Night, scientists need your help observing the stars and reporting how dark the sky appears. Your findings help researchers uncover the NELM in your area. Look at these images of the night sky featuring the same imaginary constellations with different pretend NELMs.

Bright lights in the big city: Here, you can only see one star of the pretend constellation Shark Banana.

In the suburbs: For this one, you can see 50 stars in the constellation.

Just in the country: In this one, you can see 100 stars.

Way out there: In this one, you can see 550 stars.
Use the information from the NELM pictures on the previous page to answer these questions.

1. What percent of the number of stars you see in the **country** (100) can you see in the **suburbs** (50)?
   
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2. What percent of the stars that you can see in the **big city** (1) can you see **way out there** (550)?
   
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3. How many more stars can you see **way out there** (550) than you can see **just in the country** (100)?
   
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4. How many fewer stars can you see in the **suburbs** (50) than you can see **in the country** (100)?
   
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5. Circle the symbol to correctly complete these expressions.

   - country stars visible (>, <, =) city stars visible
   - city stars visible (>, <, =) way-out-there stars visible
   - suburb stars visible (>, <, =) city stars visible
   - country stars visible (>, <, =) suburb stars visible

What are stars? Stars are bright gas clouds, mostly helium and hydrogen, glowing from **nuclear fusion** reactions at their cores. Nuclear fusion is one way atoms can combine. When they do combine, they produce light and heat.
6. Why do you think you can see more stars in the country than in the city?

The closest star to us is the sun. It’s 93 million miles away! If you traveled in today’s fastest rocket, it would take **81,000 years** to get there from the earth.
MEET Ekta Patel, Ph.D.
Astrophysicist, University of California Berkeley

What’s the coolest part of your job?
I get to spend my days pondering processes that occur over billions of years. I study satellite galaxies—typically, a galaxy that orbits another, more massive galaxy. It’s like how the Earth orbits around the Sun, but we know much less about the way satellite galaxies move because they are so much farther away than the planets in our Solar System. I am particularly interested in how these satellite galaxies orbit around their host galaxies, how long this process takes, and how the orbital tracks of those satellite galaxies help us learn more about the satellites themselves, as well as the galaxies that they orbit around. The universe is so vast that even a galaxy moving at 450,000 miles per hour can take billions of years to make one complete orbit around its host galaxy.

What’s something you wish you’d known about astrophysics when you were a kid?
I was lucky to witness a meteor shower when I was 14 years old—and to have enough curiosity and resources to research what it takes to become an astrophysicist. One thing I wish I knew not only as a kid but also as a young adult is that I could be whatever I wanted. I wish I’d been able to read a book like this one and learn about careers that aren’t advertised as “ordinary.” Science thrives when people of all backgrounds join together to solve the mysteries of the universe. In my career as an astrophysicist, I have seen this come true in front of me.