Teacher Tips: Measurement in Real Life

What is STEM in 30

STEM in 30 is a broadcast series where students can explore unexpected intersections of air and space with their everyday lives like how weather impacts balloon flight, the conditions needed for a habitable planet, and more. Each 30 minute episode focuses on a STEM related topic which can be broken into classroom friendly clips that may be used on their own, or in conjunction with the entire episode.

In this document you will find:

Episode Description:Amazing Models and Measurement Season 11, Episode 6

“One accurate measurement is worth a thousand expert opinions.” - Grace Hopper, United States Navy rear admiral

Why is it important to have an accurate way to measure things? Who sets those standards and how does it affect science, car parts and even tape measurers? In this episode of STEM in 30 we’ll dive into the importance of wind tunnels, modeling and take a look how measurement affects our everyday lives.

Standards:

NGSS Standards

- MS-PS1-1 Matter and its Interactions
    - Develop models to describe the atomic composition of simple molecules and extended structures.

Common Core Math

- CCSS.Math.Content.5.MD.A.1
    - Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

- CCSS.Math.Content.4.MD.A.1
    - Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.

Classroom Activity

- Now that you've watched the video, are you ready to try out some measuring skills with your students? In this "Measuring with Your Shoe" lesson plan, students explore some of the best and worst ways to measure things and learning why standard measurements are important in daily life.

Segments within this Episode

- Two Horses and a Space Shuttle
    - What does a king's foot have to do with a ruler? Do you know how many grains of barley are in an inch? There are many ways to measure things. We may not measure things the same way today as we did in the past, but the past still influences the way things are measured and built today - including rocket engines.
- Modeling Flight with the Wrights
    - Inventing the airplane took a lot of planning, research and experimentation. Before Wilbur and Orville Wright built their flying machine they built gliders and a kite. The Wright kite was one of the first experiments done to test their theories of controlling roll aerodynamically.
- Measurement in Aviation
    - There are many weights and measurements taken into consideration to ensure safety in the air, especially when you are traveling at twice the speed of sound. Join National Air and Space Museum curator Dr. Bob van der Linden to learn about the Concorde and measurement in aviation.
- The Mars Metric Mistake
    - The Mars Climate Orbiter was launched toward the red planet in December 1998. After almost a year long journey it reached its destination. Then on September

23, 1999, communication with the spacecraft was lost. But why? Could it have been a simple measuring mistake?

Youtube Playlist

Related Resources

Here are some other related materials you might enjoy.

- The National Institute of Standards and Technology or NIST was founded in 1901 and is one of the nation's oldest physical science laboratories. Congress established the agency to remove a major challenge to U.S. industrial competitiveness at the time — a second-rate measurement infrastructure that lagged behind the capabilities of the United Kingdom, Germany and other economic rivals.Today, NIST measurements support the smallest of technologies to the largest and most complex of human-made creations — from nanoscale devices so tiny that tens of thousands can fit on the end of a single human hair up to earthquake-resistant skyscrapers and global communication networks.
- The first Educational Wind Tunnel design for AEROLAB was crafted in Wiley Sherwood's basement in 1947. Sherwood saw a need for an Educational Wind Tunnel to help students understand basic aerodynamic principles. Today AEROLAB designs and builds wind tunnels for all sorts of uses including one for the museum's new How Things Fly Gallery.
- Did you know that before they built flying machines the Wright brothers built bikes? They also ran a successful printing business and it was a toy that sparked their interest in flight. Learn more about the Wrights and see the original 1903 Wright Flyer in the newly renovated gallery The Wright Brothers & The Invention of the Aerial Age now open at the National Air and Space Museum.
- Being able to measure things has changed over time. Measuring devices have become more accurate and standardized. And the devices used to measure things are so important that the Smithsonian Institution has been collecting them for years. To learn more about these items checkout our website.

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