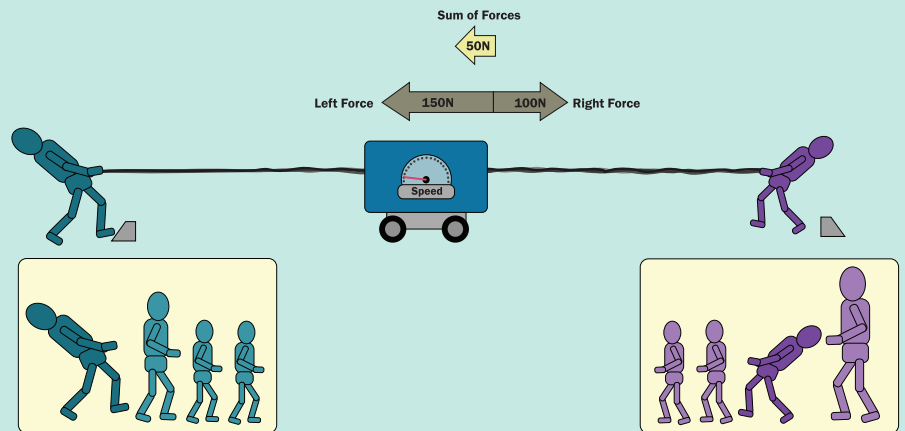




CONCEPT PhET provides fun, free, interactive, research-based science, and mathematics simulations. These tests include student interviews and observation of simulation use in classrooms. The simulations are written in Java, Flash or HTML5, and can be run online or downloaded to your computer. All simulations are open source.

BACKGROUND

PhET was founded in 2002 by Carl Wieman at the University of Colorado Boulder. PhET began with Wieman's vision to improve the way science is taught and learned. Their stated mission is "To advance science and math literacy and education worldwide through free interactive simulations."



REAL WORLD CONNECTIONS

Labs and tutorials that use equipment such as circuits can be modified to use PhET simulations instead. Research shows that substituting the PhET Circuit Construction Kit simulation for real equipment in a variety of contexts leads to improved conceptual learning in the best cases, and the same conceptual learning in the worst cases. There are many advantages to using PhET simulations over real equipment: They are easy to use, so students can play around and modify the experiment quickly and easily without fear of breaking the equipment. They have productive constraints to focus attention on the most important aspects of the experiment (e.g. bulb brightness and current flow) rather than on irrelevant aspects (e.g. wire color and length). Finally, if real equipment is not available, PhET simulations provide the opportunity to do multiple experiments with a single piece of equipment: a computer.

Make sure it measures up



EXAMPLES

PHYSICS:

- Motion (Balancing Act, Forces and Motions, Friction, Gravity Force Lab)
- Sound & Waves (Wave Interference, Waves on a String, Waves Intro)
- Work, Energy & Power (Energy Skate Park, Gas Properties, Pendulum Lab)
- Heat & Thermo (Gasses Intro, Gasses Properties, States of Matter)
- Quantum Phenomena (Blackbody Spectrum, Rutherford Scattering)
- Light & Radiation (Bending Light, Color Vision, Molecules and Light)
- Electricity, Magnets & Circuits (Charges and Fields, Coulombs Law, Circuit Construction Kit DC)

CHEMISTRY:

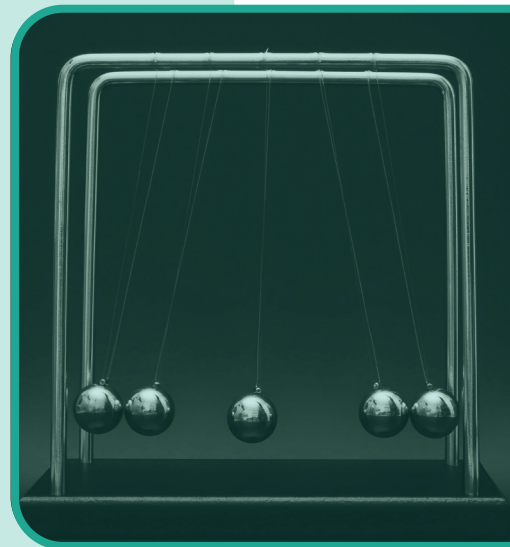
- General Chemistry (Acid Base Solutions, Balancing Chemical Equations)
- Quantum Chemistry (Blackbody Spectrum)

MATH:

- Math Concepts (Area Builder, Arithmetic, Build A Fraction, Graphing Lines)
- Math Applications (Masses and Springs, Pendulum Lab, Projectile Motion)
- Earth Science (Gravity and Orbits, Gravity Forces Lab, Under Pressure)
- Biology (Color Vision, Natural Selection, pH Scale)

GRADE LEVEL:

- Elementary School
- Middle School
- High School
- University



FORMULAS

PHYSICS:

Wave Speed $v = f \lambda$

Projectile Motion $h = v^2 / 2g$

CHEMISTRY:

Molarity (M) = $\frac{\text{moles of solute}}{\text{liters of solution}}$

Boyle's Law $P_1V_1 = P_2V_2$

EARTH SCIENCE:

Gravity of two Objects $F = G \frac{m_1 m_2}{r^2}$



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