

but what are Gizmos?

ExploreLearning **Gizmos**[™] are award-winning simulations that bring research-proven teaching strategies to life and make learning fun.

Try them online at <http://www.ExploreLearning.com>.



- Students use Gizmos to interact with and explore hundreds of Math & Science topics, ranging from heredity to trigonometry.
- Teachers use Gizmos as dynamic “what if” tools to help students move beyond memorizing to true understanding.

Inquiry-based lessons

Each Gizmo comes complete with a step-by-step, inquiry-based lesson that can be used as-is, or is easily customizable by teachers.

Exploration Guide: Tides

Every day, tides ebb and flow along the seashores. At low tide, thousands of shorebirds flock to exposed mudflats, feeding on worms, crabs, and other delicacies. High tide brings relief to the inhabitants of tide pools. Sea anemones, barnacles, and mussels filter the water for plankton, while snails scrape algae off the rocks. Without tides, many of these organisms would not survive.

Like many daily events, tides are often taken for granted. But coming up with a complete explanation of tides was a challenge that engaged many great scientists, including Galileo and Lord Kelvin. Even today, predicting the tides with precision is a difficult task.

Daily Tides

In the Gizmo[™], Earth and the Moon are shown. An observer is standing on the equator. Although it is not visible, the Sun is considered to be far off in space to the left.

1. On the **SIMULATION** pane, notice the relative positions of the Sun, Earth, Moon and the observer. Select the **BAR CHART** tab, and click **Play** (▶). After 24 hours of simulated time, click **Pause** (⏸).

 - a. As time goes by, what do you notice on the **BAR CHART** tab?
 - b. Click **Reset** (↺), and then **Play**. When the water reaches its maximum depth, click **Pause**. This is **high tide**. What is the water depth at high tide?
 - c. At what time did high tide occur?
 - d. Press **Play**, and then **Pause** when the water is next at its minimum depth. This is **low tide**. What is the water depth at low tide?
 - e. At what time did low tide occur?

2. Click **Reset**. Notice that the **BAR CHART** currently shows high tide. Click **Play**, run the Gizmo for 24 simulated hours, and then click **Pause**. Select the **GRAPH** tab.

 - a. How many high tides occurred in this 24-hour period?
 - b. How many low tides occurred in the same period?
 - c. Suppose it was high tide. About how many hours would you have

Tides

Gain an understanding of high, low, spring, and neap tides on the Earth by observing the tidal heights and the positions of the Earth, Moon, and Sun. Tidal bulges can be observed from space, and water depths can be recorded from a dock by the ocean.

*Click the Exploration Guide link to launch a step-by-step activity for this Gizmo.

[Exploration Guide](#)

Tides Gizmo

DESCRIPTION TABLE BAR CHART GRAPH

Day

h (ft)

20.0

15.0

10.0

5.0

0.0

Speed: Slow Fast

clock: 37 days 10 hours 0 minutes

controls: ▶ ⏸ ⏪

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Assessment Questions

5. A tide monitor was placed in the water and recorded data for several days before being broken by a curious seal. A graph was made of the data collected up to the time that the monitor was broken, indicated by the blue arrow. Which image represents the positions of the monitor, the Moon and the Sun at the time the monitor was broken? (Note: In each illustration the monitor is represented by a human figure.)

Correlation by State

I. Based on the diagram below

11:59 AM

the human eye (and other light-sensitive animals).

- ☑ Laser Reflection
- ☑ Ray Tracing (Lenses)
- ☑ Ray Tracing (Mirrors)

120: Students who meet the standard know and apply concepts of force and motion and the principles that explain them.

120.1: Apply scientific inquiries or technological design to explore the forces, comparing gravitational, electromagnetic, nuclear strong and weak interactive forces, or describing the impact of these forces at all levels.

- ☑ Freefall Laboratory
- ☑ Golf Range!

120.3: Apply scientific inquiries or technological designs to explore gravitation, applying gravitational potential energy and satellite describing the applications of rocket propulsion.

- ☑ Energy of a Pendulum
- ☑ Freefall Laboratory
- ☑ Gravitational Force
- ☑ Orbital Motion - Kepler's Laws
- ☑ Potential Energy on Shelves
- ☑ Tides

120.4: Apply scientific inquiries or technological designs to explore thermodynamics, explaining the kinetic theory of gases, the ideal gas laws, calculating temperature and pressure variations of gases, specific heat values, and heat capacities of solids and liquids and mechanical equivalents of heat, calculating thermal expansion and transfer capabilities of different substances, or explaining entropy in common terms and examples.

Image A

Assessment & reporting

Students can check their understanding and get helpful feedback after every Gizmo. Teachers can use immediate results to guide instructional decision making.

Exceptional support for teachers

- First-rate Professional Development
- Teacher home pages for easy class management and lesson planning
- Extensive online Help Center
- Toll-free phone and email support

Flexibility & ease of use

Gizmos are designed for success in computer labs, classroom settings with an LCD projector or interactive whiteboard, or even at home.

Correlations to standards & textbooks

Gizmos are correlated to your state standards and to leading textbooks, so finding just the right Gizmo is a breeze.



Online simulations that power inquiry and understanding

...with extensive coverage across elementary, middle and high school Math & Science topics:

Middle and High School Math

Number and Operations

Fractions with unlike denominators
Improper fractions and mixed numbers
Ordering percents, fractions and decimals
Part-to-part and part-to-whole ratios
Estimating population size
Percent of change
Ordering and approximating square roots
Order of operations
Modeling and solving two-step equations
Using tables, rules and graphs
Permutations and combinations
[and many more...](#)

Algebra 1

Points in the coordinate plane
Linear functions
Point-slope form of a line
Slope-intercept form of a line
Quadratic and absolute value functions
Simple and compound interest
Distance-time and speed-time graphs
Linear inequalities in two variables
[and many more...](#)

Geometry

Investigating angle theorems
Constructing congruent segments and angles
Conditional statements
Polygon angle sums
Area of parallelograms
Classifying quadrilaterals
Similarity in right triangles
Triangle angle sum
Triangle inequalities
Pythagorean theorem
Circle: circumference and area
Chords and arcs
Perimeters and areas of similar figures
Sine, cosine and tangent
Rotations, reflections and translations
Surface and lateral area of prisms and cylinders
3D and orthographic views
[and many more...](#)

Data Analysis and Probability

Theoretical and experimental probability
Independent and dependent events
Histograms
Constructing box-and-whisker plots
Describing data using statistics
Correlations
Lines of best fit using least squares
[and many more...](#)

Algebra 2/ Pre-Calculus

Modeling linear systems
Linear programming
Quadratic inequalities
Points in a complex plane
Fourth-degree polynomials
General form of a rational function
Logarithmic functions
Exponential functions
Parabolas
Circles
Ellipses
Hyperbolas
Arithmetic and geometric series
Sine, cosine and tangent functions
Simplifying and verifying trigonometric functions
[and many more...](#)

Middle and High School Science

Biology

Codominant traits
RNA and protein synthesis
DNA fingerprinting
Human evolution
The Hardy-Weinberg equilibrium
Adaptations (Galapagos finches)
Food chains
Cell energy cycle
Viruses
Seed germination
Homeostasis
Human perception, reflexes, and learning
[and many more...](#)

Earth and Space Science

Map reading
Earthquakes
Soil porosity
Water cycles
Relative humidity
Coastal winds and clouds
Seasons around the world
Moon phases
Tides
Solar and lunar eclipses
Kepler's laws of orbital motion
Stellar spectra
[and many more...](#)

Chemistry

Density
Phase changes
Colligative properties
Freezing point depression
Measuring pH

Atomic structure
Bohr model of the atom
Photoelectric effect
Nuclear decay and half-life
Ideal gas laws (Boyle's Law & Charles' Law)
Dehydration and synthesis reactions
Analyzing a mystery substance
[and many more...](#)

Physics

Interpreting graphs of distance vs. time
Newton's laws
Freefall
Projectile motion
Physics of roller coasters
Buoyancy
Inclined planes
Kinetic and potential energy
Torque
Prisms
Doppler effect
Circuits
[and many more...](#)

Elementary Science

Earth and Space Science

Mineral identification
Pangaea and moving continents
Solar and lunar eclipses
Moon phases
Planets
[and many more...](#)

Life Science

Plant growth
Germination
Forest ecosystems (food webs)
Heredity
The circulatory system
Pond ecosystems
[and many more...](#)

Physical Science

Graphing skills
Magnetism
Electrical circuits
Pendulums
Gravity and orbits
Measuring speed
Weight and mass
Heat absorption
Bicycle gears
Conduction and convection
[and many more...](#)

 **Gizmos**