



## Internationalizing the Academic Standards: Indiana ~ Comments From Educators

*...This work represents a solid resource for teachers in Indiana to use to internationalize their lesson plans as they consider Indiana's standards. It also provides a wonderful launching point for teachers to envision their own methods for bringing learning about the world into their classrooms in Indiana...*

- Jennifer Manise, Executive Director, Longview Foundation: For Education in World Affairs and International Understanding, Inc., Falls Church, VA

*...Children's knowledge of the rest of the world can't be taught just in social studies for ten minutes a day. Outside of taking them abroad, Internationalizing the Academic Standards: Indiana is the best resource I've seen to promote global competence in the next generation...*

- Philip Boley, Retired Indiana District Superintendent, Executive Director, Global Indiana: A Consortium for International Exchange, Director of International Education, Central Indiana Educational Service Center, Indianapolis, IN

*...An increasingly clear fact of living in the 21<sup>st</sup> century is that the world is shrinking at a shocking pace and teachers have a responsibility to their students to prepare them for their place in this world. This resource, which clearly connects teachable and relevant skills for students to the standards that guide decision-making, is a tremendous aid to any teacher...*

- Kevin M. Cline, Department Chair, Social Studies, Frankton High School, Frankton, IN

### *Invitation to Contribute:*

Please submit suggestions for incorporating international content when teaching Indiana's K-12 academic standards for the core subjects at:

<http://www.indiana.edu/~global/educational/standardsSuggestion.php>

Suggestions will be shared with other educators after review.

URL:

<http://www.indiana.edu/~global/resources/standardsInd.php>

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INTERNATIONALIZING THE ACADEMIC STANDARDS:  
**INDIANA**

Middle School & High School:  
*Science*

# Internationalizing the Academic Standards: Indiana

Developed by Indiana University's

*Center for the Study of Global Change*

Office of the Vice President for International Affairs

*Center for International Business Education and Research*

Kelley School of Business

*Center for Latin American and Caribbean Studies*

College of Arts and Sciences

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To access *Internationalizing the Academic Standards: Indiana* online, go to:

<http://www.indiana.edu/~global/educational/standardsInd.php>



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Each teacher in this list provided the project with critical guidance and/or authored valuable *suggestions* to integrate international content into one or more of Indiana's K-12 academic standards for her or his respective grade level(s) and core subject(s). We are grateful for the enormous time, effort, and creativity that each of them committed to this project. Indiana students - citizens and leaders of the 21<sup>st</sup> century - will be the beneficiaries.

\*Acronyms: ES – Elementary School; HS – High School; IU – Indiana University; JHS – Junior High School; MS – Middle School

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## Preface

The purpose of the series, *Internationalizing the Academic Standards: Indiana* (IASI), is to suggest ways for educators to incorporate international content into the teaching of Indiana's K-12 academic standards for the core subjects: English/language arts, mathematics, science, and social studies. As the world becomes increasingly interdependent and complex, the need for international knowledge, skills, and attitudes is more clear and compelling, as is the call for relevant teacher resources that are readily accessible. The underlying principle of IASI is to integrate content and pedagogy into the approved curriculum already being taught in the classroom. A unique strength of this resource is that it was created *for* classroom teachers *by* classroom teachers interested in sharing their creative ideas.

IASI evolved from the *Indiana in the World III* project. Our initial goal was to create the third edition of a book for K-12 educators to help them teach about Indiana's global connectedness using complete lesson plans. To this end, three teacher focus group meetings were held to gather information and generate ideas. A presentation was also given to members of the Lotus Education and Arts Foundation Board, a diverse Bloomington community group, which offered perspectives about the need for citizens to be internationally competent. From this process a very different product emerged: subject-based booklets containing brief, easy-to-use ideas for internationalizing the existing academic standards. An IASI draft sampler was then created and shared with the participants (primarily K-12 school principals) of the December 2009 Indiana International Education Leadership Retreat. It was extremely well received, thereby solidifying this concept of IASI.

The IASI series consists of five booklets: one for elementary school teachers focusing on all four core subjects and four for middle and high school teachers, each addressing one of the core subjects. Not all standards are included because some standards lend themselves more easily to the integration of international content than others. In addition, the booklets include a variety of suggestions for differentiated instruction, where appropriate, for both special needs and highly able students. The standards were identified directly from the Indiana Department of Education Web site (<http://www.doe.in.gov/>).

Indiana University's Center for the Study of Global Change, Center for International Business Education and Research, and Center for Latin American and Caribbean Studies are very proud to have facilitated the development of this resource which was created by and for teachers.

**Booklets can be downloaded in PDF format for free, in their entirety or in part, at:**  
**<http://www.indiana.edu/~global/educational/standardsInd.php>**



## How to Use this Book

Within this booklet are *suggestions* for how to integrate international content when teaching selected Indiana academic standards of the four core subjects.

### How suggestions were created:

Each teacher-author selected academic standards or indicators from those listed on the IDOE Web site (<http://www.doe.in.gov/>) and then provided suggestions about how to incorporate international content, including knowledge, skills, and/or attitudes. Sometimes the teacher-author also suggested a specific resource, such as a book, web link, or poem that s/he has used successfully in the past.

### What a suggestion looks like:

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**Grade:** 8

**Academic Standard:** 8.1

**Academic Standard Indicator:** 8.1.8

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain that humans help shape the future by generating knowledge, developing new technologies, and communicating ideas to others.

**Suggestion for Integrating International Content:** Have students research scientific theories or technologies that have been developed around the world and discuss how these developments are communicated and influence people globally. **Examples:** Darwin (England) and the theory of natural selection; Watson and Crick (U.S.) and the 3-D structure of DNA; evolution of the microscope from the simple microscope of Z. and H. Janssen and Van Leeuwenhoek (Holland) to the light microscope of Hooke (England) and the perfection of the instrument by Spencer (U.S.).

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### What you do with a suggestion:

Entries are suggestions only, meant to get you thinking about how to internationalize your own curriculum. You may like entire suggestions or only parts of them. Think of different ways to best integrate these suggestions into your lesson plans and daily pedagogy.

### Notes:

**Web links** are correct as of the date of publication.

All **Standard Descriptions** were copied directly from the IDOE Web site, dated 2011.

Some **Standard Descriptions** and **Suggestions for Integrating International Content** call for cultural/country comparisons. To avoid over-generalizations and the possibility of stereotyping, the IASI leadership team encourages teachers and their students to appreciate not only the differences and similarities among cultures/countries, but also the diversity and extreme variation within them.



## **How to Make Your Own Suggestions**

1. Add your own ideas to this book in the blank spaces provided on the last page.
2. Submit your own suggestions to share with other educators at\*:  
<http://www.indiana.edu/~global/educational/standardsSuggestion.php>



\*Note: Your e-mail address is required only to confirm details before your ideas are posted.

<b>SCIENCE</b>
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**Grade:** 6**Academic Standard:** 6.1**Academic Standard Indicator:** --**Core Standard:** No

**Standard Description (Academic or Indicator):** Students design investigations. They use computers and other technology to collect and analyze data; they explain findings and can relate how they conduct investigations to how the scientific enterprise functions as a whole. Students understand that technology has allowed humans to do many things, yet it cannot always provide solutions to our needs.

**Suggestion for Integrating International**

**Content:** After discussing the history of Charles Darwin's findings, have students break up into small groups and come up with hypotheses about the strength of sea turtles (how much weight a turtle can pull) or compare the different foods they eat, their ability to swim in various amounts of water, or activity levels at different times of the day. Then have students investigate real data on the behavior of sea turtles to test their hypotheses.

**Grade:** 6**Academic Standard:** 6.1**Academic Standard Indicator:** --**Core Standard:** No

**Standard Description (Academic or Indicator):** Students design investigations. They use computers and other technology to collect and analyze data; they explain findings and can relate how they conduct investigations to how the scientific enterprise functions as a whole. Students understand that technology has allowed humans to do many things, yet it cannot always provide solutions to our needs.

**Suggestion for Integrating International**

**Content:** Have students discuss the technologies with which people are trying to solve global problems. Discuss technology's opportunities and limitations. **Examples:** LifeStraws for clean water; solar energy for power.

**Grade:** 6**Academic Standard:** 6.1**Academic Standard Indicator:** --**Core Standard:** No

**Standard Description (Academic or Indicator):** Students design investigations. They use computers and other technology to collect and analyze data; they explain findings and can relate how they conduct investigations to how the scientific enterprise functions as a whole. Students understand that technology has allowed humans to do many things, yet it cannot always provide solutions to people's needs.

**Suggestion for Integrating International**

**Content:** The teacher should research a variety of local and global examples to describe how the needs, attitudes, resources, and values of a time period influence direction of technological development in a variety of cultures and societies. **Example:** Some underdeveloped countries have progressed from having only a single land line telephone for a whole village straight to many villagers having their own pay-per-minute cell phones. The stage of individual land line telephones was skipped over entirely.

**Grade:** 6**Academic Standard:** 6.1**Academic Standard Indicator:** 6.1.8**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Describe instances showing that technology cannot always provide successful solutions for problems or fulfill every human need.

**Suggestion for Integrating International**

**Content:** Have students consider the cane toad problem in Australia where giant toads from Central and South America were imported as a natural pest control for sugar cane. Explain how the toads later became a nuisance because they had no natural predators to control their population growth. Have students map the migration of the cane toad over the years using online sources for guidance. They can also create a timeline of the after effects, as well as make a

Venn diagram comparing the similarities and differences of a native Australian toad and a Latin American cane toad. **Suggested resource:** *Toad Overload* by Patricia Seibert (Millbrook Press, 1996).

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**Grade:** 6  
**Academic Standard:** 6.2  
**Academic Standard Indicator:** 6.2.9  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Compare consumer products, such as generic and brand-name products, and consider reasonable personal trade-offs among them on the basis of features, performance, durability, and costs.

**Suggestion for Integrating International Content:** Team up with a school in Europe and have students from both schools take an inventory of items in their classrooms such as school supplies, clothing, and equipment, charting each item's country of origin. Have students in both schools compare their items, as well as the perceived quality of different items. **Extension:** Have students price selected items and convert currencies to determine relative prices. **Suggested resource:** <http://www.epals.com/>.

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**Grade:** 6  
**Academic Standard:** 6.3  
**Academic Standard Indicator:** 6.3.8  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Explain that fresh water, limited in supply and uneven in distribution, is essential for life and also for most industrial processes. Understand that this resource can be depleted or polluted, making it unavailable or unsuitable for life.

**Suggestion for Integrating International Content:** Have students consider global water issues in light of contemporary books which complement each other and will generate discussion about global warming, water supply and demand, and the latest scientific research. *A Cool Drink of Water* by Barbara Kerley (National Geographic Children's Books, 2006) is a somewhat contemplative introduction to water

issues and is illustrated with large-scale photos from the National Geographic. *One Well: The Story of Water on Earth* by Rochelle Strauss and Rosemary Woods (Kids Can Press, 2007) reflects global interconnectedness by using the metaphor of one solitary well that all must share and provides thought-provoking facts, such as "It takes about 45 gallons of water to produce one gallon of milk" or "China and India make up about 1/3 of the world's population."

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**Grade:** 6  
**Academic Standard:** 6.3  
**Academic Standard Indicator:** 6.3.12  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Describe ways human beings protect themselves from adverse weather conditions.

**Suggestion for Integrating International Content:** Assign students to research various types of shelters from around the globe. Then, using a Venn diagram, have students compare their assigned type of shelter to their own home. **Examples:** Tipis; adobe houses; peat houses; yurts; igloos.

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**Grade:** 6  
**Academic Standard:** 6.3  
**Academic Standard Indicator:** 6.3.13  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Identify, explain and discuss some effects human activities, such as the creation of pollution, have on weather and atmosphere.

**Suggestion for Integrating International Content:** Have students work as individuals or in groups to calculate personal carbon footprints using online tools. Then have students follow up by comparing the relative carbon footprints of various international cities and countries to similar U.S. locations. **Suggested resources:** Earthday Network at <http://earthday.net>; Global Footprint Network at <http://www.footprintnetwork.org>.

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**Grade:** 6  
**Academic Standard:** 6.4

**Academic Standard Indicator:** --

**Core Standard:** No

**Standard Description (Academic or Indicator):** Students recognize that plants and animals obtain energy in different ways, and they can describe some of the internal structures of organisms related to this function. They examine the similarities and differences between humans and other species. They use microscopes to observe cells and recognize cells as the building blocks of all life.

**Suggestion for Integrating International**

**Content:** With students, discuss and model specific traits, such as the variety of human eye color, explaining the interrelationship between ancestors and parents. Then have students compare these traits amongst cultures.

**Grade:** 6

**Academic Standard:** 6.4

**Academic Standard Indicator:** --

**Core Standard:** No

**Standard Description (Academic or Indicator):** Students recognize that plants and animals obtain energy in different ways, and they can describe some of the internal structures of organisms related to this function. They examine the similarities and differences between humans and other species. They use microscopes to observe cells and recognize cells as the building blocks of all life.

**Suggestion for Integrating International**

**Content:** To address the structures and functions of living systems and matter and energy transformation, have students in pairs track and compare the one-way path that energy takes through producers, consumers, and decomposers, both locally and in another world region.

**Grade:** 6

**Academic Standard:** 6.4

**Academic Standard Indicator:** 6.4.8

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain that in all environments, such as freshwater, marine, forest, desert, grassland, mountain, and others, organisms with similar needs may compete with one another for

resources, including food, space, water, air and shelter. Note that in any environment, the growth and survival of organisms depend on the physical conditions.

**Suggestion for Integrating International**

**Content:** Instead of addressing the general topic of biomes, have students consider specific examples from around the world. **Example:** The grasslands group could have one student researching the Latin American pampas, another the Eurasian steppes, and another the South African veldt or East African savannah. Have students in biome groups compare issues in their specific locations, such as climate, erosion, pollution, natural or manmade disasters, and species diversity.

**Grade:** 7

**Academic Standard:** 7.1

**Academic Standard Indicator:** 7.1.2

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Explain that what people expect to observe often affects what they actually do observe and provide an example of a solution to this problem.

**Suggestion for Integrating International**

**Content:** Have students use examples from Rudyard Kipling's *Just-So Stories* that explain some observed occurrences in unexpected ways, emphasizing that a hypothesis needs to be rigorously tested before being accepted. **Suggested resources:** *Just So Stories* by Rudyard Kipling (Dover Publications, 2001); <http://chronicle.com/article/How-the-Scientist-Got-His/63287/>.

**Grade:** 7

**Academic Standard:** 7.1

**Academic Standard Indicator:** 7.1.4

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Describe that different explanations can be given for the same evidence, and it is not always possible to tell which one is correct without further inquiry.

**Suggestion for Integrating International**

**Content:** To illustrate the point that different explanations can be given for the same evidence, have students read and discuss a version of the Indian legend called “Six Blind Men and the Elephant”. **Suggested resource:** [http://www.noogenesis.com/pineapple/blind\\_men\\_elephant.html](http://www.noogenesis.com/pineapple/blind_men_elephant.html).

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**Grade:** 7

**Academic Standard:** 7.1

**Academic Standard Indicator:** 7.1.5

**Core Standard:** No

**Standard Description (Academic or Indicator):**

Identify some important contributions to the advancement of science, mathematics, and technology that have been made by different kinds of people, in different cultures, at different times.

**Suggestion for Integrating International**

**Content:** Using online resources, have students research about scientists and inventors from around the world and their contributions. Then have students make visual summaries on 8.5”x11” sheets and put these up on a wall around a world map, attached by string to their respective countries. **Suggested resources:** <http://web.mit.edu/invent/i-archive.html>; <http://www.astr.ua.edu/4000WS/>.

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**Grade:** 7

**Academic Standard:** 7.1

**Academic Standard Indicator:** 7.1.8

**Core Standard:** Yes

**Standard Description (Academic or Indicator):**

Explain that technologies often have drawbacks as well as benefits. Consider a technology, such as the use of pesticides, which helps some organisms but may hurt others, either deliberately or inadvertently.

**Suggestion for Integrating International**

**Content:** Have students research issues connected to e-waste (electronic waste) and WEEE (Waste Electrical and Electronic Equipment), which include harmful materials and require special handling and recycling methods worldwide. **Extension:** Have students list different sustainable methods of dealing with e-waste around the world.

**Grade:** 7

**Academic Standard:** 7.2

**Academic Standard Indicator:** 7.2.5

**Core Standard:** No

**Standard Description (Academic or Indicator):**

Estimate probabilities of outcomes in familiar situations, on the basis of history or the number of possible outcomes.

**Suggestion for Integrating International**

**Content:** Have students explore probability through international games. **Examples:** Japanese version of rock-paper-scissors, janken or jan-ken-pon; Korean version, gawi-bawi-bo or muk-chi-ba; ancient hand game of morra played in Roman and Greek times. **Suggested resources:** <http://www.math.wichita.edu/history/activities/prob-act.html#rock>; [http://www.utdanacenter.org/k12mathbenchmark/tasks/22\\_rockpaper.php](http://www.utdanacenter.org/k12mathbenchmark/tasks/22_rockpaper.php); <http://www.netrover.com/~kingskid/rock/rock.html>, where students can play against a computer.

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**Grade:** 7

**Academic Standard:** 7.2

**Academic Standard Indicator:** 7.2.7

**Core Standard:** Yes

**Standard Description (Academic or Indicator):**

Incorporate circle charts, bar and line graphs, diagrams, scatter plots, and symbols into writing, such as lab or research reports, to serve as evidence for claims and/or conclusions.

**Suggestion for Integrating International**

**Content:** Have students use data available online about natural disasters around the world to create graphic documents for discussions or research reports. **Examples:** 2010 earthquakes in Haiti and Chile; 2011 Japan earthquake and tsunami; 2004 South Asia tsunami. **Suggested resource:** [www.usgs.gov](http://www.usgs.gov).

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**Grade:** 7

**Academic Standard:** 7.3

**Academic Standard Indicator:** 7.3.5

**Core Standard:** Yes

**Standard Description (Academic or Indicator):**

Recognize and explain that heat

energy carried by ocean currents has a strong influence on climate around the world.

**Suggestion for Integrating International**

**Content:** Have students use a map of global ocean currents to make and discuss hydrographic observations worldwide, particularly how warm water currents can affect coastal areas.

**Extension:** Discuss the effects of El Niño and La Niña cycles.

**Grade:** 7

**Academic Standard:** 7.3

**Academic Standard Indicator:** 7.3.5

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Recognize and explain that heat energy carried by ocean currents has a strong influence on climate around the world.

**Suggestion for Integrating International**

**Content:** Have students investigate and report on the oceans' role in global climate change.

**Grade:** 7

**Academic Standard:** 7.3

**Academic Standard Indicator:** 7.3.6

**Core Standard:** No

**Standard Description (Academic or Indicator):** Describe how gas and dust from large volcanoes can change the atmosphere.

**Suggestion for Integrating International**

**Content:** Have students research Iceland's Eyjafjallajökull volcanic eruption in April 2010 and chart its impact on world travel on both a timeline and a world map.

**Grade:** 7

**Academic Standard:** 7.3

**Academic Standard Indicator:** 7.3.7

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Give examples of some changes in Earth's surface that are abrupt, such as earthquakes and volcanic eruptions, and some changes that happen very slowly, such as uplift

and wearing down of mountains and the action of glaciers.

**Suggestion for Integrating International**

**Content:** Have students investigate the global impact of major geological events and features.

**Examples:** Mount Paricutin volcano in Mexico; 1995 earthquake in Kobe, Japan; December 2004 Indian Ocean tsunami; Greenland ice sheet/glacier; Himalaya mountains; Alps in Europe; mountains in New Zealand.

**Grade:** 7

**Academic Standard:** 7.3

**Academic Standard Indicator:** 7.3.10

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain how the thousands of layers of sedimentary rock can confirm the long history of the changing surface of Earth and the changing life forms whose remains are found in successive layers, although the youngest layers are not always found on top, because of folding, breaking, and uplifting of layers.

**Suggestion for Integrating International**

**Content:** Have students compare and contrast various rock and fossil columns or strata layers in different parts of the world. **Suggested resource:**

<http://slohs.slcsd.org/pages/teachers/rhamley/Biology/GeoHistory/Far-Flung%20Fossils%202004.htm>

**Grade:** 7

**Academic Standard:** 7.4

**Academic Standard Indicator:** 7.4.2

**Core Standard:** No

**Standard Description (Academic or Indicator):** Describe that all organisms, including the human species, are part of and depend on two main interconnected global food webs, the ocean food web and the land food web.

**Suggestion for Integrating International**

**Content:** Have students study a variety of food webs from different biomes and countries.

**Examples:** Grasslands (Australia, Africa); tundras (Arctic, alpine); rainforests (Central America, Southeast Asia, Congo, Madagascar,

Amazon, Olympic); deserts (Sahara, Turkestan, Takla Makan-Gobi, Thar, Atacama, Arabian, Iranian, Australian, Kalahari, Namib, Patagonian); bodies of water (oceans, rivers; eg., the Amazon and Nile, the Great Barrier Reef).

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**Grade:** 7

**Academic Standard:** 7.4

**Academic Standard Indicator:** 7.4.9

**Core Standard:** No

**Standard Description (Academic or Indicator):** Understand and explain that as any population of organisms grows, it is held in check by one or more environmental factors. These factors could result in depletion of food or nesting sites and/or increase loss to increased numbers of predators or parasites. Give examples of some consequences of this.

**Suggestion for Integrating International**

**Content:** Have students explore the Great Barrier Reef and the pressures that affect coastal habitats. **Suggested resource:** [http://www.gbrmpa.gov.au/corp\\_site/info\\_services/publications/sotr/latest\\_updates/seabirds/pressure](http://www.gbrmpa.gov.au/corp_site/info_services/publications/sotr/latest_updates/seabirds/pressure).

---

**Grade:** 7

**Academic Standard:** 7.4

**Academic Standard Indicator:** 7.4.9

**Core Standard:** No

**Standard Description (Academic or Indicator):** Understand and explain that as any population of organisms grows, it is held in check by one or more environmental factors. These factors could result in depletion of food or nesting sites and/or increase loss to increased numbers of predators or parasites. Give examples of some consequences of this.

**Suggestion for Integrating International**

**Content:** Have students investigate the impact of the Cane Toad, an animal introduced to Australia and which is now a threat to the biodiversity of the country's wilderness frontiers. **Suggested resource:** *Toad Overload* by Patricia Seibert (Millbrook Press, 1996).

**Grade:** 7

**Academic Standard:** 7.4

**Academic Standard Indicator:** 7.4.10

**Core Standard:** No

**Standard Description (Academic or Indicator):** Describe how technologies having to do with food production, sanitation, and disease prevention have dramatically changed how people live and work and have resulted in changes in factors that affect the growth of human population.

**Suggestion for Integrating International**

**Content:** Have students compare and contrast sanitation and disease prevention in various countries using historical and current perspectives, as well as identify educational and technological practices that have helped improve human survival.

---

**Grade:** 7

**Academic Standard:** 7.4

**Academic Standard Indicator:** 7.4.14

**Core Standard:** No

**Standard Description (Academic or Indicator):** Explain that the environment may contain dangerous levels of substances that are harmful to human beings. Understand, therefore, that the good health of individuals requires monitoring the soil, air, and water as well as taking steps to keep them safe.

**Suggestion for Integrating International**

**Content:** Have students investigate the export of hazardous electronic waste to China, South East Asia, and India and the significant health risks posed as a result.

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**Grade:** 7

**Academic Standard:** 7.4

**Academic Standard Indicator:** 7.4.14

**Core Standard:** No

**Standard Description (Academic or Indicator):** Explain that the environment may contain dangerous levels of substances that are harmful to human beings. Understand, therefore, that the good health of individuals requires monitoring the soil, air, and water as well as taking steps to keep them safe.

**Suggestion for Integrating International**

**Content:** Have students research and discuss the impact of cyanide use in gold mining in many countries across the world. **Examples:** U.S.; Canada; China; Guyana; Bolivia; Zimbabwe; the Philippines; Ghana.

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**Grade:** 7

**Academic Standard:** 7.4

**Academic Standard Indicator:** 7.4.14

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Explain that the environment may contain dangerous levels of substances that are harmful to human beings. Understand, therefore, that the good health of individuals requires monitoring the soil, air, and water as well as taking steps to keep them safe.

**Suggestion for Integrating International**

**Content:** Have students investigate global sites with the worst pollution, as well as stories of successful environmental clean up. **Suggested resource:** The Blacksmith Institute at <http://blacksmithinstitute.org/>.

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**Grade:** 7

**Academic Standard:** 7.6

**Academic Standard Indicator:** 7.6.2

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Understand and explain that Louis Pasteur wanted to find out what caused milk and wine to spoil. Note that he demonstrated that spoilage and fermentation occur when microorganisms enter from the air, multiply rapidly, and produce waste products, with some desirable results, such as carbon dioxide in bread dough, and some undesirable, such as acetic acid in wine. Understand that after showing that spoilage could be avoided by keeping germs out or by destroying them with heat, Pasteur investigated animal diseases and showed that microorganisms were involved in many of them. Also note that other investigators later showed that specific kinds of germs caused specific diseases.

**Suggestion for Integrating International**

**Content:** Have students research French chemist

Louis Pasteur, known for creating the first rabies vaccine and for inventing a method to stop milk and wine from going sour. Discuss how this led to worldwide improvement in food for human consumption.

---

**Grade:** 7

**Academic Standard:** 7.6

**Academic Standard Indicator:** 7.6.3

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Understand and explain that Louis Pasteur found that infection by disease organisms (germs) caused the body to build up an immunity against subsequent infection by the same organisms. Realize that Pasteur then demonstrated more widely what Edward Jenner had shown for smallpox without understanding the underlying mechanism: that it was possible to produce vaccines that would induce the body to build immunity to a disease without actually causing the disease itself.

**Suggestion for Integrating International**

**Content:** Have students research Edward Jenner of Gloucestershire, England and the history of his discovery of a smallpox vaccination. Have them consider the World Health Assembly's official 1980 declaration that "the world and its peoples" are free from endemic smallpox.

---

**Grade:** 7

**Academic Standard:** 7.6

**Academic Standard Indicator:** 7.6.4

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Understand and describe changes in health practices that have resulted from the acceptance of the germ theory of disease. Realize that before germ theory, illness was treated by appeals to supernatural powers or by attempts to adjust body fluids through induced vomiting or bleeding. Note that the modern approach emphasizes sanitation, the safe handling of food and water, the pasteurization of milk, quarantine, and aseptic surgical techniques to keep germs out of the body; vaccinations to strengthen the body's immune system against subsequent infection by the same kind of microorganisms;



and antibiotics and other chemicals and processes to destroy microorganisms.

**Suggestion for Integrating International**

**Content:** When discussing the evolution of germ theory, have students research the microbiology studies performed by Ferdinand Cohn, a German biologist; Robert Koch, a German physician; and Sir Alexander Fleming, a Scottish doctor.

**Grade:** 7

**Academic Standard:** 7.6

**Academic Standard Indicator:** 7.6.4

**Core Standard:** No

**Standard Description (Academic or Indicator):** Understand and describe changes in health practices that have resulted from the acceptance of the germ theory of disease. Realize that before germ theory, illness was treated by appeals to supernatural powers or by attempts to adjust body fluids through induced vomiting or bleeding. Note that the modern approach emphasizes sanitation, the safe handling of food and water, the pasteurization of milk, quarantine, and aseptic surgical techniques to keep germs out of the body; vaccinations to strengthen the body's immune system against subsequent infection by the same kind of microorganisms; and antibiotics and other chemicals and processes to destroy microorganisms.

**Suggestion for Integrating International**

**Content:** Have students investigate India's Sulabh International Social Service Organisation, paying particular attention to the Sulabh sanitation movement and the role of such efforts in improving public health. **Suggested resource:**

[http://www.sulabhinternational.org/sm/magnitud\\_e\\_sanitation\\_problemnational\\_global.php](http://www.sulabhinternational.org/sm/magnitud_e_sanitation_problemnational_global.php).

**Grade:** 8

**Academic Standard:** 8.1

**Academic Standard Indicator:** 8.1.8

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain that humans help shape the future by generating knowledge, developing new technologies, and communicating ideas to others.

**Suggestion for Integrating International**

**Content:** Have students research scientific theories or technologies that have been developed around the world and discuss how these developments are communicated and influence people globally. **Examples:** Darwin (England) and the theory of natural selection; Watson and Crick (U.S.) and the 3-D structure of DNA; evolution of the the microscope from the simple microscope of Z. and H. Janssen and Van Leeuwenhoek (Holland) to the light microscope of Hooke (England) and the perfection of the instrument by Spencer (U.S.).

**Grade:** 8

**Academic Standard:** 8.2

**Academic Standard Indicator:** 8.2.1

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Estimate distances and travel times from maps and the actual size of objects from scale drawings.

**Suggestion for Integrating International**

**Content:** Have students use world maps to estimate distances and travel times given specific parameters. Have them check their work using the Measure Distance Map at <http://www.freemaptools.com>.

**Grade:** 8

**Academic Standard:** 8.2

**Academic Standard Indicator:** 8.2.2

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Determine in what unit, such as seconds, meters, grams, etc., an answer should be expressed based on the units of the inputs to the calculation.

**Suggestion for Integrating International**

**Content:** Have students learn how scientists in the lab and working in the field typically use the International System of Measurement (SI Units or metric system) and discuss why scientists in the U.S. use this system, even though Americans as a whole do not. Be sure that students are familiar with the SI Units used to measure mass, length, distance, and volume and can use the appropriate tools of measurement.

**Grade:** 8  
**Academic Standard:** 8.3  
**Academic Standard Indicator:** 8.3.3  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain that the solid crust of Earth, including both the continents and the ocean basins, consists of separate plates that ride on a denser, hot, gradually deformable layer of earth. Understand that the crust sections move very slowly, pressing against one another in some places, pulling apart in other places. Further understand that ocean-floor plates may slide under continental plates, sinking deep into Earth, and that the surface layers of these plates may fold, forming mountain ranges.

**Suggestion for Integrating International Content:** Have students identify different areas on the earth where convergent, divergent, and transform boundaries are formed. Ask students to describe what the topography of the land would be like in these places and how it might affect the areas, cities, or people nearby.  
**Extension:** Have students use this information to explain the 2011 Japan earthquake and tsunami.

**Grade:** 8  
**Academic Standard:** 8.3  
**Academic Standard Indicator:** 8.3.4  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain that earthquakes often occur along the boundaries between colliding plates, and molten rock from below creates pressure that is released by volcanic eruptions, helping to build up mountains. Understand that under the ocean basins, molten rock may well up between separating plates to create new ocean floor. Further understand that volcanic activity along the ocean floor may form undersea mountains, which can thrust above the ocean's surface to become islands.

**Suggestion for Integrating International Content:** Have student groups examine a map of the world that shows where many of the major earthquakes have occurred. Then have them mark these locations on a blank world map (8.5"x11") and "connect the dots" to visualize the major plate boundaries on earth. **Suggested**

**resource:** Maps at <http://edserver.ucsd.edu/visualizingearth/>.

**Grade:** 8  
**Academic Standard:** 8.3  
**Academic Standard Indicator:** 8.3.6  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Understand and explain that the benefits of the Earth's resources, such as fresh water, air, soil, and trees, are finite and can be reduced by using them wastefully or by deliberately or accidentally destroying them.

**Suggestion for Integrating International Content:** Have students research and discuss examples from around the world of the destruction of the Earth's resources. **Examples:** Destruction of rainforest and deforestation in Brazil; reduction of mangrove swamps and wetlands in coastal regions around the world; severe air pollution in Asia. **Suggested resource:** <http://earthtrends.wri.org/>.

**Grade:** 8  
**Academic Standard:** 8.3  
**Academic Standard Indicator:** 8.3.8  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain that all matter is made up of atoms which are far too small to see directly through an optical microscope. Understand that the atoms of any element are similar but are different from atoms of other elements. Further understand that atoms may stick together in well-defined molecules or may be packed together in large arrays. Also understand that different arrangements of atoms into groups comprise all substances.

**Suggestion for Integrating International Content:** Have students investigate some of the international history behind atomic theory. **Examples:** Work of Ernest Rutherford (New Zealand-English physicist); James Chadwick (English physicist).

**Grade:** 8  
**Academic Standard:** 8.3

**Academic Standard Indicator:** 8.3.18

**Core Standard:** No

**Standard Description (Academic or Indicator):** Investigate and explain that electric currents and magnets can exert force on each other.

**Suggestion for Integrating International**

**Content:** Have students research the development of Magnetically Levitated Trains (MagLevs) trains, discussing how they work and what the advantages and disadvantages are of these trains in different places around the globe.

**Suggested resources:** [www.howstuffworks.com](http://www.howstuffworks.com); Shanghi Maglev Train site at [www.smtdc.com/en/](http://www.smtdc.com/en/).

**Grade:** 8

**Academic Standard:** 8.3

**Academic Standard Indicator:** 8.3.20

**Core Standard:** No

**Standard Description (Academic or Indicator):** Compare the differences in power consumption in different electrical devices.

**Suggestion for Integrating International**

**Content:** In addition to comparing the differences in devices, also have students compare electric power consumption among different countries. **Suggested resource:** [http://www.nationmaster.com/graph/ene\\_ele\\_pow\\_con\\_kwh-energy-electric-power-consumption-kwh](http://www.nationmaster.com/graph/ene_ele_pow_con_kwh-energy-electric-power-consumption-kwh).

**Grade:** 8

**Academic Standard:** 8.4

**Academic Standard Indicator:** 8.4.3

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Recognize and describe that new varieties of cultivated plants, such as corn and apples, and domestic animals, such as dogs and horses, have resulted from selective breeding for particular traits.

**Suggestion for Integrating International**

**Content:** Have students compare and contrast the captive breeding of endangered species from around the world, such as the white rhinoceros

and giant panda, to selective breeding of dogs and horses. Consider the implications and outcomes of breeding in captivity in zoos far away from their native countries and habitats.

**Grade:** 8

**Academic Standard:** 8.4

**Academic Standard Indicator:** 8.4.5

**Core Standard:** No

**Standard Description (Academic or Indicator):** Explain that energy can be transferred from one form to another in living things.

**Suggestion for Integrating International**

**Content:** Have student groups each choose a different habitat or biome from around the world. Then have them develop the relevant food chains or webs using native organisms and report to the class. **Examples:** African grasslands; Latin American rainforests. **Extension:** Lead the class in a comparison of the resulting food webs, identifying similarities and differences.

**Grade:** 8

**Academic Standard:** 8.4

**Academic Standard Indicator:** 8.4.7

**Core Standard:** No

**Standard Description (Academic or Indicator):** Recognize and explain that small genetic differences between parents and offspring can accumulate in successive generations so that descendants are very different from their ancestors.

**Suggestion for Integrating International**

**Content:** Have students read about and discuss research on guppies in the Caribbean island of Trinidad, which demonstrates evolution by the process of natural selection in a natural environment. **Suggested resources:** <http://cnas.ucr.edu/guppy/>; <http://www.pbs.org/wgbh/evolution/library/>.

**Grade:** 8

**Academic Standard:** 8.4

**Academic Standard Indicator:** 8.4.8

**Core Standard:** No

**Standard Description (Academic or Indicator):** Describe how environmental conditions affect the survival of individual organisms and how entire species may prosper in spite of the poor survivability or bad fortune of individuals.

**Suggestion for Integrating International Content:** Have students discuss the presence of genetic mutations and allele frequencies in different regions of the world. **Example:** Common African mutation that is helpful in preventing malaria, but causes sickle cell anemia. Have students consider how the allele frequency of this gene might differ among individuals in populations in West Africa versus the U.S. **Suggested resource:** <http://www.pbs.org/wgbh/evolution/library/>.

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**Grade:** 8  
**Academic Standard:** 8.4  
**Academic Standard Indicator:** 8.4.9  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Recognize and describe that fossil evidence is consistent with the idea that human beings evolved from earlier species.

**Suggestion for Integrating International Content:** Have students research and describe important fossil finds around the world. **Examples:** Lucy (*Australopithecus afarensis*); the Laetoli footprints; the Hadar skull. **Suggested resource:** <http://www.pbs.org/wgbh/evolution/library/>.

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**Grade:** 8  
**Academic Standard:** 8.5  
**Academic Standard Indicator:** 8.5.5  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Illustrate that it takes two numbers to locate a point on a map or any other two-dimensional surface.

**Suggestion for Integrating International Content:** Using world maps, have students identify cities by using coordinates or using a map of a particular city. Also have them use coordinates to locate significant points of interest

in a scavenger hunt. **Examples:** Museums; universities.

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**Grade:** 8  
**Academic Standard:** 8.5  
**Academic Standard Indicator:** 8.5.9  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Compare the mean, median, and mode of a data set.

**Suggestion for Integrating International Content:** Have students use data from the World Health Organization to calculate and compare the mean, median, and mode of a data set. **Example:** Life expectancy of males and females in the U.S. and a variety of other countries. **Suggested resource:** [www.who.int/whosis/en/index.html](http://www.who.int/whosis/en/index.html).

**Differentiated Instruction- Special Needs Accommodations:** Suggest a variety of presentation modes for students to select from to demonstrate their knowledge - diorama, PowerPoint, chart, etc. Allow students to research a particular point of interest and present on it.

**Differentiated Instruction- Highly Able Accommodations:** Discuss and demonstrate how statistics can be manipulated to influence the audience. Have students compare how the mean, median, and mode averages can be used to convey different points of view.

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**Grade:** 8  
**Academic Standard:** 8.5  
**Academic Standard Indicator:** 8.5.10  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Explain how the comparison of data from two groups involves comparing both their middles and the spreads.

**Suggestion for Integrating International Content:** Have students use data to compare phenomena from around the globe. **Examples:** Volcanic eruption data from two similar volcanoes in two different areas of the world, or the number of people in two different regions or

countries of the world who have contracted malaria.

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**Grade:** 8

**Academic Standard:** 8.6

**Academic Standard Indicator:** 8.6.2

**Core Standard:** No

**Standard Description (Academic or Indicator):** Understand and describe that the accidental discovery that minerals containing uranium darken photographic film, as light does, led to the discovery of radioactivity.

**Suggestion for Integrating International**

**Content:** Have students discuss French physicist Antoine Henri Becquerel's life and work, including the details of his famous experiment that led to the discovery of radioactivity.

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**Grade:** 8

**Academic Standard:** 8.6

**Academic Standard Indicator:** 8.6.3

**Core Standard:** No

**Standard Description (Academic or Indicator):** Understand that and describe how in their laboratory in France, Marie Curie and her husband, Pierre Curie, isolated two new elements that were the source of most of the radioactivity of uranium ore. Note that they named one radium because it gave off powerful invisible rays, and the other polonium in honor of Madame Curie's country of birth, Poland. Also note that Marie Curie was the first scientist ever to win the Nobel Prize in two different fields, in physics, shared with her husband, and later in chemistry.

**Suggestion for Integrating International**

**Content:** Have students create a class scrapbook focusing on the Curies' lives. **Extension:** Have small student groups take the scrapbook and share it with younger students.

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**Grade:** 8

**Academic Standard:** 8.7

**Academic Standard Indicator:** 8.7.6

**Core Standard:** No

**Standard Description (Academic or Indicator):** Recognize that and describe how

symmetry may determine properties of many objects, such as molecules, crystals, organisms, and designed structures.

**Suggestion for Integrating International**

**Content:** Have students consider additional examples of the concept of symmetry in artwork from around the world. **Examples:** Leonardo daVinci's "The Last Supper"; Islamic, Greek, or Mayan mosaics.

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**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** --

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Students work with the concepts, principles, and theories that enable them to understand the living environment. They recognize that living organisms are made of cells or cell products that consist of the same components as all other matter, involve the same kinds of transformation of energy, and move using the same kinds of basic forces. Students investigate, through laboratories and fieldwork, how living things function and how they interact with one another and their environment.

**Suggestion for Integrating International**

**Content:** Have student pairs create local-global scientific activities with a partner. Team up with schools in other countries to learn about sustainable development together or use scientists from other countries as resources.

**Suggested resources:** <http://www.learns.org/>; <http://globe.gov/>.

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**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.25

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Explain that gene mutations in a cell can result in uncontrolled cell division, called cancer. Also know that exposure of cells to certain chemicals and radiation increases mutations and thus increases the chance of cancer.

**Suggestion for Integrating International**

**Content:** Explain that a hole in the ozone allows

more UV light to reach Australia than many other countries and that the increased radiation has increased mutations and led to a higher incidence of skin cancer. Then have students consider the campaigns to get individuals in Australia to decrease their exposure to UV light by using hats, sunscreen, and sun avoidance, and research how skin cancer rates have been impacted.

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**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.27

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain that the similarity of human DNA sequences and the resulting similarity in cell chemistry and anatomy identify human beings as a unique species, different from all others. Likewise, understand that every other species has its own characteristic DNA sequence.

**Suggestion for Integrating International Content:** After explaining the connection between DNA and physical appearance, have students compare photographs of individuals from different parts of the world and contrast their own physical features with those of the individuals in the photographs. Next have students attempt to repeat the process with photographs of other animals, plants, fungi, protists, and bacteria. Guide students to an understanding that even with our multitude of differences, human beings are a unique species with our own characteristic DNA.

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**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.29

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Understand that and explain how the actions of genes, patterns of inheritance, and the reproduction of cells and organisms account for the continuity of life, and give examples of how inherited characteristics can be observed at molecular and whole-organism levels - in structure, chemistry, or behavior.

**Suggestion for Integrating International Content:** Have students examine family

photographs in books or online and identify physical characteristics that were passed from parents to children and grandchildren. Emphasize that although certain characteristics may be unique to that family or that part of the world, all families have common traits unique to the human species. **Suggested resources:** *Hungry Planet* by Peter Menzel and Faith D'Aluisio (Material World, 2007); <http://www.time.com/time/photogallery/0,29307,1626519,00.html>.

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**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.29

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Understand that and explain how the actions of genes, patterns of inheritance, and the reproduction of cells and organisms account for the continuity of life, and give examples of how inherited characteristics can be observed at molecular and whole-organism levels - in structure, chemistry, or behavior.

**Suggestion for Integrating International Content:** Display and discuss a family tree for Queen Victoria and Prince Albert that shows the incidence of hemophilia in the British royal line.

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**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.31

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Describe how natural selection provides the following mechanism for evolution: Some variation in heritable characteristics exists within every species, and some of these characteristics give individuals an advantage over others in surviving and reproducing. Understand that the advantaged offspring, in turn, are more likely than others to survive and reproduce. Also understand that the proportion of individuals in the population that have advantageous characteristics will increase.

**Suggestion for Integrating International Content:** Relate bird beak characteristics to available food sources in different species

around the world. **Example:** The differentiation of finch bird beaks in the Galapagos Islands.

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**Grade:** Biology I  
**Academic Standard:** B.1  
**Academic Standard Indicator:** B.1.31  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Describe how natural selection provides the following mechanism for evolution: Some variation in heritable characteristics exists within every species, and some of these characteristics give individuals an advantage over others in surviving and reproducing. Understand that the advantaged offspring, in turn, are more likely than others to survive and reproduce. Also understand that the proportion of individuals in the population that have advantageous characteristics will increase.

**Suggestion for Integrating International Content:** Study how changes in a society influence the ability of different organisms to survive. **Example:** Natural selection of peppered moths in England before, during, and after the Industrial Revolution.

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**Grade:** Biology I  
**Academic Standard:** B.1  
**Academic Standard Indicator:** B.1.32  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain how natural selection leads to organisms that are well suited for survival in particular environments, and discuss how natural selection provides scientific explanation for the history of life on Earth as depicted in the fossil record and in the similarities evident within the diversity of existing organisms.

**Suggestion for Integrating International Content:** Using a map of Africa, have students pinpoint and date significant hominid fossil discovery sites and have students compare and contrast the skeletal structures of those fossils.

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**Grade:** Biology I  
**Academic Standard:** B.1  
**Academic Standard Indicator:** B.1.32  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain how natural selection leads to organisms that are well suited for survival in particular environments, and discuss how natural selection provides scientific explanation for the history of life on Earth as depicted in the fossil record and in the similarities evident within the diversity of existing organisms.

**Suggestion for Integrating International Content:** The teacher provides an overview of fossil discoveries in Olduvai Gorge, Tanzania. Note that survival seemed to favor hominids that were able to craft and use increasingly complex tools as indicated by the fossil record.

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**Grade:** Biology I  
**Academic Standard:** B.1  
**Academic Standard Indicator:** B.1.36  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Trace the relationship between environmental changes and changes in the gene pool, such as genetic drift and isolation of sub-populations.

**Suggestion for Integrating International Content:** Have students explore how environmental conditions at a geographic location can affect the frequency of certain alleles in a population, as demonstrated by connections between sickle cell anemia and the resistance to malaria. **Extension:** Have students explore the effects of climate changes on the incidence of sickle cell anemia and malaria.  
**Suggested resource:**  
[http://www.pbs.org/wgbh/evolution/library/01/2/1\\_012\\_02.html](http://www.pbs.org/wgbh/evolution/library/01/2/1_012_02.html).

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**Grade:** Biology I  
**Academic Standard:** B.1  
**Academic Standard Indicator:** B.1.37  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain that the amount of life any environment can support is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle the residue of dead organic materials. Recognize, therefore, that human activities and technology

can change the flow and reduce the fertility of the land.

**Suggestion for Integrating International**

**Content:** Have students use an online calculator to compare the environmental impact of individuals in different countries and their lifestyles. **Suggested resource:** Earth Day Network Footprint Calculator at <http://files.earthday.net/footprint/index.html>.

**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.38

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Understand and explain the significance of the introduction of species, such as zebra mussels, into American waterways, and describe the consequent harm to native species and the environment in general.

**Suggestion for Integrating International**

**Content:** On a map, identify the origin of the zebra mussel from lakes in southeastern Russian and then identify other countries that now are home to the zebra mussel and view it as an invasive species. **Examples:** England; Italy; Spain; Sweden; U.S. Have students research and report on the effect of the mussels on native species and the environment in each of those locations.

**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.39

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Describe how ecosystems can be reasonably stable over hundreds or thousands of years. Understand that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages that eventually result in a system similar to the original one.

**Suggestion for Integrating International**

**Content:** Have students research the impact of different natural disasters that have occurred in the world in the distant past and report on their effects on local ecosystems. Students should further identify how those ecosystems continued

to change after the disaster. **Suggested resource:** [http://en.wikipedia.org/wiki/List\\_of\\_natural\\_disasters](http://en.wikipedia.org/wiki/List_of_natural_disasters).

**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.41

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Recognize that and describe how human beings are part of the Earth's ecosystems. Note that human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.

**Suggestion for Integrating International**

**Content:** Have students consider specific examples of human-induced ecosystem changes around the world. **Examples:** Effect of dumping untreated sewage into water on the growth of algae in coastal waters in China; effect of deforestation on the native people in the Amazon Basin; effect of global warming on the coral in the Great Barrier Reef and polar bears of the Arctic; introduction of the Nile Perch into Lake Victoria for food and sport fishing.

**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.41

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Recognize that and describe how human beings are part of the Earth's ecosystems. Note that human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.

**Suggestion for Integrating International**

**Content:** Have students research and diagram the sequence of events that led to an outbreak of bubonic plague when the World Health Organization used DDT in Borneo for mosquito control in the 1950s. The action was an attempt to decrease the incidences of malaria.

**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.42

**Core Standard:** Yes



**Standard Description (Academic or Indicator):** Realize and explain that at times, the environmental conditions are such that plants and marine organisms grow faster than decomposers can recycle them back to the environment. Understand that layers of energy-rich organic material thus laid down have been gradually turned into great coal beds and oil pools by the pressure of the overlying earth. Further understand that by burning these fossil fuels, people are passing most of the stored energy back into the environment as heat and releasing large amounts of carbon dioxide.

**Suggestion for Integrating International**

**Content:** Have students use a graph of top carbon dioxide emitting countries to make a connection between developed and developing countries and their carbon dioxide emissions.

**Suggested resource:**

[http://www.ucsusa.org/global\\_warming/science\\_and\\_impacts/science/graph-showing-each-countrys.html](http://www.ucsusa.org/global_warming/science_and_impacts/science/graph-showing-each-countrys.html).

**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.43

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Understand that and describe how organisms are influenced by a particular combination of living and non-living components of the environment.

**Suggestion for Integrating International**

**Content:** Have students research and diagram the sequence of events that led to an outbreak of bubonic plague when the World Health Organization used the pesticide DDT in Borneo for mosquito control in the 1950s. The action was an attempt to decrease the incidences of malaria.

**Grade:** Biology I

**Academic Standard:** B.1

**Academic Standard Indicator:** B.1.45

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Recognize that and describe how the physical or chemical environment may influence

the rate, extent, and nature of the way organisms develop within ecosystems.

**Suggestion for Integrating International**

**Content:** Have students research the known effects of uranium on development of human babies. Then have students relate their findings to specific data on birth defects that can be obtained from instances of use of weapons in Hiroshima, Japan during World War II and in Fallujah, Iraq in 2004. Help students determine what further research, if any, might be necessary to establish a definite cause and effect.

**Grade:** Biology I

**Academic Standard:** B.2

**Academic Standard Indicator:** B.2.4

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Explain that after the publication of Origin of Species, biological evolution was supported by the rediscovery of the genetics experiments of an Austrian monk, Gregor Mendel, by the identification of genes and how they are sorted in reproduction, and by the discovery that the genetic code found in DNA is the same for almost all organisms.

**Suggestion for Integrating International**

**Content:** Emphasize the global nature of science by stressing that the travels of an Englishman (Darwin) around the world led to hypotheses supported by the earlier work of an Austrian monk working in a monastery in the Czech Republic.

**Grade:** Chemistry I

**Academic Standard:** C.1

**Academic Standard Indicator:** C.1.2

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Determine the properties and quantities of matter such as mass, volume, temperature, density, melting point, boiling point, conductivity, solubility, color, numbers of moles, and pH (calculate pH from the hydrogen ion concentration), and designate these properties as either extensive or intensive.

**Suggestion for Integrating International**

**Content:** Make samples of water with differing

concentrations of salt that reflect varying levels of salinity in different bodies of water around the world. Then have students calculate the density and identify the locations on a map to see if there are relationships between similarly located bodies of water.

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**Grade:** Chemistry I  
**Academic Standard:** C.1  
**Academic Standard Indicator:** C.1.10  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Recognize and classify reactions of various types such as oxidation-reduction.

**Suggestion for Integrating International Content:** Have students study oxidation-reduction reactions by considering fireworks and their history and importance in Chinese culture. **Example:** On the fifth day of the Chinese New Year, extravagant fireworks displays are created to attract the God of Fortune.

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**Grade:** Chemistry I  
**Academic Standard:** C.1  
**Academic Standard Indicator:** C.1.10  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Recognize and classify reactions of various types such as oxidation-reduction.

**Suggestion for Integrating International Content:** Have students examine how iron present in clay pottery from Native Americans, ancient Greeks, and other international sources can exhibit different colors based on the oxidation number of the iron. **Example:** Iron oxide can be black or orange-red depending on the technique used to create the piece.

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**Grade:** Chemistry I  
**Academic Standard:** C.1  
**Academic Standard Indicator:** C.1.21  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Predict how changes in temperature, surface area, and the use of catalysts will qualitatively affect the rate of a reaction.

**Suggestion for Integrating International Content:** Have students study the importance of catalysts in the polymerization process used to manufacture plastic. Then have them consider the global environmental impact of plastics. **Examples:** Harmful nature of plastic bags; plastic waste shipped to developing countries; harm to animals and birds by six-pack plastic rings. Then have students balance the convenience of the product with its impact on the globe. **Extension:** Have students research alternatives to plastic.

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**Grade:** Chemistry I  
**Academic Standard:** C.1  
**Academic Standard Indicator:** C.1.22  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Use oxidation states to recognize electron transfer reactions and identify the substance(s) losing and gaining electrons in an electron transfer reaction.

**Suggestion for Integrating International Content:** Have students study oxidation-reduction reactions by considering fireworks and their history and importance in the Chinese culture. **Example:** On the fifth day of the Chinese New Year, extravagant fireworks displays are created to attract the God of Fortune.

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**Grade:** Chemistry I  
**Academic Standard:** C.1  
**Academic Standard Indicator:** C.1.22  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Use oxidation states to recognize electron transfer reactions and identify the substance(s) losing and gaining electrons in an electron transfer reaction.

**Suggestion for Integrating International Content:** Have students examine how iron present in clay pottery from Native Americans, ancient Greeks, and other international sources can exhibit different colors based on the oxidation number of the iron. **Example:** Iron oxide can be black or orange-red depending on the technique used to create the piece.

**Grade:** Chemistry I  
**Academic Standard:** C.1  
**Academic Standard Indicator:** C.1.30  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Perform calculations that demonstrate an understanding of the gas laws. Apply the gas laws to relations between pressure, temperature, and volume of any amount of an ideal gas or any mixture of ideal gases.

**Suggestion for Integrating International Content:** Have students study the Gas Laws by learning about the International Balloon Fiesta which is held annually in Albuquerque, NM. Balloonists from around the world come to the event to compete; a directory and pictures of the balloons are available online. Students can do a variety of calculations and experiments to determine the effect of flying the balloon at different temperatures, altitudes, and volumes. At the same time, they can study international balloons for design elements that are unique to their countries of origin. **Suggested resource:** <http://www.balloonfiesta.com>. (See also Standard C.1.31)

**Grade:** Chemistry I  
**Academic Standard:** C.1  
**Academic Standard Indicator:** C.1.31  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Use kinetic molecular theory to explain changes in gas volumes, pressure, and temperature (Solve problems using  $pV=nRT$ ).

**Suggestion for Integrating International Content:** Have students study the Gas Laws by learning about the International Balloon Fiesta which is held annually in Albuquerque, NM. Balloonists from around the world come to the event to compete; a directory and pictures of the balloons are available online. Students can do a variety of calculations and experiments to determine the effect of flying the balloon at different temperatures, altitudes, and volumes. At the same time, they can study international balloons for design elements that are unique to their countries of origin. **Suggested resource:** <http://www.balloonfiesta.com>. (See also Standard C.1.30)

**Grade:** Chemistry I  
**Academic Standard:** C.1  
**Academic Standard Indicator:** C.1.4  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Describe solutions in terms of their degree of saturation.

**Suggestion for Integrating International Content:** Have students read narratives or interview natives of different countries to determine how they prefer their coffee or tea, based on cultural preference. People in some countries prefer very “strong” (high saturation) of coffee or tea, while others prefer “weak” (unsaturated solution) coffee or tea. Students could host a tea party or coffee house with a sampling of the coffee or tea preferences from different countries.

**Grade:** Chemistry I  
**Academic Standard:** C.1  
**Academic Standard Indicator:** C.1.42  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Describe that the energy release per gram of material is much larger in nuclear fusion or fission reactions than in chemical reactions. The change in mass (calculated by  $E=mc^2$ ) is small but significant in nuclear reactions.

**Suggestion for Integrating International Content:** Have students research global policies and utilization of nuclear energy and compare of how nuclear energy is perceived around the world. Have them investigate the historical impact of nuclear incidents like Chernobyl and Three Mile Island and argue for or against the use of nuclear energy. (See also Standard C.1.43)

**Grade:** Chemistry I  
**Academic Standard:** C.1  
**Academic Standard Indicator:** C.1.43  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Calculate the amount of radioactive substance remaining after an integral number of half-lives have passed.

**Suggestion for Integrating International**

**Content:** Have students research global policies and utilization of nuclear energy and compare how nuclear energy is perceived around the world. Have them investigate the historical impact of nuclear incidents like Chernobyl and Three Mile Island and argue for or against the use of nuclear energy. (See also Standard C.1.42)

**Grade:** Chemistry I

**Academic Standard:** C.1

**Academic Standard Indicator:** C.1.45

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Recognize common functional groups and polymers when given chemical formulas and names.

**Suggestion for Integrating International**

**Content:** Have students study the importance of catalysts in the polymerization process used in the manufacturing of plastic. Then have them consider the global environmental impact of plastics. **Examples:** Harmful nature of plastic bags; plastic waste shipped to developing countries; harm to animals and birds from six-pack rings. Then have students balance the convenience of the product with its impact on the globe. **Extension:** Have students research alternative materials to plastic. (See also Standard C.1.21)

**Grade:** Chemistry I

**Academic Standard:** C.1

**Academic Standard Indicator:** C.1.5

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Describe solutions in appropriate concentration units (be able to calculate these units), such as molarity, percent by mass or volume, parts per million (ppm), or parts per billion (ppb).

**Suggestion for Integrating International**

**Content:** Have students prepare and compare different concentrations of coffee from around the world. Then have them calculate the amount of caffeine in the samples and express those amounts as concentrations using units such as molarity and molality.

**Grade:** Chemistry I

**Academic Standard:** C.2

**Academic Standard Indicator:** --

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Students gain understanding of how the scientific enterprise operates through examples of historical events. Through the study of these events, students understand that new ideas are limited by the context in which they are conceived, that these ideas are often rejected by the scientific establishment, that these ideas sometimes spring from unexpected findings, and that these ideas grow or transform slowly through the contributions of many different investigators.

**Suggestion for Integrating International**

**Content:** Join existing international science collaborations to do projects with other schools and use scientists and data from other countries as resources. **Suggested resources:** <http://www.iearn.org/>; <http://globe.gov/>.

**Grade:** Integrated Chemistry-Physics

**Academic Standard:** CP.1

**Academic Standard Indicator:** CP.1.2

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Realize and explain that the energy in a system is the sum of both potential energy and kinetic energy.

**Suggestion for Integrating International**

**Content:** Have students research the tallest buildings in ten different countries and calculate potential and kinetic energies of objects dropped off the tops of these buildings. Visual aids will allow students to share the buildings, countries, and results with classmates.

**Grade:** Integrated Chemistry-Physics

**Academic Standard:** CP.1

**Academic Standard Indicator:** CP.1.21

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Understand and explain that the change in motion of an object (acceleration) is proportional to the net force applied to the object and inversely proportional to the object's mass.

**Suggestion for Integrating International**

**Content:** Have students choose a sport from another country and use Newton's laws to describe the motion of the objects involved in their choice of sport. **Examples:** Cricket; curling; polo; rugby.

**Grade:** Integrated Chemistry-Physics

**Academic Standard:** CP.1

**Academic Standard Indicator:** CP.1.24

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Recognize and explain that waves are described by their velocity, wavelength, frequency or period, and amplitude.

**Suggestion for Integrating International**

**Content:** For an introduction to waves and terminology involved with waves, have students use data from different coasts. **Examples:** Mediterranean; Atlantic; Pacific. Then have students calculate wave properties. **Examples:** Frequency; amplitude; wave length.

**Grade:** Integrated Chemistry-Physics

**Academic Standard:** CP.1

**Academic Standard Indicator:** CP.1.31

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Realize and explain that moving electric charges produce magnetic forces, and moving magnets produce electric forces.

**Suggestion for Integrating International**

**Content:** Have students research the Magnetically Levitated Trains (MagLevs) that are in use around the world. **Examples:** Japan; Germany.

**Grade:** Integrated Chemistry-Physics

**Academic Standard:** CP.1

**Academic Standard Indicator:** CP.1.7

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Identify the substances gaining and losing electrons in simple oxidation-reduction reactions.

**Suggestion for Integrating International**

**Content:** Have students study oxidation/reduction reactions as related to fireworks and their importance in Chinese culture, both historically and culturally. **Example:** On the 5th day of the Chinese New Year, extravagant fireworks displays are created to attract the God of Fortune.

**Grade:** Integrated Chemistry-Physics

**Academic Standard:** CP.1

**Academic Standard Indicator:** CP.1.7

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Identify the substances gaining and losing electrons in simple oxidation-reduction reactions.

**Suggestion for Integrating International**

**Content:** Have students examine pottery examples of Early Greeks to demonstrate that iron, present in clay pottery, can exhibit different colors based on the oxidation number of the iron. Iron oxide can be black or orange-red depending on the technique used to create the piece.

**Grade:** Environmental Science, Advanced

**Academic Standard:** ENV.1

**Academic Standard Indicator:** ENV.1.1

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Know and describe how ecosystems can be reasonably stable over hundreds or thousands of years. Consider as an example the ecosystem of the Great Plains prior to the advent of the horse in Native American Plains societies, from then until the advent of agriculture, and well into the present.

**Suggestion for Integrating International**

**Content:** Have student teams identify, research, and report about other countries or ecosystems that have remained stable and free from outside influence. **Example:** The Himalayan country of Bhutan has remained isolated from outside influences for hundreds of years.

**Grade:** Environmental Science, Advanced

**Academic Standard:** ENV.1

**Academic Standard Indicator:** ENV.1.13

**Core Standard:** No

**Standard Description (Academic or Indicator):** Understand and describe how layers of energy-rich organic material have been gradually turned into great coal beds and oil pools by the pressure of the overlying earth. Recognize that by burning these fossil fuels, people are passing stored energy back into the environment as heat and releasing large amounts of carbon dioxide.

**Suggestion for Integrating International**

**Content:** Have students make a graph of top carbon dioxide emitting countries to illustrate connections among developed and developing countries and their carbon dioxide emissions.

**Suggested resource:**

[http://www.ucsusa.org/global\\_warming/science\\_and\\_impacts/science/graph-showing-each-countrys.html](http://www.ucsusa.org/global_warming/science_and_impacts/science/graph-showing-each-countrys.html).

**Grade:** Environmental Science, Advanced  
**Academic Standard:** ENV.1

**Academic Standard Indicator:** ENV.1.14

**Core Standard:** No

**Standard Description (Academic or Indicator):** Recognize and explain that the amount of life any environment can support is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle organic materials from the remains of dead organisms.

**Suggestion for Integrating International**

**Content:** Have students develop an awareness campaign for large scale logging and livestock interests and government policy makers to explain that the short-term benefits from the clearing of rainforest land are outweighed by longer term problems such as erosion and desertification.

**Grade:** Environmental Science, Advanced  
**Academic Standard:** ENV.1

**Academic Standard Indicator:** ENV.1.19

**Core Standard:** No

**Standard Description (Academic or Indicator):** Demonstrate and explain how the factors, such as birth rate, death rate, and

migration rate, determine growth rates of populations.

**Suggestion for Integrating International**

**Content:** Assign students different countries with declining population growth and different reasons for the decline. Have them report on the factors affecting the decrease. **Examples:** Zimbabwe; Japan; Bulgaria; Armenia.

**Grade:** Environmental Science, Advanced

**Academic Standard:** ENV.1

**Academic Standard Indicator:** ENV.1.2

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Understand and describe that if a disaster, such as flood or fire occurs, the damaged ecosystem is likely to recover in stages that eventually result in a system similar to the original one.

**Suggestion for Integrating International**

**Content:** Have students research the impact of different natural disasters that have occurred in the world and identify their immediate effects on local ecosystems. Then have them further identify how those ecosystems continued to change after the disaster. **Suggested resource:** [http://en.wikipedia.org/wiki/List\\_of\\_natural\\_disasters](http://en.wikipedia.org/wiki/List_of_natural_disasters).

**Grade:** Environmental Science, Advanced

**Academic Standard:** ENV.1

**Academic Standard Indicator:** ENV.1.20

**Core Standard:** No

**Standard Description (Academic or**

**Indicator):** Demonstrate how resources, such as food supply, influence populations.

**Suggestion for Integrating International**

**Content:** Have students explain how the phenomenon of the Great Migration in the Serengeti-Maasai Mara areas of Kenya and Tanzania, the largest migration of land mammals on the planet, resulted from the explosive growth of the wildebeest population in the 1960s.

**Grade:** Environmental Science, Advanced

**Academic Standard:** ENV.1

**Academic Standard Indicator:** ENV.1.22  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Demonstrate knowledge of the distribution of natural resources in the U. S. and the world, and explain how natural resources influence relationships among nations.

**Suggestion for Integrating International Content:** Have students participate in the World Water Day on March 22. **Suggested resource:** <http://www.worldwaterday.org/>.

**Grade:** Environmental Science, Advanced  
**Academic Standard:** ENV.1  
**Academic Standard Indicator:** ENV.1.25  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Recognize and describe alternative sources of energy provided by water, the atmosphere, and the sun.

**Suggestion for Integrating International Content:** Contrast the environmental health of Bhutan, a Himalayan country using and exporting hydroelectric power, to that of Croatia, a country using primarily fossil fuel combustion, and Brazil, which produces and uses ethanol to be independent of foreign oil.

**Grade:** Environmental Science, Advanced  
**Academic Standard:** ENV.1  
**Academic Standard Indicator:** ENV.1.3  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Understand and explain that ecosystems have cyclic fluctuations, such as seasonal changes or changes in population, as a result of migrations.

**Suggestion for Integrating International Content:** Show students a video about Monarch Butterfly migration and have them identify changes in the ecosystems that the Monarchs spend time in during their migration. **Suggested resource:** “The Incredible Journey of the Butterflies” at <http://video.pbs.org/video/1063682334/>.

**Grade:** Environmental Science, Advanced  
**Academic Standard:** ENV.1  
**Academic Standard Indicator:** ENV.1.33  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Identify natural Earth hazards, such as earthquakes and hurricanes, and identify the regions in which they occur as well as the short-term and long-term effects on the environment and on people.

**Suggestion for Integrating International Content:** Have students explore the different effects of the 2010 earthquakes in California, Chile, and Haiti and explain the reasons for those differences.

**Grade:** Environmental Science, Advanced  
**Academic Standard:** ENV.1  
**Academic Standard Indicator:** ENV.1.4  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Understand and explain that human beings are part of the Earth’s ecosystems, and give examples of how human activities can, deliberately or inadvertently, alter ecosystems.

**Suggestion for Integrating International Content:** Have students consider specific examples of human-induced ecosystem changes around the world. **Examples:** Effect of dumping untreated sewage into water on the growth of algae in coastal waters in China; effect of deforestation on the native people in the Amazon Basin; effect of global warming on the coral in the Great Barrier Reef and polar bears of the Arctic; introduction of the Nile Perch into Lake Victoria for food and sport fishing.

**Grade:** Environmental Science, Advanced  
**Academic Standard:** ENV.1  
**Academic Standard Indicator:** ENV.1.5  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Explain how the size and rate of growth of the human population in any location is affected by economic, political, religious, technological, and environmental factors, some of which are influenced by the size and rate of growth of the population.

**Suggestion for Integrating International**

**Content:** Show the 7-minute video “World Population” from the Population Connection at [http://www.youtube.com/watch?v=9\\_9SutNmfFk](http://www.youtube.com/watch?v=9_9SutNmfFk) and have students identify factors causing increases and decreases in population growth.

**Grade:** Earth and Space Science I

**Academic Standard:** ES.1

**Academic Standard Indicator:** ES.1.10

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Recognize and describe that the earth sciences address planet-wide interacting systems, including the oceans, the air, the solid Earth, and life on Earth, as well as interactions with the Solar System.

**Suggestion for Integrating International**

**Content:** Have students consider the disruptions affecting numerous countries that the earth sciences address. **Examples:** El Niño; global climate change; 2010 eruption of Iceland’s Eyjafjallajökull Volcano; 2010 Gulf of Mexico oil spill; 2004 Indian Ocean tsunami; 2010 earthquakes in Haiti and Chile. **Extension:** Have students research all of the countries that jointly operate the international space station.

**Grade:** Earth and Space Science I

**Academic Standard:** ES.1

**Academic Standard Indicator:** ES.1.11

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Examine the structure, composition, and function of the Earth’s atmosphere. Include the role of living organisms in the cycling of atmospheric gases.

**Suggestion for Integrating International**

**Content:** Have students make a graph of top carbon dioxide emitting countries to illustrate connections among developed and developing countries and their carbon dioxide emissions.

**Suggested resource:**

[http://www.ucsusa.org/global\\_warming/science\\_and\\_impacts/science/graph-showing-each-countrys.html](http://www.ucsusa.org/global_warming/science_and_impacts/science/graph-showing-each-countrys.html).

**Grade:** Earth and Space Science I

**Academic Standard:** ES.1

**Academic Standard Indicator:** ES.1.11

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Examine the structure, composition, and function of the Earth’s atmosphere. Include the role of living organisms in the cycling of atmospheric gases.

**Suggestion for Integrating International**

**Content:** Have students access the website <http://www.breathingearth.net/> to determine which countries are contributing the most to increased atmospheric carbon dioxide.

**Extension:** Have students research and report on different suggestions to reduce atmospheric carbon dioxide.

**Grade:** Earth and Space Science I

**Academic Standard:** ES.1

**Academic Standard Indicator:** ES.1.16

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Investigate the causes of severe weather and propose appropriate safety measures that can be taken in the event of severe weather.

**Suggestion for Integrating International**

**Content:** Have students research and report on the Indian Ocean tsunami of 2004. Their focus should be on the underlying cause of the tsunami and what preventative measures could have reduced the loss of life.

**Grade:** Earth and Space Science I

**Academic Standard:** ES.1

**Academic Standard Indicator:** ES.1.18

**Core Standard:** Yes

**Standard Description (Academic or**

**Indicator):** Demonstrate the possible effects of atmospheric changes brought on by things such as acid rain, smoke, volcanic dust, greenhouse effect, and ozone depletion.

**Suggestion for Integrating International**

**Content:** Discuss with students effects.

**Examples:** Disruption in air travel caused by the 2010 eruption of Iceland’s Eyjafjallajökull volcano; increased incidence of skin cancer in



Australia as a result of ozone depletion; forest destruction due to acid rain in the border among Germany, Poland, and the Czech Republic; polar bear endangerment due to glacial melting in the Arctic.

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**Grade:** Earth and Space Science I  
**Academic Standard:** ES.1  
**Academic Standard Indicator:** ES.1.23  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Explain motions, transformations, and locations of materials in Earth's lithosphere and interior. For example, describe the movement of the plates that make up Earth's crust and the resulting formation of earthquakes, volcanoes, trenches, and mountains.

**Suggestion for Integrating International Content:** Have students identify and locate on a globe the two most seismic regions in the world, the Pacific Ring of Fire and the Alpide Belt in Eurasia.

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**Grade:** Earth and Space Science I  
**Academic Standard:** ES.1  
**Academic Standard Indicator:** ES.1.25  
**Core Standard:** No

**Standard Description (Academic or Indicator):** Investigate and discuss the origin of various landforms, such as mountains and rivers, and how they affect and are affected by human activities.

**Suggestion for Integrating International Content:** Divide students into two groups and have them research and debate the impact of the Three Gorges dam built on the Yangtze River in China. Half of the students should provide arguments in support of the dam and the benefits it offers the Chinese people. The other group of students should provide arguments indicating the negative impacts of the dam.

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**Grade:** Earth and Space Science I  
**Academic Standard:** ES.1  
**Academic Standard Indicator:** ES.1.28  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Discuss geologic evidence, including fossils and radioactive dating, in relation to the Earth's past.

**Suggestion for Integrating International Content:** Give students an overview of fossil discoveries in Olduvai Gorge, Tanzania. Note that, as indicated by the fossil record, survival seemed to favor hominids that were able to craft and use increasingly complex tools.

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**Grade:** Earth and Space Science I  
**Academic Standard:** ES.2  
**Academic Standard Indicator:**  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Students gain understanding of how the scientific enterprise operates through examples of historical events. Through the study of these events, they understand that new ideas are limited by the context in which they are conceived, that the ideas are often rejected by the scientific establishment, that the ideas sometimes spring from unexpected findings, and that the ideas grow or transform slowly through the contributions of many different investigators.

**Suggestion for Integrating International Content:** On a map or globe, have students pinpoint the birthplace or workplace of individuals from all over the world whose work has contributed to modern knowledge of earth and space sciences. Note the name and date for each location. Emphasize that science involves the work of many individuals in many locations.  
**Examples:** Claudius Ptolemy (2nd century, observations made in Alexandria, Egypt); Nicholas Copernicus (16th century, born in Torun, Poland); Johannes Kepler (late 16th/early 17th century, born in Weil der Stadt, Germany); Tycho Brahe (16th century, born in Scania, then Denmark, now Sweden); Galileo (late 16th/early 17th century, born in Florence, Italy); James Hutton (18th century, Edinburgh, Scotland); Charles Yell (19th century, born in Forfarshire, Scotland); Alfred Wegener (late 19th/early 20th century, born in Berlin, Germany).

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**Grade:** Physics I  
**Academic Standard:** P.1

**Academic Standard Indicator:** P.1.2

**Core Standard:** No

**Standard Description (Academic or Indicator):** Measure or determine the physical quantities including mass, charge, pressure, volume, temperature, and density of an object or unknown sample.

**Suggestion for Integrating International Content:** Have students determine mass or other physical qualities of a variety of objects brought into the classroom from world travels.  
**Examples:** Flags; pottery; clothing; jewelry.

**Grade:** Physics I

**Academic Standard:** P.1

**Academic Standard Indicator:** P.1.11

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Recognize energy in its different manifestations such as kinetic ( $KE = \frac{1}{2}mv^2$ ) gravitational potential ( $PE = mgh$ ), thermal, chemical, nuclear, electromagnetic, or mechanical.

**Suggestion for Integrating International Content:** Have students research the tallest buildings in the world, find visuals for each of them, or even build models. Then have them calculate the amount of potential energy that an object has at the top of the tallest buildings and complete related calculations.

**Grade:** Physics I

**Academic Standard:** P.1

**Academic Standard Indicator:** P.1.11

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Recognize energy in its different manifestations such as kinetic ( $KE = \frac{1}{2}mv^2$ ) gravitational potential ( $PE = mgh$ ), thermal, chemical, nuclear, electromagnetic, or mechanical.

**Suggestion for Integrating International Content:** Have students research the tallest buildings in ten different countries and calculate potential and kinetic energies of objects dropped off the tops of the buildings. Have students use

visual aids to share their data about the buildings and countries with classmates.

**Grade:** Physics I

**Academic Standard:** P.1

**Academic Standard Indicator:** P.1.20

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Describe electric and magnetic forces in terms of the field concept and the relationship between moving charges and magnetic fields. Know that the magnitude of the force on a moving particle with charge  $q$  in a magnetic field is  $qvB\sin\alpha$ , where  $v$  and  $B$  are the magnitudes of vectors  $v$  and  $B$  and  $\alpha$  is the angle between  $v$  and  $B$ .

**Suggestion for Integrating International Content:** Have students research the Magnetically Levitated Trains (MagLevs) that are in use around the world. **Examples:** Japan; Germany.

**Grade:** Physics I

**Academic Standard:** P.1

**Academic Standard Indicator:** P.1.22

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Describe waves in terms of their fundamental characteristics of velocity, wavelength, frequency or period, and amplitude. Know that radio waves, light, and X-rays are different wavelength bands in the spectrum of electromagnetic waves, whose speed in a vacuum is approximately  $3 \times 10^8$  m/s (186,000 miles/second).

**Suggestion for Integrating International Content:** For an introduction to waves and terminology involved with waves, have students use data from different coasts. **Examples:** Mediterranean; Atlantic; Pacific. Then have students calculate wave properties. **Examples:** Frequency; amplitude; wave length.

**Grade:** Physics I

**Academic Standard:** P.1

**Academic Standard Indicator:** P.1.34

**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Understand and explain the properties of radioactive materials, including half-life, types of emissions, and the relative penetrative powers of each type.

**Suggestion for Integrating International Content:** Any study of nuclear energy should also include a comparison of how nuclear energy is perceived around the world. Have students research global policies and utilization of nuclear energy. Have them research the historical impact of nuclear incidents like Chernobyl and Three Mile Island. Have students take a stand for or against the use of nuclear energy in their home state.

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**Grade:** Physics I  
**Academic Standard:** P.1  
**Academic Standard Indicator:** P.1.35  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Describe sources and uses of radioactivity and nuclear energy.

**Suggestion for Integrating International Content:** Have students compare how nuclear energy is perceived by various countries around the world by researching global policies and utilization of nuclear energy. Have students research the historical impact of nuclear incidents like Chernobyl and Three Mile Island. Have students take a stand for or against the use of nuclear energy in their home state.

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**Grade:** Physics I  
**Academic Standard:** P.1  
**Academic Standard Indicator:** P.1.5  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Use appropriate vector and scalar quantities to solve kinematics and dynamics problems in one and two dimensions.

**Suggestion for Integrating International Content:** Have students gather data from the latest Olympics or other international sports competition. Then have them use vectors and scalar quantities to describe and portray movement from different competitions.

**Grade:** Physics I  
**Academic Standard:** P.1  
**Academic Standard Indicator:** P.1.6  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Describe and measure motion in terms of position, time, and the derived quantities of velocity and acceleration.

**Suggestion for Integrating International Content:** Have students gather data from the latest Olympics or other international sports competition. Then have them use vectors and scalar quantities to describe and portray movement from different competitions.

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**Grade:** Physics I  
**Academic Standard:** P.1  
**Academic Standard Indicator:** P.1.7  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Use Newton's Laws (e.g.,  $F=ma$ ) together with the kinematic equations to predict the motion of an object.

**Suggestion for Integrating International Content:** Have students choose a sport from another country and use Newton's laws to describe the motion of the objects involved in their choice of sport. **Examples:** Cricket; curling; polo; rugby.

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**Grade:** Physics I  
**Academic Standard:** P.1  
**Academic Standard Indicator:** P.1.9  
**Core Standard:** Yes

**Standard Description (Academic or Indicator):** Use the conservation of energy and conservation of momentum laws to predict, both conceptually and quantitatively, the results of the interactions between objects.

**Suggestion for Integrating International Content:** Have students study the conservation of momentum in bull fighting, a cultural tradition in Spain. **Example:** When a bull collides with the bull fighter, or when a bull is struck with a sword, momentum is conserved.

**Grade:** Physics I

**Academic Standard:** P.2

**Academic Standard Indicator:** P.2.3

**Core Standard:** No

**Standard Description (Academic or Indicator):** Explain that the Newtonian model made it possible to account for such diverse phenomena as tides, the orbits of the planets and moons, the motion of falling objects, and the earth's equatorial bulge.

**Suggestion for Integrating International Content:** Have students study the connectedness of locations based on tide data and consider how and why the U.S. tides are related to tides around the world.

**SCIENCE**

**Create Your Own Suggestions for Integrating International Content**

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**Grade/Subject:**

**Academic Standard:**

**Academic Standard Indicator:**

**Core Standard:**

**Standard Description (Academic or Indicator):**

**Suggestion for Integrating International Content:**

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**Grade/Subject:**

**Academic Standard:**

**Academic Standard Indicator:**

**Core Standard:**

**Standard Description (Academic or Indicator):**

**Suggestion for Integrating International Content:**

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**Grade/Subject:**

**Academic Standard:**

**Academic Standard Indicator:**

**Core Standard:**

**Standard Description (Academic or Indicator):**

**Suggestion for Integrating International Content:**