



# BILL NYE THE SCIENCE GUY

Science  
Health  
Math  
Environmental Studies



30 24-min. Programs  
Grades 3-9  
Teacher's Guide  
SOL Correlations Below

Bill Nye knows how to provide easy access to hard science. The series uses a fast-paced approach blending humorous hi-jinks and hands-on activities. Bill encourages kids to ask interesting questions and then shows them how to discover fascinating answers. He works his magic across a range of topics, so teachers can even enlist his help when it comes time to teach Health, Math, Nature, and Environmental issues.

**1. Earth's Crust** — By carefully studying the Earth's surface, scientists have discovered that the Earth is made up of gigantic layers. Bill Nye goes to the depths of the earth (literally) to explain how the earth's surface and its inner mantle differ.  
**Science:** 3.9, 4.7, 5.7, 6.3, 6.6, 6.8, ES.4

**2. Gravity** — In this program, student will learn what holds the ocean on the Earth and what makes the earth round. Bill Nye also answers other questions about the earth's gravity.  
**Science:** 3.9, 4.7, 5.7, 6.3, 6.6, 6.8, ES.4

**3. Digestion** — Bill Nye explains how the body's digestive system is like a fine-tuned machine that processes food into energy.  
**Science:** LS.3, BIO.5

**4. Magnetism** — The two key concepts in this program are that all magnets have certain things in common and all magnets have two poles—north and south. Bill Nye shows unexpected places where magnets can be found—even the Earth's hot, churning, iron core is like a giant magnet. He explains how to make a compass.  
**Science:** 2.2, 4.3, PS.11, PH.12

**5. Chemical Reaction** — Students will learn that everything is made of chemicals. Chemical reactions occur when chemicals combine to form new substances. Bill Nye shows that fire is a chemical reaction and tries to extinguish a "tornado of fire."

**Science:** 6.4, LS.6, PS.2, PS.4, CH.4

**6. Food Web** — The lives of living things are intertwined—that's why scientists call it a food web. Mice are eaten by bats, snakes, birds and foxes, to name a few. Insects are eaten by other insects, birds, snakes, cats, rats, raccoons and even humans. All living things on the Earth's surface need plants. The cool part about the food web is that living things are made of other living things. It's a cycle of either eating or being eaten. Bill Nye gets tangled in a complex food web in his quest to show students that all living things depend on each other to survive.

**Science:** 4.5, LS.6, LS.7, LS.9

**7. Light Optics** — Light is energy that normally travels in a straight line, unless it hits something or is pulled by gravity. When it hits something, light can be bent, bounced or absorbed. Students will see that often all three things happen at the same time.  
**Science:** 4.3, 5.3, PS.6, PS.9

**8. The Sun** — Bill Nye harnesses the power of the Sun to teach students that the Sun is the source of energy for all life on Earth. The Sun is made of gas. It has so much gravity that its atoms constantly crash into each other. When the atoms collide, they form new atoms and release energy. Scientists call this atom smashing "nuclear fusion," which gives off a lot of energy. A very small portion of this energy

beams straight through space to Earth, giving living things like people the power to live, grow and eat.

**Science:** 3.9, 3.11, 4.4, 4.7, 6.2, 6.8, ES.4

**9. Atmosphere** — In this program, Bill Nye explores the atmosphere, the thin layer of air that surrounds the Earth.

**Science:** 6.3, 6.4, 6.6, ES.12

**10. Respiration** — Breathing is how bodies get oxygen from the air. Air is a mixture of gases, and a human's lungs are only set up to absorb the oxygen. Cells in the body use oxygen to combine with chemicals from food to make energy. The process of combining chemicals with oxygen to make energy is called respiration. Bodies need respiration to grow, move, think and live.

**Science:** LS.3, BIO.3

**11. Planets and Moons** — Students can see some of the planets with just their eyes on a clear night, but to get a good look at other planets, astronomers have to use powerful telescopes. Planets bounce light from the Sun into our eyes here on Earth. All planets, including the Earth, go around the Sun in nearly circular orbits. Gravity keeps the planets moving around the Sun in their elliptical orbits. Each planet is different in size, color, atmosphere and more.  
**Science:** 3.8, 4.7, 6.8, ES.4, ES.12

## BILL NYE THE SCIENCE GUY (Continued)

**12. Plants** — Unlike animals, plants make their own food. Plants use sunlight to take carbon dioxide from the air and release oxygen. Although most plants cannot move around, they have developed many other ways of living on Earth. In this program, Bill explores the fascinating world of plants.

**Science:** 3.6, 3.7, 3.8, 3.10, 4.4, 4.5, 4.8, 5.5, 6.9, LS.2, LS.4

**13. Evolution** — All living things are made of the same stuff, but look different because they've gone through lots of small changes over millions and millions of years. This process is called evolution. By passing along changes, living things can give their offspring advantages in surviving and reproducing. Fossils show that living things have been changing for billions of years.

**Science:** LS.14, ES.10, ES.12, ES.14, BIO.1, BIO.8

**14. Friction** — In this program, students will learn that friction is the resistance to motion of things that are touching. It slows things down when they rub against each other. Friction changes the energy of motion to heat.

**Science:** 4.2

**15. Climates** — Deserts, plains, mountains and forests have different climates. Students will understand that climate is the average weather of a place. The most important parts of a climate are the amount of rain or snow the place gets and how warm it is. Climate determines what plants and animals live in different places. This program explores different types of Earth's climates.

**Science:** 6.5, LS.11, ES.11, ES.13

**16. Ocean Life** — Most living things in the ocean are too small to see with just your eye. These small organisms, called plankton, support many different ecosystems in the ocean. Bill explores the importance of plankton to the ocean ecosystems.

**Science:** 3.6, 5.6, 6.3, 6.4, ES.11

**17. Mammals** — In this program, Bill Nye looks at the characteristics mammals have in common. Every single mammal has hair of some sort on its body. All mammals feed their babies milk, which comes from the mothers' mammary glands. Mammals are warm-blooded which means they keep their body temperature the same no matter how hot or cold their environment is. Mammal parents take good care of their little ones to make sure they'll survive.

**Science:** 4.5, 5.5, 6.9, LS.2, LS.3, LS.4, LS.5

**18. Populations** — A population is a group of living things of the same kind in one area. Populations need a couple of basic things to survive—food and a place to live. When two or more populations of living things are crowded into a small area, there can be competition for food and space. Competition is a natural part of life, but problems can arise if populations get out of balance. Humans are the fastest growing population on Earth, constantly taking up more and more space. When humans move in, a lot of other populations are forced to move out to different areas. Sometimes there's no place for them to go. In this program, students will understand that the human population has a big effect on all the other populations on Earth.

**Science:** 3.6, LS.8, LS.9, LS.11, LS.12, BIO.8

**19. Earthquakes** — Bill Nye shakes it up in this program on earthquakes! The Earth's surface is broken up into plates. Earthquakes happen when energy stored in the plates is released suddenly. The program looks at the impact earthquakes have on the surface of the Earth and on living things.

**Science:** 5.7

**20. Pollution Solutions** — Students will learn that people are the only animals on Earth that make pollution. Garbage, burning fuel, chemicals, sewage, oil and pesticides are all human-made things that make the Earth's atmosphere, water and soil unclean. In this program, Bill demonstrates how important it is for all humans to prepare for the future by recycling, researching and developing innovative solutions to combat pollution.

**Science:** 3.6, 3.10, 4.8, 6.7, 6.9, LS.8, LS.9

**21. Probability** — There's a good chance this will be one of Bill's best episodes! In fact, he'll probably make the complicated concept of probability very simple to understand, showing how it allows people to predict events. Probability is a way to measure how likely it is that something will happen. Students will learn that when a scientist wants to calculate a probability, she or he gathers data and then uses the data to make her or his prediction. Scientists use probabilities to predict the future, to decide if and when things will happen.

**Science:** 3.1, 4.1, 5.1, 6.1, LS.1

**Math:** 3.23, 4.19, 5.17, 6.20, 7.14

**22. Flowers** — Bill Nye shows that flowers are more than just pretty faces: they make seeds, play a key role in pollination and help plants to reproduce. This program covers plant parts, including the pistil and stamen, as well as the different shapes, smells and

colors of flowers that evolved to help those particular plants survive and thrive.

**Science:** 3.6, 3.7, 3.8, 3.10, 4.4, 4.5, 4.8, 5.5, 6.9, LS.2, LS.4, LS.5, LS.6

**23. Deserts** — A desert is a large area of land that gets very little rain or snow. Desert plants and animals have special ways of finding, storing and using water. Most deserts are hot, but some are cold. Bill travels to Arizona's stunning Sonora desert and has a close encounter of the camel kind. He explores this unique ecosystem and demonstrates the special ways its native plants and animals flourish.

**Science:** 3.6, 4.5, LS.7

**24. Heart** — Bill will check out the heart's function in the body, by pulling nine "G's" with the United States Navy's Blue Angels. Key concepts include that the heart is a muscle that works all of the time, the heart pushes blood around the body, and that the heart is a pump with valves that control the flow.

**Science:** BIO.5

**25. Inventions** — Humans invent things to solve problems and make life easier. Inventions are the results of careful thought or accidental discovery. In this program, Bill examines the process of inventing and helps students realize that each of them can become inventors.

**Science:** 3.1, 4.1, 5.1, 6.1, PH.1, PH.2, PH.3

**26. Genes** — Bill explores the chromosomal world of DNA and visits with a veterinarian who helps to save endangered animals using gene technology. All living things have genes in their cells. Genes are long strings of chemicals that determine the shapes, sizes and behavior of things. Living things pass their genes on to their offspring.

**Science:** LS.13, LS.14, BIO.2, BIO.6, BIO.8

**27. Do It Yourself** — Do-it-yourself science involves a question, observations, a hypothesis and experimentation. Using the scientific method, Bill shows students some classic home experiments, and some brand new ones he likes to perform around Nye Labs.

**28. Lakes and Ponds** — Lakes and ponds are large bodies of water surrounded by land. Lakes and ponds have special ecosystems and are teeming with all sorts of plants and animals. Bill travels to the Great Salt Lake to explain why some lakes are salty and others are not.

**Science:** 3.6, 5.6, 6.3, ES.11

(Continued)

## **BILL NYE THE SCIENCE GUY** (Continued)

**29. Storms** — Where do wild, dangerous and necessary tornadoes, hurricanes and thunderstorms come from? Storms happen when huge air masses collide. Students will learn how along the border of these air masses, water vapor condenses into clouds, strong winds form and the clouds rub against each other with the ground often becoming electrically charged waiting to send lightning bolts across the sky. Bill explores the eye of a hurricane, the heart of a raging blizzard, and the middle of a thunderstorm. Other key concepts include that storms are driven by heat from the Sun and the spin of the Earth and storms also happen on other planets

**Science:** 2.6, 4.6, 6.3, ES.13

**30. Motion** — Everything needs a force, either a push or pull, to make it move or stop moving. All motion requires force. Bill rides roller coasters and merry-go-rounds to show that the only thing harder than getting something to move is getting it to stop. Students will also learn that the way things appear to move depends on the movement of the observer.

**Science:** 4.2, 4.7, 6.3, PS.10, PH.1, PH.5, PH.7

Additional Resource Information:

The website to support this series is found at [www.billnye.com](http://www.billnye.com)