



## Eye Wonder



## Government & Public Administration

*Careers in Government and Public Administration involve planning, managing and providing services at federal, state or local levels.*



## Eye Wonder

### About the Series

[Eye Wonder](#) excites students with interesting facts and just plain fun! The series explores science and integrates technology, while focusing on various careers. The videos are less than 10 minutes and are filmed through the eyes of the cameraman, D.V.

Careers in **Government and Public Administration** involve planning, managing and providing services at federal, state or local levels. View a listing of videos from Eye Wonder.

VIDEO LISTING: <http://media.knowitall.org/series/government-public-administration-0>

#### **Firefighter** (11:05)

The **Eye Wonder** team finds out about the daily life of a firefighter. D.V. speaks with real firefighters about the training and education needed to safely fight fires.

**NOTE : S.C. Standards and Classroom Activities are in a separate document for [Eye Wonder Firefighter \(PDF\)](#)**

#### **Fish Hatchery** (8:03)

The **Eye Wonder** team investigates the workings of a fish hatchery. D.V. visits a fish hatchery where they raise trout. He learns about the scientific process of breeding trout and how they are managed and cared for.

#### **Forensics** (8:45)



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The **Eye Wonder** team investigates the ins and outs of forensics. D.V. visits a lab where he learns about how evidence is analyzed and collected, as well as how fingerprints are lifted and identified.

### **Garbage** (9:13)

The Eye Wonder team finds out where garbage goes. D.V. takes a look inside of a garbage truck and goes on a ride-along with a city of Columbia garbage collector. He learns more about the parts of a garbage truck and how the weight of garbage is used to charge the city and its customers.

### **Library** (8:50)

The **Eye Wonder** team explores a library. D.V. visits the Richland Library and learns about the importance of cataloguing and organization, and how the Dewey Decimal System works.

### **Navy Training Ship** (8:26)

D.V. goes on board a Navy ship that is actually a floating school to see how students (cadets) are trained in many different subjects.

### **Oceanography** (7:34)

The **Eye Wonder** team discovers oceanography. D.V. visits an oceanographer who explains why the sea is "salty" and the scientific study of the ocean.

### **Sewage Treatment** (8:52)

The **Eye Wonder** team investigates how sewage is treated. D.V. visits a treatment plant and learns how the water is purified through several



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treatments and during one treatment, the water is cleaned with the help of microorganisms.

### **Submarine** (9:05)

The **Eye Wonder** team explores a submarine. D.V. meets a submarine captain who tells him all about the science and technology of submarines and how they can be used to collect samples and data for other scientists.

### **Volcano** (7:25)

The **Eye Wonder** team takes a look inside a volcano. D.V. visits Mount St. Helens, an active volcano in the continental United States, to learn how tectonic plates make a volcano, and what exactly happens when a volcano erupts.



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### S.C. Standards & Classroom Activities

*Standards need to be updated.*

## Garbage

### Grade 7

**Standard:** III.A.7.G.

Analyze the benefits of solid waste management (reduce, reuse, recycle).

**Type of Activities:** Post-video Discussion/Group Activity

**Introduction-** After watching the video, students will come up with different methods of reducing solid waste in their community so that they do not have to have as many large, costly, smelly landfills such as the one in the video. This can be done as a class discussion, as group activity, or as individual activity. It should also come after you have discussed this standard in class already.

**Background:** Many different types of solid waste decompose at different rates. Some, like organics (materials created from or derived from living things- e.g. food products, some fabrics), decompose very rapidly, others, like plastics, can take years, decades, or even centuries to decompose, and



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some, like metals, will never decompose and may also pollute the soil and water table where they are disposed of. Some waste can also be hazardous, such as medical and industrial waste products. Some of this garbage can be recycled.

Many types of plastic and paper can be recycled. Many metals can also be reused and recycled. Organic materials that decompose rapidly can be used as fertilizer. Some, however, cannot be reused and must be safely disposed of. In addition to recycling programs, other methods, such as reducing the use of certain products, can decrease the amount of garbage we produce. With the increasing demands of land use, coupled with the decreasing amount of natural resources, the need to change how we manage our garbage is becoming a greater priority.

**Activity:** What to do with all that garbage?

This activity would best be done after watching the video and after the teacher has already discussed the problems with waste management and the different types of solid waste and their problems (long lasting, polluting, toxic, etc...)

**Materials:** none

**Procedure:**

1. Students will work in small groups or individually after the video to come up with as many ways as possible to deal with solid waste management (other than a landfill)



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2. The teacher will need to let students know the complications with solid waste, such as the smelly, large land fill, rain water filtering through the garbage and mixing with the water table, the toxic affect of heavy metals, the long lasting nature of certain types of waste like plastics and metals, etc... The teacher should also present a few of the options, such as recycling, reuse, and reduce as alternatives to landfills.
3. After the students have developed their methods and alternatives, they should present them and be able to support their ideas, explaining their choices.

**Follow-up:** The *Eye Wonder* segment on Plastic Bottle Recycling would be an excellent follow-up to this segment.



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### Sewage Treatment

Grade 4, 5, 7

**Standard:**

Describe how organisms may benefit their environment (e.g., earthworms improve the quality of soil, birds disperse seeds). (4<sup>th</sup> - II, B, 2, a)

Distinguish among the roles organisms serve in a food web (producers, decomposers, consumers, prey and predators). (5<sup>th</sup> - II, B, 2, a)

Identify and investigate the abiotic factors in an ecosystem such as quantity of light, air, and water; range of temperature; salinity, water pressure; and soil composition. (5<sup>th</sup> - II, B, 4, a)

Identify and investigate the biotic factors in an ecosystem. (5<sup>th</sup> - II, B, 4, b)

Analyze the role of producers, consumers and decomposers in an ecosystem. (7<sup>th</sup> - II, D, 2, a)

Identify technologies designed to reduce sources of point and nonpoint water pollution. **(T, P)** (7<sup>th</sup> - III, A, 3, f)

Analyze the benefits of solid waste management (reduce, reuse, recycle). **(T, P)** (7<sup>th</sup> - III, A, 7, g)

**Type of Activities:** In-class discussion.



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**Introduction-** For this lesson, it would be best if the teacher has already discussed the roles of decomposers as well as biotic and abiotic factors on an environment (5<sup>th</sup> and 7<sup>th</sup> grades) For 4<sup>th</sup> grade, this discussion could be simplified to simply pointing out examples of how both living and non-living factors are used in treatment.

**Background:** Modern sewage treatment involves both biotic and abiotic factors that often result in water that is cleaner than before it was utilized by an upstream community. When the wastewater initially enters the plant, it is screened for large, solid material. This material is eventually sent to a landfill. The water then enters the primary treatment tank where its velocity is reduced dramatically. As a result, the solid waste that is suspended in the water either floats to the top or sinks to the bottom. This allows the skimmers to remove the solid material for eventual burning. This is an example of an abiotic factor at work to filter out the waste.

4The secondary treatment involves the use of microbes that feed off of any contaminants that might still remain in the water. These microbes are detritus feeders that are either bacteria that break down organic matter or larger microbes that feed on the bacteria already in the water. These microbes are removed and the clean water is disinfected with chemicals to kill any harmful bacteria or viruses that might still be in the water. The final purified water is then released back into the local watershed (river or stream). Though artificial, this process utilizes both abiotic and biotic factors to regulate the cleaning of wastewater in much the same way as an ecosystem in nature works. Still, though the water is clean, this process is not without waste byproducts. The solid matter screened off is sent to a



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landfill and the settled material is burned, both of which contribute to pollution of the land and air.

**Discussion:** Compare and Contrast

**Procedure:** Following the segment, the teacher will lead the class in a discussion comparing and contrasting the factors at work within a modern sewage treatment plant with the way biotic and abiotic factors work in nature. The teacher will need to have already discussed such an example with the class. The discussion should also be sure to point out the pollution still caused by the treatment process and could lead to a discussion of how those factors could be reduced (especially for the 7<sup>th</sup> grade standards- III, A, 3, f, and 7, g)

**Modifications:** For a 4<sup>th</sup> grade class, the discussion should be less specific and should focus on how both physical methods (density--settling vs. floating) and biological methods (microbes in the aeration tank) are used and relate this to a similar combination of biotic and abiotic relationships in nature.



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### Submarines

#### Grade 7-8

**Standard:** II.B.3.b. (7<sup>th</sup>), II.A.2.a. (8<sup>th</sup>)

Predict an organism's response to an environmental stimulus based on its level of organization. (7<sup>th</sup>)

Suggest evidence for how species have adapted to changes in their habitats. (8<sup>th</sup>)

**Type of Activities:** Follow-up activity

**Introduction-** In this activity, the students will work in groups to come up with fictional creatures that might live in the deep, dark, cold waters that the submarines go to.

**Background:** Animals adapt to their environments. This is necessary to overcome the natural hazards of living in certain settings. In the deep ocean regions, animals must develop a series of characteristics that enable them to survive in a light-less world with great pressure and extreme cold. Some do this by losing their ability to see (their eyes atrophy or completely vanish). Others develop the ability to glow in the dark as a way to attract a curious prey. Most deep water marine organisms cannot survive in shallower waters because their bodies are used to the constant high



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pressure. Removing them from this environment can kill them as the fluids and gases in their bodies try to expand when the pressure surrounding them decreases.

**Activity:** Design your own sea creature!

This is best done as a post video activity once students have learned what the deep-sea environment is like.

**Materials:** Paper, pencils, colored pencils (or crayons, etc..).

### Procedures:

1. In small groups, brainstorm ideas about what a creature that lives at the bottom of the ocean would need to be like in order to survive. Be able to explain how it moves, how it hunts, where it gets its food, how it finds others of his species in order to mate, what it looks like, and anything else the group thinks is important. Make a list of these things. Explain how each of these is necessary under the circumstances of where it lives (deep ocean)
2. Come up with a name for the sea creature (use the proper binomial nomenclature for naming genus and species). Write down the list on the paper under the name.
3. Come up with what the creature looks like and what color(s) it is. Draw and color the sea creature on the paper beside the list.



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### Volcanoes

#### Grade 8

**Standard:** III.B.3.b.

Compare and contrast with respect to the four types of regions where volcanoes occur (3.b.).

**Type of Activities:** Post video activity

**Introduction-** This is a variation on the traditional model volcano activity using baking soda and vinegar. It involves making models that illustrate the different types of volcanoes

**Background:** Not every volcano is the same. There is a distinct relationship between the type of volcano and its location on the globe related to plate boundaries. Shield volcanoes are broad mountains with very gentle slopes and very wide bases. Their eruptions are usually mild and not extremely dangerous unless you happen to be directly in the path of a lava flow. They seldom occur along plate boundaries and are often the result of hotspot activity in the middle of a plate. Hawaii is the classic example of a shield volcano. Cinder Cone volcanoes are the exact opposite of shield volcanoes. They have very steep slopes and are not exceptionally wise. Instead of being built up by successive lava flows, they are usually constructed of loose pyroclastic debris that piled up in steep slopes on the mountains side due to violent, explosive eruptions. Capulan Mountain and Mount Vesuvius are both examples of cinder cones.



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Composite volcanoes are produced by alternating calm and explosive eruptions, making it a combination of both cinder cone and shield type volcanoes. As a result, its sides are fairly steep and they often grow to great heights. Mt Rainier in the Pacific Northwest is 14410 feet above sea level. Another danger from composite volcanoes is that their great heights often results in the development of glaciers on their slopes. During eruptions, this ice melts and causes destructive mudslides. This was what happened when Mt Saint Helens erupted in 1980. These volcanoes are most often found along convergent plate boundaries.

### **Activity:** Making Volcanoes

This project can be as simple as building a model volcano out of clay or as complex as researching specific volcanoes and making models of them before causing them to erupt. The eruptions are best done outside to keep the mess under control.

**Materials:** small paper cup, modeling clay, baking soda, vinegar, yellow and red food coloring, pictures of real volcanoes, plastic tarp



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### Procedures:

1. Using pictures of real volcanoes (either provided or researched off the internet), students will build a model of a real volcano around the small plastic cup.
2. Fill the cup with baking soda.
3. Mix the yellow and red food coloring into the vinegar making it orange.
4. Spread out the plastic tarp. Pour the vinegar into the cup filled with baking soda.

**Modifications:** none recommended



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### Volcanoes

#### Grade 8

**Standard:** III.B.3.b.

Compare and contrast with respect to the four types of regions where volcanoes occur (3.b.).

**Type of Activities:** Post video research and discussion

**Introduction-** This is a post video research project and discussion comparing and contrasting the eruption of Mt. Saint Helens with the volcanoes of Hawaii.

**Background:** Not every volcano is the same. There is a distinct relationship between the type of volcano and its location on the globe related to plate boundaries. Shield volcanoes are broad mountains with very gentle slopes and very wide bases. Their eruptions are usually mild and not extremely dangerous unless you happen to be directly in the path of a lava flow. They seldom occur along plate boundaries and are often the result of hotspot activity in the middle of a plate. Hawaii is the classic example of a shield volcano. Composite volcanoes are produced by alternating calm and explosive eruptions, making it a combination of both cinder cone and shield type volcanoes. As a result, its sides are fairly steep and they often grow to great heights. Mt Rainier in the Pacific Northwest is 14410 feet above sea level. Another danger from composite volcanoes is that their great heights



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often results in the development of glaciers on their slopes. During eruptions, this ice melts and causes destructive mudslides. This was what happened when Mt Saint Helens erupted in 1980. These volcanoes are most often found along convergent plate boundaries.

**Activity:** Not all volcanoes are the same

This is best done as a research project and class discussion after the video.

**Materials:** Internet access

**Procedures:**

1. Students are to research additional information about the May 18<sup>th</sup> eruption of Mt Saint Helens with the ongoing eruptions of the big island of Hawaii.
2. Make special note on the type of eruptions, type of igneous rocks produced, and locations relative to plate boundaries.

**Modifications:** none recommended



## Eye Wonder

### Credits

An instructional television series produced by Instructional Television, South Carolina Department of Education and ETV in SC (*Equal Opportunity Employers*)

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