

## SUGGESTED REFERENCES

- **Tooth Structure**  
<http://www.enchantedlearning.com/subjects/anatomy/teeth/toothanatomy.shtml>
- **Science of the human face**  
[http://www.bbc.co.uk/science/humanbody/humanface/exp\\_intro.shtml](http://www.bbc.co.uk/science/humanbody/humanface/exp_intro.shtml)
- **Evolution of the Human Face**  
<http://www.beyondveg.com/billings-t/comp-anat/comp-anat-6b.shtml>
- **Evolution of Beauty**  
<http://tlc.discovery.com/convergence/humanface/timeline/timeline.html>
- **Paul Ekman's website**  
 Dr. Ekman specializes in coding facial expressions and the physiology of deception  
<http://www.paulekman.com/>
- **Symmetry and Attractiveness**  
 Site explores the relationship between facial symmetry and attractiveness  
<http://www.beautyworlds.com/form.htm>

## NATIONAL SCIENCE EDUCATION STANDARDS

### K - 4

**Life Science**  
 The characteristics of organisms

**Science and Technology**  
 Abilities of Technological Design

### 5 - 8

**Life Science**  
 Diversity and adaptations of organisms

**Science and Technology**  
 Abilities of Technological Design

*\*Source: National Science Education Standards, 1996, National Academy Press*

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# SCIENCE SCREEN REPORT FOR KIDS®

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# SCIENCE SCREEN REPORT FOR KIDS

VOLUME 14 ISSUE 7

## THE IMPORTANCE OF OUR FACE



Accreditation Board  
 for Engineering  
 and  
 Technology



Presidential Awards  
 for Excellence in  
 Mathematics  
 and  
 Science Teaching



Junior Engineering  
 Technical Society  
[www.jets.org](http://www.jets.org)

## SYNOPSIS

The face is our window to the world, allowing us to communicate with the world around us. The organs of the mouth function to take in food and start the digestive process. The mouth also allows us to speak and communicate our thoughts and ideas through language.

The face is composed of many muscles whose primary purpose is to communicate through expressions. These expressions can be used to convey emotions like happiness, sadness, surprise and anger. Scientists have learned that both attractiveness and facial expressions are universal. This edition of SCIENCE SCREEN REPORT explores the varied functions of the face.

## CURRICULUM UNITS

- ANATOMY
- PHYSIOLOGY
- PSYCHOLOGY
- ECOLOGY

## RUNNING TIME

25:59

## BACKGROUND

The head is the location of the mouth and receptors specialized for finding food. Chemo receptors and light receptors are used to both locate and taste food. Over time, organisms have developed more complex receptors, yet many organisms like the snail have only primitive receptors.

Human chemo receptors are located in our mouth and nose. These receptors work to identify food. Taste buds in the mouth and olfactory cells in the nose help us differentiate between a great variety of foods.

Humans have a long gestation period. We are born without teeth and will not have a complete set of adult teeth until we are about twenty years old. The video shows, through a series of X-ray images, how first the milk teeth and finally the permanent teeth develop and erupt.

An excellent description of the anatomy of the teeth is shown. Students will be particularly interested in a segment showing what happens when you bite down on something hard. X-ray movies of swallowing allow students to see how food is broken down, formed into a bolus and passed into the esophagus.

The function of the taste buds is described with excellent images of the tongue. Taste buds work only when molecules are put in solution by the saliva. This is a good real world example of solutions. Saliva also makes it easier to swallow foods and protect against bacterial infection in the mouth.

The effect of lactic acid, produced by bacteria, that eats away at tooth enamel is shown. It is an excellent inquiry opportunity for your students; see the critical thinking exercises for a suggestion. It also illustrates the importance of brushing and flossing.

We have many specialized muscles controlling the mouth. These muscles are used for chewing and swallowing as well as making facial expressions. The expressions that we use allow people to gauge our moods or attempt to read our behaviors. Charles Darwin predicted that our expressions would be universal and it turns out that they are universal.

Our expressions are used to convey emotions like happiness, sadness and anger. Expressions can also be used to deceive others. The video shows two subjects who are deliberately lying. The video illustrates behaviors and expressions that indicate deceptive behavior.

Scientists want to know why some people are more attractive than others. Attractiveness is apparently linked to facial symmetry. It seems that no matter what group of people you are studying, the same faces were rated as attractive. These faces had greater symmetry. The link between symmetry and attractiveness is universal. Possibly, people with greater symmetry project a healthier image that suggests better genes.

The last segment shows how both humans and computer software attempt to identify faces. An experiment using an MRI machine is shown. The experiment shows that the primary job of some parts of the brain is to identify faces. An experiment using EEG shows that people can recognize a face very quickly, but not names.

This is also true of the current face recognition technology. It can identify a small number of faces using regions of the face that are difficult to change or it can be used to identify suspects in a crowd of people, but neither system is "fail-safe". Scientists are working to improve the quality of this technology so that we can increase our security.

## ADVANCED ORGANIZERS

Prior to viewing this video, students should have some understanding of the following Benchmarks\* for Science Literacy, Oxford University Press which are excerpted and, in some cases, abbreviated below. Refer to the Benchmarks for more information.

### Benchmark 1: The Human Organism

#### Section A - Human Identity

##### Know by Grade 5

- Human beings have made tools and machines to sense and do things that they could not otherwise sense or do at all, or as quickly, or as well.
- Human beings use technology to match or excel many of the abilities of other species. Technology has helped people with disabilities survive and live more conventional lives.

##### Know by Grade 8

- Like other animals, human beings have body systems for obtaining and providing energy, defense, reproduction, and the coordination of body functions.
- Human beings have many similarities and differences. The similarities make it possible for human beings to reproduce and to donate blood and organs to one another throughout the world. Their differences enable them to create diverse social and cultural arrangements and to solve problems in a variety of ways.
- Specialized roles of individuals within other species are genetically programmed, whereas human beings are able to invent and modify a wider range of social behavior.
- Human beings use technology to match or excel many of the abilities of other species. Technology has helped people with disabilities survive and live more conventional lives.

#### Section B - Human Development

##### Know by Grade 5

- There is a usual sequence of stages in physical and mental development in human beings, although individuals differ in exactly when they reach each stage.

*\*Benchmarks can be found at [www.project2061.org/tools/benchol/bolintro.htm](http://www.project2061.org/tools/benchol/bolintro.htm)*

## CRITICAL THINKING EXERCISES

- Design an experiment to see how many facial expressions a typical male or female exhibit in different situations.
- Explain how it is possible for both humans and chimpanzees to have the same kinds of facial expressions.
- Students can see how acid affects teeth by using an egg as a model. Place the egg in a container and cover the egg with vinegar.
- Design an experiment to test the relationship between taste and smell. You can use blindfolds and clothespins to expose students to different conditions and see how well they can identify unknown foods.

## VOCABULARY

<b>Attractive</b> . . . . .	Pleasing to the eye or mind, especially through beauty or charm
<b>Deciduous (milk) teeth</b> . . . . .	The first teeth that erupt starting at about 6 months of age and are replaced by adult teeth starting between the ages of 5-8
<b>Dentin</b> . . . . .	The main, calcareous part of a tooth, beneath the enamel and surrounding the pulp chamber and root canals
<b>Enamel</b> . . . . .	Hard outer surface of the teeth
<b>Enzyme</b> . . . . .	Proteins produced by living organisms
<b>Magnetic Resonance</b> . . . . .	The use of an NMR spectrometer to produce electronic images of human cells, tissues, and organs
<b>Imaging (MRI)</b> . . . . .	Faulty contact between the upper and lower teeth when the jaw is closed
<b>Malocclusion</b> . . . . .	The lower jaw of vertebrate animals
<b>Mandible</b> . . . . .	Fibrous connective tissue surrounding the root of a tooth that separates it from and attaches it to the alveolar bone
<b>Periodontal ligament</b> . . . . .	Section of the digestive track extending from the nose cavities to the larynx and continuing to the esophagus
<b>Pharynx</b> . . . . .	the esophagus
<b>Plaque</b> . . . . .	A film of mucus and bacteria on a tooth surface
<b>Dental pulp</b> . . . . .	The soft tissue forming the inner structure of a tooth and containing nerves and blood vessels
<b>Saliva</b> . . . . .	A clear liquid secreted into the mouth by the salivary glands and mucous glands of the mouth; moistens the mouth and food, and starts the digestion of starches
<b>Solution</b> . . . . .	A homogeneous mixture of two or more substances, which may be solids, liquids, or gases
<b>Symmetry</b> . . . . .	Balance among the parts of something
<b>Taste buds</b> . . . . .	Oval sensory organs on the surface of the tongue

## CAREER POSSIBILITIES

- |                     |                |                |
|---------------------|----------------|----------------|
| ■ DENTAL TECHNICIAN | ■ PHYSICIAN    | ■ PSYCHOLOGIST |
| ■ DENTIST           | ■ PHYSIOLOGIST | ■ SOCIOLOGIST  |