Learn at Home

Grade 7 - Science

Department of Education
Carmen Fariña, Chancellor

OFFICE OF CURRICULUM, INSTRUCTION
& PROFESSIONAL LEARNING

Unit Overview

This packet of resources is designed for students and their parents who wish to support in-school learning with activities that can be done independently and/or with a partner at home. This packet includes ten activities that support major scientific content related to earth science, focused on science literacy appropriate for the grade. These activities should take 40-60 minutes and may be completed in any order.

How to use this guide

For each activity, you will find:

- List of vocabulary words and their meanings for a better understanding of the reading passages
- Reading passages on a topic of interest and related to the science content
- Multiple choice questions
- Short writing assignments
- A short description and link for an informal science institution that supports the understanding of the content of this assignment.

Students and their families are invited to further explore these topics by conducting the activities found at the end of each assignment and/or by visiting the recommended informal science institutions.

Day 1 Science

Activity: Earthquake Shakes Japan

Vocabulary

Explore the new science vocabulary words below. You will use these vocabulary words in today's activity.

- ☐ **Colleague** (noun): a coworker
- ☐ **Havoc** (noun): destruction
- ☐ **Magnitude** (noun): a measure of the amount of energy released by an earthquake, as indicated on the Richter scale
- ☐ **Richter scale** (noun): a scale from one to 10 used to measure how strong an earthquake is
- ☐ **Tectonic plates** (noun): pieces of the earth's crust that move against one another

Directions

- Read the article below and answer the questions that follow.

Earthquake Shakes Japan

WAJIMA, Japan (Achieve3000, March 27, 2007). A powerful earthquake shook coastal central Japan on Sunday, March 25. The disaster killed at least one person and caused major damage.

The earthquake, which measured 6.9 on the Richter scale, struck off the north coast of the Sea of Japan. Television footage taken during the quake showed buildings shaking violently for about 30 seconds. Footage captured afterwards showed collapsed buildings and shops with shattered windows. The footage also revealed streets littered with roof tiles and roads with cracked pavement.

"We felt violent shaking. My [coworkers] say the insides of their houses are a mess, with everything smashed on the floor," said Wataru Matsumoto, deputy mayor of the town of Anamizu, which was near the epicenter of the quake.

The quake brought destruction to the affected area. It knocked down at least 68 homes and left another 164 partially destroyed. The violent shaking triggered landslides, cut power, and interfered with phone service. It also broke underground water pipes and halted public transportation.

Even after the quake was over, its effects continued. Japan's Meteorological Agency issued a warning about possible tsunamis and stated that aftershocks could continue for a week. Thirty-six minutes after the quake, a small tsunami hit the shore, and officials removed the tsunami warning. Several aftershocks, two of them measuring 5.3 and 4.8 on the Richter scale, shook the area.

"A fairly big aftershock hit just minutes ago, and I jumped out the door," said Tomio Maeda, manager of a convenience store in Anamizu. "It's scary; I guess it's not over yet."

The quake killed at least one person and injured more than 200 others. The Fire and Disaster Management Agency reported that most of the injuries and damage were concentrated in the city of Wajima, which is about 193 miles northwest of Tokyo. That area is not considered prone to earthquakes; its last major earthquake took place in 1933.

Speaking to a parliamentary upper house committee on the day after the disaster, Japanese Prime Minister Shinzo Abe described the damage in detail. He then promised his support for the victims.

"The government will make every effort to help the victims of the earthquake so they can [go back to their] normal lives," the prime minister said.

One day after the earthquake, officials declared that Japan's new earthquake early alert system was a success. The system is designed to issue early warnings of possible tsunamis. It is more sensitive than the one it replaced and can detect slight underground shaking that happens before a major quake occurs. This allows officials to warn people to get to high ground before a possible tsunami hits the shoreline.

"Before the new system went into effect, it took about three minutes to get out a tsunami alert. On Sunday, we were able to get the alert out within a minute, so I'd say it was a success," said Meteorological Agency official Yosuke Igarashi.

Japanese officials are constantly working on improvements to Japan's earthquake warning system, and for good reason. Japan sits on four tectonic plates, making it one of the world's most earthquake-prone countries. In the last few years, Japan has experienced several major quakes. In October 2004, an earthquake measuring 6.8 on the Richter scale hit northern Japan, killing 40 people and damaging more than 6,000 homes. It was the deadliest quake to hit Japan since 1995. That year, a quake measuring 7.2 killed 6,433 people in Kobe, in western Japan. Experts say that Tokyo, the nation's capital, has a 90-percent chance of suffering a major quake in the next 50 years.

The Associated Press contributed to this story.

Question 1: What is today's article mainly about?

1. A recent tsunami in Japan and its effects.
2. Damage to stores from a tsunami in Japan.
3. A recent earthquake in Japan and its effects.
4. Damage to roads from an earthquake in Japan.

Question 2: Which information is not in the article?

1. How Tokyo residents prepare their homes for a major earthquake.
2. What Japanese officials think about the country's early warning system.
3. How likely it is that a major earthquake will hit Tokyo within 50 years.
4. What kind of damage occurred from a recent earthquake and its aftershocks.

Question 3: Why does the author point out that the last major earthquake in Wajima took place in 1933?

1. To show that people there are not afraid of earthquakes.
2. To show that the city does not have a warning system in place.
3. To show that people there do not know anything about earthquakes.
4. To show that the city does not experience many strong earthquakes.

Question 4: The reader can tell from the article that Japanese officials

1. expect earthquakes to occur and try to be prepared for them.
2. are not creating a warning system fast enough to keep people safe.
3. expect large tsunamis to occur because they happen nearly every day.
4. are not worried about the effects of large earthquakes or possible tsunamis.

Question 5: After which paragraph would the author place a quote from a resident of Wajima who was surprised by the strong earthquake?

1. After paragraph 3
2. After paragraph 5
3. After paragraph 7
4. After paragraph 11

Question 6: Which statement best summarizes the *last* paragraph?

1. Japan has had a few small earthquakes.
2. Officials in Japan have a lot of work to do in cleaning up the damage.
3. Japan is very prone to large earthquakes.
4. Officials in Japan are unhappy with the earthquake and tsunami warning system.

Question 7: Which is the closest antonym for the word *prone*?

1. Restless
2. Unlikely
3. Primitive
4. Spectacular

Question 8: Another name for a *tsunami* is a(n)

1. Ocean
2. Current
3. Whirlpool
4. Tidal wave

Day 2 Science

Activity: Earthquake Shakes Japan

Use the information from the article you read on Day 1 to create an article and complete at least one of the Family Engagement Activities.

Additional Question

Your state plans to send aid to assist people affected by the earthquake in Japan. What do people need? Make a list in order of importance. Explain why you placed the aid in this order.

Use details from the article, as well as your own ideas, in your response.

Achieve3000 (www.tebiz3000.com)

Activity #1:

Earthquake Tower Challenge

You have been hired as the structural engineer in charge of designing a new two-story art building. There are many building codes you must follow. Each floor of the building must support ***at least*** 250 grams of weight. Also, the building will be located near an earthquake fault; therefore your building must be able to withstand ***both*** small and large earthquakes. Since the building will be used for art classes, you may be as creative as you like with the shape and design of the building (it does not need to be box shaped).

You are limited to the following materials:

- 1 cardboard base (approximately 25 cm by 25 cm)
- 30 straws
- 100 paper clips (one box)
- 20 pins
- 2 meters of string

Your building must meet the following requirements:

- The building must fit on the base. Attach your building to the base using pins, paper clips, or string.
- Your building must be at least 36 cm tall.
- Your building has 2 stories that are each at least 18 cm tall (approximately the height of 1 straw).
- Each story must support the weight of at least 1 sand bag (250 grams) without collapsing.
- A construction drawing with measurements and analysis must be submitted before earthquake testing.
- To survive an earthquake test, the building must not collapse for 10 seconds after the earthquake begins. The weights must stay on the building. You have 1 minute to repair any damage to your building before the next earthquake test.

Hints and tips:

- **PLAN CAREFULLY!** Additional supplies will not be provided.
- Remember these words of wisdom: “Measure twice. Cut once.”
- Use the concepts of tension and compression. If an element is in tension and not compression, you can use string instead of straws.
- Try building without pins first, then add pins where connections need reinforcement.
- Make sure that your foundation is very strong.

Remember to design a way to secure the weights so that they don’t fall off AND **so you can add additional weights to the top story.**

Activity #2:

Students and families may enjoy exploring the Gottesman Hall of Planet Earth, in which earthquakes are investigated illustrated and explained. Further information to plan your visit found here. http://www.amnh.org/exhibitions/permanent-exhibitions/rose-center-for-earth-and-space/david-s.-and-ruth-l.-gottesman-hall-of-planet-earth/why-are-there-ocean-basins-continents-and-mountains/earthquakes

Day 3 Science

Activity: First Life

Vocabulary

Learn the new vocabulary words below. You will use these vocabulary words in today's activity.

- ☐ **Blast** (*verb*): to destroy, break apart, or remove (something) with an explosive
- ☐ **Insanely** (*adverb*): extreme
- ☐ **Gushes** (*verb*): to emit a sudden copious flow
- ☐ **Hot Springs** (*noun*): a place where hot water flows out of the ground.
- ☐ **Intrigued** *(verb)*: to make someone want to know more about something: to cause someone to be more interested
- ☐ **Spawn** *(verb)*: bring forth, generate
- ☐ **Complex Chemicals** *(noun)*: is a molecular entity formed by loose association involving two or more molecular entities (ionic or uncharged), or the corresponding chemical species.
- ☐ **Outward** *(adjective)*: moving, directed, or turned toward the outside or away from a center
- ☐ **Fluid** *(noun)*: having particles that easily move and change their relative position without a separation of the mass and that easily yield to pressure: capable of flowing

Directions

- Read the article below and answer the questions that follow.

© Amanda Lucidon/Lucid Pix 1 Robert Hazen looks into the pressure bomb that he uses to simulate the chemical environment that might have given rise to life on Earth.

First Life

By Kirsten Weir

How did Earth's earliest life-forms evolve out of ancient raw materials?

Robert Hazen builds bombs. He's not a weapons manufacturer or a criminal, though. He's a scientist at the Carnegie Institution for Science in Washington, D.C.

Hazen uses small metal cylinders called pressure bombs to blast minerals with insanely high pressures and temperatures. It's all done in the hopes of answering one of the biggest questions in science: How did life begin on Earth?

Hazen's background is studying *minerals*—solid, crystalline materials that form naturally through geological processes and make up rocks. He's using that knowledge to figure out how ancient minerals might have been involved in the evolution of the first primitive life-forms.

Earth's first life-forms, says Hazen, could have arisen almost anywhere on the planet—at least any place where there is *energy.* Energy is the capacity to do work, and all living things need it to function.

Solar energy bathes Earth's surface. Chemical energy from rocks and minerals pulses beneath Earth's crust. At the bottom of the oceans, heat energy flows from *hydrothermal vents.* Hydrothermal vents are cracks in the seafloor where superheated, mineral-rich water gushes upward. The undersea hot springs are homes to bizarre life-forms that exist nowhere else.

Ralph White/Corbis A hydrothermal vent 1

As an expert in minerals, Hazen is intrigued by the mineral-rich worlds around deep-sea vents. Did ancient hydrothermal vents spawn the first living things? To test that idea, he dropped the bomb.

First, he combined a few basic ingredients that were present during Earth's early days: carbon, water, and several other simple compounds. Next, he put the ingredients in a pressure bomb to recreate the conditions around hydrothermal vents. Then, he cranked up the heat to a scorching 249 degrees Celsius (480 degrees Fahrenheit) and squeezed the contents to a pressure 2,000 times greater than atmospheric pressure at sea level. "We let those high-temperature, high-pressure conditions work their magic," he says.

After a few hours, he cracked open his back-in-time capsule. Inside he found thousands of newly made compounds, including many *organic* ones. Organic compounds contain one or more carbon atoms. All life is based on them. The most interesting organic compounds that Hazen found were simple sugars, amino acids, and lipids. Those three materials are necessary for life as we know it. "Depending on the conditions and what minerals you use," Hazen notes, "you can make all the building blocks of life."

Getting Together

Hazen's research showed that the unique conditions around hydrothermal vents could have created the basic ingredients of living things. But how, in the vast ocean, did a handful of new molecules and compounds get together to form the more complex chemicals that led to life? That's the question Hazen is working on now.

Some molecules seek one another naturally, he says. Lipids are one example. A lipid molecule is long and skinny. One end is naturally attracted to water, and the other end is repelled by it. When lipids are underwater, they bunch together to form a little ball. Their water-loving heads face outward, giving them contact with the fluid. Their water-hating tails poke into the center of the ball, away from the wet stuff. Simply because of their chemical properties, Hazen says, "they self-assemble into spherical structures that look like little cells."

Other organic molecules like to cling to the surface of certain minerals. Life's earliest molecules might have been attracted to rocks and minerals on the ocean floor. Once they began meeting up on those surfaces in large numbers, they could have joined together to create bigger molecules and, eventually, the first living things on the planet.

Hazen's research doesn't apply just to life on Earth. Scientists have found amino acids and other molecular

building blocks of life inside space rocks. What happened here might be happening on moons and planets throughout the universe, he says.

Earth First

For now, Hazen is concentrating his efforts here on Earth, trying to work out how young, organic molecules might have found one another in the big, lonely ocean. In other labs across the country, scientists are looking at how those molecules might have joined together and started copying themselves.

The researchers are all inspired by a common goal. “One of the great human motivations, in science and the arts, is to understand who we are and where we came from,” Hazen says. “Studying the origin of life is part of that exploration—it’s part of what it is to be human.”

Life’s Building Blocks

Robert Hazen’s pressure-bomb experiments created a number of organic molecules, including simple sugars, amino acids, and lipids—the main building blocks of life. All three are found in every living organism on Earth.

- **Simple sugars** are relatively small molecules that contain carbon, hydrogen, and oxygen. *Carbohydrates* are made from simple sugars. Carbohydrates provide structure to cells and are an essential component of DNA. They also provide energy to living things.
- **Amino acids** are compounds that contain carbon, hydrogen, oxygen, and nitrogen. *Proteins* are made from amino acids. Proteins are complex substances that perform many crucial jobs in living organisms, such as transporting oxygen in the blood and controlling chemical reactions inside cells.
- **Lipids** are a group of fatty molecules that contain carbon, hydrogen, and oxygen. *Cell membranes* are made from lipids. Cell membranes are the barriers that surround living cells and *organelles,* the specialized structures inside cells.

Shutterstock

<u>Question 1</u>: Why is scientist Robert Hazen using pressure bombs to blow up minerals?

1. He is doing experiments to see how big of an explosion he can create.
2. He is doing experiments to see how life may have begun on earth.
3. He is a weapons manufacturer trying to build a better bomb.
4. He is doing experiments to see how combustible minerals are.

<u>Question 2</u>: Read these two sentences from the passage: "How, in the vast ocean, did a handful of new molecules and compounds get together to form the more complex chemicals that led to life? That's the question Hazen is working on now."

Which of the following describes the relationship between these two sentences?

1. The sentences make a comparison.
2. The sentences argue about a topic.
3. The second sentence adds information to the first sentence.
4. The second sentence shows the effect of the first sentence.

<u>Question 3</u>: Which of the following conclusions about Robert Hazen's experiments are supported by the passage?

1. His experiments have shown how life began on earth.
2. His experiments haven't found out anything important.
3. Scientists have decided that the best thing to do about Hazen's experiments is to ignore them.
4. Scientists are exploring ideas from his research in their own experiments.

<u>Question 4</u>: Read this sentence: "The undersea hot springs are homes to bizarre life-forms that exist nowhere else." In this sentence, what does <u>*bizarre*</u> mean?

1. New
2. Large
3. Strange
4. Attractive

<u>Question 5</u>: What is the main idea of this passage?

1. Life may exist on other planets and moons.
2. Blowing up minerals is a good way to learn about science.
3. Robert Hazen is an important American scientist who has lived an interesting life.
4. Robert Hazen's experiments may help show how life began on earth.

Day 4 Science

Activity: First Life

Use the information from the article you read about molecules and hydrothermal vents to answer these questions and complete at least one of the Family Engagement Activities

<u>Question 6</u>: According to the passage, how might simple molecules find each other and combine to make more complex molecules?

_____

_____

_____

<u>Question 7:</u> What might be some implications of Robert Hazen's experiments and research? Cite evidence from the text to support your answer.

_____

_____

_____

<u>Question 8</u>: The question below is an incomplete sentence. Choose the word that best completes the sentence.

Scientists find Robert Hazen's experiments to be valuable_____they point to signs of life that may have begun beneath the surface of the oceans.

1. yet
2. because
3. however
4. after

<u>Question 9:</u> Answer the following questions based on the sentence below.

For the immediate future, scientist Robert Hazen is concentrating his efforts to work out how life might have begun.

Who? <u>scientist Robert Hazen</u>

(is doing) What?

When?

Why?

<u>Question 10:</u> Vocabulary Word: vents – openings in a surface, often where gas or liquid comes out.

Use the vocabulary word in a sentence.

Reading passages and exercises from http://www.readworks.org

Family Engagement Activities

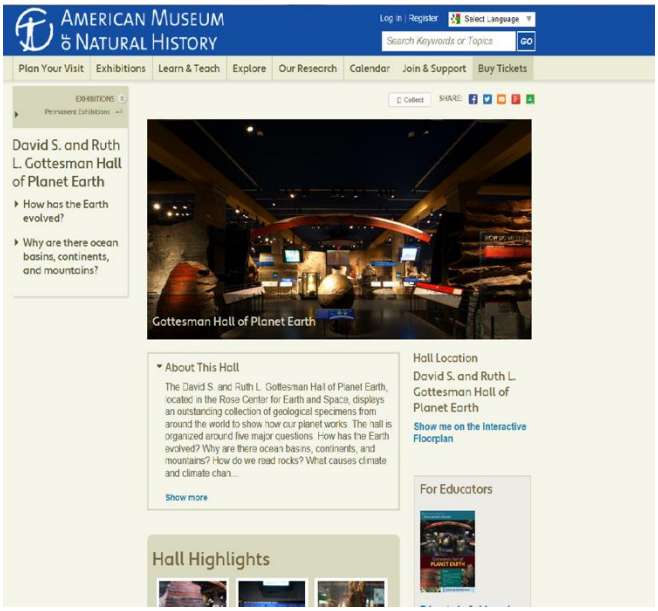
Activity #1: Go to your kitchen and find, if available, the foods on the list.

Which specific compound (saturated fat, unsaturated fat, protein, glucose, starch, cellulose) is each food mostly made of?

_____	almond	_____	celery
_____	spinach	_____	soy beans
_____	beef jerky	_____	cranberries
_____	bacon	_____	egg white
_____	noodles	_____	table sugar
._____	orange juice	_____	popcorn
_____	cheese	_____	lobster
_____	wheat	_____	sesame oil

Activity #2:

Students and families may enjoy exploring David S. and Ruth L. Gottesman Hall of Planet Earth at the American Museum of Natural History. This hall contains exhibits and activities with details about how basic elements create sustainable life on planet Earth. For more information, please visit this website http://www.amnh.org/exhibitions/permanent-exhibitions/rose-center-for-earth-and-space/david-s.-and-ruth-l.-gottesman-hall-of-planet-earth



Day 5 Science

Activity: Tsunami Warning System Does Its Job

Vocabulary

Learn the vocabulary words below. You will use these vocabulary words in today's activity.

- ☐ **Dispatch** (verb): to send off or away with speed
- ☐ **Meteorologist** (noun): a person who studies the earth's atmosphere, especially its patterns of climate and weather
- ☐ **Prone** (adjective): likely to do or be affected by something
- ☐ **Richter scale** (noun): a scale from one to 10 used to measure how strong an earthquake is
- ☐ **Sparsely** (adverb): few and widely separated

Directions

- Read the article below and answer the questions that follow.

Tsunami Warning System Does its Job

TOKYO, Japan (Achieve3000, November 17, 2006). A powerful undersea earthquake near Japan on November 15 led officials to issue tsunami warnings. After the danger passed, officials were relieved. There had been no major damage, and the episode had given them a chance to test tsunami warning systems.

Officials became concerned about possible tsunamis after an earthquake measuring 8.1 on the Richter scale struck in the northern Pacific Ocean. Major ocean earthquakes can cause tsunamis thousands of miles away. The quake was located 275 miles north-northeast of the Kuril Islands, which are east of Hokkaido, Japan's northernmost island. Based on this location, officials issued alerts for the sparsely populated, Russia-governed Kuril Islands and for parts of Japan and the U.S.

In Japan, officials directed warnings at Hokkaido. Several thousand people on the coast of the island fled to higher ground after officials predicted a 6.5-foot tsunami. The coastal city of Nemuro dispatched about 20 firetrucks and cars after the warning. City official Masayuki Kikuchi said that the proceedings went smoothly; that is probably because residents of the earthquake-prone region live with the possibility of tsunamis every day.

"There was no panic," Kikuchi said. "Residents made their way to higher ground, just like they do in our annual tsunami drill."

As it turned out, residents did not need to be too concerned. The highest wave measured only 16 inches,

and the sea remained fairly calm.

In the U.S., the Pacific Tsunami Warning Center issued alerts for Hawaii and the western U.S. and Canadian coasts. Some areas experienced minor tsunamis, but nothing major occurred. Officials kept the warnings in effect until they could be sure that the danger was over.

"It went very smoothly, and there weren't any major problems at all," said Brian Shiro, a scientist at the center. "We issued a warning for 1,000 kilometers (621 miles) surrounding the earthquake and an advisory for the rest of the Pacific Ocean."

In Crescent City, California, harbor workers noticed an unusual, fast-moving current, which destroyed two floating docks. Another surge followed, damaging a third dock. Several vessels tied to the docks pulled out of their anchorage and likely suffered damage.

"It wasn't wave action," said meteorologist Dave Reynolds. "It was the current that caused the damage. This is almost like a fast-moving river of water that is coming in, so . . . it's the currents that toss the boats around."

Several small tsunamis struck Hawaii. Just before the waves arrived, an undertow developed in the water. One swimmer was pulled through an opening in the seawall, resulting in minor injuries. One 2.5-foot surge flooded a harbor but caused no serious damage. After officials canceled the alerts, local authorities warned people to stay out of the water in case of unusual currents.

Officials have been particularly concerned about tsunamis since 2004. In December of that year, a major quake off the coast of Indonesia caused a 33-foot tsunami. The wall of water killed 213,000 people in 11 countries.
Most people had little or no warning about the approaching wave.

The response to this latest quake indicates that tsunami warning systems can be effective.

The Associated Press contributed to this story.

<u>Question 1</u>: The author probably wrote this article to:

1. Show that tsunami warning systems can work and can save lives.
2. Explain the difference between an earthquake and a tsunami.
3. Show how to prepare for earthquakes and tsunamis.
4. Explain the way of life in Japan and Indonesia.

<u>Question 2</u>: The reader can tell from the article that the residents of Nemuro, Japan, were probably:

1. Upset that they were not warned ahead of time about a possible tsunami.
2. Prepared to leave their homes since they live in an area that is prone to tsunamis.
3. Upset about having to leave their homes for the first time because of a possible tsunami.
4. Prepared to stay in their homes since they live in an area that is safe from tsunamis.

<u>Question 3</u>: Imagine that someone made the following statements:
"I saw a few small waves, so I thought it was safe to swim. Then, the current was so strong that I got hurt!"

Which person from the article would most likely say this?

1. Dave Reynolds
2. An official from Nemuro
3. Masayuki Kikuchi
4. The swimmer in Hawaii

<u>Question 4</u>: The reader can tell from the article that at the time of the 2004 tsunami that:

1. There must have been a few small towns along the coasts.
2. The tsunami warning system must have been very helpful.
3. There must have been many people living near the coasts.
4. The tsunami warning system must have been brand new.

<u>Question 5</u>: Based on the article, the reader can predict that:

1. People in earthquake-prone areas will continue to resend tsunami warnings.
2. More countries will find ways to stop tsunamis from happening.
3. People in earthquake-prone areas will continue to ignore tsunami warnings.
4. More countries will develop tsunami warning systems.

<u>Question 6</u>: Why does the author include the quote from the Nemuro city official in the fourth paragraph?

1. To show that tsunami warnings cause stress but at least they save lives.
2. To show why tsunami warning systems are not very popular.
3. To show that tsunami warnings work well even when they happen regularly.
4. To show why tsunami warning systems usually do not work.

<u>Question 7</u>: Which is the closest synonym for the word dispatch?

1. Send out
2. Pull up
3. Drop in
4. Put away

<u>Question 8</u>: If a town is sparsely populated, this means that:

1. There are many people, and they live far apart.
2. There are few people, and they live far apart.
3. There are many people, and they live close together.
4. There are few people, and they live close together.

Day 6 Science

Activity: Tsunami Warning System Does Its Job

Based on the article previously read and your knowledge of science, complete the written assignment below, and **at least one of the Family Engagement Activities.**

Additional Question

Explain the value of the tsunami warning systems described in the article. What effect will repeated tsunami warnings have on people over time?

Use supporting evidence and reasons from the article, as well as your own ideas, in your response.

Achieve3000 (www.teenbiz3000.com)

Family Engagement Activities

Activity #1: Design a Family Plan and complete the form below, to help everyone having the same information in case of emergencies.

www.ready.marines.mil

READY MARINE CORPS

Family Emergency Plan

Fill out these cards and give one to each member of your family to make sure they know who to call and where to meet in case of an emergency. Use this card for any additional information needed to supplement primary and alternate command points of contact.

Additional Important Phone Numbers & Information:

< FOLD HERE >

Family Emergency Plan

READY MARINE CORPS

Emergency Contact Name:
Telephone:
Out-Of-Town Contact Name:
Telephone:
Neighborhood Meeting Place:
Telephone:
Out of Neighborhood Meeting Place:
Telephone:

DIAL 911 OR YOUR LOCAL EMERGENCY NUMBER

Family Emergency Plan

READY MARINE CORPS

Emergency Contact Name:
Telephone:
Out-Of-Town Contact Name:
Telephone:
Neighborhood Meeting Place:
Telephone:
Out of Neighborhood Meeting Place:
Telephone:

DIAL 911 OR YOUR LOCAL EMERGENCY NUMBER

Additional Important Phone Numbers & Information:

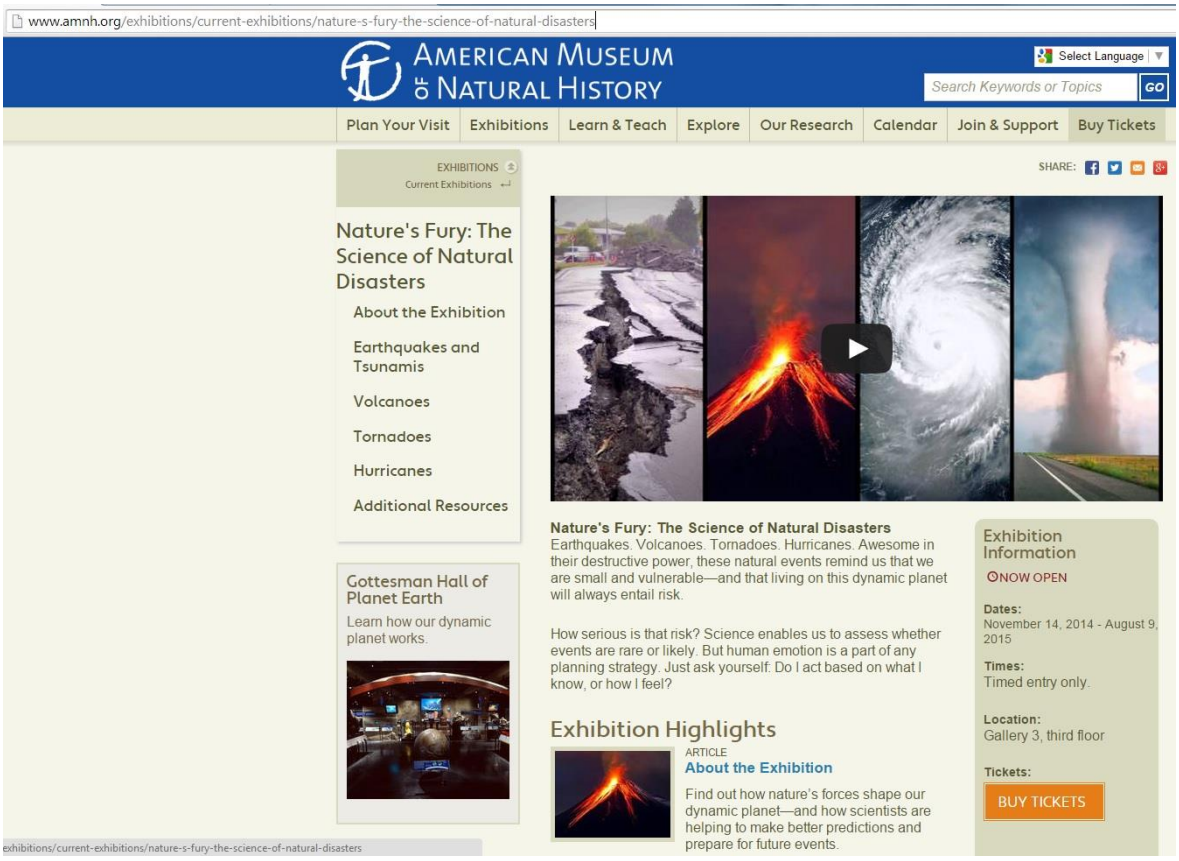
Additional Important Phone Numbers & Information:

Additional Important Phone Numbers & Information:

Activity #2:

Students and families may want to perform this activity, investigating tsunamis. http://www.sciencebuddies.org/science-fair-projects/project_ideas/OceanSci_p016.shtml

Families may want to visit the current exhibit at the American Museum of Natural History: Nature's Fury, on natural disasters including earthquakes. http://www.amnh.org/exhibitions/current-exhibitions/nature-s-fury-the-science-of-natural-disasters



Day 7 Science

Activity: Heat, Energy, and Bicycling in New York City

Vocabulary

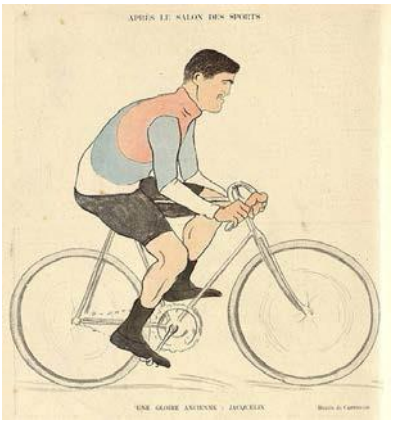
Learn the vocabulary words below. You will use these vocabulary words in today's activity.

- ☐ **Dense** *(adjective)*: tightly packed
- ☐ **Mere** *(adverb)*: just about nothing
- ☐ **Hope** *(verb)*: to expect with confidence
- ☐ **Combustion** *(noun)*: a chemical reaction that occurs when oxygen combines with other substances to produce heat and usually light
- ☐ **Engine** *(noun)*: a machine that changes energy (such as heat from burning fuel) into mechanical motion
- ☐ **Fuel** *(noun)*: a material (such as coal, oil, or gas) that is burned to produce heat or power
- ☐ **Propels** *(verb)*: to push or drive (someone or something) forward or in a particular direction
- ☐ **Decline** *(verb)*: to become lower in amount or less in number
- ☐ **Perhaps** *(adverb)*: possibly but not certainly
- ☐ **Reluctant** *(adjective)*: feeling or showing doubt about doing something: not willing or eager to do something
- ☐ **Insulates** *(verb)*: to add material or substance to (something) in order to stop heat, electricity, or sound from going into or out of it
- ☐ **Reacts** *(verb)*: to behave or change in a particular way when something happens, is said, etc.
- ☐ **Migrates** *(verb)*: to move from one area to another

Directions

- Read the article below and answer the questions that follow.

Heat, Energy, and Bicycling in New York City



New York City is one of the densest cities in the world, with millions of people squeezed into a mere 303 square miles. Although it has the world's largest subway system, traffic can still be quite bad, particularly at rush hour. The city decided that it would be a good idea to encourage more people to use bicycles. If more people rode bicycles, the roads would be less clogged with cars. Also, when you ride a bicycle, you are exercising, which makes you healthy. But how can you encourage people to ride more bikes?

The city came up with an innovative solution. In 2013, city workers began installing long racks of bicycles in different neighborhoods. These bicycles were, for a small fee, available for anyone to use. A person could ride the bicycle from one bike rack to another bike rack and park it there. This system was ideal for people who did not own bikes or who wanted to take a bicycle on a short ride without having to return it to the place they took it from. This also made it possible to move quickly between areas that did not connect easily by the subway. The city hoped that people would start using these bicycles instead of taxis or other kinds of cars.

While the city installed the bikes in part because of concerns about traffic, it was also interested in another question: how we use and spend energy. Any time an object is in motion, it is both producing energy and, in many cases, expending energy. For example, a car does not just move because we want it to move. It is powered by a special kind of engine, called an internal combustion engine that burns fuel. When this fuel is burned, it causes a cylinder to spin in circles. This cylinder is connected to the wheels of the car. As the cylinder spins, so do the wheels. So, one type of energy — fuel — is transformed into another type of energy — forward motion. Energy contained in the motion of an object is called "motion energy."

Just as cars can be considered a kind of energy conversion device, converting fuel to forward motion, so can bicycles. When you step on the pedals of a bicycle, it causes the wheels of the bicycle to spin, pushing the bicycle forward. The energy of your foot pressing down is converted into energy that propels the bicycle. Nearly all transportation — airplanes, trains, pogo sticks — can be thought of as devices that take one form of energy and make it into another form of energy.

When there is a change in one of the forms of energy used to power modes of transportation, then the energy generated by these devices changes as well. Let's say you're pedaling very fast on a bicycle. You are exerting a lot of energy as you do this. You can tell because your heart rate may increase, you may breathe harder, and you may begin to sweat
— a sign that your body is trying to cool itself. This is producing a lot of motion energy in the bicycle

because you are causing it to move very fast. But if you stop pedaling, then the bicycle will begin to slow down, and the motion energy in the bicycle will decrease. You will also be expending less energy. Your heart rate and your breathing will slow down, too. The decline in your own motion energy — the movement of your feet — is causing the motion energy of another object — the bicycle — to fall at about the same rate.

In the early days of the program, the bike racks were only moderately popular. People were still getting used to the idea of borrowing a bike for a short time at one location, riding it, and then leaving it in another location. Perhaps another reason that people were initially reluctant to use the bike racks is that they were introduced during a very hot week, at the beginning of summer. As discussed above, when you ride a bicycle, you often sweat. This is particularly true when the temperature is high, because your body produces sweat as a way of trying to keep your body cool. If your body gets too hot, you can get sick, so it's in your body's interest to maintain a constant temperature.

How much the temperature of a body increases when it gets warm depends on a number of different factors. While it makes sense that one person in 100-degree heat will get hotter than a person in 75-degree heat, even if two people are exposed to the same temperature, their bodies may react differently. In fact, one person may get much hotter than the other. This is because the amount of heat — which is a form of energy — needed to change the temperature of another object depends on the properties of that object. For example, a person who is wearing a sweatshirt in summer is likely to get much hotter than a person who is wearing a t-shirt. This is because the sweatshirt insulates the person, trapping heat inside. The t-shirt, which is more open, lets the heat escape. So, even if the amount of heat energy directed at the person is the same, the temperatures of different people will react differently.

That raises another question: why does sweat makes people colder? This has to do with a special property of heat. Heat is a kind of energy, and energy moves spontaneously from hotter regions or objects to colder ones. So, consider what happens when your body releases sweat. When it is released, sweat is colder than your body's temperature. When it is on the surface of your skin, it draws the heat from your skin into the water, because heat migrates from warm areas to cold ones. This causes the sweat to warm up. Then the sweat rises into the air and takes some of your body heat with it, cooling the body down.

Your body is constantly monitoring its own temperature. Many of the buildings in New York have air conditioning in the summer. When you walk from the hot street outside to the cool lobby of a tall office building, you can feel the change immediately. After a while, your body temperature will go down. This is because, just as the heat from your body moves to the sweat on your skin, it will also move to the cool air produced by the air conditioning. When your body gets cool enough, it will no longer need to produce sweat to cool you down.

As people continue to ride bicycles, you can expect their collective body temperatures to rise, as their bodies produce energy to power the bicycles and they spend more time outdoors in the hot sun. If the city chooses to install more bikes, then it may also want to install more air conditioning — or pass out more sticks of deodorant.

<u>Question 1:</u> What do cars, bicycles, and many other types of transportation do when they are in motion?

1. They take one form of energy and convert it into another form of energy.
2. They clog the streets of New York City and create lots of traffic.
3. They cause people to sweat because of the energy it takes to use such transportation.
4. They make people spend more time outside and increase their body temperatures.

<u>Question 2:</u> What does the author describe in this passage?

1. The author describes different types of t-shirts.
2. The author describes reasons for moving to New York City.
3. The author describes two types of energy.
4. The author describes the dangers of riding in taxis.

<u>Question 3:</u> A person on a bicycle is breathing hard, sweating, and pedaling fast.

Based on this evidence, the person is probably

1. moving very slowly
2. exerting a lot of energy
3. exerting a little energy
4. exerting no energy

<u>Question 4:</u> When you step from a hot street into an air-conditioned room, you feel cooler. Why does this change occur?

1. Heat is moving from a cold area (the room) to a hotter area (the street).
2. Heat leaves your body as it moves from a warm area (your body) to a colder area (the air in the room).
3. The motion energy used to walk into the room lowers your body temperature.
4. The motion energy used to walk into the room raises your body temperature.

<u>Question 5:</u> What is this passage mainly about?

1. Forward motion and backward motion
2. Cars and air conditioning
3. 100-degree heat, t-shirts, and sweatshirts
4. Motion energy and heat energy

<u>Question 6:</u> Read the following sentences: ". . . a person who is wearing a sweatshirt in summer is likely to get much hotter than a person who is wearing a t-shirt. This is because the sweatshirt insulates the person, trapping heat inside."

What does the word *<u>insulates</u>* mean in the sentence above?

1. Protects the person by keeping the person cool.
2. Protects the person by preventing the loss of heat.
3. Traps the person
4. Makes the person uncomfortable

<u>Question 7:</u> Choose the answer that best completes the sentence below.

A person's body temperature rises_____he or she rides a bicycle.

1. although
2. before
3. then
4. when

Day 8 Science

Activity Heat, Energy, and Bicycling in New York City

Please complete the brief answer questions below and **at least one of the Family Engagement Activities.**

Question 8: According to the passage, how does the human body get rid of heat energy to keep itself cool when the temperature is high?

Question 9: According to the passage, where does the energy that propels a bicycle forward come from?

Question 10: Why can a bicycle be considered a device that can convert energy?

Reading passages and exercises from http://www.readworks.org

Family Engagement Activities

Activity #1:

Students and families may enjoy exploring resources available at https://www.bike.nyc/recycleabicycle/. This organization, residing in Brooklyn, involves youth in learning about healthy living, community engagements and environmental education through their program.

Activity #2: What do you recycle at home?
Make a list of re-usable items that can be donated for other families to use once they are no longer used at your house.

Day 9 Science

Activity Your Skin Unmasked

Directions

Learn the vocabulary words below. You will use these vocabulary words in today's activity.

Vocabulary

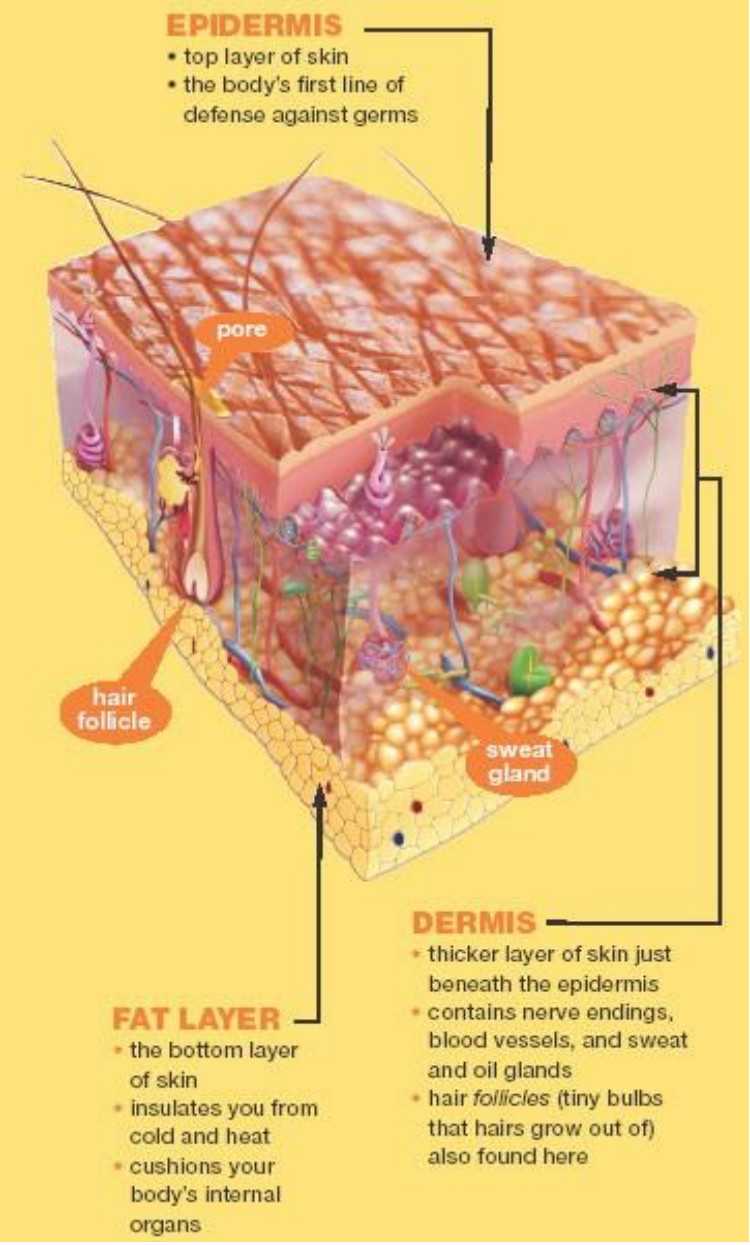
- ☐ **Organ** *(noun)*: a part of the body (such as the heart or liver) that has a particular function
- ☐ **Skin** *(noun)*: the natural outer layer of tissue that covers the body of a person or animal
- ☐ **Dermatologist** *(noun)*: person or scientist that studies the skin and its diseases
- ☐ **Texture** *(noun)*: the way something feels when you touch them
- ☐ **Hormonal** *(adjective)*: of, relating to, or effected by hormones
- ☐ **Allergies** *(noun)*: a medical condition that causes someone to become sick after eating, touching, or breathing something that is harmless to most people
- ☐ **Blood Vessels** *(noun)*: small tubes that carry blood to different parts of a person or animal's body
- ☐ **Salicylic Acid** *(noun)*: a crystalline chemical compound that is used medicinally especially as an analgesic, similar to aspirin
- ☐ **Benzoyl Peroxide** *(noun)*: a white crystalline compound used in bleaching and in medicine especially in the treatment of acne
- ☐ **Blemishes** *(noun)*: marks that make something imperfect
- ☐ **Exposure** *(noun)*: a physical condition resulting from being outside without adequate protection

Directions

- Read the article below and answer the questions that follow.

Find out what's going on beneath the surface.

By Margie Markarian



Bsip/Photo Researchers, Inc. 1

What do you think is the body's largest organ? It's something that covers each of us from head to toe. And by the time you're an adult, you will have about 8 pounds of it. It's skin!

"It keeps your insides in and the outside out," says Linda Franks, a New York City *dermatologist* (skin doctor) who treats teens. Without skin, you'd look a lot like a piece of meat at the supermarket. Not exactly a pretty picture!

That's not all. "Skin acts as a shield for your body," says Ron Davis, a dermatologist who teaches at Tulane University's School of Medicine in New Orleans.

Skin also helps

- fight off infections,
- maintain body temperature,
- protect the body's organs,
- give us our sense of touch.

Skin's color and texture also helps define what you look like. But its importance is more than just skin deep. Read on to learn more about keeping your skin as healthy as it can be.

Skin Problems

It's easy to take skin for granted until something goes wrong or changes. Rashes, pimples, warts, and athlete's foot are just a few common (and annoying!) skin concerns for teens. "It's hard not to be self-conscious about skin problems," says Davis, because many things that happen to skin affect the way you look.

Most skin problems go away with time, proper skin care, and the help of remedies you can buy at the store. More stubborn or serious skin problems may need a doctor's attention or prescription medicine to help them heal.

Here are some examples of skin problems many teens face, where they come from, why they show up, and how you can take care of them.

Acne and pimples. Hormonal changes in the body trigger more activity in the skin's oil glands during the teen years. Sometimes, the glands produce more oil than the skin needs to stay moist. When that happens, the oil, sweat, bacteria, and dead skin cells can mix together and plug up the *pores* (tiny holes) on your skin's surface. The result can be pimples, whiteheads, blackheads, or full-blown acne.

Rashes. Rashes happen when you come in contact with something that irritates your skin. Rashes are usually red, itchy, warm to the touch, and sometimes bumpy. Allergies to foods, plants, or animals sometimes cause rashes. So do sensitivities to soaps, fragrances, cosmetics, fabrics, chemicals in household products, and even heat from the sun.

Cuts and scrapes. Ever had a small splinter that caused giant-sized pain? a deep cut that bled a lot and needed stitches? Then you probably experienced an injury to the *dermis*, the thicker layer of skin that lies just beneath the exposed layer (the *epidermis*). The dermis is home to nerve endings (that's why a sliver hurts so much) and blood vessels (that's why there is so much bleeding when you get a deep cut).

Warts. Warts are raised lumps of skin and are usually found on hands and feet. They are caused by viruses. Warts are usually harmless infections but can be annoying or make you feel self-conscious. Products available in stores can treat warts on hands. Warts on the bottoms of the feet usually need to be removed by a doctor because they make walking uncomfortable.

Bacterial and fungal infections. An opening in the skin can lead to infections from bacteria or a fungus. Athlete's foot is an example of a fungal infection that thrives in dark, moist areas. It spreads easily in locker room showers. Body piercings and tattoos are at a high risk for bacterial infections. That is why piercing and tattooing need to be done under super- sanitary conditions. The body parts that get pierced or tattooed also need to be kept clean during the healing period.

The Keys to Healthy Skin

The surest route to healthy skin is to keep it clean. Experts say to wash your face twice a day with warm water and a mild soap. When acne breakouts occur, try using a cleanser that contains *salicylic acid*. You can also spot treat pimples with an ointment containing *benzoyl peroxide*. Both of those ingredients help fight the bacteria that cause acne breakouts.

It's natural to want to look your best, but it's also important to be realistic. "It's impossible to have perfect skin—we all have blemishes of some kind," says Ira Skolnik, a Concord, Mass., dermatologist. That even goes for celebrities and models! Many times, magazine photos are changed to make skin look perfect, Skolnik says.

Another key to healthy skin is to always wear sunscreen. "The sun exposure you get before you are 18 years old plays a big role in the health of your skin later in life," says Skolnik. Exposing your skin to the sun (or a tanning bed) without protection can age skin early, and may also lead to skin cancer.

The good news? There is a lot you can start doing right now to ensure that you'll have healthy skin for a lifetime! "If you take care of your skin," says Skolnik, "it will take care of you."

Miss Florida Teen:
Face-to-Face With Skin Cancer

AP Images

Kayla Collier, 19, will never forget the day she went shopping for a dress to wear to a dance. It was the same day her mother noticed a suspicious spot on her back.

"I was in the dressing room trying on a green and gold halter dress," recalls Collier, who was crowned Miss Florida Teen in 2009. "She asked if I had bumped into something or scratched my back because I had a dark brown spot that looked like a rippled scab."

When she showed the spot to a dermatologist, he removed it right away and sent it to a medical lab for testing. She didn't think it was anything to worry about. A week later, however, she was shocked when the test showed she had *melanoma*, a serious form of skin cancer. "I thought, *This can't be happening. I'm only 16 years old*."

Fortunately, Collier's cancer was caught early. She had surgery to remove it, and the cancer has not returned. But for the rest of her life, she and her doctors will have to check her skin regularly for suspicious moles and growths.

Skin cancer is the most common form of cancer in the United States, according to the American Cancer Society. Ultraviolet rays from the sun and indoor tanning equipment are the most common causes of skin cancer.
Collier's cancer was likely triggered by both.

"I live in Florida, am fair skinned, and sunburn easily," says Collier. "I always wore sunscreen at the beach but not every time I went out to play and run around in the yard with my brothers."

Collier regrets ever using a tanning bed. She went no more than five times in her life, she says, during the spring of the year melanoma was found. "I wanted to look tan before a pageant," she says.

As part of her Miss Florida Teen platform, Collier frequently talks about preventing teen skin cancer at events sponsored by the American Cancer Society. She has even given speeches to lawmakers in her state about creating laws that would limit teens' use of tanning beds.

<u>Question 1:</u> According to the passage, which of the following is the body's largest organ?

1. Lungs
2. Heart
3. Liver
4. Skin

<u>Question 2:</u> In the passage, which of the following does the passage recommend as a solution to common skin problems?

1. Read magazines for tips
2. Do not put on sunscreen
3. Go tanning often
4. Keep it clean

<u>Question 3:</u> It can be concluded from the passage that

1. Protecting the skin is important.
2. Everyone has perfect skin.
3. Many skin problems cannot be fixed.
4. It is okay to go tanning a lot.

<u>Question 4:</u> Read this sentence from the passage: "It's impossible to have perfect skin—we all have blemishes of some kind."

As used in the sentence, <u>*blemishes*</u> means

1. Cancer
2. Prescriptions for a skin problem
3. Things that are not perfect
4. Celebrities and models

Question 5: What is a main idea of this passage?

1. How to prevent common skin problems.
2. How models get perfect skin.
3. How to wash your face properly.
4. When to go to the doctor about a problem.

Day 10 Science

Activity Your Skin Unmasked

Please complete the brief answer questions below, and **at least one of the Family Engagement Activities.**

Question 6: According to the passage, what plays a big role in the health of your skin later on in life?

_____

_____

_____

Question 7: Why might a teenager feel self-conscious about his or her blemishes or other skin problems?

_____

_____

_____

Question 8: The question below is an incomplete sentence. Choose the word that best completes the sentence.

It is important to wear sunscreen_____it will prevent skin cancer later on in life.

1. but
2. after
3. although
4. because

Question 9: Answer the following questions based on the sentence below. Your skin helps protect your body by acting as a shield.

What? your skin

(does) What? _____

How? _

_____

Question 10: When you go to the beach on a sunny day, what would be a good form of protection?

_____

_____

_____

Reading passages and exercises from http://www.readworks.org

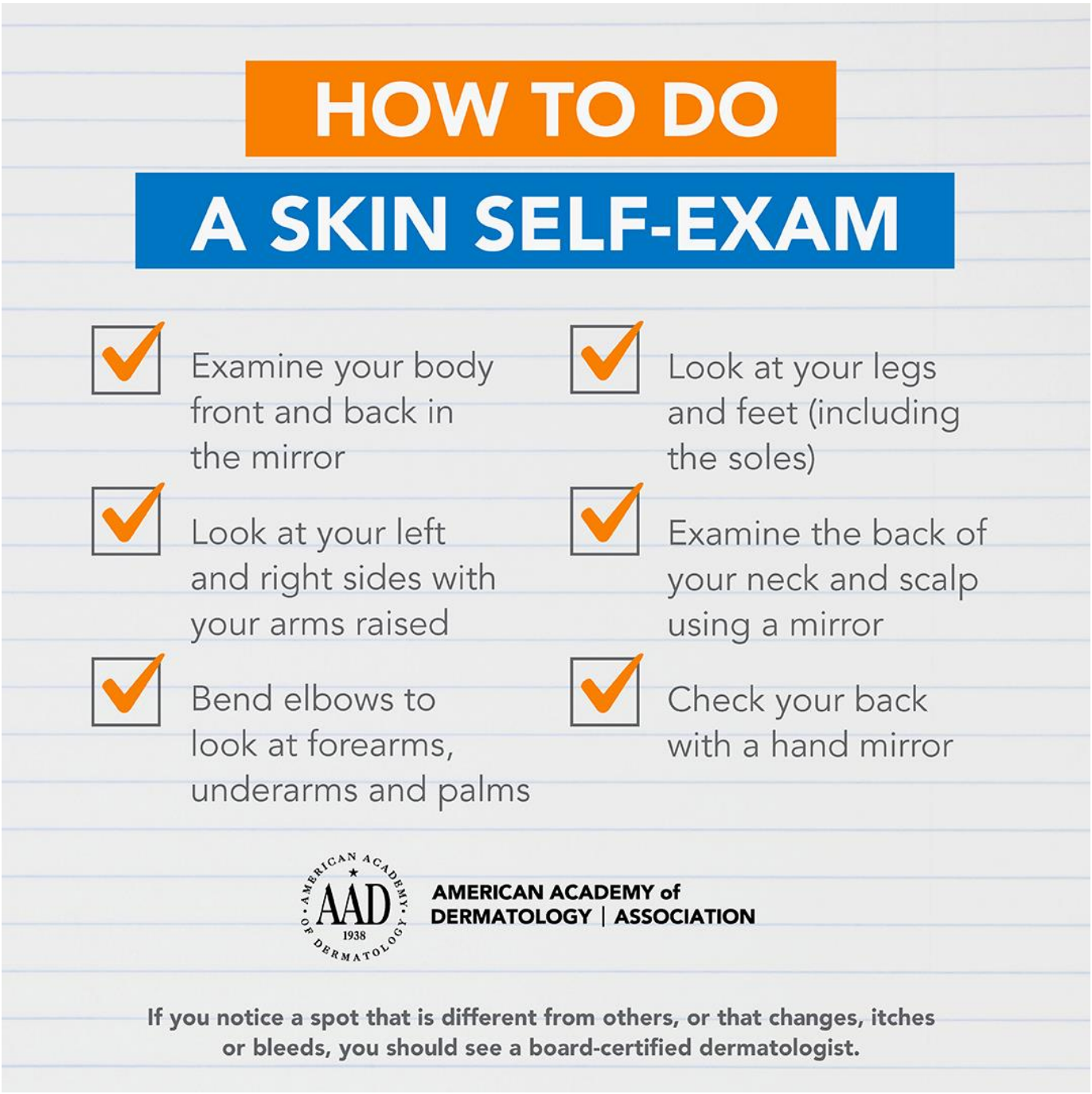
Family Engagement Activities

Activity #1: Create your own plan to optimize your skin health

Part of your skin	Frequency (times per day/ week)	List products/ Steps to Do
Scalp (hair – head skin)		
Face		
Body		
Hands		
Feet		

Activity #2:

Make sure all members of your family perform this skin test and report below.


HOW TO DO
A SKIN SELF-EXAM
Examine your body front and back in the mirror
Look at your left and right sides with your arms raised
Bend elbows to look at forearms, underarms and palms
Look at your legs and feet (including the soles)
Examine the back of your neck and scalp using a mirror
Check your back with a hand mirror
AAD
AMERICAN ACADEMY of DERMATOLOGY | ASSOCIATION
If you notice a spot that is different from others, or that changes, itches or bleeds, you should see a board-certified dermatologist.