

Important Concepts . . .

Preview Review



Science

Grade 8 TEACHER KEY

W3 - Lesson 3A: Vision and Lenses

W3 - Lesson 3B: Water in its Various States

Affects Earth's Landforms and Climate

Important Concepts of Grade 8 Science

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Textbook:
*Science in
Action 8*

Science Grade 8

Version 5

Preview/Review W3 - Lesson 3 TEACHER KEY

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Preview/Review Concepts for Grade Eight Science

TEACHER KEY



***W3 - Lesson 3A:
Vision and Lenses***

OBJECTIVES

By the end of this lesson, you should

- name the parts of the eye and explain the function of each
- name the parts of a camera and explain the function of each
- explain the effect of concave and convex lenses on light
- identify the types of lenses used to correct near and far-sightedness

GLOSSARY

concave lens - thicker at the edges than the center, diverge light

convex lens - thicker at the center than the edges, converge light

lens - a curved piece of transparent material that refracts light in a predictable way

W3 - Lesson 3A: Vision and Lenses

Welcome to Lesson 3A. This lesson is designed to describe the differences and similarities between vision and lenses. It should take about 30 minutes to complete.

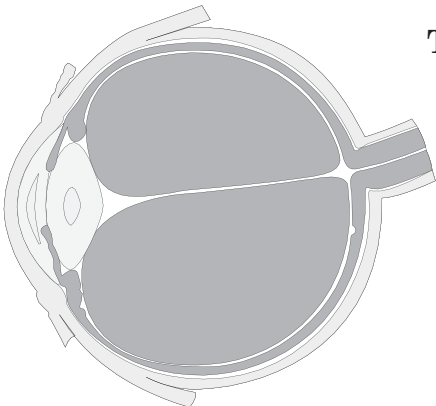
Vision

Vision is the ability to see the environment with an organ called the eye. The human eye is delicate and important. The human eye and a digital camera produce images in similar ways.

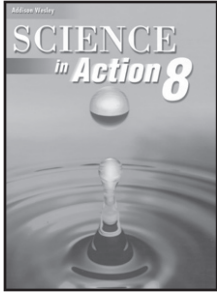
Light enters the eye through an opening called the **pupil**, which controls the amount of light allowed to enter. The **cornea** is the clear part that covers the front of the eye and is designed to protect it from foreign objects. Sometimes, in older people, the cornea develops cataracts (a clouding effect). However, they can be removed by surgery.

The coloured area surrounding the pupil is the **iris**. On a bright day, the iris makes the pupil very small, and in low light conditions it opens to make a large pupil allowing more light to enter. A **convex lens** at the front of the eye refracts the light and makes it converge on the **retina**, which is located on the back part of the eye. This lens changes its shape and focuses light to one point on the retina.

Specialized nerve cells on the retina, called rods and cones, are light sensitive. Cones work in bright light and detect colours. Rods are stimulated in low light levels and give vision in shades of grey and black. These specialized nerve cells send the message to the **optic nerve**, which transmits the image to the brain.



The camera has parts that perform similar functions. The aperture allows light through. The diaphragm controls the size of the aperture. The lens focuses the light and the light hits and stimulates the film or sensor array.



Activity 1

Read and understand pages 231 to 232 in *Science in Action 8*. Then, answer the following questions.

1. Sketch a human eye and label the major parts. Be sure you can explain the function of each part.

See page 230 of text for an example of sketch.

2. The human eye has a pupil. What is its function?

It is the hole in the human eye, similar to an aperture in a camera. The iris controls the size of the pupil and regulates the amount of light that enters the eye.

3. Describe how a “shutter” in a camera resembles the iris in the pupil.

The shutter opens and closes when you press the button to take a picture exposing the film for a certain amount of time to light. The iris is like the shutter; it opens to allow only a certain amount of light to reach the retina. Then it closes like the shutter closes to avoid overexposure.

4. Where is the retina located in the eye? _____

On the inside back of the eye

5. Cells that are sensitive to light are called ***photoreceptors*** .

6. Define the two types of photoreceptors and what do they do.

Rods are highly sensitive to light; they function in very low light and cause one to see shades of gray. Cones detect colour and cannot function in low light.

7. Describe the function of the optic nerve.

The optic nerve is the nerve at the back of the eye conveying the message to the brain.

Lenses

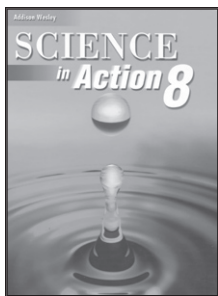
Lenses are made of transparent material and refract light. Lenses are very important for the human eye and for other optical devices such as cameras. They allow the image to be seen clearly because they focus the image onto a retina located on the back of the eye or, in a camera onto film. The lens in the eye is **convex** *outwardly rounded*, thicker at the curve than the sides. It converges light (brings it together).

A lens that is thicker at the edges and thinner in the centre bends the light so that it spreads out or diverges. These types of lenses are called concave lenses. All images produced by **concave lenses** are smaller and sharper than the original image.

Concave lenses can be used to correct vision problems such as **nearsightedness**, where the image forms in front of the retina. This causes the individual to have difficulty seeing objects at a distance but no trouble seeing objects nearby. To correct this problem a concave lens is used to make the light rays diverge before they enter the eye.

Convex lenses are thinner at the edges and thicker in the centre. These lenses cause light rays to converge. This corrects **farsightedness** where a person can see distant objects clearly but has trouble seeing objects nearby. This vision impairment is caused when the image falls behind the retina. When the rays are converged by the lens, they focus closer to the front of the eye—on the retina.



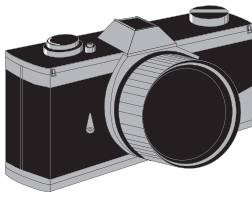


Activity 2

Read and understand pages 233 to 235 in *Science in Action 8*. Then, answer the following questions.

- Is the lens in the human eye convex or concave? **Convex**
- Describe two vision conditions discussed in the text.
Farsightedness and nearsightedness. Farsighted people cannot see close objects clearly. They can see far but not near items. The eye cannot make the lens thick enough to focus light on the retina and the image falls behind the retina. Nearsighted people cannot see distant objects clearly. They can see near but not far. The eye cannot make the lens thin enough to focus light on the retina, and the image falls in front of the retina.
- The above conditions can be corrected. What can be prescribed for people with either of these two conditions?
Eyeglasses or contact lenses.
- Describe how night vision goggles work.
The human eye cannot see well in low light conditions. Night vision goggles allow for light to focus onto an image intensifier. Inside the intensifier, the light energy releases a stream of particles. These particles hit a phosphor-coated screen. The phosphors glow green when the particles strike them. The person wearing the goggles sees a glowing green image.



**Fill in the Blanks:**

When the pupil of the eye is very large, it is said to be

_____ *dilated* _____.

The organization that uses night vision goggles the most is

_____ *the military* _____.

The clear layer in the front of the eye is _____ *cornea* _____.

The type of lens that focuses light onto one point is _____ *concave* _____.

You should now be able to meet all the objectives listed at the beginning of the lesson. Go through the list to see if there is anything you need to spend more time on.



Preview/Review Concepts for Grade Eight Science

TEACHER KEY



***W3 - Lesson 3B:
Water in its Various States Affects
Earth's Landforms and Climate***

OBJECTIVES

By the end of this lesson, you should

- describe how water in its various states affects landforms
- describe how glaciers change the earth's surface
- describe how the movement of tectonic plates affects the Earth's surface
- describe how water affects Earth's climate

GLOSSARY

climate - long term temperature, wind, and precipitation patterns for an area

delta - land formed by sediment deposits at the mouth of a river where it flows into a lake or ocean

erosion - the wearing away and movement of rock fragments and soil

glacier - very large, moving body of ice

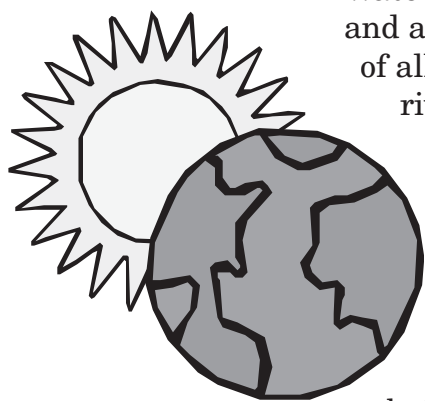
tide - twice daily rise and fall in water level in the ocean (caused by the gravitational pull of the moon)

tsunami - very large ocean wave usually produced by underwater earthquakes

W3 - Lesson 3B: Water in its Various States Affects Earth's Landforms and Climate

Welcome to W3 - Lesson 3B. This lesson is designed to teach you that water in its various states has an effect on the Earth's landforms and climate. It should take about 1 hour to complete this lesson, there will be a small homework assignment at the end.

How Water in its Various States Affects Earth's Landforms



Water is found in three states: a solid (ice or snow), a liquid (water), and a gas (water vapour or humidity). Water is key to the survival of all organisms and can be found just about anywhere. Oceans, rivers, polar ice caps, underground aquifers, even the air you breathe has some form of water in it.

Did you know that less than 1% of all the water in the world is suitable to drink? Canada is one of the few countries in the world where fresh water is in a great supply.

Liquid water, whether it be freshwater or saltwater, can affect both land formations and climate. One way is by the action of waves and tides. Waves are created mostly by the energy of moving air. This air along with water that is constantly crashing onto the shoreline causes the land formation to change over time. These land formations affect the types of vegetation and other organisms that can live in an area.

Large waves called tsunamis are created by earthquakes under the oceans. When an undersea earthquake occurs, energy is transferred from the earth's crust to the oceans causing large ocean waves close to shore. These waves can flood small islands and land close to shore. They can tear away large pieces of rock and salt, and deposit them in various places.

Tides are created by the gravitational force of the moon and its location around the world at various times of day. The moon's gravity pulls the water towards itself. The location of the moon over time can be predicted, so tides can be predicted. This movement of water on the shoreline causes land formations to appear and disappear depending on whether it is a high tide or a low tide. During high tide the water level is at its highest; during low tide the water levels are at their lowest.

Read pages 349, 351-353 for more details.

1. How do small waves change shorelines compared to large waves?

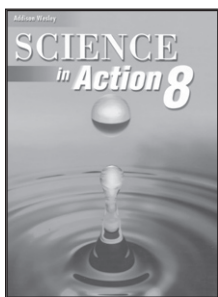
small waves – deposit material

large waves – erode the shore

Streams and Rivers

Streams and rivers also play a large part in creating landforms. They carry sediments of sand, silt, clay, and rock that they pick up from the land they move through. These materials are then deposited at points where the stream or river slows, forming what are known as deltas. Deltas are usually located where a river or stream meets a larger body of water such as a lake or an ocean. Large deltas have developed over long periods of time.

Another example of land formations are coastline beaches. Strong ocean currents that carry and deposit sediments along the coastline tend to create beaches of various shapes and forms.



Activity 1

Read and understand the information above and pages 355, 358-359 in *Science in Action 8*. Then answer the following questions.

1. *Sediments* are rock fragments and soil carried by a river and deposited.
2. Describe what happens to the sediment load when a river slows.

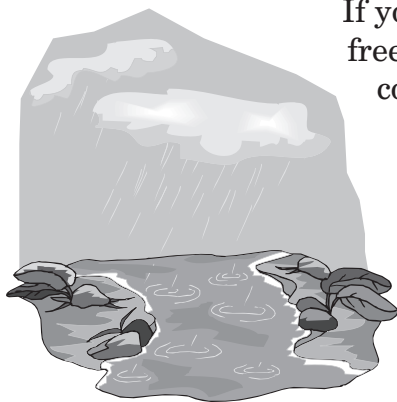
The sediment load cannot be carried any more, and it is deposited.

3. If water did not carry sand, silt, or clay, what landforms would not occur?

Deltas

Weathering

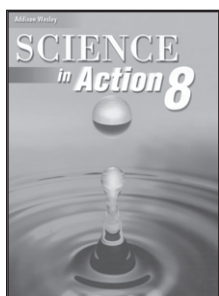
Physical weathering is another form of erosion. This is the moving of soil and rock from areas such as hillsides to new formations at their base. Temperature has a key role in the structure of the land. As the temperature increases, the movement of water increases, causing greater amounts of erosion.



If you have ever placed a closed container full of water in a deep freeze, you might have discovered that when the water froze, the container broke. This is because water expands as it freezes. The effect of water freezing and expanding also contributes to the weathering of landforms.

If water pools in cracks on a mountainside and the temperature decreases to cause the water to freeze, the frozen, expanded water forces chunks of rocks apart. These pieces will eventually end up at the bottom of the slope. This prying apart of materials, commonly rock, by the expansion of water freezing is known as frost wedging.

Another way landforms are created by water is through chemical weathering. This occurs when rainwater slowly reacts with rock such as limestone. Over time the limestone is dissolved and huge underground caverns are formed.



Activity 2

Read and understand page 359 in *Science in Action 8*. Then, answer the following questions.

1. Describe how chemical weathering affects limestone and other rocks.

Water collects in cracks and holes in the rock. As it

sits there, it gradually dissolves more and more of the

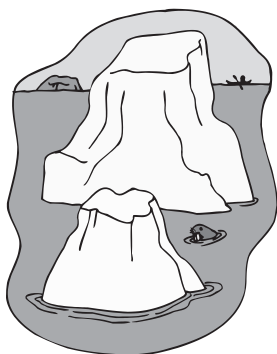
rock until large caverns form.

2. What are two reasons water is a very strong force in erosion?

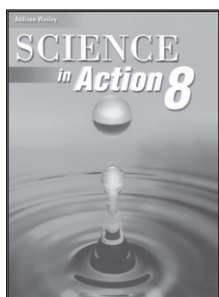
Running water carries away sediments. Frozen

water can split rocks apart.

Glaciers



Glaciers are large bodies of ice that move across the earth's surface, changing the shape of the land. As the temperature increases, the glacier melts. Sediments, ranging from large boulders to small pebbles are left behind. This type of erosion is found in mountain valleys where the valley walls are a distinctive u shape as opposed to a v shape, indicating the erosion was caused by streams and rivers. Glacial erosion can also occur over entire continents. Glacial melt waters can also change the shape of the land by carrying and depositing sediment.



Activity 3

Read and understand pages 363 to 365 in *Science in Action 8*. Then, answer the following questions.

1. Identify and define two different types of glaciers.

Continental glacier or icecap cover large areas of land

and form in the earth's coldest regions. Valley glaciers

flow through the high valleys between mountain peaks.

2. How do glaciers erode and shape the land they go over?

Rock imbedded in ice and the great weight of the glacier

grind the surface of the land.

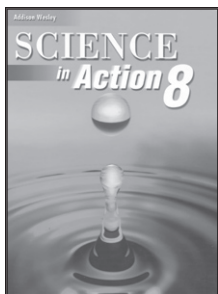
3. Glaciers are snow that is compressed to ice. Identify and define at least three features that glaciers have left on the landscape.

Answers may vary. Moraines form from rock and gravel that build up along the sides and the end of the glacier. Eskers form when part of the glacier melts, and this melt water flows in tunnels under the ice. The melting releases sand and gravel from the glacier; these sediments are deposited by the melt water in the pattern of a winding river. Drumlins are small, teardrop shaped hills. They form when a glacier moves over moraines that had formed earlier. The tip of the drumlin points in the direction that the glacier was moving. Kettle lakes form when large chunks of ice left behind by the glacier melted away. They can also be formed in a valley glacier (hanging valley) where the glacier had scoured out rock material.

Tectonics Plates

Other makers of landforms are the tectonics plates that fit together to make the earth's crust. These plates are in constant motion. As these plates move apart and together, so does the earth's crust. Some areas are enlarged while other areas vanish completely. One result of this constant motion is the formation of volcanoes and mountain ranges, both underwater and on land.





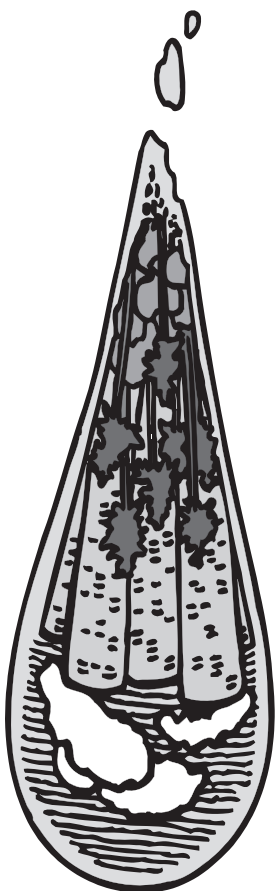
Activity 4

Read and understand pages 361 to 362 in *Science in Action 8*. Then, answer the following questions.

1. The Plate Tectonics Theory states that the surface of Earth is divided into huge moving plates.
2. Define the lithosphere.

It is the solid outer part of the Earth.

Water in its Various States Affects Earth's Climate



Water affects climate in several ways. The combination of precipitation (rain, snow, etc.), the amount of sunshine a region experiences yearly, and the temperature is known as climate. Climates can be influenced by ocean currents. These currents can affect the temperature of the air and the amount of precipitation that occurs. The temperature of these ocean currents warm or cool the air that is above them, causing the air to move.

When air is cooled, it tends to lose some of the water it is carrying, producing precipitation. During some years, the warm water at the equator may increase in temperature making the ocean water warmer further north. This has an effect on weather and could possibly cause droughts and other catastrophic weather events in some areas. This effect is called El Nino. Chinooks that Albertans experience in the southern part of the province occur when air loses much of its moisture while rising when warm and cold water mix together. Their different densities cause them to move and form currents over the mountains. The air is then warmed as it descends to the prairies and is compressed.

Activity 5

Read and understand the above and then answer the following questions.

1. How does a chinook form?

Westwardly wind blows over the Pacific Ocean and picks up moisture. This moisture is dumped on the westward side of the mountains in British Columbia as orographic precipitation and it gives off latent heat. The air moves over the mountains and loses elevation and becomes even warmer. The chinook is a warm dry wind.

2. Name one way that each state of water affects landforms.

Solid water *Solid water forms ice that can break things apart.*

Liquid water *Liquid water has wave action that erodes shorelines.*

Gas water *Gas water becomes precipitation.*

The Future Effect of Water on Climate and Landforms

Water will always affect climate and landforms. Scientists are concerned about global warming and the greenhouse effect. The greenhouse effect involves greenhouse gases such as carbon dioxide and methane. As their levels increase in the atmosphere, the Earth's average temperature increases.

As global warming continues, temperatures and climates will change even more. These changes caused by temperature increases include the rate of melting of the polar ice caps and an increase in the number of violent storms. These will increase the water levels not only in the ocean but also in rivers and lakes. These climatic changes would have an enormous effect on coastal cities and coastal swamp lands, which would be flooded.



Activity 6

Read and understand the above paragraphs then answer the following questions.

1. What is the main concern with water, climate, and landforms?

The greenhouse effect could raise ocean levels a few centimeters or a few meters decimating coastal populations.

2. What effect does a very large body of water have on an area's climate?

It prevents extremes in temperature.

3. In your view, which landform process is responsible for the greatest change?

The tectonic process may have spread the continents apart, glaciers may have changed the local landscape dramatically, the forces of water continue to change landscapes. All are valid as long as accurate reasons are given.

You should now be able to meet all the objectives listed at the beginning of the lesson. Go through the list to see if there is anything you need to spend more time on.

Extended Activity (Homework)

Take a container such as a plastic pop bottle and fill it with water. Put the cap on. Place the pop bottle in a larger container such as an ice cream bucket and place them in the freezer. Leave them overnight. What happened to the pop bottle?





