Chapter 11 The Flow of Fresh Water

Section 1 The Active River

Objectives
Describe how moving water shapes the surface of the Earth by the process of erosion.
Explain how water moves through the water cycle.
Describe a watershed.
Explain three factors that affect the rate of stream erosion.
Identify four ways that rivers are described.

Youtube.com - Bill Nye Water Cycle Video

Rivers: Agents of Erosion
Erosion
process that transports soil and sediment from one location to another

Grand Canyon is now 1.6 km (about 1 mile) deep and 446 km long

The Water Cycle
Water Cycle
continuous movement of water from one ocean to the atmosphere to the land and back to the ocean

Precipitation
when water falls to the Earth in a form of rain, snow, hail and sleet

Evaporation
occurs when water from the Earth's surface changes into a gas (water vapor)

Condensation
takes place when water vapor cools and changes into water droplets that form clouds in the atmosphere

Runoff
precipitation that moves over land into streams and rivers

Transpiration
process of moisture that is carried through plants from the roots to the leaves where it changes to water vapor (gas) and is released to the atmosphere

Percolation
downward movement of water through pores in soil

Assignment: Draw the water cycle in your notes.

River Systems
Tributary
a stream that flows into a lake or into a larger stream

Watersheds
a division of river systems

an area of land that is drained by a water system

Mississippi River watershed has hundreds of tributaries

Divide
separates watersheds by an area of higher ground

What is the difference between a watershed and a divide?

A divide is the boundary that separates drainage areas, whereas a watershed is the area of land that is drained by a water system.

Assignment: Complete USA map and the Minnesota Map.
Locate, draw, and label the drainage basins of the USA.
Locate, draw, and label the major river systems of USA.
Draw in the divides that separate the river systems.
Locate, draw, and label the drainage basin in Minnesota.
Locate, draw, and label the major river systems of Minnesota.
Include a Legend or a Key.

YouTube.com - Bill Nye Rivers and Streams

Stream Erosion
Channel
a path that a stream follows

once a channel becomes wider and deeper it will then be called a river

Three factors that determine erosion
Gradient
the measure of the change in elevation over a certain distance

high gradient = more energy = more erosion

low gradient = less energy = less erosion

Discharge
amount of water that a stream or river carries in a given amount of time

can increase or decrease as water is available

Load
the materials being carried by the stream or river

Stages of a River
term does not describe age but features of a river

Youthful Rivers
flows quickly due to steep gradient
eroding deeper faster than wider
little discharge


Mature Rivers
erodes channel wider more than deeper
gradient not as steep
fewer falls and rapids
fed by many tributaries
more discharge


Old Rivers
low gradient
little erosion
makes deposits
few tributaries because they have joined together


Rejuvenated Rivers
land is raised by tectonic activity
terraces - spikelike formations form
gradient becomes steeper



Assignment
Directed Reading

Feb 9-9:14 AM

Section 2 Stream and River Deposits

Key Concepts

Describe the four different types of stream deposits.
Describe how the deposition of sediment affects the land.

Deposition of Water

Deposition

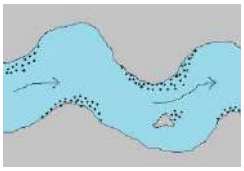
a process where materials are laid down or dropped

sediments - soil and rock

4 Types of Stream Deposits

Placer Deposits

heavy minerals are deposited at places in a river where the current slows down



Delta

deposits made in a fan-shaped pattern as the current slows to empty into a large body of water

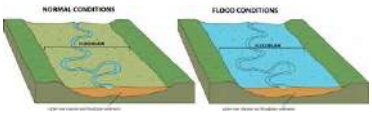
Alluvial fans

fan-shaped deposit that forms on dry land from a quick change in elevation

Floodplain

occurs along a river that forms from sediments deposited when the river overflows its banks

each time it floods a new layer of sediment is deposited



How to control water flow?

Dam

redirects the flow of water

Levee

build up of sediment to help keep river inside

Assignment

Directed Reading - Stream and River Deposits

Feb 12-11:43 AM

Section 3 Water Underground

Key Concepts

Identify and describe the location of the water table.
Describe an aquifer.
Explain the difference between a spring and a well.
Explain how caves and sinkholes form as a result of erosion and deposition.

The Location of Groundwater

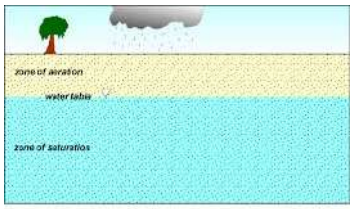
Source of drinking water for about 60% of the US.
There is about 20 times more water underground than in the atmosphere and in all of the river and lakes combined.

Two zones that water seeps into underground

Zone of Aeration - upper zone that rainwater passes through

Zone of Saturation - below the zone of aeration where water collects to fill spaces between rocks

Water Table - where these two zones meet



Aquifers - able to hold groundwater and allows water to pass through it

rely on the water cycle to maintain water flow

Porosity - the percentage of open space between rock particles

the more space between rocks the more water an aquifer can hold

Permeability - the ability to allow water to pass the open spaces

the larger the rocks are the more water that can get through

most permeable materials sandstone, limestone, layers of sand and gravel

impermeable - rocks that stop the flow of water

friction - a force that causes water to slow down

Recharge Zone - the area that water travels down to join up with the aquifer

more spaces between rocks

Springs and Wells

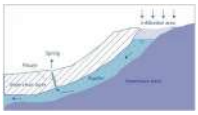
Lakes form when the water table is higher than the Earth's surface

Spring - when water flows out of the ground

Artesian Formation - two layers of impermeable rock on either side of two layers of permeable rock

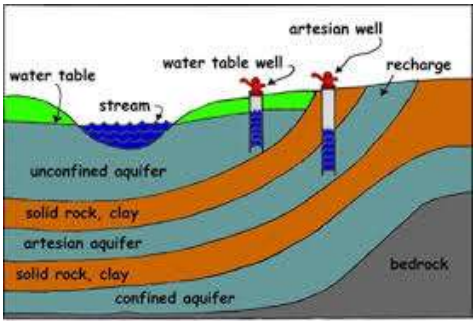
Cap Rock - top layer of impermeable rock

Artesian Spring - when water flows from a crack in the cap rock



Well - man made hole that goes from the surface to the aquifer

it is important when putting in a well that the hole is deep enough that when the water table drops water is still available



Feb 18-10:03 AM

Key Concepts

Identify two forms of water pollution.
Explain how the properties of water influence the health of a water system.
Describe two ways that wastewater can be treated.
Describe how water is used and how water can be conserved in industry, in agriculture, and at home.

https://www.youtube.com/watch?v=RMyCcWECbNE

You are hiking, you realize your canteen is almost empty. What do you do?

Water Pollution

Only 3% of Earth's water is drinkable.
Of the 3%, 75% is frozen in the polar icecaps.

Pollution

introduction of harmful substances into the environment

Point-source pollution

pollution that come from a specific site

a leak

Nonpoint-source pollution

pollution that comes from many sources

fertilizers, eroded soils, drainage, runoff

Thermal pollution

increasing the temperature of the water which causes a decrease in the oxygen in the water

What type of pollution is the hardest to control?

nonpoint

Health of a Water System

The quality of water affects your life. Good water helps with good health.

Properties of Water

Dissolved Oxygen

oxygen that is dissolved in the water
used by fish and other organisms
sewage, fertilizer runoff, animal wastes, temperature changes
cold water holds more oxygen than warm water

Nitrates

naturally occurring compounds of nitrogen and oxygen
nitrates come from animal wastes or fertilizers

Alkalinity

water's ability to neutralize acid
acid rain and other acid wastes harm water life
higher alkalinity can protect organisms from life

Cleaning Polluted Water

Sewage Treatment Plant

a facility that cleans the waste materials from water that comes from sewers or drains

takes care of city water

Primary Treatment

steps to clean water

dirty water is passed through a large screen to catch solid objects
water transferred to a large tank
sludge (small particles) sink to the bottom
floating oils and scum are skimmed of the surface
sent to secondary treatment

Secondary Treatment

steps to clean water

water is sent to an aeration tank - mixed with oxygen and bacteria
bacteria feed on wastes and use the oxygen
water sent to a settling tank
chlorine is added to disinfect the water
water released

Septic Tank

tank that separates solid waste from liquids
has bacteria that breaks down the solid waste
households
water is distributed to soak into the ground

Where does the water go?

60% is used by bathing, toilet flushing, and laundry
32% is used by lawn watering, car washing, pool maintenance
8% is used by drinking, cooking, washing dishes, running a garbage disposal

19% of water used in the world is used by industrial purposes

How can we conserve water?

Feb 24-9:17 AM