

# Ch. 9 Rocks and Minerals & Ch. 11 Earth's Resources {

# Ch. 9 & 11 Vocabulary {

- ⌘ Mineral: natural, nonliving solid with a definite chemical structure
- ⌘ Crystal: naturally formed solid with a definite internal pattern
- ⌘ Rock: formed from one or more minerals combined
- ⌘ Sedimentary Rock: rock that is made from pieces of rocks and minerals

# Vocabulary

- ⌘ Igneous Rock: rock that forms from molten rock that has cooled and hardened
- ⌘ Metamorphic Rock: rock that forms when one type of rock changes into another type of rock
- ⌘ Humus: the dark colored matter formed from decayed plant and animal remains
- ⌘ Organic Matter: any substance that is made of living things or the remains of living things

# Vocab



- ⌘ Renewable Resource: a resource that can be replaced as fast as it is used
- ⌘ Nonrenewable Resource: a resource that cannot be replaced as fast as it is used
- ⌘ Fossil Fuel: an energy source made from once-living organisms
- ⌘ Geothermal Energy: a renewable resource that is generated from the heat in Earth's interior

# Vocab

- ⌘ Coal: a solid fossil fuel that formed from swamp plants
- ⌘ Petroleum: a liquid fossil fuel that formed from ocean water organisms
- ⌘ Natural Gas: a fossil fuel found in the form of a gas
- ⌘ Acid Precipitation: rain or snow that has a large amount of acid

# Vocab

# Ch. 9 Rocks and Minerals

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# Ch. 9.1 What are rocks and minerals? {

- ⌘ To be a mineral, a substance must fit all parts of the definition
- ⌘ Sand is made of a mineral called quartz
- ⌘ Examples of minerals: diamond, quartz, emerald, copper, and ruby
- ⌘ Most minerals have a geometric shape
- ⌘ Minerals are made of crystals
- ⌘ Crystals are arranged in a particular repeating pattern
- ⌘ Crystals form when minerals are made in nature

# Minerals

- ⌘ Minerals can be identified by their properties
- ⌘ Scientists use hardness and other properties to identify them
- ⌘ Use the Mohs Hardness Scale to tell hardness of minerals
- ⌘ Hardness refers to how difficult it is to scratch its surface
- ⌘ A mineral can only be scratched by a harder mineral
- ⌘ Talc has the softest measure with a 1
- ⌘ Diamond is a 10

# Identifying Minerals



- ⌘ Minerals show particular patterns when they are broken
- ⌘ Some split or cleave along flat planes
- ⌘ This is called cleavage
- ⌘ Others don't split. They fracture or break into uneven pieces
- ⌘ Some appear metallic, greasy, glassy or waxy
  - ⌘ How it appears is called luster
- ⌘ Some show colors when under UV light
- ⌘ Some are magnetic

# Identifying Minerals



- ⌘ Most minerals are found mixed together in rocks
- ⌘ When studying rocks, scientists look at the rock's color and texture
- ⌘ Can use its characteristics to determine where and how it formed
- ⌘ Rocks are always changing
- ⌘ As time passes, they break down and the minerals in them are recycled
- ⌘ The pattern of change is called the rock cycle

# Rocks

- ⌘ Sedimentary rock forms in layers with the oldest rock at the bottom
- ⌘ Like a history book because it contains past events in each layer
- ⌘ Sometimes contain fossils
- ⌘ Fossils are only found in sedimentary rocks
- ⌘ An example is limestone: made from the shells of tiny sea animals or from dissolved minerals that settle out of seawater

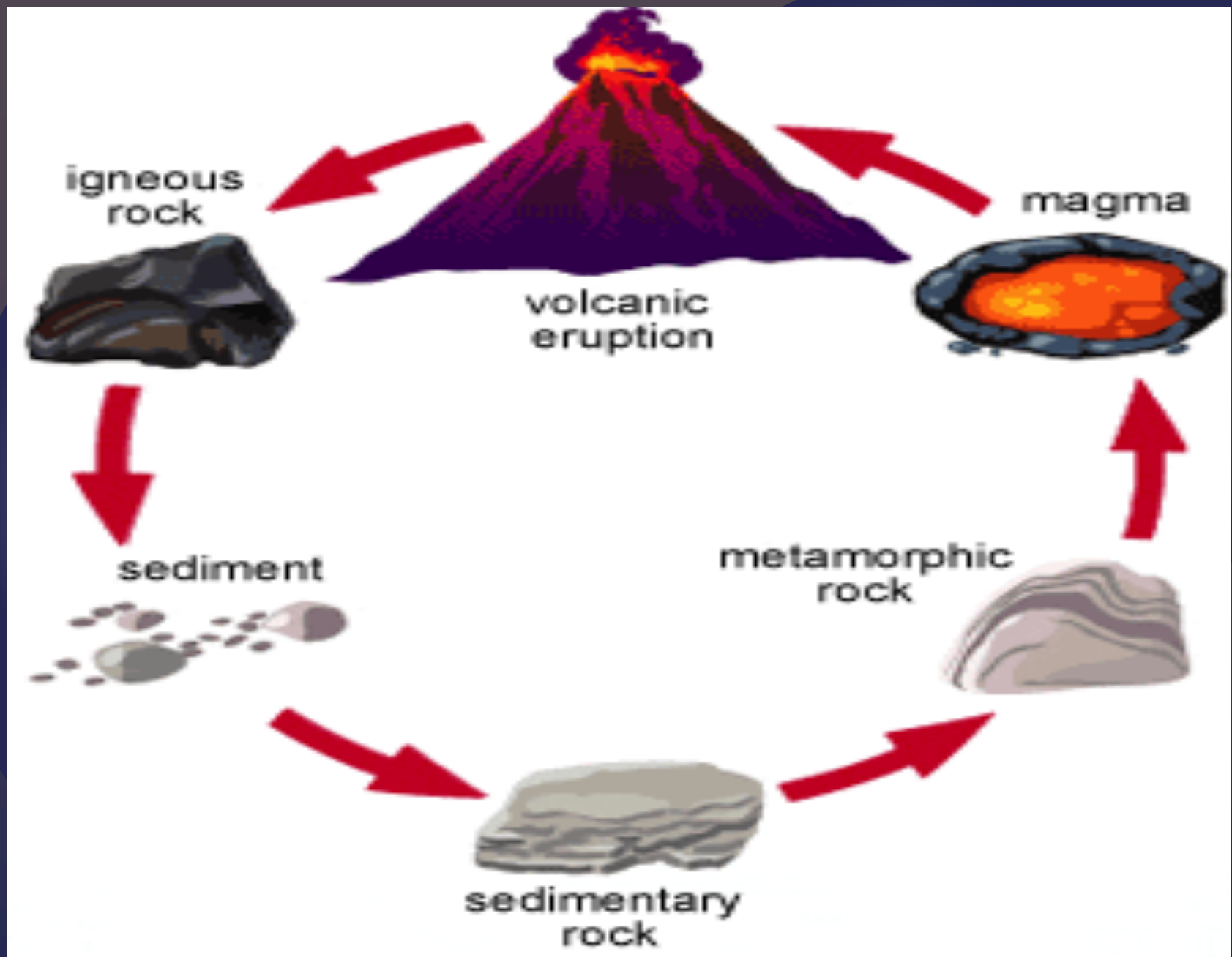
# The Rock Cycle

- ⌘ Igneous rocks form when magma cools and hardens
- ⌘ Some form below Earth's surface and only appear when the rocks above them wear away
- ⌘ Others form when lava cools at the surface
- ⌘ When it cools quickly, fine grained rock forms
- ⌘ When it cools slowly it forms coarse grained rock

# The Rock Cycle

- ⌘ Metamorphic rock forms when rock is changed into another type of rock
- ⌘ It is made from sedimentary or igneous rock
- ⌘ Example: marble is formed from limestone

# The Rock Cycle



Ch. 9.2 Why is soil  
important to living  
things?  
{



- ⌘ Rocks are not only apart of the rock cycle, they also are apart of the process that forms soil
- ⌘ When rock breaks down due to weathering, soil is formed
- ⌘ Water and air fill in spaces between the broken down pieces of rock
- ⌘ This is the nonliving part of soil

# Forming Soil



- ⌘ As time passes. Bacteria, fungi and plants begin to grow
- ⌘ When these organisms die, they decay
- ⌘ The soil then contains organic matter
- ⌘ Humus, the organic part of soil, is rich in nutrients needed by plants
- ⌘ Soil forms in 3 layers

# Forming Soil

- ⌘ The first layer is topsoil
  - ⌘ Mixture of small rock pieces, humus and other organic matter
  - ⌘ Most living things found here
  - ⌘ Dead leaves and twigs cover topsoil
- ⌘ The second layer is subsoil
  - ⌘ Has less organic matter than topsoil
  - ⌘ Lighter in color
  - ⌘ Minerals carried away from topsoil end up in subsoil
- ⌘ The third layer is made up of parent rock material
  - ⌘ Very little organic matter in this layer

# Forming Soil

- ⌘ There are many types of soil
- ⌘ Clay soils are fine grained and hold water extremely well
- ⌘ Silt soil has medium sized grains
- ⌘ Sandy soils are large grained and are poor at holding water
- ⌘ Most soils are a mix of all 3
- ⌘ Loam is a type of soil that contains silt and sand in roughly equal amounts

# Kinds of Soil

- ⌘ Climate of an area may be the most important factor in determining the type of soil
- ⌘ Weathering takes place more quickly in warmer areas with a lot of rainfall
- ⌘ In tropical climates, plentiful rainfall washes minerals out of the topsoil and into the subsoil
  - ⌘ Topsoil is thin and not very fertile
- ⌘ In the desert weathering is very slow
  - ⌘ Since water evaporates quickly, minerals that were dissolved in water collect on the soil surface

# Factors That Affect Soil

- ⌘ The different minerals in rocks affect the characteristics of soil
- ⌘ Can affect color or weathering process
- ⌘ Color is also affected by the amount of organic material
- ⌘ More organic material equals darker soil
- ⌘ Shape of land affects soil formation
  - ⌘ Mountains have thin layers because it is eroded down the slopes
  - ⌘ Flat lands have thicker layers of topsoil

# Factors That Affect Soil



# Ch. 11 Earth's Resources {

# Ch. 11.1 What are Earth's natural resources?

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- ⌘ Renewable resources are all around us
  - ⌘ Air, water, land, sunlight, wind
- ⌘ Nonrenewable resources take millions of years to form
  - ⌘ Minerals and fossil fuels
- ⌘ Important to consider the costs before using any resources

# Renewable and Nonrenewable Resources

- ⌘ Life is possible because of nitrogen, oxygen and carbon dioxide in the atmosphere
- ⌘ These gases are renewable
- ⌘ Air can become polluted
- ⌘ Pollution can occur when fuels such as coal, oil and natural gas are burned

# Air Resources

- ⌘ Land resources include farmlands, grazing lands, soil, minerals, forests and wildlife
- ⌘ Soil can take hundreds of years to form
- ⌘ Land also provides the minerals we use everyday
- ⌘ Minerals take thousands of years to form and are nonrenewable

# Land Resources

- ⌘ Forests contribute a lot to humans, the planet and animals
- ⌘ Deforestation is causing problems
  - ⌘ Animals losing homes
  - ⌘ Rise in carbon dioxide levels
  - ⌘ Medicines and food

# Forests

- ⌘ Water is considered renewable because of the water cycle
- ⌘ However it can become polluted
  - ⌘ Picks up pesticides and fertilizers
  - ⌘ Used by factories to cool equipment and returned warmer than usual
- ⌘ Even though 75% of the Earth is water, most of it is the salt water in the oceans that can't be used
- ⌘ Fresh water is only about 3% of the water on Earth
  - ⌘ Most is frozen

# Water Resources

- ⌘ The ocean provides us with many minerals
  - ⌘ Salt, tin, magnesium, copper
  - ⌘ Can be found in lumps called nodules
- ⌘ Oil and natural gas can also be found under the ocean floor
- ⌘ Ocean waves can produce energy
  - ⌘ However only few places have the right coastline

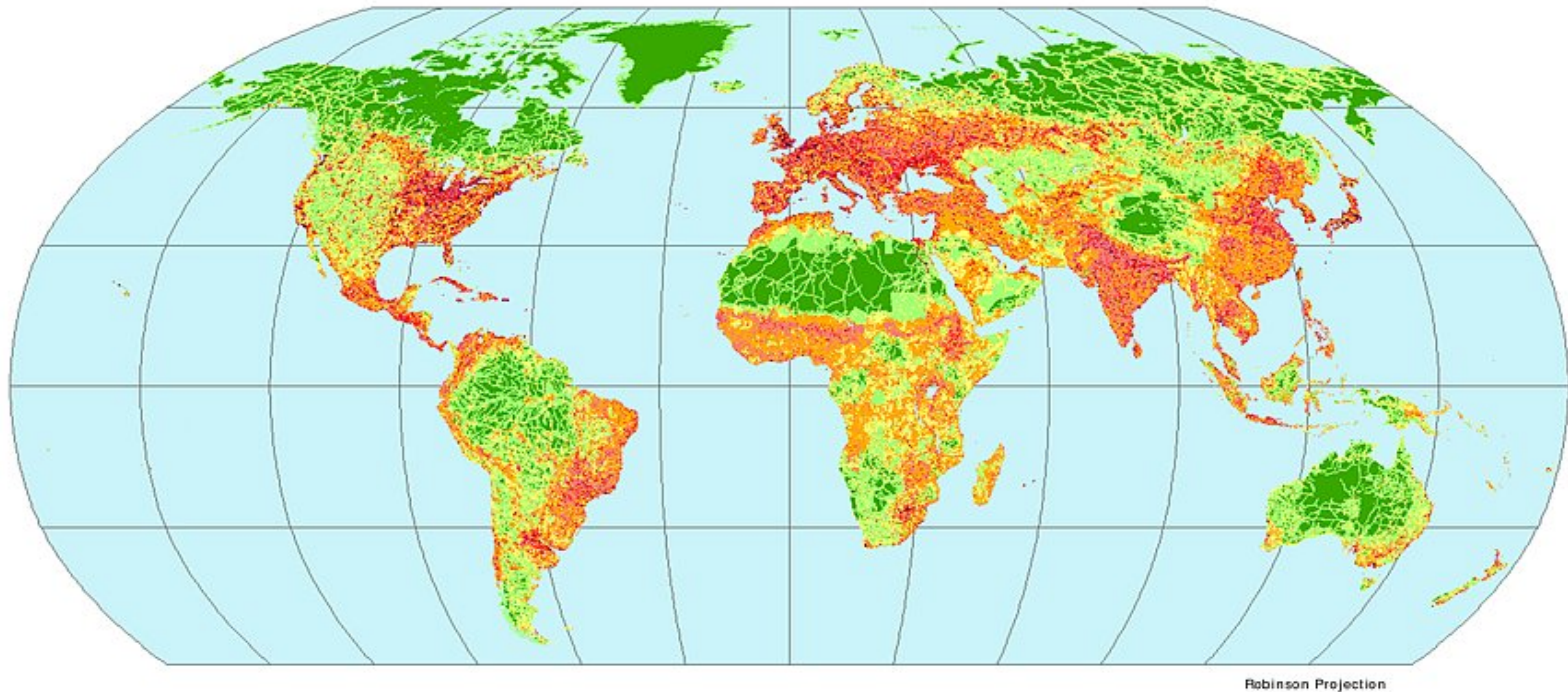
# Ocean Resources



- ⌘ Humans have affected 83% of Earth's land
- ⌘ 98% of the land where rice, wheat and maize can be grown has been impacted

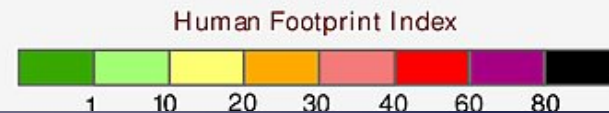
# Connections Among Resources





### The Human Footprint Index

The Human Footprint Index (HF) expresses as a percentage the relative human influence in each terrestrial biome. HF values range from 0 to 100. A value of zero represents the least influenced - the "most wild" part of the biome with value of 100 representing the most influenced (least wild) part of the biome.



# Human Footprint Map

Ch. 11.2 Where do  
we get energy?  
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- ⌘ Moving water can be used for energy
- ⌘ Hydroelectric power is produced when dams are built across waterways
- ⌘ Water pushes against the blades of a turbine, causing the blades to turn
- ⌘ The energy created is converted to electrical energy in a generator
- ⌘ Advantages
  - ⌘ Doesn't release pollution
  - ⌘ Renewable
- ⌘ Disadvantages
  - ⌘ Can destroy wildlife habitats

# Energy from Moving Water

- ⌘ Nuclear energy comes from the heat produced when atoms split apart
- ⌘ Nuclear energy is nonrenewable
- ⌘ Doesn't pollute the air, but waste can be harmful to most living organisms
- ⌘ Geothermal energy comes from deep within Earth's interior
- ⌘ Scientists drill into Earth's surface, and release steam
- ⌘ The steam powers turbines
- ⌘ This is a renewable resource but is more available in certain parts of the world

# Energy from Atoms and Earth's Heat



- ⌘ Energy from the sun is solar energy
- ⌘ Can be converted to electricity without turbines
- ⌘ Renewable and doesn't pollute
- ⌘ Wind energy comes when wind pushes against giant wind turbines
- ⌘ Renewable
- ⌘ Not available in all places and can be harmful to wildlife

# Energy from Sunlight and Wind

# Ch. 11.3 How are fossil fuels formed and used?

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- ⌘ When animals and plants die, they store some amount of energy. These are called fossil fuels
- ⌘ When we burn fossil fuels we are releasing that energy
- ⌘ Coal: solid fossil fuel. Until 1960 was world's primary energy source. Now used in power plants to produce energy
- ⌘ Petroleum: also called crude oil, liquid fossil fuel, has been used more than 5000 years, used to make gasoline
- ⌘ Natural gas: fossil fuel that is a mixture of gases, used to heat homes

# Types of Fossil Fuels

- ⌘ Most of energy in US is fossil fuels
- ⌘ US also has large amounts of coal
- ⌘ Both are nonrenewable, so scientists work on ways to create energy
- ⌘ They also cause problems
- ⌘ When fossil fuels are produced they release greenhouse gases that trap heat in the atmosphere
- ⌘ This trapped heat may cause Earth to warm up which could kill many organisms
- ⌘ Gases can also mix with water vapor and form acid precipitation
- ⌘ Smog is a yellowish brownish haze that can cover cities and be harmful to breathe in

# Using Fossil Fuels

- ⌘ Coal, petroleum and natural gas formed from buried remains of organisms
- ⌘ Coal formed from swamp plants
  - ⌘ Plants buried in water and mud
  - ⌘ Formed a layer of dead material called peat
  - ⌘ Over time more mud, water, and peat formed over it causing pressure
  - ⌘ The pressure and heat from Earth's surface changed peat into lignite, a soft form of coal
  - ⌘ The more heat and pressure turns coal into a different form
  - ⌘ Each type has more carbon than the last
  - ⌘ The more carbon, the cleaner it burns

# How Coal Forms

- ⌘ Oil and natural gas formed from the remains of tiny organisms that lived in water
- ⌘ Natural gas rises above oil
- ⌘ Both can be drilled into and recovered deposits used for energy

# Oil and Natural Gas

- ⌘ When petroleum is removed from the ground it is a mixture of many different products
- ⌘ Separated at an oil refinery
- ⌘ There crude oil is heated and substances are removed
- ⌘ Finished products are stored at the refinery until shipped to gas stations or factories

# Processing and Delivering Petroleum



- ⌘ [https://www.learner.org/interactives/rockcycle/images/rockintro\\_08.gif](https://www.learner.org/interactives/rockcycle/images/rockintro_08.gif)
- ⌘ <http://sedac.ciesin.columbia.edu/downloads/maps/wildareas-v2/wildareas-v2-human-footprint-geographic/World.jpg>

# Picture Sources