

In addition to reading the textbook and using this study guide, be sure to study your review questions and the in-class activities.

Formation of solar system: nebular hypothesis, planet makeup

Geosphere: compositional divisions—what divides, how thick

divisions based on physical properties—what divides, how thick

Lithosphere: plates that move—character of boundaries, continental vs. oceanic, Features of ocean basins—abyssal plains, deep ocean trenches, oceanic ridges

Features of continents—young mountain belts (two: know them),

stable platform and continental shield: what distinguishes these two?

Elements of Earth's crust: know eight most common, order of abundance of top five, weight percent of top two, type of most common minerals formed

Atom: three fundamental subatomic particles—characteristics of each

- Structure of the atom: nucleus with electron shells
- Periodic table arranged on structure and properties
  - Know what periodic table can tell you
  - Valence electrons
  - # of shells of electrons

Water molecule: polar, bent, covalent bonds,

Unique properties of water due to hydrogen bonding

- high specific heat capacity: 1 calorie per gram to raise temperature 1° C
- expands upon freezing
- high heat of vaporization
- dissolves ionic substances—polar nature of molecule
- high surface tension

Heat: movement of molecular kinetic energy from substance with higher temperature to substance with lower temperature

- Temperature: measure of hotness
  - Fahrenheit scale: water—freezing 32° F, boiling 212° F
  - Celsius scale: water—freezing 0° C, boiling 100° C
  - Kelvin scale: absolute zero=0, water—freezing 273 K, boiling 373 K
- Heat measured in calories (cal.) or joules (J)
  - 1 calorie heat energy raises 1 gram water 1 degree Celsius
  - 4.184 joules = 1 calorie
- Most substances expand w/heat transfer to them, and contract on heat loss

Water contracts with loss of heat until 4° C  
Begins to expand slightly until 0° C  
Expands 9% upon freezing  
Contracts after freezing, slightly  
Know natural implications of this phenomenon

#### Specific heat capacity

Rock, soil specific heat capacity about 1/5 of water  
Water defines calorie—higher than many substances  
Moderates temperature of regions  
Marine influence keeps temperatures mild  
Desert, continental areas—less water: wider temperature fluctuations  
Metals have specific heat capacity about 1/8 of water

#### Heat of water

Condensation/Evaporation—540 calories per gram, 2254 joules/gram  
Freezing/Melting—80 calories per gram, 334 joules/gram  
Be able to calculate heat transferred in temperature change and phase change  
Boiling is a cooling process  
100° C at sea-level pressure  
More at elevated pressures  
Less at reduced pressures

#### Pollution

Greatest source: organic wastes from sewage and agriculture runoff  
Problems: methane, algal bloom, depleting oxygen  
Solution: keep raw effluent out of water  
Additional sources include metals from industry, acid drainage from mining,  
petroleum derivatives: solvents, pesticides, paints  
Concentrations may be harmful in parts per million range—know how to  
calculate parts per million

#### Water distribution: 97+% in sea, ¼ of remaining is ice, most rest is groundwater

Evaporation/precipitation percents over sea and land  
Runoff contains natural and man-caused impurities  
Atmospheric sources: what, why  
Land sources: natural—what, why  
Contamination: what, why, prevention measures  
Less than ¼ of water stored on land is fresh liquid water as groundwater  
Aquifer and aquitard—know definitions, differences  
Water table—position, fluctuation  
Springs—  
With respect to water table  
Geysers created by addition of heat to water

## Oceanography

### Sediments

Terrigenous: from land—sand and gravel, abyssal clay

Biogenous: from organisms—dominates where high biologic activity

Calcareous dissolves below 4500 m, silicic does not

Hydrogenous—from water—evaporites, nodules, metal sulfides

### Ocean basins

Three types of provinces—know them

continental margin (two types): know features, lithosphere interaction

ocean basin floor: features, formation

oceanic ridge: features, lithospheric plate interaction

### resources

energy—petroleum: shelf deposits, methane hydrate

others—metal sulfides, sand and gravel, evaporites

## Sea water

- What accounts for differences in salinity?
- How does temperature affect the density of sea water?
- Describe the reason for, and the path of, the thermohaline conveyor circulation
- Ocean circulation: Be able to locate California, Kuroshio, Equatorial, Gulf Stream, and West Wind Drift currents on a map, and identify the general temperature of each. What does the Gulf Stream bring to Cornwall?

## Sea life—most derives energy from photosynthesis, directly or by eating

- Classifications of sea life: plankton, nekton, benthos; pelagic, abyssal
- Distribution controlled by what two major factors?

## Coastal area

- Headland erosion and inlet deposition of sediment
- Erosional and depositional features
- Types of coastal stabilization, and the implication of their construction
- Tides: what causes them, what do they produce, names of extreme tides and minimal tides
- What is an estuary, and how is it formed?

## Earth's relation to Sun

- Axial tilt leads to seasons, solstice and equinox: know details and dates of these, and general relation of latitude to day length
- Know names of special circles of Earth's surface defined by Sun relation
- How does Earth's relation to Sun affect temperature? Why?