CRCT Study Guide – Science

Chap 12 - Atmosphere

The atmosphere is made mostly of nitrogen (78%) & oxygen (21%).

Earth’s atmosphere makes conditions on Earth suitable for living things.

Air pollution and acid rain is caused by burning fossil fuels.

As you go higher in the air (altitude increases), air pressure and density decrease.

Layers of the atmosphere are classified according to temperature.

 Troposphere – you live here, weather is here, temperature decreases as altitude increases

 Stratosphere – contains ozone layer and jet stream, temperature increases as altitude increases

 Mesosphere – coldest layer, protects us from being hit by most meteoroids, shooting stars here

 Thermosphere – hottest & thickest layer, divided into two layers

 Ionosphere – aurora borealis happens here and radio waves can be bounced from here at night

 Exosphere – satellites orbit Earth here, no definite limit, just blends into outer space

Only about ½ of the sun’s energy reaches Earth’s surface. The ozone layer helps block out UV rays.

The greenhouse effect keeps Earth at suitable temperatures. It is a natural process. However, human actions could increase the greenhouse gases which could increase the greenhouse effect and could lead to global warming.

Cool Cats Rule – Conduction, Convection, & Radiation – ways that heat is transferred.

Convection currents transfer most heat in the troposphere.

Wind is caused by the unequal heating of the Earth. Unequal heating causes differences in air pressure and density. Air moves from areas of high pressure to areas of low pressure. The movement is wind.

 Local – Sea Breeze/Land Breeze (land heats and cools faster than water)

 Global – Polar Easterlies, Prevailing Westerlies, Horse Latitudes, Trade Winds, Doldrums

 Prevailing Westerlies – bring us most of our weather in GA

 Jet Streams – fast moving winds that help bring weather to us in GA

Coriolis Effect – wind and water appear to turn because of Earth’s rotation. Causes winds and ocean currents to turn.

Chap 13 Weather

Weather – day-to-day condition of the atmosphere, includes temperature, precipitation, cloud coverage, wind (know weather map symbols)

Water cycle – evaporation (and transpiration), condensation (clouds), precipitation, runoff, groundwater

Humidity & relative humidity – amount of water vapor in the air

Clouds – cirrus, stratus (& fog), cumulus, cumulonimbus

Precipitation – rain, hail, sleet, snow, freezing rain

Air masses have temperature and moisture like the area it formed over. Tropical, polar, maritime, continental

Fronts – bring us changes in weather and storms, is a boundary between air masses. Cold, warm, stationary, occluded (know all symbols)

Cyclone – low pressure, stormy. Anticyclone – high pressure, dry air.

Happy highs, lousy lows

Storms:

Thunderstorm – form at fronts, especially cold fronts, may make hail

Hurricane - storm surge – deadliest part, eye – calm part, form over warm ocean water with low pressure at center

Tornado – form at fronts, especially cold, highest winds of all storms

snow storm – stay out of wind

Chap 14 Climate

Climate – average year-after-year of temperature, precipitation, winds, and clouds in an area

Temperature zones:

 Tropical - warm

 Temperate - seaons

 Polar - cold

Maritime climate – mild winters, cool summers

Continental climate – more extreme temperatures, winters cold & summers hot

What affects temperature? Latitude, altitude, close-by bodies of water, ocean currents (Gulf Stream – warms much of Europe)

What affects precipitation? Prevailing winds, mountain ranges (rainshadow – windward side, leeward side), seasonal winds (monsoons)

Seasons – caused by the tile of Earth’s axis

GA has temperate marine, humid subtropical climate

Causes of climate change: Earth’s position compared to sun, solar energy (sunspots), volcanic activity, movement of continents

Global changes in the atmosphere: short-term: El Nino (warmer water) & La Nina (colder water) (both in the tropical Pacific Ocean), global warming – greenhouse effect may be increased by burning fossil fuels

Ozone layer has been damaged by CFCs (chlorofluorocarbons in spray cans)

Chap 10 – Fresh Water

Water cycle – know all steps, process that moves water from air to land and back to air

Earth is 70-75% water and 25-30% land. Of the water, 97% is salt and 3% is fresh (2% is frozen, 1% in air, ground, rivers, lakes)

Surface water – important terms: tributaries, water shed, divides, wetlands (3 types of fresh: marsh, swamp, bog)

Groundwater – important terms: permeable, impermeable, saturated, unsaturated, water table, spring, geyser, aquifer, artesian well

Conserve water – turn off faucet when brushing teeth, irrigation (water plants carefully), agriculture is biggest use of water in US

Water pollution – important terms: point source & non-point source

Chap 11 – Oceans

Salt water comes from minerals being dissolved from rock by water as it flows to the ocean. 3.5% salinity. Salinity is balanced because of water cycle & animals in ocean.

Ocean floor – know all features: continental shelf, continental slope, abyssal plains, trench, mid-ocean ridge, seamount, volcanic island, guyot

Ocean zones - across the ocean – intertidal, neritic, & open-ocean. Most life is in intertidal because of sunlight for photosynthesis.

Ocean zones – going down into ocean – surface, transition, deep

Waves – begin as wind blows across water and transmits energy to water. Know parts of wave, water moves in a circle, breaker, how wave changes near shore, tsunami (caused by earthquake on ocean floor)

Waves affect shore by: longshore drift, rip currents, beach erosion, barrier beaches (like Tybee)

As you go deeper in the ocean, temperature & light decrease and pressure and density increase.

Currents & Climate: surface currents caused by wind, deep currents caused by differences in density due to differences in temperature and salinity. El Nino – warmer water in tropical Pacific Ocean – changes weather patterns around the world. Upwelling – movement of cold water upward from ocean bottom because winds have blown away warm surface water.

Tides – caused by gravity of the moon (and sun) pulling on Earth’s water. Know important terms: high tide, low tide, spring tide, neap tide, tidal energy (can make electricity by capturing the moving water). Know diagram and moon phases to cause spring & neap tides.

Chap 15 – Earth, Sun, Moon

Key Terms: rotation, revolution, axis, orbit, seasons, solstice, equinox, gravity

Earth moves in 2 ways in space – rotates & revolves

Moon phases – caused by the Moon revolving around Earth and our view of the lit portion, know all phases and diagrams to create them

Eclipses - solar & lunar (know diagram and moon phases to cause it)

Tides – caused by gravity of the moon (and sun) pulling on Earth’s water. Know important terms: high tide, low tide, spring tide, neap tide, tidal energy (can make electricity by capturing the moving water). Know diagram and moon phases to cause spring & neap tides.

Moon: maria, highlands, craters, ice at poles, has no air, no atmosphere, smaller gravity than Earth, huge differences in day & night temperature

First person on the moon: Neil Armstrong, First American in space: Alan Shepard, First American to orbit Earth: John Glen

Know difference in space shuttle, space station, space probe, rover

Chap 16 Solar System

Geocentric (Earth at center of universe) – old idea by Ptolemy, Heliocentric (sun at center of solar system) – newer idea, by Coppernicus with Galelio’s support later by telescope.

Inner Planets – Mercury, Venus, Earth, Mars (small, dense, rocky, close to sun, rotate slowly, revolve quickly) Know important characteristics of each planet. Mars is the most likely planet to have life other than Earth.

Outer Planets – Jupiter, Saturn, Uranus, Neptune (and Pluto if they ask for nine). Large, gas giants, far from sun, cold, rotate quickly, revolve slowly, many moons

Comets, Asteroids, Meteorids: comet is like a dirty snowball, asteroids left over parts of planets formation, meteoroids – parts of asteroids or old comets. Meteor –burns up in atmosphere, meteorite – touches Earth. Asteroid belt located between Mars & Jupiter. Kuiper belt is past Pluto while Oort cloud surrounds whole solar system. Both are thought to be home of many comets.

Chap 17 Stars, Galaxies, the Universe

Key Terms: constellations, universe, galaxy, light-year

We live in the Milky Way Galaxy, on the Orion arm. Milky Way may be a barred spiral galaxy.

Types of galaxies: spiral (like Milky Way), irregular, elliptical.

Big Bang Theory – the theory of how the universe was created – a small dot of hot, heavy material exploded and began expanding in all directions. Red Shift is the leading support for this theory – all galaxies seem to be moving away from the Milky Way.

Chap 2 Minerals & Rocks

Key terms: mineral, inorganic, crystal, luster, streak, hardness, cleavage, fracture, sediment, erosion, deposition, compaction, cementation

Know how to identify a mineral using some key characteristics such as color, streak, luster, hardness (Mohs)

Rocks: classified by how they were formed, made of minerals and organic material, 3 types: igneous (intrusive & extrusive), sedimentary (organic, chemical, clastic), metamorphic (foliated & nonfoliated).

Rock Cycle – know it from every direction

Chap 3 – Plate Tectonics

Layers of Earth – crust, (asthenosphere & lithosphere), mantle, outer core, inner core(density is 15 g/cm) – we know these by studying earthquakes (seismic waves). Know characteristics of each layer including composition, temperatue, & density.

CCR – Conduction, Convection, Radiation – 3 types heat transfer.

Convection currents in mantle – thought to move the plates at surface of Earth

Continental Drift – Wegner said Pangaea was a large continent that somehow broke apart and each continent drifted to its current location

Seafloor spreading – says seafloor is spreading apart at mid-ocean ridges

Plate Tectonics – theory that explains the formation, movement, & subduction of Earth’s tectonic plates. This pulls in Continental Drift and Seafloor spreading. Plates are the broken parts of the lithosphere (crust & top of mantle). Faults are breaks in Earth’s crust.

Plate boundaries – divergent divides ( rift-valley, mid-ocean ridge), convergent collides (mountains, subduction zones, trenches, volcanoes), transform slides (major earthquakes)

Chap 4 – Earthquakes

Most earthquakes occur at plate boundaries.

Key terms: fault, epicenter (need 3 stations to find), focus, Mercalli scale, Richter scale, moment magnitude scale, seismograph, liquefaction, tsunami

Chap 5 – Volcanoes

Most volcanoes occur at plate boundaries.

Key Terms: Ring of Fire (volcanoes surrounding Pacific Ocean), hot spot (Hawaii & YellowStone), crater, caldera, dormant, extinct, geothermal activity, hot spring, geyser

Chap 6 – Weathering & Soil

Key terms: oxidation, humus, fertility, topsoil, subsoil, soil horizon, soil profile, soil conservation, litter, contour plowing, crop rotation, conservation plowing, terracing, wind breaks,

Mechanical & chemical weathering break down rock. Know causes of each type.

Weathering & erosion work together to wear down & carry away rocks at the surface.

Soil - long time to form, horizons form in order of C, A, B from bedrock below. We can’t live on Earth without soil. GA has southern forest soil.

Soil conservation – know negatives (overgrazing & forest harvesting) and positives. Main idea is to keep soil covered so it can’t blow or wash away.

Chap 7 - Erosion & Deposition

Key terms: erosion, deposition, sediment, delta, alluvial fan, meaner, oxbow lake, flood plain, groundwater, stalactite, stalagmite, abrasion, glacier, ice age, longshore drift, sand dune

Erosion – moving sediment. Deposition - dropping sediment

Agents of erosion & deposition – wind, water, ice, gravity, & waves

Glaciers make u-shaped valleys, rivers make v-shaped valleys

Know landforms created by deposition (alluvial fan, delta, barrier beach, sand dune, sand bar)

Chap 8 – Fossils

Key Terms: fossil, index fossils, trace fossil, law of superposition, unconformity (gap in geologic time record)

Index fossils held identify age of rock layers.

Chap 9 – Energy Resources

Key Terms: fossil fuel (coal, oil, natural gas), renewable, nonrenewable, biomass, geothermal, hydroelectric, wind, solar, energy conservation

Nonrenewable resources – energy resources that are in limited supply or take a long time to make (coal, oil, natural gas, & uranium)

Renewable resources – energy resources that are readily available or can be replaced with a pretty short time (wind, solar, geothermal, biomass, hydroelectric, hydrogen)

Human Impact

People affect Earth by using and abusing natural resources. We have a negative effect on water, air, soil, fossil fuels. We must be careful not to pollute or overuse our natural resources.

Science tools

Barometer – used to measure air pressure in millibars (aneroid) and inches of mercury (mercury barometer)

Thermometer – used to measure temperature in Celsius, or Fahrenheit

Anemometer – used to measure wind speed

Psychrometer – used to measure relative humidity (amount of water vapor in the air)

Telescope – used to see into space

Seismograph – used to measure earthquake waves

Scientists

Meteorologist – studies weather

Astronomer – studies Earth in space

Geologist – studies Earth

Oceanographer – studies oceans

Seismologist – studies earthquakes

Volcanologist – studies volcanoes

Paleontologist – studies fossils

Important word parts

Hydro – water

Helio – sun

Geo – earth

Sol – sun

Sphere – a ball

Seism – earthquake

Therm - heat