# Earth & Environmental Science NC Final Review

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This Review Guide outlines the NC Essential Standards for Earth/Environmental Science. Key terms are **bolded**. You can find PowerPoint’s from the textbook on my class website (mrleehuhs.weebly.com)

## EEn 1.1 Explain Earth’s role (position) as a body in space.

1. How is Earth’s motion related to the origin of the galaxy and its solar system?
2. What is Earth’s position in the hierarchy of organization within the universe?
3. How do **Kepler’s laws** describe planetary orbits (esp. Earth’s)?
4. What is the relative motion of Earth in the solar system, the solar system in the galaxy, and the galaxy in the universe?
5. What motion causes a **year?**
6. What motion causes **day and night**?
7. What initial event do scientists hypothesize caused the universe to expand?
8. What is **precession?** How does it change the climate?
9. What is **nutation**? How does it change the climate?
10. What is **barycenter**? Why does the Sun wobble?
11. What causes the **seasons**?
12. When are winter, spring, summer, and fall in each hemisphere? Relate this to Earth’s **tilt**.
13. Why are seasons opposite in the Northern and Southern hemispheres?
14. What force and motion causes the circumference of Earth to be **larger around the equator** than around the poles?
15. What is **fusion**?
16. Where in the universe does fusion occur naturally?
17. How does **fission** differ from fusion? (Where does fission occur on Earth?)
18. What is **combustion**? How does **combustion** differ from fusion or fission?
19. What forms of energy are produced by the sun?
20. What are **electromagnetic waves**?
21. How are **ultraviolet rays** filtered or blocked by our atmosphere?
22. How are **cosmic rays** blocked?
23. By what three processes does the Sun’s energy warm the Earth and its atmosphere?
24. What is **radiation**?
25. What is **conduction**?
26. What is **convection**?
27. Which takes longer to warm or cool – land or water?
28. How does the **differential heating** of land and water cause wind?
29. How does the **differential heating** of land and water affect coastal climates?
30. What is **photosynthesis**?
31. How is solar energy transformed into chemical energy through photosynthesis?
32. What factors affect a plant’s ability to perform photosynthesis?
33. What is Earth’s **magnetic field**?
34. What creates the magnetic field?
35. How does it protect us from the harmful effects of the Sun’s radiation?

## EEn 2.1: Explain how processes and forces affect the lithosphere.

## EEn 2.2: Understand how human influences impact the lithosphere.

1. What are the processes that change one type of rock into another type in the **rock cycle**?
2. What processes form **igneous rocks**?
3. What processes form **sedimentary rocks**?
4. What processes form **metamorphic rocks**?
5. What is **weathering**? How is it related to the rock cycle?
6. What is the difference between **chemical weathering** and **physical weathering**?
7. What are ways that rocks can be chemically weathered? Physically weathered?
8. In which type of climate do rocks experience more chemical weathering? Physical weathering?
9. Which types of rocks are more easily physically weathered?
10. What type of weathering produces caves and clay?
11. How does weathering help to make **soil**?
12. What is **soil**?
13. How do the three particle types of soil (**clay, silt, sand**) differ?
14. How can a **soil texture triangle** be used to determine the texture of soil in a location?
15. What type of soil is found in the desert, the tundra, the tropical forest, and the temperate (deciduous) forest and grasslands?
16. What is the difference between **renewable** and **nonrenewable resources**?
17. What consequences do the following environmental issues have on the lithosphere – **desertification, monoculture, pesticide use, erosion, deforestation, urbanization**? What is each? How can the effects of each situation be prevented or lessened? Why do we use **traditional agriculture**?
18. What is **erosion**?
19. How does **water** cause erosion? What is a **delta**? What is an **alluvial fan**?
20. How does **wind** cause erosion? What is **abrasion**? What is **deflation**? What is **desert pavement**? What is a **sand dune**?
21. How do **glaciers** cause erosion? What is a **moraine**? What is **till**?
22. What are the types of **mass movements** of Earth materials due to the force of gravity? How do the following types of mass movements change Earth’s surface – **landslides,** **slumps, avalanche, rock slide** (fall), **creep**?
23. Which locations would be most at risk for the destruction of buildings due to mass movements? How might this destruction be prevented?
24. What is the effect of human activity on **shorelines**? What are artificial stabilization efforts used to prevent shore erosion? (What is a **jetty, groin, seawall, breakwater**?)
25. What is the effect of human activity on **mountainsides**? What are artificial stabilization efforts used to prevent erosion on mountainsides?
26. What is the theory of **plate tectonics**? What tectonic features do scientists look at on a world map that indicates that Earth’s lithosphere is broken into giant plates?
27. How are the plates **moving** at each of the following plate boundaries - **divergent, convergent, transform**?
28. What might the **convection currents** in the mantle under each of these boundaries look like? (That is, in which direction are they flowing?)
29. How do the forces of **ridge push** and **slab pull** move the tectonic plates?
30. What **geologic events/landforms** occur at of the following plate boundaries – **divergent,** **convergent (ocean/ocean), convergent (ocean/continental), convergent (continental/ continental)**, **transform?** Answer the following questions. Studying diagrams would be immensely helpful!!
    1. At which boundary is **seafloor spreading** occurring?
    2. Which of the boundaries form **fissure volcanoes,** a **rift valley,** or a **midocean ridge**?
    3. Which of the boundaries form **volcanic islands**?
    4. Which of the boundaries form a **volcanic mountain range** near a coastline?
    5. At which boundary is an **ocean trench** present?
    6. What forms an ocean trench?
    7. What is a **subduction zone**? What often forms above a subduction zone?
    8. Where is the **ring of fire**?
    9. At which boundary are **folded mountains** (such as the Appalachians) formed?
31. How did the **Appalachian Mountains** of N. Carolina form? (See Computer Lab and p. 532-534..)
    1. What type of **boundary** created the Appalachian Mtns?
    2. **When** did these events occur?
    3. What is a **fall zone**?
    4. How were our **barrier islands** formed?
32. What is a **volcano**?
33. What is the difference between **magma** and **lava**?
34. How does a **shield cone** (Hawaii) form? What effects does that have on the lithosphere?
35. How does a **cinder cone** (Central America) form? What effects does that have on the lithosphere?
36. How does a **composite volcano** (Mt. St. Helens/ Vesuvius) form? What effects does that have on the lithosphere?
37. What is a **lahar**? A **lava flow**? A **pyroclastic flow**? How does each affect the lithosphere?
38. What is **volcanic ash**? How does it affect the atmosphere and global temperatures?
39. Where do most volcanoes form? What is a **hot spot** volcano?
40. What causes an **earthquake**?
    1. What is **stress**? What do - **compression, tension, shear -** result in?
    2. What is a **fault**?
    3. What type of stress and rock movement are found at each of the 3 types of faults - **reverse, normal, strike-slip?**
    4. What are **seismic waves**?

How do the following types of seismic waves - **primary, secondary, surface -** move the rocks through which they travel? Which are fastest? Which do the most damage?

What does a **Travel-Time Graph** show? (You should be able to use one!)

What is the **focus** of an EQ? What is the **epicenter**? How can an EQ’s epicenter be located? (Be able to locate the epicenter if given the arrival times of P-waves and S-waves.)

1. How do the following scales - **Richter, Modified Mercalli -** measure the intensity of earthquakes? What numbers are used by each? What does each successive number represent?
2. How is a **seismic intensity map** made? Which of our states have the highest seismic risk? What is North Carolina’s seismic risk? Is it the same across the state?
3. Where on Earth do most EQs occur? (If plotting the locations of EQs on a world map, what pattern would you see?)
4. How do the following EQ hazards - **pancaking, soil liquefaction, fault scarp, tsunami –** affect the lithosphere and human life and property?
5. What precautions can be taken to prevent the loss of human life and destruction to property due to EQs?
6. Where is each located - **crust, upper mantle, asthenosphere, lower mantle, core?**

## EEn 2.3: Explain the structure and processes within the hydrosphere.

## EEn 2.4: Evaluate how humans use water.

1. When sea ice melts, the water gets cold and salty and sinks - why?
   1. Where does cold water from the poles go?
   2. What does deep ocean water do as it reaches the equator and warms?
   3. What is an **upwelling**? What causes it?
2. How do each of these processes of the water cycle work? **evaporation, transpiration, condensation, precipitation,** and **infiltration**.
3. What is the connection between **surface water** and **groundwater**? How does each turn into the other?
4. What are the following parts of a river? – **river, tributaries, watershed, divide, floodplain, meander, headwaters, and mouth?**
5. Where does water in a river flow the **fastest**? the **slowest**? Which part of a meander would be eroded more – the inside or outside? (Hint, where is water moving fastest?)
6. What causes **floods**? How do groundwater levels affect flooding?
7. List **threats** to the Yadkin-PeeDee River.
8. What is **eutrophication**? What can speed it up?
9. Where would the following types of **wetlands** be found in N. Carolina – bogs, swamps, marshes?
   1. What are two important **functions** of wetlands?
   2. What **human activities** can degrade (harm) our wetlands?
   3. What are three ways our wetlands can be **preserved**?
   4. What is an **estuary**? Where does the fresh and salt water come from? How would an upstream **drought** affect the water in an estuary?
10. Where is most of Earth’s water? Where is most of Earth’s **fresh** water?
11. How are the following terms describing groundwater defined **– porosity, aquifer, aquiclude, zone of saturation, water table**?
12. What is a **well**?
13. The following are consequences of the **overuse of groundwater**…
    1. What is **drawdown**?
    2. What is **aquifer depletion**?
    3. What is **subsistence**?
    4. What causes **salt-water intrusion** into wells in coastal areas?
14. What are some **threats** to our groundwater supplies?
    1. What **substance** is drawn up when wells are over pumped?
    2. Can most chemical contaminants **be easily removed** from groundwater?
    3. How can our groundwater be protected and restored?
15. What are 4 important uses of freshwater in our country?
    1. How water use differ in different parts of our country?
    2. How is water used in NC?
    3. What are **dams** built for?
16. What is the difference between **point** and **nonpoint pollution**? What are examples of each? Include **sedimentation** and **stormwater** runoff in your answer.
    1. What are sources of **arsenic** in groundwater?
    2. What is the difference between groundwater and surface water pollution? Which is easier to pollute? To clean up?
    3. What chemical & physical factors affect the quality of NC streams?
    4. How is the **biotic index** used to determine the quality of water in a stream?
    5. Where is a stream **most affected by pollution** – headwaters or mouth – and why?
17. How is water treated to make it **potable (drinkable**)?
    1. What is the effect of **population growth** on potable water sources?
    2. What two laws were passed to ensure clean, drinkable water?
18. How can farmers, industries, every day people conserve water?

## EEn 2.5: Understand the structure of and processes within our atmosphere.

1. What is the **most** abundant gas in the atmosphere? By what percent? The **second** most? By what percent?
2. What are the functions/importances of the following substances in the atmosphere… **oxygen,** **carbon dioxide, ozone, water vapor, water, ice, dust** and **salt**
3. What are the characteristics and composition of the 5 layers of the atmosphere – **troposphere, stratosphere, mesosphere, thermosphere, exosphere**? What is found in each?
   1. Where is the **ozone layer**? Why is it so important to life on Earth?
   2. How does the temperature, pressure, & density vary as one moves up the **troposphere**?
   3. What characteristic is used to identify the **layers of the atmosphere**?
   4. Why is the **thermosphere** said to be the hottest layer when it feels so cold up there?
4. How much of the sun’s energy does Earth’s surface **absorb**? What happens to the rest of it?
5. What is **dew point**? What does it tell us?
6. If warm air and cold air collide, which will rise?
   1. Why does **warm air rise**?
   2. Why does **cold air sink**?
7. What creates **wind**?
8. What is **relative humidity**?
   1. What **instrument** is used to determine relative humidity?
   2. How is a **relative humidity chart** used?
9. How are **clouds** formed? What part of the water cycle is involved?
   1. What is the **lifted condensation level**?
   2. What is **orographic lifting**?
10. What is the difference between **weather** and **climate?**
11. What are the location and characteristics of the **5 major air masses** that affect the weather of the USA? **continental tropical, maritime tropical, continental polar, continental tropical, Arctic**
12. What is the location (by latitude) and wind direction of the each of the **global wind systems… polar easterlies, prevailing westerlies, trade winds**. Which is responsible for the movement of weather across the USA?
13. What is a **jet stream**?
14. What are the **horse latitudes and the doldrums**? What causes them?
15. What causes the four types of **fronts** - **cold, warm, stationary, occluded?** Identify symbols for each & describe the weather & clouds each causes. What happens to temperature of an area after each passes?
16. Be able to read a weather map! (Geolab 6) What are **isobars**? **Isotherms**? What type of wind is represented by isobars that are close together? (strong or weak?)
17. Describe the 2 types of **pressure systems – high** and **low**. Recognize the symbol for each. What kind of weather do they cause?
18. What kind of data is collected by the following weather instruments – **thermometer, barometer, anemometer, hygrometer (psychrometer), ceilometers**
19. What type of data do **radiosondes** collect – *in general and specifically*?

What is **radar**?

* 1. What is radar used to track?
  2. What is **Doppler radar** used for?

1. How is a **station model** read**?** Why are station models used?
2. Where do the majority of **thunderstorms** occur in the USA?
   1. When and where do the following types of thunderstorms occur – **sea breeze, orographic**?
   2. Where is the safest place to be during a **thunderstorm**?
3. What is a **tornado**?
   1. Review the **Enhanced Fujita Scale**. **What** does it measure? **When** and **how** does it measure that?
   2. Where is **Tornado Alley**?
   3. Which **2** **air masses** create tornados? During which month do most tornadoes occur?
   4. Where is the safest place to be in during a **tornado?**
4. What is a **tropical cyclone**? (a hurricane?)
   1. Where do cyclones derive their **energy**? What causes them to **lose strength**?
   2. Which direction do hurricanes spin and which way do they usually move in the N. hemisphere?
   3. Which wind system pushes them back to the east?
   4. Do **winds** increase or decrease as a hurricane strengthens? What about air **pressure**?
   5. What does the **Saffir-Simpson Scale** classify?
5. **Hurricane Hazards**…
   1. Where are the **strongest winds** in a hurricane?
   2. What is a **storm surge**? What kills **9 out of 10** people who die in hurricanes?
   3. What is the number 1 safety tip for surviving a **hurricane**?
6. How does **acid rain** form?
   1. What **human activities** alter the pH of rain to cause acid rain?
   2. What can **coal-burning power plants** do to **prevent** acid rain?
   3. How does **sea water acidification** affect the oceans?
7. How do the following activities affect the quality of atmospheric composition?
   1. How do **aerosols** affect the atmosphere**?**
   2. How do **chlorofluorocarbons** affect the atmosphere**?**
   3. How does **burning of wood or fossil fuels** affect the atmosphere**?**
   4. How do **industrial byproducts** affect the atmosphere**?**
   5. How does **over-farming** affect the atmosphere**?**

Look at each of the activities above. How can people reduce their negative impact on the atmosphere for each activity?

## EEn 2.6: Analyze patterns of global climate change over time.

## EEn 2.7: Explain how the lithosphere, hydrosphere, and atmosphere individually and collectively affect the biosphere over time.

1. What are 3 factors that describe the **climate** of a location?
2. Where are each of the following climate zones is located **- tropics, temperate, polar?** 
   1. In general, what temperatures would you experience in each zone?
   2. Why does it get colder as one moves toward the poles?
3. What is the **rain shadow effect**? What does it create on the leeward side of a high mountain range?
4. How do **ocean currents** affect climate?
   1. Which current affects our climate? California’s?
   2. On which coast would you find **cold currents? Warm** **currents**?
5. How do **coastal** climates differ from **continental** (inland) climates? Why?
6. What does the **Koeppen classification system** classify?
7. Which climate zone, class, and subclass do **WE** live in?
8. What is a **microclimate**? Give an example.
9. Are coastal areas **cooler** or **warmer** than inland areas in the winter? (Think about the difference in temperature between Clemmons and Wilmington.)
10. What is a **heat island**? Give an example.
11. What is a **biome**? What do the terms ***biotic factors*** and ***abiotic factors*** mean?
12. What are the characteristics of the six biomes… How can you describe the climate of each? What plants and animals live in each? What adaptations must the plants and animals have to survive in each biome? What air mass is each affected by?
    1. **Tundra**
    2. **Taiga**
    3. **Deciduous forest**
    4. **Desert**
    5. **Grasslands**
    6. **Rain forest**
13. Which biome is most of **North Carolina** in?
14. What is an **ice age**? How does an ice age affect sea level?
15. What is **El Niño**?
    1. Which **current** is affected? How does pressure change in the Pacific Ocean?
    2. Which **global wind system** weakens?
    3. Why is the **cold upwelling** along the Peruvian Coast so important?
    4. What happens to the fisheries when the water warms?
    5. How does it affect the California coast? The Gulf Coast? The Atlantic?
16. How do the absence (or presence) of **sunspots** affect Earth’s climate? Why was the **Maunder Minimum** (Little Ice Age) so cold?
17. How does a **more elliptical orbit** affect Earth’s climate?
18. How do **large volcanic eruptions** affect Earth’s climate?
19. How does extra **carbon dioxide** in the atmosphere affect Earth’s climate? (Answer this question with the standard statement about CO2 being a toxic, greenhouse gas that causes global warming - for your Exam!)
    1. How do changes in global temperatures affect **agriculture**?
    2. How do changes in global temperatures affect **species diversity** (esp. amphibians)?
    3. How do changes in global temperatures affect **ecosystem balance**?
    4. How do changes in global temperatures affect **weather events**?
    5. How do changes in global temperatures affect **sea level**? (esp. during warming) Related to this…
       1. How do **glaciers** affect sea level?
       2. How does **plate movement** affect sea level?
    6. How are the **shorelines and barrier islands of NC** affected by sea level rise?
    7. How do changes in global temperatures affect **ocean acidification**? (and sea life)
20. What is the **biosphere**?
21. What is **biodiversity**?
    1. What is **genetic biodiversity**? Why is it important? What is a species that has lost genetic biodiversity?
    2. Which biome has the **most** biodiversity? Why?
    3. Which biome has the **least** biodiversity? Why?
22. What are 5 things that can reduce biodiversity?
    1. Specifically, what is an **invasive species**? How does it impact biodiversity? What is an example of an invasive species here in NC?
    2. What is **overharvesting**?
    3. What is **habitat alteration**?
23. What impact does the **loss of biodiversity** have on our society – local and global?
24. How can we **prevent** the loss of biodiversity?

## EEn 2.8: Evaluate human behaviors in terms of how likely they are to ensure the ability to live sustainably on Earth.

* + - 1. What methods do we use to obtain… **peat & wood, natural gas & petroleum (oil), uranium & coal**?
      2. What are the consequences of the following activities on the lithosphere? **Mining**? **Harvesting**? **Drilling**?
      3. What are the benefits, costs, and environmental impact of the following types of alternative energy – **solar, wind, biofuels, nuclear fusion, fuel cells, wave power,** and **geothermal**?
      4. Which of the energy sources listed above would work best in the mountains, piedmont, and coastal plains of NC? Why?
      5. What are the advantages and disadvantages of **traditional aquaculture**? **Sustainable aquaculture**?
      6. What is **carrying capacity**?
      7. What is the difference between **dependent** & **independent limiting factors**? What are examples of each?
      8. What is the impact of a **growing population on North Carolina’s natural resources**?
      9. What is an **ecological footprint**? What are **levels** of ecological footprints?
      10. What contributes to your ecological footprint? Is it big or small? How can you make it smaller?
      11. How can the philosophy of “**reduce, reuse, recycle**” be used to preserve our natural resources? Which of the 3 “R’s” is the **best** policy? Which has the **least impact** but is better than no action?