Earth/Environmental Science Review Packet

Explain the Earth's role as a body in space.
1. Explain the Earth's motion through space, including precession, nutation, the barycenter, and its path about the galaxy.

A. Matching

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Rotation</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Revolution</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Precession</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Nutation</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Barycenter</td>
<td></td>
</tr>
<tr>
<td>A.</td>
<td>Day and Night (24 hrs)</td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>A Year (365 days)</td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>change in direction of the axis, but without any change in tilt—this changes the stars near (or not near) the Pole</td>
<td></td>
</tr>
<tr>
<td>D.</td>
<td>wobbling around the axis (This occurs over an 18 year period)</td>
<td></td>
</tr>
<tr>
<td>E.</td>
<td>the center of mass where two or more celestial bodies orbit each other (This is the point about which the Earth and Moon orbit as they travel around the Sun.)</td>
<td></td>
</tr>
</tbody>
</table>

B. Fill in the blank

________________________ is made of ____________________________ which are made of many __________________________. Some stars have planetary systems similar to our __________________________. Earth is a __________________________ of one particular star.
(star, galaxy, universe, satellite planet, solar system)

C. The universe is __________________________ (expanding or contracting) after the Big Bang.

True or False.
1. _____ Kepler discovered that the path of each planet around the sun is an ellipse.
2. _____ The universe is made of galaxies, galaxies contain stars, stars may have planetary systems.

Identify Kepler's Laws

_____ The line joining the planet to the Sun sweeps out equal areas in equal times as the planet travels around the ellipse.

_____ The ratio of the squares of the revolutionary periods for two planets is equal to the ratio of the cubes of their semimajor axes.

_____ The orbits of the planets are ellipses, with the Sun at one focus of the ellipse.

2. Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides.

A. Fill in "tide" or "season" for the chart
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<table>
<thead>
<tr>
<th>C. What is our main source of electromagnetic energy?</th>
<th>D. True or False. Energy produced by the Sun is transferred to earth by radiation.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**B. Describe Earth's shape**

**C. What is our main source of electromagnetic energy?**

**D. True or False. Energy produced by the Sun is transferred to earth by radiation.**

**E. Explain Nuclear Fusion.**

**F. Explain Nuclear Fission.**

**Electromagnetic Spectrum**

- Decreasing wavelength
  - Violet
  - Blue
  - Green
  - Yellow
  - Orange
  - Red

- Increasing wavelength

(Not drawn to scale)

**2. Explain how incoming solar energy makes life possible on Earth.**

**A. What is photosynthesis?**

**B. Explain how the sun's energy moves through the food chain**

**Explain how processes and forces affect the lithosphere**

**1. Explain how the rock cycle, plate tectonics, volcanoes, and earthquakes impact the lithosphere.**

**A. Match the type of rock that forms due to the following**
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1. __Igneous
2. __Metamorphic
3. __Sedimentary

A. Melting and Cooling
B. Heat and pressure
C. Weathering/erosion and compaction

B. Explain the theory plate tectonics

________________________________________________________________________
________________________________________________________________________

C. All of the following support the theory of continental drift except _____.
A. The continents seemed to fit together like pieces of a puzzle.
B. There are similar fossils on different continents.
C. Mountain ranges on different continents lined up.
D. The North Pole and Antarctica are covered in ice.

D. What hypothesis states that the continents were once joined to form a single supercontinent?
   a. plate tectonics
   c. continental drift
   b. seafloor spreading
   d. paleomagnetism

E. Use the word bank below to complete the sentences.

<table>
<thead>
<tr>
<th>seismograph</th>
<th>Sea floor spreading</th>
<th>earthquakes</th>
<th>melt</th>
</tr>
</thead>
<tbody>
<tr>
<td>P Waves</td>
<td>Continental-continental</td>
<td>Metamorphic</td>
<td>S Waves</td>
</tr>
</tbody>
</table>

1. Which of the following occur at divergent boundaries? ________________________
2. An earthquake __________________ is occurs directly above the focus.
3. Mountains form at ____________________________ convergent boundaries.
4. __________________ rocks form due to heat a pressure.
5. Magma forms when rocks from the upper crust and mantle ________________________.
6. A ____________________________ is the instrument that records earthquake waves.
7. ______________ shake particles at a right angle to the direction of travel.
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_______________ change a materials volume by expansion and compression.

8. Predictions are made on the assumption that ________________ are repetitive (they occur on the same fault lines).

F. Match structures formed at each plate boundary

A  


C. Explain what happens (plate motion) and what features occur at each plate boundary. Convergent (Hint: Three types)

G. In the chart below compare and contrast magma and lava.

<table>
<thead>
<tr>
<th>Magma</th>
<th>Lava</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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2. Locate volcanoes and relate back to plate boundaries. Explain volcanic effects on the lithosphere and relate back to plate boundaries (convergent, divergent, transform) including lahar (mud) flows and ash in the atmosphere.

A. Circle the best answer

1. Most of the active volcanoes on Earth are located in a belt known as the _____.
   a. Ring of Lava       c. East African Rift Valley
   b. Ring of Fire       d. circum-Atlantic belt

B. Label the epicenter and focal point.

C. At which type of plate boundary do earthquakes typically occur?

D. Complete the chart below.
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#### Seismic Waves:

<table>
<thead>
<tr>
<th>Seismic Waves</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave Letter</td>
<td></td>
</tr>
<tr>
<td>Wave Name</td>
<td></td>
</tr>
<tr>
<td>Order of Arrival</td>
<td></td>
</tr>
<tr>
<td>Motion</td>
<td></td>
</tr>
<tr>
<td>Force</td>
<td></td>
</tr>
</tbody>
</table>

E. Summarize the major events in the geologic history of North Carolina and the southeastern United States.

1. __ Appalchian Mountains  
   a. due to uplifting of rock in the western part of NC
2. __ Fall Zone  
   b. line of erosion between piedmont and coastal plains
3. __ Shorelines  
   c. affected by erosion due to increase in sea level
4. __ Barrier Islands  
   d. built up by sediment from rivers, and constantly changing due to wave action
5. __ River Basins  
   e. area of land that contributes water to a river

F. What is currently happening to global sea level? Why?

---

3. Explain how natural actions such as weathering, erosion (wind, water and gravity), and soil formation affect Earth’s surface.

A. Label each diagram as “weathering”, “erosion” or “soil formation”
**B. Mass Movements:**

<table>
<thead>
<tr>
<th>1. The downslope movement of rock, regolith, and soil under the direct influence of gravity is called a(n) ___________.</th>
<th>2. A mass movement that involves the sudden movement of a block of material long a flat, inclined surface is called a ___________.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Slide</td>
<td>b. Slump</td>
</tr>
<tr>
<td>c. Flow</td>
<td>d. Rockfall</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. The downward movement of a block of material along a curved surface is called a(n) ___________.</th>
<th>4. What is the slowest type of mass movement?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Earthflow</td>
<td>b. Slump</td>
</tr>
<tr>
<td>c. Creep</td>
<td>d. Rockfall</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. What factor(s) commonly triggers mass movement?</th>
<th>6. What is the force behind mass movement?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Earthquakes</td>
<td>a. The sun’s energy</td>
</tr>
<tr>
<td>b. Saturation of surface materials with water</td>
<td>b. Gravity</td>
</tr>
<tr>
<td>c. Removal of vegetation</td>
<td>c. Flowing water</td>
</tr>
<tr>
<td>d. All of the above</td>
<td>d. Moving ice</td>
</tr>
</tbody>
</table>

**C. Earthquakes:**

<table>
<thead>
<tr>
<th>1. What are the causes of damage during or after an earthquake (5 in total)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
</tr>
<tr>
<td>2)</td>
</tr>
<tr>
<td>3)</td>
</tr>
<tr>
<td>4)</td>
</tr>
<tr>
<td>5)</td>
</tr>
<tr>
<td>3. Which of the following affects the amount of destruction caused by earthquake vibrations? a. The design of structures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. How can we predict earthquakes?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>4. What is the minimal number of seismic stations that is needed to determine the location of an Earthquake’s epicenter?</td>
</tr>
</tbody>
</table>
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| b. The nature of the material on which structures are built | a. One  
b. Two  
c. Three  
d. Four |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Explain the hazards to humans from an earthquake ---&gt;</td>
<td></td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**D. Volcanoes:**

1. The particles ejected in volcanic eruptions are called ____.  
   a. Calderas  
b. Volcanic stocks  
c. Laccoliths  
d. Pyroclastic material

2. List the types of volcanoes and explain each of them.

3. Most of the active volcanoes on Earth are located in a belt known as the ____.
   a. Ring of Fire  
b. Ring of Lava  
c. East African Rift Valley  
d. Mid-Pacific Rise

Which of the following factors helps determine whether a volcanic eruption will be violent or relatively quiet?
   a. amount of dissolved gases in the magma  
b. temperature of the magma  
c. composition of the magma  
d. all of the above

---

Explain precautions that can be made to protect life from various geohazards. Some examples include landslides, earthquakes, tsunamis, sinkholes, groundwater pollution, and flooding.

__________________________________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________
Understand how human influences impact the lithosphere.

1. Explain the consequences of human activities on the lithosphere past and present.
   
   A. Match each human activity to possible consequences

<table>
<thead>
<tr>
<th>Activity</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ___ mining</td>
<td>a. soil erosion</td>
</tr>
<tr>
<td>2. ___ deforestation</td>
<td>b. desertification</td>
</tr>
<tr>
<td>3. ___ agriculture</td>
<td>c. nutrient depletion</td>
</tr>
<tr>
<td>4. ___ overgrazing</td>
<td>d. global warming</td>
</tr>
<tr>
<td>5. ___ urbanization</td>
<td>e. heat islands</td>
</tr>
</tbody>
</table>

Explain the structure and processes within the hydrosphere.

1. Explain how water is an energy agent
   
   A. Explain how warm and cold currents cycle.

2. Explain how ground water and surface water interact.
   
   A. Label: evaporation, transpiration, precipitation, condensation, run off

   B. Label the watershed with: headwaters, estuary, floodplain, tributaries, precipitation
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Evaluate how humans use water.

1. Evaluate human influences on freshwater availability
   A. Fill in the blank: well, aquifer, dams, agriculture, recreation, subsidence, salt water intrusion.

   To access groundwater, ___________ are dug into ___________. The primary use of groundwater by humans is for _______________. Issues with aquifers include _______________ (sinking of sediment) and _______________ (contamination of salt water by the coast).

   B. Growing human population will ___________ freshwater as a resource. (increase or decrease).

   C. True or False:
      ___________ Pollution in the ground cannot affect freshwater.
      ___________ Pollution at one area of a watershed cannot affect other areas of the watershed.
      ___________ A biotic index of macroinvertebrates can be used to determine water quality

Understand the structure of and processes within our atmosphere.

1. Summarize the structure and composition of our atmosphere.
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A. Label the layers of the atmosphere to the right: thermosphere, troposphere, stratosphere, mesosphere

B. Which diagram above shows how air masses move in the troposphere?
(H = high pressure, L = low pressure)

C. True or False:

___________ warm moist air rises over cold dense air
___________ rain occurs when warm moist air condenses at higher altitudes
___________ higher elevations are colder than lower elevation
___________ a cold front occurs when cold air masses push under a warm air mass. Narrow storms are produced

___________ wide bands of precipitation occur at warm fronts
___________ thunderstorms occur at warm moist air masses moving along a cold front
___________ tornadoes are measured by the Fujita Scale
___________ hurricanes are measured by the Saffir-Simpson Scale
___________ isotherms show lines of temperature
___________ isobars show lines of air pressure
___________ psychrometers measure humidity
___________ barometers measure air pressure
___________ thermometers measure air temperature
___________ anemometers measure air speed
___________ a weather vane measure wind direction
___________ a rain gauge shows the amount of precipitation
2. Explain how cyclonic storms form based on the interaction of air masses

   A. Why does dew form in the morning?
   B. Explain how clouds form.

<table>
<thead>
<tr>
<th>Hurricane Formation</th>
<th>Tornado Formation</th>
</tr>
</thead>
</table>

3. Explain how human activities affect air quality
   A. Match the following to their impact on the atmosphere

1. ___ Acid Rain
2. ___ chlorofluorocarbons (CFC's)
3. ___ burning of fossil fuels

   a. formed by sulfur dioxide and nitrogen oxides, decrease pH of precipitation
   b. decreases ozone
   c. increases the amount of greenhouse gases and sulfur dioxide and nitrogen oxides

**Analyze patterns of global climate change over time**
1. Differentiate between weather and climate
   A. True or False?
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- Temperate climates are located closest to the equator.
- Polar climates are cold year round
- Temperate climates have warm and cold seasons
- Polar climates have the most precipitation
- Tropical climates have the most varied climate

B. Compare weather and climate.

<table>
<thead>
<tr>
<th>Weather</th>
<th>Climate</th>
</tr>
</thead>
</table>

2. Explain changes in global climate due to natural processes.

A. Matching

1. ___ El Nino/La Nina | a. unusually warm temperatures caused by a change in ocean currents
2. ___ volcanic eruptions | b. cause cooler temperatures due to absorption of sun’s energy by atmospheric particles
3. ___ sunspots | c. decrease in climate due to magnetic field changes of the sun
4. ___ shifts in Earth’s orbit | d. changes in climate due to the change in the tilt of Earth’s axis
5. ___ carbon dioxide fluctuations | e. increases climate when increase occurs

B. Explain the concept of the greenhouse effect and identify 2 greenhouse gases.

3. Analyze the impacts that human activities have on global climate change (such as burning hydrocarbons, greenhouse effect, and deforestation).

A. Matching

1. ___ burning hydrocarbons | a. increases greenhouse gases (CO2) in the atmosphere
2. ___ greenhouse effect | b. traps heat in the atmosphere
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3. ___ deforestation  
4. ___ heat island  
5. ___ industrialization  
c. increases CO2 in the air and results in less CO2 being removed from the air by photosynthesis  
d. urban areas that reflect more heat and produce more CO2  
e. results in increased burning of fossil fuels.

Explain how the lithosphere, hydrosphere, and atmosphere individually and collectively affect the biosphere.

1. Explain how abiotic and biotic factors interact to create the various biomes.
   A. Identify if the following factors of biomes are biotic or abiotic: temperature, rainfall, altitude, type of plant, latitude, type of animals.

<table>
<thead>
<tr>
<th>Biotic</th>
<th>Abiotic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

B. Explain why biodiversity is important.

C. Complete the chart

<table>
<thead>
<tr>
<th>Human Influence</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human population growth</td>
<td></td>
</tr>
<tr>
<td>Habitat alteration</td>
<td></td>
</tr>
<tr>
<td>Introduction of invasive species</td>
<td></td>
</tr>
<tr>
<td>Pollution</td>
<td></td>
</tr>
<tr>
<td>Over harvesting</td>
<td></td>
</tr>
</tbody>
</table>

Evaluate human behaviors in terms of how likely they are to ensure the ability to live sustainably on Earth

1. Critique conventional and sustainable agriculture and aquaculture practices in terms of their environmental impacts.
   A. Fill in the chart
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<table>
<thead>
<tr>
<th>Energy</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>solar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wind</td>
<td></td>
<td></td>
</tr>
<tr>
<td>biofuels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nuclear fission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fuel cells</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wave power</td>
<td></td>
<td></td>
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<tr>
<td>geothermal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>coal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>natural gas</td>
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</tbody>
</table>

B. Identify if the above energy sources are renewable or nonrenewable in the chart below:

<table>
<thead>
<tr>
<th>Renewable</th>
<th>Nonrenewable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Explain the effects of uncontrolled population growth on the Earth’s resources.
   A. What is the carrying capacity of the following graph and explain?

   ![Graph](image)

   B. What are three limiting factors for human population?
C. What will most likely happen if the human population continues to grow at current rates?
   a. There will be fewer natural resources available for future generations.
   b. There will be an increase in nitrogen levels in the atmosphere.
   c. There will be a decrease in the number of strong hurricanes.
   d. There will be a decrease in water pollution.

3. Evaluate the concept of “reduce, reuse, recycle” in terms of impact on natural resources.

A. What is ecological footprint?
   a. measures the amount of renewable and nonrenewable resources that are used by our activities
   b. the maximum number of individuals that the environment can support
   c. measure of how many people make up the world population

B. Identify one example of a material that could be reused. How could reusing the object provide a lasting impact on the environment?