

Earth/Environmental Science Review Packet for the NC Common Exam

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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

1. <u>A</u> Rotation	A. Day and Night (24 hrs)
2. <u>B</u> Revolution	B. A Year (365 days)
3. <u>C</u> Precession	C. change in direction of the axis, but without any change in tilt—this changes the stars near (or not near) the Pole
4. <u>D</u> Nutation	D. wobbling around the axis (This occurs over an 18 year period)
5. <u>E</u> Barycenter	E. 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.)

B. Fill in the blank

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

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

True or False.

1. T Kepler discovered that the path of each planet around the sun is an ellipse.

2. F The universe is made of galaxies, galaxies contain stars, stars may have planetary systems.

Identify Kepler's Laws

1. 2 The line joining the planet to the Sun sweeps out equal areas in equal times as the planet travels around the ellipse.

2. 3 The ratio of the squares of the revolutionary periods for two planets is equal to the ratio of the cubes of their semimajor axes.

3. 1 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.

Earth rotates about its axis which causes it to

bulge at the equator (spheroid). Because earth

is tilted, as it revolves around the sun, either

the N or S hemisphere is tilted towards the sun.

This causes the seasons. It is the rotation of

the earth, along with the presence of the moon

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A. Fill in "tide" or "season" for the chart

due to the approximate 23.5 degree tilt and revolution of the Earth	<u>Season</u>
due to the gravitational interaction between the Earth and moon	<u>tide</u>

B. Describe Earth's shape

oblate spheroid

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

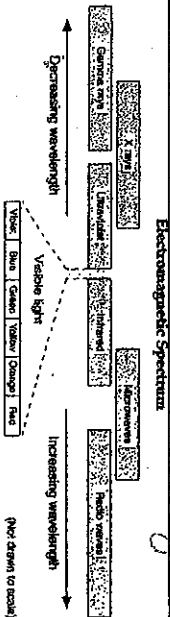
D. True or False. Energy produced by the Sun is transferred to earth by radiation. T

E. Explain Nuclear Fusion

combining of lighter nuclei to produce heavier nuclei

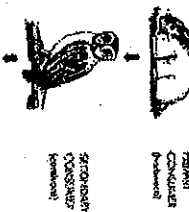
F. Explain Nuclear Fission

splitting of a heavy nucleus to produce lighter nuclei

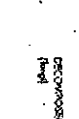


2. Explain how incoming solar energy makes life possible on Earth.

A. What is photosynthesis? plants use energy from sun to produce energy & oxygen



B. Explain how the sun's energy moves through the food chain. plants use energy to grow & produce food. animals consume plants, humans consume both



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

rocks transform into other rocks or break down into sediments to make soil

the plates are in motion which creates

new rock, melts old rock, cause volcanoes (subduction zones & hot spots), & cause

earthquakes—which break the surface

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A. Match the type of rock that forms due to the following

1. <u>Igneous</u>	A. Melting and Cooling	
2. <u>Metamorphic</u>	B. Heat and pressure	
3. <u>Sedimentary</u>	C. Weathering/erosion and compaction	

B. Explain the theory plate tectonics

explains the features of earth's surface, earthquakes, volcanoes, & mountains based on the surface consisting of large plates that move over time (big of heat in mantle - convection)

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
- b. sea floor spreading
- c. continental drift
- d. paleomagnetism

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

seismograph	Sea-floor-spreading	earthquakes	melt
P Waves	Continental-continental	Metamorphic	S Waves

1. Which of the following occur at divergent boundaries? sea floor spreading

2. An earthquake epicenter is occurs directly above the focus.

3. Mountains form at continental-continental convergent boundaries.

4. Metamorphic rocks form due to heat & pressure.

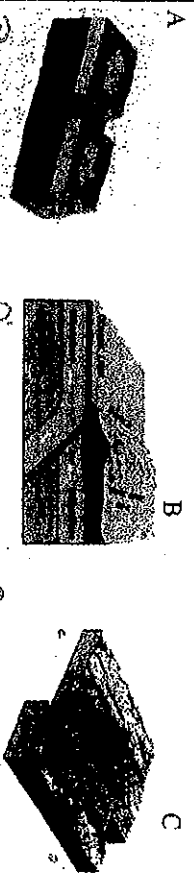
5. Magma forms when rocks from the upper crust and mantle melt.

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6. A seismograph is the instrument that records earthquake waves.
7. S waves shake particles at a right angle to the direction of travel. P waves change a materials volume by expansion and compression.
8. Predictions are made on the assumption that earthquakes are repetitive (they occur on the same fault lines).

F. Match structures formed at each plate boundary



- A 1. Convergent
- B 2. Divergent
- C 3. Transform

C. Explain what happens (plate motion) and what features occur at each plate boundary.

Convergent (Hint: Three types)
C-C moves toward each other, causes mountain ranges
C-O oceanic plate subducts => volcanoes
O-O one plate subducts => volcanoes

Divergent (Hint: Two types)
O-O sea floor spreading, allows magma to fill gap & creates new crust
C-C ridges and rifts

Transform
plates scrape past each other, creates ridges & causes earthquakes

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(5)

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

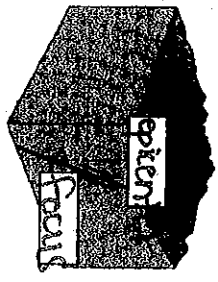
Magma	Lava
molten rock below surface	molten rock on surface

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 _____.
- Ring of Lava
 - East African Rift Valley
 - Ring of Fire
 - circum-Atlantic belt

B. Label the epicenter and focal point.



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

Along transform boundaries

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(6)

D. Complete the chart below.

Seismic Waves:	Seismic Waves:		
Waves			
Wave Letter	P	S	Surface
Wave Name	Primary	Secondary	Surface
Order of Arrival	1st	2nd	Last
Motion	push-pull	rt angles to travel	up & down
Force	sea level	small	large

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

- P Appalachian
 - B Fall Zone
 - C Shorelines
 - D Barrier Islands
 - E River Basins
- a. due to uplifting of rock in the western part of NC
 b. line of erosion between piedmont and coastal plains
 c. affected by erosion due to increase in sea level
 d. built up by sediment from rivers, and constantly changing due to wave action
 e. area of land that contributes water to a river

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

Rising - as temps warm, water expands, also as polar ice melts what is over land) it runs into sea

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

(3)

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A. Label each diagram as "weathering", "erosion" or "soil formation"

<p><u>weathering</u></p>	<p><u>soil formation</u></p>	<p><u>erosion</u></p>
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B. Mass Movements:

<p>1. The downslope movement of rock, regolith, and soil under the direct influence of gravity is called a(n) <u>mass movement</u>.</p>	<p>2. A mass movement that involves the sudden movement of a block of material long a flat, inclined surface is called a <u>slide</u>.</p>
<p>3. The downward movement of a block of material along a curved surface is called a(n) <u>slump</u>.</p>	<p>4. What is the slowest type of mass movement? a. Earthflow b. Slump c. Creep d. Rockfall</p>
<p>5. What factor(s) commonly triggers mass movement? a. Earthquakes b. Saturation of surface materials with water c. Removal of vegetation d. All of the above</p>	<p>6. What is the force behind mass movement? a. The sun's energy b. Gravity c. Flowing water d. Moving ice</p>

C. Earthquakes:

<p>1. What are the causes of damage during or after an earthquake (5 in total)? 1) <u>floods</u> 2) <u>tsunamis</u> 3) <u>fire</u> 4) <u>land subsidence</u> 5) <u>land slides</u></p>	<p>2. How can we predict earthquakes? <u>by studying past earthquakes, measuring seismic waves,</u></p>
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<p>3. Which of the following affects the amount of destruction caused by earthquake vibrations? a. The design of structures b. The nature of the material on which structures are built c. The intensity and duration of the vibrations d. All of the above</p>	<p>4. What is the minimal number of seismic stations that is needed to determine the location of an Earthquake's epicenter? a. One b. Two c. Three d. Four</p>
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Explain the hazards to humans from an earthquake -->

Falling into cracks, crushed by falling debris, fires, unsanitary conditions, polluted water, loss of power & communication

D. Volcanoes:

<p>1. The particles ejected in volcanic eruptions are called <u>lava - pyro</u>.</p> <p>a. Calderas b. Volcanic stocks c. Laccoliths d. Pyroclastic material</p>	<p>2. List the types of volcanoes and explain each of them. <u>Shield - broad, gently sloped cinder cones - small, built from single very composite - both lava & pyro</u></p>
<p>3. Most of the active volcanoes on Earth are located in a belt known as the <u>Ring of Fire</u>.</p> <p>a. Ring of Lava b. Ring of Fire c. East African Rift Valley d. Mid-Pacific Rise</p>	<p>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</p>

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

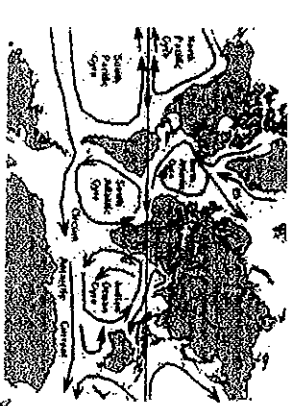
steep
Block off areas following floods, heavy snows (landslides)
Warning systems & evacuate for tsunamis
Build structures to withstand seismic activity
Reevaluate the dumping of chemicals, monitor water supplies
Build levees in areas prone to flooding

Understand how human influences impact the lithosphere. (limes, tams, wetlands)

1. Explain the consequences of human activities on the lithosphere past and present.

A. Match each human activity to possible consequences

1. <u>A</u> mining	a. soil erosion
2. <u>B</u> deforestation	b. desertification
3. <u>C</u> agriculture	c. nutrient depletion
4. <u>D</u> overgrazing	d. global warming
5. <u>E</u> urbanization	e. heat islands



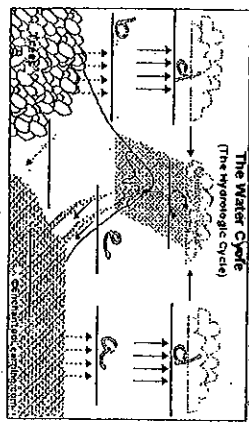
Explain the structure and processes within the hydrosphere.

1. Explain how water is an energy agent

A. Explain how warm and cold currents cycle.

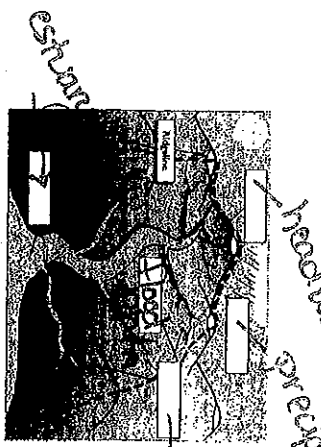
water absorbs energy (warm)
cold water sinks, warm water flows in above it

B. Why are coastal cities warmer than inland cities?
water has high specific heat
& retains heat longer than land



2. Explain how ground water and surface water interact.

A. Label: evaporation, transpiration, precipitation, condensation, run off



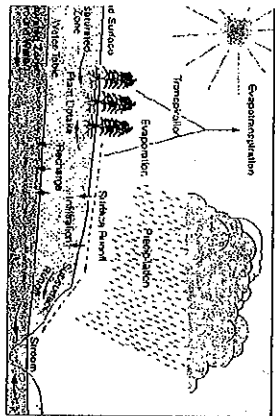
B. Label the watershed with: headwaters, estuary, floodplain, tributaries, precipitation

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, wells are dug into aquifers. The primary use of groundwater by humans is for agriculture & recreation. Issues with aquifers include subsidence (sinking of sediment) and salt water intrusion (contamination of intrusion)



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

C. True or False:

F Pollution in the ground cannot affect freshwater.

F Pollution at one area of a watershed cannot affect other areas of the watershed.

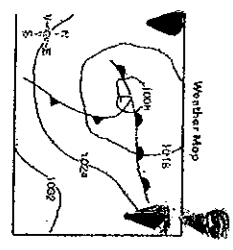
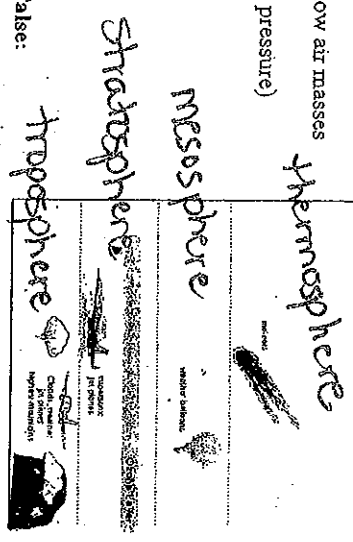
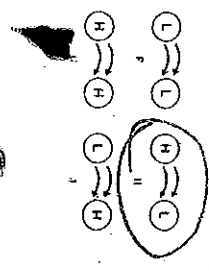
T A biotic index of macroinvertebrates can be used to determine water quality.

Station Model	Station Model Explanation
<p>28</p> <p>196</p> <p>25</p>	<p>Amount of cloud cover (approximately 75% covered)</p> <p>Present weather: Temperature (°F) 28</p> <p>Visibility (mi) 1/2</p> <p>Barometric pressure (1019.6 mb)</p> <p>Wind speed: 196</p> <p>Wind direction: (e) steady (see in past 3 hours)</p> <p>Precipitation: 25 (0.25 inches in past 3 hours)</p> <p>Winds: (10 knots) (1 knot = 1.15 mi/h)</p>

Understand the structure of and processes within our atmosphere.

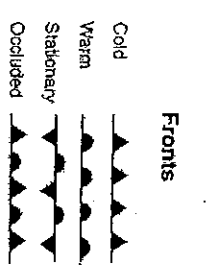
- Summarize the structure and composition of our atmosphere.
 - Label the layers of the atmosphere to the right: *thermosphere, troposphere, stratosphere, mesosphere*

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



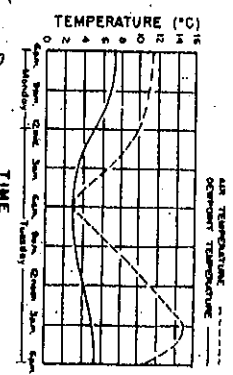
- True or False:
 - warm moist air rises over cold dense air
 - rain occurs when warm moist air condenses at higher altitudes
 - higher elevations are colder than lower elevation
 - a cold front occurs when cold air masses push under a

- warm air mass. Narrow storms are produced
- F** wide bands of precipitation occur at warm fronts
- T** thunderstorms occur at warm moist air masses moving along a cold front
- T** tornadoes are measured by the Fujita Scale
- T** hurricanes are measured by the Saffir-Simpson Scale
- T** isotherms show lines of temperature
- T** isobars show lines of air pressure
- T** psychrometers measure humidity
- T** barometers measure air pressure
- T** thermometers measure air temperature
- T** anemometers measure air speed
- T** a weather vane measure wind direction
- T** a rain gauge shows the amount of precipitation



- Explain how cyclonic storms form based on the interaction of air masses

- Why does dew form in the morning? *bc it's cooler & cold air holds less moisture*
- Explain how clouds form. *water evaporates, temps decrease w/ altitude ∴ wet vapor condenses forming clouds*



Hurricane Formation
Over very warm water, the warm humid air rises meeting cooler air, the wind (Coriolis effect) causes rotation

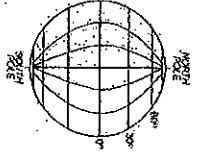
Tornado Formation
as warm & cold air meet, warm air rises & can spiral (form funnel)

- Explain how human activities affect air quality
 - Match the following to their impact on the atmosphere

<ol style="list-style-type: none"> Acid Rain chlorofluorocarbons (CFC's) burning of fossil fuels 	<ol style="list-style-type: none"> formed by sulfur dioxide and nitrogen oxides, decrease pH of precipitation decreases ozone increases the amount of greenhouse gases and sulfur dioxide and nitrogen oxides
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Analyze patterns of global climate change over time

- Differentiate between weather and climate
 - True or False?
 - 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



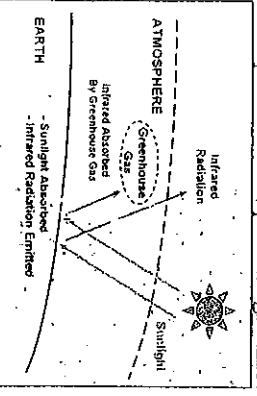
B. Compare weather and climate.

Weather	Climate
conditions of a specific time	Average temperature and precipitation over time

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

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

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



Greenhouse gases such as CO₂ & H₂O trap heat (IR) from sunrays that are reflected (re transmitted) off surface of earth

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

A. Matching	
1. <u>a</u> burning hydrocarbons	a. increases greenhouse gases (CO ₂) in the atmosphere
2. <u>b</u> greenhouse effect	b. traps heat in the atmosphere
3. <u>c</u> deforestation	c. increases CO ₂ in the air and results in less CO ₂ being removed from the air by photosynthesis
4. <u>d</u> heat island	d. urban areas that reflect more heat and produce more CO ₂
5. <u>e</u> industrialization	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: <i>temperature, rainfall, altitude, type of plant, latitude, type of animals</i>
type of plants	Abiotic: <i>temperature, latitude, rainfall, altitude</i>
type of animals	Biotic

B. Explain why biodiversity is important. Biodiversity is important because it ensures wide variety of genetic material, ecosystems are healthier (more resilient), provides medicines variety

Human Influence	Effect
Human population growth	burden on natural resources such as land & water
Habitat alteration	disrupts water cycle, increases erosion, extinction of species
Introduction of invasive species	destroys native species
Pollution	hurts air & water quality makes us sick, global warming, vegetation can't recover, depression, more erosion
Over harvesting	

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

- Critique conventional and sustainable agriculture and aquaculture practices in terms of their environmental impacts.
 - Fill in the chart

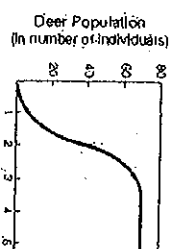
Energy	Advantages	Disadvantages
solar	clean, free renewable	expensive initially, needs steady sunlight & storage
wind	clean, can use land, renewable	needs lots of wind, kills birds, noisy
biofuels	farmlands restore land, large supply	CO ₂ if trees not replanted, soil erosion, water pollution
nuclear fission	large fuel supply	radioactive waste
fuel cells	low CO ₂ , safe, low enviro impact	expensive, doesn't last long, not readily available
wave power	no CO ₂ , works 24/7	expensive, not available everywhere
geothermal	available 24/7, low emissions	not available everywhere, loss of habitats
coal	high energy, low cost	releases CO ₂ , SO ₂ , NO _x , mining destroys land
oil	high energy, low cost	releases CO ₂ , etc. NonRen
natural gas	cleanest of mined sources	fracking causes pollution of groundwater, NO ₂

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

Renewable	Nonrenewable
Solar wind biofuels fuel cells wave power geothermal	Coal oil natural gas nuclear fission

2. Explain the effects of uncontrolled population growth on the Earth's resources.

- What is the carrying capacity of the following graph and explain?



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B. What are three limiting factors for human population?

Space, resources, natural disasters, disease.

C. What will most likely happen if the human population continues to grow at current rates?

- There will be an increase in nitrogen levels in the atmosphere.
- There will be a decrease in the number of strong hurricanes.
- There will be a decrease in water pollution.

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

Makes best use of resources, cuts down on amount used, repurposes resources, helps help limit waste.

A. What is ecological footprint?

- measures the amount of renewable and nonrenewable resources that are used for our activities.
- the maximum number of individuals that the environment can support
- 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?

glass → doesn't take up space in landfills if we reuse it
plastic
paper