***The Earth Science Semester 1 Exam consists of 100 multiple choice questions. This mid-term exam counts for 20% of your overall semester grade. The following questions are designed to prepare you.***

*Complete* ***30 questions*** *in DETAIL,* ***½ page note-guide*** *to use for exam.*

*Complete* ***ALL 60 questions*** *in DETAIL,* ***Full-Page note-guide*** *to use on exam.*

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***Earth System Science/Metrics and Measurement***

1. Identify the appropriate tools used to perform a specific measurement, such as:
   1. Length
   2. Mass
   3. Liq. Vol.
   4. Air Pressure
2. Calculate the average and the range when given data. (show work)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Month* | January | April | July | October |
| *Humidity (%)* | 45 | 53 | 77 | 65 |

1. Calculate volume (mL) and density (g/mL) of an object given the following information:
   1. A piece of galena has a mass of 30g. When carefully slid into a graduated cylinder filled with 63-mL of water, the object raises the water level to 67-mL.
2. List the 4 Earth Systems discussed in class
3. Describe 2 interactions that occur between each of the these pairs of sphere in the Earth System:
   1. Atmosphere & Hydrosphere
   2. Biosphere & Hydrosphere
   3. Biosphere & Atmosphere
   4. Cryosphere & Hydrosphere

**Sky Observations & Motions**

1. Describe how a star's spectrum can be used to determine that stars composition.
2. Explain what a Doppler shift is and what a spectrum shifting towards the red end tells us versus what a shift towards the blue end tells us.
3. Describe the relationship between Earth tilted axis and seasons (winter vs. summer).
4. Describe how a planet can retrograde in its revolution around the Sun.
5. Explain what a light year is its conversion to kilometers.
6. Explain what causes the Moon to appear as different phases during the month.
7. Identify moon phases based on diagrams (either space-view or Earth-view).

***Draw your own examples***

1. Explain what causes solar and lunar eclipses on Earth, and why they are so rare.
2. Identify what kind of tide (spring, neap, normal) will occur on specific moon phases.

***Make your own examples.***

1. Describe how high tides and low tides behave during spring tides and neap tides.
2. Explain the difference between a planet’s rotation, revolution, and its precession as well as the time it takes to complete each.

**Earth In Space**

1. Describe the origin of our solar system
2. Explain the "Big Bang” theory, including evidence used to support it.

**Stellar Evolution**

1. Describe physical characteristics for the 3 main groupings on the H-R diagram:
   1. Main Sequence
   2. Red Giants
   3. White Dwarfs
2. Outline and describe the life cycle of a smaller, less massive (Sun-like) star.
3. Starting with Main Sequence, outline and describe the life cycle of a larger, more massive star.
4. Describe the process of nuclear fusion and how it differs between main sequence stars and red giant stars.

**The Sun**

1. Outline the activity that occurs in each of the 6 layers of the Sun.

***Core Rad Zone Conv Zone Photosphere Chromosphere Corona***

1. Describe the cause of auroras on Earth. Where are they most commonly found on Earth?

**Intro to the Atmosphere**

1. Explain the difference between weather and climate.
2. Define air pressure and identify where it is highest and lowest.
3. List (with %) the 2 main gases of Earth’s present atmosphere.
4. Describe the importance of 3 *minor* atmospheric components:
   1. H2O vapor
   2. Ozone
   3. Atmo. Dust
5. Describe the composition of a CFC, its destructive nature in the stratosphere, and what effect less ozone would have on our surface.
6. Identify the 4 layers of Earth’s atmosphere from bottom to top, including + how and why temperature changes with height in the first 2 layers.
7. Explain how the (1) thermosphere + mesosphere, (2) stratosphere, and (3) troposphere each filter out a part of the electromagnetic (EM) spectrum.
8. Describe the processes of conduction, convection, and radiation.

Explain how all 3 pay a role in the daily heating of Earth’s troposphere.

1. Define albedo, and describe how different surface albedos influence temperature.
2. Describe how each factor listed below influence surface temperature:
   1. latitude from equator
   2. elevation above sea level
   3. location by water
3. Describe the movement of weather systems due to trade winds and westerly prevailing winds.

**Water in the Atmosphere**

1. Define what humidity, relative humidity, and dew point temperature are.
2. Explain and describe the main conditions needed for clouds to form.
3. Draw and describe the structure of the following cloud types:
   1. stratus
   2. cumulus
   3. cirrus
   4. cumulonimbus
   5. nimbostratus
   6. cirrostratus
4. Describe the difference between the cloud forming processes of
   1. convective cooling
   2. forceful lifting by mountains
   3. forceful lifting by air masses.
5. DRAW and describe the differences in humidity, cloud cover, and air pressure on the windward (west) vs. leeward (east) side of a mountain in the US..

**Weather Forecasting and Severe Weather**

1. Describe the 4 main air masses that that affect the U.S., and where each forms.
   1. mT
   2. cP
   3. cT
   4. mP
2. Describe the movement of air near HIGH and LOW pressure centers.

Explain why Michigan has mostly clear skies under HIGH pressure but cloudy skies under LOW pressure.

1. Predict temp changes as warm and cold fronts approach, plus cloud types that precede each.
2. Describe how an occluded front forms.
3. Describe how isobars can be used to indicate relative wind speed.
4. Describe the ingredients needed for thunderstorm and possibly tornado formation.
5. Explain the scientific cause of the following:
   1. hail
   2. lightning
   3. thunder
6. Explain what makes the south-central US (tornado alley) a prime location for tornadoes.
7. Describe hurricane formation, hurricane movement, and the causes of hurricane destruction.
8. Predict the time of year associated with hurricane formation

**Biogeochemical Cycles**

1. Explain why the Earth is considered to be a closed system with regards to matter
2. Illustrate the previous objective with a small diagram showing the different reservoirs of the
   1. carbon cycle
   2. nitrogen cycle

**Climate**

1. Define salinity and describe factors that increase or decrease ocean salinity.
2. Explain how ocean currents have an effect on maritime climates and some Northern latitudes.
3. Describe the major causes of surface ocean currents.

Predict the ocean currents directions in the N and S hemispheres based on Coriolis.

1. Describe the normal greenhouse effect

ID/describe the 4 main greenhouse gases responsible.

1. Describe the following causes of climate change.
   1. Natural
   2. Man-Made
2. Describe the current pattern in atmospheric CO2 levels and global temperatures.
3. Describe the effect that warmer oceans could have.
4. List and describe evidence that scientists use to see if climate change has occurred in the past.
   1. Tree Rings
   2. Pollen Spores
   3. Ice Cores/O2