

Print Name: _____

Last 5 digits of SSN: _____

Signature: _____

1. Multiple choice. select the best answer, one point each (20 points)

- 1) Which of the following is not a major ion in seawater?
 - a) chloride
 - b) sulfate
 - c) phosphate
 - d) calcium
 - e) magnesium

- 2) The approximate mixing time of the oceans is
 - a) 100 years
 - b) 500 years
 - c) 1000 years
 - d) 5000 years
 - e) 10,000 years

- 3) The major ions in seawater have a residence time of
 - a) 10,000 years
 - b) 100,000 years
 - c) 500,000 years
 - d) 1,000,000 years
 - e) 5,000,000 years

- 4) Which of the following is not likely to be a limiting nutrient?
 - a) iron
 - b) silicate
 - c) nitrate
 - d) phosphate
 - e) calcium

- 5) What percentage of nutrients are recycled in the upper ocean?
 - a) 10%
 - b) 25%
 - c) 60%
 - d) 75%
 - e) 90%

- 6) The earth-moon system revolves around a center of mass located about 1060 miles
- a) from the center of the earth
 - b) inside the earth
 - c) away from the surface of the earth
 - d) from the moon
 - e) inside the moon
- 7) What percentage of incoming solar radiation is absorbed by the water and land?
- a) about 10%
 - b) about 25%
 - c) about 50%
 - d) about 75%
 - e) about 90%
- 8) The weight of one square inch of atmosphere at the Earth's surface is about
- a) 2 pounds
 - b) 10 pounds
 - c) 15 pounds
 - d) 20 pounds
 - e) 50 pounds
- 9) The effect of the sun on the generation of tides is about what percentage less than that of the moon
- a) 15%
 - b) 25%
 - c) 45%
 - d) 65%
 - e) 85%
- 10) The pycnocline starts to disappear at around which latitude
- a) 20-30 degrees North and South
 - b) 30-40 degrees North and South
 - c) 40-50 degrees North and South
 - d) 50-60 degrees North and South
 - e) 60-70 degrees North and South
- 11) Pure water reaches maximum density at about
- a) minus 2 degrees Celsius
 - b) 0 degrees Celsius
 - c) 2 degrees Celsius
 - d) 4 degrees Celsius
 - e) 6 degrees Celsius

- 12) The Hadley cell is an atmospheric circulation cell that moves air from
- a) the equator to 30 degrees North or South
 - b) the equator to the polar regions
 - c) 30 degrees North to 60 degree North
 - d) 30 degrees South to 60 degrees South
 - e) c and e
- 13) Tropical cyclones are called typhoons in the
- a) Eastern Pacific
 - b) Eastern Atlantic
 - c) Western Pacific
 - d) Western Atlantic
 - e) Southern Ocean
- 14) The pycnocline is the layer in the water column where there is a rapid change change in
- a) temperature
 - b) pressure
 - c) density
 - d) salinity
 - e) nutrients
- 15) A wave breaks when the ratio of wave height to water depth is
- a) 1:4
 - b) 2:4
 - c) 3:4
 - d) 2:5
 - e) 3:5
- 16) Which of the following is not a characteristic of the California Current
- a) warm
 - b) diffuse
 - c) southerly
 - d) slow
 - e) all of the above
- 17) The most likely cause of the extinction of the dinosaurs was
- a) an impact from a meteorite, comet or asteroid
 - b) volcanic eruptions
 - c) a reptile epidemic-
 - d) Divine Intervention.
 - e) heavy predation

- 18) The hierarchy of the modern taxonomic system (in order) is
- Kingdom, Class, Phylum, Family, Order, Genus, Species
 - Phylum, Kingdom, Class, Family, Order, Genus, Species
 - Kingdom, Phylum, Class, Order, Family, Genus, Species
 - Phylum, Kingdom, Class, Order, Family, Genus, Species
 - Kingdom, Phylum, Class, Family, Order, Genus, Species
- 19) If the evolutionary clock were to be replayed on planet earth again:
- the same species would probably evolve
 - different species would probably evolve
 - human beings would probably evolve again
 - life would not exist
 - none of the above
- 20) The human population on earth is
- about 6.0 billion people
 - beyond carrying capacity,
 - increasing exponentially
 - all of the above
 - none of the above

II. Write True or False on the line before each statement, one point each (20 points)

- The gyres in the southern hemisphere move counter-clockwise.
- Westerly winds go to the east.
- Radiation from the sun is short wave.
- Deep water forms in the North Pacific and flows to the North Atlantic.
- Tsunamis are deep water waves.
- In a low pressure zone, air is rising.
- The tides in Hawaii are diurnal.
- In the Ekman spiral, the velocity of the current decreases with depth.
- The age of the solar system is about 4.65 billion years.
- It is highly **unlikely** that life exists elsewhere (besides earth) in the Universe.

- 11) The main evidence for the Big Bang and an expanding universe is the blue shift.
- 12) The Spark Chamber experiment provided evidence in favor of Panspermy.
- 13) The first organisms that evolved on earth were probably aerobic.
- 14) All primary production in the surface ocean is a result of photosynthesis.
- 15) Reality can be based on either "atoms (matter and energy) or opinions".
- 16) Evolution of a species depends on natural selection, reproductive isolation and chance.
- 17) Speciation occurs because of gradual change and/or punctuated equilibrium.
- 18) All species in nature are "fixed" and do not change.
- 19) The evolution of sexual reproduction was an important factor that led to a great diversification of life in the Cambrian.
- 20) The course of evolution has been changed many times by chance events.

III. Fill in the blank spaces with the best answer, one point each (20 points)

- 1) The restoring force for large wind generated waves is _____.
- 2) If you evaporate water from the surface of the ocean, the density of seawater will _____.
- 3) Currents flow around the boundaries of the gyres because of _____
- 4) There are about _____ grams of salt in 2 kilograms of seawater.
- 5) The _____ of a Wave is the time it takes succeeding crests to pass a fixed point.
- 6) Nutrients are removed from the upper ocean down to the point where the light level is about _____ percent of the surface.
- 7) Dust inputs to the Pacific ocean come from the deserts in _____.

- 8) The layer in the water column in which sound waves travel at minimum speed is called the _____ layer.
- 9) Trade winds are deflected to the _____ in the southern hemisphere because of the Coriolis force.
- 10) _____ tides occur when the sun, earth and moon are in line with each other.
- 11) The _____ of a wave is the distance between succeeding crests.
- 12) The upper 20% of the ocean is driven by surface currents while the lower 80% is driven by _____ currents.
- 13) The theoretical net transport of a water mass in the Ekman spiral is _____ degrees to the right of the surface wind direction.
- 14) Sea urchins belong to the Phylum _____
- 15) Corals belong to the Phylum _____
- 16) The system for naming species is called the _____
- 17) Write the chemical equation for photosynthesis _____
- 18) Speciation helps to avoid intraspecific _____ between species.
- 19) Give an example of an Echinoderm _____
- 20) The teaching assistants office is in the _____ building.

IV. Mini-Essay questions (15 points)

1. Describe the 3 factors needed to calculate the size of waves produced in a storm, and the 3 factors that must be calculated to make a surf forecast for a given coastline. (6 points)

2. List 5 processes that affect the evolution of species, and briefly describe each. (5 points)

3. List four theories for the origin of life and select the one for which there is the most evidence, and describe that evidence. (4 points)