Name \_\_\_\_\_

#### A. List and briefly explain the four major tenants of Darwinian Evolutionary Theory (pp.1-2)

1.

2.

3.

4.

#### B. What is “macroevolution” or “speciation” (p.1)

## C. What new theory modifies Darwin’s gradualistic approach to evolution? (p.1)

1. Define this new theory.

2. Why was this theory created?

D. Give information about the following concepts, stating their role in Natural Selection (pp. 2-3)

1. Overpopulation

2. Competition

3. Adaptation

4. Survival of the Fittest

5. Variation

6. Heredity

E. What is the goal of all species?

F. Which beetle (color) did not survive and why (p. 4)?

Research

*Research the following people and concepts, showing their contribution or relationship to evolutionary theory:*

1. Alfred Wallace

2. Jean Baptiste Lamarck’s law of use and disuse (What is it? Is it valid?)

3. August Weismann

4. Thomas Malthus

5. Stephen Gould

6. Artificial Selection

7. Vestigial Structures or Organs (define and give at least two examples)

8. Give and explain three examples of natural selection (use one plant, one animal, one human)

a.

b.

c.

Fill in the blanks based on the reference material (pp. 5-7):

1. \_\_\_\_\_ Record

a. Some people deny the existence of fossils … not good science

b. We have listed \_\_\_\_\_ types of fossils:

1) \_\_\_\_\_ 2) \_\_\_\_\_ 3) \_\_\_\_\_ 4) \_\_\_\_\_ 5) \_\_\_\_\_ 6) \_\_\_\_\_

c. Fossils can be dated using various techniques that are SPECIFIC to each type of fossil

1) \_\_\_\_\_ dating only dates “organic” materials reliably up to \_\_\_\_\_ years

2) \_\_\_\_\_ (Pb-Xe) and \_\_\_\_\_ (K-Ar) are used to date various \_\_\_\_\_ and minerals

3) \_\_\_\_\_ isotopes break down over time (\_\_\_\_\_-life) … scientists compare the amount of a mineral or material \_\_\_\_\_ and comes up with an “age”

2. Comparative \_\_\_\_\_

a. Observing the \_\_\_\_\_ parts and \_\_\_\_\_ of various organisms

b. \_\_\_\_\_ structures 🡪 structures that look similar and have \_\_\_\_\_ function

c. Show examples of homologous structures:

3. Comparative \_\_\_\_\_

a. Observing the \_\_\_\_\_ and \_\_\_\_\_ of various organisms

b. All living things are made up of \_\_\_\_\_. Many of the cell structures are the same with the same function.

* Nucleus 🡪 \_\_\_\_\_, genetic code
* Cytoplasm
* endoplasmic reticulum 🡪 \_\_\_\_\_ and transport
* cell membrane 🡪 \_\_\_\_\_
* lysosomes 🡪 \_\_\_\_\_
* ribosomes 🡪 \_\_\_\_\_ synthesis
* Golgi apparatus 🡪 “\_\_\_\_\_ centers”
* etc.

c. Cells can be \_\_\_\_\_ (no nucleus, unicellular) or Eukaryotic … yet there are many similar structures in each

* all living things are either unicellular or multi-cellular

d. \_\_\_\_\_ of various organisms possess the same type of cells (e.g. *muscle (striated or smooth*), skin (*epidermis, endodermis*), digestive, cardiac, nervous (*dendrites, axons, synapses*), organs (*cells for* *liver, gall bladder, gonads, kidneys*), etc.)

4. Comparative \_\_\_\_\_

a. Observing the \_\_\_\_\_ /\_\_\_\_\_ of various organisms

b. CHNOPS, \_\_\_\_\_, \_\_\_\_\_, DNA, RNA, \_\_\_\_\_.

1) 98% of the DNA in chimpanzees and humans is the same …

a) macro-evolution states \_\_\_\_\_ ancestry

b) the 2% difference is still huge considering the amount of amino acid sequences that are produced from the DNA genetic code in the body (e.g. 1 billion amino acids still allows for over 2 million differences!)

2) \_\_\_\_\_ membrane (phospholipid layers, semi-permeable)

3) universal genetic code (mRNA codon sequence for amino acids) … there are millions of combinations for the amino acids, yet most organisms fit into the same basic genetic code sequences

c. DNA studies show relationships among organisms.

5. Comparative \_\_\_\_\_

a. Observing the \_\_\_\_\_ and developmental processes of various organisms

b. \_\_\_\_\_ look similar among organisms.

c. Mammals seem to share the following (list 4 things):

EVIDENCE or PROOF? Summarize:

ANSWER KEY

### Darwin & Natural Selection Reference Material Questions

#### A. List and briefly explain the four major tenants of Darwinian Evolutionary Theory (pp.1-2)

1. ***Organisms have changed over time***

2. ***Speciation 🡪 development of a new species***

3. ***All organisms are derived from common ancestors***

4. ***Change is gradual and slow (gradualism)***

#### B. What is “macroevolution” or “speciation” (p.1)

***Macroevolution (new species are produced over time as in gradualism/Darwinian evolution) should be distinguished from “microevolution” (any change over time as in Natural Selection)***

## C. What new theory modifies Darwin’s gradualistic approach to evolution? (p.1)

***Punctuated equilibrium established by former gradualistic evolutionist like Stephen Gould and Stephen Hawking.***

1. Define this new theory.

***New species existed at a point in time, not gradually.***

2. Why was this theory created?

***There are so few to none “intermediate” life forms to demonstrate gradualism***.

D. Give information about the following concepts, stating their role in Natural Selection (pp. 2-3)

1. Overpopulation

***Organism produce more offspring than the environment can support so that at least a few will survive. E.g. maple trees, frogs, etc.***

2. Competition

***Struggle between organisms within the same species for resources (food, territory, water), mates and survival.***

3. Adaptation

***Organisms adapt/adjust to their environment in order to survive. E.g. thicker skin in the winter to keep warm; rabbits run in a zig zag pattern to avoid predators.***

4. Survival of the Fittest

***The organism most suited to its environment will have more chance to survive. The young and old tend to get caught first when chased by prey. Camouflage, adaptive behaviors (hissing, snarling, barking, weaving, etc.) all help organisms survive better.***

5. Variation

***Organisms vary traits (size, color, distinctive markings, etc.).***

6. Heredity

***The ability to pass on traits to offspring.***

E. What is the goal of all species?

***Survival.***

F. Which beetle (color) did not survive and why (p. 4)?

***The green beetle did not survive because it “stood out” more to the birds (who ate them).***

Research

1. Alfred Wallace

***Observed and made hypotheses very similar to Darwin. Even wrote about “gradualism” before Darwin, but Darwin got all the credit.***

***Wallace was not as prominent or respected as Darwin (wrong place, wrong time?) … just as Michael Bublé hit it big because of his song style while others who copy him do not.***

2. Jean Baptiste Lamarck’s law of use and disuse (What is it? Is it valid?)

***New structures appeared in the course of evolution because they were needed. Structures that were present and were used became better developed and increased in size; structures that were not needed or not much used decreased in size and eventually disappeared. ACQUIRED traits (during the lifetime of the organism) were passed onto offspring.***

***Why did people listen to Lamarck? Because he was a respected scientist due to his efforts in classification.***

3. August Weismann

***Proved Lamarck’s “law of use and disuse” wrong. He used the tails of mice as his basis. He cut off the mice tails and allowed them to reproduce. Offspring always had tails. He continued this for several generations.***

4. Thomas Malthus

***Studied “population growth” in relation to limited resources such as food, water, oxygen, territory (shelter). If insufficient resources existed, then a population would either migrate or die.***

5. Stephen Gould

***Established the modified evolutionary theory of Punctuated Equilibrium due to the lack of “intermediates” in the evolutionary record. He stated that new species existed at points of time rather than evolved gradually.***

6. Artificial Selection

***Natural selection exists in nature. Artificial selection is man-made. Man has bred for all kinds of traits. i.e. plants that are disease resistant, can live on less water, shade tolerant; horses that are faster; cattle that produce more meat, etc.***

7. Vestigial Structures or Organs (define and give at least two examples)

***Vestigial organs are structures that exist, but seem to have no function. Therefore, it implies that in the past the structure did have some kind of function (in the ancestors).***

* ***Appendix in humans; Tonsils in humans***
* ***“legs” in snakes (on their hip bone)***

8. Give and explain three examples of natural selection (use one plant, one animal, one human)

a. ***disease resistant plants; shade tolerant trees***;

b. ***faster horses; maple tree send out millions of seeds; birds/butterflies live in different locations on the same tree***

c. ***students chose to study rather than party to earn a scholarship en route to a better career and live-style; people eat healthy foods, don’t smoke; girls chose guys that are honest and have integrity to produce good traits in their offspring***