Review Questions for Booklet 2

Name _______________________________________
Class_____________

1. Which statement is basic to the theory of evolution by natural selection?
   a. In general, living organisms maintain a constant population from generation to generation
   b. Changes in living organisms are almost completely the result of mutations
   c. Natural variations are inherited
   d. There is little competition between species

2. Which statement is not included as part of our modern understanding of evolution?
   a. Sexual reproduction and mutations provide variation among offspring
   b. Traits are transmitted by genes and chromosomes
   c. More offspring are produced than can possibly survive
   d. New organs are formed when organisms need them

3. Which pair of structures are homologous?
   a. Wing of an insect and wing of a bird
   b. Tentacle of a hydra and flipper of a whale
   c. Front leg of an insect and bones in the leg of a human
   d. Bones in the front leg of a dog and the bones in the wing of a bat

4. Sexual reproduction is related to evolution because sexual reproduction
   a. Occurs only in more recently evolved forms of animal life
   b. Increases the chances for variation to occur
   c. In the more usual kind of reproduction

5. Evolution could not occur without genetic variations. These variations will not be acted upon by natural selection unless they
   a. Produce unfavourable characteristics
   b. Produce favourable characteristics
   c. Are found in the fossil record
   d. Affect the organisms’ appearance or functioning

6. Mutations can be transmitted to the next generation if they are present in
   a. Hormones
   b. Gametes
   c. Body cells
   d. Muscle cells
7. In most populations, individuals that produce the greatest number of offspring are
   a. Always the strongest
   b. Usually the best adapted
   c. Those that have only inheritable traits
   d. Those that are the most intelligent

8. The presence of similar structures in all vertebrates suggests that these vertebrates
   a. All develop at the same rate
   b. Evolved from different animals that appeared on Earth at the same time
   c. All developed internally and rely on nutrients supplied by the mother
   d. May have an evolutionary relationship

9. Which of the following is produced by mutation and is essential for evolution to occur?
   a. Stability in the genetic code of organisms
   b. Additional DNA in an organism
   c. A struggle for existence
   d. Variations in organisms

10. The sudden appearance of light coloured moths in a large population of dark coloured
    moths was probably the result of
    a. A mutation
    b. Random mating
    c. Non-random mating
    d. Isolation of the moth population

11. Which of the following could be used as evidence to show that two different species of
    organisms most likely developed from a single common ancestor?
    a. They eat the same types of food
    b. They have different digestive systems
    c. They lived during the same time period
    d. They contain similar amino acid sequences

12. The shark has changed very little in the last 50 million years. Which statement best explains
    why this is the case?
    a. The shark is well adapted to its relatively unchanged environment
    b. Sharks have high reproductive rate and show little change in their genetic makeup
       from one generation to the next
    c. Sharks need to change only if humans are present in their environment
    d. Sharks have high rates of mutation and genetic recombination
13. Throughout the history of the Earth, which factor has probably been the chief cause of the extinction of various species?
   a. People’s interference with nature
   b. Failure to adapt to environmental changes
   c. Warfare within the species
   d. Volcanic eruptions

14. Compounds like DDT may bring about the evolution of new strains of organisms by
   a. Destroying food producers
   b. Acting as an agent of natural selection
   c. Mixing two different sets of genes
   d. Creating new ecological niches

15. Many animals exist today in a form that is almost identical to the form they had a million years ago. What is the most probably explanation for this lack of evolutionary change?
   a. Genetic mutations have occurred among these animals
   b. The environment of these animals remained about the same
   c. These animals reproduce by sexual reproduction
   d. Complex organisms evolved into simpler ones

16. The DNA sequences found in two different species are 95% the same. This suggests that these species
   a. Are evolving into the same species
   b. Contain identical proteins
   c. May have similar evolutionary histories
   d. Have the same number of mutations

17. A large population of cockroaches was sprayed with a newly developed, fast-acting insecticide. The appearance of some cockroaches that are resistant to this insecticide supports the concept that
   a. Species traits tend to remain constant
   b. Variation exists within a species
   c. Insecticides cause mutations
   d. The environment does not change

18. A population of mosquitoes is sprayed with a new insecticide. Most of the mosquitoes are killed, but a few survive. In the next generation, the spraying continues, but still more mosquitoes hatch that are resistant to the insecticide. How could these results be explained according to the theory of evolution?
   a. The insecticide caused a mutation in the mosquitoes
   b. The mosquitoes learned how to fight the insecticide
   c. The insecticide caused the mosquitoes to develop an immune response, which was inherited
   d. A few mosquitoes in the first population were resistant and transmitted this resistance to their offspring
19. Bones located in the wing of a bird and in the flipper of a whale are all similar in appearance, yet they have very different functions. This observation is evidence that they most likely
   a. Developed in a common environment
   b. Developed from a common ancestor
   c. Have identical genetic makeup
   d. Use identical methods to obtain food

20. Fossil evidence indicates that many species have existed for relatively brief periods of time and have then become extinct. Which statement best explains the reason for their short existence?
   a. These organisms lacked variations having adaptive value
   b. These organisms lacked the energy to produce mutations
   c. Humans modify plant and animal species through the knowledge of genetics
   d. Within these species, increasing complexity reduced their chances of survival

Use the diagram of the culture plate (a special dish used to grow bacteria) to answer the following questions. A, B, C and D are discs of different antibiotic. The unshaded areas show where no bacterial growth has occurred. The shaded area shows where bacteria have grown.

21. Which antibiotic was the most effective?

22. Which antibiotic was the least effective?

23. The diagram below shows a comparison of nitrogen base sequences in the DNA of some organisms to those of a human. According to this diagram, humans may be most closely related to the
   a. gorilla
   b. ancestral primate
   c. orangutan
   d. chimpanzee
24. Fossils of an extinct species of giant armadillo were found to be similar to a smaller species of armadillo presently inhabiting the same region. This similarity could best be explained on the basis of
   a. evolution from older forms
   b. use and disuse
   c. inheritance of acquired characteristics
   d. the heterotroph hypothesis

25. A study of the position and shape of the bones in the forelimbs of a flying squirrel, a bat, and a beaver showed that the beaver and the flying squirrel appear to be most closely related. This determination was most likely based on a study in the field of comparative
   a. anatomy
   b. biochemistry
   c. embryology
   d. cytology

26. Fossils would most likely be found in
   a. amber that is over 8 billion years old
   b. icebergs that are 500 billion years old
   c. sedimentary rocks that are 500 million years old
   d. volcanic rocks that are 50 million years old

27. The diagram below shows undisturbed sedimentary strata at the bottom of an ocean. The fossils found in layer B resemble the fossils found in layer A. This similarity suggests that
   a. the fossils in layer B were formed before the fossils in layer A
   b. modern forms of life may have evolved from earlier forms of life
   c. vertebrate fossils are only found in sediments
   d. the fossils in layer A must be more complex than those in layer B
28. The diagrams below show embryos of three different vertebrate species. According to one theory, similarities in these embryos suggest common ancestry. As these embryos mature, they will most likely
   a. develop new organs according to the nutritional requirements of each organism
   b. show no similarity as adults
   c. continue to closely resemble each other as adults
   d. develop the distinctive characteristics of their species

29. Darwin's studies of finches on the Galapagos Islands suggest that the finches' differences in beak structure were most directly due to
   a. acquired characteristics in the parent finches
   b. the size of the island where the finches live
   c. mating behaviors of the different finch species
   d. adaptations of the finches to different environments

30. Biologically similar organisms have similar DNA and proteins. This statement supports the concept of
   a. diversity in species
   b. acquired characteristics
   c. use and disuse
   d. organic evolution
**True/False Section:** Indicate whether the following statements are true or false based on your knowledge of the living environment and study of evolutionary theories.

1. The concept of biological evolution is that the Earth’s present-day species developed from earlier, distinctly different species.

2. The sorting and recombination of genes during mitosis and fertilization result in a great variety of different gene combinations which drive the process of evolution.

3. New heritable characteristics can result from new combinations of existing genes or from mutations of genes in reproductive cells.

4. Gene mutations can be caused by agents such as radiation and chemicals.

5. Only gene mutations which occur in gametes or sex cells can be passed on to the offspring.

6. Asexually reproducing species have more variations which make the species more likely to survive changing conditions.

7. Natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms, as well as for the molecular and structural similarities seen amongst many diverse organisms living today.

8. Individuals with advantageous adaptations to the environment tend to increase in numbers.
Short answer essay questions

1. Describe the process of natural selection as illustrated by the peppered moth.

2. The diagram below shows some characteristics of two present day breeds of dog which descended from a wolf-like common ancestor.

Wolf-like common ancestor

Husky
• Good stamina
• Strong

Collie
• Very intelligent
• Good herding instinct

Name and describe the process which humans have used to produce different breeds of dog.

Both of these questions are worth 5 points each. You must therefore make five correct statements to receive the full marks. Labelled diagrams are acceptable.