

## 125 THINGS YOU SHOULD KNOW FOR THE LIVING ENVIRONMENT REGENTS EXAM

1. Amino acids are the individual units that bond together to form a polypeptide (protein).
2. Monosaccharides are the individual units that bond to together to form a polysaccharide (starch).
3. Enzymes are protein molecules that catalyze (help speed up) chemical reactions.
4. The 3-dimensional shape of a molecule is important to its proper functioning.
5. Enzymes break apart (digest) or put together (synthesize) the substrate into products. Enzymes (catalysts) cause chemical reactions within certain temperature ranges.
6. Each type of nutrient (protein, glucose, lipids, etc.) is digested by only one kind of enzyme. So, protease digests protein, but not glucose or starches!
7. Bacteria are prokaryotic cells which lack a nucleus and other membrane bound organelles.
8. The nucleus contains DNA in eukaryotic cells.
9. Chloroplasts are organelles found in autotrophic cells that produce glucose in the process of photosynthesis.
10. Mitochondria are the organelles where aerobic cellular respiration occurs to produce ATP energy in cells.
11. The mitochondrion makes energy (ATP) from glucose; this is called respiration. Glucose comes from photosynthesis by plants and algae.
12. The cell membrane is a selectively permeable boundary around a cell.
13. Diffusion from high to low concentration will occur across a membrane if the molecules are small and unchanged. Substances diffuse from areas of high concentration to areas of low concentration.
14. A large surface area will allow for a fast rate of diffusion into a cell.
15. Active transport occurs when membrane proteins use ATP energy to carry materials into and out of a cell.
16. Receptor proteins in cell membranes attach to specific molecules.
17. Many of the cells inside the human body are differentiated to carry out specific functions.
18. The many body cells in an individual can be very different from one another even though they have the same genetic instructions because they USE different parts of the instructions.
19. Mitosis involves a diploid cell dividing into two identical daughter cells.
20. Cancer involves body cells dividing uncontrollably by mitosis.
21. Meiosis is the process used to produce the sex cells (or gametes) which are haploid.
22. Meiosis is one of the factors responsible for producing variation among the gametes produced by an organism.
23. A source of genetic variation occurs either during meiosis (Gene shuffling and Crossing over) or during sexual recombination (the recombination of genes from both parents). Random mutations within sex cells also cause variations of traits.
24. New individuals of an existing species are produced through the process of reproduction.
25. Asexual reproduction produces offspring that are genetically identical to the parent organism.
26. Mitosis is the type of cell division that occurs in asexual reproduction. Mitosis is also used for tissue repair and growth.
27. Modern cell biology techniques allow complex organisms such as mammals to be cloned.

28. DNA mutations and chromosomal abnormalities may be passed on to the next generation if they are located in cells that produce gametes.
29. Testosterone is the hormone that stimulates gamete (sperm) production and the formation of secondary sex characteristics in males.
30. Fertilization is the process that involves the fusion of a haploid sperm cell with a haploid egg cell to form a diploid cell called a zygote.
31. Cleavage is the type of mitotic cell division without a change in cell size involved in embryonic development.
32. During intrauterine development in humans, the chorion, amnion, and placenta are necessary to maintain homeostasis.
33. If parents with desirable characteristics are selected to mate, the chance that their offspring will possess the alleles for these characteristics is high.
34. Humans artificially breed or select racehorses whereas most animals undergo natural selection.
35. Genetic diseases are inherited through DNA codes and are transmitted from parents to offspring during sexual reproduction.
36. Each chromosome holds hundreds of genes. 46 chromosomes hold 40,000 genes.
37. Environmental factors such as temperature and light can turn-on and turn-off genes in organisms.
38. DNA replication involves making an identical copy of a cell's DNA.
39. DNA replication involves matching nucleotide bases together using the law of complementary base pairing. A pairs with T and C pairs with G. Transcription involves matching nucleotide bases together using the law of complementary base pairing, however, there is no T in RNA instead there is a U.
40. During DNA replication, the double strand of DNA unzips as weak H bonds between the base pairs are broken.
41. DNA            RNA            Protein
42. DNA mutations may result in the production of abnormal proteins that do not function correctly, or in stopping protein production.
43. Insertion of recombinant plasmids into bacterial cells by transformation will allow them to produce new proteins.
44. Recombinant viral DNA can be added to human cells using the process of transduction.
45. Electrophoresis is a technique used to separate fragments of cut DNA according to size.
46. Organisms have different structural adaptations to carry out essential life functions.
47. Natural selection is the process that may lead to the evolution of new species.
48. The fossil record provides evidence that evolution has occurred.
49. The first living organisms were single celled prokaryotic organisms.
50. The rate at which evolution occurs varies from organism to organism.
51. The allele frequency in a population is the percentage of alleles for a specific characteristic.
52. When a small group of individuals is separated from the main population, they may evolve into a new species that is specialized for a different environment or become extinct.
53. Changes in genes result in variations that lead to the formation of new species.
54. Variation in genes makes evolution possible.

55. If a population has a wide range of variation due to genetic diversity, it gives the population an increased ability to adapt if the environment ever changes drastically.
56. Gradualism is slow and continuous change; punctuated equilibrium is sudden change followed by a long period of very little change.
57. Gradualism is supported in the fossil record by the presence of transitional forms. Punctuated equilibrium is supported in the fossil record by the lack of intermediate forms.
58. Behaviors change and become common because they result in greater reproductive success. Only changes in the genes of sex cells can be passed on or inherited by the future generation.
59. Gradualism: evolution occurs at a slow and steady pace (Darwin).
60. Punctuated Equilibrium: Evolution occurs rapidly with interspersed periods of stability (Gould).
61. Organs and systems in the human body help maintain homeostasis.
62. Enzymes in the digestive system are responsible for the hydrolysis (breaking down) of carbohydrates, proteins, and lipids.
63. The circulatory system is responsible for moving plasma and cells to all regions of the body through the blood vessels, while the lymphatic system moves water and small molecules to each individual cell.
64. The right side of the heart is the pump that moves deoxygenated blood to the lungs and the left side of the heart is the pump that moves oxygenated blood to the body's cells.
65. White blood cells fight pathogens in the body.
66. Antibodies are proteins produced by white blood cells in the human body that attach to invading pathogens and clump them together: antigen-antibody complex.
67. When a person gets an organ transplant, the cells of the implanted organ are recognized as foreign invading cells by the recipient's immune system.
68. Vaccines are weakened forms of pathogen or a protein from the pathogen's surface.
69. The nervous system and endocrine system allow cells within multi-cellular organisms to communicate and coordinate their actions.
70. Hormones are specific chemical messenger molecules that travel through the blood and attach to receptor proteins on the surface of target cells.
71. The hormone insulin is secreted from the pancreas and lowers the glucose level in the blood.
72. Hormonal feedback mechanisms maintain homeostasis in the human body.
73. The kidneys are part of the excretory system and regulate urine composition and water balance in the blood by filtering and reabsorbing molecules.
74. Stomata maintain homeostasis in leaves by regulating gas exchange and water loss.
75. Chlorophyll molecules in chloroplasts capture light energy from the sun to power the process of photosynthesis.
76. Carbon dioxide gas is consumed in photosynthesis, while excess oxygen gas is produced in photosynthesis.
77. Glucose is the first stable product of photosynthesis and serves as a food source within cells.
78. Cellular Respiration is the process of producing ATP energy from glucose and oxygen in mitochondria.
79. Carbon dioxide is the waste gas produced in cellular respiration and excreted through the lungs.

80. All organisms carry on respiration to breakdown glucose and produce ATP energy molecules.
81. Photosynthesis and respiration are responsible for the stable levels of oxygen and carbon dioxide in the Earth's atmosphere.
82. Energy is transferred from one organism to another within a food web.
83. Decomposers are responsible for recycling materials when they breakdown organic molecules from dead organisms.
84. Food chains always begin with a producer, progress with a series of consumers, and end with decomposers.
85. Only 10% of the energy progresses from one level of the food chain to the next level because energy is used in metabolism.
86. Plants hold most of the energy in the ecosystem and are at the base of an ecosystem's energy pyramid.
87. If the population of one organism in a food web increases or decreases, it will affect all the other organisms in the food web with which it is linked.
88. In a host-parasite symbiotic relationship, one organism is harmed while the other is benefited.
89. Stable ecosystems have a complex food web and high biodiversity.
90. All the individuals of the same species living in the same area make up a population. All of the populations in a habitat make up a community. An ecosystem is the interaction of all of the living organisms with the cycling of materials and the flow of energy.
91. Biomes are the regions of the Earth with similar climatic conditions, plants, and animals.
92. Climax communities develop in ecosystems over thousands of years through the process of ecological succession.
93. Succession in Aquatic (water) ecosystems: pond and lakes into marshes, into swamps, into dry land.
94. Succession in Land ecosystems: rock into soil by lichens acid secretions, into mosses, into grasses, into shrubs, into conifers and then into deciduous forests (leafy trees), called a climax community: the most mature kind of community.
95. Ecosystems containing climax communities will remain stable unless they are disrupted by a natural disaster or human activities including pollution.
96. The human population on Earth has exponentially increased in the past 60 years due to a decrease in disease.
97. An increase in human population has caused a depletion of the world finite resources and an increase in environmental damage.
98. Pollution by humans has disrupted the balance in many ecosystems and subsequently has endangered many species.
99. Acid rain is a major environmental problem caused by factory emissions containing nitrogen and sulfur.
100. Chemical pesticides and wastes that enter into the environment affect wildlife and may cause a decrease in biodiversity.
101. Destruction of the ozone layer by pollution results in more ultraviolet rays reaching the surface.
102. Increased levels of greenhouse gases (CO<sub>2</sub> and methane CH<sub>4</sub>) in the atmosphere have led to global warming.

103. Importing species from other ecosystems into an area may cause an imbalance in the food web and environmental destruction.
104. When a population's size is too large, competition for resources increases between members of the species.
105. The carrying capacity is the maximum number of individuals that can survive on the resources that are present in an area.
106. Biological controls (natural predators) are better than chemical controls (pesticides) for regulating the size of populations.
107. Chemical pesticides permanently damage the environment, but only provide a short-term solution to insect population problems.
108. The problem is what is being investigated and is written in question form.
109. The hypothesis is a testable possible solution about the answer to the problem and is a statement written in a sentence.
110. A conclusion is determined from data in an experiment and is stated as a complete sentence.
111. An inference is an idea that is supported by the conclusion (hence the data) in an experiment.
112. An experiment must be completed several times before results are considered valid.
113. The independent variable is the numerical data known before the experiment begins, e.g. time, temperature, or day. This is the factor in the experiment that a scientist purposely changes.
114. The dependent variable is the numerical data obtained during the experiment; the measured variable. This is the factor in the experiment that a scientist wants to observe or measure.
115. Every experiment must have a control.
116. Conditions in an experiment must be exactly the same for all test tubes or test subjects. Only the single variable condition being investigated should differ.
117. Always use multiple set-ups at each condition and average the results to obtain valid data. Each setup must contain an organism of the same species and exactly the same conditions.
118. Effective experiments have significant differences in results and large sample sizes.
119. Open the diaphragm of the microscope to adjust the brightness and only use the fine adjusting knob when focusing using high power magnification.
120. Wet mount slides must be prepared to view live specimens under a microscope.
121. Bromothymol Blue is an indicator for carbon dioxide, and used in photosynthesis and respiration experiments. Phenolphthalein is an indicator for pH. Iodine (Lugol's solution) is an indicator for starch (polysaccharide).
122. Wide range pH paper can be used to determine the acidity or basicity of a solution.
123. Data tables are used for organizing scientific data.
124. Use a line graph when there are two sets of numerical data. (The independent variable is placed on the X axis and the dependent variable is placed on the Y axis)
125. On graphs, be sure the axes are labeled, start at zero, and are divided into evenly spaced intervals.