

101 Things to Know About the Living Environment

(Note: You will no longer be asked specific questions about representative organisms such as hydra, earthworm or grasshopper, though such organisms may be used to illustrate a question.)

1. Bio is life, the rest is just details.
2. Seven main life functions: nutrition, transport, respiration, excretion, synthesis, regulation and growth.
3. Reproduction is a life function, but it is not necessary for individuals (only the species).
4. King Philip came over for good soup. = Linnaean Classification: kingdom, phylum, class, order, family, genus, species. Genus is always capitalized and species is always lowercase. Genus and species will make up an organisms "Scientific name".
5. Homeostasis is the key that fits the lock called life = bio-balance.
6. Five main kingdoms: Mother protests funny pink alligators = Monera, Protista, Fungi, Plants, Animals
7. Cells are: (a) the basic unit of structure and function; and (b) come only from pre-existing cells.
8. Exceptions to Cell Theory: (a) Where did the first cell come from? (b) Viruses undergo reproduction and synthesis, but no other functions. (c) Although they are organelles, mitochondria and chloroplasts will reproduce independently of the cell.
8. Total magnification = ocular multiplied by objective
9. To adjust focus, coarse, then fine; to adjust brightness, adjust iris diaphragm.
10. Magnification increases, field of view decreases; Magnification decreases, field of view increases.
11. Indicators and stains: Lugol's Solution - stains cellulose, turns starch blue-black. Methylene Blue dyes most cells dark blue. Bromothymol blue turns yellow in presence of carbon dioxide, back to blue in presence of oxygen, phenolphthalein - acid base indicator - clear in presence of acid, pink in presence of bases.
12. 1 millimeter = 1,000 micrometers (μ = symbol for micrometers).
13. Plant cells are "cuboidal" and animal cells tend to be more "spherical". This is due to the cell wall (cellulose wall) that gives shape to the plant cells.
14. Two kinds of molecules: either organic (containing C and H) or inorganic (lack either C or H)
15. Carbohydrates: Carbohydrates always contain C:H:O in a close to 1:2:1 ratio. -starch, sugars.
16. Lipids: Sometimes called fats - contain C:H:O ratio of 1:2:>>>1 ratio. - Cholesterol, fats, waxes, oils.
17. Proteins: Composed of building blocks called amino acids. Amino acids are composed of an amino group (-NH₂), a carboxyl group (-COOH) and another group (R=variable sidechain)
18. Enzymes - (a) each chemical reaction requires a specific enzyme. (b) enzymes modify (speed up or slow down) the rate of reaction.
19. Just like a key fits one lock, enzymes and substrates fit together. Enzymes are affected by: temperature, relative amounts of enzyme or substrate, and pH.
20. If it ends in -ase, it is most likely an enzyme.
21. Photo- means "light"; -synthesis means "to make". You do the math! It is the basis of nutrition in autotrophs (those that AUTOMATICALLY make their own food.)
22. Plants grow best at the wavelength they are not (green doesn't work, red and blue are best)
23. $6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\text{light and enzymes}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$
24. Results of Photosynthesis: glucose is formed for: (a) use as energy for cellular respiration; (b) synthesized into other metabolic compounds. (c) converted into storage products by dehydration synthesis and other reactions.
25. Nutrition in Heterotrophs: Ingestion (taking IN), digestion (DIViding), and egestion (Ejecting wastes).
26. Carbohydrates simple sugars (fructose, galactose, glucose); lipids fatty acids and glycerol; proteins amino acids
27. Nutrition: Fungi - rhizoids; Protozoan - pseudopods, phagocytosis, food vacuole; Hydra - stinging cells (nematocysts),

gut cavity; Earthworm - one-way, pharynx, crop, gizzard, intestine; Grasshopper - gastric caeca, mouth parts, salivary glands, one-way; Human - one way alimentary canal, specialized structures and glands for breakdown.

28. Cell Membrane: called a bilipid layer (protein floating between two lipid layers "floating protein icebergs in a fatty sea"); Diffusion - movement of molecules from an area of high concentration to an area of low concentration; Osmosis - diffusion across a semi-permeable membrane.

29. Phagocytosis (cell eating) - engulfing of undissolved large particles by "growing" around them and enclosing them in a vacuole; Pinocytosis (cell drinking) - vacuoles form at cell surface "sip" large particles through the cell membrane.

30. Active transport in a "pump" (it's active) that move particles through a membrane - it requires energy.

31. Intra- versus Inter-: Remember it this way: If you are intra, you stay inside the track (within its' boundaries). If you are inter, you are interfering with other cells (between the cells).

32. Plants - bryophytes look like a brush - short and low with no vascular tissue. Tracheophytes are taller because they have vascular tissue (xylem & phloem).

33. Root hairs - increase water absorption - Someone with lots of hair can have wet hair for a long time if they don't dry it. Bald people cannot get wet hair!

34. Xylem & Phloem - Remember that water always phloes (flows) down a hill.

35. Transport in animals: Hydra-flagellated cells that assist in circulation; Earthworm-closed circulatory system with aortic arches to help move blood that contains hemoglobin; Grasshopper-open circulatory system and blood without hemoglobin; Human - closed circulatory system, four chambered heart, hemoglobin rich blood.

36. Respiration - think energy release and transfer. ATP - energy molecule; aerobic - when you do aerobics, you require a lot of oxygen. If no oxygen, then it is anaerobic (anti-aerobic, for those of you who do not like to exercise!)

37. Fermentation-breakdown of glucose that produces lactic acid, alcohol, and or carbon dioxide.

38. Aerobic respiration - that which uses oxygen - produces 38 ATP molecules in eukaryotic organisms.

39. Respiratory adaptations: plants - stoma and lenticels (allows for gas exchange); hydra - gas exchange in watery environment; earthworm - moist skin air exchange (worms don't last long on a hot sunny day on the pavement!!); grasshopper-tracheal tubes that "ship" oxygen directly to tissues; human - moist membranes inside lungs - exchange gases by diffusion across moist membranes.

40. Excretion - What's waste? - carbon dioxide, water, mineral salts, nitrogenous wastes (most toxic is ammonia, moderately toxic is urea, least toxic is uric acid)

41. Adaptations: protista - contractile vacuoles; plants - excrete and recycle; hydra-depends on watery environment; earthworm-carbon dioxide through skin...most nitrogenous wastes through nephridia; grasshopper water and bodily fluids through tracheal tubes, uric acid through Malpighian tubules; human - excretion through lungs, excretion of nitrogenous wastes through nephrons.

42. Regulation - coordination; Hydra-nerve net; earthworm; cerebral ganglion, ventral nerve cord; grasshopper-fused ganglion ("brain"); human - use your brain (and spinal cord).

43. Chemical control in Plants - lean towards the source of the answer!!! (ie. geotropism - attraction to ground, phototropism - attraction towards light, hydrotropism - attraction towards water, etc...) - all due to the concentration of auxins (plant hormones).

44. Chemical control in animals - endocrine glands secrete hormones. Principle use in insects is metamorphosis (change in the body).

45. Locomotion - Why do you need it? Affords increased opportunities to obtain food, seek shelter, avoid predators, move away from toxic wastes, find a mate, etc.

46. Adaptation for locomotion - protista, flagella, pseudopods, or cilia; hydra - mostly sessile, can somersault or bubble float; earthworm-setae and longitudinal muscles; grasshopper - jumpers and walkers, occasionally fly; human-endoskeleton that allows them to walk.

47. Nutrition in humans - needed for the energy, growth, repair and maintenance of tissues - includes water, minerals, fats, carbohydrates, and proteins - foods move via peristalsis - rhythmic contraction.

48. Starts in mouth - mechanical digestion to increase surface area and chemical digestion of amylose and simple starch starts here as well. passes through esophagus, into stomach where protein digestion starts and acid is added to the food, now known as chyme. Into the small intestine, where in the first foot or so bile (manufactured by liver and stored in gall bladder) is squirted in to start emulsification of fats and pancreatic juices start to react with the sugars. Much of the absorption occurs here as the villi (which house the lacteals) absorb dissolved nutrients directly into the bloodstream. Then, it passes to the large intestine, where it is compacted, water is removed and recycled, and is passed from the body as feces.

49. Hydrolysis: chemical breakdown of large molecules to small molecules; maltose+water→2 glucose; proteins+water→amino acids; lipids+water→3 fatty acids and 1 glycerol

50. Malfunctions: constipation - dry fecal mass doesn't pass; diarrhea - loose watery fecal mass that will pass too easily; appendicitis-inflammation of appendix due to infection; gallstones-solidification of bile and cholesterol deposits in the gall bladder.

51. Transport - circulatory system: Transport media known as blood - has plasma (liquid), red blood cells (hemoglobin oxygen carriers), platelets (cell fragments) that trap to form clots. White blood cells - prevent disease and fight infection; active immunity - antigen-antibody reaction such as a vaccination; passive immunity-medicines and the like - give temporary immunity from disease.

52. Transport through the body - occurs in 1) arteries - carry away from heart, 2) veins - carry towards the heart, and 3) capillaries, connect the arteries and veins - also a site for oxygen and carbon dioxide to exchange between blood and cells. - deoxygenated blood returns to heart through inferior and superior vena cava to the right atrium. Passes through the Rt. AV valve into the right ventricle and out to the L and R lungs where it picks up oxygen. Returns to the heart through the pulmonary veins and empties into the L atrium. It then passes to the L ventricle, the strongest chamber, where it is then pumped out to the rest of the body through the aorta. Four types of circulation: coronary - circ to heart muscle; hepatic - circ. to the liver; pulmonary - circ. to the lungs; and systemic - circ. to entire body.

53. Malfunctions include: high BP (hypertension)-increased arterial pressure that compromises the elasticity of the vessels; Heart attack-thrombosis-blockage of vessels and subsequent oxygen deprivation; angina pectoris - heart or chest pain caused by narrowing of vessels and oxygen deprivation; anemia-impairment of oxygen carrying capability; leukemia-cancer of bone marrow, the cell producing tissues of the system; AIDS-virus which is blood borne that destroys disease fighting systems of the body.

54. Respiration - respiratory system: involves the processes of cellular respiration and gas exchange and the conversion of chemical bond energy from foods into usable energy (ATP) in human cells. Also referred to as breathing - the diffusion of gases into and out of the blood across moist membranes after inhalation and expiration of environmental gases.

55. Air Flow - where does it go? In through nose (nasal cavity) and mouth (oral cavity) into the trachea. Trachea is protected from food entering trachea because of the epiglottis. Passes through the bronchi, two large tubes that split to each lung. Gradually the "tubes" get smaller: bronchi become bronchioles, become alveoli (the smallest) and these are surrounded by capillaries for air exchange. Breathing rate is regulated by carbon dioxide concentration in the blood which in turn lowers the pH of the blood. Common malfunctions are: bronchitis-inflammation of the bronchi from dust or other inhalants; asthma-allergic response which narrows respiratory passages; emphysema-change in structure of lungs characterized by degeneration of tissues (caused by pollution and cigarette smoke).

56. Excretion-removing the body of the metabolic wastes. Lungs - get rid of heat, water, and carbon dioxide. Liver-breakdown and deamination of amino acids, recycling of usable materials, and destruction of old, worn-out red blood cells. Urinary system - elimination of urea and unneeded body fluids through kidneys - pass through kidney where blood is filtered, into the ureter which leads to the bladder-collects and is eliminated through the urethra. Malfunctions: kidney disease-results from damage to or disease of the kidney - result is buildup of toxic wastes in blood stream. Gout - inflammation of joints associated with a buildup of uric acid crystals which lead to arthritic-like painful attacks.

57. Regulation-the nervous system. Organized into a series of neurons (nerve cells) which relay an electrochemical message from cell to cell. Divided into two parts: CNS (central nervous system) which includes brain and spinal cord and PNS (peripheral nervous system) which includes all other nervous tissues. Further extended into the somatic NS to control voluntary actions and the autonomic NS which controls the automatic or reflex actions of the body. Malfunctions: meningitis - inflammation of the membranes surrounding brain and spinal cord; Stroke-caused by cerebral hemorrhage (burst blood vessel) resulting in brain damage; Polio-viral disease resulting in paralysis (uncommon now since we are all immunized against it).

58. Endocrine system - system of ductless glands that helps to regulate body functions - uses chemical messages to hit target tissues. Hypothalamus-influences master gland; Pituitary gland-master gland that governs all other glands, produce Growth stimulating hormone; thyroid gland - influences metabolism; parathyroid glands - produce parathormone needed for control of blood calcium levels; adrenal glands influence metabolism, reabsorption of sodium and chloride ions and adrenalin (fight or flight); Islets of Langerhans-produce insulin and glucagon to regulate blood sugar levels; Gonads (testes and ovaries) control influence of secondary sex characteristics.

59. Humans have an ENDOskeleton - this means it is inside. It consists of bones(internal support); cartilage (cushions bones); tendons(hold muscle to bone); and ligaments(hold bone to bone). It also has muscle (movement tissue) which is divided into three different type: visceral (those of the digestive system); cardiac (the heart); and skeletal (pretty self-explanatory). They work in pairs - one that flexes (flexors) and one that extends(extensors). basic malfunctions include arthritis (pain associated with swelling around the bones) and tendinitis(inflammation of the tendons).

60. Two different types of reproduction exist: Asexual (without sex) and sexual (meaning with sex). Remember, sex is not an act, in the biological sense, but rather a conjoining of the actual male and female reproductive cells.

61. Asexual: most organisms that are asexual reproduce by means of mitosis - the replication of nuclear material that is followed by cytokinesis (splitting of the cytoplasm). It is characterized by 4 stages: prophase, metaphase, anaphase, and telophase. It differs between animal and plant cells because plant cells form a cell plate. If cells continue to grow at an irregular and uncontrollable rate, cancer could result and spread (metastasis).

62. 5 main types of asexual reproduction in organisms. 1. binary fission - bi- means two, so think of an organism splitting equally into two distinct parts; 2. budding - incomplete division of cytoplasm, equal division of nuclear material; 3.

sporulation-spores, need we say more, drift off of the mother plant and create new life; 4. Regeneration - re-means again, generation means to make; so put the two together and we get the answer: the making of new material (it is a bit more involved, but that's for you to look up.) and lastly 5. Vegetative propagation - the reproduction of new veggies: think of the different plants, some are bulbs, some have runners, some are grafted (where do the seeds for seedless orange trees come from?), some are cuttings.

63. Sexual reproduction - literally the joining (fertilization or fusion) of specialized sex cells (gametes) to create a fertilized egg (zygote) that will undergo a series of divisions (cleavages) in which the number of cells increases, but the mass stays the same. Then, the "cell ball" gastrulates and starts to differentiate and increase in mass and area.

64. These gametes are formed by gametogenesis (genesis means beginning). Oogenesis makes the egg (ovum, ova, etc) cells and spermatogenesis makes the sperm (male) sex cells.

65. This brings us to meiosis (not the same as mitosis). Meiosis occurs in sexual reproduction and is the process of producing monoploid sex cells. (Normal body cells or somatic cells have a diploid number of chromosomes. Each species has a characteristic number of chromosomes—e.g. for humans it is 46). Meiosis occurs in two distinct stages and is sometimes referred to as reduction division. In Meiosis 1, each single stranded chromosome replicates and forms sister chromatids. These sister chromatids join together, a process called synapsis, having a total of $4n$ the normal number of chromosomes. After this, they align at the equator of the cell and then tear apart into two different cells. Meiosis 2 begins with the alignment of these sister chromatids (now $2n$ since it has undergone cytoplasmic division) once again at the center of the two new cells. Once again, the sister chromatids replicate and then begin to migrate towards the end of the poles. When cytoplasmic division occurs this time, however, each resulting cell has only the "n" number of chromosomes. Meiosis in a nutshell is: $2n \rightarrow 4n \rightarrow 2n$ & $2n$: $2n$ & $2n$ & n & n & n . This produces: in oogenesis - 1 mature egg cell and 3 polar bodies and in spermatogenesis 4 viable sperm cells.

66. Fertilization and development: to fertilize, you will need 1 "n" male gamete and 1 "n" female gamete. When you join these two together, you get one fertilized egg (called a zygote) ($n+n = 2n$, the diploid number of chromosomes is restored)

67. Fertilization happens either internally, as in humans and most mammals, or externally, as is the case with fish and amphibians. There are some exceptions to this rule.

68. As far as cleavage (see #63), this cleaving or splitting ball of cells will start to differentiate. This means it forms new layers that will start to get distinct functions. The ectoderm (outside) forms the skin and nervous system. The mesoderm (middle) forms the muscles, circulatory system, skeleton, excretory system, and gonads. The endoderm forms the lining of the respiratory and digestive systems and portions of the liver and pancreas.

69. A marsupial is a mammal that is nonplacental in which the young are born very prematurely and get their nutrition from the mammary glands of a mother organism (usually in some form of pouch as the kangaroo has).

70. The human reproductive system is pretty much the same as most other mammals. The male system consists mainly of a pair of testes, sperm producing glands, that are held outside the body in an outpocketing of skin called the scrotum. It is necessary to produce sperm cells and to deposit the cells into the female reproductive system. The female system is important not only for reproduction, but also for the development of the young. It consists of a hollow muscular tube called the vagina, which accepts the penis during intercourse. It is joined internally by the uterus, the holding place for a developing embryo. In most mammals, the lining of the uterus is shed periodically to replenish the lining (this is the menstrual cycle). It consists of 4 stages: follicle stage, ovulation, corpus luteum, and the menstruation. It is entirely controlled and regulated by hormones, including FSH follicle stimulating hormone, LH-leutenizing hormone, estrogen, and progesterone. All of these are governed by a negative feedback system, much the same as the thermostat in your house that regulates temperature.

71. Foundations of Genetics – “The father of genetics”, Gregor Mendel - came up with theories to explain inheritance patterns by studying pea plants. He formulated three principles: dominance-some traits can be masked by others; segregation-there are so many possibilities because genes can recombine in many different ways; and independent assortment-some traits can be inherited while others are not.

72. Mendel's work led to the gene-chromosome theory which states that two genes associated with a specific characteristic are known as alleles and are located on homologous chromosomes.

73. Crossing over - during synapsis in meiosis 1, the chromatids in a homologous pair of chromosomes often twist around each other and break off, exchanging segments. This results in a rearrangement of linked genes and increases in variability.

74. Multiple alleles – sometimes there several alleles which may control a trait (but only 2 at a time are inherited). Best example is blood groups in humans. The following are the possible genotypes and phenotypes for blood groups in humans:

Genotype	Phenotype	Antigens present	Antibody produced
$I^A I^A$ or $I^A i$	Type A blood	A only	anti-A
$I^B I^B$ or $I^B i$	Type B blood	B only	anti-B
$I^A I^B$	Type AB blood	Both A & B	anti-A and anti-B
ii	Type O blood	Neither A nor B	None (Universal Donor)

75. Sex determination - as most people know, there are two predominant sexes: male or female. This is because upon

fertilization, the female contributes either an X or and X. The male, however, can contribute either an X or a Y chromosome. Therefore, the MALE determines the sex of the offspring (at least in humans).

76. Mutations: Let's keep this to a minimum (no pun intended). Mutation is a change in the genetic material - plain and simple. Mutations that occur only in body cells will not be passed on to offspring. However, those that occur in sex cells may possibly be passed on to offspring.

77. Chromosomal alteration mutations are a change in the number or structure of chromosomes. Failure of chromosomes to separate during meiosis I (nondisjunction) is another form. This most commonly results in offspring having too many or too few chromosomes. It is also the cause of Down's syndrome (nondisjunction of chromosome #21).

78. Translocation - transfer of a section of a chromosome from one chromosome to a nonhomologous chromosome; addition - the gain of a portion of a chromosome; deletion - loss of a portion of a chromosome.

79. Description and detection of genetic disorders: PKU - absence of an enzyme necessary for the metabolism of phenylalanine, characterized by the development of mental retardation; Sickle-cell anemia - homozygous condition resulting in the formation of abnormal hemoglobin prevalent in African Americans; Tay-Sachs - recessive genetic disorder characterized by malfunction of the nervous system due to accumulation of fatty deposits along the axon of nerve cells. Detection: Screening - chemical analysis of body fluids to detect presence or absence of such disorders; karyotyping - enlarged photograph of chromosomes which may show chromosome abnormalities; amniocentesis - removal of amniotic fluid from fluid around fetus for cellular or chemical analysis.

80. Modern Genetics - DNA and RNA. In 1940, Oswald Avery, Colin McLeod, and Maclyn McCarty found that DNA is the genetic material found in cells and is passed on from generation to generation. DNA is structured so that small subunits called nucleotides are arranged, each with three main parts: a phosphate group, a deoxyribose group, and a nitrogenous base (adenine, guanine, cytosine, or thymine). In 1953, James Watson and Francis Crick developed the first model of DNA, a double helix (twisted ladder). This molecule will replicate (when needed as in cellular reproduction). Genetic engineering: Insertion of recombinant plasmids into bacterial cells by transformation will allow them to produce new proteins. Electrophoresis is a technique used to separate fragments of cut DNA according to size. It is used to establish relationships between organisms.

81. RNA is slightly different from DNA. It is a nucleic acid, that's for sure, but the three main differences are: RNA is a single chain of nucleotides, Ribose is substituted for deoxyribose, and uracil will always replace thymine. It exists in three forms: messenger RNA (mRNA) which carries the DNA message from the DNA in the nucleus to the ribosomes; transfer (tRNA) which transports amino acids within the cytoplasm to the ribosomes, and Ribosomal (rRNA) which makes up the rRNA for each ribosome for specific protein manufacturing.

82. Evolution - a series of changes over a period of time. Believe what you want theologically, but understand what is here biologically. We call it organic evolution. It is supported by: 1. geologic record - fossils are our window into what once was; 2. comparative biochemistry - nucleic acids and other chemicals and their functions closely relate animals that are currently living, although they may not look like each other or act like each other; 3. comparative cytology - organelles and organisms have similar anatomy and physiology now as they did years ago; 4. comparative anatomy - different animals and organisms have similar structures (7 neck vertebrae in humans, whales, mice, and giraffes); 5. comparative embryology - similar appearance of different embryos as they develop.

83. Theories of Evolution - Lamarck (1809) had two main ideas (1) Use and Disuse - new organs will arise when they are needed and their size will be determined by their need. (2) Transmission of Acquired Traits - Useful characteristics that you acquire during your lifetime will be passed on to your children. Darwin - based all theories on variation and natural selection - encompassed the following tenets: overproduction (more are born than can possibly survive); competition (there is a struggle for existence among all creatures); survival of the fittest (only the most fit will survive long enough to breed); reproduction (if you live long enough, you will most likely breed at one time or another); and speciation - if characteristics help you to survive, your chances to reproduce are greater, therefore the trait that you had will appear more often)

84. Time Frame for evolution - either gradual (as the name implies - things happen at a slow and steady rate) or punctuated (large change in a very brief amount of time).

85. Heterotroph Hypothesis - developing earth was a volatile place with a lot of inorganic compounds that existed naturally. Over time, these compounds, with the help of severe rains and storms, started to cool and condense into the seas. Intense sunlight, radiation, and more storms (mostly electrical) started to change the structure of the molecules and make them become, somehow, organic. That's our best guess and evidence for this hypothesis was provided by Miller and Urey's experiment. These organics soon changed again and became self-replicating life.

86. Over time, this life (from #85) started to carry on some primitive form of photosynthesis and then started to produce oxygen. This allowed other organisms that were formerly anaerobic to start using oxygen in ways that we still don't understand and this may have led to the first autotrophic organisms.

87. Ecology is a science. It investigates the interactions of all life (biotic) with all of the non-living (abiotic) forces that exist in our environment. It has a "step-up" approach: populations are all of one certain species in a given area at a given time, communities are all of the different populations in a given area at a given time, an ecosystem is all of the communities in a certain area at a given time, and a biosphere is basically everything on Earth working together and against each other to achieve a living and nonliving equilibrium.

88. Ecosystems are the level of ecological organization that is commonly talked about in the news media. It has very basic requirements: (1) it must have a constant energy source and a living system capable of incorporating the energy in these compounds into organic energy and (2) it must be able to cycle and recycle these materials between the organisms and the

environment.

89. Biotic versus abiotic: biotic factors include things like trees, algae, deer, bacteria, protists, birds, etc... Essentially, everything that is alive. Abiotic factors are everything that is not living like rocks, water, temperature, sunlight, humidity, gases, pH, etc...

90. Biotic factors also depend on some sort of Nutritional relationships. They include: (1) autotrophs - any organism (not just plants) that can synthesize their own food from inorganic molecules and a usable energy source. Commonly referred to as autotrophs and in some instances chemotrophs. (2) Heterotrophs - are organisms that rely on autotrophs and other heterotrophs for their energy source. Based on this, these are any organism described in #91.

91. The different types of heterotrophs are: (1) Saprophytes - organisms of decay, including non-green plants, fungi and bacteria. These are the janitors of the planet, converting waste and dead material back into usable energy. (2) Herbivores - as the name implies, these are the plant eaters. Around here, people think of things like cows and deer as being the only herbivores. However, one of the largest scale herbivores on the planet is insects, closely followed by humans. Can a human be an herbivore - of course. In a sense we all are. Since a cow eats grasses, and we eat the cow, we are basically eating grass that has been converted into meat! (3) Carnivores - are those animals that eat only other animals. They are divided into two separate categories (a) predators, which actively hunt and kill their prey such as eagles and wolves; and (b) scavengers which live off the "leftovers" from the predators, hoping that the predator didn't strip the bones of what it killed bare (these include vultures and crabs.)

92. All or at least most of these animals live in some sort of symbiotic (dependent) relationship. The three different types are: (1) Commensalism - commonly referred to as a +,0 relationship. This means that one organism benefits from the interaction and one is unaffected. (2) Mutualism - is commonly called a +,+ relationship in which both organisms benefit from the interaction; and (3) Parasitism - is commonly called a +,- relationship because one organism benefits and the other is negatively affected.

93. Food Chains and Succession - A food chain is just that - a chain. The grass grows, the insect eats the grass, the frog eats the insect, the fox eats the frog, the car eats the fox, the bacteria consume the fox carcass, and this in turn fertilizes the soil so that the grass grows again. A web is slightly more complex. In the web, a linear fashion is not followed. At any of the above stages in a web, other organisms can "sneak in" and upset the balance of the chain. For instance, maybe the bear eats half the frogs and humans eat some. But, a human caught off guard gets eaten by a bear and the fox comes in to finish off the carcass (kinda gruesome, I know). See, everything is related as far as this is concerned. I suggest watching the Disney movie "The Lion King". When Mufasa explains the prideland to Simba - he does a better job than any textbook ever could - get it and watch it! Also, there are distinct regions on our planet where materials are recycled - look back into your review book and you will see these cycles - once again - the old saying "What goes around comes around" holds true. Lastly, these regions have certain flora (plants) and fauna (animals) that exist at certain latitudes and altitudes. The biomes, as they are called, are somewhat like biological homes (thus the word biomes) where certain conditions exist that will allow only certain species to live at certain conditions. They are: tundra (like upper reaches of Canada), taiga (like Alaska), temperate deciduous forest (most of New York State), tropical forest (Central America), grassland (such as the savanna plains of the states of Wyoming and Nebraska), and desert (kind of like Arizona).

94. The human population on Earth has exponentially increased in the past 60 years due to medical advances and a decrease in disease.

95. An increase in human population has caused a depletion of the world's finite (limited) resources and an increase in environmental damage.

96. Pollution by humans has disrupted the balance in many ecosystems and subsequently has endangered many species.

97. Acid rain is a major environmental problem caused by factory emissions containing nitrogen and sulfur.

98. Chemical pesticides and wastes that enter into the environment affect wildlife and may cause a decrease in biodiversity.

99. Destruction of the ozone layer by pollution (CFCs) results in more ultraviolet rays reaching the surface. May lead to an increase in skin cancer rates.

100. Increased levels of greenhouse (CO₂ and methane CH₄) in the troposphere have led to global warming.

101. Importing species from other ecosystems into an area may cause an imbalance in the food web and environmental destruction.