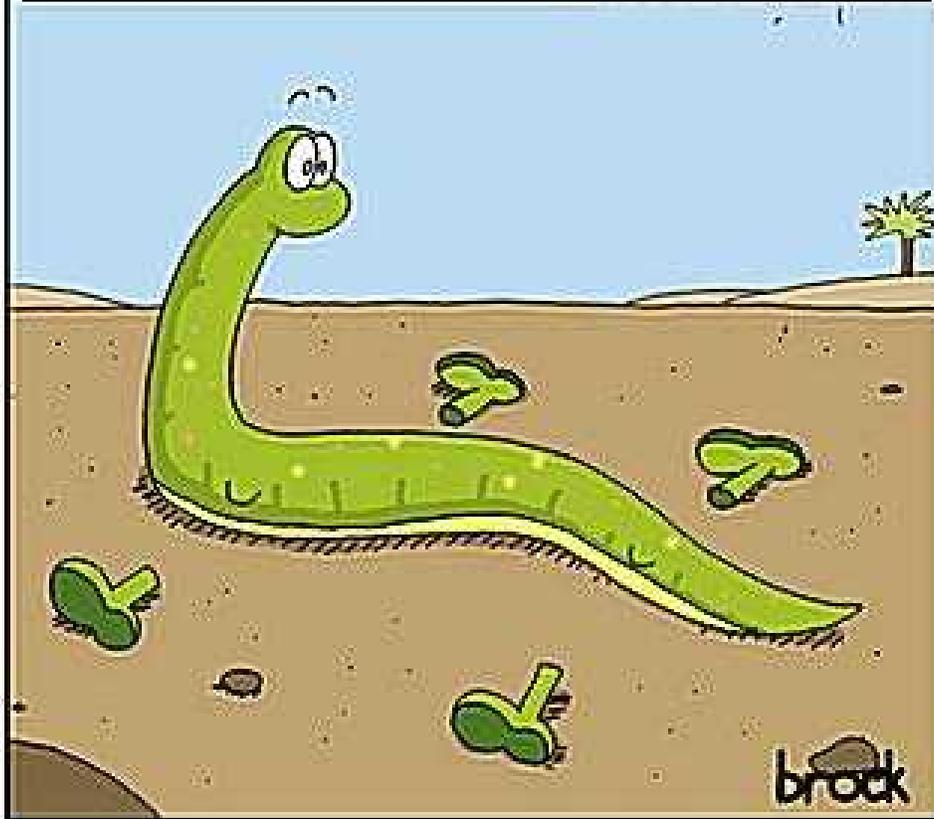


Biology 20 Review Package

100 million years ago...



And just like that, Larry Lizard found he'd evolved into a snake.

Study Tips

- ✓ Organize your notes & materials
- ✓ Get all of your checklists for the course (available on Bio 20 website)
- ✓ Prioritize study areas (spend more time on your weakest areas)
- ✓ Re-read appropriate sections in the textbook and your notes if required.
- ✓ Use online resources like www.hippocampus.org or www.albertabiology.com or www.kahnacademy.org or Korotash Bio 20 website
- ✓ Quiz yourself using www.exambank.com (username: mchs, password: prairie)
- ✓ Study with friends – don't just gossip... ask each other questions, explain concepts to each other.
- ✓ Have your parents quiz you from your notes or textbook
- ✓ Create index flip cards and quiz yourself
- ✓ Check the school's website for tips on how to answer multiple choice questions and other helpful information.
- ✓ Review old exams (by appointment)
- ✓ **Ask lots of questions – that's what I'm here for!**
- ✓ **Come to Bio 20 Help Session June 20th at 3:00pm**

Biology 20 Review Questions

These questions are not due, and are not for marks. If you can honestly answer these questions, and you understand the concepts that these questions cover, you will do very well on the exam. The questions in *italics* are probably more important than those that aren't.

Chapter 1 – Energy & Matter Exchange in the Biosphere

- 1) Write the first two laws of thermodynamics
- 2) *What is the difference between an autotroph and a heterotroph?*
- 3) *Draw a food chain with 5 organisms. What will happen to the population of organisms in the fourth trophic level if the population of organisms in the third trophic level increases? Decreases?*

- 4) Draw a food web containing three trophic levels. For each organism, identify the trophic level, whether it is a producer, primary consumer, secondary consumer etc or whether it is a top consumer.
- 5) Explain the difference between a food chain and a food web.
- 6) How does the amount of energy change from one trophic level to the next in a food chain? Why does that happen – in other words, where does the energy go?
- 7) Ecological Pyramids
 - a) draw a hypothetical pyramid of numbers for your food chain in question 2. What does the size of the box represent in a pyramid of numbers?
 - b) Would the pyramids of energy & biomass be the same shape or different? Why?
 - c) Which eco-pyramid can be inverted (not pyramid shaped)?
- 8) Which organism in your food chain from question 2 should be most concerned about bio-magnification & why?

Chapter 2 – Biogeochemical Cycles

- 9) Draw a flowchart depicting the water / hydrologic cycle. Include the following steps / processes on your diagram: evaporation, condensation, transpiration, precipitation, seepage, runoff, groundwater, infiltration
- 10) Draw a flowchart depicting the carbon cycle. Include the following steps on your diagram: photosynthesis, cellular respiration, decomposition, consumption, burning of fossil fuels
- 11) Draw a flowchart depicting the nitrogen cycle. Include the following steps on your diagram: Nitrogen fixation, ammonification, nitrification(x2), denitrification, consumption, and waste.
- 12) Identify 3 different types of bacteria in the nitrogen cycle. For each, identify the chemical reaction / conversion that they contribute to the nitrogen cycle. Add these bacteria to your nitrogen cycle from question #10.
- 13) Describe how a farmer might rotate crops to maximize the amount of nitrogen in the soil. Give examples of the types of crops, and the name given to “nitrogen-enriching” crops.
- 14) Draw a flowchart depicting the phosphorous cycle. Include the following steps on your diagram: sedimentation, geological uplifting, consumption, decomposition, weathering
- 15) Make a list of all the processes that the biogeochemical cycles have in common.

Chapter 3 – Ecosystems

- 16) List 5 biotic factors that could influence a population’s growth.

- 17) List 6 abiotic factors in an environment. For each, indicate what would happen to overall biomass if the factor was increased or decreased.
- 18) Draw a cross-section of the edge of a lake. Identify the limnetic, benthic, profundal, photic, and littoral zones.
- 19) Describe the relationship between water temperature, and the amount of dissolved oxygen.
- 20) Use a table to list some of the differences between Oligotrophic and Eutrophic bodies of water.
- 21) Eutrophication is a natural process but has been accelerated by humans in many ecosystems. List the steps involved in eutrophication, and explain why it is so detrimental to aquatic life. Be sure to include the type of nutrients that cause the problem, and where they come from.
- 22) List in order the 8 levels of taxonomy (from broadest to most specific). Identify the taxonomic levels for the horse and the brown bat (you don't need to memorize these) and identify at what level the horse & brown bat diverge.
- 23) Create a dichotomous key for three organisms of your choosing.

Chapter 4 – Population Change

- 24) Explain the difference between a "variation" and an "adaptation"
- 25) Using an example, explain the difference between Lamarck's view of population change, and Darwin's view of population change.
- 26) Using an example, explain how natural selection occurs. How do new, advantageous traits arise (where do they come from)?
- 27) What is speciation? How does it occur?
- 28) Explain at least 5 pieces of evidence that support the theory that we have descended / evolved from common ancestors through the process of natural selection (we discussed at least 7 in class)
- 29) Explain the difference between the two models for the rate of evolution: punctuated equilibrium and gradualism.

Chapter 5 – Photosynthesis and Cellular Respiration

- 30) Write the formulas for photosynthesis and cellular respiration. Be sure to include the energy sources and/or energy released. Which process makes CO_2 and which makes O_2 ? Which uses CO_2 and which uses O_2 ?
- 31) What are enzymes? What role do they play in photosynthesis and cellular respiration?

- 32) Create an overview diagram of the two phases of photosynthesis: what are the inputs (reactants) and what are the outputs (products)
- 33) What products from the light dependent part of photosynthesis does the light-independent phase depend on?
- 34) Pick from the following numbers: 1 2 4 10 34 36
- ___ The number of PGAL molecules made by one rotation of the Calvin Cycle
 - ___ The number of PGAL molecules needed to make a glucose
 - ___ The number of ATP produced during Glycolysis
 - ___ The number of NADH created by the breakdown of glucose
 - ___ The number of FADH₂ created by the breakdown of glucose
 - ___ The number of ATP produced in the Electron Transport Chain of cellular respiration
 - ___ The total number of ATP produced in aerobic respiration
 - ___ The total number of ATP produced in anaerobic respiration
 - ___ The number of CO₂ molecules produced by the Krebs cycle
- 35) Identify the location of the following processes:
- Light Dependent Reactions of Photosynthesis
 - Light Independent Reactions of Photosynthesis
 - Glycolysis
 - Krebs Cycle
 - Chemiosmosis / Electrochemical Gradient (2 locations – one in photosynthesis and one in cellular respiration)
- 36) Identify two types of aerobic respiration and describe where and when they occur.

Chapter 6 - Biochemistry & Digestion

- 37) Explain hydrolysis & dehydration synthesis for proteins, carbs, and lipids (which components are joined, or broken apart)
- 38) Choose from either Carbs, Lipids, or Proteins
- ___ Used as primary energy source in living things
 - ___ Enzymes are an example of this
 - ___ No hormones are this type of molecule
 - ___ Contains nitrogen
 - ___ Primary component of cell membranes
 - ___ Made of amino acids
 - ___ Makes up cell wall in plants
 - ___ Contains a glycerol molecule
- 39) Identify two monosaccharide isomers, two disaccharide isomers, and two different types of starches.
- 40) What is the approximate pH for each digestive organ: oral cavity, stomach, small intestine, large intestine

- 41) Create a flow chart to show how carbohydrates are digested in the digestive system. Include the following: amylase, sucrase, & lactase. Be sure to show where each of these enzymes are active.
- 42) Create a flow chart to show how proteins are digested in the digestive system. Include the following: hydrochloric acid, pepsin, trypsin, erepsin. Be sure to show where each of these enzymes are active.
- 43) Create a flow chart to show how lipids are digested in the digestive system. Include the following: bile, lipase, lymph. Be sure to show where each is active, and where they come from.
- 44) What is the name of the circular muscles that control the movement of food through the digestive system? Can you name & locate three of them?
- 45) Identify the location & function of the following structures: pharynx, epiglottis, esophagus, stomach, duodenum, large intestine, villi.
- 46) Explain the difference between chemical digestion, and mechanical digestion and identify where both occur.
- 47) Identify three functions of the liver

Chapter 7 – Respiration

- 48) Identify the function and location of the following structures: pharynx, epiglottis, larynx, trachea, bronchi, bronchioles, alveoli, lungs, intercostals muscles, diaphragm
- 49) Describe the movement of gasses in the alveoli using the terms "high concentration, low concentration, diffusion, oxygen, and carbon dioxide"
- 50) Create a graph of respiratory volumes to differentiate between tidal volume, inspiratory reserve, expiratory reserve, vital capacity, residual volume, and total lung capacity.
- 51) Describe what happens to the intercostal muscles and the diaphragm when they contract, and how that changes air pressure in the lungs.

Chapter 9 – Excretion / Kidneys

- 52) Describe osmosis in terms of hypertonic and hypotonic solutions.
- 53) Sketch a diagram of a nephron, and label the glomerulus, bowman's capsule, proximal tubule, loop of Henle, distal tubule, and the collecting duct.
- 54) For each of the structures above, describe their primary function
- 55) Create a list of substances that are found in blood, and indicate which diffuse through the glomerulus into the Bowman's Capsule

- 56) *In which of the nephron's structures is water reabsorbed?*
- 57) *In which of the nephron's structures does the most active transport take place?*
- 58) *Trace the pathway from urine formation to excretion (where urine exits the body)*
- 59) List at least two waste products the kidney is responsible for eliminating.
- 60) *Describe the function of ADH and Aldosterone. How are they the same, and how are they different?*
- 61) *What is a diuretic and how does it affect the hormones in the question above?*
- 62) List three functions of the mammalian kidney.
- 63) Explain the difference between diabetes mellitus and diabetes insipidus.

Chapter 8 – Circulation and Immunity

- 64) Create a table to list the differences between veins and arteries
- 65) Draw a picture of a heart with all major blood vessels. Draw arrows to show the flow of blood and label the following structures: left atrium, AV valves, left ventricle, septum, semi-lunar valves, aorta, vena cava, right atrium, right ventricle, pulmonary arteries and veins.
- 66) *Using your picture of a heart, colour the areas blue that contain deoxygenated blood, and red the red the areas that contain oxygenated blood.*
- 67) *Explain the purpose of the valves and describe the part the cardiac cycle when each valve is open and when each valve is closed.*
- 68) *Which side of the heart has thicker muscle and why?*
- 69) *Describe the relationship between blood capillaries and lymph vessels.*
- 70) *Write a brief description of the function of each of the following types of cells: platelets, antibodies, macrophages, T Cells (killer, helper & suppressor), B cells (memory and plasma)*
- 71) *What is hemoglobin? where is it found?*
- 72) *Blood Typing:*
- a) *Why do people have different blood types? In other words, what is different about our blood cells?*
 - b) *What does agglutination mean?*
 - c) *If a sample of a person's blood agglutinates when exposed to anti-A antibodies and anti-RH antibodies, what blood type are they?*
- 73) *What is the pulse of a healthy person at rest? What about their blood pressure?*

74) Describe the disorders of the circulatory system: atherosclerosis, anemia, leukemia, hemophilia

Chapter 10

75) Describe two features each of skeletal muscle, smooth muscle, and cardiac muscle.

76) Explain how actin and myosin myofibrils work together to cause muscles to contract. Which ones are the thin ones and which are the thick ones?

77) What is the role of calcium in muscle contraction?

78) Describe three ways that muscles can obtain ATP.

79) Describe how muscles store both O₂ and ATP

80) Which muscles store more ATP, fast twitch or slow twitch muscles?

General Knowledge

81) Mr. Korotash wants to determine whether tomatoes grow better on the West side of his deck, or South side of his garage. He places 5 plants next to the deck, and 5 plants next to the garage, and monitors their growth for 8 weeks. Describe what some of the controls should be, what the manipulated variable is, what the responding variables could be. Propose a hypothesis.

82) Make a list of three things that all good graphs should have!

83) Identify three technologies that could be used to prevent the spread of disease