

# Quarter 1 Mastery Packet

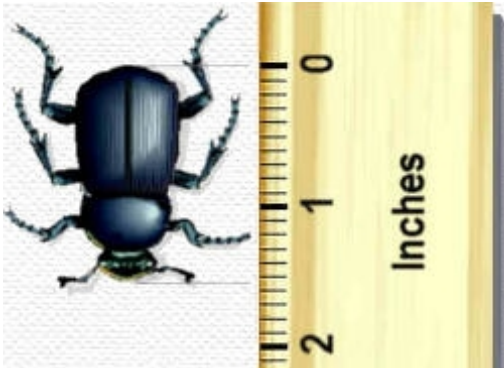
Name \_\_\_\_\_

## IB Bio 1 2011-2012

What follows is a practice test only and should not be your only resource for preparing for your exam. The study guide posted on-line is all inclusive of what you'll need to know; this mastery packet is not. The actual exam will be entirely multiple choice and will be 75-ish questions long.

- 1) Which of the following is a correct sequence of levels of biological organization?  
A) Molecule, cell, organ, tissue  
B) Molecule, cell, population, organism  
C) Cell, organ, tissue, organ system  
D) Molecule, cell, population, organelle  
E) Molecule, cell, tissue, organ
- 2) One early piece of evidence supporting the cell theory was the observation that  
A) Animal cells come from plant cells.  
B) Cells come from other cells.  
C) Only plants are composed of cells.  
D) Only animals are composed of cells.
- 3) The stable internal environment maintained by living things is called  
A) Adaptation  
B) Homeostasis  
C) Interdependence  
D) Differentiation
- 4) Which of the following statements is NOT part of the modern cell theory?  
A) All cells arise from pre-existing cells  
B) Different cells are specialized to perform various functions  
C) The cell is the basic unit of structure and function of all organisms  
D) All organisms are composed of cells

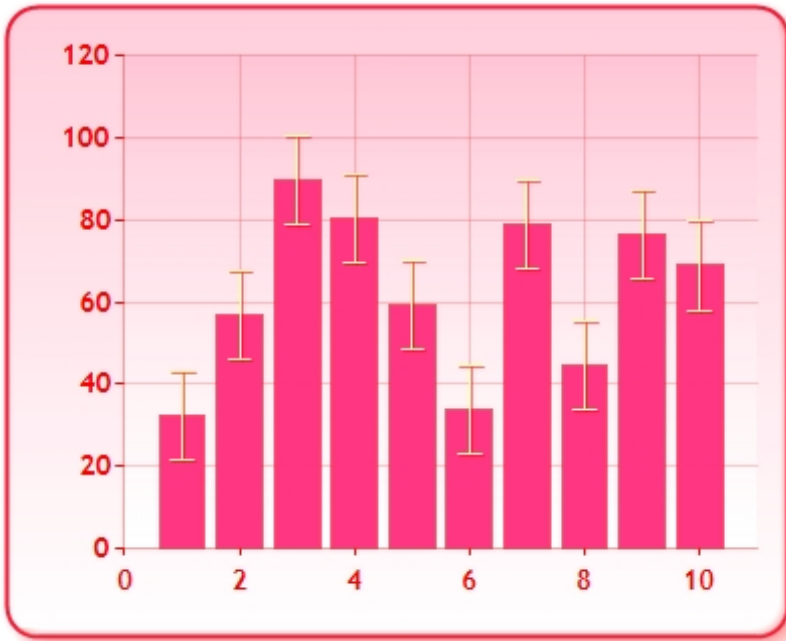
- 5) Which of the following best describes the length of the beetle's body in the picture below?



- A) Between 0 and 2 in  
B) Between 1 and 2 in  
C) Between 1.5 and 1.6 in  
D) Between 1.54 and 1.56 in  
E) Between 1.546 and 1.547 in
- 6) What is the measurement uncertainty of the ruler seen above?  
A) 0.05 inches  
B) 0.50 inches  
C) 0.005 inches  
D) 5 inches  
E) 1 inch
- 7) Which percentage of values in a normal distribution is more than one standard deviation greater of less than the mean?  
A) 32%  
B) 5%  
C) 68%  
D) 95%
- 8) A plasma membrane is characteristic of  
A) prokaryotic cells only  
B) eukaryotic cells only  
C) eukaryotic cells except for plant cells  
D) animal cells only  
E) all cells

- 9) The hydrophilic properties of phospholipids are due to the presence of  
 A) alcohols                                      B) phosphates                                      C) glycerol                                      D) saturated fatty acids

10) Are groups 8 and 10 significantly different from each other? Groups 9 and 10? How do you know?



- 11) Why is it important that an experiment include a control group?  
 A) The control group provides a reserve of experimental subjects.  
 B) A control group assures that an experiment will be repeatable.  
 C) The control group is the group that the researcher is in control of; it is the group in which the researcher predetermines the nature of the results.  
 D) Without a control group, there is no basis for knowing if a particular result is due to the variable being tested or to some other factor.  
 E) A control group is required for the development of an "if ... then" statement.
- 12) What does the term "hydrophilic" mean when it is translated literally?  
 A) oil fearing                                      B) water loving                                      C) water fearing                                      D) oil loving
- 13) One of the functions of cholesterol in animal cell membranes is to  
 A) phosphorylate ADP.  
 B) maintain membrane fluidity.  
 C) store energy.  
 D) facilitate transport of ions.  
 E) speed diffusion.
- 14) The interior of the phospholipid bilayer is  
 A) hydrophilic.  
 B) hydrophobic.  
 C) water.  
 D) composed of fatty acids.  
 E) composed of cholesterol.
- 15) Humans are composed of \_\_\_\_\_ cells.  
 A) bacterial                                      B) archaeal                                      C) prokaryotic                                      D) eukaryotic                                      E) eubacterial
- 16) All of the following molecules are carbohydrates *except*  
 A) hemoglobin.                                      B) cellulose.                                      C) lactose.                                      D) glycogen.                                      E) starch.

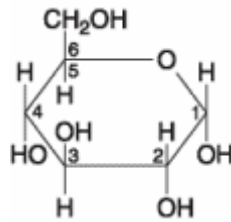
- 17) According to the fluid mosaic model of membrane structure, proteins of the membrane are mostly
- A) free to depart from the fluid membrane and dissolve in the surrounding solution.
  - B) confined to the hydrophobic core of the membrane.
  - C) embedded in a lipid bilayer.
  - D) spread in a continuous layer over the inner and outer surfaces of the membrane.
  - E) randomly oriented in the membrane, with no fixed inside-outside polarity.
- 18) Though science fiction has produced stories like, "The Blob," we don't see very many large single-celled organisms. Which of the following tends to most limit cell size?
- A) Ability to reproduce a large cell
  - B) The amount of DNA in the cell
  - C) Ability to maintain a continuous large membrane
  - D) Surface area to volume ratio

*Please use the following information to answer the following question(s).*

Your textbook describes a case study involving warning coloration and mimicry in snakes. Many species, not just snakes, exhibit various patterns of coloration. Biologists seek to determine the function, if any, of these color patterns. Might coloration function in ways other than warning or camouflage? Certain lizard species found in the Desert Southwest have extensive color variation in one or both sexes. One such species, the collared lizard, has been observed to have males that exhibit considerable color variation, ranging from brightly colored to a very dull pattern. There are only two species of venomous lizards in the world, and they are quite large in comparison to collared lizards. It is therefore unlikely that the coloration of male collared lizards functions as a warning to predators. Your goal is to determine the function, if any, of male color patterns in collared lizards, using the scientific method. Your tentative explanation as to the function of male coloration in collared lizards is that it plays a role in attracting females for mating purposes. You predict that females will preferentially choose brightly colored males over dull-colored ones. To test this prediction, you observed the interactions of female collared lizards with their male counterparts. You selected males that were the same age and size, and differed only in their coloration pattern. You placed equal numbers of the two types of male lizards, bright and dull, in aquariums, along with one female lizard per aquarium. Out of 350 aquariums observed, the female chose to mate with the brightly colored male 277 times, and the dull-colored male 70 times. In 3 instances, the females did not mate with either type.

- 19) Identify the experimental group of this case study.
- A) brightly colored female lizards
  - B) dull-colored female lizards
  - C) dull-colored male lizards
  - D) brightly colored male lizards
  - E) all of the above
- 20) Dull-colored males were part of the \_\_\_\_\_.
- A) control group
  - B) experimental group
  - C) predicted group
  - D) observation group
  - E) hypothesized group
- 21) When mixed with water, phospholipids spontaneously form membranes because they \_\_\_\_\_.
- A) have hydrophilic fatty acid tails that are attracted to water and hydrophobic phosphate groups that avoid water
  - B) do not spontaneously form membranes when mixed with water
  - C) have hydrophilic phosphate groups that are attracted to water and hydrophobic fatty acid tails that avoid water
  - D) are capable of violating the second law of thermodynamics
  - E) have hydrophilic phosphate groups that are attracted to their hydrophobic fatty acid tails
- 22) Which four elements make up approximately 96% of living matter?
- A) carbon, sodium, chlorine, magnesium
  - B) oxygen, hydrogen, calcium, sodium
  - C) carbon, hydrogen, nitrogen, oxygen
  - D) carbon, oxygen, sulfur, calcium
  - E) carbon, sulfur, phosphorus, hydrogen

- 23) The absence of \_\_\_\_\_ in the primitive atmosphere was essential to the origin of life on Earth.  
A) N<sub>2</sub>                      B) CO<sub>2</sub>                      C) NH<sub>3</sub>                      D) O<sub>2</sub>                      E) CH<sub>4</sub>
- 24) In a water molecule, hydrogen and oxygen are held together by a(an) \_\_\_\_\_ bond.  
A) ionic  
B) double covalent  
C) nonpolar covalent  
D) hydrogen  
E) polar covalent
- 25) Which of the following is an example of a hydrogen bond?  
A) the bond between Mg and Cl in MgCl<sub>2</sub>  
B) the bond between Na and Cl in salt  
C) the bond between the H of one water molecule and the O of another water molecule  
D) the bond between two hydrogen atoms  
E) the bond between C and H in methane
- 26) What determines the cohesiveness of water molecules?  
A) covalent bonds  
B) ionic bonds  
C) hydrogen bonds  
D) high specific heat  
E) hydrophobic interactions
- 27) Which of the following is possible due to the surface tension of water?  
A) Water can act as a solvent.  
B) A waterstrider can walk across a small pond.  
C) The pH remains neutral.  
D) Lakes don't freeze solid in the winter, despite low temperatures.  
E) Organisms resist temperature changes although they give off heat due to chemical reactions.
- 28) Life on Earth is dependent on all the properties of water as well as the abundance of water. Which property of water is probably *most* important for the functioning of organisms at the molecular level?  
A) cohesion and high surface tension  
B) versatility as a solvent  
C) expansion upon freezing  
D) high specific heat  
E) high heat of vaporization
- 29) Which of the following best summarizes the relationship between dehydration reactions and hydrolysis?  
A) Dehydration reactions assemble polymers, and hydrolysis breaks them down.  
B) Hydrolysis creates monomers, and dehydration reactions destroy them.  
C) Dehydration reactions occur in plants, and hydrolysis happens in animals.  
D) Hydrolysis occurs during the day, and dehydration reactions happen at night.  
E) Dehydration reactions can occur only after hydrolysis.
- 30) Which of the following is *true* concerning saturated fatty acids?  
A) They are the predominant fatty acid in corn oil.  
B) They are usually produced by plants.  
C) They have double bonds between the carbon atoms of the fatty acids.  
D) They have a higher ratio of hydrogen to carbon than do unsaturated fatty acids.  
E) They are usually liquid at room temperature.
- 31) The molecular formula for glucose is C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>. What would be the molecular formula for a polymer made by linking ten glucose molecules together by dehydration reactions?  
A) C<sub>60</sub>H<sub>120</sub>O<sub>60</sub>              B) C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>              C) C<sub>60</sub>H<sub>111</sub>O<sub>51</sub>              D) C<sub>60</sub>H<sub>100</sub>O<sub>50</sub>              E) C<sub>60</sub>H<sub>102</sub>O<sub>51</sub>



- 32) If 100 molecules of the general type shown above were covalently joined together in sequence, the single molecule that would result would be a
- nucleic acid.
  - polypeptide.
  - fatty acid.
  - polyunsaturated lipid.
  - polysaccharide.
- 33) What name is given to the following reaction?  
 sucrose + water  $\rightarrow$  glucose + fructose
- dehydration reaction
  - glucogenesis
  - denaturation
  - anabolism
  - hydrolysis
- 34) Carbohydrates typically have \_\_\_\_\_.
- C, H, and O in a 1:2:1 ratio
  - an  $\text{NH}_2$  group
  - a 5-carbon ring
  - a hydrocarbon chain
  - a  $\text{PO}_4$  group
- 35) By definition, what type of fatty acid has double bonds?
- monoglyceride
  - steroid
  - unsaturated
  - triglyceride
  - saturated
- 36) In the following reaction, galactose is a \_\_\_\_\_.  
 galactose + glucose  $\rightarrow$  lactose + water
- protein
  - lipid
  - polysaccharide
  - polymer
  - monomer
- 37) Which of the following terms includes all others in the list?
- monosaccharide
  - disaccharide
  - carbohydrate
  - polysaccharide
  - starch
- 38) The following molecule is best described as a \_\_\_\_\_.  
 $\text{CH}_3\text{—CH}_2\text{—CH}_2\text{—CH}_2$
- hydrocarbon
  - nucleic acid
  - lipid
  - carbohydrate
  - protein

- 39) What was the first stage of the process that led to the abiotic origin of life?
- abiotic synthesis of ribozymes
  - origin of self-replicating molecules
  - abiotic synthesis of polymers
  - abiotic synthesis of monomers, such as amino acids and nucleotides
  - abiotic formation of pre-cells
- 40) Whose seminal experiments demonstrated that, given the conditions on the primitive Earth, life could arise spontaneously?
- Miller and Urey
  - Darwin
  - Pauling
  - Margulis
  - Watson
- 41) The difference between eukaryotic and prokaryotic cells is that eukaryotic cells \_\_\_\_\_ prokaryotic cells.
- have a nucleoid region, which is lacking in
  - lack the complexity seen in
  - have a nucleus surrounded by a membrane, which is lacking in
  - have DNA, which is lacking in
  - have a plasma membrane, which is lacking in
- 42) Why is RNA thought to have been the first genetic material?
- RNA codes for fewer amino acids than does DNA.
  - RNA is structurally simpler than DNA.
  - RNA is capable of self-replication; DNA is not.
  - RNA has been found on meteorites; DNA has not.
  - Primitive organisms, such as some viruses, have RNA as their genetic material.
- 43) The concept of a membrane as a fluid mosaic reflects the ability of \_\_\_\_\_.
- phospholipids but not proteins to drift about in the plane of the membrane
  - proteins but not phospholipids to drift about in the plane of the membrane
  - carbohydrates to drift into and out of the membrane structure
  - nucleotides to drift into and out of the membrane structure
  - phospholipids and proteins to drift about in the plane of the membrane
- 44) A single carbon atom can form a maximum of \_\_\_\_\_ covalent bond(s).
- none; carbon only participates in ionic bonds
  - 4
  - 1
  - 3
  - 2
- 45) \_\_\_\_\_ is a hydroxyl group.
- |                     |       |          |        |        |
|---------------------|-------|----------|--------|--------|
| A) —NH <sub>2</sub> | B) —H | C) —COOH | D) —SH | E) —OH |
|---------------------|-------|----------|--------|--------|
- 46) What name is given to the following reaction?
- galactose + glucose → lactose + water
- dehydration reaction
  - glycolysis
  - hydrogenation
  - hydrolysis
  - gluconeogenesis
- 47) Geological evidence indicates that Earth formed about \_\_\_\_\_ years ago.
- |                |            |                |                |                |
|----------------|------------|----------------|----------------|----------------|
| A) 4.5 billion | B) 500,000 | C) 3.6 billion | D) 8.3 million | E) 156 million |
|----------------|------------|----------------|----------------|----------------|

- 48) The tendency of molecules to stick together is called \_\_\_\_\_.  
 A) cohesion                      B) interactivity                      C) bonding                      D) polarity                      E) adhesion
- 49) Which of the following are isomers?  
 A) sucrose and lactose  
 B) glucose and fructose  
 C) glucose and sucrose  
 D) sucrose and glucose  
 E) lactose and maltose
- 50) Water's surface tension and heat storage capacity are accounted for by its \_\_\_\_\_.  
 A) orbitals  
 B) hydrogen bonds  
 C) size  
 D) weight  
 E) mass
- 51) As water freezes \_\_\_\_\_.  
 A) its atoms move farther apart  
 B) its hydrogen bonds break apart  
 C) it cools the surrounding environment  
 D) it absorbs energy from the surrounding environment  
 E) it loses its polarity
- 52) Why (if you are careful) are you able to float a needle on the surface of water?  
 A) The surface tension that is a result of water's cohesive properties makes this possible.  
 B) The covalent bonds that hold a water molecule together are responsible for this ability.  
 C) The polarity of individual water molecules makes this happen.  
 D) A single needle is less dense than water.  
 E) Water exhibits adhesive properties.
- 53) Adjacent water molecules are joined by \_\_\_\_\_ bonds.  
 A) ionic  
 B) polar and covalent  
 C) covalent only  
 D) trivalent  
 E) hydrogen
- 54) Why is water considered a polar molecule?  
 A) The negatively charged oxygen atom attracts the positively charged hydrogen atoms.  
 B) It remains liquid even at very low temperatures.  
 C) Both hydrogens are at one end of the molecule, and oxygen is at the other end.  
 D) Its electrons spend more time with its oxygen than with either hydrogen.  
 E) The oxygen is found between the two hydrogens.
- 55) The hydrogens and oxygen of a water molecule are held together by \_\_\_\_\_ bonds.  
 A) hydrolytic                      B) osmotic                      C) covalent                      D) ionic                      E) hydrogen
- 56) In the following reaction, what type of bond is holding the two atoms together?  
 $K + Cl \rightarrow K^+ + Cl^- \rightarrow KCl$   
 A) hypertonic                      B) covalent                      C) hydrophilic                      D) ionic                      E) hydrophobic
- 57) Proteins are polymers constructed from \_\_\_\_\_ monomers.  
 A) nucleotide                      B) 5-carbon ring                      C) hydrocarbon                      D) amino acid                      E) peptide

- 58) An atom with a positive charge has \_\_\_\_\_.  
 A) more neutrons than protons  
 B) equal numbers of protons, electrons, and neutrons  
 C) more electrons than protons  
 D) more protons than electrons  
 E) more protons than neutrons
- 59) Fatty acids are \_\_\_\_\_.  
 A) components of DNA  
 B) nonpolar  
 C) composed of four linked rings  
 D) composed of carbon, hydrogen, glycerol, and a phosphate group  
 E) composed of carbon, hydrogen, and oxygen in a 1:2:1 ratio
- 60) Amino acids consist of \_\_\_\_\_.  
 A) a central nitrogen, a carbon atom, an amino group, and a carbonyl group  
 B) a central carbon, a hydrogen atom, a hydroxyl group, and a carbonyl group  
 C) a central hydrogen, a nitrogen atom, an amino group, and a carboxyl group  
 D) a central hydrogen, a nitrogen atom, a hydroxyl group, and a carbonyl group  
 E) a central carbon, a hydrogen atom, an amino group, and a carboxyl group
- 61) \_\_\_\_\_ is a steroid.  
 A) Butter  
 B) Maltose  
 C) Monounsaturated fat  
 D) Amino acid  
 E) Estrogen
- 62) A fat that is hydrogenated is \_\_\_\_\_.  
 A) easier to spread on bread  
 B) likely to go bad faster  
 C) less likely to cause strokes  
 D) more solid  
 E) more unsaturated
- 63) Saturated fats are saturated with \_\_\_\_\_.  
 A) hydrogen                      B) phosphorus                      C) oxygen                      D) carbon                      E) nitrogen
- 64) A glycerol with three fatty acids attached is referred to as a \_\_\_\_\_.  
 A) steroid                      B) protein                      C) nucleic acid                      D) prostaglandin                      E) fat
- 65) Animals store carbohydrates as \_\_\_\_\_.  
 A) glycogen                      B) starch                      C) cellulose                      D) maltose                      E) glucose
- 66) Which of the following is an example of a polysaccharide?  
 A) starch                      B) glucose                      C) fructose                      D) maltose                      E) sucrose
- 67) Complete the equation:  
 monosaccharide + monosaccharide → \_\_\_\_\_ + water  
 A) nucleic acid  
 B) disaccharide  
 C) polypeptide  
 D) fat  
 E) polysaccharide