

# Review sheet - test I

## Ch. 1 introductory stuff

### study of biology

- 1) what are the basic properties of living things? i.e. what makes something living?
- 2) what are the basic levels of organization of living things? (e.g. cell, tissue, organ, etc.)
- 3) what are the basic steps of the scientific method?
- 4) what is an independent variable? dependent variable? control group?
- 5) what is a hypothesis?
- 6) what is a theory?
- 7) what is a law?
- 8) what are the 4 main rules that define what types of questions science can address? (i.e. what makes something science?)
- 9) what are the basic levels of taxonomic classification?
- 10) what is a domain?
- 11) what are the three domains of living organisms? how do these relate to the old five kingdom system?

## Ch. 2 basic chemistry

### bonds

- 12) what is a covalent bond?
- 13) what is a hydrogen bond?
- 14) what is an ionic bond?
- 15) what is meant by polarity?
- 16) why are some covalent bonds polar?
- 17) what does it mean for a substance if it is polar or non-polar? how does this related to solubility?
- 18) know what hydrophobic/hydrophilic mean, and how this affects large molecules.
- 19) what are van der waals interactions?

### water

- 20) why is water such a good solvent?
- 21) what is cohesion? what is adhesion? why do these happen?
- 22) what happens when something dissolves in water? salt? glucose?
- 23) what is pH? pOH?
- 24) what does it mean if something is acidic? basic?

- 25) if given a pH, be able to compute the H<sup>+</sup> concentration, OH<sup>-</sup> concentration, and pOH without a calculator, and vice versa.
- 26) what is a molecule? compound?

## Ch. 3 Macromolecules

### organic macromolecules

- 27) what makes a compound organic?
- 28) what is a functional group?
- 29) be able to recognize the basic functional groups (phosphate, hydroxyl, carbonyl, amino, etc.)
- 30) what is a macromolecule?
- 31) how are macromolecules formed?
- 32) know the four main groups of organic macromolecules, and know the monomers for each.
- 33) be able to give examples of each type of organic macromolecule.
- 34) know the basic characteristics of each of the types of organic macromolecules.
- 35) what is a steroid? what are they used for?
- 36) what are trans-fats?
- 37) what are saturated/unsaturated fats?
- 38) what is a polypeptide?
- 39) how is a protein different from a polypeptide?
- 40) know the basic structure of an amino acid.
- 41) what are the four levels of complexity/ structure that we see in proteins?
- 42) what is a double helix?
- 43) what does DNA code for?

## Ch. 4 tour of a cell

### types of cells

- 44) what are the two main types of cells, and what are their characteristics?
- 45) how are these distributed in the domains?

### eukarya

- 46) know the major organelles of plants and animals that we discussed and what they do.
- 47) know the parts of the nucleus.
- 48) what is the nuclear membrane like? what is it attached to?
- 49) what is the nucleolus?
- 50) how do proteins get into the nucleus?
- 51) why are some ribosomes bound?

- 52) what does the endoplasmic reticulum do?
- 53) what kinds of proteins get processed by the endoplasmic reticulum?
- 54) what does the golgi apparatus do?
- 55) how do things get sent from the ER to the golgi, and back?
- 56) what do i mean when i say that the golgi is a dynamic organelle? (not static)
- 57) what to do the mitochondria do?
- 58) know the parts of the mitochondria.
- 59) what is meant by endosymbiont theory?
- 60) what do chloroplasts do?
- 61) know the parts of the chloroplast.
- 62) what are the three main types of cytoskeletal elements?
- 63) what are the main jobs that the cytoskeleton carries out?

## **Ch. 5 the working cell membranes**

- 64) what is meant by a lipid bilayer?
- 65) what are the main functions of proteins in the plasma membrane? (there are 6)
- 66) what phase of matter is the cell membrane?
- 67) what does it mean if a molecule is amphipathic?
- 68) what characteristics affect passage of materials through the lipid bilayer?
- 69) what kinds of things pass through easily/quickly? what things pass more slowly? blocked?
- 70) what is meant by flux?
- 71) what is diffusion?
- 72) why is water able to diffuse across cell membranes so quickly?
- 73) what is water potential?
- 74) what is osmosis?
- 75) what is meant by isotonic? hypertonic? hypotonic?
- 76) what is turgor pressure? plasmolysis?

### **transport**

- 77) how are things like ions transported across a membrane?
- 78) what is meant by passive/active transport?
- 79) how are transporters different from channels?
- 80) what are the requirements for diffusion across a membrane? (2)

## **energy transformation**

- 81) what is the first law of thermodynamics?
- 82) what is the second law of thermodynamics?
- 83) how are potential and kinetic energy different?
- 84) what do we mean when we say that a process is energetically favorable? unfavorable?
- 85) what is meant by entropy?
- 86) what is an exergonic reaction? endergonic?
- 87) how do cells carry out energetically unfavorable reactions?
- 88) what is ATP? what is NADH? how do these store energy?
- 89) what are the three main types of cellular work?

## **metabolism**

- 90) what is meant by metabolism?
- 91) be able to tell the difference in an anabolic pathway and a catabolic pathway.
- 92) how do enzymes help to control when and where reactions occur?
- 93) what are the three main mechanisms that enzymes use?
- 94) what is meant by an enzyme/transporter being saturated?
- 95) how are enzymes turned off?
- 96) what is a/an irreversible/reversible inhibitor?
- 97) if an enzyme inhibitor is competitive, what does that mean?
- 98) what is a substrate?

## **Ch. 6 cellular respiration**

### **powering life**

- 99) how does sunlight get converted to energy in an ecosystem?
- 100) what is an autotroph? heterotroph?
- 101) what do I mean when I say that all of our energy is actually solar energy?
- 102) what is meant by reduction/oxidation?
- 103) which is more oxidized, carbon dioxide or methane? why?
- 104) what happens in a combustion reaction?
- 105) why are there so many steps in cellular respiration?
- 106) what is the basic formula for cellular respiration (from glucose)? i.e. just know the products and the reactants. (you don't need to

know all the numbers or balance the equation.)  
107) what is produced when NAD<sup>+</sup> is reduced?  
108) what are the three main parts of aerobic respiration (from glucose)? what do they produce in terms of energy? (like, what activated carriers)

### **glycolysis**

109) know the two main phases of glycolysis.  
110) for one molecule of glucose, what is produced as output?  
111) know the four main types of enzymes (by function) that we talked about. (kinase, isomerase, mutase, dehydrogenase)  
112) why does glucose get phosphorylated twice during the investment phase of glycolysis? what does this do?  
113) what happens to the NADH produced during glycolysis? i.e. what is it used for?  
114) what other types of macromolecules result in the production of acetyl CoA (or pyruvate)?  
115) how does pyruvate get into the mitochondrial matrix?  
116) where does glycolysis happen in the cell?  
117) where does the krebs cycle happen?  
118) where does oxidative phosphorylation happen?

### **tca cycle**

119) know the names TCA cycle, citric acid cycle, and krebs cycle (they are all the same thing).  
120) what gets produced in one turn of the krebs cycle? ATP? NADH? FADH<sub>2</sub>? (it makes two turns per glucose)  
121) how many oxidation reactions happen in the krebs cycle?  
122) what is the input into the krebs cycle?

### **electron transport**

123) where are the enzyme complexes of the electron transport chain located?  
124) what happens in the electron transport chain?  
125) where do the electrons come from?  
126) where do the electrons go?  
127) how is potential energy stored during the movement of electrons through the ETC?  
128) how is this energy used to make ATP?

### **oxidative phosphorylation**

129) what is ATP synthase?

130) what powers ATP synthase?  
131) where is ATP synthase located?  
132) what parts of aerobic respiration produce CO<sub>2</sub>? what parts use O<sub>2</sub>? what parts produce H<sub>2</sub>O?

## **Ch. 7 photosynthesis**

### **overview**

133) how is photosynthesis similar to aerobic respiration chemically?  
134) what are the two main phases of photosynthesis?  
135) how is energy stored during the light reactions to be used for carbon fixation later?

### **light reactions**

136) What happens in the two photosystems?  
137) where are the PS I and PS II located in the chloroplasts?

### **light independent reactions**

138) what happens in the calvin cycle? (three main steps)  
139) why is the calvin cycle so energetically costly?  
140) what is the ultimate output of photosynthesis?  
141) why is photosynthesis so important for all organisms on earth?

## **Ch. 31 plant structure / reproduction**

### **plant structure**

142) What is the importance of plant domestication?  
143) Know the major groups of plants.  
144) Know the basic characteristics of monocots and eudicots.  
145) What are the basic organ systems of vascular plants?  
146) Know the main organs of plants.  
147) Know the four main tissue types in angiosperms.  
148) Know the main types of plant cells.

### **plant growth**

149) What is primary growth? secondary growth?  
150) What types of meristems are responsible for primary growth? secondary growth?

151) What types of plants have secondary growth?

152) Be able to label the parts of a woody stem.

### **plant reproduction**

153) Be able to label the parts of a flower.

154) Be able to label the parts of a mature ovule.

155) What is a gametophyte? sporophyte?

156) What is a fruit?

157) Be able to label which parts are sporophyte and gametophyte for an angiosperm.

## **Ch. 32 plant nutrition**

### **plant transport**

158) how do vascular plants move water from one place to another?

159) how do plants move sugars from one place to another?

160) what is transpiration?

161) what are stomata?

### **plant nutrition**

162) what types of nutrients do plants need?

163) how do plants acquire nutrients?

164) where do the nutrients in soil come from?

165) what is erosion?

166) what is genetic engineering?

167) know the nitrogen cycle.