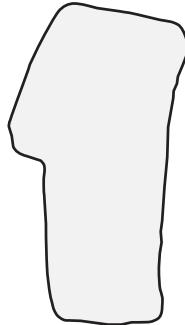


# **Mississippi SATP2 Biology I**

## **Student Review Guide**

### **Practice Test**



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**5 What type of bond is formed when electrons are transferred from one atom to another atom?**

- A Hydrogen
- B Covalent
- C Ionic
- D Nonpolar

(A) (B) (C) (D)

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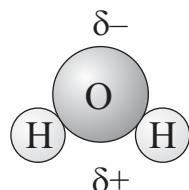
**6 Which idea of Thomas Malthus influenced the theory of evolution?**

- F All organisms have evolved from a common ancestor.
- G Population growth in humans will exceed the resources to sustain that growth.
- H Geological forces shaped the surface of the earth over long periods of time.
- J Organisms that are best adapted to their environment will survive and reproduce.

(F) (G) (H) (J)

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**7 The diagram of a water molecule is shown below.**



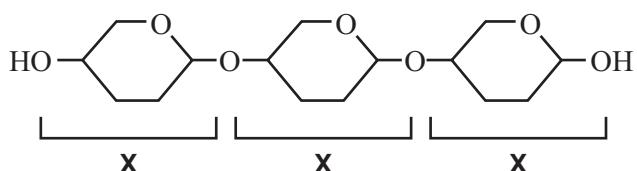
The symbols  $\delta-$  and  $\delta+$  indicate a partial negative charge on one side and a partial positive charge on the other side. What important property of water is indicated by this diagram?

- A Water is a polar molecule.
- B Water is an ionic substance.
- C Water contains double bonds.
- D Water is a very weak solvent.

(A) (B) (C) (D)

**GO ON**

- 
- 8** The diagram below shows the structure of a starch molecule. What is the name of the units labeled “X” in the diagram?



- F** Nucleotide  
**G** Peptide  
**H** Amino acid  
**J** Monosaccharide

---

- 9** An independent research company conducts an experiment on the effects of a melatonin supplement on sleep patterns in people ages 40 to 60. The company recruits participants from across the country who suffer from insomnia (inability to fall asleep). The setup of the experiment is represented in the table below.

**Melatonin Experiment**

<b>Group</b>	<b>Number of Participants</b>	<b>Dose of Melatonin</b>	<b>Time of Dose</b>
1	100	40 mg pill	8 PM
2	100	80 mg pill	8 PM
3	100	?	?

To make this a controlled experiment, how should Group 3 be treated?

- A** They should receive no pill.  
**B** They should receive a placebo pill at 8 PM.  
**C** They should receive a 120 mg pill at 8 PM.  
**D** They should receive an 80 mg pill at 10 PM.

**GO ON**

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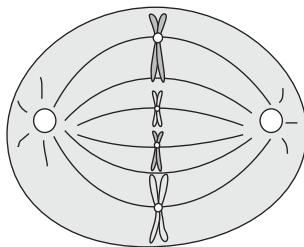
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**10** Look at the diagram of the cell below.



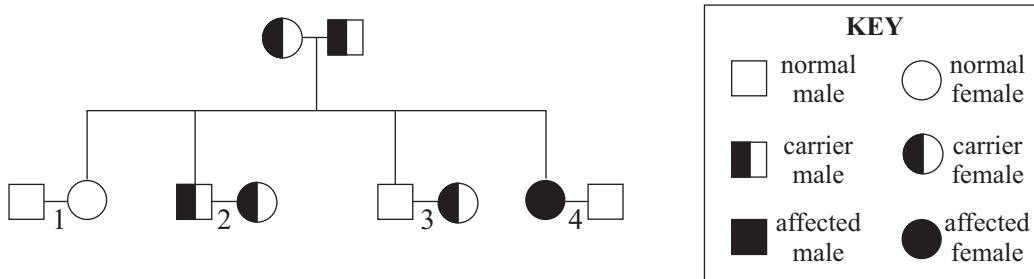
Which stage of mitosis is shown in the diagram?

- F** Metaphase
- G** Anaphase
- H** Prophase
- J** Telophase

(F) (G) (H) (J)

---

**11** Albinism in humans is an autosomal recessive condition characterized by a lack of melanin (pigment) in skin, hair, and eyes. The pedigree below shows the inheritance of albinism in a family.



Which set of numbered couples has the greatest chance of having a child affected by albinism?

- A** 1
- B** 2
- C** 3
- D** 4

(A) (B) (C) (D)

**GO ON**

- 
- 12** For a science fair project, a student placed equal amounts of *E. coli* bacteria onto agar gels in nine different petri dishes. The table below summarizes the experimental conditions for each petri dish.

***E. Coli* Bacteria Experiment**

Group	Petri Dish	Temperature	pH
A	1	23°C	7.0
	2	23°C	2.0
	3	23°C	11.0
B	4	10°C	7.0
	5	10°C	2.0
	6	10°C	11.0
C	7	40°C	7.0
	8	40°C	2.0
	9	40°C	11.0

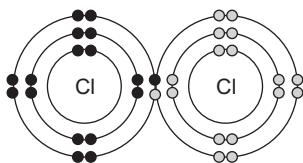
Based on the information in the table, which question is the experiment designed to test?

- F** How do extreme temperatures and pHs affect the growth of *E. coli*?  
**G** Can *E. coli* be grown on different types of agar solutions?  
**H** At a neutral pH, how does temperature affect the growth rate of *E. coli*?  
**J** Which types of bacteria grow best at different temperatures and pHs?

(F) (G) (H) (J)

---

- 13** The diagram of a diatomic chlorine molecule is shown below.



Which type of bond is formed between the two atoms of chlorine?

- A** Ionic  
**B** Hydrogen  
**C** Covalent  
**D** Polar

(A) (B) (C) (D)

**GO ON**

# Competency Correlation Chart (Teacher's Edition)

The chart below correlates each competency as given in the 2010 Mississippi Biology I Framework to the student guide. The Text Section column gives the section numbers in the text where each competency is reviewed. The Pretest and Practice Test columns give the question number(s) in that test that correlates to each competency.

Competency	Text Section(s)	Pretest	Practice Test 1	Practice Test 2
<b>INQUIRY</b> <b>1. Apply inquiry-based and problem-solving processes and skills to scientific investigations.</b>				
a. Conduct a scientific investigation demonstrating safe procedures and proper care of laboratory equipment. (DOK 2) • Safety rules and symbols • Proper use and care of the compound light microscope, slides, chemicals, etc. • Accuracy and precision in using graduated cylinders, balances, beakers, thermometers, and rulers	Section 1	1, 34, 54, 56	4, 30	7, 19
b. Formulate questions that can be answered through research and experimental design. (DOK 3)	Section 2, Section 3	7	11	12
c. Apply the components of scientific processes and methods in classroom and laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development). (DOK 2)	Section 2, Section 3	59	9, 16	24, 26
d. Construct and analyze graphs (e.g., plotting points, labeling x-and y-axis, creating appropriate titles and legends for circle, bar, and line graphs). (DOK 2)	Section 3	38	17	38
e. Analyze procedures, data, and conclusions to determine the scientific validity of research. (DOK 3)	Subsection 2.4	41	29	40
f. Recognize and analyze alternative explanations for experimental results and to make predictions based on observations and prior knowledge. (DOK 3)	Section 2, Section 3	68	34	46
g. Communicate and defend a scientific argument in oral, written, and graphic form. (DOK 3)	Section 2, Section 3	20	42	54
<b>PHYSICAL SCIENCE</b> <b>2. Describe the biochemical basis of life and explain how energy flows within and between the living systems.</b>				
a. Explain and compare with the use of examples the types of bond formation (e.g., covalent, ionic, hydrogen, etc.) between or among atoms. (DOK 2) • Subatomic particles and arrangement in atoms • Importance of ions in biological processes	Section 4	12	5	13

Competency	Text Section(s)	Pretest	Practice Test 1	Practice Test 2
<b>PHYSICAL SCIENCE</b> <b>2. Describe the biochemical basis of life and explain how energy flows within and between the living systems.</b>				
b. Develop a logical argument defending water as an essential component of living systems (e.g., unique bonding and properties including polarity, high specific heat, surface tension, hydrogen bonding, adhesion, cohesion, and expansion upon freezing). (DOK 2)	Subsection 4.6	24	7	9
c. Classify solutions as acidic, basic, or neutral and relate the significance of the pH scale to an organism's survival (e.g., consequences of having different concentrations of hydrogen and hydroxide ions). (DOK 2)	Subsections 4.7, 5.6	43, 48	18, 41	1, 36
d. Compare and contrast the structure, properties, and principle functions of carbohydrates, lipids, proteins, and nucleic acids in living organisms. (DOK 2) • Basic chemical composition of each group • Building components of each group (e.g., amino acids, monosaccharides, nucleotides, etc.) • Basic functions (e.g., energy, storage, cellular, heredity) of each group	Section 5	2, 51	8, 25	27, 44
e. Examine the life processes to conclude the role enzymes play in regulating biochemical reactions. (DOK 2) • Enzyme structure • Enzyme function, including enzyme-substrate specificity and factors that effect enzyme function (pH and temperature)	Subsection 5.6	8, 27	47	53
f. Describe the role of adenosine triphosphate (ATP) in making energy available to cells. (DOK 1) • ATP structure • ATP function	Subsections 8.1, 8.2, 8.3	49	55	32
g. Analyze and explain the biochemical process of photosynthesis and cellular respiration and draw conclusions about the roles of the reactant and products in each. (DOK 3) • <i>Photosynthesis and respiration (reactants and products)</i> • <i>Light-dependent reactions and light independent reactions in photosynthesis, including requirements and products of each</i> • <i>Aerobic and anaerobic processes in cellular respiration, including products each and energy differences</i>	Subsections 8.2, 8.3, 8.4	5	50, 62	29, 42
<b>LIFE SCIENCE</b> <b>3. Investigate and evaluate the interaction between living organisms and their environment.</b>				
a. Compare and contrast the characteristics of the world's major biomes (e.g., deserts, tundra, taiga, grassland, temperate forest, tropical rainforest). (DOK 2) • Plant and animal species • Climate (temperature and rainfall) • Adaptations of organisms	Subsections 16.7, 17.8, Section 20	31, 39, 52, 53	19, 26, 45, 51	2, 33, 37, 41

Competency	Text Section(s)	Pretest	Practice Test 1	Practice Test 2
<b>LIFE SCIENCE</b> <b>3 Investigate and evaluate the interaction between living organisms and their environment.</b>				
b. Provide examples to justify the interdependence among environmental elements. (DOK 2) <ul style="list-style-type: none"> <li>• Biotic and abiotic factors in an ecosystem (e.g., water, carbon, oxygen, mold, leaves)</li> <li>• Energy flow in ecosystems (e.g., energy pyramids and photosynthetic organisms to herbivores, carnivores, and decomposers)</li> <li>• Roles of beneficial bacteria</li> <li>• Interrelationships of organisms (e.g., cooperation, predation, parasitism, commensalism, symbiosis, and mutualism)</li> </ul>	Subsection 15.2, Section 18, Section 19	10, 30, 70, 72, 74	15, 21, 46, 65, 68	5, 8, 18, 43, 62
c. Examine and evaluate the significance of natural events and human activities on major ecosystems (e.g., succession, population growth, technology, loss of genetic diversity, consumption of resources). (DOK 2)	Subsection 14.2, Section 21	6, 16, 19, 58	2, 27, 67, 70	17, 25, 69
<b>4. Analyze and explain the structures and function of the levels of biological organization.</b>				
a. Differentiate among plant and animal cells and eukaryotic and prokaryotic cells. (DOK 2) <ul style="list-style-type: none"> <li>• Functions of all major cell organelles and structures (e.g., nucleus, mitochondrion, rough ER, smooth ER, ribosomes, Golgi bodies, vesicles, lysosomes, vacuoles, microtubules, microfilaments, chloroplast, cytoskeleton, centrioles, nucleolus, chromosomes, nuclear membrane, cell wall, cell membrane [active and passive transport], cytosol)</li> <li>• Components of mobility (e.g., cilia, flagella, pseudopodia)</li> </ul>	Subsections 6.1, 6.2, 6.3, Section 7, Subsections 15.2, 15.3	13, 29, 33, 46, 60, 76	3, 10, 28, 35	6, 39, 60, 61
b. Differentiate between types of cellular reproduction. (DOK 1) <ul style="list-style-type: none"> <li>• Main events in the cell cycle and cell mitosis (including differences in plant and animal cell divisions)</li> <li>• Binary fission (e.g., budding, vegetative propagation, etc.)</li> <li>• Significance of meiosis in sexual reproduction</li> <li>• Significance of crossing over</li> </ul>	Section 9	35, 37, 40, 57, 63, 81	31, 36, 48, 52	10, 56, 59, 64
c. Describe and differentiate among the organizational levels of organisms (e.g., cells, tissues, organs, systems, types of tissues.) (DOK 1)	Subsections 6.4, 16.6	64, 79, 84	12, 37, 66	20, 21, 67
d. Explain and describe how plant structures (vascular and nonvascular) and cellular functions are related to the survival of plants (e.g., movement of materials, plant reproduction). (DOK 1)	Section 16	18, 23, 83	20, 32, 49, 57	15, 35, 58, 66
<b>5. Demonstrate an understanding of the molecular basis of heredity.</b>				
a. Analyze and explain the molecular basis of heredity and the inheritance of traits to successive generations by using the Central Dogma of Molecular Biology. (DOK 3) <ul style="list-style-type: none"> <li>• Structures of DNA and RNA</li> <li>• Processes of replication, transcription, and translation</li> <li>• Messenger RNA codon charts</li> </ul>	Subsections 12.1, 12.2, 12.3	28, 32, 50, 61	22, 39, 53, 58	22, 45, 50, 52

Competency	Text Section(s)	Pretest	Practice Test 1	Practice Test 2
<b>5. Demonstrate an understanding of the molecular basis of heredity.</b>				
b. Utilize Mendel's laws to evaluate the results of monohybrid Punnett squares involving complete dominance, incomplete dominance, codominance, sex linked, and multiple alleles (including outcome percentage of both genotypes and phenotypes.) (DOK 2)	Section 10, Section 11	15, 26, 55, 66, 69	14, 59, 63, 69	23, 47, 55, 68
c. Examine inheritance patterns using current technology (e.g., pedigrees, karyotypes, gel electrophoresis). (DOK 2)	Subsections 11.4, 12.4, 12.5	4, 62, 71, 73	40, 54, 56, 60	4, 11, 31, 48
d. Discuss the characteristics and implications of both chromosomal and gene mutations. (DOK 2) <ul style="list-style-type: none"> <li>• Significance of nondisjunction, deletion, substitutions, translocation, frame shift mutation in animals</li> <li>• Occurrence and significance of genetic disorders such as sickle cell anemia, Tay-Sachs disorder, cystic fibrosis, hemophilia, Downs Syndrome, color blindness</li> </ul>	Subsections 10.3, 11.3, 12.4	17, 45, 78	33, 38, 44	16, 28, 34, 63
<b>6. Demonstrate an understanding of principles that explain the diversity of life and biological evolution.</b>				
a. Draw conclusions about how organisms are classified into a hierarchy of groups and subgroups based on similarities that reflect their evolutionary relationships. (DOK 2) <ul style="list-style-type: none"> <li>• Characteristics of the six kingdoms</li> <li>• Major levels in the hierarchy of taxa (e.g., kingdom, phylum/division, class, order, family, genus, and species)</li> <li>• Body plans (symmetry)</li> <li>• Methods of sexual reproduction (e.g., conjugation, fertilization, pollination)</li> <li>• Methods of asexual reproduction (e.g., budding, binary fission, regeneration, spore formation)</li> </ul>	Subsections 9.4, 9.5, Subsection 13.5, Section 15, Section 16, Section 17,	11, 14, 25, 82	1, 64	49, 51
b. Critique data (e.g., comparative anatomy, Biogeography, molecular biology, fossil record, etc.) used by scientists (e.g., Redi, Needham, Spallanzani, Pasteur) to develop an understanding of evolutionary processes and patterns. (DOK 3)	Subsections 13.1, 13.5, 14.4, 14.5	65, 75, 77	23, 61	57, 65
c. Research and summarize the contributions of scientists, (including Darwin, Malthus, Wallace, Lamarck, and Lyell) whose work led to the development of the theory of evolution. (DOK 2)	Subsection 13.2	44, 67	6	3
d. Analyze and explain the roles of natural selection, including the mechanisms of speciation (e.g., mutations, adaptations, geographic isolation) and applications of speciation (e.g., pesticide and antibiotic resistance). (DOK 3)	Subsection 13.2, Section 14, Subsections 16.7, 17.8	3, 9, 21, 42, 47, 85	24, 43	30, 70
e. Differentiate among chemical evolution, organic evolution, and the evolutionary steps along the way to aerobic heterotrophs and photosynthetic autotrophs. (DOK 2)	Subsections 13.2, 13.3, 13.4	22, 36, 80	13	14