

# ANSWERS

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Biology EOC Review Questions

1. List 4 characteristics unique to living things:

1. Organization - made of cells
2. Growth & Development
3. Reproduction
4. Adjusting to Surroundings - respond to stimuli,

2. Explain the difference between biotic and abiotic factors. have adaptations

living vs nonliving  
3. What is homeostasis?  
maintaining balance

4. How do cells maintain homeostasis: pH, temperature and salinity?

buffers warm-blooded kidneys,  
vs. cold-blooded excretory  
5. Explain the following

a. ionic bonds - giving away  $e^-$  or gaining  $e^-$

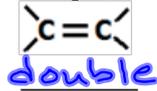
b. covalent bonds - sharing  $e^-$

c. hydrogen bonds - weak interactions between  $H_2O$  molecules.

6. Number the following bonds in order of strength from strongest to weakest:

medium ionic bonds strongest covalent bonds weakest hydrogen bonds

7. Which of these represents a single, double, and triple bond?



8. How many bonds can each of the following make?

4 Carbon (C) 3 Nitrogen (N) 2 Oxygen (O) 1 Hydrogen (H)

9. Which of the following stores energy? (Circle Your Answer)

Making Bonds Breaking Bonds

10. Which of the following releases energy? (Circle Your Answer)

Making Bonds Breaking Bonds

11. What is an organic compound?

contains C ; made by living things  
(except  $CO_2$   
&  $CO$ )

12. Complete the table regarding the four types of organic molecules:

Organic Molecule:	Atoms Present:	Building Blocks (Monomers)	What do they do?
Carbohydrates Example? <i>sugars, starches</i>	<i>CHO</i>	<i>glucose</i>	<i>energy storage</i>
Lipids Example? <i>fats, oils, steroids</i>	<i>CHO</i>	<i>glycerol with 3 fatty acids</i>	<i>energy storage</i>
Proteins Example? <i>hemoglobin, insulin, collagen</i>	<i>CHON(S)</i>	<i>amino acids</i>	<i>Variety - enzymes, hormones, transport, structural</i>
Nucleic Acids Example? <i>DNA, RNA</i>	<i>CHONP</i>	<i>nucleotides</i>	<i>store &amp; use the genetic info</i>

*enzymes*

*enzymes, hormones, transport, structural*

13. Match the test with the organic molecule (draw a line):

Organic Molecule	Test
Lipids (Fats/Oils)	Iodine Test (brown → dark blue)
Carbohydrates (Starches)	Brown Paper Bag Test (translucent spot) OR Sudan Test (red → orange)
Proteins	Benedict's Test (blue → green, yellow, or red)
Carbohydrates (Simple Sugars)	Biuret Test (blue → purple)

14. List the *function* and *describe the structure* of the following organelles:

- a. nucleus - *control center; has chromosomes*
- b. plasma membrane - *gatekeeper*
- c. cell wall - *support*
- d. mitochondria - *powerhouse*
- e. vacuoles - *storage*
- f. chloroplast - *photosynthesis*
- g. ribosomes - *protein synthesis*

15. Explain how a compound light microscope works.

*- 2 or more lenses to magnify, using light*

16. Draw the way a lowercase letter "e" would look under a microscope:



17. Explain the differences in size, chromosome structure, and organelles between prokaryotes and eukaryotes.

small cells — bigger cells  
 chromosome circular — chromosomes separate  
 no membrane-bound organelles — are membrane-bound organelles

18. Explain why water is important to cells.

— solution; regulate chemical reactions  
 — temp. changes; moving materials;

19. Define:

a. active transport — uses ATP

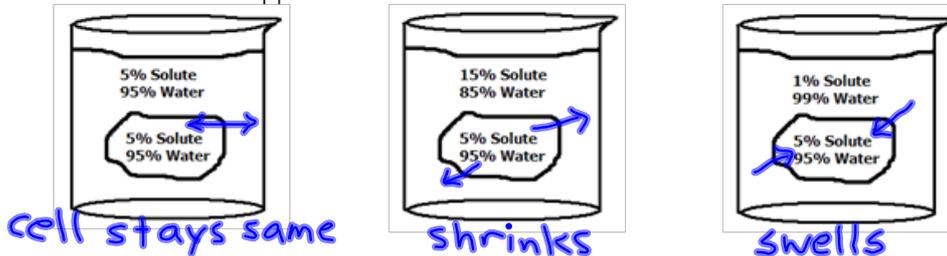
b. passive transport — no ATP

c. diffusion — passive; from high to low

d. osmosis — passive; H<sub>2</sub>O movement from high to low across membrane

e. selectively permeable membranes — only let certain materials through

20. Draw arrows to show which way water will move in each of the following situations, and tell what will happen to each cell:



21. Define enzymes — catalysts — help reactions by lowering activation energy

22. How do temperature and pH affect enzymes?

↑ temp. or wrong pH can denature enzymes  
 ↳ will not work

23. Explain the lock-and-key model of enzymes and substrates.

↳ enzyme acts as key to lock/unlock substrates

24. Define:

a. aerobic — with O<sub>2</sub>; makes more ATP

b. anaerobic — without O<sub>2</sub>; makes less ATP

25. What is alcoholic fermentation? What are the products?  $-CO_2$  & alcohol  
*anaerobic resp.*

26. Write the equation for aerobic Cellular Respiration:



27. What are the reactants and what are the products for cell respiration?

28. What is chemosynthesis?

*-producing organic compounds using chemical energy instead of light energy*

29. Write the equation for Photosynthesis:



30. What are the reactants and what are the products for photosynthesis?

31. Describe the structure of the DNA molecule.

*double helix - 2 strands of nucleotides with hydrogen bonds across middle*

32. Name the nitrogen bases found in DNA and what they bond to.

*A-T C-G*

33. What type of bond forms between the nitrogen bases in DNA?

*hydrogen bonds*

34. Describe the process of DNA replication.

*strands separate; new nucleotides are added to both*

35. List three differences between DNA and RNA:

1. *DNA is double-stranded; RNA single-stranded*
2. *DNA sugar is deoxyribose; RNA is ribose*
3. *DNA has A, T, C, G; RNA has A, U, C, G*

36. Describe the process of transcription and where it happens.

*-copying of DNA to mRNA in nucleus*

37. Describe the process of translation and where it happens.

*-assembling amino acids using mRNA & tRNA, at ribosomes*

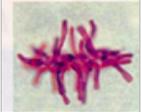
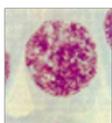
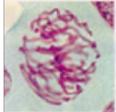
38. What is a codon?

*-sequence of 3 bases that code for an amino acid*

39. Compare and contrast Mitosis and Meiosis:

*Mitosis - 1 division; makes 2 identical cells*  
*Meiosis - 2 divisions; makes 4 non-identical cells*

40. Put the pictures of cells in interphase and the stages of mitosis in order, and name each phase.

SEQUENCE	3 <sup>rd</sup>	5 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	4 <sup>th</sup>
PHOTO					
NAME	<i>metaphase</i>	<i>telophase</i>	<i>interphase</i>	<i>prophase</i>	<i>anaphase</i>

*IPMAT*

41. Define:
- a. diploid - **cells with 2n (double) set of chromosomes; regular body cells**
  - b. haploid - **cells with 1n (single) set of chromosomes; (somatic cells) are diploid gametes & spores are haploid**
42. a. What is crossing over? **exchange of DNA between homologous chromosomes**  
 b. When does crossing over occur? **prophase I of meiosis**  
 c. What's the benefit of crossing over? **genetic variation; new gene combinations**
43. What is the Law of Independent Assortment? How does it increase variation?  
**genes for different traits are inherited separately, if they are on different chromosomes; offspring get new gene combinations**
44. What is a mutation? How does it increase variation?  
**change in DNA sequence; can change genes**
45. How can reproductive variations benefit a species?  
**variations may aid in survival**
46. Define:
- a. dominant - **allele that is expressed, even when recessive is also present**
  - b. recessive - **allele that is hidden when dominant is also present**
  - c. homozygous - **genotype with 2 same alleles (AA or aa)**
  - d. heterozygous - **genotype with 2 different alleles (Aa)**
  - e. genotype - **alleles an individual has for a trait; what "type o' genes" they have**
  - f. phenotype - **traits that are expressed; what "physical form" they have**

47. Sample Monohybrid Cross Question:

In a genetics laboratory, two heterozygous tall plants are crossed. If tall is dominant over short, what are the expected phenotypic results?

**75% tall, 25% short  
3 tall: 1 short**

	T	t
T	TT	Tt
t	Tt	tt

48. Sample Dihybrid Cross Question:

The table below shows a cross between two pea plants both heterozygous for round seeds (Rr) and yellow seeds (Yy). What phenotype ratio would you expect in the offspring?

	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

**9:3:3:1**

**9 round, yellow:  
3 round, green:  
3 wrinkled, yellow:  
1 wrinkled, green**

49. Sample Blood Type (Multiple Allele) Question:

Mr. Jones has blood type A and Mrs. Jones has blood type AB. What is the probability that they will have a child with blood type A if both of Mr. Jones's parents were AB?

	A	A
A	AA	AA
B	AB	AB

(so, Mr. Jones has to be AA - he can't be Ao)

50% chance of child with type A

50. Sample Sex-linked trait Question:

Color blindness is a sex-linked recessive trait. A mother with normal color vision and a color blind father have a color blind daughter. Which of the following statements is correct?

A) All of their daughters will be color blind.

Color-blind Father =  $X^cY$

B) The mother is a carrier of the color blindness gene.

Mother =  $X^cX^c$  (has to be a carrier to have color-blind daughter)

C) All of their sons will have normal color vision.

Color-blind Daughter =  $X^cX^c$

D) All of their sons will be color blind.

51. What is a pedigree? How is it useful in genetics?

**family tree that follows inheritance of a trait; useful to predict chances of inheritance**

52. What is a polygenic trait?

**trait caused by more than one gene; example - skin color**

53. Describe Gregor Mendel's pea plant experiments:

**P cross between opposite pure breeding parents;  $F_1$  showed all dominant;  $F_2$  showed 3:1**

54. How can DNA technology allow us to:

a. Identify an individual? **gel electrophoresis produces "DNA fingerprints" that are unique**

b. Identify a person's parents? **in child's "DNA fingerprint" some of the bands will match with one parent and the rest with the other parent**

c. Investigate a crime scene? **DNA evidence left at crime scene may match with suspect**

55. What is amniocentesis? **using fetal cells from amniotic fluid to test for genetic disorders**

56. What is gene therapy? **using recombinant DNA to insert the "correct" gene into a person with a genetic disorder**

57. How can genetic technology allow us to create human insulin using bacteria?

**human insulin gene is inserted into bacterial plasmid, and bacterium produces human insulin**

58. What is a transgenic organism and give an example?

**organism containing genes transferred from a different organism; Bt cotton (has pesticide**

59. What is cloning?

**genes from Bt bacterium)**

**producing an identical copy of a gene, cell, or organism**

60. What is gel electrophoresis?

**separation of DNA fragments based on size, and attraction to positive charge**

61. Be able to interpret a gel electrophoresis diagram.

62. What are some ethical implications and dangers of biotechnology?  
**especially with humans - is it right to change our genes?; GM organisms may interfere**
63. Explain the interacting role of genetics and environment on human health. **with food webs**  
**many traits and diseases are influenced by both genes & environment**
64. Describe the following genetic diseases:
- sickle-cell anemia - **autosomal recessive; abnormal hemoglobin; fatigue, etc.**
  - colorblindness - **sex-linked recessive; cannot distinguish between red & green**
  - cystic fibrosis - **autosomal recessive; thick mucus in lungs**
  - hemophilia - **sex-linked recessive; inability of blood to clot properly**
  - Down Syndrome (trisomy 21) - **extra copy of 21st chromosome; mental retardation, etc.**
  - Huntington's Disease - **autosomal dominant; brain deterioration after age 30-40**
65. Describe how genetics and environment affect:
- cardiovascular disease - **can inherit tendency, but poor diet/exercise can also cause**
  - diabetes - **can inherit tendency, but poor diet/exercise can also cause type II diabetes**
  - cancer - **can inherit tendency, but environmental mutagens can also cause**
  - asthma - **can inherit tendency, but exposure to irritants can also cause**
66. Describe what causes:
- malnutrition - **improper diet; lacking nutrients**
  - lead poisoning - **exposure to lead in paint, water supply, etc.**
67. What are the impacts of:
- tobacco use – **decreased lung volume; lung/oral cancer; emphysema**
  - radiation – **cancers**
68. Contrast abiogenesis and biogenesis.  
**abiogenesis=spontaneous generation ; biogenesis=life comes from life of same type**
69. What did Louis Pasteur contribute to our understanding of the origins of life?  
**biogenesis; S-necked flasks of broth stayed clear because microbes couldn't get in**
70. Explain Miller and Urey's hypothesis and lab simulation.  
**heated up fluids found on primitive Earth; shocked with electricity; formed simple organic molecules (simulated what could have happened in primordial seas)**
71. What can we infer from the fossil record? Where do you find the oldest/youngest fossils?  
**oldest fossils are in the lowest layers of sedimentary rock & youngest are in top layers**
72. Define and give an example:
- adaptive radiation - **many different species form from one species, usually due to**
  - vestigial structures **-have reduced/no function; appendix** separation geographically
  - biochemical similarities between species -  
**DNA/proteins in common show common ancestry; hemoglobin genes**
73. Define natural selection.  
**change in species over time, due to some adaptations favoring survival/reproduction**
74. How are variation and natural selection related?  
**variation is part of natural selection - certain variations may aid in survival**
75. What is geographic isolation?  
**separation of population groups by water or landmasses, that may lead to speciation**
76. What is reproductive isolation?  
**separation of groups within a population due to mating time or courtship behavior; may lead to speciation**

77. Describe Charles Darwin's theory of natural selection:  
**variation exists; organisms compete for resources; best adapted survive & reproduce; species changes over time**

78. Define the following and explain how they are related to natural selection:

- a. pesticide resistance – **insects adapt to be resistant to pesticides that kill others of their species**
- b. antibiotic resistance – **bacteria adapt to be resistant to antibiotics that kill many of their species**

79. How does our modern classification system show the evolutionary relationship among organisms? **organisms in common taxa (groups) evolved from common ancestor**

80. How has a knowledge of evolutionary relationships affected our understanding of:

- a. DNA analysis- **organisms with large similarities in DNA evolved from common ancestor**
- b. Biochemical analysis- **close sequences in amino acids in proteins = common ancestry**
- c. Embryological development- **similar stages in embryonic development = common ancestry**

81. Explain the characteristics of these organisms including their reproduction, how they eat, & how they regulate their internal environment.

KINGDOM	Group	Reproduction	How They Get Food	Regulation of Internal Environment
ANIMALS	Porifera	budding; also sexual	filter-feeding	simple - diffusion
	Cnidaria	budding; also sexual	stinging tentacles	nerve net; diffusion
	Annelida	mostly sexual	mouth>dig.tract>anus	"brain", nerve cord, nephridia
	Mollusca	sexual	mouth>...anus	ganglia; nephridia
	Arthropoda	sexual	mouth>...anus	brain, complex senses; excretory organs
	Chordata	sexual	mouth>...anus	complex brain, complex senses; excretory organs
PLANTS	Mosses	swimming sperm; gametophyte dominant	photosynthesis	simple - diffusion
	Ferns	swimming sperm; sporophyte dominant	photosynthesis	vascular tissue
	Angiosperms	pollen; flower; fruit; seed	photosynthesis	vascular tissue
	Gymnosperms	pollen; cone; seed	photosynthesis	vascular tissue
FUNGI		budding; spores	absorption	simple - diffusion
PROTISTS		asexual-by mitosis	some photosynthetic; some absorptive	simple - diffusion
MONERA		asexual-binary fission	some photosynthetic; some absorptive	simple - diffusion

82. Are viruses living or nonliving? Explain. **not composed of cells & cannot reproduce on own; but do have DNA or RNA & can infect cells**

83. Be able to use a simple dichotomous key.

84. Describe the function of the following systems:
- Body covering (skin) - **(integumentary) - defense; maintaining temp./moisture**
  - Cardiovascular - **transport of nutrients, wastes, gases through body**
  - Digestive - **breakdown and absorption of nutrients from food**
  - Endocrine - **regulation of organs by hormones, released from glands**
  - Excretory - **removal of nitrogenous waste by kidneys**
  - Immune - **defense against pathogens; B cells make antibodies; T cells kill pathogens directly**
  - Nervous - **communication; receiving stimulus->interpreting->responding**
  - Muscular - **body movement and organ movement**
  - Reproductive - **producing gametes & enabling development of embryo/fetus**
  - Respiratory - **gas exchange: removal of CO<sub>2</sub> from blood and intake of O<sub>2</sub>**
  - Support (skeletal) - **framework for attachment of muscles; protection of organs**

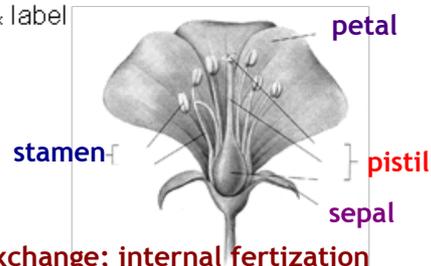
85. How do hormones work and what is a feedback system? **hormones travel through blood to target organ to cause change; feedback = an end product affects its own production**

86. Explain how neurons pass information to muscles and other neurons.

**axon end of neuron cell -> across a synapse -> muscle cell or dendrite of another neuron**

87. Describe the function of the following parts of the flower, & label them in the picture to the left:

- petals - **attract pollinators**
- pistil - **female part in middle**
- stamen/anthers - **male parts; make pollen**
- ovary - **in pistil; contains ovules (eggs); becomes fruit**



88. What adaptations are necessary for:

- life on land: **keeping in moisture; support; gas exchange; internal fertilization**
- aquatic life: **removing excess H<sub>2</sub>O/salts; support; external fertilization**

89. What abiotic factors determine what biome will be present in a region?  
**temperature and precipitation**

90. How do the biotic factors and the abiotic factors in an ecosystem affect each other?

**biotic (living) factors can be limited by abiotic (nonliving) factors, like water, air, etc.**

91. What is a niche?

**the role an organism has in its environment (trophic level, etc.)**

92. Define these types of relationships (symbiosis).

- mutualism - **both species benefit [+/+]**
- commensalism- **one species benefits, other is unharmed [+/0]**
- parasitism- **one species benefits, other is harmed [+/-]**

What is a predator/prey relationship?

**predator hunts prey**

93. Define and give an example of:

a. density-dependent limiting factor –

**factor influenced by population size; ex. overcrowding causes stress, disease**

b. density-independent limiting factor –

**factor not influenced by population size; ex. storms, fire, drought**

94. What is carrying capacity?

**amount of individuals that can be sustained in a population over time**

95. Describe the following cycles:

a. water cycle- **condensation->precipitation->intake by organisms->respiration, transpiration, evaporation**

b. carbon cycle- **CO<sub>2</sub> in air->by photosynthesis into carbohydrates->eaten by consumers, in variety of organic molecules->back to CO<sub>2</sub> by cell respiration or burning**

c. nitrogen cycle- **N<sub>2</sub> gas in air->into nitrates by nitrogen-fixing bacteria->absorbed by plants->into proteins & nucleic acids in plants & animals->decomposers send back to air**

96. Study the materials cycle diagrams in your book.

97. How can humans influence cycling with:

a. deforestation-

**cutting down or burning forests could reduce O<sub>2</sub> and increase CO<sub>2</sub>**

b. fertilizers-

**excess fertilizers can upset aquatic ecosystems by adding too much N or P**

c. factories-

**burning of fuels adds CO<sub>2</sub> to air; causing greenhouse effect/global warming**

98. What is nitrogen fixation and what organisms are involved?

**conversion of nitrogen gas to a form usable by plants; nitrogen-fixing bacteria (lightning also converts it)**

99. How does photosynthesis relate to energy getting into ecosystems?

**energy from sun enters ecosystems through photosynthesis in producers (plants)**

100. What role do decomposers play in the environment?

**recycle nutrients so they can be used again**

101. What is a trophic level?

**feeding levels: producer->1st order consumer->2nd order consumer...**

102. What is a food chain? Draw a food chain including the following organisms: *heron*, *minnow*, *plankton*.

**plankton (algae) → minnow → heron**



103. Study the trophic pyramids in your book.

104. What happens to energy in an ecosystem? What happens to nutrients?

**energy is lost as it transfers; nutrients are not lost but recycled**

105. How much energy is passed from one trophic level to the next in an ecosystem? What happens to the rest?

**only 10% of energy is passed to next level; the rest is used & waste heat is released**

106. What is a food web? **interconnected food chains - shows all feeding relationships**
107. What is primary succession? **orderly change over time in types of plants (& animals) in an area - when starting with bare rock or no nutrients in soil**
108. What is secondary succession? **orderly change over time in types of plants (& animals) in an area - when starting with soil with some nutrients (after fire, etc.)**
109. What is a climax community?  
**the final community of plants (& animals) in an area after succession**
110. What is global warming? What causes it?  
**increased temperature on Earth, due to greenhouse effect from increased CO<sub>2</sub>**
111. What are the possible effects of global warming?  
**melting polar ice caps; coastline changes; weather changes**
112. What are some ways that carbon dioxide emissions can be reduced?  
**reduce burning fossil fuels & forests**
113. What are some factors that influence birth/death rates in the human population?  
**medical care; sanitation; overcrowding; cultural factors**
114. What effects would the following have on the environment?
- human population size- **increased demand for food & resources**
  - human population density- **increased disease; pollution; habitat destruction**
  - resource use- **depletion of natural resources**
115. What effect can a buildup of pesticides have over the long term in the environment (bioaccumulation/biological magnification)?  
**top trophic levels will get such build-up that health will decrease**
116. What affect can pesticides have on organisms that they weren't intended to affect?  
**harming organisms & upsetting balance in ecosystem**
117. What is pesticide resistance? What are the long term affects?  
**adaptation of ability to live in presence of pesticide; overpopulation of resistant species**
118. What are some biological alternatives to chemical pesticides? What are the pros and cons?  
**importing predators that will reduce pests; pro=no pesticides; con=non-native species may overpopulate and upset ecosystem**
119. What is DDT and what are its effects on the ecosystem?  
**pesticide that was used extensively in US; bio-magnification harmed predatory birds**
120. Explain how the following adaptations affect an organism's ability to survive:
- Mimicry – **looking like a dangerous animal will make predators avoid them**
  - Protective coloration- **camouflage; hide from predators**
  - Parental behavior- **nurturing from parents aids in survival of young**
  - Feeding strategies- **food-getting methods/structures help in survival**
121. Give an example of how an organism might change their behavior to respond to their environment.  
**learning to eat new food sources; changing habitats and behaviors if ecosystem is damaged by natural disaster**

122. Define the following tropisms:
- phototropism – **growth of plant stems/leaves toward light**
  - geotropism/gravitropism – **growth of roots towards Earth's gravity and shoots (stems) away from gravity**
  - thigmotropism – **growth of stems towards or away from touch**
123. Define:
- chemotaxis (positive/negative)- **movement of protist or animal towards/away from a specific chemical; ex. food, poison, etc.**
  - phototaxis (positive/negative)- **movement of protist or animal towards/away from light**
  - reflexes- **simple innate behavior that protects from harm**
  - imprinting- **simple learned behavior where baby bonds to parent**
  - instincts- **complex innate behavior**
  - types of learned behavior- **imprinting, habituation, trial & error, conditioning, insight (reasoning)**
124. Define:
- Circadian rhythms – **behaviors based on a 24-hour pattern (sleep/wake cycles, etc.)**
  - Migration – **instinctual behavior of seasonal movement**
  - Estivation – **slow state of metabolism triggered by dry, hot weather**
  - Hibernation – **slow state of metabolism triggered by cold weather**
  - Biological Clocks – **behaviors based on instinct and time (ex. seasonal)**
125. Explain how certain animal behaviors such as courtship and other behaviors may have evolved.
- if the behavior is governed by genetics and helps in survival/reproduction, it is adaptive**