

Honors Biology Practice Worksheet

Fifty questions spanning cell structure, cellular energy, genetics, evolution and ecology, and human body systems. Questions 45 to 50 ask for written explanations.

QUESTIONS	50	MULTIPLE CHOICE	29	WRITTEN	21
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Instructions

Answer in complete sentences where a question asks you to explain, not just label.

- 1** Which organelle is the site of aerobic respiration?
 - A) Nucleus
 - B) Ribosome
 - C) Mitochondria
 - D) Golgi apparatus
- 2** Which structure controls what enters and leaves a cell?
 - A) Nucleus
 - B) Cell membrane
 - C) Cytoplasm
 - D) Cell wall
- 3** Diffusion moves molecules:
 - A) From low to high concentration
 - B) From high to low concentration
 - C) Only with ATP
 - D) Only across a membrane
- 4** Which process requires ATP to move molecules against a concentration gradient?
 - A) Diffusion
 - B) Osmosis
 - C) Active transport
 - D) Facilitated diffusion
- 5** A cell is placed in a hypotonic solution (less solute outside). What happens to the cell?
- 6** Which is the correct summary equation for photosynthesis?
 - A) Glucose + oxygen → CO₂ + water + ATP
 - B) CO₂ + water + light → glucose + oxygen
 - C) Glucose → CO₂ + ATP
 - D) Oxygen + water → glucose
- 7** Cellular respiration primarily occurs in the:
 - A) Chloroplast
 - B) Nucleus
 - C) Mitochondria
 - D) Ribosome
- 8** What molecule serves as the cell's main energy currency?
- 9** An enzyme's ability to work on only one type of substrate is due to:
 - A) Its size
 - B) Its active site shape
 - C) Its color
 - D) Its location in the cell

- 10** If a heterozygous (Bb) individual is crossed with another heterozygous (Bb) individual, what fraction of offspring are expected to show the recessive phenotype?
- A) $\frac{1}{4}$
 - B) $\frac{1}{2}$
 - C) $\frac{3}{4}$
 - D) 0
- 11** Genotype refers to:
- A) The observable trait
 - B) The genetic makeup
 - C) The chromosome number
 - D) The species name
- 12** Phenotype refers to:
- A) The genetic makeup
 - B) The observable trait
 - C) The DNA sequence only
 - D) The number of alleles
- 13** In DNA, adenine pairs with which base?
- _____
- _____
- _____
- 14** In DNA, guanine pairs with which base?
- _____
- _____
- _____
- 15** Which process converts mRNA into a protein?
- A) Transcription
 - B) Translation
 - C) Replication
 - D) Mitosis
- 16** Which process copies DNA into mRNA?
- A) Transcription
 - B) Translation
 - C) Replication
 - D) Meiosis
- 17** Meiosis produces cells with:
- A) The same chromosome number as the parent
 - B) Half the chromosome number of the parent
 - C) Double the chromosome number
 - D) No chromosomes
- 18** A Bb parent is crossed with a bb parent. What genotype ratio is expected in offspring?
- _____
- _____
- _____
- 19** A BB parent is crossed with a bb parent. What genotype do ALL offspring have?
- _____
- _____
- _____
- 20** Natural selection acts on:
- A) Individual organisms only, changing during their lifetime
 - B) Heritable variation within a population over generations
 - C) Random mutations that always help the organism
 - D) Only visible physical traits
- 21** Define adaptation in one sentence.
- _____
- _____
- _____
- 22** Which best describes speciation?
- A) Two species merging into one
 - B) Reproductive isolation leading to a new species
 - C) A population growing in size
 - D) A single organism changing species
- 23** In a food chain, what is the correct order: producer, primary consumer, secondary consumer?
- _____
- _____
- _____

- 24** Approximately what percent of energy transfers from one trophic level to the next?
- A) 1%
 - B) 10%
 - C) 50%
 - D) 90%
- 25** Explain, using the 10% rule, why food chains rarely have more than 4-5 levels.
- _____
- _____
- _____
- 26** Carrying capacity refers to:
- A) The fastest possible growth rate
 - B) The maximum population an environment can sustain
 - C) The minimum viable population
 - D) The total number of species in an area
- 27** Which body system transports oxygen and nutrients throughout the body?
- A) Digestive
 - B) Circulatory
 - C) Nervous
 - D) Respiratory
- 28** Which body system exchanges oxygen and carbon dioxide with the environment?
- A) Circulatory
 - B) Digestive
 - C) Respiratory
 - D) Nervous
- 29** Which body system sends rapid electrical signals for communication?
- A) Circulatory
 - B) Nervous
 - C) Digestive
 - D) Respiratory
- 30** Define homeostasis in one sentence.
- _____
- _____
- _____
- 31** Which of these is an example of homeostasis?
- A) A cell dividing
 - B) The body sweating to cool down
 - C) A plant photosynthesizing
 - D) DNA replicating
- 32** Which macromolecule stores genetic information?
- A) Carbohydrate
 - B) Lipid
 - C) DNA
 - D) Protein
- 33** Which macromolecule is the primary catalyst for biological reactions?
- A) Carbohydrate
 - B) Lipid
 - C) Nucleic acid
 - D) Protein (enzyme)
- 34** Which organelle modifies and packages proteins for transport?
- A) Golgi apparatus
 - B) Nucleus
 - C) Mitochondria
 - D) Ribosome
- 35** Which structure synthesizes proteins?
- A) Golgi apparatus
 - B) Ribosome
 - C) Lysosome
 - D) Vacuole
- 36** A population of rabbits has both brown and white individuals. Explain how natural selection could favor brown rabbits in a forest environment.
- _____
- _____
- _____
- 37** Which is a producer in most ecosystems?
- A) A deer
 - B) A wolf
 - C) Grass
 - D) A mushroom (decomposer)

38 A dihybrid cross ($AaBb \times AaBb$) for two independently assorting traits produces what phenotype ratio?

- A) 1:1
- B) 1:2:1
- C) 3:1
- D) 9:3:3:1

39 Explain why a recessive allele can be present in a population without being expressed.

40 Explain the difference between an observational study and a controlled experiment in a biology investigation.

41 A student's data table shows enzyme activity increasing with temperature up to 37 degrees C, then dropping sharply. Explain this pattern.

42 Explain why mitochondria are often called the 'powerhouse of the cell.'

43 Explain, using osmosis, why saltwater is not a safe substitute for freshwater for a freshwater fish.

44 A pedigree shows a recessive trait skipping a generation. Explain how this is possible.

45 Explain why a mutation in a gene does not always change the resulting protein.

46 Describe one way an invasive species can disrupt an established ecosystem's food web.

47 Explain why active transport requires energy while diffusion does not.

48 Explain the relationship between genotype, phenotype, and environment using an example.

49 Which structure is found in plant cells but not animal cells?

- A) Nucleus
- B) Cell wall
- C) Mitochondria
- D) Ribosome

50 Chloroplasts are the site of which process?

- A) Cellular respiration
- B) Photosynthesis
- C) Protein synthesis
- D) DNA replication

Answer key

Direct answers only, in question order. Work the set first, then check.

1. C) Mitochondria	2. B) Cell membrane	3. B) From high to low concentration	4. C) Active transport	5. The cell swells as water moves in
6. B) CO ₂ + water + light -> glucose + oxygen	7. C) Mitochondria	8. ATP	9. B) Its active site shape	10. A) 1/4
11. B) The genetic makeup	12. B) The observable trait	13. Thymine	14. Cytosine	15. B) Translation
16. A) Transcription	17. B) Half the chromosome number of the parent	18. 1 Bb : 1 bb	19. Bb	20. B) Heritable variation within a population over generations
21. An inherited trait that improves an organism's chance of survival or reproduction in its environment	22. B) Reproductive isolation leading to a new species	23. Producer -> primary consumer -> secondary consumer	24. B) 10%	25. So much energy is lost as heat at each transfer that too little remains to support another level after 4-5 steps
26. B) The maximum population an environment can sustain	27. B) Circulatory	28. C) Respiratory	29. B) Nervous	30. The maintenance of a stable internal environment despite external changes
31. B) The body sweating to cool down	32. C) DNA	33. D) Protein (enzyme)	34. A) Golgi apparatus	35. B) Ribosome

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| 36. Brown rabbits blend into the forest and are less visible to predators, so they survive and reproduce more often, passing the brown allele to more offspring over generations | 37. C) Grass | 38. D) 9:3:3:1 | 39. A recessive allele is only expressed in the phenotype when an individual is homozygous recessive; in a heterozygote, the dominant allele masks it | 40. An observational study records data without manipulating variables, while a controlled experiment deliberately changes one variable (the independent variable) while holding others constant to test cause and effect |
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- | | | | | |
|---|--|--|---|---|
| 41. Enzyme activity increases with temperature as molecules move faster and collide more often, up to an optimal temperature; beyond that point, the enzyme denatures and loses its functional shape, so activity drops | 42. Mitochondria carry out aerobic cellular respiration, converting the chemical energy in glucose into ATP that powers most cellular activities | 43. Saltwater is hypertonic relative to the fish's cells, so osmosis would pull water out of the fish's cells, causing dehydration at the cellular level | 44. A carrier (heterozygous) individual in the skipped generation does not show the recessive trait but can still pass the recessive allele to offspring, who may show the trait if they inherit it from both parents | 45. The genetic code is redundant (multiple codons can code for the same amino acid), so a mutation may not change the amino acid sequence, or it may occur in a non-coding region of DNA |
|---|--|--|---|---|
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46. An invasive species can outcompete native species for resources, prey on native species with no natural defenses, or lack natural predators itself, disrupting the existing balance of the food web
47. Diffusion moves substances down their concentration gradient (high to low), which happens spontaneously; active transport moves substances against their gradient (low to high), which requires the cell to expend ATP to do work against the natural direction of movement
48. Genotype sets the potential for a trait, but the phenotype (observed trait) can be influenced by environment; for example, a plant's genotype may allow for tall growth, but poor soil (environment) could result in a shorter phenotype than the genotype allows
49. B) Cell wall
50. B) Photosynthesis
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Error log

Bring this page to your next session so the tutor can start from what actually blocked you.

Questions I answered incorrectly:

Was it a vocabulary gap, a process I couldn't explain, or a diagram I couldn't read?

The single topic I want to start the next session with:
