

AP Biology Practice Worksheet

Fifty questions across chemistry of life, cellular energetics, cell communication, heredity, gene expression, natural selection, and ecology. Questions 45 to 50 ask for written claim-evidence-reasoning.

QUESTIONS	50	MULTIPLE CHOICE	34	WRITTEN	16
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Instructions

Where a question asks you to explain, write a full claim-evidence-reasoning answer.

- 1** Water's ability to form hydrogen bonds explains its:
A) Low specific heat
B) High specific heat and cohesion
C) Nonpolar behavior
D) Inability to dissolve ionic compounds
- 2** The monomer of a protein is a(n):
A) Nucleotide
B) Amino acid
C) Monosaccharide
D) Fatty acid
- 3** The monomer of DNA is a(n):
A) Amino acid
B) Monosaccharide
C) Nucleotide
D) Glycerol
- 4** Enzyme specificity is best explained by:
A) Enzyme size
B) The unique shape of the active site matching a substrate
C) Enzyme color
D) The temperature of the reaction
- 5** The fluid mosaic model describes the structure of the:
A) Nucleus
B) Cell membrane
C) Mitochondria
D) Ribosome
- 6** The light reactions of photosynthesis occur in the:
A) Stroma
B) Thylakoid membrane
C) Mitochondrial matrix
D) Cytoplasm
- 7** The Calvin cycle occurs in the:
A) Thylakoid
B) Stroma
C) Cytoplasm
D) Nucleus
- 8** Glycolysis produces a net of how many ATP molecules per glucose?
- 9** The majority of ATP from aerobic respiration is produced by the:
A) Glycolysis
B) Krebs cycle alone
C) Electron transport chain
D) Calvin cycle
- 10** Which process occurs in the cytoplasm, independent of oxygen?
A) Krebs cycle
B) Electron transport chain
C) Glycolysis
D) Calvin cycle

- 11** List the three steps of signal transduction in order.
- _____
- _____
- _____
- 12** Mitosis produces cells that are:
- A) Genetically varied and haploid
 - B) Genetically identical and diploid
 - C) Genetically identical and haploid
 - D) Genetically varied and diploid
- 13** Meiosis produces cells that are:
- A) Genetically identical and diploid
 - B) Genetically varied and haploid
 - C) Genetically identical and haploid
 - D) Genetically varied and diploid
- 14** Programmed cell death is called:
- A) Mitosis
 - B) Meiosis
 - C) Apoptosis
 - D) Cytokinesis
- 15** Uncontrolled cell division, often due to checkpoint failure, can lead to:
- A) Apoptosis
 - B) Cancer
 - C) Meiosis
 - D) Gene silencing
- 16** How many haploid gametes does one diploid cell produce through meiosis?
- _____
- _____
- _____
- 17** Independent assortment occurs during which phase?
- A) Prophase II
 - B) Metaphase I
 - C) Anaphase II
 - D) Telophase II
- 18** Crossing over occurs during which phase?
- A) Prophase I
 - B) Metaphase II
 - C) Anaphase I
 - D) Telophase I
- 19** State the central dogma of molecular biology in order.
- _____
- _____
- _____
- 20** Transcription produces:
- A) A protein
 - B) mRNA from a DNA template
 - C) DNA from RNA
 - D) A new cell
- 21** Translation produces:
- A) mRNA from DNA
 - B) A protein from mRNA
 - C) DNA from mRNA
 - D) A new chromosome
- 22** An operon allows a cell to:
- A) Store genetic information permanently
 - B) Turn genes on or off in response to conditions
 - C) Undergo mitosis faster
 - D) Prevent all mutations
- 23** Which is required for natural selection to occur in a population?
- A) Identical genotypes in all individuals
 - B) Heritable variation and differential reproductive success
 - C) A constant environment
 - D) Human intervention
- 24** In Hardy-Weinberg, if $p=0.6$, what is q ?
- _____
- _____
- _____

- 25** In Hardy-Weinberg, if $p=0.7$, find p^2 (frequency of the homozygous dominant genotype).

- 26** A Hardy-Weinberg population is assumed to be:

A) Rapidly evolving
B) Not evolving (a baseline for comparison)
C) Extinct
D) Entirely homozygous

- 27** Two species competing for the same limited resource illustrates:

A) Mutualism
B) Competition
C) Commensalism
D) Parasitism

- 28** A relationship where both species benefit is called:

A) Commensalism
B) Parasitism
C) Mutualism
D) Competition

- 29** A relationship where one species benefits and the other is unaffected is called:

A) Mutualism
B) Commensalism
C) Parasitism
D) Predation

- 30** Approximately what percent of energy transfers between trophic levels?

- 31** Which best demonstrates a controlled experiment testing enzyme activity?

A) Observing enzyme activity in nature without changing anything
B) Varying only temperature while holding pH and substrate concentration constant
C) Changing temperature, pH, and substrate concentration all at once
D) Recording data from a single trial

- 32** A gene is 'turned off' most directly through:

A) Mutation of the entire chromosome
B) Gene regulation (e.g. repressor binding)
C) Meiosis
D) Photosynthesis

- 33** Which molecule carries the genetic code from the nucleus to the ribosome?

A) tRNA
B) mRNA
C) rRNA
D) DNA polymerase

- 34** A mutation in a gene's coding sequence that does NOT change the amino acid produced is called:

A) A frameshift mutation
B) A silent mutation
C) A nonsense mutation
D) A deletion

- 35** A mutation that inserts or deletes a number of bases not divisible by 3 causes a:

A) Silent mutation
B) Frameshift mutation
C) Point mutation only
D) No effect

- 36** Explain why the electron transport chain requires oxygen, using its role as the final electron acceptor.

- 37** A population of moths has both light and dark colored individuals. After pollution darkens tree bark, dark moths become more common. Explain this using natural selection.

- 38** Explain why sexual reproduction produces more genetic variation than asexual reproduction.

- 39** A student observes that a plant's leaves turn toward a light source over several hours. Propose an explanation involving cell communication.

- 40** Explain why an enzyme's activity decreases sharply above its optimal temperature.

- 41** Explain how removing a top predator from an ecosystem could affect populations at lower trophic levels.

- 42** Explain why identical twins can still show phenotypic differences despite having identical genotypes.

- 43** A researcher finds that a new antibiotic kills 99% of a bacterial population, but the surviving 1% repopulate and are now resistant. Explain this using natural selection, not adaptation of individual bacteria.

- 44** DNA replication is semi-conservative because each new DNA molecule contains:

- A) Two entirely new strands
- B) Two original strands
- C) One original strand and one new strand
- D) Only RNA

- 45** A population growing exponentially eventually slows as it approaches its:

- A) Mutation rate
- B) Carrying capacity
- C) Gene pool
- D) Biomass

- 46** Genetic drift has the strongest effect on:

- A) Large populations
- B) Small populations
- C) Populations with no variation
- D) Asexual populations only

- 47** Which technique separates DNA fragments by size using an electric current?

- A) PCR
- B) Gel electrophoresis
- C) Centrifugation
- D) Chromatography

- 48** PCR (polymerase chain reaction) is used to:

- A) Sequence an entire genome
- B) Amplify (make many copies of) a specific DNA segment
- C) Translate mRNA into protein
- D) Separate proteins by charge

49 The gradual change in an ecosystem over time after a disturbance, starting with pioneer species, is called:

- A) Natural selection
- B) Ecological succession
- C) Genetic drift
- D) Speciation

50 A cross between two heterozygous individuals ($Aa \times Aa$) for a single gene produces what phenotype ratio (dominant:recessive)?

Answer key

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

1. B) High specific heat and cohesion	2. B) Amino acid	3. C) Nucleotide	4. B) The unique shape of the active site matching a substrate	5. B) Cell membrane
6. B) Thylakoid membrane	7. B) Stroma	8. 2	9. C) Electron transport chain	10. C) Glycolysis
11. Reception, transduction, response	12. B) Genetically identical and diploid	13. B) Genetically varied and haploid	14. C) Apoptosis	15. B) Cancer
16. 4	17. B) Metaphase I	18. A) Prophase I	19. DNA → RNA → protein	20. B) mRNA from a DNA template
21. B) A protein from mRNA	22. B) Turn genes on or off in response to conditions	23. B) Heritable variation and differential reproductive success	24. 0.4	25. 0.49
26. B) Not evolving (a baseline for comparison)	27. B) Competition	28. C) Mutualism	29. B) Commensalism	30. 10%
31. B) Varying only temperature while holding pH and substrate concentration constant	32. B) Gene regulation (e.g. repressor binding)	33. B) mRNA	34. B) A silent mutation	35. B) Frameshift mutation

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| 36. Oxygen accepts the electrons at the end of the electron transport chain, combining with hydrogen ions to form water; without oxygen to accept these electrons, the chain backs up and stops, halting ATP production | 37. Dark moths are better camouflaged against the darkened bark, making them less visible to predators; they survive and reproduce more often than light moths, passing the dark-coloration allele to more offspring, increasing its frequency in the population over generations | 38. Sexual reproduction combines independent assortment, crossing over, and the fusion of two genetically distinct gametes during fertilization, while asexual reproduction produces genetically identical clones of the parent with variation arising only from mutation | 39. The plant likely detects light through a photoreceptor, triggering a signal transduction pathway that causes an uneven distribution of the growth hormone auxin, leading to differential cell elongation on the shaded side and bending the plant toward the light | 40. High temperatures disrupt the hydrogen bonds and other interactions maintaining the enzyme's 3D shape, causing denaturation; once the active site's shape is altered, it can no longer bind its substrate effectively, reducing activity |
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- | | | | | |
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| 41. Without the predator controlling their numbers, the prey population may increase rapidly, which could then over-consume the next lower trophic level (e.g. plants), potentially causing a cascade of population changes throughout the food web (a trophic cascade) | 42. Environmental factors and gene expression differences (such as epigenetic changes, diet, or experiences) can cause the same genotype to be expressed differently, producing phenotypic differences even between genetically identical individuals | 43. The population already contained rare, pre-existing genetic variation for antibiotic resistance before treatment; the antibiotic did not cause the resistance, but selected for the resistant individuals by killing the non-resistant ones, so the survivors' resistant alleles became common in the next generation | 44. C) One original strand and one new strand | 45. B) Carrying capacity |
|---|---|---|---|--------------------------|
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46. **B) Small
populations**

47. **B) Gel
electrophoresis**

48. **B) Amplify
(make many
copies of) a
specific DNA
segment**

49. **B) Ecological
succession**

50. **3:1**

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 or a claim-evidence-reasoning gap?

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