# NCEA Level 2 Biology Genetics Practice Exam (Sample)

## Study Guide


**Everything you need from our exam experts!**

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# Introduction

**Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.**

**This guide was designed to help you do exactly that.**

**Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.**

**The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:**

- **Practice answering questions under realistic conditions,**
- **Improve accuracy and speed,**
- **Review explanations to strengthen weak areas, and**
- **Approach the exam with greater confidence.**

**We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.**

**Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.**

**Let's begin.**

# How to Use This Guide

**This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here’s how to get the most out of your Examzify study guide:**

### 1. Start with a Diagnostic Review

**Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.**

### 2. Study in Short, Focused Sessions

**Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.**

### 3. Learn from the Explanations

**After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.**

### 4. Track Your Progress

**Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.**

### 5. Simulate the Real Exam

**Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.**

### 6. Repeat and Review

**Don’t just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.**

**There’s no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!**

# Questions

1. **How is evolution defined in a biological context?**
   - A. The process of individual organisms adapting to their environment
   - B. The change in the genetic composition of a population over successive generations
   - C. The emergence of new species
   - D. The stabilization of genetic traits over time

2. **What does stabilising selection ultimately affect in a population?**
   - A. The genetic diversity by reducing extreme traits
   - B. The overall population size by increasing mutation
   - C. The environmental factors by changing habitat
   - D. The breeding patterns by encouraging isolation

3. **What situation occurs when allele frequencies remain constant over time?**
   - A. Genetic drift
   - B. Genetic stability
   - C. Genetic equilibrium
   - D. Microevolution

4. **How can environmental influences affect an organism's phenotype?**
   - A. By altering the genetic code of the organism
   - B. By making mutations occur in the DNA
   - C. By interacting with genotype to produce variations in physical traits
   - D. By changing the reproductive success of individuals

5. **What does the term phenotype ratio refer to in genetics?**
   - A. The proportion of alleles in a population
   - B. The average number of offspring produced
   - C. The ratio of different phenotypes observed in offspring from a genetic cross
   - D. The frequency of mutations in a gene

**6. What is the result of a genetic cross that produces a 3:1 phenotype ratio?**

**A. It indicates complete dominance of one allele over another**

**B. It shows equal expression of both alleles**

**C. It suggests codominance between the alleles**

**D. It highlights the influence of multiple genes**

**7. What type of cell division produces reproductive cells or gametes?**

**A. Mitosis**

**B. Meiosis**

**C. Fertilization**

**D. Binary Fission**

**8. What would happen if a pentadactyl limb evolved to have an additional digit?**

**A. The limb would become a hexadactyl limb**

**B. The limb would serve no purpose**

**C. The limb would improve functionality**

**D. No change would occur in the organism**

**9. Which of the following best defines the term genotype?**

**A. All observable characteristics of an organism**

**B. The physical expression of a trait in an organism**

**C. The genetic constitution of an organism**

**D. The combination of environmental influences on traits**

**10. What is gene mutation?**

**A. A change in an organism's habitat**

**B. A change in the base sequence of a gene**

**C. A change in an organism's diet**

**D. A change in population size**

# Answers

1. B
2. A
3. C
4. C
5. C
6. A
7. B
8. A
9. C
10. B

# Explanations

## 1. How is evolution defined in a biological context?

A. The process of individual organisms adapting to their environment

**B. The change in the genetic composition of a population over successive generations**

C. The emergence of new species

D. The stabilization of genetic traits over time

**In a biological context, evolution is defined as the change in the genetic composition of a population over successive generations. This definition emphasizes that evolution operates at the population level rather than the individual level. Over time, variations that arise through mutations, genetic drift, migration, and natural selection can lead to changes in alleles and genetic traits within a population, contributing to its evolution. While adaptations of individual organisms to their environment can occur, this process does not equate to evolution, which requires population-level genetic change. Similarly, the emergence of new species is a possible outcome of evolutionary processes but is not the complete definition of evolution itself. The stabilization of genetic traits suggests a lack of change, which contrasts with the dynamic nature of evolution as it encompasses continuous genetic shifts within a population. Thus, the correct choice captures the essence of evolution as a gradual change in genetic makeup across generations.**

## 2. What does stabilising selection ultimately affect in a population?

**A. The genetic diversity by reducing extreme traits**

B. The overall population size by increasing mutation

C. The environmental factors by changing habitat

D. The breeding patterns by encouraging isolation

**Stabilising selection is a type of natural selection that acts to reduce variation in a trait and promotes intermediate phenotypes. This type of selection occurs when individuals with extreme traits have lower fitness compared to those with traits closer to the average. As a result, stabilising selection helps maintain the status quo of trait distribution in a population, leading to a decrease in genetic diversity by reducing the frequency of extreme traits. For example, in a population of birds where the average beak size is optimal for food acquisition, individuals with very small or very large beaks may struggle to survive because their beaks are not well-suited to the available food resources. Over time, individuals with intermediate beak sizes will become more common, while those with extreme sizes will be selected against. Therefore, stabilising selection ultimately affects genetic diversity by reducing the representation of extreme traits in the population.**

## 3. What situation occurs when allele frequencies remain constant over time?

**A. Genetic drift**

**B. Genetic stability**

**C. Genetic equilibrium**

**D. Microevolution**

**When allele frequencies remain constant over time, the situation described is known as genetic equilibrium. In this state, a population's genetic composition does not change from one generation to the next, indicating that the forces of evolution, such as natural selection, genetic drift, mutation, and migration, are not acting upon the population to alter allele frequencies. At genetic equilibrium, the underlying assumptions typically involve a large population size, random mating, no mutations, no gene flow, and no selection pressures. This equilibrium is closely associated with the Hardy-Weinberg principle, which provides a mathematical model to predict the genetic variation of a population at equilibrium. The other scenarios mentioned — such as genetic drift, genetic stability, and microevolution — describe different mechanisms or states of genetic change or consistency. Genetic drift involves random changes in allele frequencies, especially in small populations. Microevolution refers to small-scale changes in allele frequencies over time due to evolutionary pressures. Genetic stability isn't a standard term in genetics but may imply some level of unchanged genetic structure over a short period, which does not capture the specific conditions required for genetic equilibrium.**

## 4. How can environmental influences affect an organism's phenotype?

**A. By altering the genetic code of the organism**

**B. By making mutations occur in the DNA**

**C. By interacting with genotype to produce variations in physical traits**

**D. By changing the reproductive success of individuals**

**The correct answer highlights the relationship between the environment and the expression of an organism's genotype, which gives rise to variations in phenotypes. Environmental influences, such as temperature, availability of nutrients, light, and other ecological factors, can interact with the underlying genetic makeup of an organism to shape its physical characteristics and behaviors. This interaction means that two organisms with the same genotype may exhibit different phenotypes if they are subjected to different environmental conditions. For example, consider a plant that has the genetic potential to grow tall but is stunted due to a lack of sunlight or water. The plant's environment has directly influenced its height, showcasing how environmental factors can lead to phenotypic variations. The other choices suggest alternatives that do not accurately describe how phenotypes are formed in conjunction with environmental influences. Altering the genetic code or causing mutations would imply permanent changes to the DNA, which are different processes from how the environment affects existing genetic potential. Similarly, while reproductive success can be influenced by traits that may be affected by the environment, it does not directly address the immediate interaction between environment and phenotype expression.**

## 5. What does the term phenotype ratio refer to in genetics?

**A. The proportion of alleles in a population**

**B. The average number of offspring produced**

**C. The ratio of different phenotypes observed in offspring from a genetic cross**

**D. The frequency of mutations in a gene**

**The term phenotype ratio refers specifically to the ratio of different phenotypes observed in the offspring resulting from a genetic cross. This concept is crucial in genetics as it provides insight into how traits are expressed based on the genotype of the parents and the patterns of inheritance. When a genetic cross is performed, especially one involving traits governed by simple dominance (such as Mendelian traits), the resulting offspring may exhibit a variety of observable traits, or phenotypes. For example, in a classic monohybrid cross, the phenotype ratio can often be simplified to typical 3:1 for dominant and recessive traits. This ratio allows scientists to predict the likelihood of certain traits appearing in future generations based on the genetic makeup of the organisms involved. In contrast, the other choices refer to different concepts within genetics, such as allele frequency, reproductive output, and mutation rates, which do not specifically relate to the proportion of observable traits among offspring. The phenotype ratio is a critical tool in understanding the relationship between genotype and observable characteristics, making option C the correct choice here.**

## 6. What is the result of a genetic cross that produces a 3:1 phenotype ratio?

**A. It indicates complete dominance of one allele over another**

**B. It shows equal expression of both alleles**

**C. It suggests codominance between the alleles**

**D. It highlights the influence of multiple genes**

**The observation of a 3:1 phenotype ratio in a genetic cross typically indicates complete dominance of one allele over another. This ratio commonly arises in a monohybrid cross, where two heterozygous individuals (both carrying one dominant and one recessive allele) are crossed. In this scenario, the dominant allele completely masks the expression of the recessive allele in the phenotype of the heterozygous individuals. As a result, when the offspring are analyzed, approximately three-quarters will display the dominant trait, while one-quarter will show the recessive trait, leading to the characteristic 3:1 ratio. This clear differentiation between dominant and recessive traits illustrates how dominant alleles can overshadow the effects of recessive alleles in a phenotype when they are present.**

## 7. What type of cell division produces reproductive cells or gametes?

**A. Mitosis**

**B. Meiosis**

**C. Fertilization**

**D. Binary Fission**

**Meiosis is the type of cell division that specifically produces reproductive cells, also known as gametes. This process is essential for sexual reproduction, as it reduces the chromosome number by half, resulting in haploid cells. In humans and many other organisms, meiosis occurs in specialized cells within the gonads: the ovaries in females and the testes in males. During meiosis, a single diploid cell undergoes two rounds of division (meiosis I and meiosis II) to produce four genetically unique haploid cells, each containing one set of chromosomes. This genetic variation is vital for evolution and adaptation, as it allows for different combinations of alleles to be passed on to the next generation. In contrast, mitosis is a process of cell division that produces two identical diploid daughter cells for growth and repair, not for reproduction. Fertilization involves the union of two gametes to form a zygote, and binary fission is a form of asexual reproduction commonly seen in prokaryotes, leading to the division of a single cell into two identical daughter cells.**

## 8. What would happen if a pentadactyl limb evolved to have an additional digit?

**A. The limb would become a hexadactyl limb**

**B. The limb would serve no purpose**

**C. The limb would improve functionality**

**D. No change would occur in the organism**

**When a pentadactyl limb, which normally has five digits, evolves to have an additional sixth digit, it would indeed be referred to as a hexadactyl limb. The term "hexadactyl" specifically describes any limb or structure that has six digits. The evolution of an additional digit signifies a direct change in the anatomical makeup of the limb itself. Considering the other potential outcomes, it's important to note that an additional digit could serve a purpose depending on the specific context of the organism's environment and its evolutionary adaptations. For example, a hexadactyl limb might enable improved grip, locomotion, or manipulation of objects, thus potentially aiding survival. However, this possibility isn't addressed in the correct choice. Regarding the notion of no changes occurring or the additional digit serving no purpose, these imply situations where the limb structure would have neither evolutionary significance nor functional improvement, which would generally be inconsistent with evolutionary principles that favor beneficial adaptations. Thus, while those options explore different concepts, they don't address the factual naming convention for the limb upon the addition of a digit.**

## 9. Which of the following best defines the term genotype?

**A. All observable characteristics of an organism**

**B. The physical expression of a trait in an organism**

**C. The genetic constitution of an organism**

**D. The combination of environmental influences on traits**

**The term genotype refers specifically to the genetic constitution of an organism, meaning it encompasses all the alleles and genes that an organism carries. This includes the variations or forms of specific genes inherited from both parents, which ultimately determine the potential traits or characteristics of that organism. The genotype serves as the foundational blueprint that can influence an organism's traits, but it is distinct from the observable traits, known as the phenotype, which arise from the interaction between genotype and environment. This understanding helps to clarify why recognizing the genetic basis of traits is essential in genetics.**

## 10. What is gene mutation?

**A. A change in an organism's habitat**

**B. A change in the base sequence of a gene**

**C. A change in an organism's diet**

**D. A change in population size**

**A gene mutation refers to a change in the base sequence of a gene, which can affect how the gene functions. Genes are composed of sequences of DNA, and any alteration in this sequence can lead to changes in the production of proteins, ultimately influencing an organism's traits. Mutations can occur naturally during DNA replication or can be induced by environmental factors, such as radiation or chemicals. These changes can have various effects, ranging from no impact at all, to significant effects on an organism's phenotype, potentially leading to evolutionary changes over time. This understanding is fundamental in genetics, as it reveals how genetic diversity arises within populations and how some mutations can lead to adaptations to environmental changes.**

# Next Steps

**Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.**

**As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.**

**If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.**

**Or visit your dedicated course page for more study tools and resources:**

**https://ncealvl2biogenetics.examzify.com**

**We wish you the very best on your exam journey. You've got this!**