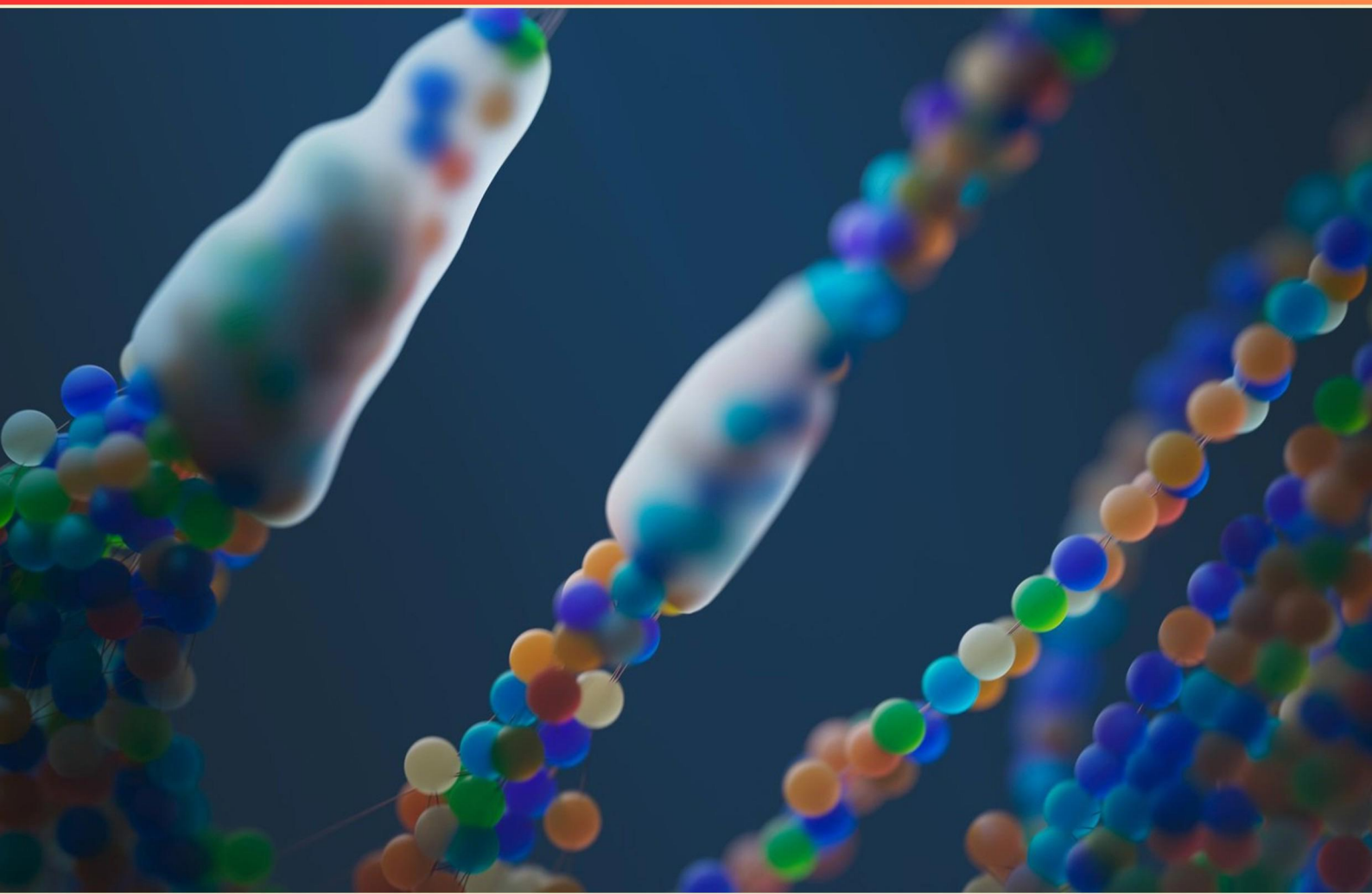


TEXAS A&M UNIVERSITY (TAMU) BIMS 320 BIOMEDICAL GENETICS EXAM 1 PRACTICE (SAMPLE) STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

**VISIT US ONLINE FOR
THE FULL VERSION STUDY GUIDE**

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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

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1. A dihybrid cross with independent assortment produces a phenotypic ratio of 9:3:3:1.
 - A. True
 - B. False
 - C. 3:1
 - D. 1:1:1:1
2. How many different types of chromosomes do humans possess?
 - A. 46
 - B. 23
 - C. 22
 - D. 24
3. More than one mode of inheritance can be seen for a single trait.
 - A. It cannot occur in nature
 - B. It can only occur in plants
 - C. True
 - D. Opposes Mendelian genetics
4. Which chromatids exchange during crossing-over?
 - A. Non-sister chromatids
 - B. Sister chromatids
 - C. Identical chromosomes
 - D. Single copy genes only
5. A dihybrid cross $AaBb \times AaBb$ is expected to yield which phenotypic ratio under independent assortment?
 - A. 9:1:1:9
 - B. 3:1
 - C. 1:2:1
 - D. 9:3:3:1

6. In heterozygous crosses, the phenotypic and genotypic ratios differ for complete dominance but are the same for incomplete dominance.
- A. For sex-linked traits only
 - B. It depends on the organism
 - C. True
 - D. False
7. Independent assortment refers to the random alignment of homologous chromosomes during which principle?
- A. It ensures that offspring receive the same parental allele combinations as the parents.
 - B. It occurs when genes are located on the same chromosome and are close together.
 - C. It occurs when genes are located on different chromosomes or are far apart on the same chromosome.
 - D. It only occurs during meiosis II.
8. Which of the following best defines autosomes in humans?
- A. All chromosomes other than the sex chromosomes
 - B. The sex chromosomes only
 - C. Chromosomes that are found only in gametes
 - D. All chromosomes including the sex chromosomes
9. Which genotype yields the AB phenotype in the ABO blood group system?
- A. $I^A I^A$
 - B. $I^B I^B$
 - C. $I^A I^B$
 - D. $i i$
10. A trait inherited only through the male line and seen in males is most likely which type of inheritance?
- A. Y-linked
 - B. X-linked dominant
 - C. Mitochondrial
 - D. Autosomal dominant

Answers

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

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Explanations

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1. A dihybrid cross with independent assortment produces a phenotypic ratio of 9:3:3:1.

A. True

B. False

C. 3:1

D. 1:1:1:1

Independent assortment of two unlinked genes in a dihybrid cross with complete dominance produces four phenotype classes. For each trait, the dominant phenotype occurs with probability $3/4$ and the recessive phenotype with probability $1/4$. Since the traits assort independently, multiply these probabilities: $3/4 \times 3/4 = 9/16$ for both dominant, $3/4 \times 1/4 = 3/16$ for only the first dominant, and $1/4 \times 3/4 = 3/16$ for only the second dominant, and $1/4 \times 1/4 = 1/16$ for both recessive. This yields the phenotype ratio 9:3:3:1. So a dihybrid cross with independent assortment gives 9:3:3:1 under these conditions. If linkage or interactions occur, the ratio can change.

2. How many different types of chromosomes do humans possess?

A. 46

B. 23

C. 22

D. 24

In humans, the number of distinct chromosome types in a gamete is twenty-three. A human has 22 autosome types (labeled 1 through 22) plus a sex chromosome type, which in a gamete can be either X or Y. So a gamete carries one copy of each type, totaling 23 different chromosome types. In contrast, a somatic cell contains two copies of each type, for a total of 46 chromosomes. The option 22 would omit the sex chromosome, and 24 would treat X and Y as separate types in every genome, which isn't how the haploid set is organized.

3. More than one mode of inheritance can be seen for a single trait.

A. It cannot occur in nature

B. It can only occur in plants

C. True

D. Opposes Mendelian genetics

Inheritance patterns aren't limited to a single, fixed mode. A single phenotype can arise from different genetic mechanisms in different contexts. For example, a trait may be shaped by multiple genes (polygenic) with interactions that modify expression, by imprinting where the parent of origin affects the outcome, or by mitochondrial inheritance that comes from the mother. At the same time, interactions at a single gene can yield complete, incomplete, or codominance depending on allele combinations. Environmental factors and epigenetic changes can also shift how a trait is expressed. Because all these factors can influence how a trait is passed on and expressed, more than one mode of inheritance can be seen for a single trait.

4. Which chromatids exchange during crossing-over?

- A. Non-sister chromatids**
- B. Sister chromatids
- C. Identical chromosomes
- D. Single copy genes only

Crossing-over happens during meiosis between non-sister chromatids of homologous chromosomes. After DNA replication, each chromosome consists of two sister chromatids. When homologous chromosomes pair up and form a tetrad, the non-sister chromatids—one from each homolog—exchange equivalent segments at points called chiasmata. This reciprocal exchange creates recombinant chromatids that contain a mix of parental alleles, increasing genetic diversity in the gametes. Exchange between sister chromatids would not produce new allele combinations because sister chromatids are copies of the same chromosome. Also, crossing-over is not limited to single-copy genes; it can involve larger chromosomal regions containing many genes, as long as there is homology between the chromatids.

5. A dihybrid cross $AaBb \times AaBb$ is expected to yield which phenotypic ratio under independent assortment?

- A. 9:1:1:9**
- B. 3:1
- C. 1:2:1
- D. 9:3:3:1

When two genes assort independently, a dihybrid cross where each gene has two alleles produces a distinctive 9:3:3:1 phenotypic pattern. For $AaBb \times AaBb$, each gene shows dominant phenotypes in $3/4$ of the offspring ($A_ = 3/4$, $a_ = 1/4$; $B_ = 3/4$, $bb = 1/4$). Because the genes segregate independently, multiply the probabilities for the combined phenotypes: - Dominant for both traits: $3/4 \times 3/4 = 9/16$ - Dominant for the first trait and recessive for the second: $3/4 \times 1/4 = 3/16$ - Recessive for the first trait and dominant for the second: $1/4 \times 3/4 = 3/16$ - Recessive for both traits: $1/4 \times 1/4 = 1/16$ So the expected phenotypic ratio is 9:3:3:1.

6. In heterozygous crosses, the phenotypic and genotypic ratios differ for complete dominance but are the same for incomplete dominance.

- A. For sex-linked traits only
- B. It depends on the organism
- C. True**
- D. False

In genetics, how the phenotype relates to genotype changes with the pattern of dominance. In complete dominance, the heterozygote looks like the homozygous dominant, so two genotypes (dominant homozygote and heterozygote) map to one phenotype. That yields a 3:1 phenotypic ratio but a 1:2:1 genotypic ratio, so the two ratios differ. In incomplete dominance, neither allele is completely dominant, so the heterozygote has an intermediate phenotype distinct from both homozygotes. Each genotype produces a distinct phenotype, so the phenotypic and genotypic ratios are both 1:2:1. Therefore the statement is true.

7. Independent assortment refers to the random alignment of homologous chromosomes during which principle?

- A. It ensures that offspring receive the same parental allele combinations as the parents.
- B. It occurs when genes are located on the same chromosome and are close together.
- C. It occurs when genes are located on different chromosomes or are far apart on the same chromosome.**
- D. It only occurs during meiosis II.

Independent assortment reflects how homologous chromosomes orient and separate randomly during meiosis I. When these pairs line up on the metaphase plate, maternal and paternal chromosomes are distributed into gametes in all possible combinations. This means genes that are on different chromosomes, or those far apart on the same chromosome (where crossing over can shuffle alleles), will assort independently from one another into gametes, increasing genetic variation. If genes are close together on the same chromosome, they tend to be inherited together (linkage) unless a crossover occurs between them. The principle does not describe maintaining the same parental allele combinations, nor does it pertain to meiosis II.

8. Which of the following best defines autosomes in humans?

- A. All chromosomes other than the sex chromosomes**
- B. The sex chromosomes only
- C. Chromosomes that are found only in gametes
- D. All chromosomes including the sex chromosomes

Autosomes are the non-sex chromosomes that carry the majority of our genes and are the same in both males and females. In humans, there are 22 pairs of autosomes and 1 pair of sex chromosomes (XX in females, XY in males). So autosomes are all chromosomes except the sex chromosomes. The other options miss this distinction: one focuses only on sex chromosomes, another implies autosomes exist only in gametes, and another would include the sex chromosomes as well.

9. Which genotype yields the AB phenotype in the ABO blood group system?

- A. IAIA
- B. IBIB
- C. IAIB**
- D. ii

The AB phenotype arises when one A allele and one B allele are present, because IA and IB are expressed together (co-dominance). Each allele encodes a different enzyme that adds A or B antigens to the surface of red blood cells. With one IA and one IB, both enzymes act, so both A and B antigens appear on the cell surface, giving AB blood type. In contrast, two A alleles produce only A antigens, two B alleles produce only B antigens, and two i alleles produce neither, resulting in type O.

10. A trait inherited only through the male line and seen in males is most likely which type of inheritance?

A. Y-linked

B. X-linked dominant

C. Mitochondrial

D. Autosomal dominant

Y-linked inheritance involves genes on the Y chromosome. Because only males carry a Y, a trait on that chromosome is passed from father to all of his sons and cannot appear in daughters. Seeing a trait only in males and tracking through the male line is a hallmark of Y-linked inheritance. In contrast, X-linked traits can affect both sexes and show different patterns (e.g., sons receiving the allele from a carrier mother), mitochondrial traits come from the mother to all offspring, and autosomal traits are not restricted to the paternal lineage and can appear in both sexes.

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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://tamu-bims320exam1.examzify.com>

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

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