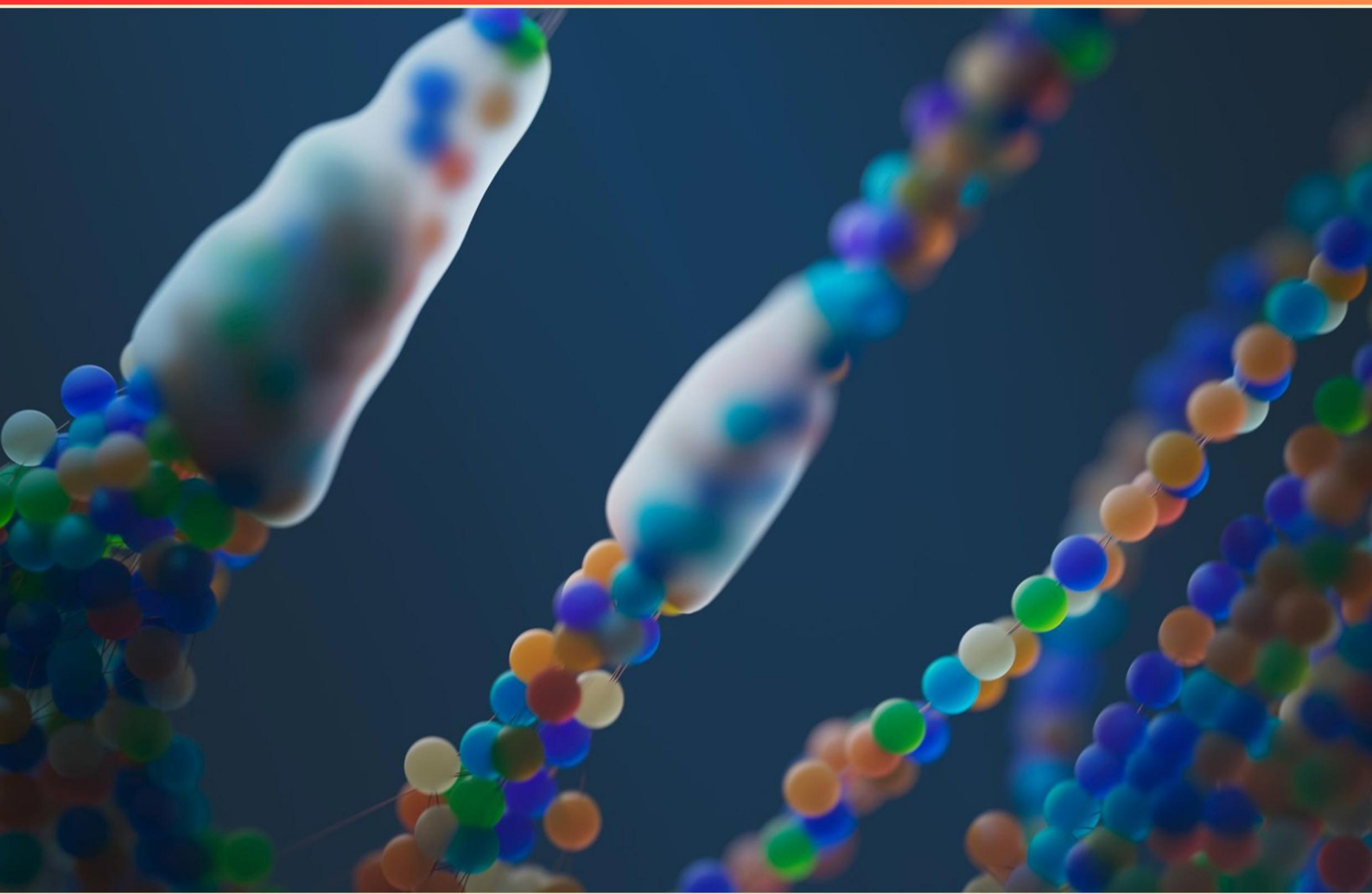


TEXAS A&M UNIVERSITY (TAMU) BIMS 320 BIOMEDICAL GENETICS EXAM 1 PRACTICE (SAMPLE) STUDY GUIDE



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. Which statement correctly differentiates genetic cloning from somatic cell nuclear transfer (SCNT) cloning?**
 - A. Genetic cloning produces identical copies of DNA or organisms; SCNT creates a clone by transferring a somatic nucleus into an enucleated egg.
 - B. Genetic cloning always uses somatic cells; SCNT is identical to producing copies of bacteria.
 - C. Genetic cloning refers only to organisms; SCNT cannot create a whole organism clone.
 - D. Genetic cloning and SCNT are alternative names for the same process.
- 2. MicroRNAs primarily regulate gene expression at which level?**
 - A. Post-transcriptional by binding complementary mRNA to inhibit translation or promote degradation.
 - B. Transcriptional by binding promoter regions to enhance transcription.
 - C. Translational by binding ribosomes to increase protein synthesis.
 - D. DNA replication by binding origin sequences.
- 3. In X-linked recessive inheritance, a carrier mother x normal father have a son. What is the probability the son is affected?**
 - A. 0%
 - B. 25%
 - C. 50%
 - D. 100%
- 4. What is the founder effect and how can it influence allele frequencies in a new population?**
 - A. A small number of individuals start a new population, reducing genetic diversity and potentially increasing frequency of rare alleles.
 - B. A mutation arises independently in many individuals.
 - C. Migration introduces new alleles to a population.
 - D. Genetic drift never changes allele frequencies.
- 5. Which statement best describes the genetic basis of human trait expression?**
 - A. Genes on the 46 chromosomes are the only factors determining all traits.
 - B. Environment and non-chromosomal factors can influence trait expression.
 - C. Mitochondria do not contribute to any trait.
 - D. Chromosome number changes during adulthood.

6. In base excision repair, after the damaged base is removed to create an abasic site, which enzyme cleaves the DNA backbone at that site?
- A. DNA polymerase
 - B. DNA ligase
 - C. RNA polymerase
 - D. AP endonuclease
7. In Mendel's terminology, what did we call 'factors' that we now call?
- A. Nucleotides
 - B. Genes
 - C. Bases
 - D. Chromosomes
8. Give an example of an autosomal aneuploidy and a common trisomy with characteristic features.
- A. Monosomy X (Turner syndrome)
 - B. Monosomy 18 and Trisomy 21 (Down syndrome)
 - C. Trisomy 13 and Monosomy 8
 - D. Trisomy 16 and Monosomy 7
9. What does true-breeding mean in genetics?
- A. They produce only homozygous offspring for the traits studied
 - B. They produce heterozygous offspring
 - C. They cannot reproduce
 - D. They only produce recessive traits
10. Two unaffected individuals who are carriers for an autosomal recessive allele have a child. What is the probability that the next child will be affected?
- A. 25% (1/4)
 - B. 50% (1/2)
 - C. 0% (none)
 - D. 100%

Answers

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

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Explanations

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1. Which statement correctly differentiates genetic cloning from somatic cell nuclear transfer (SCNT) cloning?

- A. Genetic cloning produces identical copies of DNA or organisms; SCNT creates a clone by transferring a somatic nucleus into an enucleated egg.**
- B. Genetic cloning always uses somatic cells; SCNT is identical to producing copies of bacteria.
- C. Genetic cloning refers only to organisms; SCNT cannot create a whole organism clone.
- D. Genetic cloning and SCNT are alternative names for the same process.

Genetic cloning describes making identical copies of genetic material or of entire organisms, while somatic cell nuclear transfer is a specific method used to produce a whole-organism clone. In SCNT, you take a somatic cell's nucleus and insert it into an egg cell that has had its own nucleus removed, then stimulate development to an embryo. The clone's nuclear DNA is the same as the donor's, though mitochondrial DNA comes from the egg donor and epigenetic reprogramming can affect the final appearance and traits. This distinction explains why the statement is correct: it recognizes genetic cloning as the broad idea of copying DNA or organisms, and identifies SCNT as the concrete technique used to create an organism clone. Other options misstate the scope or capabilities—genetic cloning isn't limited to somatic cells, SCNT can yield a whole organism, and the terms aren't interchangeable.

2. MicroRNAs primarily regulate gene expression at which level?

- A. Post-transcriptional by binding complementary mRNA to inhibit translation or promote degradation.**
- B. Transcriptional by binding promoter regions to enhance transcription.
- C. Translational by binding ribosomes to increase protein synthesis.
- D. DNA replication by binding origin sequences.

MicroRNAs regulate gene expression after the RNA is made, by guiding a protein complex to target messenger RNAs and altering their fate. They pair with complementary sequences on the mRNA—usually in the 3' untranslated region—and recruit the RNA-induced silencing machinery. This can block the ribosome from translating the message or mark the mRNA for degradation, shrinking the amount of protein produced without changing how the gene is transcribed in the nucleus. They don't typically boost transcription by binding promoters, nor do they increase translation or affect DNA replication. So the primary mode is post-transcriptional control of mRNA stability and translation.

3. In X-linked recessive inheritance, a carrier mother x normal father have a son. What is the probability the son is affected?

- A. 0%
- B. 25%
- C. 50%**
- D. 100%

In X-linked recessive inheritance, a male will be affected if he inherits the mutant allele on his single X chromosome, because he does not have a second X to mask it. A carrier mother has a 50% chance to pass her mutant X to each child. For a son, the father contributes a Y chromosome, not an X, so the son's fate depends entirely on which X the mother passes. If the son gets the mutant X, he will be affected; if he gets the normal X, he will be unaffected. Therefore, the probability the son is affected is 50%. If you were asked about any child (without specifying sex), the overall chance would be 25% (since half would be male and half would be affected among the males).

4. What is the founder effect and how can it influence allele frequencies in a new population?

- A. A small number of individuals start a new population, reducing genetic diversity and potentially increasing frequency of rare alleles.**
- B. A mutation arises independently in many individuals.
- C. Migration introduces new alleles to a population.
- D. Genetic drift never changes allele frequencies.

The founder effect occurs when a new population is started by a very small number of individuals. Because the founding group is a tiny, non-representative sample of the original population, the mix of alleles they carry may be quite different from the larger gene pool. This random sampling can elevate the frequency of some alleles—potentially including rare ones—simply by chance. With such a small starting size, genetic drift then acts strongly, causing allele frequencies to wander and become more different from the source population over generations, often reducing overall genetic diversity. This is why a founding event can leave a lasting mark on the genetic makeup of the new population, with some alleles more common than before and others lost. It isn't about new mutations arising in many individuals, nor about migration introducing new alleles, and genetic drift can and does change allele frequencies in small populations.

5. Which statement best describes the genetic basis of human trait expression?

- A. Genes on the 46 chromosomes are the only factors determining all traits.
- B. Environment and non-chromosomal factors can influence trait expression.**
- C. Mitochondria do not contribute to any trait.
- D. Chromosome number changes during adulthood.

Traits result from a combination of genetic makeup and the environment, not from genes alone. While the nuclear genome provides the blueprint, environmental influences and non-chromosomal factors can modify how those genes are expressed, leading to variation in phenotypes. For example, nutrition, exposures, and lifestyle can affect growth, metabolism, and development, and epigenetic mechanisms can alter gene activity without changing the DNA sequence. Mitochondrial DNA and other non-nuclear factors can also contribute to traits, further showing that trait expression isn't determined solely by the 46 chromosomes. The other statements misrepresent how trait expression works: chromosome number doesn't change during adulthood in normal cells, and mitochondria and non-chromosomal factors do play a role, while traits aren't dictated exclusively by nuclear genes.

6. In base excision repair, after the damaged base is removed to create an abasic site, which enzyme cleaves the DNA backbone at that site?

- A. DNA polymerase
- B. DNA ligase
- C. RNA polymerase
- D. AP endonuclease**

In base excision repair, once a damaged base is removed by a DNA glycosylase, an abasic site remains. The next crucial step is incision of the DNA backbone at that site, which is carried out by AP endonuclease. This enzyme recognizes the abasic site and cleaves the phosphodiester bond adjacent to it, producing a nick with a 3'-OH end and a 5'-deoxyribose phosphate. This incision sets up the gap that DNA polymerase can fill and DNA ligase can then seal. The other enzymes don't perform this backbone cut at the abasic site—DNA polymerase fills in the new nucleotides, DNA ligase seals the backbone, and RNA polymerase isn't part of this repair pathway.

7. In Mendel's terminology, what did we call 'factors' that we now call?

- A. Nucleotides
- B. Genes**
- C. Bases
- D. Chromosomes

Mendel's 'factors' are what we now call genes. These are the discrete units of heredity that determine traits, and Mendel showed they segregate and assort independently from one generation to the next. Genes are specific DNA sequences that carry the instructions for making or regulating traits. He didn't know about DNA or chromosomes, but his idea of separate, transmissible units laid the groundwork for calling them genes. The other terms relate to different concepts: nucleotides and bases are the building blocks of DNA, and chromosomes are the structures that organize and carry many genes in the cell.

8. Give an example of an autosomal aneuploidy and a common trisomy with characteristic features.

- A. Monosomy X (Turner syndrome)
- B. Monosomy 18 and Trisomy 21 (Down syndrome)**
- C. Trisomy 13 and Monosomy 8
- D. Trisomy 16 and Monosomy 7

This question tests the ability to recognize an abnormal number of autosomes and a well-known trisomy with characteristic features. An autosomal aneuploidy involves a numerical change in one of the 22 autosomes (not a sex chromosome). A classic example of a common trisomy with recognizable features is Trisomy 21, Down syndrome, which has hallmark traits such as developmental delay, distinctive facial features, hypotonia, and often congenital heart defects. The option that combines an autosomal aneuploidy (an abnormal autosome number) with Trisomy 21 fits these criteria best. Other options mix sex-chromosome abnormalities (like Turner syndrome, which is monosomy X) or involve trisomies that are not as commonly associated with viable, characteristic feature sets.

9. What does true-breeding mean in genetics?

- A. They produce only homozygous offspring for the traits studied**
- B. They produce heterozygous offspring
- C. They cannot reproduce
- D. They only produce recessive traits

True-breeding describes organisms that are homozygous for the trait being studied. Because they carry two identical alleles, self-pollinating or crossing two true-breeding individuals of the same trait yields offspring that are all the same homozygous genotype for that trait. For example, a true-breeding tall line with genotype AA will produce only AA offspring if selfed, and a true-breeding short line with genotype aa will produce only aa offspring; crossing AA and aa yields all heterozygous offspring, which are not true-breeding themselves. So the idea that true-breeding produces only homozygous offspring best captures the concept.

10. Two unaffected individuals who are carriers for an autosomal recessive allele have a child. What is the probability that the next child will be affected?

- A. 25% (1/4)**
- B. 50% (1/2)
- C. 0% (none)
- D. 100%

In autosomal recessive inheritance, a person must inherit two recessive alleles (one from each parent) to be affected. If both parents are carriers, their genotypes are Aa. For each pregnancy, the child receives one allele from each parent. The chance of getting the recessive allele from the first parent is 1/2, and from the second parent is 1/2, so the chance of the child being aa (affected) is $1/2 \times 1/2 = 1/4$, or 25%. A Punnett square $Aa \times Aa$ shows the possible genotypes as AA (25%), Aa (50%), and aa (25%), confirming the 25% probability. Also, each pregnancy is independent, so the likelihood for the next child remains 25% even if previous children were affected or unaffected.

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:

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

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