DNA Technology Practice Test (Sample)

Study Guide

Everything you need from our exam experts!

Table of Contents

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. **What is used as a marker gene to show that the human gene has been taken up or expressed?**

   A. Housekeeping gene

   B. Antibiotic resistance marker

   C. Lactose metabolism gene

   D. Cell wall synthesis gene

2. **What feature allows scientists to identify bacteria that have taken up the recombinant plasmid during transformation?**

   A. Restriction enzymes used to cut DNA

   B. Promoter regions of genes

   C. Origin of replication in plasmid

   D. An antibiotic resistance gene that enables selection of transformants

3. **Why is DNA heated to 95°C in the polymerase chain reaction?**

   A. To separate the two strands of the DNA by breaking hydrogen bonds

   B. To inactivate the polymerase enzyme

   C. To anneal primers to the template

   D. To synthesize new DNA strands

4. **Explain why ADA deficiency gene therapy often requires repeated treatment, while a bone marrow transplant can be a permanent cure.**

   A. T lymphocytes have a limited life span; die off

   B. Bone marrow provides continual supply of T lymphocytes

   C. Gene therapy permanently cures ADA deficiency

   D. Repeated treatment is unnecessary

5. **Starting with a single molecule of DNA, the PCR was allowed to go through 3 complete cycles. How many molecules would be produced?**

   A. 4

   B. 6

   C. 12

   D. 8

6. In the described cloning process, what is the purpose of including a sheep promoter in front of the Factor IX gene?

A. To drive expression of the human Factor IX gene in sheep cells

B. To allow jellyfish gene to glow

C. To protect the gene from degradation

D. To assist replication of plasmid

7. Why are plasmids often constructed to contain antibiotic resistance genes?

A. Act as marker gene

B. It makes bacteria resistant to all antibiotics

C. It increases plasmid size dramatically

D. It causes rapid degradation of plasmid DNA

8. In the described cloning process in sheep, what is the step immediately after inserting copies of the DNA into the nuclei of sheep body cells?

A. Embryo implanted into uterus

B. Nucleus is transplanted into enucleated egg cell

C. Jellyfish gene inserted into DNA

D. Embryo grown in culture

9. In the gene probe procedure, what is the purpose of heating the DNA sample?

A. To allow the probe to hybridize to complementary single-stranded DNA

B. To activate the radioactive label

C. To degrade non-target DNA

D. To denature the probe

10. During PCR, which statement describes the step that allows binding of nucleotides and primers to the DNA template?

A. Adding primers.

B. Heating to denature DNA.

C. Cooling to allow binding of nucleotides/primers.

D. Adding nucleotides.

Answers

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

Explanations

1. What is used as a marker gene to show that the human gene has been taken up or expressed?

A. Housekeeping gene

B. Antibiotic resistance marker

C. Lactose metabolism gene

D. Cell wall synthesis gene

Marker genes act as flags to show which cells have taken up the introduced DNA. An antibiotic resistance marker is the standard choice because it lets you select for cells that received the construct: only those cells survive in the presence of the antibiotic, indicating uptake (and, if the marker is active, expression of the construct). Housekeeping genes are typically used as internal controls, not as markers for uptake or expression. Lactose metabolism or cell wall synthesis genes aren't used as general markers for this purpose. So the antibiotic resistance marker best indicates that the human gene has been taken up (and possibly expressed).

2. What feature allows scientists to identify bacteria that have taken up the recombinant plasmid during transformation?

A. Restriction enzymes used to cut DNA

B. Promoter regions of genes

C. Origin of replication in plasmid

D. An antibiotic resistance gene that enables selection of transformants

The key idea is using a selectable marker carried on the plasmid to distinguish cells that have taken it up. An antibiotic resistance gene on the plasmid lets transformed bacteria survive when grown on a medium containing that antibiotic. Only those cells that received the plasmid—and thus express the resistance gene—live; non-transformed cells are killed or inhibited. This makes transformants easy to identify as colonies growing on the antibiotic-containing plate. Other features on the plasmid aren't about selecting transformants. The origin of replication is needed for the plasmid to replicate in the host, but it doesn't tell you which cells actually took up the plasmid. Restriction enzymes are tools for cutting DNA during cloning, not for selecting transformants. Promoter regions control gene expression but don't provide a survival advantage under selective conditions.

3. Why is DNA heated to 95°C in the polymerase chain reaction?

A. To separate the two strands of the DNA by breaking hydrogen bonds

B. To inactivate the polymerase enzyme

C. To anneal primers to the template

D. To synthesize new DNA strands

DNA is heated to 95°C to disrupt the hydrogen bonds that hold the two strands together, denaturing the double helix into single strands. This denaturation creates single-stranded templates so the primers can bind in the next step. The high temperature specifically breaks those base-pair interactions without permanently destroying the DNA, and the process uses a thermostable polymerase that remains active during the subsequent, cooler step where primers anneal and DNA synthesis occurs.

4. Explain why ADA deficiency gene therapy often requires repeated treatment, while a bone marrow transplant can be a permanent cure.

A. T lymphocytes have a limited life span; die off

B. Bone marrow provides continual supply of T lymphocytes

C. Gene therapy permanently cures ADA deficiency

D. Repeated treatment is unnecessary

The durability of the immune correction depends on where the corrected cells come from and how long they persist. Gene therapy often fixes immune cells like mature T lymphocytes, which have a finite lifespan and die off after weeks to months. Once those corrected cells disappear, the immune system can revert toward the deficient state, so repeated rounds of therapy are needed to replenish them with newly corrected cells. A bone marrow transplant, on the other hand, introduces donor hematopoietic stem cells that reside in the bone marrow and continually renew the immune system. After successful engraftment, these stem cells keep producing new T lymphocytes and other immune cells for the patient's life, providing a long-lasting, often permanent cure—as long as engraftment is achieved and complications are managed.

5. Starting with a single molecule of DNA, the PCR was allowed to go through 3 complete cycles. How many molecules would be produced?

A. 4

B. 6

C. 12

D. 8

PCR amplifies DNA exponentially: each cycle roughly doubles the amount of target DNA because every existing molecule serves as a template for a new copy. Starting with a single DNA molecule, the first cycle yields two copies, the second cycle yields four, and the third cycle yields eight. So, after three complete cycles, you'd expect eight molecules of the target DNA, assuming near-perfect efficiency and that each cycle proceeds to completion. This illustrates how PCR builds an exponential number of copies very quickly.

6. In the described cloning process, what is the purpose of including a sheep promoter in front of the Factor IX gene?

A. To drive expression of the human Factor IX gene in sheep cells

B. To allow jellyfish gene to glow

C. To protect the gene from degradation

D. To assist replication of plasmid

Promoters act as the switches that tell cells where transcription should start. A sheep promoter placed in front of the human Factor IX gene ensures that the sheep's cellular machinery can recognize and initiate transcription of that gene in sheep cells. That means mRNA for Factor IX is produced, which is then translated into the Factor IX protein in the animal. Without a promoter that the host species can use, the gene wouldn't be transcribed and no protein would be made. This isn't about making proteins glow (that would involve a different gene and its own promoter) or about protecting the gene from degradation, or about helping the plasmid replicate. The promoter's role here is to drive transcription in the sheep.

7. Why are plasmids often constructed to contain antibiotic resistance genes?

A. Act as marker gene

B. It makes bacteria resistant to all antibiotics

C. It increases plasmid size dramatically

D. It causes rapid degradation of plasmid DNA

The main idea here is the use of a selectable marker in cloning. An antibiotic resistance gene on a plasmid lets you quickly identify cells that have taken up the plasmid: grow the cells on a medium containing the corresponding antibiotic, and only those with the plasmid survive. This makes it easy to isolate transformed cells and keep the plasmid in culture, which is essential for downstream experiments. The other options don't fit. A single resistance gene doesn't make bacteria resistant to all antibiotics; resistance is usually specific to one antibiotic or a few. Adding the resistance gene adds only a small amount of DNA and doesn't dramatically increase plasmid size. And antibiotic resistance genes don't cause rapid degradation of plasmid DNA.

8. In the described cloning process in sheep, what is the step immediately after inserting copies of the DNA into the nuclei of sheep body cells?

A. Embryo implanted into uterus

B. Nucleus is transplanted into enucleated egg cell

C. Jellyfish gene inserted into DNA

D. Embryo grown in culture

The step being tested is the nucleus transfer in somatic cell nuclear transfer cloning. After a donor body cell's DNA is prepared, the immediate next move is to transplant that nucleus into an egg cell from which the original nucleus has been removed (enucleated). This places the donor genome into an egg that can reactivate and begin embryonic development. Once the nucleus is inside, the egg is stimulated to activate, starts to divide, and the embryo can be cultured to an appropriate stage before being implanted into a uterus. The other options describe steps that occur later (implantation or culture) or are unrelated to the cloning process (such as inserting a jellyfish gene).

9. In the gene probe procedure, what is the purpose of heating the DNA sample?

A. To allow the probe to hybridize to complementary single-stranded DNA

B. To activate the radioactive label

C. To degrade non-target DNA

D. To denature the probe

Heating the DNA sample denatures the double-stranded DNA, turning it into single strands. This exposes the target sequences so the labeled probe, which is complementary in sequence, can find and bind to its matching region through base pairing. After the heat step, cooling allows the probe to anneal specifically to its target; non-specific bindings are less stable at the annealing temperature, helping ensure a true hybrid. Heating does not activate the label or degrade non-target DNA, and the probe is typically already single-stranded, so the main purpose is to make the target accessible for specific hybridization.

10. During PCR, which statement describes the step that allows binding of nucleotides and primers to the DNA template?

A. Adding primers.

B. Heating to denature DNA.

C. Cooling to allow binding of nucleotides/primers.

D. Adding nucleotides.

The step being described is the annealing phase. After heating to separate the DNA strands, lowering the temperature allows primers to find and bind to their complementary sequences on the single-stranded templates. This binding creates the starting points for DNA synthesis, which is carried out in the next phase as the polymerase adds nucleotides to extend from the primers. While primers must be added, their binding depends on cooling to an appropriate annealing temperature; nucleotides are incorporated later during extension, not during annealing. The denaturation step is about separating strands, and adding nucleotides happens during extension, not the binding step.

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://dnatechnology.examzify.com

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