MTTC Integrated Science (Secondary) (094) Practice Test (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. Epistasis means?

A. Two or more genes located on the same chromosome

B. A single gene determines a phenotype

C. Two or more genes determine a single phenotype

D. Genes are inherited independently of each other

2. In the terminology of tRNA binding sites, which site is designated as the start codon?

A. P - amino acid is transferred to

B. E - first tRNA exits and 2nd and 3rd tRNA molecules shift opening A site for the next tRNA, continues transfers from P to A site until translation is complete

C. B - exit site

D. A - start codon

3. Lenticels are pores in branches that allow gas exchange.

A. Gas exchange in leaves

B. Water transport

C. Nutrient exchange

D. Pores in branches that allow gas exchange

4. Glycolysis converts glucose to pyruvate with net production of ATP and NADH in which cellular compartment?

A. Mitochondria

B. Mitochondria and chloroplasts

C. Cytosol

D. Nucleus

5. Anabolic reactions are best described as which of the following?

A. Builds larger molecules from smaller ones

B. Breaks down molecules to release energy

C. Involves genetic replication

D. Occurs only in mitochondria

6. Which process engulfs large particles by the cell membrane (endocytosis)?

A. Osmosis

B. Endocytosis

C. Active transport

D. Exocytosis

7. Which meristem tissue in stems promotes secondary growth, increasing girth?

A. Meristem

B. Cambium

C. Stomata

D. Phloem

8. Spermatophytes include plants that use seeds to reproduce; gymnosperms and angiosperms are included.

A. They reproduce only by spores

B. They require external fertilization by water

C. They use seeds to reproduce; includes gymnosperms and angiosperms

D. They are non-vascular

9. A comet is described as:

A. A celestial body composed of frozen gases and rocky, metallic materials with a tail made of ionized gases

B. A bright star that never moves

C. A meteor that has slowed down

D. A planet with rings

10. Which concept explains evolution by differential survival and reproduction?

A. Darwinian evolution

B. Natural selection

C. Fossilization

D. Stratification

Answers

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

Explanations

1. Epistasis means?

A. Two or more genes located on the same chromosome

B. A single gene determines a phenotype

C. Two or more genes determine a single phenotype

D. Genes are inherited independently of each other

Epistasis is when two or more genes at different locations interact to produce a single phenotype. The visible trait depends on the combination of alleles across those genes, and one gene's effect can be masked or modified by another gene. This is why a trait can be controlled by several genes working together, not just by a single gene. For example, in some cases pigment production and pigment deposition are controlled by different genes. If the deposition gene isn't functioning, no pigment shows up even if the color gene could produce pigment. That kind of interaction—multiple genes shaping one trait—is epistasis. The other ideas describe different concepts: two or more genes on the same chromosome refers to linkage, a single gene determining a phenotype is classic Mendelian single-gene inheritance, and genes inherited independently refers to independent assortment. None of those capture the idea that multiple genes at different loci combine to determine one phenotype.

2. In the terminology of tRNA binding sites, which site is designated as the start codon?

A. P - amino acid is transferred to

B. E - first tRNA exits and 2nd and 3rd tRNA molecules shift opening A site for the next tRNA, continues transfers from P to A site until translation is complete

C. B - exit site

D. A - start codon

The main idea is how the ribosome uses its three tRNA binding sites during translation. The start signal on the mRNA—AUG—is recognized by the initiator tRNA carrying methionine, and this initiator tRNA binds in the P site. This sets the reading frame and marks the beginning of polypeptide synthesis. After initiation, the next aminoacyl-tRNA enters the A site, a peptide bond forms transferring the growing chain from the P-site tRNA to the A-site tRNA, and the ribosome translocates so the tRNA carrying the now-polypeptide moves to the E site for exit while the A site becomes ready for the next tRNA. So, the start codon is associated with the P site, not the A site. The A site is for new tRNA entry, and the E site is the exit path for tRNA after it has contributed its amino acid.

3. Lenticels are pores in branches that allow gas exchange.

A. Gas exchange in leaves

B. Water transport

C. Nutrient exchange

D. Pores in branches that allow gas exchange

Lenticels serve as diffusion pores that let gases move between the inside of a woody stem and the outside air. In woody plants, the bark (periderm) forms a protective, nearly watertight surface, which would block gas exchange if not for lenticels. These spots have loosely arranged cells and air spaces that provide a pathway for oxygen to reach living cells beneath the bark and for carbon dioxide to exit. This supports respiration of tissues like the cortex and cambium that lie under the bark. Leaves exchange gases mainly through stomata on the leaf surface, not lenticels, and water movement occurs through xylem while nutrients move through phloem. So the best description is that lenticels are pores in branches that allow gas exchange.

4. Glycolysis converts glucose to pyruvate with net production of ATP and NADH in which cellular compartment?

A. Mitochondria

B. Mitochondria and chloroplasts

C. Cytosol

D. Nucleus

Glycolysis happens in the cytosol—the fluid part of the cytoplasm inside the cell. All the enzymes that convert glucose to pyruvate operate in this location, so the whole pathway occurs there rather than in organelles like mitochondria or the nucleus. During glycolysis, a net amount of ATP is produced via substrate-level phosphorylation, and NAD+ is reduced to NADH. This setup makes cytosol the correct compartment because the subsequent steps of aerobic respiration—the pyruvate conversion to acetyl-CoA, the Krebs cycle, and oxidative phosphorylation—take place inside mitochondria, while the nucleus houses genetic material. Under aerobic conditions, pyruvate moves into mitochondria for further oxidation; under anaerobic conditions, the NADH produced must be reoxidized in the cytosol to keep glycolysis running.

5. Anabolic reactions are best described as which of the following?

A. Builds larger molecules from smaller ones

B. Breaks down molecules to release energy

C. Involves genetic replication

D. Occurs only in mitochondria

Anabolic reactions are processes that build larger, more complex molecules from smaller units, using energy. This assembly is essential for growth, repair, and the creation of biomolecules such as proteins from amino acids or polysaccharides from simple sugars. Because these reactions require energy input and result in more complex products, they contrast with catabolic reactions, which break down molecules to release energy. Saying that replication of genetic material describes anabolic activity is not as precise as recognizing that anabolic processes involve bond-making to assemble large molecules, while many anabolic steps occur outside mitochondria.

6. Which process engulfs large particles by the cell membrane (endocytosis)?

A. Osmosis

B. Endocytosis

C. Active transport

D. Exocytosis

Endocytosis is the process by which the cell membrane wraps inward to engulf large particles from outside the cell, pulling them into a vesicle. This is how cells take in things that are too big to pass through channels, such as bacteria or other solid matter. When solid particles are taken in this way, it's called phagocytosis, the cell-eating form of endocytosis; there's also pinocytosis for liquids or small particles. Endocytosis requires energy because the cytoskeleton must rearrange to push membrane around the material and pinch off the vesicle. Exocytosis, by contrast, releases material from the cell; osmosis is the movement of water across a membrane; and active transport is a broader category of moving substances against a gradient, which can include endocytosis as a specialized, energy-dependent form.

7. Which meristem tissue in stems promotes secondary growth, increasing girth?

A. Meristem

B. Cambium

C. Stomata

D. Phloem

Secondary growth in stems comes from a lateral meristem called cambium. This tissue sits between the xylem (inside) and phloem (outside) and continually divides to add new layers: secondary xylem to the inside and secondary phloem to the outside. That production builds more vascular tissue and pushes the stem outward, increasing girth. Other options don't fit because meristem is a general growth tissue and doesn't specify where thickening happens; stomata are for gas exchange on the epidermis and aren't involved in stem thickening; phloem is a transport tissue produced by cambium, not the growth site itself.

8. Spermatophytes include plants that use seeds to reproduce; gymnosperms and angiosperms are included.

A. They reproduce only by spores

B. They require external fertilization by water

C. They use seeds to reproduce; includes gymnosperms and angiosperms

D. They are non-vascular

Seed-producing vascular plants, called spermatophytes, reproduce by seeds rather than spores. This group includes gymnosperms and angiosperms; seeds form from fertilized ovules and are protected within structures such as fruit in angiosperms or cones in gymnosperms. Fertilization is internal and accomplished by pollen grains delivering sperm to the ovule, so free-standing water is not required for fertilization. They are vascular plants, with xylem and phloem to transport water and nutrients. Because of these traits, the statement that spermatophytes use seeds to reproduce and include gymnosperms and angiosperms is the best description. The other options describe spore-producing plants, fertilization that requires water, or non-vascular plants, which do not apply to this group.

9. A comet is described as:

A. A celestial body composed of frozen gases and rocky, metallic materials with a tail made of ionized gases

B. A bright star that never moves

C. A meteor that has slowed down

D. A planet with rings

The main idea here is what defines a comet and how it behaves. Comets are icy bodies made of frozen gases mixed with rocky and metallic material. When they travel toward the Sun, heat causes the ices to sublimate, releasing gas and dust that form a visible atmosphere (the coma) and a tail that points away from the Sun. The tail—made of ionized gases and dust—is a hallmark of a comet's activity in space. That's why this option is the best fit: it describes a celestial body composed of frozen gases and rocky/metal materials with a tail made of ionized gases, exactly matching how comets behave when near the Sun. Other choices don't fit because: - A bright star that never moves describes stars in the sky, which don't form tails or have icy activity like comets. - A meteor is a small rock burning up in Earth's atmosphere, not a distant icy body with a solar-driven tail. - A planet with rings describes a planet like Saturn, not a comet.

10. Which concept explains evolution by differential survival and reproduction?

A. Darwinian evolution

B. Natural selection

C. Fossilization

D. Stratification

Natural selection is the process by which evolution occurs through differential survival and reproduction. In any population, individuals have variation in heritable traits. Those traits that help an organism survive longer or reproduce more successfully lead to more offspring, so the trait becomes more common in the next generation. Over many generations, this shifts the population toward better adaptation to the environment. Darwinian evolution is the broader idea that natural selection drives evolution, but the specific mechanism described by differential survival and reproduction is natural selection. Fossilization and stratification describe how fossils form and how rock layers are arranged, not how traits spread through populations.

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://mttc94.examzify.com

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