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ABSTRACT

This document is a supplement to the Test Content Description for the Georgia High School Test in Science. The sample items are representative of items on the actual Georgia High School Tests. The strands (major areas) being tested are: (1) Process/Research Skills (30% to 32% of the test); (2) Physical Science (33% to 35% of the test); and (Biology (33% to 35% of the test). General test taking hints are given, suggesting that students read carefully, consider every choice, guess intelligently, spend test time wisely, and check work carefully. Some sample items with explanations of the answers are given, and other practice items are included with answers but no explanations. A student self-assessment and remediation plan is attached. (SLD)

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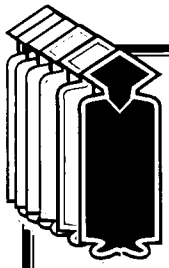
How to Prepare for Tests



A Guide for Georgia High School Students Preparing for the Georgia High School Graduation Tests

Content: Science

Including:

Hints on Preparing for the GHSGTs

Practice Test Questions and Answers

Thorough Explanation of the Answers to Select Questions

Note: This section is intended as a student aid and is *not* copyrighted. Please photocopy as necessary for student use.

Table of Contents

Introduction

This document is designed as a supplement to the *Test Content Description* for Science. The strands and their respective weights are included here. However, please refer to the *Test Content Description* (available from your teacher) for further description of the tested objectives.

The sample items listed in this document are representative of the items found on the actual Georgia High School Tests. The strands (or major areas relating to science) being tested are:

Process/Research Skills (30-32% of the test)

Items will test processes and skills common to all areas of science: use of resources, experimental design, and reading and interpreting data presented in tables, charts, or other formats.

Physical Science (33-35% of the test)

Items will test all areas of physical science, including chemical concepts. Specific topics include properties of matter, electricity, acids and bases, force, work, wave motion, and energy transfer. Most items present physical concepts in real-world situations.

Biology (33-35% of the test)

Items will test knowledge of the cellular basis of life, animal and plant systems, reproduction, genetics, classification schemes, ecology, and principles of environmental conservation.

While test score reports provide scaled scores for each of these strands, it is performance on the overall test that is of primary importance. Strand scores are provided in order to give students, teachers, and parents/guardians an idea of student relative strengths and weaknesses. It is important to remember that while the overall difficulty of the tests remains the same from one edition to the next, difficulty for a particular strand may vary. Thus, some students who score below 500 on a given strand on one occasion may score above 500 on the same strand on a subsequent occasion. Over the course of several tests, a student may even score above 500 on all four strands without having passed the test.

Hints to Help You Pass the GHSGT

Read everything carefully.

Many of the GHSGT questions involve short articles, tables, charts, and graphs. All test questions require careful reading of the directions and the question and four answer choices.

There are no trick questions.

While it is important to read each question carefully, we have not included any trick questions. You should not spend too much time trying to figure out what we *really* mean. If you read the entire question (including all accompanying material), the real meaning should be clear. We do not consider requiring a careful reading of the entire question to be a trick.

Consider every choice.

You must choose, from the four alternatives, the answer that best addresses the question. Some of the alternatives (distractors) will be attractive because they include an irrelevant detail, a common misconception, or apply the right information in the wrong way.

Guess intelligently.

There is no penalty for guessing on this test. If you are not sure of the correct answer you are encouraged to guess. Guessing is easier if you can eliminate one or more distractors as clearly incorrect. Be warned, however, that many of the distractors are very attractive because they are based on common mistakes students make.

Spend test time wisely.

Many tests are arranged so that the easiest items are first and the hardest are last. The GHSGT are not arranged that way. Instead the questions are arranged by topic. Therefore, it is possible find several difficult questions, followed by a set of easier questions later. If you run into a few hard questions, do not get discouraged. It would be better to move on, answer as many questions as possible, and then go back and re-attempt the harder questions.

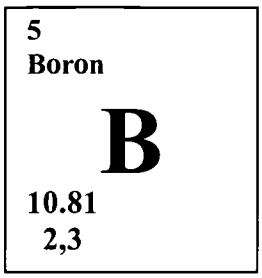
Check your work.

There are several places where carelessness can cause you to answer incorrectly. The first is in the initial reading of the question. Read everything carefully: The second is in choosing the answer. You should evaluate each answer option critically to make sure it actually answers the question. The third possibility for making a mistake is in the transfer of the correct answer to your answer document. You should ask yourself two questions: "Am I on the right question number in the right section of the test?" and "Is this the answer I mean to mark?"

Sample Questions with Explanations of Answers

Explanation of Parts of a Test Question

Refer to the portion of the periodic table below to answer the question that follows.



Stimulus

The number 5 refers to the element's

Stem

A.	atomic number.	<=Key
B.	atomic mass.	<=Distractor
C.	number of neutrons.	<=Distractor
D.	number of electron shells.	<=Distractor

Options

Cognitive Levels

Cognitive levels are based on learning expectations, not item difficulty. Items may be written at the following levels:

Low: requires recognition only and typically deals with terminology, identification, or other low-level activities

Medium: requires some degree of interpretation of a problem or situation in which a scientific principle is applied

High: requires a significant degree of interpretation, problem solving, and analysis (e.g., devising a solution to a problem by applying a scientific principle)

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1. Juanita would like to know whether a sample of a solid will float in water. In which type of table could she find this information?

   A. densities
   B. chemical properties
   C. periodic table
   D. solubilities

Explanation:
This question deals with whether or not a particular substance will float in water. Since floating is a function of the density of the substance, relative to the density of water, a density table (A) would be most useful. The other choices are plausible because, for example, students might believe that the chemical properties of a substance (B) might have some bearing on ability to float. The

periodic table (C) gives atomic weights, but atomic weight alone does not determine ability to float. Solubility (D) sounds reasonable because water and another substance are involved, but soluble substances may or may not float.

This question has a **high** cognitive level because it requires a significant amount of analysis. The candidate must know how density of an object affects its ability to float and must know that the information gathered from the distractors does not give the appropriate information needed to determine if an object will float. This question falls under the strand **Process/Research Skills**.

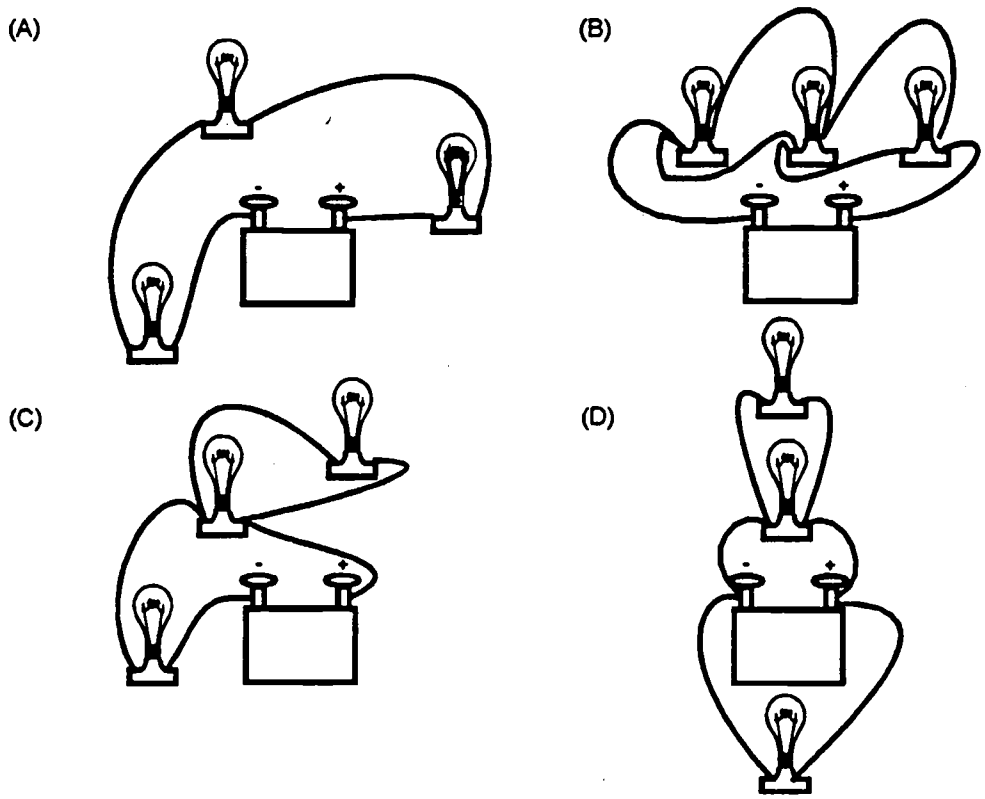
2. Flowers known as four o'clocks may be red, white, or pink. The genes show incomplete dominance. If a red and white gene are inherited, the flower is pink. If two red genes are inherited, it will be red. If two white genes are inherited, it will be white. What happens if you cross two pink plants?

   A. All of the offspring will be pink.
   B. Half the offspring will be pink, one quarter will be red, and the other quarter will be white.
   C. Half of the offspring will be red and the other half will be white.
   D. One-third of the offspring will be pink, one-third will be red, and one third will be white.

Explanation:
This item is a typical problem in genetics. Here, the student must calculate or otherwise determine that pink (red/white, or RW) crossed with RW will produce RR, RW, and WW offspring and that the proportion of RW to RR to WW will be about 2:1:1. Thus, about half the offspring will be pink, one-fourth red, and one-fourth white (B). Distractors A, C, and D reflect incomplete or incorrect application of the principles of genetics.

This question has a **high** cognitive level because it requires the analysis and application of the properties of genetics. The question falls under the strand **Biology**.

Use the illustration below to answer question 3.



3. Which setup above shows 3 light bulbs arranged in series?

A. A
B. B
C. C
D. D

Explanation:
This item presents pictures of four different circuits. The knowledgeable student will know that the series circuit is shown in option A. The distractors are all different kinds of circuits that an unknowledgeable student may choose.

This item has a **high** cognitive level because it requires the analysis of the different circuits to determine the series circuit. The question falls under the strand **Physical Science**.

4. What are recorded observations in an experiment called?

A. apparatus
B. data
C. hypotheses
D. variables

Explanation:
This factual recall question is at the **low** cognitive level. It focuses on knowledge of basic research terms and laboratory equipment. Note that while the correct answer is data (B), the distractors (A, C, and D) are all basic terminology a student will encounter in the design and execution of an experiment. This question falls under the strand **Process/ Research Skills**.

5. Today, Marjorie's lab work involves working with bases. Which types of safety equipment is Marjorie **most likely** to need?

A. gloves and safety glasses
B. safety glasses and litmus paper
C. a fire extinguisher and a blanket
D. litmus paper and an apron

Explanation:
This item assesses the use of standard safety practices and is at the **medium** cognitive level because it goes beyond recall, asking the student to apply knowledge of various forms of safety equipment to a specific situation. To answer correctly, the student should recognize that gloves and safety glasses (A) are always required when working with bases. The distractors (B,C, and D) all focus on other types of laboratory equipment that may be present in the lab, but are not types of safety equipment Marjorie will most likely need. This question falls under the strand **Process/Research Skills**.

6. Refer to the portion of the periodic table below to answer the question that follows.

6 Carbon **C** 12.011 2,4
14 Silicon **Si** 28.086 2,8,4
32 Germanium **Ge** 72.59 2,8,18,4
50 Tin **Sn** 118.69 2,8,18,18,4
82 Lead **Pb** 207.19 -18,32,18,4

What do all of the elements listed above have in common?

A. They are metals.
B. They are in the same period.
C. They have the same number of electrons.
D. They have four electrons in their outer shells.

Explanation:
This question is written at the **medium** cognitive level. It requires the student to understand the relationships and patterns resented in the periodic table of the elements. In order to get the correct answer (D), the student must understand the periodic table and the pattern presented. Choice C is incorrect because it is based on a misinterpretation of the information given. Note that A and B, though incorrect here, are conclusions that are based on relationships exhibited in the periodic table. This question falls under the strand **Physical Science**.

Additional Sample Questions

Strand 1: Process/Research Skills

1. When measuring a small quantity of liquid, which instrument would permit the most accurate reading?

   A. beaker
   B. flask
   C. test tube
   D. graduated cylinder

2. For any laboratory experiment, what should be the first step?

   A. Form a hypothesis.
   B. State the problem.
   C. Perform the experiment.
   D. Write the conclusion.

3. A student wishes to find a diagram of Earth's interior in his science textbook. Which part of a science textbook is likely to be **most** helpful?

   A. appendix
   B. bibliography
   C. glossary
   D. index

4. In her journal, Sandy recorded that it rained yesterday because she noticed the sidewalks were wet. Which describes her journal entry?

   A. fact
   B. inference
   C. prediction
   D. theory

5. Patrice wanted to test the effect of temperature on plant growth. She filled three identical pots with the same kind of soil and identical seeds. She placed one pot in a sunny room, one in a cool basement, and one in a cool refrigerator. She gave each plant the same amount of water each day. After four weeks the plant in the warm room was taller than the other two plants. Patrice concluded that plants grow best in warm temperatures. Her conclusion was unwarranted because she failed to control one of the variables.

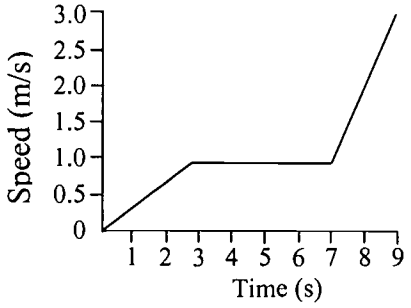
   Which variable should have also been controlled?

   A. type of soil
   B. type of seed
   C. amount of light
   D. amount of water

6. In which part of a science textbook are definitions of science terms **most likely** to be found?

   A. appendix
   B. glossary
   C. index
   D. table of contents

7. This graph contains information about the motion of a bicycle. At which of the following times is the bicycle's acceleration zero?



A. at 1 second
B. at 2 seconds
C. at 4 seconds
D. at 8 seconds

8. Two geneticists found that they could cause mutations in a type of mold. When they examined the mutated cells, they found that specific genes had changed. In cells in which one gene had changed, they found that a particular enzyme was not properly made. In cells in which another gene had changed, they found that a different enzyme was not properly made. What would the geneticists conclude from their findings?

A. Each gene is responsible for the structure of a specific enzyme.
B. Each enzyme is responsible for the structure of a specific gene.
C. Genes and enzymes are able to mutate at the same time.
D. Enzyme treatment can be effective in the battle against genetic mutations.

Strand 2: Physical Science

9. In a beaker, sugar is dissolved in water, and then the water is heated and evaporates. The sugar is recovered, and heat is again applied. Vapor is released, and the material in the beaker changes from white to black. What must you know to determine if a chemical change occurred?

A. the boiling point of water
B. the boiling point of sugar
C. the temperature at which sugar evaporates
D. whether or not the black substance is sugar

10. The atomic number of iron is 26, and the atomic mass is 55.847. What do these numbers mean in regard to protons, electrons, and neutrons?

A. There are 26 each of protons and neutrons, and the rest of the mass is the result of electrons.
B. There are 26 protons and 26 electrons. Some atoms of iron have 29 neutrons; the .847 shows that there is more than one isotope of iron.
C. There are 26 protons and 29 neutrons. Each particle has an atomic mass of 1.
D. There are 26 protons and 26 neutrons. Since neutrons have slightly more mass than protons, the mass is greater than 52.

Refer to the portion of the periodic table to answer the question that follows.

3 Lithium **Li** 6.939 2,1	4 Beryllium **Be** 9.01218 2,2	5 Boron **B** 10.81 2,3	6 Carbon **C** 12.011 2,4	7 Nitrogen **N** 14.0067 2,6	8 Oxygen **O** 15.9994 2,6	9 Fluorine **F** 18.9984 2,7	10 Neon **Ne** 20.183 2,8

11. Which element in this group would be the **least likely** to react with other elements?

    A. Boron
    B. Carbon
    C. Neon
    D. Oxygen

12. The half-life of carbon-14 is 5,730 years. How much carbon-14 would remain after 11,460 years, if any?

    A. none
    B. one-eighth
    C. one-fourth
    D. one-half

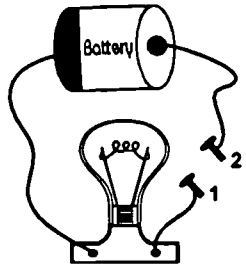
13. A balloon is rubbed with a piece of cloth. As a result, the balloon has a negative charge. What has happened?

    A. Electrons have moved from the inside to the outside of the balloon.
    B. Positive charges have traveled from the balloon to the cloth.
    C. Electrons have moved from the balloon to the cloth.
    D. Electrons have traveled from the cloth to the balloon.

14. Which is an example of the conversion of electrical energy into mechanical energy?

    A. water heating in an electric water heater
    B. filament glowing inside a light bulb
    C. fan blades turning in an electric fan
    D. coal burning to generate electricity

15. Use the illustration to answer the question below.



Which would complete the circuit between 1 and 2 to light the bulb?

    A. wooden toothpick
    B. metal paper clip
    C. plastic spoon
    D. rubber band

Strand 3: Biology

16. The water you drink each day probably comes from a municipal water supplier that employs a biologist. What is the biologist **most likely** to do that would affect the quality of the water you drink?

    A. Conduct tests to make sure there are no harmful bacteria in the water.
    B. Design systems to make sure you have enough water pressure.
    C. Inspect water pipes to make sure there are no cracks or leaks.
    D. Collect water samples from various places to make sure the pH is the same throughout the system.

17. Which of the following processes involves the chloroplast?

    A. cell division
    B. conversion of light energy to chemical energy
    C. formation of reproductive cells
    D. stringing together amino acids

18. If an intestinal cell in a butterfly contains 24 chromosomes, a butterfly egg cell would contain

    A. 3 chromosomes.
    B. 6 chromosomes.
    C. 12 chromosomes.
    D. 24 chromosomes.

19. Nitrogen-fixing bacteria can be found in soybeans and other legumes. Farmers are advised to cultivate these plants with other crops. What would be one consequence of this practice?

    A. All the nitrogen will be bound up by the bacteria.
    B. Farmers will have to monitor the pH of the soil closely.
    C. Free nitrogen will be made available to the crops.
    D. Other plants will be infected by the bacteria, and some will die.

20. It is not easy to observe individual chromosomes during the interphase because

    A. the DNA has not been duplicated yet.
    B. they have uncoiled to form long, thin strands.
    C. they leave the nucleus and are scattered throughout the cell.
    D. homologous chromosomes do not pair up until division starts.

21. Which of the following statements **best** explains why all animals need food in order to live?

A. Body mass must be maintained, and food supplies the needed body mass.
B. Cells, tissues, and organs require energy to carry out their tasks, and food provides the needed energy.
C. A balanced diet is necessary to maintain strong bones and healthy teeth.
D. Food contains essential vitamins and minerals bodies need in order to synthesize other nutrients.

22 In the longstanding war between coyotes and sheep ranchers in New Mexico, studies show that coyotes kill sheep and the percentage of sheep lost from herds in areas where coyotes have been exterminated is about the same as the percentage lost in areas where coyotes are still present.

What is the **most likely** explanation for the similarity in the percentage of sheep lost in both areas?

A. Coyotes were protecting sheep.
B. The sheep died from overcrowding.
C. Another predator was killing sheep.
D. Coyotes were preying on sick or weak sheep.

23. Theories about the effects of radiation have changed over the years. Suppose you are preparing a report on the most current scientific views on the subject. While searching for reference books, you find a book titled *Radiation and You*. Which piece of information should you use to determine if this book will be a useful source for your research?

A. the copyright date
B. if "hazardous effects" is in the index
C. whether the U.S. Energy Commission has approved it
D. whether pioneering scientists are quoted in it

24. Which of the following **best** defines absorption?

A. movement of nutrient molecules into cells lining the digestive tract
B. passage of undigested material out of the digestive tract
C. chemical breakdown of food
D. the act of eating

Answers to Sample Questions

1. D	9. D	17. B
2. B	10. B	18. C
3. D	11. C	19. C
4. B	12. C	20. B
5. C	13. D	21 B
6. B	14. C	22 D
7. C	15. B	23 A
8. A	16. A	24 A

GHSGT in Science ~ Student Remediation Plan

You may find that this checklist will help you keep track of the areas in which you need to concentrate your study. Be sure to keep the checklist updated!

Student Name _____
Test Results from *Spring* ___ *Summer* ___ *Fall* ___ *Winter* ___

Standards on the Test	***Self Assessment***
Process/Research Skills *Scale Score* = _____	
Use science process skills in laboratory or field investigations, including observations, classification, communication, metric measurement, prediction, inference, collecting, and analyzing data.	
Uses traditional reference materials to explore background and historical information regarding a scientific topic.	
Learns and uses on a regular basis standard safety practices for field investigations.	
Measure and compares relationships among speed, velocity and acceleration.	
Relates frequency and energy of the electromagnetic spectrum. Explains how waves carry energy and can interact with matter.	

Standards on the Test	***Self Assessment***
Physical Science/Chemistry *Scale Score* = _____	
Compares and contrasts matter and its characteristics related to its state (solids, liquids, and gases).	
Describes the fundamental parts of the atom.	
Identifies chemical or physical changes conceptually in a laboratory setting.	
Describes the basic structure of the atom as protons, neutrons and electrons in specific arrangements.	
Compares and contrasts matter and its characteristics related to its state (solids, liquids, and gases).	
Identifies the symbol, atomic number and mass of each of the first 20 elements of the periodic table.	
Describes the fundamental parts of the atom.	
Analyzes different types of energy in terms of sources, limits and uses, and environmental impact.	
Identifies gravity as a force that is dependent upon mass and the distance between objects.	

Measures and/or calculates work and power using several examples from the learner's environment.	
Identifies gravity as a force that is dependent upon mass and the distance between objects.	
Generates an imbalance of electrical charge and experiments with attraction and repulsion of objects. Shows how electricity and magnetism are related.	

Standards on the Test	***Self Assessment***
Biology *Scale Score* = _____	
Explains the significance of biology (e.g., impact on a daily basis)	
Explains the cellular basis of life.	
Explains homeostasis and describes the transport of materials through cell membranes.	
Recognizes that life has a chemical basis.	
Explains the processes of photosynthesis and respiration.	
Explains the structure of DNA and RNA and their role in protein synthesis. Describes the double-helix model.	
Describes the process of cell division, mitosis, and meiosis in sperm and egg formation.	
Explains and uses the basic Mendelian genetic principles.	
Describes patterns of inheritance and genetic engineering.	
Organisms are classified into a hierarchy of groups and subgroups based on their similarities.	
Describes characteristics and examples of monerans.	
Describes characteristics and examples of protists.	
Describes characteristics and examples of fungi.	
Describes the similarities and differences of spore producing plants.	
Describes the similarities and differences of seed producing plants.	
Describes the anatomy and physiology of each phyla of invertebrates.	
Describes the anatomy and physiology of classes of vertebrates.	
Analyzes the overall organization of the human body.	
Explains the structure of an ecosystem.	
Lists and describes the major biomes of the world.	
Assess the impact of man's activities on the environment and explore ways to help solve ecological problems.	

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