

New Jersey



MARCH 2005
GRADE EIGHT
PROFICIENCY ASSESSMENT

**STUDENT PREPARATION
BOOKLET**



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STUDENT PREPARATION BOOKLET

WHAT IS THE GRADE EIGHT PROFICIENCY ASSESSMENT?

Each March, all eighth graders in New Jersey take the Grade Eight Proficiency Assessment (GEPA). The GEPA is designed to help you by measuring your knowledge and skills in the areas that will be tested later in the High School Proficiency Assessment (HSPA). You will have to pass the HSPA to graduate from high school. By taking the GEPA now, you can see whether your skills in language arts literacy, mathematics, and science are where they should be at this time. If they're not, you, your teachers, and your parents can start now to make sure any current gaps in your knowledge or skills are filled in before you take the HSPA in three years.

The GEPA and HSPA are designed to make sure that you have the skills you will eventually need to succeed on the job, in college, or in the military, and to be a productive citizen.

The GEPA currently has three test sections: Language Arts Literacy, Mathematics, and Science. You will take the test over a four-day period for approximately two hours each day: Science will be tested on Monday, March 7; Mathematics will be tested on Tuesday, March 8 and Language Arts Literacy will be tested on Wednesday and Thursday, March 9 and 10.

HOW WILL MY SCORES BE REPORTED?

When you receive your GEPA scores, the report will show total scores in Language Arts Literacy, Mathematics, and Science. It will also show subtotal scores for the specific knowledge and skills measured in all content areas. The total scores will be reported in one of three proficiency levels – Advanced Proficient, Proficient, or Partially Proficient. If you have not met the appropriate level of proficiency, your school may give you additional help to further develop the skills you will need to pass the HSPA in the eleventh grade.

WHAT WILL THE TEST BE LIKE?

Like other tests you may have taken, the GEPA contains multiple-choice questions that require you to choose your response from among four answer choices (A, B, C, or D) and record it by darkening the appropriate letter's bubble in your separate answer folder. The test also contains open-ended questions that require you to either respond in your own words in written text, to draw a diagram, or to construct a numerical response, all without any answer choices available to you.

Your responses to all multiple-choice and open-ended questions must be recorded in your separate answer folder. Information recorded in your test booklet or on scratch paper does not count toward your score.

Language Arts Literacy

The Language Arts Literacy section of the test includes reading and writing activities that will measure your achievements in interpreting, analyzing, and critiquing text. The reading materials will require you to read passages selected from published books, newspapers, and magazines, as well as everyday text, and to respond to related multiple-choice and open-ended questions.

In the writing part, you will write two extended responses.

Mathematics

The Mathematics section of the test will measure your ability to solve problems by applying mathematical concepts. The areas to be tested are: number and numerical operations; geometry and measurement; patterns and algebra; and data analysis, probability, and discrete mathematics.

Most mathematics questions are multiple-choice, which have a weight of one point each for correct answer choices. The open-ended questions, requiring you to construct and explain your own written or graphic responses, can receive a score from 0 to 3. For 3 points, a response must show complete understanding of a problem's concepts and have a clear, effective explanation. For 2 points, there must be a nearly complete understanding of a problem's concepts, but the response may have minor errors. A 1-point response would show limited understanding of a mathematical concept and would have an incomplete explanation of how the problem was solved. A 0-point response would show insufficient understanding of the concept and may contain major errors.

You will be provided with a calculator when you take the test, and will receive a Mathematics Reference Sheet that contains formulas and other useful information you can use during the test.

Science

The Science section of the test will measure your knowledge in three major areas: life sciences, physical sciences, and earth sciences.

Most of the science questions are multiple-choice questions and have a weight of one point for each correct answer. There are also open-ended questions that ask you to construct your own written and/or graphic responses. These questions can receive a score of 0 to 3 points. A 3-point answer must show a complete understanding of the problem stated. A 2-point answer must show a nearly complete understanding, with perhaps minor errors. A 1-point answer will show only a limited understanding of the problem. An answer that receives no points will show little, if any, understanding of the problem.

HOW CAN I PREPARE MYSELF TO TAKE THE GEPA?

- Relax. You will think more clearly if you are relaxed when you take a test. Dress comfortably on the day of the test so that you are at ease and not distracted. Put all your other activities on hold so that you can give all your attention and energy to taking the test and doing well.
- Get a good night's sleep the night before the test. Start your day off with a good breakfast so that you have plenty of energy to take the test.
- Don't cram. The skills measured by the GEPA are learned over a long period of time.
- Think positively. Believe that you will do your very best. Be confident of your ability.
- Read the directions carefully before beginning each part of the test. If you understand what you are supposed to do, it will save time and help you avoid careless mistakes.
- Read each question carefully. Try to answer the question before you look at the responses. If you find your answer there, mark that response. If not, ask yourself whether your answer is reasonable. Reread the question, keeping the responses in mind. Make sure that you understand what the question is asking.
- Make sure that your answers are reasonable. Do you understand what the question is asking? Have you made use of all the relevant information provided to answer the question correctly? Does your response answer the question? Did you choose the best answer among those listed?
- If you aren't sure of the answer to a question, try to eliminate some of the responses. Think about the reasons why you were able to eliminate some of the choices. These reasons may provide you with the information you need to choose the correct answer. If you can eliminate some of the choices, select the remaining answer choice that makes the most sense.
- Skip a question and go on to the next one if you have no idea of the answer. Spending too much time on one question might keep you from having enough time to answer others that you do know. You should not leave any question unanswered. If there is time, you should come back to it later at the end of that part of the test.
- Check your answers as you take the test. Make sure that you have chosen the response that best answers the question. Checking your answers as you work through the test will save time later in rethinking a question. Check your answer folder to make sure that you have darkened the correct answer space.
- Some questions require more planning than others. This is especially true of open-ended questions and writing tasks. First, outline the steps required to respond to the question. Then, identify related information and eliminate non-related information when you can.

- Pace yourself during the test. Budget your time so that you have a chance to answer all of the questions. Your teacher will periodically let you know the time remaining in the part of the test you are taking.
- Fill in your separate answer folder carefully. Make sure that you record all your responses in your separate answer folder in the right spaces. You may know the answer to a question, but if you do not mark your answer in the right place, you will not receive credit for your answer.

WHAT WILL THE GEPA LOOK LIKE?

The rest of this booklet will give you an idea of what the GEPA materials are like.

Language Arts Literacy

New Jersey's Core Curriculum Content Standards identify five categories of Language Arts Literacy: speaking, listening, writing, reading, and viewing. These five activities are essential aspects of our everyday lives and critical to what we think, learn, communicate, and create.

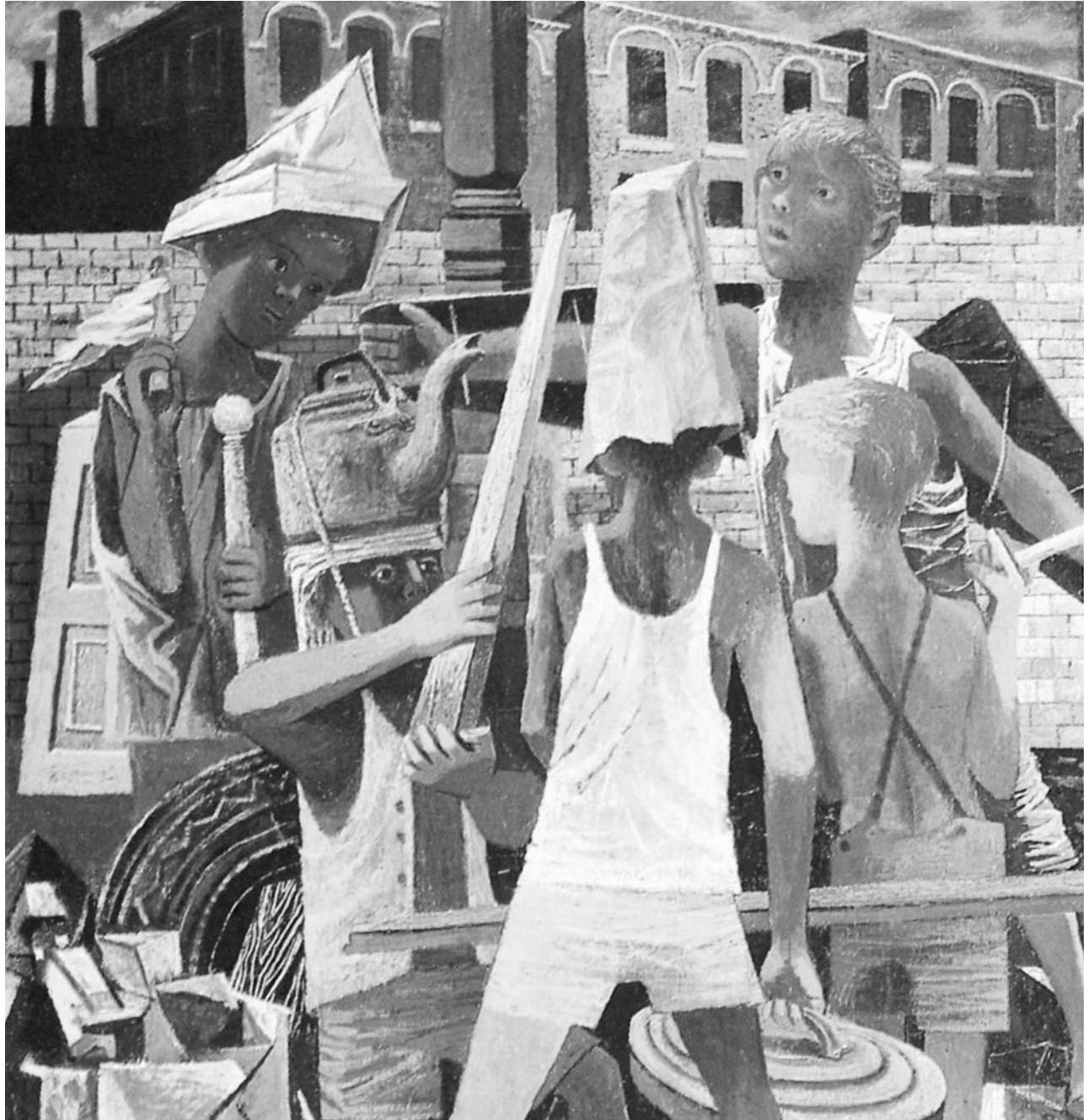
The GEPA provides a variety of activities and texts that will allow you to demonstrate your skills and knowledge in using language arts literacy. The assessment presents two types of reading passages, narrative and persuasive texts, that are followed by a set of 10 multiple-choice and two open-ended questions. The GEPA also provides two different types of writing prompts. For the two writing tasks, the test booklet provides blank pages for prewriting. Use this space to plan your ideas. Then use the lined pages in your answer folder for your written draft. As you complete these different sections of the GEPA, you will be demonstrating your skills in using language for thinking, learning, and communicating.

The GEPA's language arts literacy activities are sequenced to give you varying experiences in using language for different kinds of tasks, just as you do in your everyday lives. As preparation for taking the GEPA's language arts literacy assessment, read through the sample test materials in this booklet to familiarize yourself with the sequence and content of each test section. Also acquaint yourself with the type of scoring procedure and criteria that will be used to assess your demonstrated skills. This preview will help you understand what each task involves and how your work will be evaluated. Copies of the rubrics that will be used to score your writing are included on pages 11 and 12 of this booklet.

Following are sample materials illustrating the content of the GEPA's language arts literacy assessment. The reading passages are only excerpts from stories and articles that were chosen to illustrate the GEPA's texts. Complete versions of these texts are printed in the *Directory of Test Specifications for the Grade Eight Proficiency Assessment (GEPA) and High School Proficiency Assessment (HSPA) in Language Arts Literacy*. That document is available in your school district.

This booklet includes an example of each writing activity and both types of questions for each reading passage. As you read through the following pages, notice that the scoring procedure for each open-ended item or activity is identified to help you understand how your work will be assessed.

One writing task begins with a picture that serves as a prompt for a story. The setting and characters portrayed in the picture suggest an event or relationship that you are invited to develop and describe through a story. In this activity you may speculate about what has happened, what is happening, or what will happen at some other time. Use your imagination to create a good story that is detailed and vivid. The answer folder will provide two lined pages for your writing.



Writing Task A

Every picture tells a story, but the stories we see may be different. Look closely at this picture. What story is it telling? Use your imagination to speculate what the story is about or to describe what is happening.

SCORING PROCEDURE: Registered Holistic Scoring Rubric - Page 11

A second writing activity will introduce a controversial issue that you will address in a persuasive letter or essay. Following is an example of a writing prompt that focuses on a controversial issue.

WRITING SITUATION

In an effort to limit the amount of littering on school grounds, the Board of Education is thinking about requiring all eighth graders to take a half-year, after-school course called “Taking Care of Your Environment.” Some students believe this is a good idea; others argue against it. What is your point of view?

Your principal is preparing a report on the proposed requirement for the Board of Education and has asked each student to write a letter either supporting or opposing the requirement. Think about the effect this requirement would have on you and other students in your school. How would this requirement change the situation in your school?

DIRECTIONS for WRITING TASK

Write a letter to your principal explaining your position on this controversial issue. Use facts, examples, and other evidence to support your opinion of the proposed requirement.

The answer folder will provide four lined pages for this writing task. In addition, you will have blank pages in the test booklet to use for planning your writing. The planning space is for your benefit because it gives you a place to brainstorm and organize your ideas before you begin writing. Readers who score your writing will consider the organization and elaboration of key ideas and details as well as grammar and sentence structure. Only your writing in your answer folder will be scored.

SCORING PROCEDURE: Registered Holistic Scoring Rubric - Page 11

The GEPA also presents a narrative reading passage, followed by 10 multiple-choice and two open-ended questions that relate to the text. The answer folder will provide one full-lined page for responses to each open-ended question.

People wear many faces. As writer Robert Cormier illustrates in the following story, life challenges us to discover which is our true face.

The Moustache
by Robert Cormier

At the last minute Annie couldn't go. She was invaded by one of those twenty-four-hour flu bugs that sent her to bed with a fever, moaning about the fact that she'd also have to break her date with Handsome Harry Arnold that night. We call him Handsome Harry because he's actually handsome, but he's also a nice guy, cool, and he doesn't treat me like Annie's kid brother, which I am, but like a regular person. Anyway, I had to go to Lawnrest alone that afternoon. But first of all I had to stand inspection. My mother lined me up against the wall. She stood there like a one-man firing squad. Which is kind of funny because she's not like a man at all, she's very feminine, and we have this great relationship—I mean, I feel as if she really likes me. I realize that sounds strange, but I know guys whose mothers love them and cook special stuff for them and worry about them and all but there's something missing in their relationship.

Anyway. She frowned and started the routine.

"That hair," she said. Then admitted: "Well, at least you combed it."

I sighed. I have discovered that it's better to

scholarship, for instance. Cindy wasn't exactly crazy about the moustache, either.

Now it was my mother's turn to sigh.

"Look," I said, to cheer her up. "I'm thinking about shaving it off." Even though I wasn't. Another discovery: You can build a way of life on postponement.

"Your grandmother probably won't even recognize you," she said. And I saw the shadow fall across her face.

Let me tell you what the visit to Lawnrest was all about. My grandmother is seventy-three years old. She is a resident—which is supposed to be a better word than *patient*—at the Lawnrest Nursing Home. She used to make the greatest turkey dressing in the world and was a nut about baseball and could even quote batting averages, for crying out loud. She always rooted for the losers. She was in love with the Mets until they started to win. Now she has arteriosclerosis, which the dictionary says is "a chronic disease characterized by abnormal thickening and hardening of the arterial walls." Which really means that she can't live at home anymore or even with us, and her memory has betrayed her as well as her body. She used to wander off and sometimes didn't recognize people. My mother visits her all the time, driving the thirty miles

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1. The turning point of the story occurs when Mike
 - A. realizes he is not wearing a Chesterfield coat.
 - ★ B. accepts the role of his grandfather.
 - C. speeds home from Lawnrest.
 - D. shaves off his moustache.

2. Mike's attitude toward his grandmother changes from the beginning of the story to the end.
 - At the beginning of the story, how does Mike feel about visiting his grandmother?
 - How does Mike's attitude to his grandmother change during his visit to the nursing home?
 - Will Mike visit his grandmother in the nursing home again? Why or why not?

Use information from the story to support your response.

You will also read a persuasive passage and then answer 10 multiple-choice and two open-ended questions that relate to and extend your understanding of the text. The answer folder will provide one full-lined page for each open-ended question.

Different perspectives give life texture. Suzanne Britt presents one aspect of life that may give you a different slant on an old theme.

Neat People vs. Sloppy People
by Suzanne Britt

I've finally figured out the difference between neat people and sloppy people. This distinction is, as always, moral. Neat people are lazier and meaner than sloppy people.

Sloppy people, you see, are not really sloppy. Their sloppiness is merely the unfortunate consequence of their extreme moral rectitude. Sloppy people carry in their mind's eye a heavenly vision, a precise plan, that is so stupendous, so perfect, it can't be achieved in this world or the next.

Sloppy people live in Never-Never Land. Someday is their metier. Someday they are planning to alphabetize all their books and set up home catalogues. Someday they will go through their wardrobes and mark certain items for tentative mending and certain items for passing on to relatives of similar shape and size. Someday sloppy people will make family scrapbooks into which they will put newspaper clippings, postcards, locks of hair, and the dried corsage from their senior prom. Someday they will file everything on the surface of their desks, including the cash receipts from coffee purchases at the snack shop. Someday they will sit



hours or two weeks into the excavation, the desk looks exactly the same, primarily because the sloppy person is meticulously creating new piles of paper with new headings and scrupulously stopping to read all the old book catalogs before he throws them away. A neat person would just bulldoze the desk.

Neat people are bums and clods at heart. They have cavalier attitudes toward possessions, including family heirlooms. Everything is just another dust-catcher to them. If anything collects dust, it's got to go and that's that. Neat people will toy with the idea of throwing the children out of the house just to cut down on the clutter.

Neat people don't care about process. They like results. What they want to do is get the whole thing over with so they can sit down and watch the rasslin' on TV. Neat people operate on two unvarying principles: Never handle any item twice, and throw everything away. The only thing messy in a neat person's house is the trash can. The minute something comes to a neat person's hand, he will look at it, try to decide if it has immediate use and finding none, throw it in the trash.

1. Which of the following sets of words BEST describes the author's attitude toward neat people?

- A. insensitive, economical, and disorganized
- ★ B. noble, loving, and meticulous
- C. noble, ambitious, and vicious
- D. vicious, lazy, and cavalier

2. In paragraph 4, the author states that sloppy people "never get neat. They aim too high and wide."

- Explain what the author means by the statement "They aim too high and too wide."
- Do you agree with the author? Why or why not?

Use information from the passage to support your response.

Readers who score your answers will be looking for the following:

- 1) Did you focus your answer on the question asked?
- 2) Did you answer all parts of the question?
- 3) Did you fully explain your answer?
- 4) Did you use specific information from the passage to explain your answer?
- 5) Did you use any additional insights to explain your answer?

NEW JERSEY REGISTERED HOLISTIC SCORING RUBRIC

In scoring, consider the grid of written language	Inadequate Command	Limited Command	Partial Command	Adequate Command	Strong Command	Superior Command
Score	1	2	3	4	5	6
Content and Organization	<ul style="list-style-type: none"> May lack opening and/or closing Minimal response to topic; uncertain focus No planning evident; disorganized Details random, inappropriate, or barely apparent No apparent control Severe/numerous errors 	<ul style="list-style-type: none"> May lack opening and/or closing Attempts to focus May drift or shift focus Attempts organization Few, if any, transitions between ideas Details lack elaboration, i.e., highlight paper Numerous errors Excessive monotony/same structure Numerous errors Numerous serious errors 	<ul style="list-style-type: none"> May lack opening and/or closing Usually has single focus Some lapses or flaws in organization May lack some transitions between ideas Repetitious details Several unelaborated details Errors/patterns of errors may be evident Little variety in syntax Some errors Patterns of errors evident 	<ul style="list-style-type: none"> May lack opening and/or closing Single focus Ideas loosely connected Transitions evident Uneven development of details Some errors that do not interfere with meaning Some errors that do not interfere with meaning No consistent pattern of errors Some errors that do not interfere with meaning 	<ul style="list-style-type: none"> Generally has opening and closing Single focus Sense of unity and coherence Key ideas developed Logical progression of ideas Moderately fluent Attempts compositional risks Details appropriate and varied Few errors Few errors Few errors 	<ul style="list-style-type: none"> Has opening and closing Single, distinct focus Unified and coherent Well-developed Logical progression of ideas Fluent, cohesive Compositional risks successful Details effective, vivid, explicit, and/or pertinent Very few, if any, errors Very few, if any, errors Very few, if any, errors
Usage						
Sentence Construction						
Mechanics						

	Content/Organization	Usage	Sentence Construction	Mechanics
(FR) Fragment	Communicates intended message to intended audience	Tense formation	Variety of formations	Skills intact in:
(OT) Off Topic/ Off Task	Relates to topic	Subject-verb agreement	Correct construction	Spelling
(NE) Not English	Opening and closing	Pronouns		Capitalization
(NR) No Response	Focused	usage/agreement		Punctuation
	Logical progression of ideas	Word choice/meaning		
	Transitions	Proper modifiers		
	Appropriate details and information			

NON-SCORABLE RESPONSES

- Student wrote too little to allow a reliable judgment of his/her writing.
- Student did not write on the assigned topic/task, or the student attempted to copy the prompt.
- Student wrote in a language other than English.
- Student refused to write on the topic, or the writing task folder was blank.

OPEN-ENDED SCORING RUBRIC

For Reading, Listening, and Viewing

Sample Task: The author takes a strong position on voting rights for young people. Use information from the text to support your response to the following.

- *Requirements:**
- Explain the author’s position on voting.
 - Explain how adopting such a position would affect young people like you.

Points	Criteria
4	A 4-point response clearly demonstrates understanding of the task, completes all requirements, and provides an insightful explanation/opinion that links to or extends aspects of the text.
3	A 3-point response demonstrates an understanding of the task, completes all requirements, and provides some explanation/opinion using situations or ideas from the text as support.
2	A 2-point response may address all of the requirements, but demonstrates a partial understanding of the task, and uses text incorrectly or with limited success resulting in an inconsistent or flawed explanation.
1	A 1-point response demonstrates minimal understanding of the task, does not complete the requirements, and provides only a vague reference to or no use of the text.
0	A 0-point response is irrelevant or off-topic.

***Requirements for these items will vary according to the task.**

Mathematics

The Mathematics Section of the GEPA assessment is divided into four standards. Each standard reflects knowledge and skills specified in New Jersey's Core Curriculum Content Standards.

Grade Eight Proficiency Assessment (GEPA) Mathematics Standards

4.1. Number and Numerical Operations

- A. Number Sense
- B. Numerical Operations
- C. Estimation

4.2. Geometry and Measurement

- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measurement
- E. Measuring Geometric Objects

4.3. Patterns and Algebra

- A. Patterns and Relationships
- B. Functions
- C. Modeling
- D. Procedures

4.4. Data Analysis, Probability, and Discrete Mathematics

- A. Data Analysis (Statistics)
- B. Probability
- C. Discrete Mathematics—Systematic Listing and Counting
- D. Discrete Mathematics—Vertex-Edge Graphs and Algorithms

Types of Questions

Many of the multiple-choice (MC) questions on the GEPA Mathematics test assess higher-level cognitive processes than the questions in traditional multiple-choice tests. It is anticipated that you will take an average of between one and two minutes to answer each MC question. The answers are computer scored and are worth one point each.

Open-ended (OE) questions require you to construct your own written or graphical responses and explain your responses. It is anticipated that you will take approximately ten minutes to answer each OE question. Your responses are hand scored on a scale from 0 to 3.

The general scoring guide on the next page was created to help readers score open-ended questions consistently. This scoring guide is used by the trained readers who will score the Mathematics open-ended questions on the eighth-grade test.

You can expect to see 40 multiple-choice and 8 open-ended questions on the mathematics test.

You will be provided with a Mathematics Reference Sheet as shown on page 16. The reference sheet contains a ruler, geometric shapes, formulas, and other information you may find useful as you take the test. You will also be provided with a calculator to help you solve problems.

Scoring Guide for Mathematics Open-Ended (OE) Questions (Generic Rubric)

3-Point Response

The response shows complete understanding of the problem's essential mathematical concepts. The student executes procedures completely and gives relevant responses to all parts of the task. The response contains few minor errors, if any. The response contains a clear, effective explanation detailing how the problem was solved so that the reader does not need to infer how and why decisions were made.

2-Point Response

The response shows nearly complete understanding of the problem's essential mathematical concepts. The student executes nearly all procedures and gives relevant responses to most parts of the task. The response may have minor errors. The explanation detailing how the problem was solved may not be clear, causing the reader to make some inferences.

1-Point Response

The response shows limited understanding of the problem's essential mathematical concepts. The response and procedures may be incomplete and/or may contain major errors. An incomplete explanation of how the problem was solved may contribute to questions as to how and why decisions were made.

0-Point Response

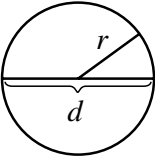
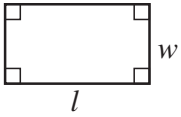
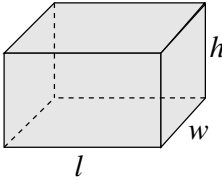
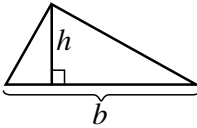
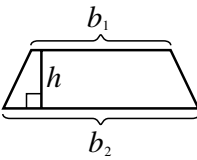
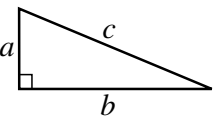
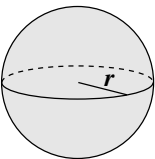
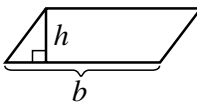
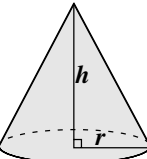
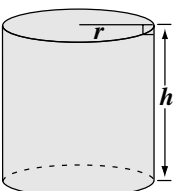
The response shows insufficient understanding of the problem's essential mathematical concepts. The procedures, if any, contain major errors. There may be no explanation of the solution or the reader may not be able to understand the explanation. The reader may not be able to understand how and why decisions were made.

The above generic rubric is used as a guide to develop specific scoring guides or rubrics for each of the open-ended (OE) questions that appear on the New Jersey statewide assessments in Mathematics. These scoring rubrics provide the criteria for evaluating and scoring student performance and are developed by a committee of mathematicians and teachers. Rubrics ensure that there is consistency, fairness, and accuracy in scoring open-ended questions.

MATHEMATICS REFERENCE SHEET

*Use the information below to answer questions on the Mathematics section of the
March 2005 Grade Eight Proficiency Assessment (GEPA).*

$$\pi \approx 3.14 \text{ or } \frac{22}{7}$$

<p>Circle Area = πr^2 Circumference = $2\pi r$ = πd</p> 	<p>Rectangle Area = lw Perimeter = $2(l + w)$</p> 
<p>Rectangular Prism</p> <p>Volume = lwh Surface Area = $2lw + 2wh + 2lh$</p> 	<p>Triangle Area = $\frac{1}{2} bh$</p> 
<p>Trapezoid</p> <p>Area = $\frac{1}{2} h(b_1 + b_2)$</p> 	<p>Pythagorean Formula $c^2 = a^2 + b^2$</p> 
<p>Sphere</p> <p>Volume = $\frac{4}{3} \pi r^3$ Surface Area = $4\pi r^2$</p> 	<p>Parallelogram Area = bh</p> 
<p>Cone</p> <p>Volume = $\frac{1}{3} \pi r^2 h$</p> 	<p>Cylinder Volume = $\pi r^2 h$</p> 

Use the following equivalents for your calculations:

60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1 day
7 days = 1 week
30 days = 1 month
52 weeks = 1 year

12 inches = 1 foot
3 feet = 1 yard
36 inches = 1 yard
5,280 feet = 1 mile
1,760 yards = 1 mile

10 millimeters = 1 centimeter
100 centimeters = 1 meter
1000 meters = 1 kilometer

8 fluid ounces = 1 cup
2 cups = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon

1000 milliliters (mL) = 1 liter (L)

16 ounces = 1 pound
2,000 pounds = 1 ton

1000 milligrams = 1 gram
100 centigrams = 1 gram
10 grams = 1 dekagram
1000 grams = 1 kilogram

Distance = rate \times time

The sum of the measures of the interior angles of a triangle = 180°

The measure of a circle is 360° or 2π radians

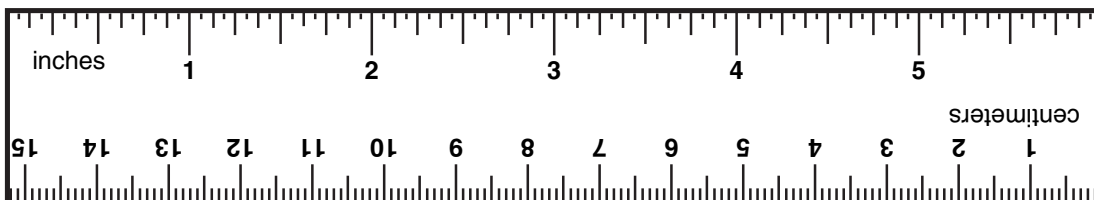
Interest = principal \times rate \times time

Simple Interest Formula: $A = p + prt$ **Compound Interest Formula:** $A = p(1 + r)^t$

A = amount after t years; p = principal; r = annual interest rate; t = number of years

The number of **combinations** of n elements taken r at a time is given by $\frac{n!}{(n-r)!r!}$

The number of **permutations** of n elements taken r at a time is given by $\frac{n!}{(n-r)!}$



GEPA MATHEMATICS SAMPLE QUESTIONS

Standard 4.1 – Number Sense

1. Find all of the numbers that satisfy the following statements:
 1. I am a positive integer less than 100.
 2. Two more than my value is a multiple of 6.
 3. The sum of my digits is a multiple of 7.

Show all of your work and explain the process you use to find the solution completely.

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Rationale: From statement 1, we have the positive integers less than 100, i.e., 1, 2, 3, 4, ..., 98, 99.

From statement 2 we conclude the number is less than the multiples of 6 that are less than 100. The following numbers are multiples of 6 less than 100: 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, and 96. The number you are looking for, therefore, is from among the following list: 4, 10, 16, 22, 28, 34, 40, 46, 52, 58, 64, 70, 76, 82, 88, and 94.

From statement 3, the sum of the digits in the number is a multiple of 7. The numbers 16, 34, 52, and 70 are responses that meet all the criteria given.

Standard 4.1 – Numerical Operations

2. If 4 out of every 7 people in Swedesboro use Ultrawhite Laundry Detergent, find the approximate number of people that use Ultrawhite if there are 5,271 people in Swedesboro.
 - A. 1,757
 - ★ B. 3,012
 - C. 5,260
 - D. 9,975

Rationale: The correct answer is B. Setting up the proportion, $\frac{4}{7} = \frac{x}{5,271}$, and multiplying both sides of the equation by 7 and then by 5,271 yields $7x = 21,084$. Solving for x results in $x = 3,012$.

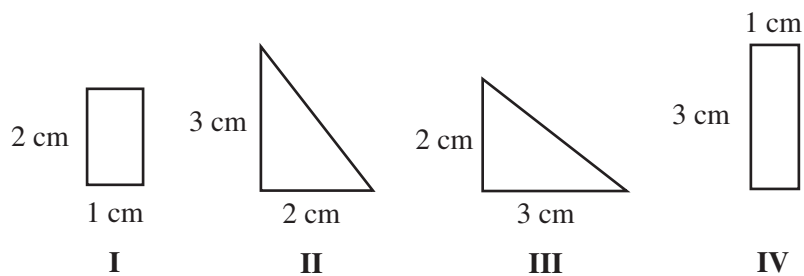
Standard 4.1 – Estimation

3. Liang got an answer of about 3.87 when she entered 15 on her calculator and pressed the ($\sqrt{\quad}$) key. As usual, she stopped to think briefly about whether or not her calculator's answer was reasonable. Which of the following statements is the most likely explanation for her to believe that her calculator's answer is or is not reasonable?
- A. It is not reasonable, because the answer should be a whole number.
 - ★ B. It is reasonable because 3 squared is 9 while 4 squared is 16.
 - C. It is not reasonable because the answer should be only slightly more than 3.
 - D. It is reasonable, because 15 is an odd number.

Rationale: The correct answer is B. The $\sqrt{9} = 3$ and the $\sqrt{16} = 4$. Therefore, when calculating the $\sqrt{15}$, it is reasonable to expect the answer to lie between 3 and 4, and to be closer to 4 than to 3 because 15 is closer to 16 than it is to 9.

Standard 4.2 – Geometric Properties

4. The figures below are either right triangles or rectangles.

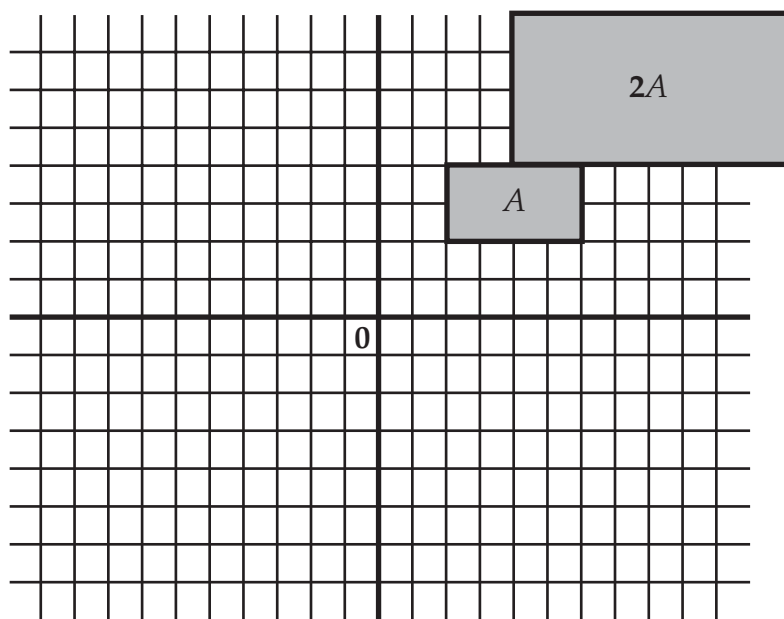


Which shapes can be placed together, without overlap, to form a square? Each of your figures may be used only once.

- A. II and III
- B. I, II, and III
- ★ C. II, III, and IV
- D. I and IV

Rationale: The correct answer is C. By definition a square has 4 congruent sides. Only by rotating and combining pieces II, III, and IV can a figure be constructed that meets this qualification. Either Figure II or Figure III must be flipped over to form the square.

Standard 4.2 – Transforming Shapes

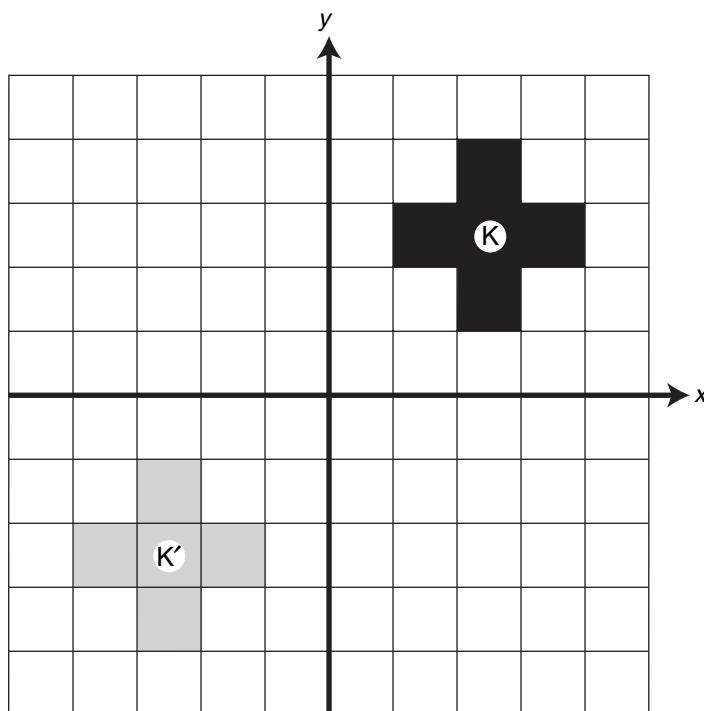


5. Figure A above is the original. Figure $2A$ is an expansion of A from the origin by a factor of 2.
- Draw a similar figure with a magnitude of $\frac{1}{2}A$.
 - Draw figure $-A$ by multiplying the coordinates of points on A by a negative 1 (the multiplication by negatives reverses directions).
 - Give the coordinates of the vertices of rectangle $-A$.

Rationale: A figure similar to A with a magnitude of $\frac{1}{2}A$ would have dimensions 1 unit by 2 units.

The coordinates of figure A are $(2,2)$, $(2,4)$, $(6,4)$, and $(6,2)$. If the coordinates are multiplied by -1 , the resulting figure, $-A$, would have coordinates $(-2,-2)$, $(-2,-4)$, $(-6,-4)$, and $(-6,-2)$.

Standard 4.2 – Coordinate Geometry



6. Figure K' is the result of a sequence of transformations of Figure K . Which of the following does NOT describe a correct possible sequence of transformations?
- A. a translation of Figure K down 5 units, then a translation to the left 5 units
 - B. a reflection of Figure K across the x -axis, then a translation to the left 5 units
 - ★ C. a reflection of Figure K across the y -axis, then a translation down 4 units
 - D. a reflection of Figure K across the x -axis, then a reflection across the y -axis

Rationale: The correct answer is C.

Answers A, B, and D, will yield the same result, that is, Figure K will map onto Figure K' .

Answer C, will be 1 unit off from mapping onto Figure K' .

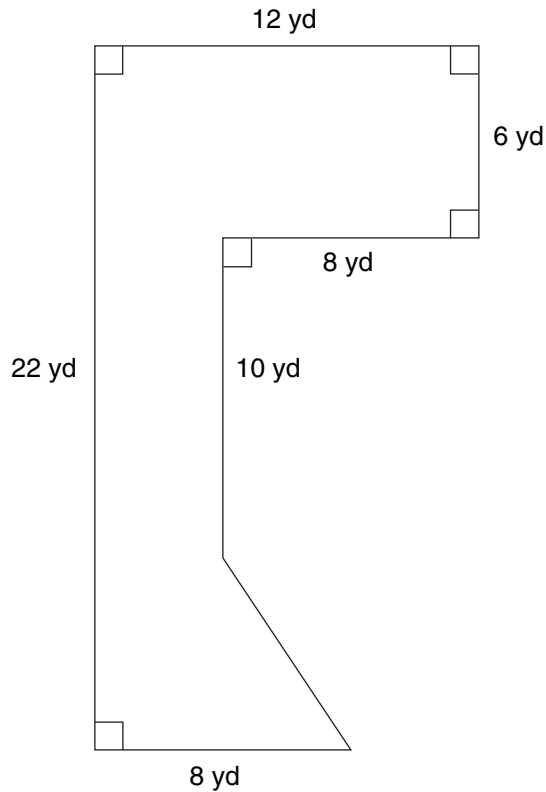
Standard 4.2 – Units of Measurement

7. Two paper clips weigh about 1 gram.
Which is the best estimate of the number of paper clips in a kilogram package?
- A. 500
 - B. 1000
 - ★ C. 2000
 - D. 4000

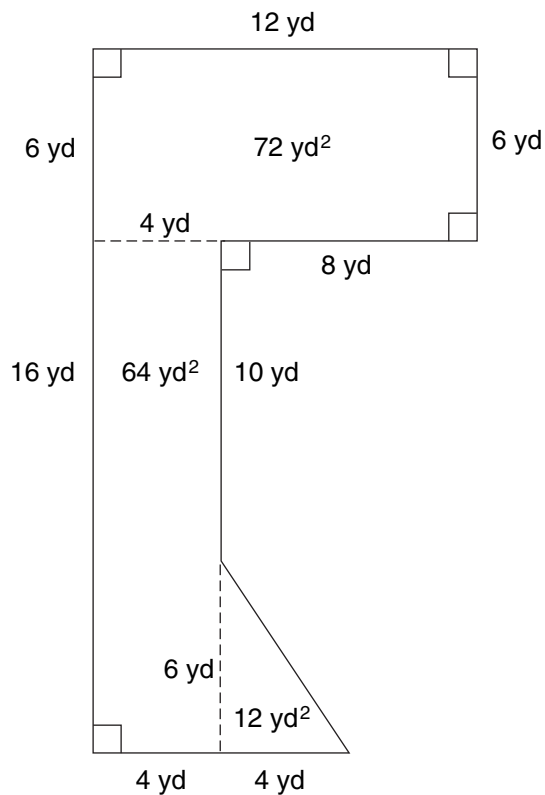
Rationale: The correct answer is C. There are 1000 grams in one kilogram. If 2 paperclips weigh 1 gram, then 2000 paper clips would weigh approximately 1 kg.

Standard 4.2 – Measuring Geometric Objects

8. The floor of an entranceway and corridor in an office building is to be covered with vinyl flooring. Find the number of square yards of flooring that will be needed. Use the diagram provided in your Answer Folder to show how you found the area of the floor. Show all your work.



Rationale:



There is a total of 148 square yards.

$$(6 \times 12) + (16 \times 4) + \frac{1}{2}(4 \times 6) = 72 + 64 + 12 = 148$$

Standard 4.3 – Patterns

9. The sequence 5, 25, 125, 625, ... continues indefinitely. Analyze it in order to answer the following questions.
- What is the 7th term of the sequence?
 - Describe the pattern you see in the sequence.
 - What algebraic expression represents the n th term?

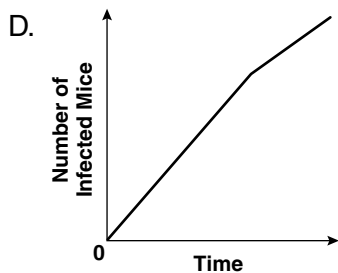
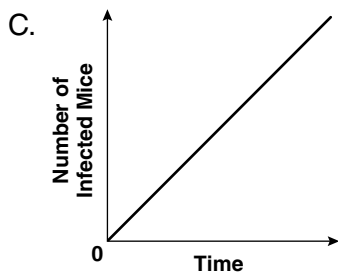
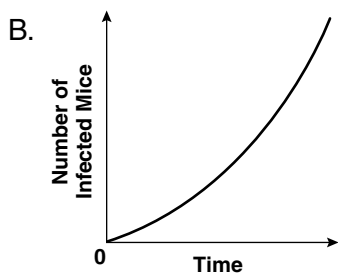
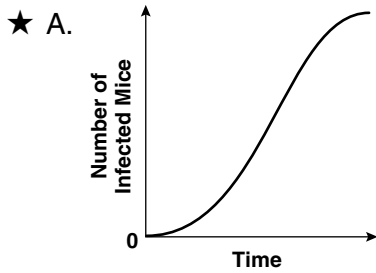
Rationale: Each term of the sequence represents a power of 5.

Term:	5	25	125	625
	5^1	5^2	5^3	5^4

Therefore, the 7th term of the sequence will be 5^7 which is equal to 78,125. The n th term is represented algebraically by 5^n .

Standard 4.3 – Functions and Relationships

10. A bacterial infection in a colony of mice began slowly and then increased exponentially. After a few weeks, the rate of infection slowed down. Which graph best shows the relationship between time and the number of infected mice?



Rationale: The correct answer is A.

A and B are the only graphs of exponential functions. The graph of A shows a slowing down of the infection rate. The graph of B shows that the infection rate continues to increase rapidly.

Standard 4.3 – Modeling

11. Which of the following equations expresses the relationship between x and y ?

x	y
1	7
2	11
3	15

- A. $y = x + 4$
- B. $y = 2x + 5$
- C. $y = x + 6$
- ★ D. $y = 4x + 3$

Rationale: The correct answer is D. Plug each of the values for x and y into each of the equations given. If one pair of values does not yield a correct solution, then that equation does not express a correct relationship between x and y for the values given.

- A. $7 \neq 1 + 4$
- B. $7 = 2(1) + 5$, *however* $11 \neq 2(2) + 5$
- C. $7 = 1 + 6$, *however* $11 \neq 2 + 6$
- D. $7 = 4(1) + 3$, $11 = 4(2) + 3$, $15 = 4(3) + 3$

Standard 4.3 – Procedures

12. For a convex polygon with a few number of sides, like a rectangle or a hexagon, it's easy to draw the figure and count its diagonals. Suppose the convex polygon has many sides. It is possible to find how many diagonals it has without drawing the figure and counting its diagonals. The following formula gives that information:

$$\text{Number of diagonals} = \frac{n^2 - 3n}{2}$$

where n = number of sides

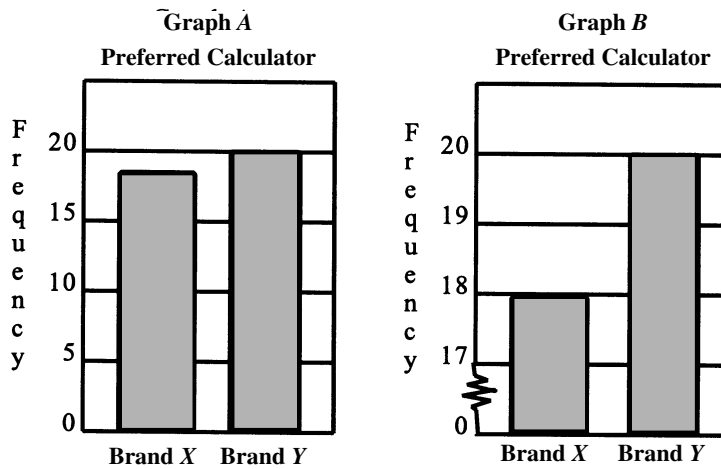
Using the formula above, find the number of diagonals for a convex polygon with 107 sides. Which of the following is the number of diagonals for that polygon?

- A. 11,128
- ★ B. 5,564
- C. 106
- D. 54

Rationale: The correct answer is B. When $n = 107$, $\frac{107^2 - 3(107)}{2} = \frac{11449 - 321}{2} = \frac{11128}{2} = 5564$

Standard 4.4 – Data Analysis

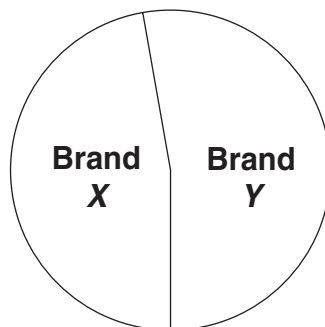
13. Jackie is preparing a presentation for her boss. She displayed her data in two different graphs.



- If Jackie is trying to convince her boss that Brand X is an acceptable choice, which graph should she use in her presentation and why?
- Display the same data using another type of graph, other than a bar graph, that would also allow Jackie to convince her boss that Brand X is acceptable.

Rationale: The representation of the data in graph A seems to show a very small difference between the two brands X and Y. If Jackie is trying to convince her boss that Brand X is acceptable, this graph indicates that studies show little preference for Y over X. Graph B, because of the vertical scale used in the presentation, visually indicates a strong preference for Brand Y. The small difference between the two products is exaggerated due to the vertical scale.

A circle graph is another way that this information could be presented. Assuming each person polled could only vote for one choice, there is a total of 38 people in the survey. The portion of the circle graph representing those who preferred Brand X would be $\frac{18}{38} \cdot 360^\circ \cong 170^\circ$. Brand Y would be $\frac{20}{38} \cdot 360^\circ \cong 190^\circ$.



Standard 4.4 – Probability

14. Jeremy has a fair coin and a fair number cube with the sides labeled 1 through 6.

What is the probability of getting both a head on a toss of the coin and a 4 on a roll of the number cube?

- A. $\frac{2}{3}$
- B. $\frac{1}{2}$
- C. $\frac{1}{3}$
- ★ D. $\frac{1}{12}$

Rationale: The correct answer is D. The probability of success on both events is equal to the product of the individual probabilities, i.e.,

$$\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$$

Standard 4.4 – Systematic Listing and Counting

15. In how many different orders can 3 people stand in a line?
- A. 1
 - B. 3
 - ★ C. 6
 - D. 9

Rationale: The correct answer is C. There are 3 people to choose from for the first space in line, 2 people to choose from for the second space in line, and 1 person to choose for the last space in line.
 $3 \times 2 \times 1 = 6$.

Or, the following arrangements can be made:

Person A, Person B, Person C
Person A, Person C, Person B
Person B, Person A, Person C
Person B, Person C, Person A
Person C, Person A, Person B
Person C, Person B, Person A

Standard 4.4 – Vertex-Edge Graphs and Algorithms

16. Four cities are to be connected with roads so that it is possible to drive between any 2 of the cities without passing through another city. Select the network that *best* represents this situation.



Rationale: The correct answer is D. Only this network allows a person to drive between any 2 cities without passing through another city.

Science

The purpose of New Jersey’s GEPA Science test is to measure what you know and are able to do in science at the eighth-grade level. Your study of science can be broken down into **knowledge** skills (including comprehension, history of science and technology), and **application** skills (including habits of mind/inquiry and mathematics).

Content Areas

The GEPA measures knowledge and skills in three content areas—life sciences, physical sciences, and earth sciences—which are subdivided into related topics.

I. Life Sciences

- A. Matter, Energy and Organization of Living Systems
- B. Diversity, Biological Evolution
- C. Reproduction and Heredity
- D. Environment/Natural Systems and Interactions

II. Physical Sciences

- A. Matter
- B. Chemical Reactions
- C. Motion and Forces
- D. Energy Transformations

III. Earth Sciences

- A. Structure and Dynamics of Geophysical Systems
- B. Origin, Evolution and Structures of the Universe

Types of Questions

The multiple-choice questions on the GEPA Science test measure higher-level thinking than the questions in traditional tests. It will probably take you an average of one minute to answer each multiple-choice question. The answers to these questions will be computer-scored and will have a weight of one point each.

Open-ended questions ask you to create your own written or graphical answers and explain them. It will probably take you about five minutes to answer each open-ended question. Your answers are hand-scored on a scale from 0 through 3.

The Scoring Guide that follows was created to help readers score your open-ended answers consistently within a single test and across different forms of that test. The scoring guide is used by these trained readers to score the open-ended Science questions on the eighth-grade test. In addition to the generic scoring guide, a specific scoring guide is developed for each open-ended question in the test.

You can expect to see 60 multiple-choice and 4 open-ended questions on the Science test.

Scoring Guide for Science Open-Ended Questions

The 0-3 point scoring guide below was created to help readers score open-ended responses consistently. In scoring, the reader will accept the use of appropriate diagrams, charts, formulas, and/or symbols that are part of a correct answer even when the question does not specifically request their use.

3-point response	Student response is reasonably complete, clear, and satisfactory.
2-point response	Student response has minor omissions and/or some incorrect information.
1-point response	Student response includes some correct information, but most information included in the response is either incorrect or not relevant.
0-point response	Student attempts the task but the response is incorrect, not relevant, or inappropriate.

GEPA SCIENCE SAMPLE QUESTIONS

Life Sciences – Diversity, Biological Evolution – Application

1. Which of the following is a survival benefit of high genetic diversity in a population?
 - A. The ability to reproduce both sexually and asexually is improved.
 - B. Acquired traits, in addition to inherited ones, can be passed on to offspring.
 - ★ C. During environmental changes, some individuals will be more likely to have a beneficial trait.
 - D. Diversity ensures that the total population will remain unchanged.

Rationale: The correct answer is C. The advantage of having genetic diversity in a population is that the wide range of genetic characteristics is likely to provide some characteristics that will enable their carriers to survive the introduction of a new disease, a climate change, or some other change in the creatures' environment.

Note that B is wrong because “acquired” traits cannot be passed along to one’s offspring genetically; they are traits such as scars, muscle development, and learned abilities that a person ‘acquires’ in the course of his or her life, they cannot enter the genetic pool.

Life Sciences – Environment/Natural Systems and Interactions – Application

2. Which of the following statements describes the energy changes involved in an ecosystem?
- A. The largest animals usually provide the energy for smaller animals and for plants in a given ecosystem.
 - ★ B. The Sun's energy is made available to an ecosystem by the plants in that ecosystem.
 - C. The energy for living plants and animals in an ecosystem comes mainly from dead animals, which are broken down by decomposers.
 - D. In an ecosystem, the smaller organisms require more energy than larger organisms.

Rationale: The correct answer is B. Within almost all ecosystems, the Sun is the ultimate source of energy and its energy is converted by plants into a form useful to animals within the system. Size does not correlate to either energy usage or placement in the food chain. Decomposition is a relatively minor source of energy in most food chains.

Physical Sciences – Motion and Forces – Knowledge

3. A lunar rock has a mass of 1 kg on the moon. What is its mass on Earth?
- A. 6 kg
 - ★ B. 1 kg
 - C. 0.6 kg
 - D. $\frac{1}{6}$ kg

Rationale: The correct answer is B. The mass of an object remains the same, no matter where it is. Mass is a constant—unaffected by forces acting on it, such as gravity. This is not true of weight, which changes with gravity. A lunar rock will weigh 6 times as much on Earth as on the Moon, but it will have the same mass.

Physical Sciences – Energy Transformations – Application

4. Which experimental condition would clearly demonstrate convection?
- A. heat one edge of a metal sheet to cause a temperature change on the opposite end
 - B. add food coloring to liquid in a clear beaker as it is heating over a burner
 - C. shine light through a glass of water to illustrate the bending of light rays
 - D. freeze a plant leaf in liquid nitrogen and drop it on the floor

Rationale: The correct answer is B because it demonstrates the transfer of heat in a fluid by convection. As the liquid in the bottom of the beaker heats up, it becomes less dense and spreads out. Since the warm water at the bottom of the beaker is less dense than the cold water above it, the water rises and replaces the cold water. The cold water in turn sinks. Since food coloring has been added to the water in the beaker, the movement of water (convection currents) can be easily observed.

Earth Sciences – Origin, Evolution and Structure of the Universe – Application

5. Which of the following must be true when it is winter in New Jersey?
- A. It is summer in Europe.
 - B. An eclipse is occurring on Earth.
 - C. The Sun is directly overhead.
 - D. Earth is closer to the Sun.

Rationale: The correct answer is D. Winter does not occur because Earth is far from the Sun. In fact, Earth is closer to the Sun (147 million km) during January than it is during July (152 million km). It is the combination of Earth's tilted axis and its revolution around the Sun that produces the seasons. At different times of the year, Earth's tilt and revolution causes areas north and south of the equator to be tilted toward or away from the Sun.

Earth Sciences – Origin, Evolution and Structure of the Universe – Application

6. If the Moon did not rotate at the same rate that it revolves, what would be different?
- A. Earth's tides would occur at different times of day.
 - ★ B. Different Moon craters would be visible on Earth at different times.
 - C. The phases of the Moon would pass more rapidly.
 - D. The length of the Moon's orbit would be different.

Rationale: The correct answer is B. Because the Moon's rate of rotation and revolution are the same, one side of the Moon always faces Earth and we are unable to see the craters on the other side; if the two rates were even slightly different from each other, the part of the Moon visible from Earth would change over time.

Earth Sciences – Structure and Dynamics of Geophysical Systems – Application

7. You are on a hillside with a geological research team studying sedimentary layers. You believe that the history of the area is as follows:
1. The area was once under the ocean's surface.
 2. Folding forces built it up into a mountain.
 3. Weathering reduced its height over time.
- Describe three observations you could make to support the suggested history.

- Rationale:
- Sediments/sedimentary rock layers, such as sandstone, are found.
 - Fossilized seashells and other sea creatures can be found in the rock.
 - The rock layers are identical to those found beneath the nearby ocean.
 - The shape of the hill is rounded and smooth.
 - There is evidence of erosion.

Students need to know about fossils, the rock cycle, and erosion in order to answer this question.

Scoring Rubric

- | | |
|-----------------|--|
| 3 Points | Student successfully completes task by describing three possible, reasonable observations. |
| 2 Points | Student adequately completes task by describing two possible, reasonable observations. |
| 1 Point | Student successfully completes task by describing one possible, reasonable observation. |
| 0 Points | Student attempts the task, but the response is incorrect, incomplete, or inaccurate. |

Earth Sciences – Structure and Dynamics of Geophysical Systems – Application

8. A student, after visiting an unpopulated area, hypothesizes that it was formed by glaciation.
- Identify **two** features that would lead to such a hypothesis,
 - Explain briefly how glaciation would have produced each of these features.

Rationale: rich soil/nutrients and mineral deposits, valleys, till, gravel, drumlins, kettles, moraines.

- The rocks and sediments carried by glaciers can carve and deepen valleys.
- Large blocks of ice can break off a glacier and later be covered by sediment. When the ice block melts, it leaves behind a depression called a kettle hole. The kettle hole can fill with water from precipitation. The result is called a kettle lake.
- Till: observed unsorted and unlayered rock debris
- Moraines: ridges of till deposition.
- Drumlin: Streamlined hill shaped like an inverted spoon formed by a glacier overriding a body of till.

Scoring Rubric

- | | |
|-----------------|--|
| 3 Points | Student correctly completes the task by identifying two features that lead to the hypothesis that an area was formed by a glacier, and then explains how glaciation would have formed these two features. |
| 2 Points | The student correctly completes the task by identifying two features that lead to the hypothesis that an area was formed by glacier but omitted an explanation of how each feature was formed or the student correctly identifies one land feature and gives an explanation about its formation. |
| 1 Point | The student correctly identifies only one feature that leads to the hypothesis that an area was formed by glacier. |
| 0 Points | Student attempts the task, but the response is incorrect, incomplete, or inaccurate. |

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