Chapter 2: iLEAP Math, Grade 3

This section describes the overall design of the iLEAP Math test to be administered to students in grade 3. Test specifications, sample test questions, and scoring rubrics are provided so that teachers may align classroom practices with the state assessment.

Test Structure

The Math test consists of four parts, or subtests, and is administered in a single day.

<table>
<thead>
<tr>
<th>Part 1: NRT (Estimation)</th>
<th>Part 3: CRT (Multiple Choice)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part 2: NRT (Multiple Choice)</td>
<td>Part 4: CRT (Constructed Response)</td>
</tr>
</tbody>
</table>

The Math test includes:

- Norm-referenced test (NRT) items from the survey battery (short form) of the Iowa Tests of Basic Skills® (ITBS). Most of the items measure Louisiana Grade-Level Expectations (GLEs). The survey battery is used to provide national norms.
- Criterion-referenced test (CRT) items. These items are aligned with Louisiana GLEs and were specifically developed to measure GLEs not assessed by NRT items.

Item Types

The test has fifty (50) multiple-choice items and two constructed-response items.

The multiple-choice items consist of an interrogatory stem and four answer options. These items assess a student’s knowledge and conceptual understanding, and responses will be scored 1 if correct and 0 if incorrect.

The constructed-response items, which involve a number of separate steps and application of multiple skills, are designed to assess one or more of the GLEs/benchmarks/strands. These items are scored, according to an item-specific rubric, on a scale of 0 to 2 points.

The NRT Component

The ITBS survey battery is the NRT component of the iLEAP Math assessment. Sample questions that show what the questions are like and show how to mark answers are provided at the beginning of each subtest. This part of the assessment measures aspects of the six Mathematics strands.
Strand N: Number and Number Relations
Standard: In problem-solving investigations, students demonstrate an understanding of the real number system and communicate the relationships within that system using a variety of techniques and tools.

Strand A: Algebra
Standard: In problem-solving investigations, students demonstrate an understanding of concepts and processes that allows them to analyze, represent, and describe relationships among variable quantities and to apply algebraic methods to real-world situations.

Strand M: Measurement
Standard: In problem-solving investigations, students demonstrate an understanding of the concepts, processes, and real-life applications of measurement.

Strand G: Geometry
Standard: In problem-solving investigations, students demonstrate an understanding of geometric concepts and applications involving one-, two-, and three-dimensional geometry, and justify their findings.

Strand D: Data Analysis, Probability, and Discrete Math
Standard: In problem-solving investigations, students discover trends, formulate conjectures regarding cause-and-effect relationships, and demonstrate critical thinking skills in order to make informed decisions.

Strand P: Patterns, Relations, and Functions
Standard: In problem-solving investigations, students demonstrate an understanding of patterns, relations, and functions that represent and explain real-world situations.

The survey battery is designed to 1) obtain information that can support instructional decisions made by teachers in the classroom, 2) provide information to students and their parents for monitoring student growth from grade to grade, and 3) examine the yearly progress of grade groups as they pass through the school’s curriculum. All questions are in multiple-choice format and have four answer options each. The survey battery is a timed test. Table 9 presents the testing times and the number of questions for each part, or subtest.

### Table 9: Grade 3 Survey Battery Test Lengths and Times

<table>
<thead>
<tr>
<th>Test</th>
<th>Time (min.)</th>
<th>No. of Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimation</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Part 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concepts and Problems</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>23</td>
</tr>
</tbody>
</table>
The descriptions that follow briefly summarize the content and skills measured by each test of the survey battery.

**Part 1** is a **timed** test on computational estimation and number sense. Problems are presented with and without an applied context, and each requires the use of one of several rounding or estimation methods. Calculators are **not** permitted on this part of the test.

**Part 2** consists of questions that test students’ understanding of mathematical concepts—number properties and operations, measurement, probability, and statistics—as well as problem solving and data interpretation. Word problems included in this **timed** test require one or more steps to solve, each involving somewhat different skills. In some cases, students select an appropriate method or approach rather than compute an answer. For some questions, data are presented in tables and graphs and students use the data displays to obtain information, compare quantities, and determine trends and relationships. Calculators may be used on this part of the test.

**The CRT Component**

The CRT component of the Math assessment was developed specifically for Louisiana. Committees of Louisiana educators reviewed all items for content and alignment with Louisiana’s content standards, benchmarks, and GLEs. Separate committees reviewed the items for potential bias and sensitive material. The CRT component of the Math assessment includes both multiple-choice and constructed-response items. As does the NRT component, this part of the test measures aspects of the six mathematics strands. Students are given a Mathematics Reference Sheet to consult as a reference. Calculators may be used on parts 3 and 4 of the test.

**Part 3** consists of questions comparable to part 2. Multiple-choice items measuring students’ mathematical skills and knowledge in realistic contexts were developed specifically to address Louisiana GLEs.

This part of the Math test is **untimed**, but students should be given about sixty (60) minutes to answer the questions.

**Part 4** consists of two relatively complex constructed-response items that involve a number of separate steps and require application of multiple skills. The constructed-response items are designed to assess one or more of the strands, benchmarks, and/or GLEs that require students to **demonstrate the connection of the strand to the other strands and to real-life situations**. The response format for part 4 is open-ended and may include numerical answers, short written answers, and other types of constructed response (e.g., draw a model or geometrical pattern). Students may be required to explain in writing how they arrived at their answers.

This part of the Math test is **untimed**, but students should be given about twenty (20) minutes to answer the questions.
Scoring Information for Constructed-Response Items

The constructed-response items are scored, according to an item-specific rubric, from 0 to 2 points.

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>The student’s response provides a complete and correct answer.</td>
</tr>
<tr>
<td>1</td>
<td>The student’s response is partially correct.</td>
</tr>
<tr>
<td></td>
<td>The student’s response demonstrates limited awareness or contains errors.</td>
</tr>
<tr>
<td>0</td>
<td>The student’s response is incorrect, irrelevant, too brief to evaluate, or blank</td>
</tr>
</tbody>
</table>

Calculator Recommendations and Restrictions

It is recommended that a calculator be made available to each student for instructional and assessment purposes. As with all instructional materials, each individual district and school should determine which calculator best supports its mathematics curriculum and instructional program.

Calculators recommended for instruction and assessment:

- K–4 students: four-function calculator
- 5–8 students: scientific calculator
- 9–12 students: scientific calculator with graphing capabilities

Calculators not permitted on statewide assessment:

- handheld or laptop computers
- pocket organizers
- calculators with paper tape
- calculators that talk or make noise
- calculators with QWERTY (typewriter-style) keypads
- electronic writing pads or pen input devices
Math Test Specifications

Table 10 provides the test specifications for parts 1, 2, and 3 of the grade 3 iLEAP Math assessment. The values in the table are approximations due to slight variations in the content across test forms at grade 3.

<table>
<thead>
<tr>
<th>Strands</th>
<th>% of Total Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number and Number Relations</td>
<td>28</td>
</tr>
<tr>
<td>Algebra</td>
<td>11</td>
</tr>
<tr>
<td>Measurement</td>
<td>16</td>
</tr>
<tr>
<td>Geometry</td>
<td>17</td>
</tr>
<tr>
<td>Data Analysis, Probability, and Discrete Math</td>
<td>16</td>
</tr>
<tr>
<td>Patterns, Relations, and Functions</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Fifty 1-point MC items plus two 2-point constructed-response items equals a 54-point test.

Key Concepts for the Grade 3 Assessment

The focus for grade 3 students is on developing the foundational mathematics skills. Grade 3 students work with arrays and sharing, as well as repeated addition and subtraction, to help them conceptualize the operations of multiplication and division. Students work with manipulatives and concrete experiences to develop basic multiplication and division facts. Activities with number concepts provide an extension of place value through thousands and a deeper understanding of the properties of operations. These are then applied to solving simple real-life problems. Students read, write, compare, and order whole numbers using symbols and models. Students also use models and symbols to represent, estimate, read, write, and show understanding of fractions through tenths. They are able to calculate the value of a combination of bills and coins and make change up to $5.00. Students also determine when and how to estimate as well as identify situations in which rounding is appropriate.

Grade 3 students’ understanding of measurement is extended to selecting and using the appropriate standard units of measure, abbreviations, and tools to measure length and perimeter, area, capacity, and weight/mass. The measurement of time is extended to telling time to the minute, and students begin to learn about elapsed time. Students also compare and order measures of time.

In geometry, grade 3 students classify and describe two- and three-dimensional objects according to given attributes. They apply concepts of congruence, similarity, and symmetry in real-life situations. Students at this level also begin to use the vocabulary for points, lines, planes, and terms for geometric relationships (e.g., parallel, perpendicular) to describe geometric figures and settings. They recognize and execute specified flips, turns, and slides of geometric figures, using correct terminology. Students also find the length of a path between two points on a grid.
Third graders’ work with data includes the extension of classification activities to problems that can be modeled by a two-circle Venn diagram. In addition, they encounter the word *average* and discuss what is typical of a data set. They also match graphs with given situations and solve problems in which data is taken from a graph, table, or similar representation. Students discuss chance situations in terms of certain/impossible, equally likely, most likely, and least likely.

In algebra, grade 3 students use the symbols $<$, $>$, and $\neq$ to express inequalities. They represent multiplication and division situations with objects, pictures, numbers, symbols, words, and number sentences. Students also begin to use letters as variables. They analyze and describe situations where proportional trades or correspondences are required.

In pattern work, students further their understanding to include even and odd numbers. Grade 3 students also extend a variety of patterns presented in tables and sequences.

**Standards, Benchmarks, and GLEs Assessed**

Louisiana’s mathematics content standards encompass number and number relations; algebra; measurement; geometry; data analysis, probability, and discrete math; and patterns, relations, and functions. Each benchmark within a standard delineates what students should know and be able to do by the end of a grade cluster. GLEs further define the knowledge and skills students are expected to master by the end of each grade or high school course. The GLEs for each grade are developmentally appropriate and increase in complexity to build the knowledge and skills students need.

All of the grade 3 standards and most of the benchmarks and GLEs are eligible for assessment on the grade 3 *iLEAP*. Some benchmarks do not have associated GLEs and will not be assessed at grade 3. GLE numbers 20, 31, 33, and 34 are not assessed because they require the use of materials or equipment not available during the test. GLE 26 is assessed only for the measurement of time. GLEs 27 and 28 are not assessed because they appear in the curriculum after the spring test administration. It is important, however, that the skills represented by all the GLEs are taught at this grade level.

**Explanation of Codes:**

GLEs are numbered consecutively at each grade level and grouped according to strand:

- N—Number and Number Relations
- A—Algebra
- M—Measurement
- G—Geometry
- D—Data Analysis, Probability, and Discrete Math
- P—Patterns, Relations, and Functions
Mathematics benchmarks are coded by strand, benchmark number, and grade cluster. The first part of the code refers to the strand (e.g., Number and Number Relations). The second part refers to the benchmark number. The third part refers to the grade cluster (E, M, H). Table 11 provides three examples of mathematics codes.

Table 11: Examples of Mathematics Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-1-E</td>
<td>Number and Number Relations, Benchmark 1, Elementary</td>
</tr>
<tr>
<td>G-5-M</td>
<td>Geometry, Benchmark 5, Middle School</td>
</tr>
<tr>
<td>A-3-H</td>
<td>Algebra, Benchmark 3, High School</td>
</tr>
</tbody>
</table>

The following chart presents all grade 3 mathematics standards, benchmarks, and GLEs.
**Grade 3**  
**Mathematics Standards, Benchmarks, and GLEs**

Number and Number Relations: In problem-solving investigations, students demonstrate an understanding of the real number system and communicate the relationships within that system using a variety of techniques and tools.

<table>
<thead>
<tr>
<th>Benchmarks</th>
<th>Grade-Level Expectations</th>
</tr>
</thead>
</table>
| **N-1-E:** constructing number meaning and demonstrating that a number can be expressed in many different forms (e.g., standard notation, number words, number lines, geometrical representation, fractions, and decimals) | 1. Model, read, and write place value in word, standard, and expanded form for numbers through 9999 (N-1-E)  
2. Read, write, compare, and order whole numbers through 9999 using symbols (i.e., <, =, >) and models (N-1-E) (N-3-E)  
3. Use region and set models and symbols to represent, estimate, read, write, and show understanding of fractions through tenths (N-1-E) (N-2-E) |
| **N-2-E:** demonstrating number sense and estimation skills, giving particular attention to common equivalent reference points (i.e., \(\frac{1}{4} = 25\% = .25; \ \frac{1}{2} = 50\% = .5; \$1 = 100\%, \text{etc.}\) | See GLE no. 3 |
| **N-3-E:** reading, writing, representing, comparing, ordering, and using whole numbers in a variety of forms (e.g., standard notation, number line, and geometrical representation) | See GLE no. 2 |
| **N-4-E:** demonstrating a conceptual understanding of the meaning of the basic arithmetic operations (add, subtract, multiply, and divide) and their relationships to each other | 4. Use the concepts of associative and commutative properties of multiplication to simplify computations (N-4-E) (N-7-E)  
5. Recognize and model multiplication as a rectangular array or as repeated addition (N-4-E) (N-7-E)  
6. Recognize and model division as separating quantities into equal subsets (fair shares) or as repeated subtraction (N-4-E) (N-7-E)  
7. Recognize and apply multiplication and division as inverse operations (N-4-E)  
Also see GLEs no. 9 and no. 16 |
| **N-5-E:** selecting appropriate operation(s) (add, subtract, multiply, and divide) for a given situation | 8. Recognize, select, connect, and use operations, operational words, and symbols (i.e., +, -, x, ÷) to solve real-life situations (N-5-E) (N-6-E) (N-9-E) |
### N-6-E: applying a knowledge of basic math facts and arithmetic operations to real-life situations

9. Know basic multiplication and division facts [0s, 1s, 2s, 5s, 9s, and turn-arounds (commutative facts), including multiplying by 10s] \( \text{(N-6-E) (N-4-E)} \)
10. Calculate the value of a combination of bills and coins and make change up to $5.00 \( \text{(N-6-E) (M-5-E)} \)
11. Add and subtract numbers of 3 digits or less \( \text{(N-6-E) (N-7-E)} \)

Also see GLE no. 8

### N-7-E: constructing, using, and explaining procedures to compute and estimate with whole numbers (e.g., mental math strategies)

12. Round to the nearest 1000 and identify situations in which such rounding is appropriate \( \text{(N-7-E) (N-9-E)} \)

Also see GLEs no. 4, no. 5, no. 6, and no. 11

### N-8-E: selecting and using appropriate computational methods and tools for given situations involving whole numbers (e.g., estimation, mental arithmetic, calculator, or paper and pencil)

13. Determine when and how to estimate, and when and how to use mental math, calculators, or paper/pencil strategies to solve addition and subtraction problems \( \text{(N-8-E) (N-9-E)} \)

### N-9-E: demonstrating the connection of number and number relations to the other strands and to real-life situations

See GLEs no. 8, no. 12, and no. 13

### Algebra: In problem-solving investigations, students demonstrate an understanding of concepts and processes that allows them to analyze, represent, and describe relationships among variable quantities and to apply algebraic methods to real-world situations.

### Benchmarks

<table>
<thead>
<tr>
<th>Grade-Level Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1-E: demonstrating a conceptual understanding of variables, expressions, equations, and inequalities (e.g., use letters or boxes to represent values; understand =, ≠, &lt;, and &gt; symbols)</td>
</tr>
<tr>
<td>14. Use the symbols &lt;, &gt;, and ≠ to express inequalities ( \text{(A-1-E)} )</td>
</tr>
<tr>
<td>15. Use objects, pictures, numbers, symbols, and words to represent multiplication and division problem situations ( \text{(A-1-E)} )</td>
</tr>
<tr>
<td>16. Use number sentences to represent real-life problems involving multiplication and division ( \text{(A-1-E) (N-4-E)} )</td>
</tr>
<tr>
<td>17. Analyze and describe situations where proportional trades or correspondences are required (e.g., trade 2 pieces of candy for 3 pieces of gum, make equivalent actions on pans to keep balance scale in equilibrium, plan for the number of pieces of bread needed for ( x ) sandwiches) ( \text{(A-1-E)} )</td>
</tr>
<tr>
<td>A-2-E: modeling and developing strategies for solving equations and inequalities</td>
</tr>
<tr>
<td>18. Use letters as variables in mathematical statements that represent real-life problems (e.g., ( 2 \times n = 8 )) ( \text{(A-2-E)} )</td>
</tr>
</tbody>
</table>
A-3-E: recognizing the connection of algebra to the other strands and to real-life situations (e.g., number sentences or formulas to represent real-world problems)

Measurement: In problem-solving investigations, students demonstrate an understanding of the concepts, processes, and real-life applications of measurement.

<table>
<thead>
<tr>
<th>Benchmarks</th>
<th>Grade-Level Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-1-E: applying (measure or solve measurement problem) the concepts of length (inches, feet, yards, miles, millimeters, centimeters, decimeters, meters, kilometers), area, volume, capacity (cups, liquid pints and quarts, gallons, milliliters, liters), weight (ounces, pounds, tons, grams, kilograms), mass, time (seconds, minutes, hours, days, weeks, months, years), money, and temperature (Celsius and Fahrenheit) to real-world experiences</td>
<td>19. Measure length to the nearest yard, meter, and half-inch (M-1-E) 20. Measure capacity using pints and gallons (M-1-E) 21. Measure weight using grams and ounces (M-1-E) 22. Find the perimeter of a geometric shape given the length of its sides (M-1-E) 23. Find the area in square units of a given rectangle (including squares) drawn on a grid or by covering the region with square tiles (M-1-E) 24. Find elapsed time involving hours and minutes, without regrouping, and tell time to the nearest minute (M-1-E) (M-5-E) Also see GLE no. 10</td>
</tr>
<tr>
<td>M-2-E: selecting and using appropriate standard and non-standard units of measure (e.g., paper clips and Cuisenaire rods) and tools for measuring length, area, capacity, weight/mass, and time for a given situation by considering the purpose and precision required for the task</td>
<td>25. Select and use the appropriate standard units of measure, abbreviations, and tools to measure length and perimeter (i.e., in., cm, ft., yd., m), area (square inch, square centimeter), capacity (i.e., cup, pint, quart, gallon, liter), and weight/mass (i.e., oz., lb., g, kg, ton) (M-2-E)</td>
</tr>
<tr>
<td>M-3-E: using estimation skills to describe, order, and compare measures of length, capacity, weight/mass, time, and temperature</td>
<td>26. Order a set of measures within the same system (M-3-E) 27. Compare U.S. and metric measurements using approximate reference points without using conversions (e.g., a meter is longer than a yard) (M-3-E) (M-4-E) 28. Estimate length, weight/mass, and capacity (M-3-E)</td>
</tr>
<tr>
<td>M-4-E: converting from one unit of measurement to another within the same system (customary and metric); comparisons between systems should be based on intuitive reference points, not formal computations (e.g., a meter is a little longer than a yard)</td>
<td>See GLE no. 27</td>
</tr>
<tr>
<td>M-5-E: demonstrating the connection of measurement to the other strands and to real-life situations</td>
<td>See GLEs no. 10 and no. 24</td>
</tr>
</tbody>
</table>
Geometry: In problem-solving investigations, students demonstrate an understanding of geometric concepts and applications involving one-, two-, and three-dimensional geometry and justify their findings.

<table>
<thead>
<tr>
<th>Benchmarks</th>
<th>Grade-Level Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>G-1-E:</strong> determining the relationships among shapes</td>
<td>See GLEs no. 29 and no. 34</td>
</tr>
</tbody>
</table>
| **G-2-E:** identifying, describing, comparing, constructing, and classifying two-dimensional and three-dimensional geometric shapes using a variety of materials | 29. Classify and describe two- and three-dimensional objects according to given attributes (triangle vs. quadrilateral, parallelogram vs. prism) (G-2-E) (G-1-E) (G-4-E)  
30. Apply concepts of congruence, similarity, and symmetry in real-life situations (G-2-E) |
| **G-3-E:** making predictions regarding combinations, subdivisions, and transformations (slides, flips, turns) of simple plane geometric shapes | 31. Draw or reconstruct figures from visual memory or verbal descriptions (G-3-E)  
32. Recognize and execute specified flips, turns, and slides of geometric figures using manipulatives and correct terminology (including *clockwise* and *counterclockwise*) (G-3-E) |
| **G-4-E:** drawing, constructing models, and comparing geometric shapes, with special attention to developing spatial sense | 33. Construct and draw rectangles (including squares) with given dimensions (e.g., grid paper, square tiles) (G-4-E)  
34. Fold a two-dimensional net into a three-dimensional object (G-4-E) (G-1-E)  
Also see GLE no. 29 |
| **G-5-E:** identifying and drawing lines and angles and describing their relationships to each other and to the real world | 35. Identify, give properties of, and distinguish among points, lines, line segments, planes, rays, and angles (G-5-E)  
36. Identify and draw segments, rays, and lines that are perpendicular, parallel, and intersecting (G-5-E)  
37. Identify, describe, and draw intersecting, horizontal, vertical, parallel, diagonal, and perpendicular lines, rays, and right angles in the real world (G-5-E) (G-6-E) |
| **G-6-E:** demonstrating the connection of geometry to the other strands and to real-life situations | 38. Find the length of a path (that does not include diagonals) between two points on a grid (G-6-E)  
Also see GLE no. 37 |
**Data Analysis, Probability, and Discrete Math:** In problem-solving investigations, students discover trends, formulate conjectures regarding cause-and-effect relationships, and demonstrate critical thinking skills in order to make informed decisions.

<table>
<thead>
<tr>
<th>Benchmarks</th>
<th>Grade-Level Expectations</th>
</tr>
</thead>
</table>
| **D-1-E:** collecting, organizing, and describing data based on real-life situations | 39. Identify categories and sort objects based on qualitative (categorical) and quantitative (numerical) characteristics (D-1-E)  
40. Read, describe, and organize a two-circle Venn diagram (D-1-E) (D-2-E)  
41. Explain the word *average* and use it appropriately in discussing what is “typical” of a data set (D-1-E) |
| **D-2-E:** constructing, reading, and interpreting data in charts, graphs, tables, etc. | 42. Match a data set to a graph, table, or chart and vice versa (D-2-E)  
Also see GLE no. 40 |
| **D-3-E:** formulating and solving problems that involve the use of data | 43. Represent and solve problems using data from a variety of sources (e.g., tables, graphs, maps, advertisements) (D-3-E) |
| **D-4-E:** exploring, formulating, and solving sequence-of-pattern problems involving selection and arrangement of objects/numerals | | |
| **D-5-E:** predicting outcomes based on probability (e.g., make predictions of same chance, more likely, or less likely; determine fair and unfair games) | 44. Discuss chance situations in terms of *certain/impossible and equally likely* (D-5-E)  
45. Use manipulatives to discuss the probability of an event (e.g., number cubes, spinners to determine what is most likely or least likely) (D-5-E) |
| **D-6-E:** demonstrating the connection of data analysis, probability, and discrete math to other strands and real-life situations | | |

**Patterns, Relations, and Functions:** In problem-solving investigations, students demonstrate an understanding of patterns, relations, and functions that represent and explain real-world situations.

<table>
<thead>
<tr>
<th>Benchmarks</th>
<th>Grade-Level Expectations</th>
</tr>
</thead>
</table>
| **P-1-E:** recognizing, describing, extending, and creating a wide variety of numerical (e.g., skip counting of whole numbers), geometrical, and statistical patterns | 46. Identify and model even and odd numbers with objects, pictures, and words (P-1-E)  
47. Find patterns to complete tables, state the rule governing the shift between successive terms, and continue the pattern (including growing patterns) (P-1-E) (P-2-E) |
| **P-2-E:** representing and describing mathematical relationships using tables, variables, open sentences, and graphs | See GLE no. 47 |
| **P-3-E:** recognizing the use of patterns, relations, and functions in other strands and in real-life situations | |
Sample Test Items: Grade 3 Math

Sample Mathematics Constructed-Response Items and Scoring Rubrics

Questions 1 and 2 show sample constructed-response items. Each item involves a number of separate steps and the application of multiple skills. The constructed-response items are designed to assess one or more of the GLEs/benchmarks/strands. The items are scored using an item-specific rubric on a scale of 0 to 2 points.

1. Amy will sort these shapes into two groups. The shapes in each group will share similar math features.

   A. Show one way Amy could sort the shapes by placing the letter from each shape in one of these boxes. Label each box with a title that explains how you sorted the shapes.

   Match to GLE: This item measures GLE 29: Classify and describe two- and three-dimensional objects according to given attributes (triangle vs. quadrilateral, parallelogram vs. prism) (G-2-E) (G-1-E) (G-4-E).
<table>
<thead>
<tr>
<th>Scoring Rubric</th>
<th>Points Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>The student earns 2 points.</td>
</tr>
<tr>
<td>1</td>
<td>The student earns 1 point.</td>
</tr>
</tbody>
</table>
| 0             | The student earns 0 points.  
                | OR The student’s response is incorrect or irrelevant to the skill or concept being measured or is blank. |

**Sample Answer:**

Box 1: B, C, E; Box 2: A and D. Titles: Shapes with Triangles and Shapes with Rectangles

**Points Assigned:**

- 2 points for sorting all five shapes into two sets with similar mathematical attributes and titling each box consistent with the way the student sorted the shapes
- OR
- 1 point for sorting all five of the shapes into two sets with similar mathematical attributes and labeling the boxes with titles inconsistent with the way the student sorted the shapes
- OR
- 1 point for sorting all five shapes with similar mathematical attributes but not titling the boxes
- OR
- 1 point for sorting fewer than five shapes into two sets with similar mathematical attributes and titling each box consistent with the way the student sorted the shapes
Fran and Joel did an experiment to find the average number of chips in a chocolate chip cookie. They took 6 cookies from a bag of their favorite brand and counted the chips in each. Here is the information they collected.

A What is the average number of chocolate chips Fran and Joel found in each cookie? Explain how you found this average.

Match to GLE: This item measures GLE 41: Explain the word average and use it appropriately in discussing what is “typical” of a data set (D-1-E).

<table>
<thead>
<tr>
<th>Scoring Rubric</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

Sample Answer:
The average number of chips in each cookie is 5. If I level out the number of chips in each column, I get 5 chips in each cookie.

Points Assigned:
3 points for finding the correct number of chips and providing a clear and complete explanation that matches the choice
OR
2 points for finding the correct number of chips and providing a partially clear or partially complete explanation that matches the choice
OR
2 points for finding an incorrect number of chips using the correct procedure
OR
1 point for finding the correct number of chips but providing no explanation
Sample CRT Multiple-Choice Items

Questions 3 through 23 are sample CRT multiple-choice items, arranged by GLE. The items test students’ ability to solve math problems. Most items are provided in context and require students to use information from stories, graphs, or tables to solve a problem. Items may assess some of the skills of a GLE while other items may measure all of the skills of the GLE.

3 Perry saved $7 during October and $4 during November. His older brother, Eric, saved $18 during that time. Which number sentence should Perry use to compare his savings with Eric’s savings?

A  $7 – 4 = 18
B  $7 – 4 > 18
C  $7 + 4 < 18
D  $7 + 4 > 18

Correct response: C

Match to GLE: This item measures GLE 14: Use the symbols <, >, and ≠ to express inequalities (A-1-E).
Clare wants to divide her collection of 20 rocks equally into 4 groups. Which model correctly shows the number of rocks Clare should put in each group?

Correct response: B

Match to GLE: This item measures GLE 15: Use objects, pictures, numbers, symbols, and words to represent multiplication and division problem situations (A-1-E).
5 A zookeeper feeds a polar bear 21 fish each day for 7 days. Which number sentence should the zookeeper use to find the total number of fish he will feed the polar bear during the 7 days?

A $21 + 7 = \Box$
B $21 - 7 = \Box$
C $21 \div 7 = \Box$
D $21 \times 7 = \Box$

Correct response: D

Match to GLE: This item measures GLE 16: Use number sentences to represent real-life problems involving multiplication and division (A-1-E) (N-4-E).

6 Hunter placed 4 small boxes of crayons on one side of this balance scale. He put 2 medium boxes of crayons on the other side to make the balance scale equal.

How many small boxes would Hunter need to balance 3 medium boxes?

A 2 small boxes
B 4 small boxes
C 5 small boxes
D 6 small boxes

Correct response: D

Match to GLE: This item measures GLE 17: Analyze and describe situations where proportional trades or correspondences are required (e.g., trade 2 pieces of candy for 3 pieces of gum, make equivalent actions on pans to keep balance scale in equilibrium, plan for the number of pieces of bread needed for x sandwiches) (A-1-E).
7  Sam and his mother have baked 24 cookies. They need a total of 120 cookies. If $c$ stands for the number of cookies they still need to bake, which number sentence should Sam and his mother use to find the number of cookies they still need to bake?

A  $120 - 24 = c$
B  $c \times 24 = 120$
C  $120 + 24 = c$
D  $c \times 120 = 24$

Correct response: A

Match to GLE: This item measures GLE 18: Use letters as variables in mathematical statements that represent real-life problems (e.g., $2 \times n = 8$) (A-2-E).

8  Mrs. Andrews wants to glue rope around the perimeter of this framed mirror to make it western-style.

![Rectangle diagram with dimensions: 75 cm x 50 cm x 50 cm x 75 cm]

How much rope does she need?

A  100 cm
B  125 cm
C  200 cm
D  250 cm

Correct response: D

Match to GLE: This item measures GLE 22: Find the perimeter of a geometric shape given the length of its sides (M-1-E).
Devon wants to cover an entire shelf, shown below, with paper.

What is the least amount of paper that will cover the entire shelf?

A 16 square inches  
B 32 square inches  
C 48 square inches  
D 52 square inches

Correct answer: C

Match to GLE: This item measures GLE 23: Find the area in square units of a given rectangle (including squares) drawn on a grid or by covering the region with square tiles (M-1-E).
A bus leaves Janell’s town at 3:35 P.M. It arrives in New Orleans 50 minutes later. Which clock shows the time the bus arrives in New Orleans?

Correct response: B

Match to GLE: This item measures GLE 24: Find elapsed time involving hours and minutes, without regrouping, and tell time to the nearest minute (M-1-E) (M-5-E).
Mr. Harris will measure the heights of several desks in his classroom. Which tool should Mr. Harris use to measure the heights of the desks?

A Meterstick  
B Scale  
C Thermometer  
D Measuring cup  

Correct response: A

Match to GLE: This item measures GLE 25: Select and use the appropriate standard units of measure, abbreviations, and tools to measure length and perimeter (in., cm, ft., yd., m), area (square inch, square centimeter), capacity (cup, pint, quart, gallon, liter), and weight/mass (oz., lb., g, kg, ton) (M-2-E).

André made this list of the amount of time he and his friends in the school band spent practicing on Saturday.

<table>
<thead>
<tr>
<th>Member of Band</th>
<th>Practice Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>André</td>
<td>110 minutes</td>
</tr>
<tr>
<td>Clark</td>
<td>50 minutes</td>
</tr>
<tr>
<td>Dave</td>
<td>3 hours</td>
</tr>
<tr>
<td>Nick</td>
<td>1 hour</td>
</tr>
</tbody>
</table>

How should André arrange the names so that they are in order from least to greatest amount of practice time?

A Nick, Clark, André, Dave  
B Clark, André, Nick, Dave  
C Nick, Dave, Clark, André  
D Clark, Nick, André, Dave  

Correct answer: D

Match to GLE: This item measures GLE 26: Order a set of measures within the same system (M-3-E).
Collette is choosing patches to sew on her clown costume. She wants a dotted patch that is congruent to this striped patch.

Which patch should Collette choose?

A

B

C

D

Correct response: B

Match to GLE: This item measures GLE 30: Apply concepts of congruence, similarity, and symmetry in real-life situations (G-2-E).
Matthew drew a design inside a shape. He kept moving the shape to make this pattern.

How did Matthew change the shape to make this pattern?

A  He slid it four times.
B  He flipped it four times.
C  He rotated it clockwise four times.
D  He rotated it counterclockwise four times.

Correct response: B

Match to GLE: This item measures GLE 32: Recognize and execute specified flips, turns, and slides of geometric figures using manipulatives and correct terminology (including clockwise and counterclockwise) (G-3-E).
15  Summer is stamping a design on some drawing paper. This is the stamp she uses.

How many line segments are on Summer’s stamp?

A  1  
B  3  
C  4  
D  6

Correct answer: B

Match to GLE: This item measures GLE 35: Identify, give properties of, and distinguish among points, lines, line segments, planes, rays, and angles (G-5-E).

16  Thuy uses this symbol to stand for a house on the map she is drawing.

How many right angles will she need to draw each time she draws this symbol?

A  1  
B  2  
C  3  
D  5

Correct response: C

Match to GLE: This item measures GLE 37: Identify, describe, and draw intersecting, horizontal, vertical, parallel, diagonal, and perpendicular lines, rays, and right angles in the real world (G-5-E) (G-6-E).
Mateen looked at the map to find the shortest distance from home to school.

What is the shortest path from home to school, staying on the lines?

A 3 blocks  
B 4 blocks  
C 5 blocks  
D 7 blocks

Correct response: C

Match to GLE: This item measures GLE 38: Find the length of a path (that does not include diagonals) between two points on a grid (G-6-E).
Mr. Duval collected data about his class on this Venn diagram.

How many of Mr. Duval’s students like math?

A  6
B  7
C  9
D  13

Correct response: D

Match to GLE: This item measures GLE 40: Read, describe, and organize a two-circle Venn diagram (D-1-E) (D-2-E).
Each third grader made a tally mark by his or her favorite season of the year on this chart.

**What is your favorite season?**

<table>
<thead>
<tr>
<th>Season</th>
<th>Tally Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>🌸 🌸 🌸 🌸 🌸</td>
</tr>
<tr>
<td>Summer</td>
<td>🌞 🌞 🌞 🌞 🌞 1 🌞</td>
</tr>
<tr>
<td>Fall</td>
<td>🍂 🍂 🍂 🍂 🍂</td>
</tr>
<tr>
<td>Winter</td>
<td>🌬️ 🌬️ 🌬️ 🌬️</td>
</tr>
</tbody>
</table>

Which graph matches the data on this chart?

A

B
Correct response: B

Match to GLE: This item measures GLE 42: Match a data set to a graph, table, or chart and vice versa (D-2-E).
Ali will toss a coin 10 times. **What is the chance the coin will land heads up all 10 times?**

A  Certain  
B  Possible  
C  Impossible  
D  Likely

**Correct response: B**

*Match to GLE: This item measures GLE 44: Discuss chance situations in terms of certain/impossible and equally likely (D-5-E).*
Mary built these four number models using base ten blocks. **Which model shows an even number?**

**A**

**B**

**C**

**D**

**Correct response: C**

*Match to GLE: This item measures GLE 46: Identify and model even and odd numbers with objects, pictures, and words (P-1-E).*
LaBrian records his karate practice time on this table.

<table>
<thead>
<tr>
<th>Week</th>
<th>Minutes of Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>10</td>
</tr>
<tr>
<td>Week 2</td>
<td>20</td>
</tr>
<tr>
<td>Week 3</td>
<td>15</td>
</tr>
<tr>
<td>Week 4</td>
<td>30</td>
</tr>
<tr>
<td>Week 5</td>
<td>25</td>
</tr>
<tr>
<td>Week 6</td>
<td>50</td>
</tr>
<tr>
<td>Week 7</td>
<td>45</td>
</tr>
<tr>
<td>Week 8</td>
<td>?</td>
</tr>
</tbody>
</table>

How many minutes will LaBrian practice during week 8 if he continues his pattern?

A 40 minutes  
B 55 minutes  
C 65 minutes  
D 90 minutes

Correct response: D

Match to GLE: This item measures GLE 47: Find patterns to complete tables, state the rule governing the shift between successive terms, and continue the pattern (including growing patterns) (P-1-E) (P-2-E).
Omar made a table to find out how long it would take him to collect 100 pennies if he doubled the number of pennies he collected every day.

<table>
<thead>
<tr>
<th>Day</th>
<th>Number of Pennies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>1</td>
</tr>
<tr>
<td>Day 2</td>
<td>2</td>
</tr>
<tr>
<td>Day 3</td>
<td>4</td>
</tr>
<tr>
<td>Day 4</td>
<td>8</td>
</tr>
<tr>
<td>Day 5</td>
<td>16</td>
</tr>
<tr>
<td>Day 6</td>
<td>?</td>
</tr>
<tr>
<td>Day 7</td>
<td>?</td>
</tr>
<tr>
<td>Day 8</td>
<td>?</td>
</tr>
<tr>
<td>Day 9</td>
<td>?</td>
</tr>
</tbody>
</table>

On which day would Omar’s number of pennies grow to more than 100?

A  Day 7  
B  Day 8  
C  Day 9  
D  Day 10

Correct response: B

Match to GLE: This item measures GLE 47: Find patterns to complete tables, state the rule governing the shift between successive terms, and continue the pattern (including growing patterns) (P-1-E) (P-2-E).
Sample NRT Multiple-Choice Items

Questions 24 through 30 are sample multiple-choice items representative of those used on the norm-referenced parts of the iLEAP test. The survey battery of the Iowa Tests of Basic Skills (ITBS) is designed to measure a wide range of student achievement. Some items address Louisiana GLEs at the specified grade level, while other items address Louisiana GLEs at other grade levels.

24 Which number fact does not belong to the same family or group of facts as the other three?

A $3 \times 9 = 27$
B $27 \div 9 = 3$
C $9 \times 3 = 27$
D $9 \div 3 = 3$

Correct Response: D

Match to GLE: This item measures GLE 7: Recognize and apply multiplication and division as inverse operations (N-4-E).

25 What is the correct way to write four hundred thirty-nine?

A 439
B 4,039
C 4,390
D 40,390

Correct Response: A

Match to GLE: This item measures GLE 1: Model, read, and write place value in word, standard, and expanded form for numbers through 9999 (N-1-E).
26  Which number sentence is true?

A  7 < 6
B  7 > 4
C  3 > 7
D  6 < 3

Correct Response: B

Match to GLE: This item measures GLE 2: Read, write, compare, and order whole numbers through 9999 using symbols (i.e., <, =, >) and models (N-1-E) (N-3-E).

27  Which figure is divided into fourths?

A

B

C

D

Correct Response: B

Match to GLE: This item measures GLE 3: Use region and set models and symbols to represent, estimate, read, write, and show understanding of fractions through tenths (N-1-E) (N-2-E).
28 Eli and Sam were trading baseball cards. Eli had 12 cards and Sam had 17.
Which shows how many cards the boys had altogether?

A 12 + 17  
B 17 – 12  
C 17 × 12  
D 17 ÷ 12

Correct Response: A

Match to GLE: This item measures GLE 8: Recognize, select, connect, and use operations, operational words, and symbols (i.e., +, −, ×, ÷) to solve real-life situations (N-5-E) (N-6-E) (N-9-E).

Directions: Use the coins below to answer question 29.

29 Art bought a cookie costing 60¢ and paid for it with a dollar bill. The clerk gave Art the change shown above. Which statement is true?

A The change was the correct amount.  
B The change was 5¢ too little.  
C The change was 5¢ too much.  
D The change was 10¢ too much.

Correct Response: C

Match to GLE: This item measures GLE 10: Calculate the value of a combination of bills and coins and make change up to $5.00 (N-6-E) (M-1-E) (M-5-E).
**Directions:**  Ben made his sister a doll cart for her birthday. He spent ten dollars for all the supplies he used to make it. Use the table below to answer question 26.

<table>
<thead>
<tr>
<th>Supply</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nails</td>
<td>$1.00</td>
</tr>
<tr>
<td>Paint</td>
<td>$1.50</td>
</tr>
<tr>
<td>Glue</td>
<td>50¢</td>
</tr>
<tr>
<td>Bolts</td>
<td>50¢</td>
</tr>
<tr>
<td>Wheels</td>
<td>$2.00</td>
</tr>
<tr>
<td>Wood</td>
<td>$3.00</td>
</tr>
<tr>
<td>Handle</td>
<td>$1.50</td>
</tr>
</tbody>
</table>

**30** Which supply costs as much as the glue and bolts?

A  Paint  
B  Nails  
C  Handle  
D  Wheels  

Correct Response: B

*Match to GLE: This item measures GLE 43: Represent and solve problems using data from a variety of sources (e.g., tables, graphs, maps, advertisements) (D-3-E).*