5th Grade Math

Chapter 2: *i*LEAP Math, Grade 5

This section describes the overall design of the *i*LEAP Math test to be administered to students in grade 5. 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 three parts, or subtests, which are administered in a single day:

- Part 1: a 30-item multiple-choice session that **does not** allow the use of calculators
- Part 2: a 20-item multiple-choice session that **allows** the use of calculators
- Part 3: a 2-item constructed-response session that **allows** the use of calculators

The suggested testing times for the Grade 5 *i*LEAP Math test listed in Table 2.1 are estimates only. The Math test is **untimed.**

Part	Description	Number of Items	Testing Time
1	Multiple Choice, no calculator	30	60 minutes
2	Multiple Choice, calculator	20	40 minutes
3	Constructed Response,	2	30 minutes
	calculator		
TOTAL		52	130 minutes

Table 2.1: Suggested Testing Times

Information about additional time needed to read test directions to students and accomplish other activities related to test administration is included in the *iLEAP Test Administration Manual*.

The Math test is composed of criterion-referenced test (CRT) items only. These items measure Louisiana GLEs that more closely match the Common Core State Standards (CCSS) focus areas.

Item Types and Scoring Information

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 are 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. The response format is openended and may include numerical answers, short written answers, and other types of constructed response (e.g., construct and draw rectangles [including squares] with given dimensions). Students may be required to explain in writing how they arrived at their answers. These items are scored, according to an item-specific rubric, on a scale of 0 to 4 points.

General Scoring Rubric for Grade 5 *i*LEAP Math Constructed-Response Items

4	The student's response demonstrates in-depth understanding of the relevant content and/or procedures.
	The student completes all important components of the task and communicates ideas effectively.
	Where appropriate, the student offers insightful interpretations and/or extensions.
	Where appropriate, the student uses more sophisticated reasoning and/or efficient procedures.
3	The student completes most important aspects of the task accurately and communicates
	clearly.
	The response demonstrates an understanding of major concepts and/or processes,
	although less important ideas or details may be overlooked or misunderstood.
	The student's logic and reasoning may contain minor flaws.
2	The student completes some parts of the task successfully.
	The response demonstrates gaps in the conceptual understanding.
1	The student completes only a small portion of the tasks and/or shows minimal
	understanding of the concepts and/or processes.
0	The student's response is incorrect, irrelevant, too brief to evaluate, or blank.

Description of the Math Test and GLEs Assessed

The Math test was developed specifically for Louisiana. Committees of Louisiana educators reviewed all items for content and alignment with Louisiana's GLEs. Separate committees reviewed the items for potential bias and sensitive material.

The Math test is **untimed.** Suggested times are estimates for scheduling sessions and assisting students in managing their time.

Students are given a Mathematics Reference Sheet to consult as a reference. Calculators may be used on two parts of the test.

As Louisiana students and teachers transition to the CCSS

(http://www.doe.state.la.us/topics/common_core.html) and PARCC assessments (http://www.doe.state.la.us/topics/common_core_assessments.html), the Math test will include only items measuring GLEs aligned to the CCSS. Table 2.2 provides a list of GLEs eligible for assessment during the transition. The table identifies the GLEs and the corresponding CCSS alignment. Some grade 5 GLEs align to CCSS at other grade levels but will continue to be taught and tested in grade 5 to decrease the possibility that the transition will create curricular gaps.

GLE #	Grade-Level Expectation Text	Aligned CCSS #
2	Recognize, explain, and compute equivalent fractions for common fractions	Retained ¹
3	Add and subtract fractions with common denominators and use mental math to determine whether the answer is reasonable	5.NF.2
4	Compare positive fractions using number sense, symbols (i.e., <, =, >), and number lines	Retained 1
5	Read, explain, and write a numerical representation for positive improper fractions, mixed numbers, and decimals from a pictorial representation and vice versa	5.NBT.3
6	Select and discuss the correct operation for a given problem involving positive fractions using appropriate language such as <i>sum</i> , <i>difference</i> , <i>numerator</i> , and <i>denominator</i>	5.OA.2 4.NF.3
7	Select, sequence, and use appropriate operations to solve multi-step word problems with whole numbers	5.OA.2 4.OA.3
8	Use the whole number system (e.g., computational fluency, place value, etc.) to solve problems in real-life and other content areas	5.NBT.5 5.NBT.6
9	Use mental math and estimation strategies to predict the results of computations (i.e., whole numbers, addition and subtraction of fractions) and to test the reasonableness of solutions	5.NF.2
11	Explain concepts of ratios and equivalent ratios using models and pictures in real- life problems (e.g., understand that 2/3 means 2 divided by 3)	5.NF.3
14	Find solutions to one-step inequalities and identify positive solutions on a number line	Retained1
16	Apply the concepts of elapsed time in real-life situations and calculate equivalent times across time zones in real-life problems	5.MD.1
21	Measure angles to the nearest degree	Retained 1
23	Convert between units of measurement for length, weight, and time, in U.S. and metric, within the same system	5.MD.1
24	Use mathematical terms to classify and describe the properties of 2-dimensional shapes, including circles, triangles, and polygons	5.G.3 5.G.4
27	Identify and plot points on a coordinate grid in the first quadrant	5.G.1 5.G.2
28	Use various types of charts and graphs, including double bar graphs, to organize, display, and interpret data and discuss patterns verbally and in writing	5.MD.2

Table 2.2: GLE Content to be Taught and Tested in 2012-13 and 2013-14

¹ This GLE was moved to another grade but will be taught and tested in this grade to decrease the possibility that the transition will create curricular gaps.

Reporting Categories

To be more reflective of the focus areas of the CCSS at each grade, the GLEs available for assessment have been grouped into the Reporting Categories shown in Table 2.3. During the transition, the Reporting Categories replace the mathematics strands (e.g., Number and Number Relations, Algebra, etc.) for assessment purposes.

Reporting Category	GLEs Covered
Number and Operations	7, 8, 9, 14
Fractions	2, 3, 4, 5, 6, 11
Measurement, Data, and Geometry	16, 21, 23, 24, 27, 28

 Table 2.3: Grade 5 Math Reporting Categories

Math Test Specifications

Table 2.4 provides test specifications for the multiple-choice part of the grade 5 *i*LEAP Math assessment. The values in the table are approximations due to slight variations in the content across test forms at grade 5.

Table 2.4: Grade 5 Math Test Specifications

Reporting Category	% of Multiple-Choice Points
Number and Operations	26
Fractions	50
Measurement, Data, and Geometry	24
Total	100

Fifty 1-point MC items plus two 4-point constructed-response items equals a 58-point test.

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 <u>not</u> permitted on statewide assessment:

- handheld or laptop computers
- pocket organizers
- calculators with Computer Algebra Systems (CAS) or other symbolic manipulation capabilities
- calculators with paper tape
- calculators that talk or make noise
- calculators with QWERTY (typewriter-style) keypads
- electronic writing pads or pen input devices

Sample Test Items: Grade 5 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. The items are scored using an item-specific rubric on a scale of 0 to 4 points.

1 The table below shows the average monthly rainfall of Baton Rouge and New Orleans for the first 6 months of 2004. The amounts have been rounded to the nearest whole millimeter.

	January	February	March	April	Мау	June
Baton Rouge	193	170	152	144	162	209
New Orleans	117	122	143	169	80	106

Average Monthly Rainfall in Millimeters

A Draw a double bar graph that represents the given information. Give your graph a title and label the axes. Be sure to scale the axes and include a key for the bars.



B The State Amateur Soccer League is planning a tournament. The league wants to hold the tournament outdoors in either Baton Rouge or New Orleans.
 Based on your double bar graph, which city and which month would be best in which to hold the tournament? Explain how you reached this answer.

Match to GLE: This item measures GLE 28: Use various types of charts and graphs, including double bar graphs, to organize, display, and interpret data and discuss patterns verbally and in writing.



- There are 18 members in a sports club:
 - 6 soccer players,
 - 9 basketball players, and
 - 3 golfers.

2

A Draw a model that represents the ratio of soccer players to basketball players to golfers in the sports club.

B Draw a second model that represents the ratio of soccer players to basketball players to golfers in the sports club. This model must be different than the one you drew in Part A but must represent an equivalent ratio.

- **C** Three football players join the club. Explain how these new members affect the ratio of soccer players to basketball players in the sports club.
- **D** Some swimmers also joined the sports club. The ratio of swimmers to the total number of members in the sports club is represented by the model below.



In the model the shaded region represents the swimmers in the sports club. Explain how to find the decimal equivalent of the ratio of swimmers to the total number of members in the sports club.

Match to GLE: This item measures GLE 11: Explain concepts of ratios and equivalent ratios using models and pictures in real-life problems (e.g., understand that 2/3 means 2 divided by 3).

Scoring Rubric				
4	The student earns 4 points.			
3	The student earns 3 points.			
2	The student earns 2 points.			
1	The student earns 1 point.			
0	The student earns 0 points.			
	OR The student's response is incorrect, irrelevant to the skill being			
	measured, or blank.			
Sample Answer:				
Part A (S) (B) (B) (B)	G			
SSBBB	G			
S S B B B	G			
Part B (S) (B) (B) (B)	G			
Part C The new members do not affect the ratio of soccer players to basketball players because none of the new players play either of these two sports.				
Part D Since there is 1 region shaded out of 8, to find the decimal equivalent you need to divide 1 by 8.				
Points Assigned:				
Part A: 1 point 1 point for drawing a model that correctly displays the ratios of the different types of players				
Part B: 1 point 1 point for drawing a different model (with a different total number of circles) that correctly displays the ratios of the different types of players				
Part C: 1 point 1 point for correctly identifying that there will be no change in the ratio of soccer players to basketball players				
Part D: 1 point 1 point for creating the expression 1 ÷ 8 or an equivalent expression				

Sample Multiple-Choice Items

Questions 3 through 24 are sample 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 Which is a pair of equivalent fractions?

Α	$\frac{1}{2}$,	$\frac{3}{6}$
в	$\frac{3}{5}$,	$\frac{3}{6}$
С	$\frac{1}{5}$,	$\frac{3}{5}$
D	$\frac{1}{2}$,	$\frac{1}{5}$

Correct Response: A

Match to GLE: This item measures GLE 2: Recognize, explain, and compute equivalent fractions for common fractions.

4 The sum of
$$\frac{1}{10}$$
 and $\frac{2}{10}$ is between
A $1\frac{1}{2}$ and 2.
B 1 and $1\frac{1}{2}$.
C $\frac{1}{2}$ and 1.
D 0 and $\frac{1}{2}$.

Correct Response: D

Match to GLE: This item measures GLE 3: Add and subtract fractions with common denominators and use mental math to determine whether the answer is reasonable.

5 Which inequality is true?

A	$\frac{1}{2} <$	$<\frac{1}{4}$
в	$\frac{1}{3} <$	$\frac{1}{5}$
С	$\frac{1}{5} <$	$\frac{1}{8}$
D	$\frac{1}{8} <$	$<\frac{1}{4}$

Correct Response: D

Match to GLE: This item measures GLE 4: Compare positive fractions using number sense, symbols (i.e., \langle =, > \rangle), and number lines.

- **6** Janie has some stickers. All of her stickers are in the shapes of circles, squares, stars, or triangles.
 - $\frac{3}{20}$ of her stickers are circles.
 - $\frac{1}{20}$ of her stickers are squares.
 - $\frac{5}{10}$ of her stickers are stars.
 - $\frac{3}{10}$ of her stickers are triangles.

The greatest fraction of stickers is of which sticker shape?

- **A** circle
- **B** square
- **C** star
- **D** triangle

Correct Response: C

Match to GLE: This item measures GLE 4: Compare positive fractions using number sense, symbols (i.e., $\langle , =, \rangle$), and number lines.



Correct Response: C

Match to GLE: This item measures GLE 5: Read, explain, and write a numerical representation for positive improper fractions, mixed numbers, and decimals from a pictorial representation and vice-versa.

8 Paul is making a recipe that calls for $\frac{3}{4}$ cup of brown sugar and $\frac{1}{3}$ cup of white

sugar. How can Paul find the total amount of sugar he uses in this recipe?

- **A** Find the sum of $\frac{3}{4}$ and $\frac{1}{3}$ by using a common numerator.
- **B** Find the sum of $\frac{3}{4}$ and $\frac{1}{3}$ by using a common denominator.
- **C** Find the difference between $\frac{3}{4}$ and $\frac{1}{3}$ by using a common numerator.
- **D** Find the difference between $\frac{3}{4}$ and $\frac{1}{3}$ by using a common denominator.

Correct Response: B

Match to GLE: This item measures GLE 6: Select and discuss the correct operation for a given problem involving positive fractions using appropriate language such as sum, difference, numerator, and denominator.

- **9** Jim bought supplies for his pet hamsters. He bought four water bottles for \$5 and a 25-pound bag of hamster food for \$8. He gave the clerk \$20. Which equation shows how Jim can figure out how much change (C) he should receive?
 - **A** $20 (5 \div 4) = C$
 - **B** 20 (4 + 25) = C
 - **C** 20 4(5) = C
 - **D** 20 (5 + 8) = C

Correct Response: D

Match to GLE: This item measures GLE 7: Select, sequence, and use appropriate operations to solve multistep word problems with whole numbers.

- **10** The school bus had seats for 38 children. When the bus reached school, only 5 seats were empty. **How many children rode on the bus?**
 - A 5B 33
 - **C** 38
 - **D** 43

Correct Response: B

Match to GLE: This item measures GLE 8: Use the whole number system (e.g., computational fluency, place value, etc.) to solve problems in real-life and other content areas.

- 11 Steven is 8 years old. His aunt is two years younger than 5 times Steven's age. How old is Steven's aunt?
 - **A** 36
 - **B** 38
 - **C** 40
 - **D** 42

Correct Response: B

Match to GLE: This item measures GLE 8: Use the whole number system (e.g., computational fluency, place value, etc.) to solve problems in real-life and other content areas.

- 12 Joan estimated the answer to these four math problems by first rounding the numbers to the nearest ten and then multiplying. For which problem did she multiply 30 × 50?
 - A 27 × 44
 B 24 × 53
 C 28 × 51
 D 32 × 58

Correct Response: C

Match to GLE: This item measures GLE 9: Use mental math and estimation strategies to predict the results of computations (i.e., whole numbers, addition and subtraction of fractions) and to test the reasonableness of solutions.

Directions: Use the pictures of pennies below to answer question 13.





Annie's 12 Pennies

Jack's 4 Pennies

13 What is the ratio of Annie's pennies to Jack's pennies?

- **A** 3:1
- **B** 4:1
- **C** 6:1
- **D** 8:1

Correct Response: A

Match to GLE: This item measures GLE 11: Explain concepts of ratios and equivalent ratios using models and pictures in real-life problems (e.g., understand that 2/3 means 2 divided by 3).

14 Mr. Watson is putting new baseboard in his kitchen. The baseboard is $\frac{1}{4}$ inch thick, and the drywall is $\frac{3}{4}$ inch thick. The nails he uses must be longer than the thickness of the baseboard and the drywall combined. Mr. Watson uses the following inequality in which *l* represents the length of the nail.

$$l>\frac{1}{4}+\frac{3}{4}$$

Which graph shows the length of the nails Mr. Watson can use for his project?



Correct response: B

Match to GLE: This item measures GLE 14: Find solutions to one-step inequalities and identify positive solutions on a number line.

- **15** Pierre worked on an art project for 2 hours and 20 minutes. He finished the project at 7:40 P.M. **At what time did Pierre begin working on the project?**
 - **A** 5:20 P.M.
 - **B** 5:40 P.M.
 - **C** 9:40 P.M.
 - **D** 10:00 P.M.

Correct response: A

Match to GLE: This item measures GLE 16: Apply the concepts of elapsed time in real-life situations and calculate equivalent times across time zones in real-life problems.

- 16 At 11:55 A.M., Ken makes a call from his home in Louisiana to his friend Simone in Alaska. Alaska is 3 hours behind Louisiana. Ken and Simone talked for 25 minutes. What was the time in Alaska when the call ended?
 - **A** 8:20 A.M.
 - **B** 9:20 A.M.
 - С 2:20 Р.М.
 - **D** 3:20 P.M.

Correct response: B

Match to GLE: This item measures GLE 16: Apply the concepts of elapsed time in real-life situations and calculate equivalent times across time zones in real-life problems.

Directions: Use this clock below to answer the question 17.



- 17 What is the measure of $\angle A$ to the nearest degree?
 - **A** 30°
 - **B** 45°
 - **C** 150°
 - **D** 180°

Correct response: C

Match to GLE: This item measures GLE 21: Measure angles to the nearest degree.

- Julia's fudge recipe calls for 6 ounces of chocolate chips. She wants to make3 batches of the recipe. Which quantity of chocolate chips does Julia need to make3 batches of her recipe?
 - **A** 1 pound
 - **B** 1 pound 2 ounces
 - **C** 3 pounds
 - **D** 3 pounds 2 ounces

Correct response: B

Match to GLE: This item measures GLE 23: Convert between units of measurement for length, weight, and time, in U.S. and metric, within the same system.

- **19** Elaine is using string to make some yo-yos.
 - She has 4 balls of string.
 - Each ball contains 5 yards of string.
 - She uses exactly 45 inches of string for each yo-yo.

What is the greatest number of yo-yos Elaine can make?

- **A** 13
- **B** 16
- **C** 20
- **D** 54

Correct response: B

Match to GLE: This item measures GLE 23: Convert between units of measurement for length, weight, and time, in U.S. and metric, within the same system.

- **20** Anthony made a frame in art class. The frame has four sides that are two different lengths, and the opposite sides are parallel. The frame has four right angles. Which shape is the frame?
 - **A** Square
 - **B** Rectangle
 - **C** Pentagon
 - **D** Trapezoid

Correct response: B

Match to GLE: This item measures GLE 24: Use mathematical terms to classify and describe the properties of two-dimensional shapes, including circles, triangles, and polygons.

- 21 Tara was standing in front of her house when she noticed the shape of the attic window. The window had <u>exactly</u> one set of parallel sides. Which polygon is the window shaped like?
 - **A** Square
 - **B** Rhombus
 - **C** Rectangle
 - **D** Trapezoid

Correct response: D

Match to GLE: This item measures GLE 24: Use mathematical terms to classify and describe the properties of two-dimensional shapes, including circles, triangles, and polygons).

Directions: Use the graph below to answer question 22.



22 Which is the ordered pair for point *A*?

- **A** (2, 4)
- **B** (4, 3)
- **C** (4, 6)
- **D** (6, 4)

Correct response: D

Match to GLE: This item measures GLE 27: Identify and plot points on a coordinate grid in the first quadrant.

Directions: Use the graph below to answer question 23.



How Long Some Animals Live

23 How many of these animals can live longer than 20 years?

A 1
B 2
C 6
D 10

Correct Response: C

Match to GLE: This item measures GLE 28: Use various types of charts and graphs, including double-bar graphs, to organize, display, and interpret data and discuss patterns verbally and in writing.

24 The line plot below shows the number of matches each member of the Tigers Ping-Pong Club won at a tournament.



After the tournament, the coaches of each club also played. The Tigers' coach added the number of matches she won to the line plot. After her data was added, only one number had the most people winning that number of matches. Which could be the number of matches the coach won during the coaches' tournament?

A 2
B 5
C 9
D 10

Correct Response: B

Match to GLE: This item measures GLE 28: Use various types of charts and graphs, including double-bar graphs, to organize, display, and interpret data and discuss patterns verbally and in writing.