

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 four parts, or subtests, and is administered in a single day.

Part 1: NRT (Estimation)

Part 3: CRT (Multiple Choice)

Part 2: NRT (Multiple Choice)

Part 4: CRT (Constructed Response)

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 4 points.

The NRT Component

The ITBS survey battery is the NRT component of the *i*LEAP 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 5 Survey Battery Test Lengths and Times

Test	Time (min.)	No. of Questions
Part 1 Estimation	3	5
Part 2 Concepts and Problems	22	23
Total	25	28

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 graph 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 thirty (30) 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 4 points.

General Scoring Rubric for iLEAP 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.

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 5 *iLEAP* Math assessment. The values in the table are approximations due to slight variations in the content across test forms at grade 5.

Table 10: Grade 5 Math Test Specifications

Strands	% of Total Points
Number and Number Relations	33
Algebra	10
Measurement	16
Geometry	18
Data Analysis, Probability, and Discrete Math	15
Patterns, Relations, and Functions	8
Total	100

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

Key Concepts for the Grade 5 Assessment

The grade 5 year is a year of developing additional mathematical skills. In number and number relations, the focus shifts from whole numbers to an emphasis on fractions and decimals. Students compare positive fractions using number sense, symbols, and number lines. Grade 5 students also add and subtract fractions with common denominators. They recognize, explain, and compute equivalent fractions for common fractions and read, explain, and write numerical representations for positive improper fractions, mixed numbers, and decimals from pictorial representations and vice versa. Students select and discuss the correct operation for a given problem involving positive fractions. They continue to work with whole numbers by selecting, sequencing, and using appropriate operations to solve multistep word problems. Students further develop estimation strategies and the ability to test the reasonableness of an answer to a given computation. Work with rates, ratios, and equivalent ratios begins, but formal development waits for later grades.

Grade 5 students select units and tools for measurement situations and perform operations on the resulting measures. They calculate equivalent times across time zones and solve real-life problems involving elapsed time. Students estimate time, temperature, weight/mass, and length in familiar situations. They compare the relative sizes of common units for time, temperature, weight, mass, and length in real-life situations. Students also compare and estimate measurements between the U.S. and metric systems in terms of common reference points. They convert between units of measurement for length, weight, and time within the same system, U.S. or metric. In geometry, students use mathematical terms to classify and describe the properties of two-dimensional shapes, including circles, triangles, and polygons. They identify transformations and shapes that have rotational symmetry. Students also identify and plot points in the first quadrant of a coordinate grid.

In data analysis, grade 5 students use various types of charts and graphs to organize, display, interpret data, and discuss patterns. Students also compare and contrast survey data from two groups relative to the same question and investigate the impact of different scales and labels

for bar and line graphs. In probability, students represent probabilities as common fractions. In algebra, they write number sentences from given physical models of equations. Students are introduced to solving number sentences by mental math, backward reasoning, inverse processes (i.e., unwrapping operations), and manipulatives. They also find solutions to one-step inequalities and identify positive solutions on number lines. In patterns, students fill in missing elements in sequences of designs, number patterns, positioned figures, and quantities of objects.

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 strand 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 5 standards and most of the benchmarks and GLEs are eligible for assessment on the grade 5 *iLEAP*. Some benchmarks do not have associated GLEs and will not be assessed at grade 5. GLE number 30 is not assessed because it requires the use of technology not available during the test. It is important, however, that the skills represented by this GLE 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

Code	Translation
N-1-E	Number and Number Relations, Benchmark 1, Elementary
G-5-M	Geometry, Benchmark 5, Middle School
A-3-H	Algebra, Benchmark 3, High School

The following chart presents **all** grade 5 Mathematics standards, benchmarks, and GLEs.

GRADE 5
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.

Benchmarks	Grade-Level Expectations
N-1-M: demonstrating that a rational number can be expressed in many forms, and selecting an appropriate form for a given situation (e.g., fractions, decimals, and percents)	<ol style="list-style-type: none"> 1. Differentiate between the terms <i>factor</i> and <i>multiple</i>, and <i>prime</i> and <i>composite</i> (N-1-M) 2. Recognize, explain, and compute equivalent fractions for common fractions (N-1-M) (N-3-M)
N-2-M: demonstrating number sense and estimation skills to describe, order, and compare rational numbers (e.g., magnitude, integers, fractions, decimals, and percents)	<ol style="list-style-type: none"> 3. Add and subtract fractions with common denominators and use mental math to determine whether the answer is reasonable (N-2-M) 4. Compare positive fractions using number sense, symbols (i.e., $<$, $=$, $>$), and number lines (N-2-M) <p>Also see GLE no. 9</p>
N-3-M: reading, writing, representing, and using rational numbers in a variety of forms (e.g., integers, mixed numbers, and improper fractions)	<ol style="list-style-type: none"> 5. Read, explain, and write a numerical representation for positive improper fractions, mixed numbers, and decimals from a pictorial representation and vice versa (N-3-M) <p>Also see GLE no. 2</p>
N-4-M: demonstrating a conceptual understanding of the meaning of the basic arithmetic operations (add, subtract, multiply and divide) and their relationships to each other	<ol style="list-style-type: none"> 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> (N-4-M) (N-5-M) <p>Also see GLE no. 7</p>
N-5-M: applying an understanding of rational numbers and arithmetic operations to real-life situations	<ol style="list-style-type: none"> 7. Select, sequence, and use appropriate operations to solve multistep word problems with whole numbers (N-5-M) (N-4-M) 8. Use the whole number system (e.g., computational fluency, place value, etc.) to solve problems in real-life and other content areas (N-5-M) <p>Also see GLEs no. 6, no. 10, and no. 11</p>
N-6-M: constructing, using, and explaining procedures to compute and estimate with rational numbers employing mental math strategies	<ol style="list-style-type: none"> 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 (N-6-M) (N-2-M) 10. Determine when an estimate is sufficient and when an exact answer is needed in real-life problems using whole numbers (N-6-M) (N-5-M)

N-7-M: selecting and using appropriate computational methods and tools for given situations involving rational numbers (e.g., estimation, or exact computation using mental arithmetic, calculator, computer, or paper and pencil)	
N-8-M: demonstrating a conceptual understanding and applications of proportional reasoning (e.g., determining equivalent ratios, finding a missing term of a given proportion)	11. Explain concepts of ratios and equivalent ratios using models and pictures in real-life problems (e.g., understand that $\frac{2}{3}$ means 2 divided by 3) (N-8-M) (N-5-M)
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	Grade-Level Expectations
A-1-M: demonstrating a conceptual understanding of variables, expressions, equations, and inequalities (e.g., symbolically represent real-world problems as linear terms, equations, or inequalities)	See GLE no. 13
A-2-M: modeling and developing methods for solving equations and inequalities (e.g., using charts, graphs, manipulatives, and/or standard algebraic procedures)	12. Find unknown quantities in number sentences by using mental math, backward reasoning, inverse operations (i.e., unwrapping), and manipulatives (e.g., tiles, balance scales) (A-2-M) (A-3-M) 13. Write a number sentence from a given physical model of an equation (e.g., balance scale) (A-2-M) (A-1-M) 14. Find solutions to one-step inequalities and identify positive solutions on a number line (A-2-M) (A-3-M)
A-3-M: representing situations and number patterns with tables, graphs, and verbal and written statements, while exploring the relationships among these representations (e.g., multiple representations for the same situation)	See GLEs no. 12 and no. 14
A-4-M: analyzing tables and graphs to identify relationships exhibited by the data and making generalizations based upon these relationships	See GLE no. 28
A-5-M: demonstrating the connection of algebra to the other strands and to real-life situations	

Measurement: In problem-solving investigations, students demonstrate an understanding of the concepts, processes, and real-life applications of measurement.	
Benchmarks	Grade-Level Expectations
M-1-M: applying the concepts of length, area, surface area, volume, capacity, weight, mass, money, time, temperature, and rate to real-world experiences	15. Model, measure, and use the names of all common units in the U.S. and metric systems (M-1-M) 16. Apply the concepts of elapsed time in real-life situations and calculate equivalent times across time zones in real-life problems (M-1-M) (M-6-M)
M-2-M demonstrating an intuitive sense of measurement (e.g., estimating and determining reasonableness of measures)	17. Distinguish among the processes of counting, calculating, and measuring and determine which is the most appropriate strategy for a given situation (M-2-M) 18. Estimate time, temperature, weight/mass, and length in familiar situations and explain the reasonableness of answers (M-2-M) 19. Compare the relative sizes of common units for time, temperature, weight, mass, and length in real-life situations (M-2-M) (M-4-M)
M-3-M: selecting appropriate units and tools for tasks by considering the purpose for the measurement and the precision required for the task (e.g., length of a room in feet rather than inches)	20. Identify appropriate tools and units with which to measure time, mass, weight, temperature, and length (M-3-M) 21. Measure angles to the nearest degree (M-3-M)
M-4-M: using intuition and estimation skills to describe, order, and compare formal and informal measures (e.g., ordering cup, pint, quart, gallon; comparing a meter to a yard)	22. Compare and estimate measurements between the U.S. and metric systems in terms of common reference points (e.g., l vs. qt., m vs. yd.) (M-4-M) Also see GLE no. 19
M-5-M: converting from one unit of measurement to another within the same system (Comparisons between systems, customary and metric, should be based on intuitive reference points, not formal computation.)	23. Convert between units of measurement for length, weight, and time, in U.S. and metric, within the same system (M-5-M)
M-6-M: demonstrating the connection of measurement to the other strands and to real-life situations	See GLE no. 16
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.	
Benchmarks	Grade-Level Expectations
G-1-M: using estimation skills to describe, order, and compare geometric measures	
G-2-M: identifying, describing, comparing, constructing, and classifying geometric figures and concepts	24. Use mathematical terms to classify and describe the properties of two-dimensional shapes, including circles, triangles, and polygons (G-2-M)

G-3-M: making predictions regarding transformations of geometric figures (e.g., make predictions regarding translations, reflections, and rotations of common figures)	25. Identify and use appropriate terminology for transformations (e.g., <i>translation</i> as <i>slide</i> , <i>reflection</i> as <i>flip</i> , and <i>rotation</i> as <i>turn</i>) (G-3-M) 26. Identify shapes that have rotational symmetry (G-3-M)
G-4-M: constructing two- and three-dimensional models	
G-5-M: making and testing conjectures about geometric shapes and their properties	
G-6-M: demonstrating an understanding of the coordinate system (e.g., locate points, identify coordinates, and graph points in a coordinate plane to represent real-world situations)	27. Identify and plot points on a coordinate grid in the first quadrant (G-6-M)
G-7-M: demonstrating the connection of geometry to the other strands and to real-life situations (e.g., applications of the Pythagorean Theorem)	
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.	
Benchmarks	Grade-Level Expectations
D-1-M: systematically collecting, organizing, describing, and displaying data in charts, tables, plots, graphs, and/or spreadsheets	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 (D-1-M) (D-2-M) (P-3-M) (A-4-M) 29. Compare and contrast different scales and labels for bar and line graphs (D-1-M) 30. Organize and display data using spreadsheets, with technology (D-1-M)
D-2-M: analyzing, interpreting, evaluating, drawing inferences, and making estimations, predictions, decisions, and convincing arguments based on organized data (e.g., analyze data using concepts of mean, median, mode, range, random samples, sample size, bias, and data extremes)	31. Compare and contrast survey data from two groups relative to the same question (D-2-M) Also see GLE no. 28
D-3-M: describing informal thinking procedures (e.g., solving elementary logic problems using Venn diagrams, tables, charts, and/or elementary logic operatives to solve logic problems in real-life situations; reach valid conclusions in elementary logic problems involving “and, or, not, if/then”)	
D-4-M: analyzing various counting and enumeration procedures with and without replacement (e.g., find the total number of possible outcomes or possible choices in a given situation)	

D-5-M: comparing experimental probability results with theoretical probability (e.g., representing probabilities of concrete situations as common fractions, investigating single-event and multiple-event probability, using sample spaces, geometric figures, tables, and/or graphs)	32. Represent probabilities as common fractions and recognize that probabilities fall between 0 and 1, inclusive (D-5-M)
D-6-M: demonstrating the connection of data analysis, probability, and discrete math to other strands and to 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.	
Benchmarks	Grade-Level Expectations
P-1-M: describing, extending, analyzing, and creating a wide variety of numerical, geometrical, and statistical patterns (e.g., skip counting of rational numbers and simple exponential number patterns)	33. Fill in missing elements in sequences of designs, number patterns, positioned figures, and quantities of objects (P-1-M)
P-2-M: describing and representing relationships using tables, rules, simple equations, and graphs	
P-3-M: analyzing relationships to explain how a change in one quantity results in a change in another (e.g., change in the dimensions of a rectangular solid affects the volume)	See GLE no. 28
P-4-M: demonstrating the pervasive use of patterns, relations, and functions in other strands and in real-life situations	

Sample Test Items: Grade 5 Math

Sample Mathematics Constructed-Response Items and Scoring Rubrics

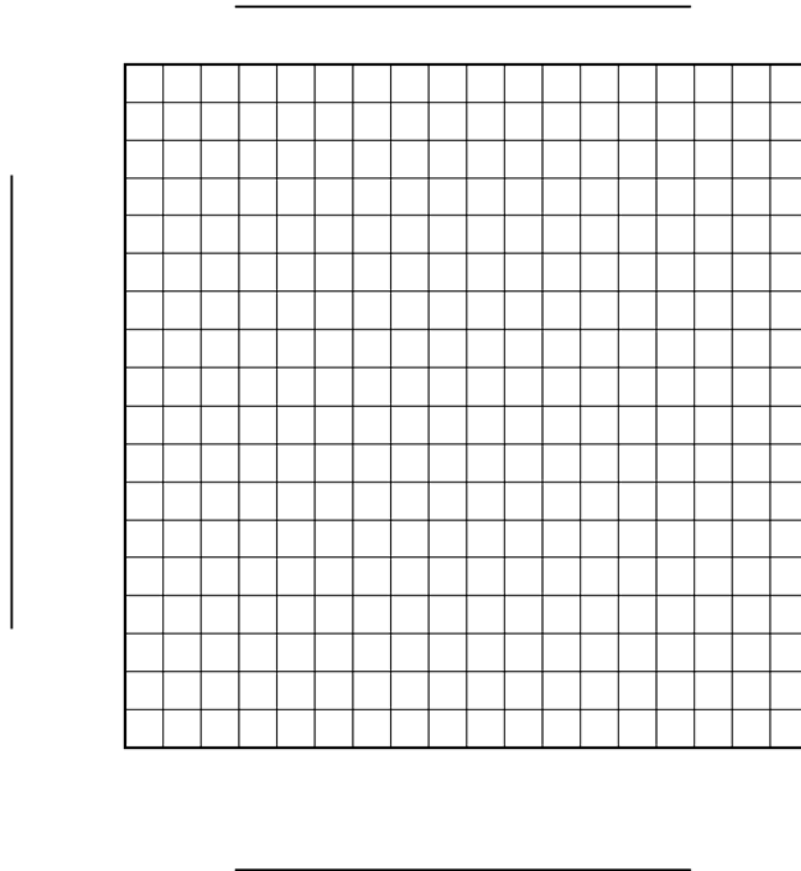
Questions 1 and 2 show sample constructed-response items. Each item involves a number of separate steps and the application of multiple skills. The constructed-response items are designed to assess one or more of the GLEs/benchmarks/strands. The items are scored using an item-specific rubric on a scale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

Average Monthly Rainfall in Millimeters

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

- 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.**

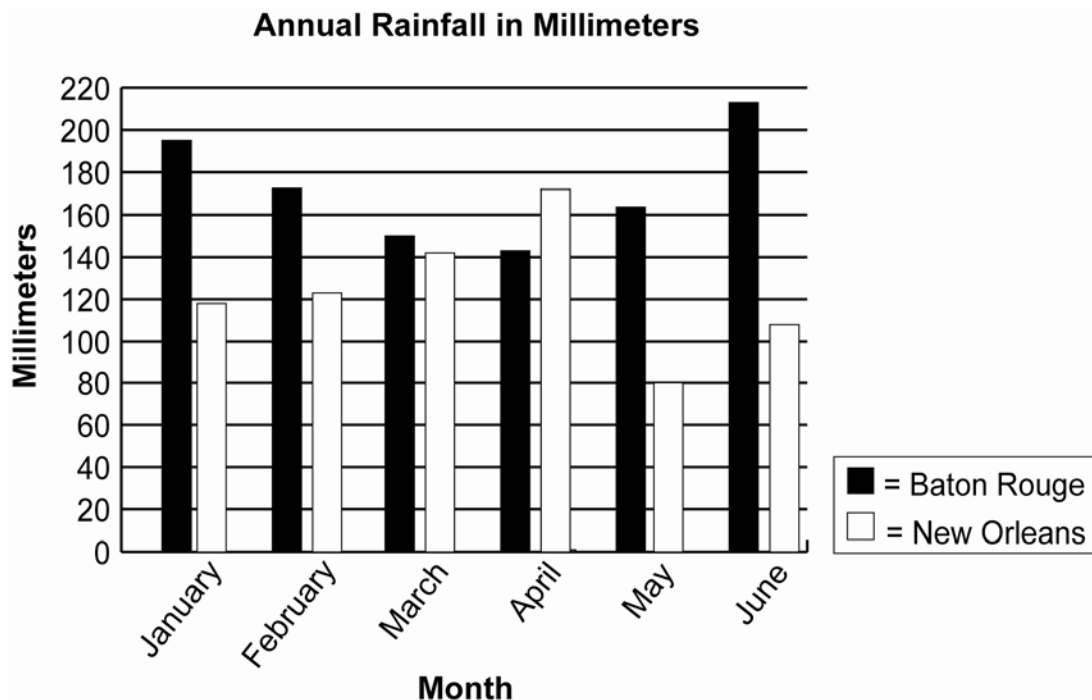
Match to GLE: This item measures GLE 28: Use various types of charts and graphs, including double bar graphs, to organize, display, and interpret data and discuss patterns verbally and in writing (D-1-M) (D-2-M) (P-3-M) (A-4-M).

Scoring Rubric	
4	The student earns 5 points.
3	The student earns 3 or 4 points.
2	The student earns 2 points.
1	The student earns 1 point. OR The student shows minimal understanding of how to use graphs to display and use data.
0	Student's response is incorrect, irrelevant to the skill or concept being measured, or is blank.

For Example:

EXAMPLE:

Part A



Part B. This is one possible answer: I think that the soccer tournament should be held in New Orleans during the month of May because the rainfall is lowest at that time and New Orleans is consistently lower in rainfall than Baton Rouge.

Points Assigned:

Part A. 3 points

3 points for drawing the graph accurately, labeling axes and graph, scaling axes, and providing a key

OR

2 points for drawing the graph but making no more than two minor errors in the categories of plotting, labeling, or scaling

OR

1 point for creating the bar graph but not labeling the parts of the graph **OR** 1 point for making a major error in one of the categories of plotting, labeling, or scaling

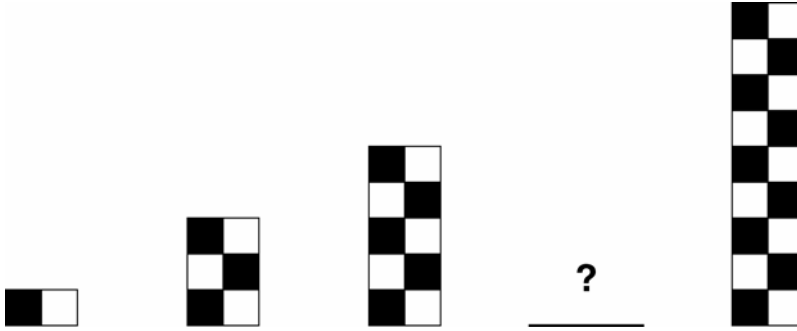
Part B. 2 points

2 points for making a correct choice for the location and month for the tournament and an explanation supported by the data graphed

OR

1 point for correctly stating the prediction based on the data graphed with no explanation

2 Use this pattern to answer the question below.



A Draw the missing fourth term of the pattern.



B Describe how the pattern grows.

C What will the total number of squares be in the sixth term of the pattern?
How many of the squares in the sixth term will be black?

Match to GLE: This item measures GLE 33: Fill in missing elements in sequences of designs, number patterns, positioned figures, and quantities of objects (P-1-M).

Scoring Rubric	
4	The student earns 5 points.
3	The student earns 4 points.
2	The student earns 2 or 3 points.
1	The student earns 1 point. OR The student shows minimal understanding of missing elements in sequences.
0	The student's response is incorrect or irrelevant to the skill or concept being measured or is blank.

For Example:

Examples:

Part A. See the drawing below.



Part B. Each new term is the same as the previous term, but a two-by-two block of four new squares is added to the top. The colors of the squares alternate between black and white so that touching squares are never the same color.

Part C. There will be a total of 22 squares and 11 black squares in the next term.

Points Assigned:

Part A. 1 point

1 point for correctly filling the pattern in the blank square

Part B. 2 points

2 points for correctly explaining how the pattern grows based on the answer in part A

OR

1 point for a partial explanation of how the pattern grows

Part C. 2 points

2 points for correctly identifying both the total number of squares and the number of black squares in the sixth term

OR

1 point for identifying the total number of squares in the sixth term but not the number of black ones **OR** 1 point for identifying the number of black squares but not the total number of squares

Sample CRT Multiple-Choice Items

Questions 3 through 20 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** Mr. Troy needed to replace some equipment for the physical education department. Of the 27 items he ordered, 12 were basketballs and the rest were volleyballs. Use the number sentence below where v represents the number of volleyballs.

$$12 + v = 27$$

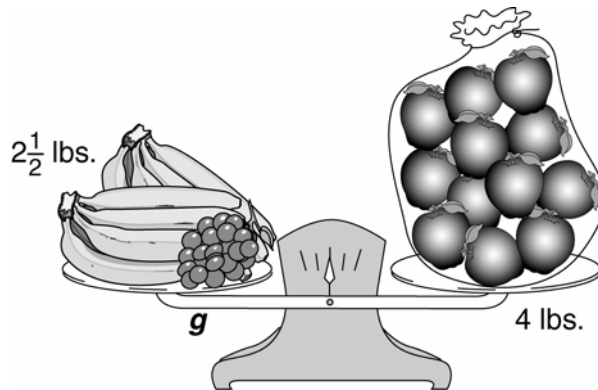
How many volleyballs did Mr. Troy order?

- A** 15
- B** 24
- C** 25
- D** 39

Correct response: A

Match to GLE: This item measures GLE 12: Find unknown quantities in number sentences by using mental math, backward reasoning, inverse operations (unwrapping), and manipulatives (tiles, balance scales) (A-2-M) (A-3-M).

- 4 Mrs. Orlando placed 8 bananas, which weighed $2\frac{1}{2}$ lbs., along with some grapes on one side of a scale. She placed 12 apples, which weighed a total of 4 lbs., on the other side of the scale. After she finished, the scale was balanced.



Which number sentence can Mrs. Orlando use to find the weight of the grapes (g)?

- A $8 + g = 12$
- B $2\frac{1}{2} + g = 4$
- C $2\frac{1}{2} - g = 4$
- D $8 + 2\frac{1}{2} + g = 12 + 4$

Correct response: B

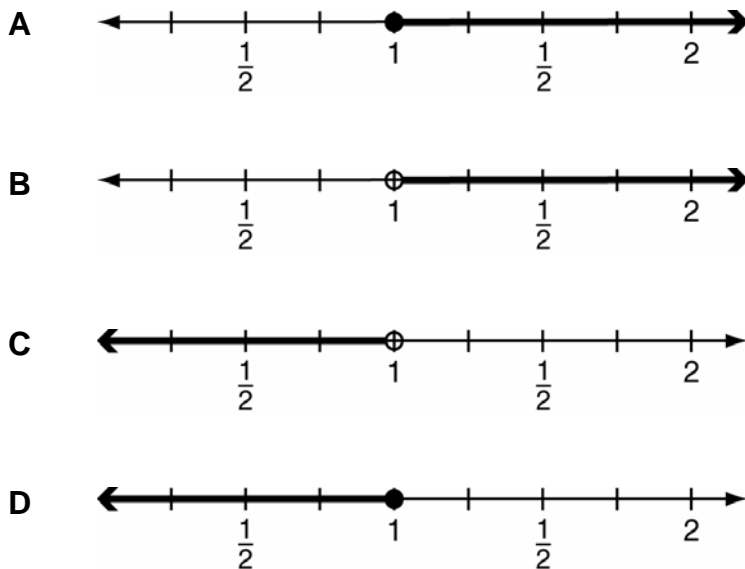
Match to GLE:

This item measures GLE 13: Write a number sentence from a given physical model of an equation (e.g., balance scale) (A-2-M) (A-1-M).

- 5 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 (A-2-M) (A-3-M).

- 6** Latrice is mailing a package that contains a scarf weighing 2 ounces and a pin weighing 4 ounces. **What is most likely the weight of Latrice’s package including the box?**
- A** 10 grams
 - B** 10 ounces
 - C** 10 pounds
 - D** 10 kilograms

Correct response: B

Match to GLE: This item measures GLE 15: Model, measure, and use the names of all common units in the U.S. and metric systems (M-1-M).

- 7** 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 (M-1-M) (M-6-M).

8 Kaya took $2\frac{1}{4}$ hours to read 100 pages. **What is the most reasonable estimate for the length of time it might take Kaya to read 225 pages?**

A $3\frac{1}{4}$ hours

B 4 hours

C 5 hours

D $7\frac{1}{4}$ hours

Correct response: C

Match to GLE: This item measures GLE 18: Estimate time, temperature, weight/mass, and length in familiar situations and explain the reasonableness of answers (M-2-M).

9 Fayette has four pieces of wood. The first piece is $1\frac{1}{2}$ feet long, the second piece is 40 inches long, the third piece is 12 inches long, and the last piece is 2.5 feet long. **What is the length of the shortest piece of wood?**

A $1\frac{1}{2}$ feet

B 40 inches

C 12 inches

D 2.5 feet

Correct response: C

Match to GLE: This item measures GLE 19: Compare the relative sizes of common units for time, temperature, weight, mass, and length in real-life situations (M-2-M) (M-4-M).

- 10 David recorded how long it took him to run a lap around the track. **Which tool would be best to record David's lap time?**
- A Tape measure
 - B Stopwatch
 - C Yardstick
 - D Scale

Correct response: B

Match to GLE: This item measures GLE 20: Identify appropriate tools and units with which to measure time, mass, weight, temperature, and length (M-3-M).

- 11 Use this clock to answer the question below.



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 (M-3-M).

12 Norman drinks about 2 quarts of water each day. **Which measure is closest to the amount of water he drinks each day?**

- A** 2 liters
- B** 2 gallons
- C** 2 ounces
- D** 2 milliliters

Correct response: A

Match to GLE: This item measures GLE 22: Compare and estimate measurements between the U.S. and metric systems in terms of common reference points (e.g., l vs. qt., m vs. yd.) (M-4-M).

13 Julia's fudge recipe calls for 6 ounces of chocolate chips. She wants to make 3 batches of the recipe. **Which quantity of chocolate chips does Julia need to make 3 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 (M-5-M).

- 14** 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

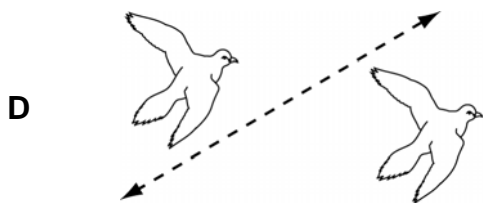
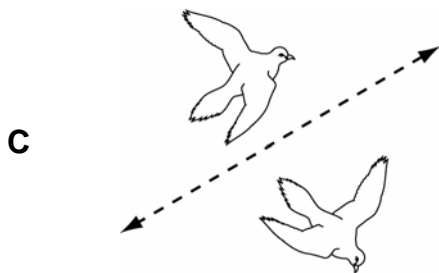
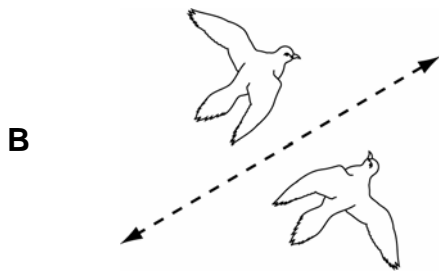
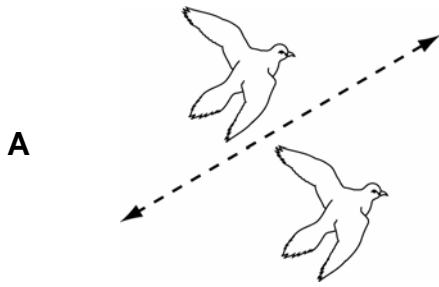
Match to GLE: This item measures GLE 24: Use mathematical terms to classify and describe the properties of two-dimensional shapes, including circles, triangles, and polygons (G-2-M).

- 15** Tara was standing in front of her house when she noticed the shape of the attic window. The window had exactly 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 (G-2-M).

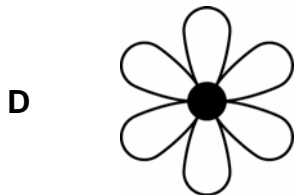
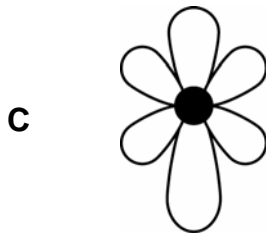
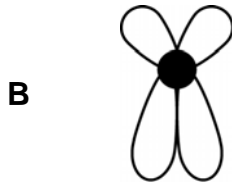
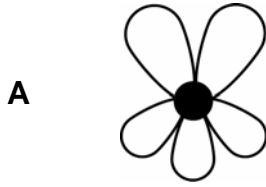
16 Which picture shows a reflection over the dotted line?



Correct response: B

Match to GLE: This item measures GLE 25: Identify and use appropriate terminology for transformations (translation as slide, reflection as flip, and rotation as turn) (G-3-M).

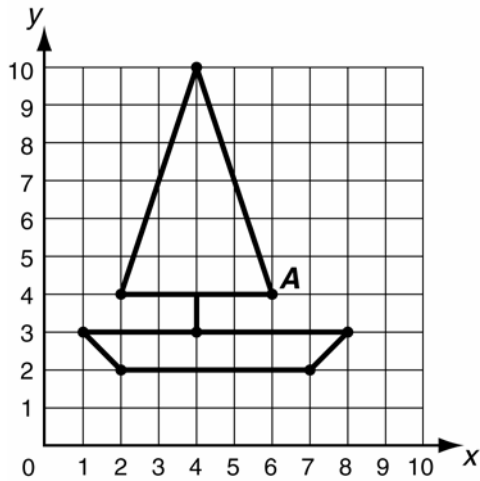
- 17 Nancy wants to draw a flower with rotational symmetry. **Which flower should Nancy draw?**



Correct response: D

Match to GLE: This item measures GLE 26: Identify shapes that have rotational symmetry (G-3-M).

- 18 Use this diagram of a sailboat to answer the question below.



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 (G-6-M).

19 Maria has 5 red picture cards, 5 green picture cards, 5 red number cards, and 5 blue number cards. **What is the probability of drawing a red or a blue card?**

A 0

B $\frac{1}{4}$

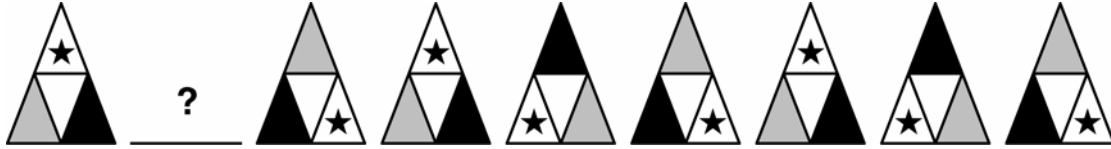
C $\frac{1}{2}$

D $\frac{3}{4}$

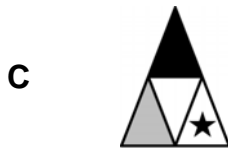
Correct response: D

Match to GLE: This item measures GLE 32: Represent probabilities as common fractions and recognize that probabilities fall between 0 and 1, inclusive (D-5-M).

20 Use this pattern to answer the question below.



Which object is missing in the pattern?



Correct response: B

Match to GLE: This item measures GLE 33: Fill in missing elements in sequences of designs, number patterns, positioned figures, and quantities of objects (P-1-M).

Sample NRT Multiple-Choice Items

Questions 21 through 29 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.

21 Which is a pair of equivalent fractions?

A $\frac{1}{2}, \frac{3}{6}$

B $\frac{3}{5}, \frac{3}{6}$

C $\frac{1}{5}, \frac{3}{5}$

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 (N-1-M) (N-3-M).

22 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 (N-2-M).

23 Which inequality is true?

A $\frac{1}{2} < \frac{1}{4}$

B $\frac{1}{3} < \frac{1}{5}$

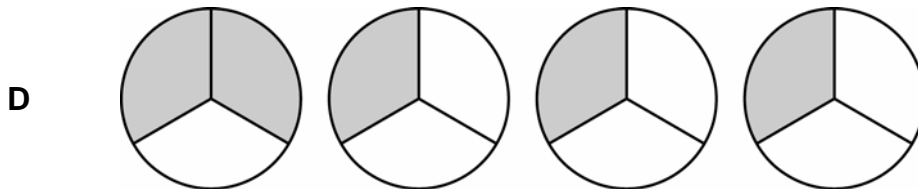
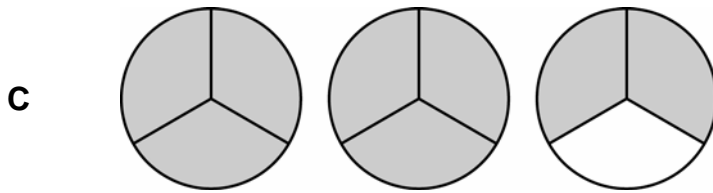
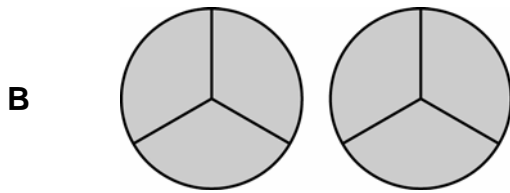
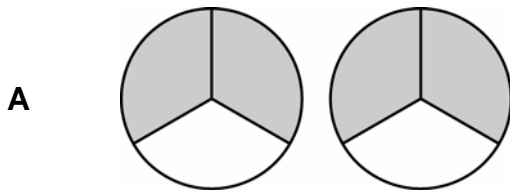
C $\frac{1}{5} < \frac{1}{8}$

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., $<$, $=$, $>$), and number lines (N-2-M).

24 Which picture shows $2\frac{2}{3}$?



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 (N-3-M).

- 25** 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 (N-5-M) (N-4-M).

- 26** 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** 5
- B** 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 (N-5-M).

- 27** 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 (N-6-M) (N-2-M).

Directions: Use the pennies below to answer question 28.



Annie's 12 Pennies



Jack's 4 Pennies

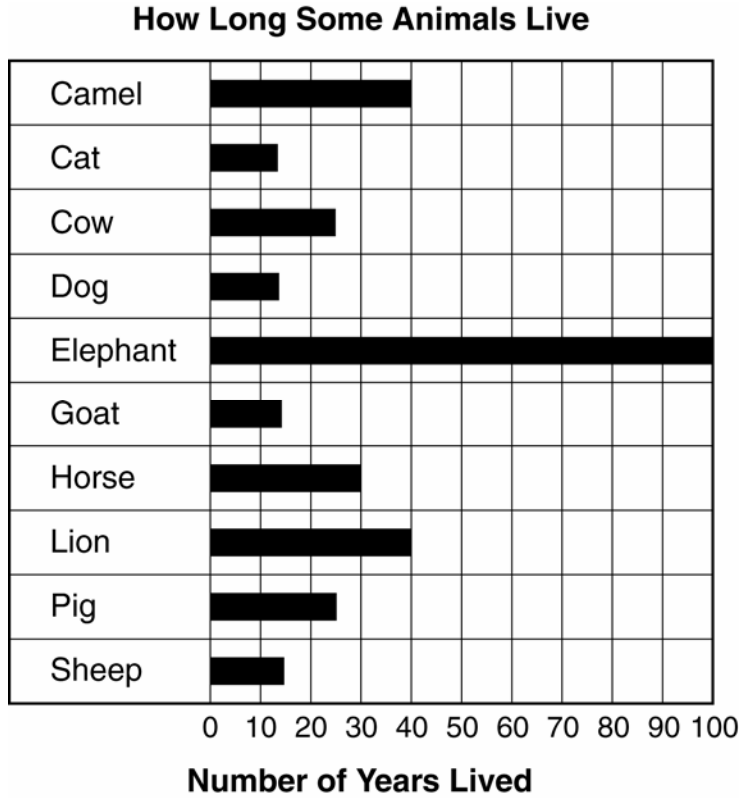
28 What is the ratio of Annie's pennies to Jack's pennies?

- 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 $\frac{2}{3}$ means 2 divided by 3) (N-8-M) (N-5-M).

Directions: Use the graph below to answer question 29.



29 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 (D-1-M) (D-2-M) (P-3-M) (A-4-M).

