This guide includes:


- Purpose
- Mathematics Assessment Design
- Assessable Content
- Test Administration Policies
- Resources
- Appendix A: Assessable Content
- Appendix B: Answer Key/Rubrics for Sample Items


## PURPOSE

This document is designed to assist Louisiana educators in understanding the LEAP 2025 mathematics assessment for grade 4, which will be administered in the spring.

### Introduction

All students in grades 3–8 will take the LEAP 2025 English language arts (ELA) and mathematics assessments, which offer the following:

- Consistency with the rigor and types of questions used in previous Louisiana assessments
- Measurement of the full range of Louisiana Student Standards for ELA and mathematics
- Ability to measure the full range of student performance, including the performance of high- and low-performing students
- Information for educators and parents about student readiness in ELA and mathematics and whether students are "on track" for college and careers
- Comparison of Louisiana student performance with the performance of students in other states

## MATHEMATICS ASSESSMENT DESIGN

Each item on the LEAP 2025 assessment is referred to as a task and is identified by one of three types: Type I, Type II, or Type III. As shown in the table, each of the three task types is aligned to one of four reporting categories: Major Content, Additional & Supporting Content, Expressing Mathematical Reasoning, or Modeling & Application. Each task type is designed to align with at least one of the Louisiana Student Standards for Mathematical Practice (MP), found on pages 6-8 in the K-12 Louisiana Student Standards for Mathematics.

| Task Type | Description | Reporting Category | Mathematical Practice (MP) |
|---|---|---|---|
| **Type I** | conceptual understanding, fluency, and application | **Major Content:** solve problems involving the major content for grade 4 **Additional & Supporting Content:** solve problems involving the additional and supporting content for grade 4 | can involve any or all practices |
| **Type II** | written arguments/justifications, critique of reasoning, or precision in mathematical statements | **Expressing Mathematical Reasoning:** express mathematical reasoning by constructing mathematical arguments and critiques | primarily MP.3 and MP.6, but may also involve any of the other practices |
| **Type III** | modeling/application in a real-world context or scenario | **Modeling & Application:** solve real-world problems engaging particularly in the modeling practice | primarily MP.4, but may also involve any of the other practices |

These reporting categories will provide parents and educators valuable information about

- overall student performance, including readiness to continue further studies in mathematics;
- student performance broken down by mathematics subcategories, which may help identify when students need additional support or more challenging work; and
- how well schools and districts are helping students achieve higher expectations.

The LEAP 2025 mathematics assessment in grade 4 contains a total of 62 points. The table below shows the breakdown of task types and point values.

**Grade 4 Mathematics Test Design**

| Test Session | Type I (points) | Type II (points) | Type III (points) | Total (points) |
|---|---|---|---|---|
| **Session 1** | 14 | 4 | 3 | 21 |
| **Session 2** | 14 | 3 | 3 | 20 |
| **Session 3** | 12 | 3 | 6 | 21 |

## ASSESSABLE CONTENT

The tasks on the LEAP 2025 mathematics test are aligned directly to the Louisiana Student Standards for Mathematics (LSSM) for all reporting categories. Type I tasks, designed to assess conceptual understanding, fluency, and application, are aligned to the major, additional, and supporting content for grade 4. Some Type I tasks may be further aligned to LEAP 2025 evidence statements for the Major Content and Additional & Supporting reporting categories and allow for the testing of more than one of the student standards on a single item/task. Type II tasks are designed to assess student reasoning ability of selected major content for grades 3 or 4 in applied contexts. Type III tasks are designed to assess student modeling ability of selected content for grades 3 or 4 in applied contexts. Type II and III tasks are further aligned to LEAP 2025 evidence statements for the Expressing Mathematical Reasoning and Modeling & Application reporting categories. All tasks will be reviewed and vetted by teacher committees to verify direct and full

alignment to the LSSM. LEAP 2025 evidence statements for grade 4 are labeled as "LEAP.I.4.#" for Type I tasks, "LEAP.II.4.#" for Type II tasks, and "LEAP.III.4.#" for Type III tasks. See the table in Appendix A for a listing of assessable content of the LSSM and LEAP 2025 evidence statements.

## TEST ADMINISTRATION POLICIES

### Administration Schedule

The LEAP 2025 ELA, mathematics, and social studies assessments will be administered during **one** testing window and will be available to districts as paper-based tests (PBT) and computer-based tests (CBT) for grade 4. The grade 4 LEAP science assessment, which is available only as a paper-based test, will be administered during the PBT testing window. The table below lists the PBT administration schedule for the spring ELA, mathematics, social studies, and science assessments.

**Paper-Based Test Administration Schedule: Grade 4**

| Testing Window: May 1, 2017 – May 5, 2017 | | | |
|---|---|---|---|
| **May 1** | English Language Arts Session 1: | Literary Analysis Task + 1 passage set **OR** Research Simulation Task | 90 minutes |
| | Mathematics Session 1 | | 75 minutes |
| **May 2** | English Language Arts Session 2: | Research Simulation Task **OR** Narrative Writing Task + 1 reading set with one or two texts | 90 minutes |
| | Mathematics Session 2 | | 75 minutes |
| **May 3** | English Language Arts Session 3: Reading Literary and Informational Texts | | 45 minutes |
| | Mathematics Session 3 | | 75 minutes |
| **May 4** | Social Studies Session 1: Item Sets | | 85 minutes |
| | Social Studies Session 2: Task Set | | 45 minutes |
| | Social Studies Session 3: Item Sets and Discrete Items | | 85 minutes |
| **May 5** | Science Session 1: Multiple Choice | | Suggested time: 60 minutes |
| | Science Session 2: Short Answer | | Suggested time: 30 minutes |
| | Science Session 3: Task | | Suggested time: 30 minutes |

The LEAP 2025 ELA, mathematics, and social studies tests are **strictly timed** and no additional time is permitted, except for students who have a documented extended time accommodation (e.g., an IEP). Although the LEAP science test is not timed, suggested times are included.

The table below lists just one example CBT administration session order for grade 4, followed by the policies and recommendations for the spring ELA, mathematics, and social studies assessments. Examples of testing schedules can be found here.

**Computer-Based Test Administration: Grade 4**

| **Test Window: April 3, 2017 – May 5, 2017** | | | |
|---|---|---|---|
| English Language Arts | Session 1: | Literary Analysis Task + 1 passage set **OR** Research Simulation Task | 90 minutes |
| Mathematics | Session 1 | | 75 minutes |
| English Language Arts | Session 2: | Research Simulation Task **OR** Narrative Writing Task + 1 reading set with one or two texts | 90 minutes |
| Mathematics | Session 2 | | 75 minutes |
| English Language Arts | Session 3: Reading Literary and Informational Texts | | 45 minutes |
| Mathematics | Session 3 | | 75 minutes |
| Social Studies | Social Studies Session 1: Item Sets | | 85 minutes |
| Social Studies | Social Studies Session 2: Task Set | | 45 minutes |
| Social Studies | Social Studies Session 3: Item Sets and Discrete Items | | 85 minutes |

Computer-based testing allows districts some flexibility in scheduling. However, to reduce incidences of testing irregularities, districts must adhere to the following scheduling and administration practices:

- Testing students in the same grade level across the district at or very close to the same time
- Completing makeup testing for students immediately upon their return
- Limiting student interaction during breaks between test sessions
- Isolating students who have not completed testing for the day (e.g., students with extended time accommodation)
- Preventing interaction between groups of students taking the same tests at different times within a testing day
- Requiring the completion of a session once it is opened (i.e., limiting the reopening of test sessions)
- Taking the sessions within a content area in the correct order (e.g., ELA Session 1 taken before ELA Session 2)

We also recommend

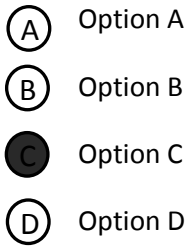
- limiting sessions to no more than three in one day for a student; and
- administering no more than one session that includes an extended-response task or writing prompt (i.e., Social Studies Session 2, ELA Session 1, and ELA Session 2) in a day to an individual student.

The LEAP 2025 ELA, mathematics, and social studies tests are **strictly timed** and no additional time is permitted, except for students who have a documented extended time accommodation (e.g., an IEP).

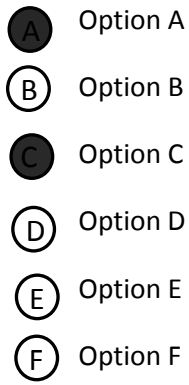
## Paper-Based Tests

Students taking the paper-based tests, except those using braille test materials, will enter all answers in their test booklets. There will be no separate answer documents. Each session of the mathematics test booklet will be sealed; day indicator bars will appear on the outside margin of each page. Instructions for how to manage the test booklets, including how to break the seals, will be outlined in the Test Administration Manual.

Multiple-choice tasks for grade 4 have three or four options. Students will shade the bubble of the one correct answer.

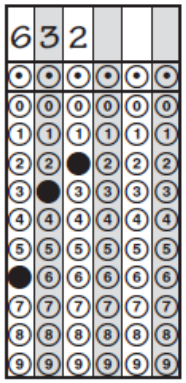



Multiple-select tasks for grade 4 have five or six options. Students will fill in the number of correct answers identified in the stem of the question. **The number of correct answers will vary from task to task.** The sample below asks for two correct answers.

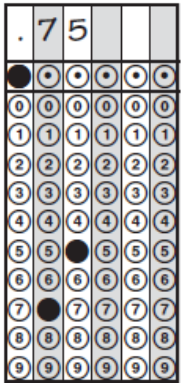


Fill-in-the-blank tasks on paper-based tests have grids for students to write the answer. Each digit of a number (whole number or decimal) is written in the boxes at the top of the grid, starting with the first box on the left. Numbers are entered without commas. Students will then shade the bubble in the column that corresponds to the entry (digit) in the top row. Blank spaces within the answer are not allowed.

To answer 632 in a question, fill in the answer grid as shown below.




To answer .75 in a question, fill in the answer grid as shown below.




**Note:** Should a student mistakenly start in a column other than column 1, the entry will be scored as correct under the following conditions:

- There are no spaces within the answer.
- The answer fits within the remaining columns.

Fractional Answers

Type I tasks with potential fractional answers in PBT forms will be presented in multiple-choice or multiple-select formats. Students will be expected to be able to correctly write and apply fractions in Type II and Type III constructed-response tasks.

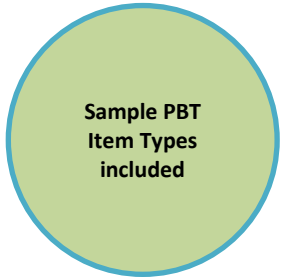
General Guidelines

When answering Type II and Type III tasks, students need to make sure to write their explanations and/or to show their work in the box provided for each question. Any information written outside the box or which has been scratched out will not be scored. The following information presents guidelines for marking/writing in the mathematics test booklet.

- Students may use yellow highlighters to highlight text in the test booklet.
- Students may write and do scratch work in the test booklet, but must avoid making stray marks in the answer circles on the multiple-choice and multiple-select tasks or in the fill-in-the-blank grids.
- Highlighting text in options and placing an X to the right of the text in an option are recommended ways for students to eliminate options. However, crossing out options could create scoring issues if students mark through answer circles.

## Sample Paper-Based Test Items

This section includes two Type I items and one Type II item as they would appear on a PBT form. The answer key for each Type I item and scoring rubric for the Type II item is located in Appendix B.




### Multiple-Choice/Multiple-Select Type I Task

**Part A**

A plant grew $\frac{3}{10}$ meter in April and $\frac{27}{100}$ meter in May. Which expression can be used to find the total amount the plant grew during the two months?

Ⓐ $\frac{3}{10} + \frac{27}{10}$

Ⓑ $\frac{30}{10} + \frac{27}{10}$

Ⓒ $\frac{3}{100} + \frac{27}{100}$

Ⓓ $\frac{30}{100} + \frac{27}{100}$

**Part B**

A plant grew $\frac{3}{10}$ meter in April and $\frac{27}{100}$ meter in May. In June, the plant grew another $\frac{13}{100}$ meter. Which fractions are equivalent to the fraction of a meter the plant grew during the three months?

Select the **two** correct answers.

Ⓐ $\frac{7}{10}$

Ⓑ $\frac{40}{10}$

Ⓒ $\frac{70}{10}$

Ⓓ $\frac{4}{100}$

Ⓔ $\frac{40}{100}$

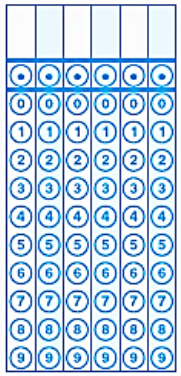
Ⓕ $\frac{70}{100}$

**Fill-in-the-Blank Task**

An airplane flew 1,155 miles on its first trip and 1,695 miles on its second trip.

What is the total number of miles the airplane flew on these two trips?

Enter your answer in the box.



**Type II Constructed-Response Task**

Use the information provided to answer Part A and Part B for question 1.

Jian's family sells honey from beehives. They collected 3,311 ounces of honey from the beehives this season. They will use the honey to completely fill 4-ounce jars or 6-ounce jars.

Jian's family will sell 4-ounce jars for $5 each or 6-ounce jars for $8 each.

Jian says if they use only 4-ounce jars, they could make $4,140 because 3,311 ÷ 4 = 827 R 3. That rounds up to 828, and 828 multiplied by $5 is $4,140.

**Part A**

Explain the error that Jian made when finding the amount of money his family could make if they use only 4-ounce jars.

Enter your explanation in the box provided.

**Part B**

Explain how to determine the money Jian's family could make if they use only 6-ounce jars. Include the total amount of money and the total number of 6-ounce jars in your explanation.

Enter your answers and your explanation in the box provided.

## Computer-Based Tests

Students taking the computer-based tests will enter their answers into the online testing system. The way each answer is entered depends on the task type. For example, for a multiple-choice task, a student will select the circle next to the correct answer. For fill-in-the-blank and constructed-response tasks on online test forms, students will type in the number (whole number or decimal) or text in the box using the typing tools provided. Some response boxes limit the length of the response that can be typed and whether numbers and/or text can be typed. Computer-based tests allow for the use of technology-enhanced items (TEI) that use innovative, engaging ways to assess student understanding of material beyond the limitations of a traditional selected-response task. A TEI may require the student to sort shapes into categories by using a drag-and-drop tool, show a fraction or an area by selecting cells in a figure, or create angles by rotating rays.

The computer-based tests include the following online tools, which allow a student to select answer choices, "mark" tasks, eliminate answer options, take notes, enlarge the task, guide the reading of a task line by line, use a ruler or protractor, and use an equation builder for entering special characters. A help tool is also featured to assist students as they use the online system.

- Pointer tool 
- Highlighter tool 
- Cross-Off tool 
- Sticky Note tool 
- Magnifying tool 
- Line Guide 

- Measurement tools 
- Equation Builder 

- Help tool 

**All students taking the computer-based tests should work through the Online Tools Training (available in INSIGHT or here using the Chrome browser) to practice using the online tools so they are well prepared to navigate the online testing system.**

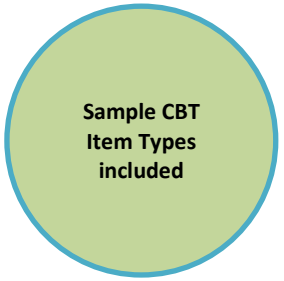
## Sample Computer-Based Test Items

This section includes four Type I items and one Type III item as they would appear on a CBT form. The answer key for each Type I item and scoring rubric for the Type III item is located in Appendix B. Look for these items in the updated OTT (*available Winter*).

### Multiple-Choice/Multiple-Select Type I Task

**Part A**

A plant grew $\frac{3}{10}$ meter in April and $\frac{27}{100}$ meter in May. Which expression can be used to find the total amount the plant grew during the two months?




(a) $\frac{3}{10} + \frac{27}{10}$

(b) $\frac{30}{10} + \frac{27}{10}$

(c) $\frac{3}{100} + \frac{27}{100}$

(d) $\frac{30}{100} + \frac{27}{100}$

**Part B**

A plant grew $\frac{3}{10}$ meter in April and $\frac{27}{100}$ meter in May. In June, the plant grew another $\frac{13}{100}$ meter. Which fractions are equivalent to the fraction of a meter the plant grew during the three months?

Select the **two** correct answers.

(a) $\frac{7}{10}$

(b) $\frac{40}{10}$

(c) $\frac{70}{10}$

(d) $\frac{4}{100}$

(e) $\frac{40}{100}$

(f) $\frac{70}{100}$

**Fill-in-the-Blank Task**

An airplane flew 1,155 miles on its first trip and 1,695 miles on its second trip.

What is the total number of miles the airplane flew on these two trips?

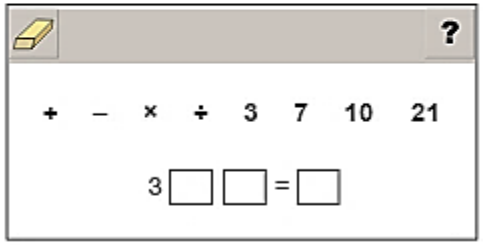
Enter your answer in the box.

**TEI: Drag-and-Drop Task**

Mike is 3 years old. His Uncle Joe is 7 times as old as Mike.

Use the numbers and symbols to find Uncle Joe's age.

Drag and drop the numbers and symbols into each correct box.



**TEI: Hot Spot / Dropdown Menu Type I Task**

**Part A**

The table shows the lengths of five different animals in a zoo. For each animal, select a place in the table to show whether it is less than or greater than $\frac{5}{10}$ meter in length.

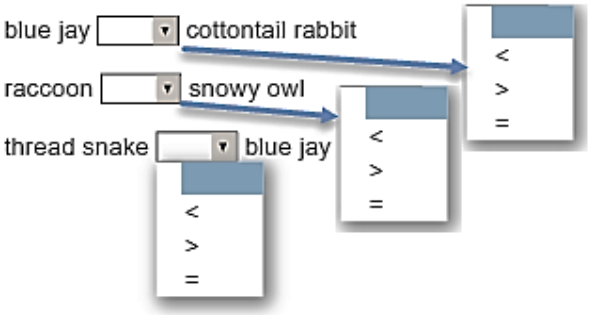
Select one cell per row.

| | Less than $\frac{5}{10}$ meter | Greater than $\frac{5}{10}$ meter |
|---|---|---|
| **Blue jay** length (in meters) $\frac{25}{100}$ | ☐ | ☐ |
| **Cottontail rabbit** length (in meters) $\frac{4}{10}$ | ☐ | ☐ |
| **Raccoon** length (in meters) $\frac{8}{10}$ | ☐ | ☐ |
| **Snowy owl** length (in meters) $\frac{67}{100}$ | ☐ | ☐ |
| **Thread snake** length (in meters) $\frac{11}{100}$ | ☐ | ☐ |

**Part B**

Use the lengths in the table to compare the lengths of the animals.

Select from the drop-down menus to correctly complete each comparison.



**Type III Constructed-Response Task**

The table shows the number of yards Ed ran in each of the first three football games of the season.

**Ed's Running Yards**

| Game | Yards |
|---|---|
| 1 | 157 |
| 2 | 309 |
| 3 | 172 |

After the first three games of the season, Rico had exactly 3 times the total number of running yards that Ed had.

How many **more** total running yards did Rico have than Ed after the first three games of the season? Show your work using equations.

Enter your answer and your work or explanation in the box provided.

EQ

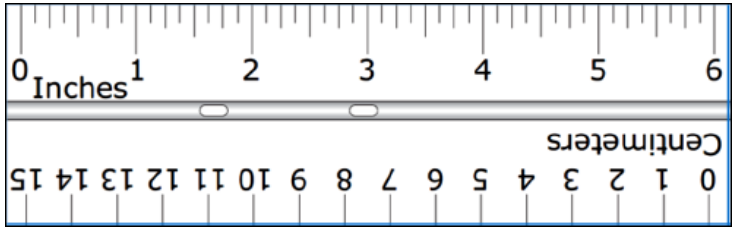
## Permitted Testing Materials

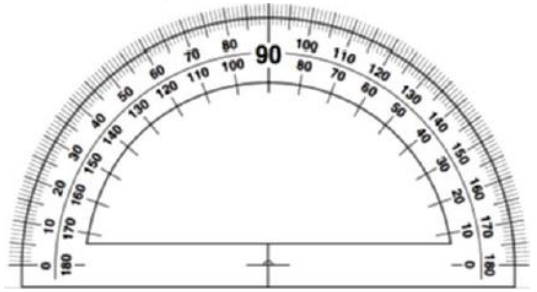
The chart that follows summarizes the tools and resources for the grade 4 mathematics assessment.

| **Provided**<br>(by vendor or part of online system) | **Required**<br>(provided by school) | **Other Allowable**<br>(may be used, not required) |
|---|---|---|
| • $\frac{1}{8}$-inch and centimeter ruler<br>• protractor | • scratch paper (lined, graph, or un-lined) | • yellow highlighter |

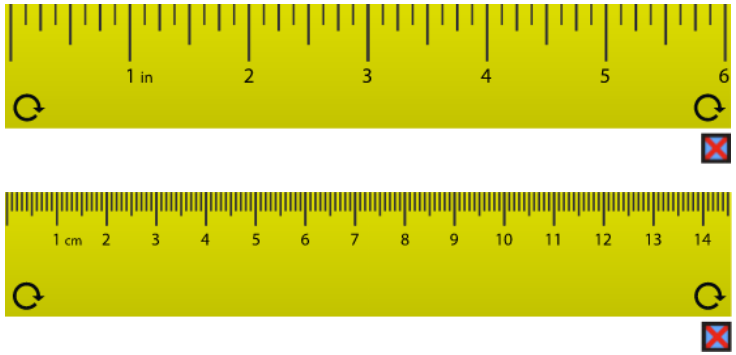
Provided tools are sent by the test vendor to the districts for the districts to distribute during testing; districts and students may **not** substitute their own tools for provided tools. Required tools must be supplied by the school and distributed to all testers during testing. Schools may provide or permit students to bring *allowable* tools. If schools permit students to bring their own *allowable* tools, tools must be given to the test administrator prior to testing to ensure that the tools are appropriate for testing (e.g., tools do not have any writing on them).

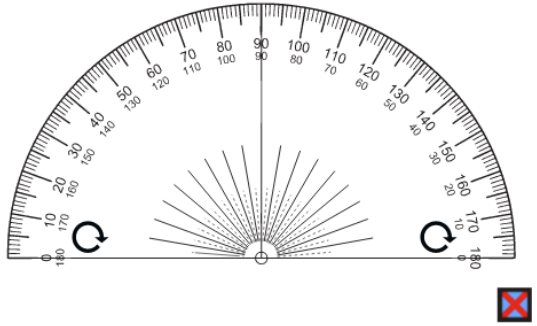
**Grade 4 ruler and protractor provided on the LEAP 2025 PBT (not actual size):**




**Grade 4 rulers and protractor provided on the LEAP 2025 CBT (not actual size):**



To ensure accurate measurement, the size of the computer-based ruler and protractor, along with the object being measured, varies depending on the computer monitor's resolution. To practice with the computer-based ruler and protractor, visit the Online Tools Training (available in INSIGHT or here using the Chrome browser).

## Calculator Policy

**Students are not allowed to use calculators during the administration of any mathematics test in grade 4.**

For students with the approved accommodation, a hand-held four-function calculator is allowed for all sessions.

- Square root, percent, memory, and +/- keys are also allowed but not required.
- A hand-held calculator is necessary for both the PBT and CBT; **an online calculator will not be available**.
- If a student needs an adaptive calculator (e.g., large key, talking), the student may bring his or her own or the school may provide one, as long as it is specified in his or her approved IEP or 504 Plan.
- The student should use the calculator they have used regularly throughout the school year in their classroom and are most familiar with, provided their regular-use calculator is not outside the boundaries of what is allowed, as detailed above.

## Reference Sheet

Students in grade 4 will **not** have a reference sheet because the LSSM for this grade do not require one.

## Requisite Knowledge

Students in grade 4 will be required to know relative sizes of measurement units within one system of units. Therefore, the following requisite knowledge is necessary in grade 4 and will **not** be provided in a reference sheet.

| | |
|---|---|
| 1 meter = 100 centimeters | 1 pound = 16 ounces |
| 1 kilometer = 1000 meters | 1 minute = 60 seconds |
| 1 kilogram = 1000 grams | 1 hour = 60 minutes |
| 1 liter = 1000 milliliters | Area formula for rectangles |
| 1 foot = 12 inches | Perimeter formula for rectangles |

## RESOURCES

- Online Tools Training: (*Available now, updated version available Winter*) provides teachers and students examples of interactive, technology-enhanced items so they can become familiar with the computer-based testing format; available in INSIGHT or here using the Chrome browser; includes Spanish version
- Grade 4 LEAP 2025 Paper Practice Test and Scoring Guide: (*Available Winter*) offers a paper-based grade-level practice test to help prepare students for the spring assessments; Spanish version also available
- Grade 4 LEAP 2025 Computer-Based Practice Test and Scoring Guide: (*Available Winter*) offers a computer-based grade-level practice test to help prepare students for the spring assessments; accessed through INSIGHT; Spanish version also available
- Accessibility and Accommodations Overview: (*Updated version available Winter*) provides an overview of Louisiana's accessibility features and accommodations for grades 3–8 spring 2017 testing, clarifying differences between paper-based and online testing
- LEAP 2025 Mathematics Practice Test Guidance: (*Available Winter*) provides teachers with information about test structure, recommended uses, general cautions, item types, and scoring of the paper-based and computer-based tests
- Guide to the LEAP Online Equation Builder Grades 3-5: provides teachers with information on using the equation builder within the open-response boxes on the CBT; Spanish version also available
- Guide to Administering the Online Practice Tests: (*Available Winter*) provides information regarding the administration and scoring process needed for the online practice tests
- Practice Tests Library: includes current and previous years' practice tests for additional practice with assessment tasks
- Fourth Grade Teacher Library: provides links to grade-specific resources, such as the standards, shared teacher resources, and instructional plans
- K-12 Louisiana Student Standards for Math: explains the development of and lists the math content standards for Louisiana students
- Grade 4 math - Teachers Companion Document PDF or word doc: contains descriptions of each standard to answer questions about the standard's meaning and how it applies to student knowledge and performance
- Grade 4 Remediation Guide: reference guide for teachers to help them more quickly identify the specific remedial standards necessary for every standard, includes information on content emphasis
- Grade 4 Crosswalk: shows specifically how the math standards have changed from 2015-2016 to 2016-2017
- K-12 LSSM Alignment to Rigor: provides explanations and a standards-based alignment to assist teachers in providing a rigorous education
- EAGLE Sample Test Items: provides teachers a bank of questions that can be used for instructional and assessment purposes

# APPENDIX A

## Assessable Content for the Major Content Reporting Category (Type I)

| LSSM Content Standards | |
|---|---|
| 4.OA.A | Use the four operations with whole numbers to solve problems. |
| 4.OA.A.1 | Interpret a multiplication equation as a comparison and represent verbal statements of multiplicative comparisons as multiplication equations, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7, and 7 times as many as 5. |
| 4.OA.A.2 | Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and/or equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison (Example: 6 times as many vs. 6 more than)[1] |
| 4.OA.A.3 | Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *Example: Twenty-five people are going to the movies. Four people fit in each car. How many cars are needed to get all 25 people to the theater at the same time?* |
| 4.NBT.A | Generalize place value understanding for multi-digit whole numbers. |
| 4.NBT.A.1 | Recognize that in a multi-digit whole number less than or equal to 1,000,000, a digit in one place represents ten times what it represents in the place to its right. *For example, (1) recognize that 700 ÷ 70 = 10; (2) in the number 7,246, the 2 represents 200, but in the number 7,426 the 2 represents 20, recognizing that 200 is ten times as large as 20, by applying concepts of place value and division*. |
| 4.NBT.A.2 | Read and write multi-digit whole numbers less than or equal to 1,000,000 using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. |
| 4.NBT.A.3 | Use place value understanding to round multi-digit whole numbers, less than or equal to 1,000,000, to any place. |
| 4.NBT.B | Use place value understanding and properties of operations to perform multi-digit arithmetic. |
| 4.NBT.B.4 | Fluently add and subtract multi-digit whole numbers with sums less than or equal to 1,000,000, using the standard algorithm. |
| 4.NBT.B.5 | Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. |
| 4.NBT.B.6 | Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. |

[1] See LSSM Table 2, p. 61.

| | |
|---|---|
| 4.NF.A | Extend understanding of fraction equivalence and ordering. |
| 4.NF.A.1 | Explain why a fraction $a/b$ is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.) |
| 4.NF.A.2 | Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.) |
| 4.NF.B | Build fractions from unit fractions. |
| 4.NF.B.3 | Understand a fraction $a/b$ with $a > 1$ as a sum of fractions $1/b$. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.)<br>a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. *Example: 3/4 = 1/4 + 1/4 + 1/4.*<br>b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8*.<br>c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.<br>d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. |
| 4.NF.B.4 | Multiply a fraction by a whole number. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.)<br>a. Understand a fraction $a/b$ as a multiple of $1/b$. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4)*.<br>b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*<br>c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* |
| 4.NF.C | Understand decimal notation for fractions, and compare decimal fractions. |
| 4.NF.C.5 | Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.[2] *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100*. |
| 4.NF.C.6 | Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram; represent 62/100 of a dollar as $0.62.* |

[2] Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.

| | |
|---|---|
| 4.NF.C.7 | Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. |
| **LEAP 2025 Evidence Statements** | |
| LEAP.I.4.1 | Perform computations by applying conceptual understanding of place value, rather than by applying multi-digit algorithms. Content Scope: Knowledge and skills articulated in<br>• 4.NBT.A, 4.NBT.B – Tasks do not have a context. |
| LEAP.I.4.2 | Apply conceptual understanding of fraction equivalence and ordering to solve simple word problems requiring fraction comparison. Content Scope: Knowledge and skills articulated in<br>• 4.NF.A – Tasks have "thin context." Tasks do not require adding, subtracting, multiplying, or dividing fractions. Prompts do not provide visual fraction models; students may at their discretion draw visual fraction models as a strategy. Fractions equal to whole numbers are limited to 0 – 5. |
| LEAP.I.4.3 | Solve one-step word problems requiring integration of knowledge and skills articulated in 4.NF. Content Scope: Knowledge and skills articulated in<br>• 4.NF.A, 4.NF.B, 4.NF.C |
| LEAP.I.4.4 | Solve one-step addition word problems. Content Scope: Knowledge and skills articulated in<br>• 4.NF.C.5, 4.NF.C.6 – Tasks are one of two kinds: Add To with result unknown, or Put Together with result unknown. See K–5 Progression on Counting and Cardinality and Operations and Algebraic Thinking, Table 2, page 9 for situations; these situations are sampled equally. |
| LEAP.I.4.5 | Solve one-step word problems involving multiplying two two-digit numbers. Content Scope: Knowledge and skills articulated in<br>• 4.NBT.B.5, 4.OA.A – The given numbers are such as to require a general strategy based on place value and the properties of operations (e.g., $63 \times 44$). Word problems shall include a variety of grade-level appropriate applications and contexts. |
| LEAP.I.4.6 | Solve one-step word problems involving multiplying a four-digit number by a one-digit number. Content Scope: Knowledge and skills articulated in<br>• 4.NBT.B.5, 4.OA.A – The given numbers are such as to require a general strategy based on place value and the properties of operations (e.g., $2392 \times 8$). Word problems shall include a variety of grade-level appropriate applications and contexts. |
| LEAP.I.4.7 | Solve one-step word problems involving dividing a four-digit number by a one-digit number. Content Scope: Knowledge and skills articulated in<br>• 4.NBT.B.6, 4.OA.A – The given numbers are such as to require a general strategy based on place value and the properties of operations (e.g., $2328 \div 8$). Quotients are whole numbers. Word problems shall include a variety of grade-level appropriate applications and contexts. |

| | |
|---|---|
| LEAP.I.4.8 | Solve multi-step[3] word problems posed with whole numbers and involving computations best performed by applying conceptual understanding of place value, perhaps involving rounding. Content Scope: Knowledge and skills articulated in<br>• 4.OA.A.3, 4.NBT – Tasks must be aligned to 4.OA.A.3 and 1 or more of the subsequent standards listed in the content scope. |
| LEAP.I.4.9 | Solve real-world and mathematical problems about perimeter involving grade-level addition and subtraction of fractions, such as finding an unknown side of a rectangle. Content Scope: Knowledge and skills articulated in<br>• 4.NF.B.3, 4.MD.A.3 – Tasks must be aligned to both standards listed in the content scope. |
| LEAP.I.4.10 | Solve one-step word problems involving adding or subtracting two four-digit numbers. Content Scope: Knowledge and skills articulated in<br>• 4.NBT.B.4, 4.OA.A – The given numbers are such as to require an efficient/standard algorithm (e.g., 7263 + 4875, 7263 – 4875, 7406 – 4637) and do not suggest any obvious ad hoc or mental strategy (e.g., 6,999 + 3,501 or 7300 – 6301). Word problems shall include a variety of grade-level appropriate applications and contexts. |
| LEAP.I.4.11 | Solve addition and subtraction word problems involving three four-digit addends, or two four-digit addends and a four-digit subtrahend. Content Scope: Knowledge and skills articulated in<br>• 4.NBT.B.4, 4.OA.A – The given numbers are such as to require an efficient/standard algorithm (e.g., 7263 + 4875 + 6901) and do not suggest any obvious ad hoc or mental strategy (e.g., 6,999 + 3,501 - 5,000). |

## Assessable Content for the Additional & Supporting Content Reporting Category (Type I)

| **LSSM Content Standards** | |
|---|---|
| 4.OA.B | Gain familiarity with factors and multiples. |
| 4.OA.B.4 | Using whole numbers in the range 1–100,<br>a. Find all factor pairs for a whole number in the range 1-100.<br>b. Recognize that a whole number is a multiple of each of its factors.<br>c. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number.<br>d. Determine whether a given whole number in the range 1-100 is prime or composite. |
| 4.OA.C | Generate and analyze patterns. |
| 4.OA.C.5 | Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way*. |
| 4.MD.A | Solve problems involving measurement and conversion of measurements. |
| 4.MD.A.1 | Know relative sizes of measurement units within one system of units including ft, in; km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (Conversions are limited to one-step conversions.) *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs* (*1, 12*), (*2, 24*), (*3, 36*), … |

[3] Multi-step must have at least 3 steps.

| | |
|---|---|
| 4.MD.A.2 | Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving whole numbers and/or simple fractions (addition and subtraction of fractions with like denominators and multiplying a fraction times a fraction[4] or a whole number), and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. |
| 4.MD.A.3 | Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor*. |
| 4.MD.B | Represent and interpret data. |
| 4.MD.B.4 | Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection*. |
| 4.MD.C | Geometric measurement: understand concepts of angle and measure angles. |
| 4.MD.C.5 | Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:<br>a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where two rays intersect the circle.<br>b. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.<br>c. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. |
| 4.MD.C.6 | Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. |
| 4.MD.C.7 | Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a letter for the unknown angle measure. |
| 4.G.A | Draw and identify lines and angles, and classify shapes by properties of their lines and angles. |
| 4.G.A.1 | Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. |
| 4.G.A.2 | Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. |
| 4.G.A.3 | Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. |

[4] Students in Grade 4 will be assessed on multiplying a fraction and a whole number as indicated in the NF domain. Some students may be able to multiply a fraction by a fraction as a result of generating equivalent fractions; however, mastery of multiplying two fractions occurs in Grade 5.

## Assessable Content for the Expressing Mathematical Reasoning Reporting Category (Type II)

| LEAP 2025 Evidence Statements | |
|---|---|
| LEAP.II.4.1 | Base explanations/reasoning on the properties of operations. Content Scope: Knowledge and skills articulated in<br>• 4.NBT.B.5 - Students need not use formal property names. Tasks do not have a context. Unneeded parentheses should not be used.[5]<br>• 4.NBT.B.6 - Students need not use formal property names. Tasks do not have a context. Unneeded parentheses should not be used.[5] |
| LEAP.II.4.2 | Base explanations/reasoning on the relationship between multiplication and division. Content Scope: Knowledge and skills articulated in<br>• 4.NBT.B.6 – Tasks do not have a context. |
| LEAP.II.4.3 | Reason about the place value system itself. Content Scope: Knowledge and skills articulated in<br>• 4.NBT.A – Tasks have "thin context"[6] or no context. |
| LEAP.II.4.4 | Base arithmetic explanations/reasoning on concrete referents such as diagrams (whether provided in the prompt or constructed by the student in her response), connecting the diagrams to a written (symbolic) method. Content Scope: Knowledge and skills articulated in<br>• 4.NF.A - Tasks have "thin context"[6] or no context.<br>• 4.NF.B.3a, 4.NF.B.3b - Tasks have "thin context" [6] or no context. Fractions equal to whole numbers are limited to 0 – 5.<br>• 4.NF.B.4a - Tasks have "thin context"[6] or no context. Fractions equal to whole numbers are limited to 0 – 5.<br>• 4.NF.B.4b - Tasks have "thin context"[6] or no context.<br>• 4.NF.C - Tasks have "thin context"[6] or no context. |
| LEAP.II.4.5 | Distinguish correct explanation/reasoning from that which is flawed, and – if there is a flaw in the argument – present corrected reasoning. (For example, some flawed 'student' reasoning is presented and the task is to correct and improve it.) Content Scope: Knowledge and skills articulated in<br>• 4.OA.A.3 – Reasoning in these tasks centers on interpretation of remainders.<br>• 4.NF.A.1 - Tasks have "thin context"[6] or no context. Fractions equal to whole numbers are limited to 0 – 5.<br>• 4.NF.A.2 - Tasks have "thin context"[6] or no context. Fractions equal to whole numbers are limited to 0 – 5.<br>• 4.NF.B - Results may equal fractions greater than 1 (including fractions equal to whole numbers limited to 0 – 5).<br>• 4.NF.C - Tasks have "thin context"[6] or no context.<br>• 3.OA.B, 3.NF, 3.MD.C – Tasks may have scaffolding.[7] |

[5] For example, use 4 + 3 x 2 rather than 4 + (3 x 2).

[6] "Thin context" is a sentence or phrase that establishes a concrete referent for the quantity/quantities in the problem, in such a way as to provide meaningful avenues for mathematical intuition to operate, yet without requiring any sort of further analysis of the context. For example, a task could provide a reason for being given a set of fractional measurements such as, "The fractions represent lengths of ribbon."

[7] Scaffolding in a task provides the student with an entry point into a pathway for solving a problem. In unscaffolded tasks, the student determines his/her own pathway and process.

| | |
|---|---|
| LEAP.II.4.6 | Present solutions to multi-step[3] problems in the form of valid chains of reasoning, using symbols such as equals signs appropriately (for example, rubrics award less than full credit for the presence of nonsense statements such as 1 + 4 = 5 + 7 = 12, even if the final answer is correct), or identify or describe errors in solutions to two-step problems and present corrected solutions. Content Scope: Knowledge and skills articulated in<br>• 4.OA.A.3 - Tasks may involve interpreting remainders.<br>• 4.NF.B.3c - Tasks have "thin context"[6] or no context. Denominators are limited to grade 3 possibilities (2, 3, 4, 6, 8) so as to keep computational difficulty lower.<br>• 4.NF.B.3d, 4.NF.B.4c - Denominators are limited to grade 3 possibilities (2, 3, 4, 6, 8) so as to keep computational difficulty lower. |
| LEAP.II.4.7 | Base explanations/reasoning on a number line diagram (whether provided in the prompt or constructed by the student in her response). Content Scope: Knowledge and skills articulated in<br>• 4.NF.A.1 - Fractions equal to whole numbers are limited to 0 – 5.<br>• 4.NF.A.2 - Fractions equal to whole numbers are limited to 0 – 5.<br>• 4.NF.B.3a<br>• 4.NF.B.4a, 4.NF.B.4b |

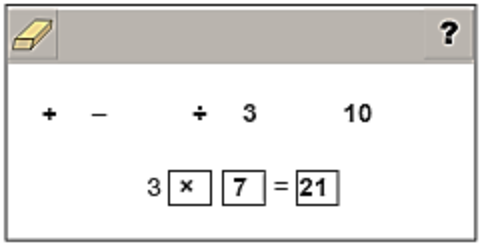
## Assessable Content for the Modeling & Application Reporting Category (Type III)

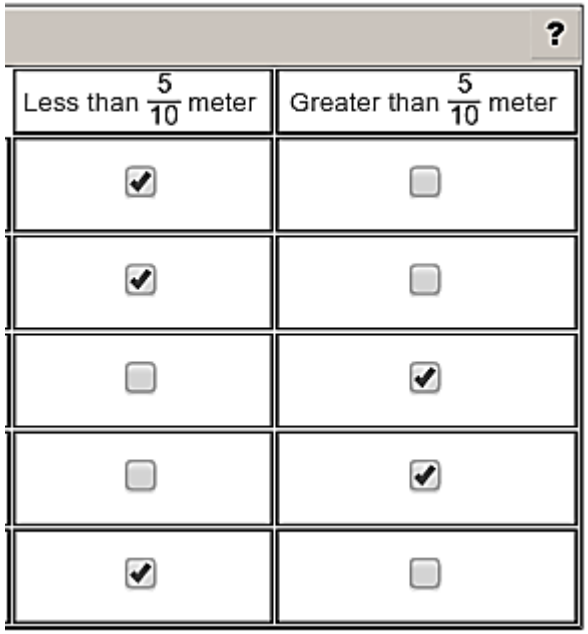
| **LEAP 2025 Evidence Statements** | |
|---|---|
| LEAP.III.4.1 | Solve multi-step[3] contextual word problems with degree of difficulty appropriate to Grade 4, requiring application of knowledge and skills articulated by the LSSM section of the Major Content Assessable Content table. Tasks may have scaffolding.[7] |
| LEAP.III.4.2 | Solve multi-step[3] contextual problems with degree of difficulty appropriate to Grade 4, requiring application of knowledge and skills articulated in 3.OA.A, 3.OA.D.8, 3.NBT, and/or 3.MD. Tasks may have scaffolding.[7] Tasks do not require a student to write a single equation with a letter standing for the unknown quantity in a two-step problem, and then solve that equation. Tasks may require students to write an equation as part of their work to find a solution, but students are not required to use a letter for the unknown. Addition, subtraction, multiplication and division situations in these problems may involve any of the basic situation types with unknowns in various positions (see LSSM, Table 1, Common Addition and Subtraction Situations, p.60; LSSM, Table 2, Common Multiplication and Division Situations, p. 61; and K–5 Progression on Counting and Cardinality and Operations and Algebraic Thinking). |

## APPENDIX B

### Answer Key/Rubrics for Sample Items

Answer Key/Rubrics included for Sample Item Types

| PBT/CBT | Item Type | Key | Alignment |
|---|---|---|---|
| PBT/CBT | Multiple-Choice/Multiple-Select Type I | Part A: D<br>Part B: A, F | LEAP.I.4.4 |
| PBT/CBT | Fill-in-the-Blank | 2850 | LEAP.I.4.10 |
| PBT | Type II Constructed-Response | See Rubric | LEAP.II.4.5 |
| CBT | TEI: Drag-and-Drop |  | 4.OA.A.1 |

| | | | |
|---|---|---|---|
| CBT | TEI: Hot Spot / Dropdown Menu Type I | Part A:<br>  <br><br>Part B:<br>blue jay [<] cottontail rabbit<br>raccoon [>] snowy owl<br>thread snake [<] blue jay | LEAP.I.4.2 |
| CBT | Type III Constructed-Response | See Rubric | LEAP.III.4.1 |

**Type II Constructed-Response Rubric**

| **PART A** | |
|---|---|
| **Score** | **Description** |
| **1** | Reasoning component: The student explains the error made. For example: "Jian rounded the quotient up, but that won't work because the remainder of 3 means there are only 3 ounces of honey left, and that isn't enough to fill the last jar."<br><br>Note: A variety of explanations are possible. As long as the explanation shows a clear understanding of the error made, credit should be awarded. |
| **0** | Student response is incorrect or irrelevant. |
| **PART B** | |
| **Score** | **Description** |
| **2** | Student response includes each of the following 2 elements.<br>• Computation component: 551 (6-ounce) jars and $4,408<br>• Reasoning component: The student explains the steps needed to solve the problem, including correctly interpreting the remainder. For example: "I would divide 3,311 by 6 and get a quotient of 551, with a remainder of 5. This means they could completely fill 551 jars, but the leftover honey wouldn't be enough to fill another jar. I multiplied 551 $\times$ $8 and got $4,408." |
| **1** | Student response includes 1 of the 2 elements. If a computation mistake is made, credit cannot be given for the computation component, but points can be given for valid reasoning. |
| **0** | Student response is incorrect or irrelevant |

**Type III Constructed-Response Rubric**

| Score | Description |
|---|---|
| **3** | Student response includes each of the following 3 elements.<br>• Computation component: Rico had 1276 more yards than Ed after the first three games.<br>• Modeling component: Student shows work or explains how to determine the number of yards that Ed had and Rico had after the 3 games.<br>• Modeling component: Student shows work or explains how to determine how many more yards Rico had than Ed.<br><br>Sample Student Response:<br><br>I found that Ed had 638 yards by adding 157 + 308 + 172. Rico had 3 times the number of yards as Ed, so 638 × 3 = 1914. To find how many more yards Rico had than Ed, I subtracted 638 from 1914 and got 1276.<br><br>Note: A variety of explanations are valid as long as the student uses a mathematically correct approach to solving the problem. |
| **2** | Student response includes 2 of the 3 elements. If a computation mistake is made, credit cannot be given for the computation component, but points can be given for modeling. |
| **1** | Student response includes 1 of the 3 elements. |
| **0** | Student response is incorrect or irrelevant |