OKLAHOMA SCHOOL TESTING PROGRAM

TEST BLUEPRINT AND ITEM SPECIFICATIONS MATHEMATICS GRADE 7

OKLAHOMA Education

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OKLAHOMA SCHOOL TESTING PROGRAM TEST AND ITEM SPECIFICATIONS

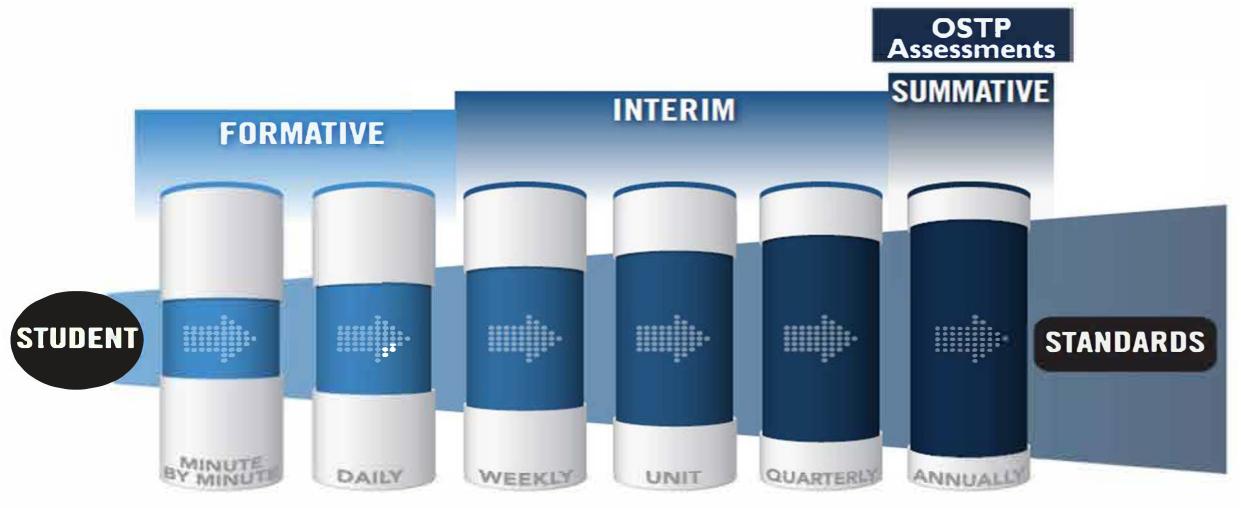
Grade 7 Mathematics Test

Purpose

A robust assessment system is predicated upon the knowledge that no one assessment is able to provide answers to all questions affecting instructional decisions. An assessment system utilizes different types of assessment to gather multiple pieces of evidence to provide timely, relevant, actionable, and reliable information about what students know and can do relative to a set of standards.

Assessments According to the Oklahoma ESSA Plan

According to page 48 of the Oklahoma ESSA Consolidated State Plan, Oklahoma recognizes that a **robust assessment system** is tied closely to students' learning and teachers' instructional practices by valuing and promoting **local, classroom-based formative assessments** that help make **student learning visible**. At the same time, that system should provide a **strong summative assessment** program that fits as a component within a multifaceted state, district, and school accountability system.



The OSDE supports an assessment system by working with Oklahoma educators and stakeholders to:

- Ensure that state and federally required annual summative assessments delivered through the Oklahoma School Testing Program (OSTP) are effective and meaningful to families, districts, educators, and members of the community;
- Develop instructional resources to support local formative and interim assessments through the curriculum frameworks projects and assessment guidance toolkit; and
- Build and deliver professional learning through face-to-face and web-based resources to support local assessment needs and interpretation of state assessment data.

Annual assessments delivered through the OSTP are aligned to the Oklahoma Academic Standards and can therefore provide point-in-time data for programmatic and curricular decisions by supporting criterion-referenced interpretations at appropriate levels and grain size (e.g., grade, student group, teacher, building/district administrator, state). Standards-based formative and interim assessments conducted at the local level can provide additional information and evidence

of learning at a smaller grain size to inform instructional decisions made at the student and classroom level.

While state summative assessments are only one measure of what students know and can demonstrate, having Oklahoma students take OSTP assessments:

- ✓ Helps students, their families, and the public know how students have grown over time and how they are performing relative to the standards, their peers in Oklahoma, and the nation;
- ✓ Enables teachers to see how their students are performing against grade-level expectations communicated through the Performance Level Descriptors (PLDs) to support evaluation and enhancement of curriculum and programs for the next school year;
- ✓ Provides a standardized and reliable measure for school/district leaders, the state, policymakers, and the public to determine how well a system is meeting the goals of helping every child grow along a continuum to prepare them for careers, college, and life; and
- ✓ Provides comparable information and data to inform continuous improvement of a system and appropriately support federal and state accountability decisions.

Test Structure, Format, and Scoring

The Grade 7 Mathematics test will consist of 50 operational items and 10 field-test items, written at a reading level about two grade levels below a Grade 7 audience. The total 60 items will be divided into two test sections.

Each item is scored as correct or incorrect. Only the 50 operational items contribute to a student's scaled score on the test. Correct and incorrect field-test items do not contribute to a student's score.

The student's raw score is converted to a scaled score using the number correct scoring method.

Test Alignment with Oklahoma Academic Standards (OAS)

Criteria for Aligning the Test with the Oklahoma Academic Standards Content Strands and Standards
1. Categorical Concurrence The test is constructed so that there are at least six items measuring each OAS strand. The number of items, six, is based on estimating the number of items that could produce a reasonably reliable estimate of a student's mastery of the content measured.
2. Range-of-Knowledge Correspondence The test is constructed so that every standard for each OAS strand has at least one corresponding assessment item.
3. Source of Challenge Each test item is constructed in such a way that the major cognitive demand comes directly from the targeted OAS strand or standard being assessed, not from specialized knowledge or cultural background that the test-taker may bring to the testing situation.

OKLAHOMA SCHOOL TESTING PROGRAM

TEST BLUEPRINT MATHEMATICS GRADE 7

This blueprint describes the content and structure of an assessment and defines the ideal number of test items by strand and standard of the Oklahoma Academic Standards (OAS).

IDEAL % OF ITEMS	STRANDS AND STANDARDS
18–22%	**NUMBER AND OPERATIONS** 7.N.1 Representation and Comparison of Rational Numbers 7.N.2 Number Operations and Absolute Value
28–32%	**ALGEBRAIC REASONING AND ALGEBRA** 7.A.1 Proportional Relationships 7.A.2 Proportions, Rates and Ratios 7.A.3 Linear Equations and Inequalities 7.A.4 Order of Operations
28–32%	**GEOMETRY AND MEASUREMENT** 7.GM.1 Surface Area and Volume of Rectangular Prisms 7.GM.2 Trapezoids and Composite Figures 7.GM.3 Circles 7.GM.4 Transformations
18–22%	**DATA AND PROBABILITY** 7.D.1 Data Analysis 7.D.2 Probability
100%	**TOTAL: 50 ITEMS**

(Please note this blueprint does not include items that may be field-tested.)
A minimum of 6 items is required to report a strand.

Depth-of-Knowledge Assessed by Test Items

The Grade 7 test will approximately reflect the following "depth-of-knowledge (DOK)" distribution of items:

Depth-of-Knowledge	Percent of Items
Level 1—Recall	15–25%
Level 2—Skills/Concept	65–75%
Level 3—Strategic Thinking	10–20%

DOK Ranges are based on the DOK of the OAS. The standards increase grade-level expectations and rigor, and set expectations for students to be college- and career-ready.

- **Level 1** (Recall and Reproduction) requires the student to recall facts, terms, definitions, or simple procedures, perform simple algorithms or apply formulas. One-step, well-defined, or straight algorithmic procedures should be included at this level.
- **Level 2** (Skills and Concepts) requires the student to make some decisions as to how to approach the problem or activity. Level 2 activities include making observations and collecting data; classifying, comparing, and organizing data; and organizing and displaying data in tables, charts, and graphs.
- **Level 3** (Strategic Thinking) requires reasoning, planning, using evidence, and a higher level of thinking. Level 3 activities include making conjectures, drawing conclusions from observations, citing evidence and developing a logical argument for concepts, explaining phenomena in terms of concepts, and using concepts to solve nonroutine problems.

Note: These descriptions are adapted from Review Background Information and Instructions, Standards and Assessment Alignment Analysis, CCSSO TILSA Alignment Study, May 21–24, 2001, Version 2.0. For an extended description of each depth-of-knowledge level, see the web site at https://sde.ok.gov/sites/default/files/documents/files/Math%20WebbAlign_DOK_Summary_Table.pdf.

Universal Design for Learning (UDL) Considerations

Universal Design for Learning (UDL), as applied to assessments, is a framework that provides flexibility in the way information is presented and in the ways students demonstrate knowledge and skills. This reduces barriers while maintaining high expectations for all students, including students with disabilities and students who are limited English proficient. In the Oklahoma Grade 7 tests, items and instructions have been designed to provide maximum readability, comprehensibility, and legibility for all students. This includes such design aspects as reducing the language load in content areas other than Language Arts, increasing the font size, displaying fewer items per page, and boxing the items to assist visual focus.

Online Administration

Test questions will be presented one at a time.

The stimulus and question will appear on the screen at the same time.

Answers may be selected by using the mouse to click on the radio button to the left of the answer choice.

Navigation buttons appear at the bottom of the page for each question. For longer items, a scroll bar will appear on the right-hand side of the window to allow scrolling through the answer choices.

Tools (including a calculator on the Grade 7 Mathematics assessment) appear at the bottom of the screen/page to aid in answering questions.

Students will be able to use scratch paper for all online assessments. This paper must be collected and destroyed by the test administrator immediately following the test. The test administrator must not look at what the student has written on the scratch paper.

Testing Schedules

This section appears in all of the test specification documents and is provided to give the reader a general sense of the overall testing program at this particular grade level.

Each Grade 7 test is meant to be administered in two sessions within one day with a break given between sessions or on consecutive days. Estimated time for scheduling purposes is given in the table below.

Grade 7 Mathematics Online Test Time Schedule	
Distributing login information	Approximately 5 minutes
Test instructions/tutorial and reviewing sample items	Approximately 15 minutes
Total:	Approximately 20 minutes
Administering Section 1 of the G7 Mathematics Online Test	Approximately 40 minutes
Administering Section 2 of the G7 Mathematics Online Test	Approximately 40 minutes

Item Types

The test will consist of a combination of multiple choice and technology enhanced items.

Most stems are positively worded—avoiding the use of the word "not." If a negative is required, it is underlined for emphasis (e.g., if a bag has the same number of red, blue, and black marbles, what is the probability that a marble randomly selected from the bag is not red?).

Multiple-Choice Item Guidelines

- All items must clearly indicate what is expected in a response and direct students to focus on their responses.
- Each multiple-choice item has a stem (question, statement, and/or graphic component) and four answer options—the correct answer and three distractors. Distractors will be developed based on the types of errors students are most likely to make.

- Multiple-choice item stems ask a question or pose a clear problem so that students will know what to do before looking at the answer choices. Students should not need to read all answer choices before knowing what is expected. A stem will seldom include an incomplete sentence.

Technology Enhanced Item Guidelines

- Technology Enhanced Items (TEIs) should be used to more authentically address some aspects of the OAS performance expectations and/or provide more opportunity for students to construct rather than select their response.
- TEI sample items have been included in this document to illustrate some of the interaction types. Each TEI contains only one interaction type per item.
- For each TEI, the interaction type used is that which is the most appropriate and enhancing to the construct to be measured.
- Each TEI is structured to contain the question (content) first followed by directions for how to complete the interaction in that item. Consistent style and language are used in these directions (e.g., "Drag the pictures," "Click the object," etc).

In summary, Grade 7 test items assess whether students understand algebraic concepts and procedures, whether they can communicate their understandings effectively in mathematical terms, and whether they can approach problems and develop viable solutions.

Stimulus Materials

Stimulus materials are the tables, charts, graphs, passages, and illustrations students must use in order to respond to items. The following characteristics are necessary for stimulus materials:

1. A stimulus that gives information must precede a question or a set of questions.
2. When students are given information to evaluate, they should know the question and the purpose of the information.
3. Passages, graphics, tables, etc., provide sufficient information for assessment of multiple objectives.
4. Stimulus materials for a set of items may be a combination of multiple stimuli.
5. Information in stimulus materials is based on situations students would encounter in or beyond school.
6. For conceptual items, stimulus materials are necessary but not conceptually sufficient for student response.
7. There is a balance of graphic and textual stimulus materials within a test form. Approximately 50 percent of the items will have appropriate pictorial or graphical representations. Graphs, tables, or figures are clearly associated with their intended items. Graphics appear on the same page as the textual stimulus or on the facing page.

General Considerations—Oklahoma School Testing Program

1. Items deal with issues and details that are of consequence in the stimulus and central to students' understanding and interpretation of the stimulus.
2. Test items are varied and address all OAS standards listed in the Test Blueprint.
3. To the greatest extent possible, no item or response choice clues the answer to any other item.
4. All items reviewed and approved by the Oklahoma Item Review Committee are assigned an OAS strand, standard, and/or objective. The Test Blueprints and score reports reflect the degree to which each OAS strand and standard is represented on the test.
5. Test items are tied closely and particularly to the stimuli from which they derive, so that the impact of outside (prior) knowledge, while never wholly avoidable, is minimized.
6. Each multiple-choice item contains a question and four answer options, only one of which is correct. Correct answers will be approximately equally distributed among A, B, C, and D responses.
7. Distractors adopt the language and sense of the material in the stimuli so that students must think their way to the correct answer rather than simply identify incorrect responses by virtue of a distractor's obviously inappropriate nature.
8. Distractors should always be plausible (but, of course, incorrect) in the context of the stimulus. Students should not be able to rule out a wrong answer or identify a correct response solely because it looks different from the other answer choices.
9. Order of presentation of item types is dictated by logic (chronologically, spatially, etc.).
10. Items are worded precisely and clearly. The better focused an item, the more reliable and fair it is certain to be, and the more likely all students will understand it in the same way.
11. The range of items measuring an OAS standard consisting of more than one skill will provide a balanced representation of those skills.
12. Items should be focused on what all students should know and be able to do as they complete their Grade 7 coursework.
13. The responses "Both of the above," "All of the above," "None of the above," and "Neither of the above" will not be used.
14. The material presented is balanced, culturally diverse, well written, and of interest to Grade 7 test level students. The stimuli and items are fairly presented in order to gain a true picture of students' skills.
15. Across all forms, a balance of gender and active/passive roles by gender is maintained.
16. Forms attempt to represent the ethnic diversity of Oklahoma students.
17. Approved calculators and the formula sheet on page 9 may be used on the Grade 7 Mathematics test. No other resource materials may be used by students during the test. More information regarding the calculator policy can be found at http://sde.ok.gov/sde/assessment-administrator-resources-administrators.
18. The stimuli avoid subject matter that might prompt emotional distress on the part of the students.
19. Permission to use stimuli from copyrighted material is obtained as necessary by testing vendor.

Considerations Specific to the Grade 7 Mathematics Test

It is necessary to create test items that are reliable, fair, and targeted to the Oklahoma Academic Standards listed on the following pages. There are some general considerations and procedures for effective item development.

These considerations include, but are not limited to, the following:

1. Each test form contains items assessing all content standards.
2. Test items that assess each standard are not limited to one particular type of response format.
3. Test questions attempt to focus on content that is authentic and that Grade 7 level students can relate to and understand.
4. Test items are worded precisely and clearly. The better focused an item, the more reliable and fair it is likely to be, and the more likely all students will understand what is required of them.
5. All items are reviewed to eliminate language that shows bias or that would otherwise likely disadvantage a particular group of students. That is, items do not display unfair representations of gender, race, ethnicity, disability, culture, or religion; nor do items contain elements that are offensive to any such groups.
6. Items are written so that calculations are kept to a minimum, and numbers are selected to minimize the time spent on computations.
7. All test items and answer choices have appropriate labels and units.
8. Most graphs are placed on a gray grid, with the x- and y-axes labeled and marked.

All items developed using these specifications are reviewed annually by Oklahoma educators and approved by the Oklahoma State Department of Education. The distribution of newly developed items is based on difficulty, cognitive ability, percentage of art/graphics, and grade-level appropriateness as determined by an annual Item Development Plan approved by the Oklahoma State Department of Education.

Oklahoma State Testing Program
7th Grade Mathematics Formula Sheet

UNIT CONVERSIONS

1 foot = 12 inches

1 yard = 3 feet

1 mile = 5280 feet

1 mile = 1760 yards

1 meter = 100 centimeters

1 meter = 1000 millimeters

1 pound = 16 ounces

1 ton = 2000 pounds

1 kilogram = 1000 grams

1 cup = 8 fluid ounces

1 pint = 2 cups

1 quart = 2 pints

1 gallon = 4 quarts

AREA

Square	$A = s^2$	Parallelogram	$A = bh$
Rectangle	$A = lw$	Circle	$A = \pi r^2$
Triangle	$A = \frac{1}{2}bh$	Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$

CIRCUMFERENCE

Circle $C = \pi d$ or $C = 2\pi r$

VOLUME

Rectangular Prism $V = Bh$ or $V = lwh$

SURFACE AREA

Rectangular Prism $S = 2B + Ph$ or $S = 2lw + 2lh + 2wh$

LINEAR EQUATIONS

Direct Variation $y = kx$

OTHER

$d = rt$

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Overview of Item Specifications

For each OAS strand, item specifications are organized under the following headings:

- OAS Strand
- OAS Standard
- OAS Objectives
- Item Specifications
    a. Emphasis
    b. Stimulus Attributes
    c. Format
    d. Content Limits
    e. Primary Process Standard(s)
    f. Distractor Domain
    g. Sample Test Items

The headings "OAS Strands" and "OAS Standards" state the OAS strand followed by the OAS standard being measured in the mathematics section of the Oklahoma Academic Standards document.

For each standard, the information under the heading "Item Specifications" highlights important points about a test item's emphasis, format, content limits, and distractor domain. Sample test items are provided with each strand to illustrate these specifications. Although it is sometimes possible to score single items for more than one concept, all items in these tests are written to address a single objective as the primary concept.

Note: With the exception of content limits, the Item Specifications offer suggestions of what might be included and do not provide an exhaustive list of what can be included. For this reason, Item Specifications are only meant to be a supplemental resource for classroom instruction.

In addition, the sample test items are not intended to be definitive in nature or construction—the stimuli and the test items that follow them may differ from test form to test form, as may their presentations. Sample test items are not intended to predict a student's performance on the actual test, but rather to allow students to familiarize themselves with the item types and formats that they may see on the test.

STANDARDS & SAMPLE ITEMS

OAS STRAND—NUMBER & OPERATIONS (N): STANDARD 7.N.1

OAS STANDARD

7.N.1 Read, write, represent, and compare rational numbers, expressed as integers, fractions, and decimals.

OAS OBJECTIVES

7.N.1.1 Know that every rational number can be written as the ratio of two integers or as a terminating or repeating decimal.

7.N.1.2 Compare and order rational numbers expressed in various forms using the symbols <, >, and =.

7.N.1.3 Recognize and generate equivalent representations of rational numbers, including equivalent fractions.

ITEM SPECIFICATIONS

Emphasis:

- Demonstrate an understanding of the structure of rational numbers.
- Compare and order rational numbers.
- Recognize and generate equivalent representations of rational numbers.

Stimulus Attributes:

- Test items may include illustrations of the following: number lines, 10 x 10 grids, 1000's blocks, fraction strips, two- and three-dimensional geometric figures, illustrations of coordinate graphs, balances; illustrations of rulers, thermometers, beakers, and other measuring instruments; calculator displays, tables, graphs, charts, maps, scale drawings, frequency charts; line, bar, circle and picture graphs; Venn diagrams; stem-and-leaf plots, box-and-whisker plots, scatter plots; histograms, data sets, spinners, and other diagrams.

Format:

- Convert between and among rational numbers, fractions, and decimals
- Compare, order, and translate among representations of rational numbers
- Generate equivalent representations of rational numbers

Content Limits:

- Limit to rational numbers, decimals, and fractions
- Limit mathematical and real-life contexts to age-appropriate situations
- Limit decimals to ten-thousandths

OAS STRAND—NUMBER & OPERATIONS (N): STANDARD 7.N.1

ITEM SPECIFICATIONS

Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop the Ability to Communicate Mathematically
- Develop a Deep and Flexible Conceptual Understanding
- Develop the Ability to Make Conjectures, Model, and Generalize

Distractor Domain:

- Incorrect procedures
- Computational errors
- Comparison errors
- Misunderstanding of mathematical symbols
- Common errors
- Incorrect use of rules or properties

1 **Which set of numbers is arranged in order from <u>least</u> to <u>greatest</u>?**

A $0.25, \frac{1}{3}, \frac{3}{5}, 0.85$

B $\frac{1}{3}, 0.25, \frac{3}{5}, 0.85$

C $0.25, 0.85, \frac{1}{3}, \frac{3}{5}$

D $\frac{1}{3}, \frac{3}{5}, 0.25, 0.85$

Standard: 7.N.1.2 Compare and order rational numbers expressed in various forms using the symbols <, >, and =.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to order numbers, which include both fractions and decimals, from smallest to largest.

Distractor Rationale:

A. **Correct. The student demonstrated an ability to compare and order rational numbers expressed in various forms.**

B. The student confused $\frac{1}{3}$ with 0.13.

C. The student did not know how to compare fractions to decimals so lists the decimals first and then the fractions.

D. The student did not know how to compare fractions to decimals so lists the fractions first and then the decimals.

2 **One day last winter, the temperature was −5.3 °C in Tamika's town and −4.06 °C in Mark's town. In Gina's town, it was even colder than both of the other towns. Which could have been the temperature in Gina's town that day?**

A −2.6 °C

B −4.1 °C

C −5.03 °C

D −5.4 °C

Standard: 7.N.1.2 Compare and order rational numbers expressed in various forms using the symbols <, >, and =.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to think about the given numbers and then identify a temperature lower than both.

Distractor Rationale:

A. The student ignored the negative signs.

B. The student found a temperature colder than Mark's town only.

C. The student made a place value error, thinking −5.03 is colder than −5.3.

D. **Correct. The student demonstrated an ability to compare and order rational numbers.**

3

Match each number in the left column with the equivalent number in the right column.
To connect numbers, click a number in the left column and then a number in the right column, and a line will automatically be drawn between them. To remove a connection, hold the pointer over the line until it turns red, and then click it. Each number in the left column matches to only one number in the right column.

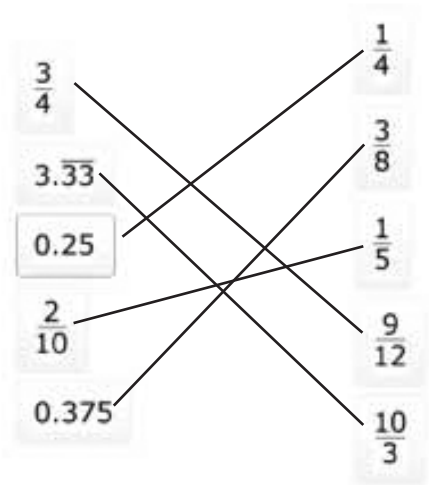
$\frac{3}{4}$	$\frac{1}{4}$
$3.\overline{33}$	$\frac{3}{8}$
0.25	$\frac{1}{5}$
$\frac{2}{10}$	$\frac{9}{12}$
0.375	$\frac{10}{3}$

Standard: 7.N.1.3 Recognize and generate equivalent representations of rational numbers, including equivalent fractions.

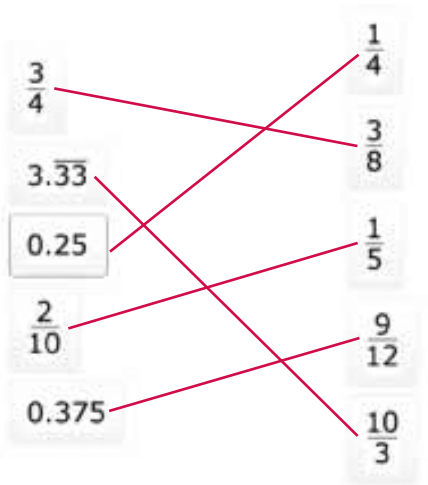
Depth-of-Knowledge: 2
This item is a DOK 2 because it requires the student to recognize equivalent numbers in different forms, including fractions and decimals.

Sample Distractor Rationales:

Correct



Incorrect



The student thought fractions with the same numerator are equivalent.

OAS STRAND—NUMBER & OPERATIONS (N): STANDARD 7.N.2

OAS STANDARD

7.N.2 Calculate with integers and rational numbers, with and without positive integer exponents, to solve real-world and mathematical problems; explain the relationship between absolute value of a rational number and the distance of that number from zero.

OAS OBJECTIVES

7.N.2.1 Estimate solutions to multiplication and division of integers in order to assess the reasonableness of results.

7.N.2.2 Illustrate multiplication and division of integers using a variety of representations.

7.N.2.3 Solve real-world and mathematical problems involving addition, subtraction, multiplication and division of rational numbers; use efficient and generalizable procedures including but not limited to standard algorithms.

7.N.2.4 Raise integers to positive integer exponents.

7.N.2.5 Solve real-world and mathematical problems involving calculations with rational numbers and positive integer exponents.

7.N.2.6 Explain the relationship between the absolute value of a rational number and the distance of that number from zero on a number line. Use the symbol for absolute value.

ITEM SPECIFICATIONS

Emphasis:

- Estimate the product and quotient of integers and assess the reasonableness of results.
- Represent multiplication and division of integers.
- Solve real-world and mathematical problems involving addition, subtraction, multiplication and division of rational numbers.
- Solve real-world and mathematical problems that involve raising integers to positive integer exponents.
- Demonstrate an understanding of absolute value.

Stimulus Attributes:

- Test items may include: illustrations of coordinate graphs, number lines, 10 x 10 grids, base-10 blocks, cubes, counting manipulatives, balances, two-dimensional geometric figures, deposits and withdrawals, rulers, thermometers, calculator displays, tables, graphs, charts, maps, scale drawings, bar graphs, picture graphs, data sets, other diagrams, equivalency statements, and algebraic expressions.

Format:

- Estimate the product and quotient of integers
- Assess the reasonableness of the product and quotient of integers
- Use graphs, grids, and other representations to illustrate multiplication and division of integers
- Use rational numbers to solve problems involving products and quotients in mathematical and real-world contexts
- Items may include fractions with different denominators

OAS STRAND—NUMBER & OPERATIONS (N): STANDARD 7.N.2

ITEM SPECIFICATIONS

Format (continued):

- Multiply decimals with one- or two-digit multipliers
- Divide decimals by two-digit divisors without remainder
- Divide whole numbers by two-digit divisors with and without remainders expressed as whole numbers or fractions
- Raise integers to positive integer exponents
- Use the rules of exponents in mathematical and real-life contexts
- Show the relationship between absolute value and the distance of that number from zero on a number line
- Use the symbol for absolute value

Content Limits:

- Limit operations to multiplication and/or division, for illustrations and estimates
- Limit fractions to halves, thirds, fourths, fifths, sixths, eighths, tenths, and twelfths
- Limit mathematical and real-world contexts to age-appropriate situations
- Limit dividends to four digits
- Limit multiplicands to three digits
- Limit exponents to natural numbers
- Limit to no more than two operations on exponential numbers

Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop the Ability to Communicate Mathematically
- Develop Mathematical Reasoning
- Develop a Deep and Flexible Conceptual Understanding
- Develop the Ability to Make Conjectures, Model, and Generalize

Distractor Domain:

- Common errors
- Incorrect procedures
- Computational errors
- Incorrect use of rules or properties
- Use of incorrect equivalencies
- Error in expression of remainder as fraction
- Order of operations errors

4 **Gabrielle had $300 in her checking account and $125 in her savings account. If Gabrielle transferred enough money from her checking account to her savings account to double the savings account balance, what is her new checking account balance?**

A $350

B $250

C $175

D $125

Standard: 7.N.2.3 Solve real-world and mathematical problems involving addition, subtraction, multiplication and division of rational numbers; use efficient and generalizable procedures including but not limited to standard algorithms.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to determine how to approach the problem, and then solve a non-routine problem involving more than one operation.

Distractor Rationale:

A. The student found the amount that needed to be transferred, $125, then doubled it to get $250, and then added that to the existing $125.

B. The student doubled the savings account balance.

C. Correct. The student demonstrated an ability to solve a real-world problem involving addition, subtraction, and multiplication.

D. The student found the amount that needed to be transferred.

5

$$8 - 4 \times 3^3 + 11$$

What is the value of this expression?

A –89

B –17

C 23

D 119

Standard: 7.N.2.5 Solve real-world and mathematical problems involving calculations with rational numbers and positive integer exponents.

Depth-of-Knowledge: 1

This item is a DOK 1 because it requires the student to complete a simple procedure, finding the value of an expression.

Distractor Rationale:

A. **Correct. The student demonstrated an ability to solve a mathematical problem involving calculations with rational numbers and positive integer exponents.**

B. The student thought $3^3 = 3 \times 3 = 9$.

C. The student did not know how to solve for exponents or how to use order of operations and computed $(8 - 4) \times 3 + 11$.

D. The student computed $(8 - 4) \times 3^3 + 11$.

6

$$\frac{12+18}{3}+5-3^4$$

What is the value of this expression?

A −66

B −54

C 26

D 96

Standard: 7.N.2.5 Solve real-world and mathematical problems involving calculations with rational numbers and positive integer exponents.

Depth-of-Knowledge: 1

This item is a DOK 1 because it requires the student to complete a simple procedure, finding the value of an expression.

Distractor Rationale:

A. **Correct. The student demonstrated an ability to solve a mathematical problem involving calculations with rational numbers and positive integer exponents.**

B. The student computed $\frac{12}{3} + 18$ instead of $\frac{12 + 18}{3}$.

C. Balance distractor

D. The student added 3^4 instead of subtracted.

OAS STRAND—ALGEBRAIC REASONING & ALGEBRA (A): STANDARD 7.A.1

OAS STANDARD

7.A.1 Understand the concept of proportionality in real-world and mathematical situations, and distinguish between proportional and other relationships.

OAS OBJECTIVES

7.A.1.1 Describe that the relationship between two variables, x and y, is proportional if it can be expressed in the form $\frac{y}{x} = k$ or $y = kx$; distinguish proportional relationships from other relationships, including inversely proportional relationships ($xy = k$ or $y = \frac{k}{x}$).

7.A.1.2 Recognize that the graph of a proportional relationship is a line through the origin and the coordinate $(1, r)$, where both r and the slope are the unit rate (constant of proportionality, k).

ITEM SPECIFICATIONS

Emphasis:

- Understand that the relationship between x and y is proportional if it can be expressed in the form $\frac{y}{x} = k$ or $y = kx$.
- Distinguish proportional relationships from other relationships.
- Demonstrate an understanding of graphs of proportional relationships.

Stimulus Attributes:

- Test items may include illustrations of the following: illustrations of coordinate graphs, number lines, balances, two- and three-dimensional geometric figures; illustrations of rulers, thermometers, beakers, and other measuring instruments; calculator displays, tables, graphs, charts, maps, scale drawings, frequency charts; line, bar, and picture graphs; Venn diagrams; stem-and-leaf plots, box-and-whisker plots, scatter plots; histograms, data sets, spinners, and other diagrams.

Format:

- Analyze the relationship between two variables in an equation to determine whether or not the relationship is proportional
- Recognize proportional relationships from other relationships
- Recognize inversely proportional relationships
- Recognize and interpret the graph of a proportional relationship
- Describe the concept of proportionality in real-world and mathematical situations

Content Limits:

- Limit number of variables in a proportion to one
- Limit real-world contexts to age-appropriate situations

OAS STRAND—ALGEBRAIC REASONING & ALGEBRA (A): STANDARD 7.A.1

ITEM SPECIFICATIONS

Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop the Ability to Communicate Mathematically
- Develop Mathematical Reasoning
- Develop a Deep and Flexible Conceptual Understanding

Distractor Domain:

- Common errors
- Incorrect procedures
- Inappropriate operations with variables
- Computational errors
- Incorrect use of rules or properties

7 **Which equation represents a proportional relationship?**

A $y = -2x$

B $y = 5 - 2x$

C $y = 2x - 5$

D $y = 2x + 5$

Standard: 7.A.1.1 Describe that the relationship between two variables, x and y, is proportional if it can be expressed in the form $y/x = k$ or $y = kx$; distinguish proportional relationships from other relationships, including inversely proportional relationships ($xy = k$ or $y = k/x$).

Depth-of-Knowledge: 1

This item is a DOK 1 because it requires the student to recall a term or definition, proportional relationship.

Distractor Rationale:

A. **Correct. The student demonstrated an ability to identify an equation that represents a proportional relationship.**

B. The student did not know how to determine if an equation represents a proportional relationship.

C. The student did not know how to determine if an equation represents a proportional relationship.

D. The student did not know how to determine if an equation represents a proportional relationship.

8 **Which table shows an inversely proportional relationship between *x* and *y*?**

A

x	y
5	60
10	30
15	20
20	15

B

x	y
5	3.5
10	7.0
15	10.5
20	17.5

C

x	y
5	−4
10	−11
15	−18
20	−25

D

x	y
5	15
10	30
15	45
20	60

Standard: 7.A.1.1 Describe that the relationship between two variables, x and y, is proportional if it can be expressed in the form $y/x = k$ or $y = kx$; distinguish proportional relationships from other relationships, including inversely proportional relationships ($xy = k$ or $y = k/x$).

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to extract information from the table in order to find the one that shows an inversely proportional relationship.

Distractor Rationale:

A. **Correct. The student demonstrated an ability to identify an inversely proportional relationship between *x* and *y*.**
B. The student confused proportional and inversely proportional relationships.
C. The student selected a relationship where the *y*-values decrease at a constant rate.
D. The student confused proportional and inversely proportional relationships.

OAS STRAND—ALGEBRAIC REASONING & ALGEBRA (A): STANDARD 7.A.2

OAS STANDARD

7.A.2 Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols, and graphs; solve problems involving proportional relationships and interpret results in the original context.

OAS OBJECTIVES

7.A.2.1 Represent proportional relationships with tables, verbal descriptions, symbols, and graphs; translate from one representation to another. Determine and compare the unit rate (constant of proportionality, slope, or rate of change) given any of these representations.

7.A.2.2 Solve multi-step problems involving proportional relationships involving distance-time, percent increase or decrease, discounts, tips, unit pricing, similar figures, and other real-world and mathematical situations.

7.A.2.3 Use proportional reasoning to solve real-world and mathematical problems involving ratios.

7.A.2.4 Use proportional reasoning to assess the reasonableness of solutions.

ITEM SPECIFICATIONS

Emphasis:

- Create and translate between representations of proportional relationships.
- Determine and compare the unit rate of proportional relationships.
- Solve multi-step problems involving proportional relationships.
- Solve real-world and mathematical problems involving ratios.
- Assess the reasonableness of solutions to problems that involve proportional relationships.

Stimulus Attributes:

- Test items may include: illustrations of coordinate graphs, number lines, balances, two- and three-dimensional geometric figures; illustrations of rulers, thermometers, beakers, and other measuring instruments; calculator displays, tables, graphs, charts, maps, scale drawings, frequency charts; line, bar, and picture graphs; Venn diagrams; stem-and-leaf plots, box-and-whisker plots, scatter plots; histograms, data sets, spinners, and other diagrams.

Format:

- Use tables, verbal descriptions, symbols, and graphs to represent proportional relationships
- Translate from one representation of proportional relationships to another
- Determine and compare the unit rate of proportional relationships
- Graph proportional relationships
- Select and apply ratios and proportions among other methods to solve multi-step proportional relationship problems in mathematical, geometric, and real-world contexts
- Find the proportional relationships involving distance-time, percent increase or decrease, discounts, tips, unit pricing, similar figures, and other real-world and mathematical situations.
- Select and apply ratios and proportions to solve problems in mathematical, geometric, and real-world contexts
- Use proportional reasoning to assess the reasonableness of solutions

OAS STRAND—ALGEBRAIC REASONING & ALGEBRA (A): STANDARD 7.A.2

ITEM SPECIFICATIONS

Content Limits:

- Limit number of variables in a proportion to one
- Limit real-world contexts to age-appropriate situations
- Limit decimals to thousandths

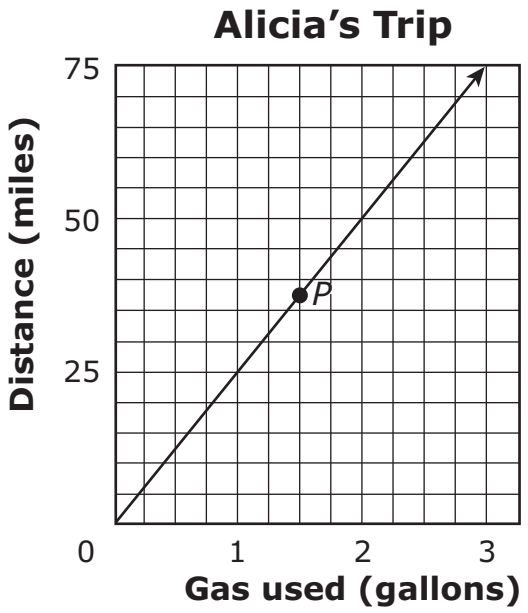
Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop the Ability to Communicate Mathematically
- Develop Mathematical Reasoning
- Develop a Deep and Flexible Conceptual Understanding

Distractor Domain:

- Common errors
- Incorrect procedures
- Computational errors
- Incorrect use of rules or properties
- Inappropriate operations with variables
- Use of incorrect equivalencies

9 **Alicia drove to her grandparent's house. The graph below shows the number of gallons of gas used and the distance traveled during the trip.**



According to the graph, which statement best describes point *P*?

A Alicia used 1.5 gallons to travel a distance of 37.5 miles.

B Alicia used 37.5 gallons to travel a distance of 1.5 miles.

C Alicia traveled at a rate of 37.5 miles per hour.

D Alicia traveled at a rate of 1.5 miles per hour.

Standard: 7.A.2.1 Represent proportional relationships with tables, verbal descriptions, symbols, and graphs; translate from one representation to another. Determine and compare the unit rate (constant of proportionality, slope, or rate of change) given any of these representations.

Depth-of-Knowledge: 2
This item is a DOK 2 because it requires the student to extract information from the graph in order to find the statement that best describes a point on the graph.

Distractor Rationale:

A. **Correct. The student demonstrated an ability to represent a proportional relationship with a verbal description.**
B. The student confused the x and y axes.
C. The student focused on the y-value and chose a common relationship.
D. The student focused on the x-value and chose a common relationship.

10 **Manuel is cooking dinner for his family of 4. The recipe he is using makes dinner for 6 people. The recipe calls for 3 cups of flour. How many cups of flour should Manuel use to make the recipe for 4 people?**

A 1 cup

B 2 cups

C 7 cups

D 8 cups

Standard: 7.A.2.2 Solve multi-step problems involving proportional relationships involving distance-time, percent increase or decrease, discounts, tips, unit pricing, similar figures, and other real-world and mathematical situations.

Depth-of-Knowledge: 2
This item is a DOK 2 because it requires the student to solve a multi-step problem.

Distractor Rationale:

A. The student computed 4 − 3.

B. Correct. The student demonstrated an ability to solve a problem using proportional relationships.

C. The student computed 4 + 3.

D. The student set up an incorrect proportion, $\frac{4}{6} = \frac{3}{x}$.

OAS STRAND—ALGEBRAIC REASONING & ALGEBRA (A): STANDARD 7.A.3

OAS STANDARD

7.A.3 Represent and solve linear equations and inequalities.

OAS OBJECTIVES

7.A.3.1 Write and solve problems leading to linear equations with one variable in the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are rational numbers.

7.A.3.2 Represent, write, solve, and graph problems leading to linear inequalities with one variable in the form $x + p > q$ and $x + p < q$, where p, and q are nonnegative rational numbers.

7.A.3.3 Represent real-world or mathematical situations using equations and inequalities involving variables and rational numbers.

ITEM SPECIFICATIONS

Emphasis:

- Write and solve problems leading to linear equations.
- Write, solve, and graph problems leading to linear inequalities.
- Represent real-world or mathematical situations using equations and inequalities.

Stimulus Attributes:

- Test items may include algebraic equations, strict and non-strict inequalities, and illustrations of the following: coordinate graphs, number lines, balances, other diagrams, and two- and three-dimensional geometric figures.

Format:

- Identify, write, and solve linear equations involved in mathematical and real-world situations
- Solve and graph the solution to a linear inequality
- Identify inequalities that model mathematical and real-world situations
- Select and apply appropriate formulas for mathematical and real-world situations
- Formulas may or may not be given

Content Limits:

- Limit inequalities to one step
- Limit inequalities to one variable
- Limit coefficients to rational numbers
- No compound inequalities
- Limit formulas to those used in real-world situations
- Limit multistep processes to no more than two steps for each component stage
- Limit real world and mathematical contexts to age appropriate situations

OAS STRAND—ALGEBRAIC REASONING & ALGEBRA (A): STANDARD 7.A.3

ITEM SPECIFICATIONS

Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop the Ability to Communicate Mathematically
- Develop Mathematical Reasoning
- Develop a Deep and Flexible Conceptual Understanding
- Develop the Ability to Make Conjectures, Model, and Generalize

Distractor Domain:

- Common errors
- Incorrect procedures
- Inappropriate operations with variables
- Use of inappropriate formulas

11 **Carla bought 8 equally priced theater tickets. The total cost was $190 including a $6 service charge. This equation can be used to find *t*, the price of each ticket.**

$$8t + 6 = 190$$

What is the price of each ticket, *t*?

A $14.00

B $23.00

C $23.75

D $24.50

Standard: 7.A.3.1 Write and solve problems leading to linear equations with one variable in the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are rational numbers.

Depth-of-Knowledge: 1

This item is a DOK 1 because it requires the student to complete a simple procedure, solving for a variable in a given equation.

Distractor Rationale:

A. The student computed $8 + 6 = 14$ or $8t + 6t = 190$ and then rounded the answer to the nearest whole number.

B. Correct. The student demonstrated an ability to solve for a variable in a linear equation.

C. The student ignored the +6 and solved for $8t = 190$.

D. The student added 6 to 190 instead of subtracting.

12

Simone ordered packets of seeds from a store. The packets cost $2.50 each plus a shipping fee of $4.00 for the entire order.

Drag the numbers into the table to show how many seed packets Simone can order for each amount in the "Total Cost" column. To place a number in the table, click and hold the number and then drag it to the desired space. To change a number, click and hold it, and then drag it back to the desired space.

Number of Seed Packets Ordered	Total Cost, Including Shipping ($)
	9.00
	16.50
	21.50
	29.00

1 2 3 4 5

6 7 8 9 10

Standard: 7.A.3.1 Write and solve problems leading to linear equations with one variable in the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are rational numbers.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to write and then solve a problem using an equation with more than one step.

Sample Distractor Rationales:

Correct

Number of Seed Packets Ordered	Total Cost, Including Shipping ($)
2	9.00
5	16.50
7	21.50
10	29.00

Incorrect

Number of Seed Packets Ordered	Total Cost, Including Shipping ($)
2	9.00
4	16.50
5	21.50
7	29.00

The student confused the $2.50 and the $4.00 and used the equation $y = 4x + 2.50$.

Number of Seed Packets Ordered	Total Cost, Including Shipping ($)
2	9.00
4	16.50
6	21.50
8	29.00

The student found the correct number of seed packets for $9.00 and then assumed that the number of seed packets would increase by 2 for each row.

13 **Which situation can be modeled by this inequality?**

$$x \geq 12$$

A Twelve bottles will fill the cardboard box.

B The students had to run at least 12 laps in track practice.

C Use the yardstick to find the length of objects longer than 12 inches.

D The sign says the play area is for children 12 years of age or younger.

Standard: 7.A.3.2 Represent, write, solve, and graph problems leading to linear inequalities with one variable in the form $x + p > q$ and $x + p < q$, where p, and q are nonnegative rational numbers.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to understand what the inequality means and then find a real-life representation of the inequality.

Distractor Rationale:

A. The student confused = and ≥.

B. Correct. The student demonstrated an ability to identify a linear inequality with one variable that represents a real-world situation.

C. The student confused > and ≥.

D. The student confused ≤ and ≥.

14

Match each inequality in the left column with its equivalent inequality in the right column. To make a match, click on an inequality in the left column and then on its equivalent inequality in the right column, and a line will automatically be drawn between them. To remove a connection, hold the pointer over the line until it turns red, and then click it. Each inequality in the left column matches to only one inequality in the right column.

$x + 3 < 5$	$x > -6$
$x - 1 \geq 9$	$x \geq 2$
$x + 8 > 2$	$x < 2$
$x - 5 \leq 3$	$x \leq 8$
	$x < 8$
	$x \geq 10$

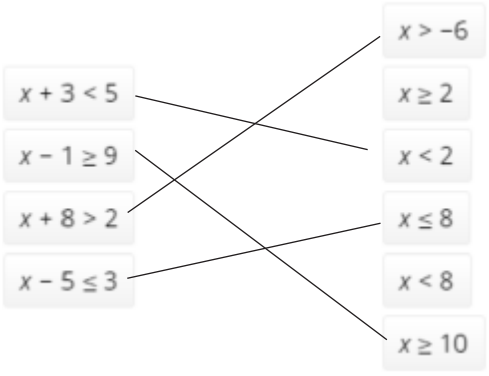
Standard: 7.A.3.2 Represent, write, solve, and graph problems leading to linear inequalities with one variable in the form $x + p > q$ and $x + p < q$, where p, and q are nonnegative rational numbers.

Depth-of-Knowledge: 2

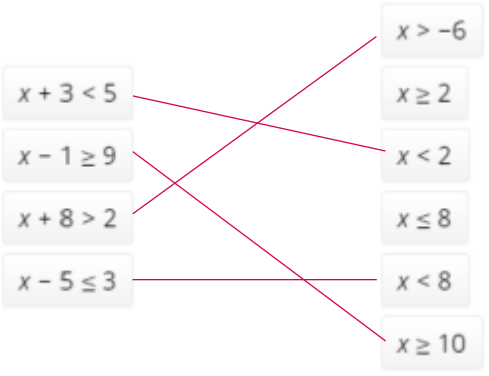
This item is a DOK 2 because it requires the student to decide how to find equivalent inequalities.

Sample Distractor Rationales:

Correct



Incorrect



The student did not understand that < is different from ≤.

OAS STRAND—ALGEBRAIC REASONING & ALGEBRA (A): STANDARD 7.A.4

OAS STANDARD

7.A.4 Use order of operations and properties of operations to generate equivalent numerical and algebraic expressions containing rational numbers and grouping symbols; evaluate such expressions.

OAS OBJECTIVES

7.A.4.1 Use properties of operations (limited to associative, commutative, and distributive) to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents.

7.A.4.2 Apply understanding of order of operations and grouping symbols when using calculators and other technologies.

ITEM SPECIFICATIONS

Emphasis:

- Use properties of operations to generate equivalent numerical and algebraic expressions.
- Demonstrate the ability to use the order of operations and grouping symbols.

Stimulus Attributes:

- Test items may include illustrations of the following: tables, graphs, charts, data sets, equivalency statements, and algebraic expressions.

Format:

- Use the properties of operations to generate equivalent numerical and algebraic expressions
- Use the rules for order of operations and grouping symbols when using calculators and other technologies
- Items may include exponents and parentheses

Content Limits:

- Limit exponents to natural numbers
- Limit properties to associative, commutative, and distributive
- Limit nested grouping symbols to two

Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop Mathematical Reasoning

Distractor Domain:

- Common errors
- Incorrect procedures
- Incorrect use of rules or properties
- Order of operations errors

15 **The expression below will be simplified according to the correct order of operations.**

$$9(4 \div 2)^2 + 1 - 6$$

Which expression results after the first step of simplifying?

A $(36 \div 18)^2 + 1 - 6$

B $9(8 \div 4) + 1 - 6$

C $9(4 \div 2)^2 + 5$

D $9(2)^2 + 1 - 6$

Standard: 7.A.4.1 Use properties of operations (limited to associative, commutative, and distributive) to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents.

Depth-of-Knowledge: 1

This item is a DOK 1 because it requires the student to complete a simple procedure, completing the first step when simplifying an expression.

Distractor Rationale:

A. The student started on the right and did 9 × 4 and 9 × 2.

B. The student tried to do the exponent first, but did 4 × 2, not 4^2.

C. The student computed from right to left.

D. Correct. The student demonstrated an ability to apply the order of operations.

OAS STRAND—GEOMETRY & MEASUREMENT (GM): STANDARD 7.GM.1

OAS STANDARD

7.GM.1 Develop and understand the concept of surface area and volume of rectangular prisms.

OAS OBJECTIVES

7.GM.1.1 Using a variety of tools and strategies, develop the concept that surface area of a rectangular prism with rational-valued edge lengths can be found by wrapping the figure with same-sized square units without gaps or overlap. Use appropriate measurements such as cm^2.

7.GM.1.2 Using a variety of tools and strategies, develop the concept that the volume of rectangular prisms with rational-valued edge lengths can be found by counting the total number of same-sized unit cubes that fill a shape without gaps or overlaps. Use appropriate measurements such as cm^3.

ITEM SPECIFICATIONS

Emphasis:

- Develop the concepts of surface area and volume of rectangular prisms.

Stimulus Attributes:

- Test items may include illustrations of the following: rectangular prisms.

Format:

- Determine the surface area of rectangular prisms
- Determine the volume of rectangular prisms
- Identify and apply strategies for determining volume and surface area of rectangular prisms
- Find the surface area of a rectangular prism by wrapping the figure with same-sized square units without gaps or overlap
- Find the volume of a rectangular prism by counting the total number of same-sized unit cubes that fill a shape without gaps or overlaps
- Identify and apply strategies for determining volume and surface area of rectangular prisms
- Choose appropriate measurements for surface area and volume

Content Limits:

- Limit solids to rectangular prisms
- Limit to rational-valued edge lengths

Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop the Ability to Communicate Mathematically
- Develop Mathematical Reasoning
- Develop a Deep and Flexible Conceptual Understanding
- Develop the Ability to Make Conjectures, Model, and Generalize

OAS STRAND—GEOMETRY & MEASUREMENT (GM): STANDARD 7.GM.1

ITEM SPECIFICATIONS

Distractor Domain:

- Computational errors
- Incorrect procedures
- Interchange volume and surface area
- Incorrect measurements

16 **A box is in the shape of a cube. The box has edge lengths of 5 inches. How many unit cubes are needed to fill the box?**

A 25

B 50

C 125

D 150

Standard: 7.GM.1.2 Using a variety of tools and strategies, develop the concept that the volume of rectangular prisms with rational-valued edge lengths can be found by counting the total number of same-sized unit cubes that fill a shape without gaps or overlaps. Use appropriate measurements such as cm^3.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to know that the length, width, and height are all the same in a cube and then determine volume as the number of cubes required to fill a cube-shaped box.

Distractor Rationale:

A. The student computed 5 × 5.

B. The student computed 5 × 10.

C. Correct. The student demonstrated an ability to find the number of unit cubes needed to fill a box given the edge length.

D. The student found the surface area of the cube.

17 **A rectangular prism has a square base. The height of the prism is equal to twice the edge length of its base. The base can be completely covered, with no overlap, by 16 squares that each have an edge length of 1 inch.**

What is the total surface area of the rectangular prism?

A 16 square inches

B 32 square inches

C 128 square inches

D 160 square inches

Standard: 7.GM.1.1 Using a variety of tools and strategies, develop the concept that surface area of a rectangular prism with rational-valued edge lengths can be found by wrapping the figure with same-sized square units without gaps or overlap. Use appropriate measurements such as cm^2.

Depth-of-Knowledge: 3

This item is a DOK 3 because it requires the student to find the surface area of a rectangular prism when given information about the height in relation to the base, rather than giving the actual dimensions.

Distractor Rationale:

A. The student added the dimensions of the prism or found the surface area of only one base.

B. The student found the surface area of the bases only.

C. The student found the volume or the total surface area of the four faces that are not bases.

D. Correct. The student demonstrated an ability to find the surface area of a rectangular prism.

OAS STRAND—GEOMETRY & MEASUREMENT (GM): STANDARD 7.GM.2

OAS STANDARD

7.GM.2 Determine the area of trapezoids and area and perimeter of composite figures.

OAS OBJECTIVES

7.GM.2.1 Develop and use the formula to determine the area of a trapezoid to solve problems.

7.GM.2.2 Find the area and perimeter of composite figures to solve real-world and mathematical problems.

ITEM SPECIFICATIONS

Emphasis:

- Solve real-world and mathematical problems involving the area of trapezoids.
- Solve real-world and mathematical problems involving the area and perimeter of composite figures.

Stimulus Attributes:

- Test items may include graphs, and diagrams of trapezoids and composite figures.

Format:

- Apply the formulas used to find the area of trapezoids in a variety of contexts
- Develop a formula to determine the area of a trapezoid
- Apply the formulas used to find the area and perimeter of composite figures
- Select and apply appropriate formulas for mathematical and real-world situations

Content Limits:

- Limit figures to triangles and quadrilaterals or combinations of triangles, quadrilaterals, circles, or semi-circles
- Limit multistep processes to no more than two steps for each component stage
- Limit formulas to those used in real-world situations
- Limit real-world and mathematical contexts to age appropriate situations

Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop the Ability to Communicate Mathematically
- Develop Mathematical Reasoning
- Develop a Deep and Flexible Conceptual Understanding
- Develop the Ability to Make Conjectures, Model, and Generalize

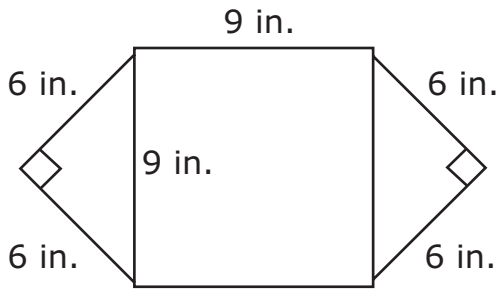
OAS STRAND—GEOMETRY & MEASUREMENT (GM): STANDARD 7.GM.2

ITEM SPECIFICATIONS

Distractor Domain:

- Common errors
- Use of incorrect formula
- Confusion between area and perimeter
- Incorrect use of rules or properties
- Incorrect procedures

18 **This figure shows the placemat Kenneth made using two square pieces of paper measured in inches (in.). He cut one piece in half.**



What is the area, in square inches, of Kenneth's placemat?

A 42 square inches

B 54 square inches

C 99 square inches

D 117 square inches

Standard: 7.GM.2.2 Find the area and perimeter of composite figures to solve real-world and mathematical problems.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to find the area of a composite figure.

Distractor Rationale:

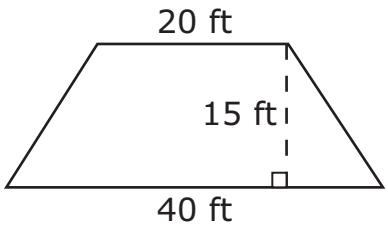
A. The student added all numbers shown on the figure.

B. The student computed 9 × 6.

C. The student focused on the middle square and saw the two 9s.

D. Correct. The student demonstrated an ability to find the area of a composite figure to solve a real-world problem.

19 **The shape and measurements, in feet (ft), of a floor are shown.**



What is the area of the floor, in square feet?

A 190 square feet

B 320 square feet

C 450 square feet

D 900 square feet

Standard: 7.GM.2.1 Develop and use the formula to determine the area of a trapezoid to solve problems.

Depth-of-Knowledge: 1

This item is a DOK 1 because it requires the student to complete a simple procedure, finding the area of a trapezoid.

Distractor Rationale:

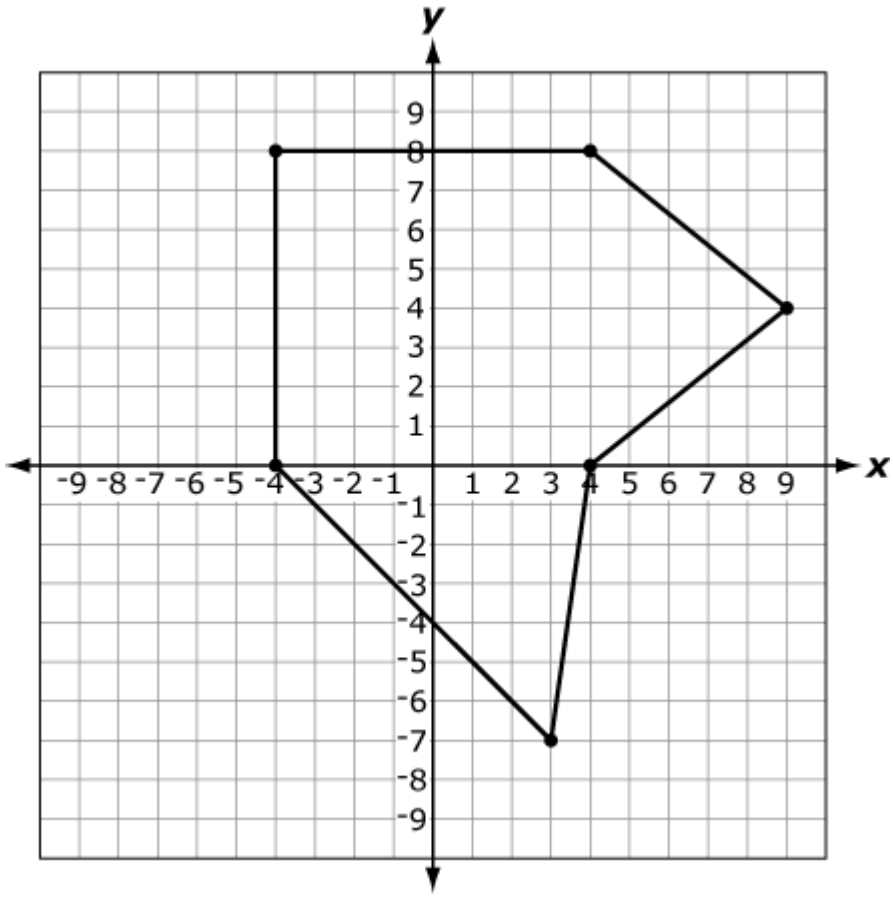
A. Balance distractor

B. The student computed $20 + \frac{40 \times 15}{2}$.

C. Correct. The student demonstrated an ability to determine the area of a trapezoid.

D. The student computed (20 + 40) × 15.

20 **The top view of a plot of land is shown on a map, where each unit on the coordinate grid represents 1 meter.**



What is the area of this plot of land in square meters?

A 84 square meters

B 92 square meters

C 112 square meters

D 120 square meters

Standard: 7.GM.2.2 Find the area and perimeter of composite figures to solve real-world and mathematical problems.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to decide how to find the area of this composite figure.

Distractor Rationale:

A. The student did not include the triangle on the bottom of the figure.

B. The student did not include the triangle on the right of the figure.

C. Correct. The student demonstrated an ability to find the area of a composite figure to solve a real-world problem.

D. The student thought both triangles were congruent with an area of 28 square meters each.

OAS STRAND—GEOMETRY & MEASUREMENT (GM): STANDARD 7.GM.3

OAS STANDARD

7.GM.3 Use reasoning with proportions and ratios to determine measurements, justify formulas, and solve real-world and mathematical problems involving circles and related geometric figures.

OAS OBJECTIVES

7.GM.3.1 Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle and that the unit rate (constant of proportionality) is π and can be approximated by rational numbers such as $\frac{22}{7}$ and 3.14.

7.GM.3.2 Calculate the circumference and area of circles to solve problems in various contexts, in terms of π and using approximations for π.

ITEM SPECIFICATIONS

Emphasis:

- Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle.
- Demonstrate a conceptual understanding of pi.
- Demonstrate the ability to solve circumference and area of circle problems.

Stimulus Attributes:

- Test items may include illustrations of the following: rulers, calculator displays, coordinate graphs, tables, graphs, charts, circles, data sets, formulas, and other diagrams.

Format:

- Show the proportional relationship between the diameter and circumference of a circle
- Show that unit rate for the proportional relationship between the diameter and circumference of a circle is π
- Approximate the value of π
- Apply the formula used to find the area and circumference of circles in a variety of contexts
- Explore the concepts of area and circumference of circles in mathematical, geometric, and real-world contexts

Content Limits:

- Limit measurements of radius and diameter to whole numbers or decimals to tenths
- Limit real-world and mathematical contexts to age appropriate situations

OAS STRAND—GEOMETRY & MEASUREMENT (GM): STANDARD 7.GM.3

ITEM SPECIFICATIONS

Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop Mathematical Reasoning
- Develop a Deep and Flexible Conceptual Understanding
- Develop the Ability to Make Conjectures, Model, and Generalize

Distractor Domain:

- Incorrect procedures
- Computational errors
- Use of incorrect formula
- Confusion between area and circumference
- Common errors
- Incorrect use of rules and properties

21 **The circle in the center of a professional basketball court has a diameter of 12 feet. What is the circumference, in feet, of the circle?**

A 6π feet

B 12π feet

C 24π feet

D 144π feet

Standard: 7.GM.3.2 Calculate the circumference and area of circles to solve problems in various contexts, in terms of π and using approximations for π.

Depth-of-Knowledge: 1

This item is a DOK 1 because it requires the student to perform a simple procedure, finding the circumference of a circle when given the diameter.

Distractor Rationale:

A. The student found πr instead of πd.

B. Correct. The student demonstrated an ability to calculate the circumference of a circle in terms of π.

C. The student found $2\pi d$ instead of πd.

D. The student found πd^2 instead of πd.

22 **Caleb went rollerskating at the local rink. The circular rink measured 70 feet from side to side through the center. What distance, in feet, did Caleb skate in one lap by skating along the edge of the rink?**

A 35π feet

B 70π feet

C 140π feet

D $4{,}900\pi$ feet

Standard: 7.GM.3.2 Calculate the circumference and area of circles to solve problems in various contexts, in terms of π and using approximations for π.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to extract the necessary information and then utilize a formula to find the circumference of a circle when given the diameter.

Distractor Rationale:

A. The student thought the formula for circumference was πr.

B. Correct. The student demonstrated an ability to calculate the circumference of a circle in terms of π.

C. The student thought the formula for circumference was $2\pi d$.

D. The student thought the formula for circumference was $d^2\pi$.

OAS STRAND—GEOMETRY & MEASUREMENT (GM): STANDARD 7.GM.4

OAS STANDARD

7.GM.4 Analyze the effect of dilations, translations, and reflections on the attributes of two-dimensional figures on and off the coordinate plane.

OAS OBJECTIVES

7.GM.4.1 Describe the properties of similarity, compare geometric figures for similarity, and determine scale factors resulting from dilations.

7.GM.4.2 Apply proportions, ratios, and scale factors to solve problems involving scale drawings and determine side lengths and areas of similar triangles and rectangles.

7.GM.4.3 Graph and describe translations and reflections of figures on a coordinate plane and determine the coordinates of the vertices of the figure after the transformation.

ITEM SPECIFICATIONS

Emphasis:

- Demonstrate an understanding of the properties of similarity.
- Compare geometric figures for similarity.
- Determine scale factors resulting from dilations.
- Apply proportions, ratios, and scale factors to solve problems.
- Graph and describe translations and reflections of figures.
- Determine the coordinates of the vertices of a figure after a transformation.

Stimulus Attributes:

- Test items may include illustrations of the following: tables, graphs, charts, data sets, other diagrams, coordinate graphs, two-dimensional geometric figures, protractors, geoboards, other geometric manipulatives, measuring instruments, maps, and scale drawings.

Format:

- Identify and use the concepts of similarity in mathematical, geometric, and real-world contexts
- Determine scale factors resulting from dilations
- Apply the concepts of similarity to geometric and real-world settings
- Apply proportions, ratios, and scale factors to solve problems involving scale drawings and determine side lengths and areas of similar triangles and rectangles
- Distinguish among translations and reflections of figures on a coordinate plane and in real-world contexts
- Determine the coordinates of the vertices of the figure after a transformation

OAS STRAND—GEOMETRY & MEASUREMENT (GM): STANDARD 7.GM.4

ITEM SPECIFICATIONS

Content Limits:

- Limit to visual identification or definition of similarity
- Limit to ratios of length
- Limit geometric figures to two dimensions
- Limit transformations to reflections, translations, and dilations
- Limit coordinates of vertices to integers
- Limit to one transformation with dialations
- Limit to no more than two transformations with translations and/or reflections

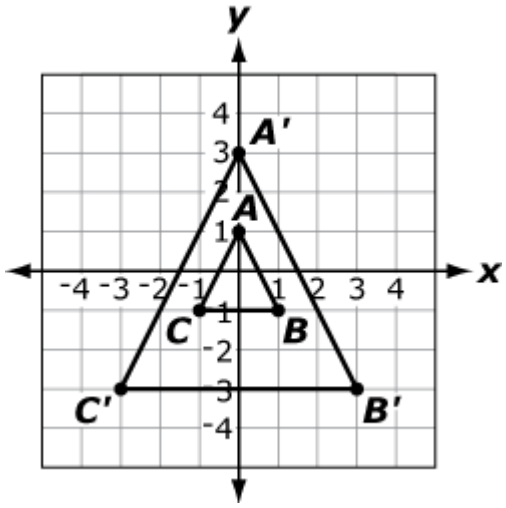
Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop a Deep and Flexible Conceptual Understanding
- Develop the Ability to Make Conjectures, Model, and Generalize

Distractor Domain:

- Common errors
- Incorrect procedures
- Computational errors
- Incorrect use of rules or properties
- Confusion between congruency and similarity
- Confusion among geometric transformations

23 **Triangle ABC was dilated with the origin as the center of dilation to create triangle A′B′C′.**



Which scale factor was used to dilate triangle ABC to create triangle A′B′C′?

A a scale factor of 2

B a scale factor of 3

C a scale factor of $\frac{1}{2}$

D a scale factor of $\frac{1}{3}$

Standard: 7.GM.4.1 Describe the properties of similarity, compare geometric figures for similarity, and determine scale factors resulting from dilations.

Depth-of-Knowledge: 1

This item is a DOK 1 because it requires the student to recall a simple procedure, identifying the scale factor used in a dilation.

Distractor Rationale:

A. The student saw that it is 2 units from A to A'.

B. Correct. The student demonstrated an ability to determine scale factors resulting from a dilation.

C. The student saw that it is 2 units from A to A' and reversed the order of the dilation.

D. The student reversed the order of the dilation.

24 **Jillian made a scale model of her lawn. The actual length of her lawn is 32 feet (ft). The length of her model is 8 inches (in.). What is the ratio of the length of Jillian's lawn to the length of her model?**

A 1 ft : 4 in.

B 4 ft : 1 in.

C 1 ft : 25 in.

D 25 ft : 1 in.

Standard: 7.GM.4.2 Apply proportions, ratios, and scale factors to solve problems involving scale drawings and determine side lengths and areas of similar triangles and rectangles.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to organize the given information in order to determine the relationship between the two lengths.

Distractor Rationale:

A. The student reversed the relationship.

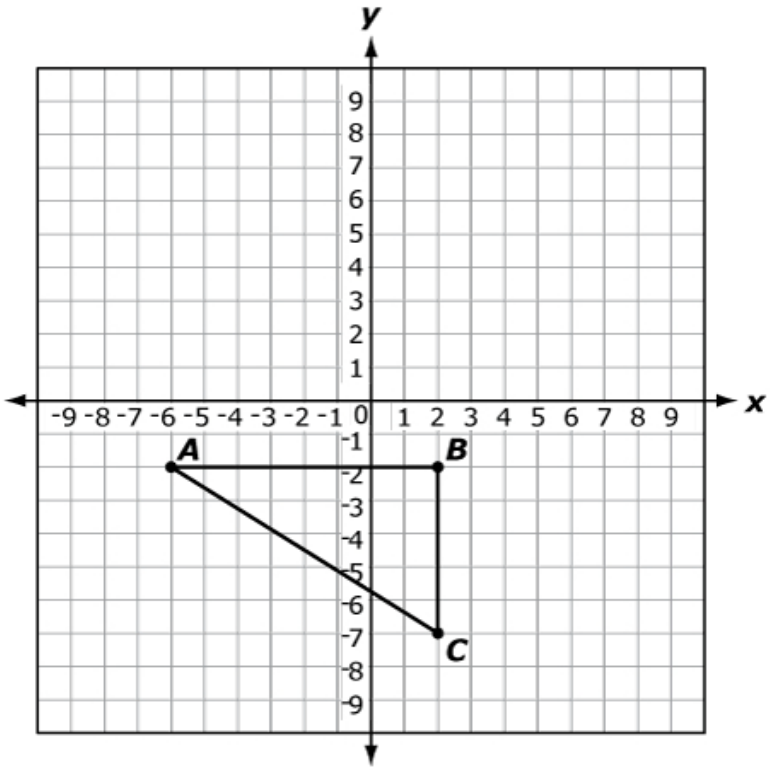
B. Correct. The student demonstrated an ability to apply scale factors to solve a problem involving a scale drawing.

C. The student did $\frac{8}{32} = \frac{1}{4} = 0.25$ and thought this meant 25 inches.

D. The student did $\frac{8}{32} = \frac{1}{4} = 0.25$ and thought this meant 25 feet.

25

Triangle *ABC* is translated 8 units up to create new triangle *A'B'C'*.



Which ordered pairs show the coordinates of the vertices of triangle *A'B'C'*?

To select the coordinates for a vertex, click the ordered pair. To deselect the coordinates, click on the ordered pair again.

(2, –2)	(–6, 6)	(–6, –10)	(2, 6)
(2, –10)	(10, –7)	(2, 1)	(10, –2)

Standard: 7.GM.4.3 Graph and describe translations and reflections of figures on a coordinate plane and determine the coordinates of the vertices of the figure after the transformation.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to perform a translation and then identify the vertices of the translated figure.

Sample Distractor Rationales:

Correct

(-6, 6) (2, 6) (2, 1)

Incorrect

(2, –2) (10, –2) (10, –7)

The student thought *ABC* and *A'B'C'* were the same triangle.

(–6, –10) (2, –10) (–6, 6)

The student confused 8 units up and 8 units down.

OAS STRAND—DATA & PROBABILITY (D): STANDARD 7.D.1

OAS STANDARD

7.D.1 Display and analyze data in a variety of ways.

OAS OBJECTIVES

7.D.1.1 Design simple experiments, collect data and calculate measures of central tendency (mean, median, and mode) and spread (range). Use these quantities to draw conclusions about the data collected and make predictions.

7.D.1.2 Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using a spreadsheet or other graphing technology.

ITEM SPECIFICATIONS

Emphasis:

- Demonstrate the ability to design simple experiments and collect data.
- Calculate measures of central tendency and spread and use these quantities to draw conclusions and make predictions.
- Display and interpret data in circle graphs and histograms.
- Choose the appropriate display for a set of data.

Stimulus Attributes:

- Test items may include illustrations of the following: number lines, tables, frequency charts, line graphs, single/double bar graphs, pictographs, Venn diagrams, stem-and-leaf plots, scatter plots, histograms, circle graphs, data sets, and spreadsheets.
- Test items may include any of the following terms: range, spread, mean, or average, median, and mode.

Format:

- Analyze the appropriate use of the mean in comparison with other measures of central tendency
- Given a set of data, the student will determine mean, median, mode, and range
- Items may include comparisons between mean, median, mode, and range
- Compare how representations of data support inferences and predictions
- Identify why a specific measure provides the most useful information in a given context
- Design a probability experiment (i.e.: divide and label sectors on a spinner)
- Organize and interpret data in circle graphs and histograms
- Select appropriate representations of data such as circle graphs or histograms

Content Limits:

- Limit data sets to at most 20 data points
- Limit data sets to numerical data

OAS STRAND—DATA & PROBABILITY (D): STANDARD 7.D.1

ITEM SPECIFICATIONS

Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop the Ability to Communicate Mathematically
- Develop Mathematical Reasoning
- Develop a Deep and Flexible Conceptual Understanding
- Develop the Ability to Make Conjectures, Model, and Generalize

Distractor Domain:

- Common errors
- Incorrect procedures
- Use of incorrect measure
- Misunderstanding of concepts
- Unsupportable conclusions
- Miscalculation
- Misreported data
- Inappropriate representations
- Incorrect or incomplete data display
- Incorrect interpretation of data display

26 **This table shows the number of birds a bird watcher saw each day during a week.**

Bird Watcher Data

Day	Number of Birds
Monday	42
Tuesday	35
Wednesday	31
Thursday	53
Friday	29
Saturday	31
Sunday	52

What is the mean number of birds the bird watcher saw in one day?

A 24

B 31

C 39

D 53

Standard: 7.D.1.1 Design simple experiments, collect data and calculate measures of central tendency (mean, median, and mode) and spread (range). Use these quantities to draw conclusions about the data collected and make predictions.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to extract information from the table and then utilize a multi-step equation to find the mean of a set of data.

Distractor Rationale:

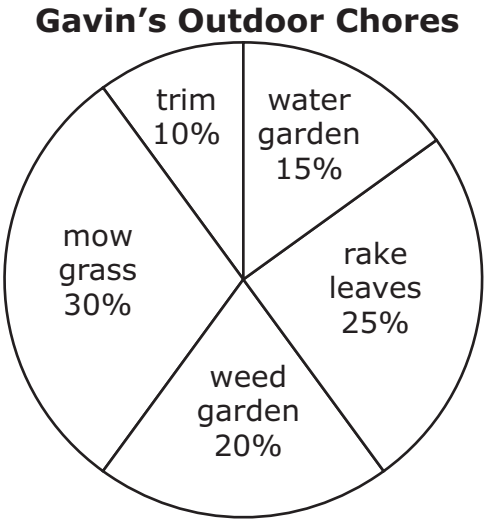
A. The student confused median and range.

B. The student confused median and mode.

C. Correct. The student demonstrated an ability to calculate the mean for a set of real-world data.

D. The student confused median and the middle number in the table, which is not in order from least to greatest.

27 **Gavin spent 40 hours last month doing outdoor chores. This circle graph shows how much time he spent on each chore.**



How many hours did Gavin spend mowing the grass?

A 8 hours

B 10 hours

C 12 hours

D 30 hours

Standard: 7.D.1.2 Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using a spreadsheet or other graphing technology.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to extract information from the graph in order to find 30% of 40 hours.

Distractor Rationale:

A. The student confused 25% and 30%.

B. The student computed 40 − 30.

C. Correct. The student demonstrated an ability to use reasoning with proportions to interpret data in circle graphs.

D. The student thought 30% meant 30 hours.

28 **Which could best be shown using a line graph?**

A the number of international airports in different states

B the percentages of different types of airplanes made in the United States

C the maximum speed of airplanes from the years 1905 to 2000

D the number of commercial airlines in different countries

Standard: 7.D.1.2 Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using a spreadsheet or other graphing technology.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to think about different real-life scenarios and determine which would be best represented using a line graph.

Distractor Rationale:

A. The student did not understand the type of data that can be shown on line graphs.

B. The student did not understand the type of data that can be shown on line graphs.

C. Correct. The student demonstrated an ability to identify a situation that would best be represented on a line graph.

D. The student did not understand the type of data that can be shown on line graphs.

OAS STRAND—DATA & PROBABILITY (D): STANDARD 7.D.2

OAS STANDARD

7.D.2 Calculate probabilities and reason about probabilities using proportions to solve real-world and mathematical problems.

OAS OBJECTIVES

7.D.2.1 Determine the theoretical probability of an event using the ratio between the size of the event and the size of the sample space; represent probabilities as percents, fractions and decimals between 0 and 1.

7.D.2.2 Calculate probability as a fraction of sample space or as a fraction of area. Express probabilities as percents, decimals and fractions.

7.D.2.3 Use proportional reasoning to draw conclusions about and predict relative frequencies of outcomes based on probabilities.

ITEM SPECIFICATIONS

Emphasis:

- Determine the theoretical probability of an event.
- Draw conclusions about and predict relative frequencies of outcomes based on probabilities.

Stimulus Attributes:

- Test items may include: illustrations of coordinate graphs, number lines, tables, graphs, and charts, such as frequency charts, line, bar, and picture graphs; Venn diagrams; stem-and-leaf plots, box-and-whisker plots, and scatter plots; histograms, circle graphs, data sets, spinners, and other diagrams.

Format:

- Predict the probability of the outcome using the ratio between the size of the event and the size of the sample space
- Express probabilities in various forms, including decimal, fraction, and percent
- Predict the probability of the outcome
- Calculate probability as a fraction of sample space or as a fraction of area
- Probability can be with or without replacement
- Draw conclusions about and predict relative frequencies of outcomes based on probabilities

Content Limits:

- Limit sample to no more than 20 pieces of data
- Limit real-world contexts to age-appropriate situations
- Limit fractions and decimals between 0 and 1
- Limit to probabilities of one event

Primary Process Standards:

- Develop Strategies for Problem Solving
- Develop Mathematical Reasoning
- Develop the Ability to Make Conjectures, Model, and Generalize

OAS STRAND—DATA & PROBABILITY (D): STANDARD 7.D.2

ITEM SPECIFICATIONS

Distractor Domain:

- Common errors
- Incorrect procedures
- Computational errors
- Incorrect use of rules or properties
- Use of incorrect equivalencies

29

At a school carnival game, players toss beanbags onto a table with equal-sized squares of different colors. On the table, there are

- 7 green squares,
- 5 orange squares, and
- 8 blue squares.

These statements describe the probabilities for different outcomes of a single beanbag toss that lands at a random location on the table. **Select the number that best completes each statement.** To select a number, click the menu and then click the desired number. To choose a different number, click the menu and click the new number.

The probability that the outcome is green is -Select an Answer- .

The probability that the outcome is orange or green is -Select an Answer- .

The probability that the outcome is not orange is -Select an Answer- .

Standard: 7.D.2.1 Determine the theoretical probability of an event using the ratio between the size of the event and the size of the sample space; represent probabilities as percents, fractions and decimals between 0 and 1.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to determine the probabilities of various outcomes, using different representations (decimal, fraction, and percent).

Sample Distractor Rationales:

Correct

The probability that the outcome is green is 0.35.

The probability that the outcome is orange or green is $\frac{3}{5}$.

The probability that the outcome is not orange is 75%.

Incorrect

The probability that the outcome is green is 0.7.

The probability that the outcome is orange or green is $\frac{1}{12}$.

The probability that the outcome is not orange is 15%.

The student chose 0.7 for green because there were 7 outcomes for green. The student chose 1/12 for orange or green because there were 12 outcomes for orange or green. The student chose 15% for not orange because there were 15 outcomes for not orange.

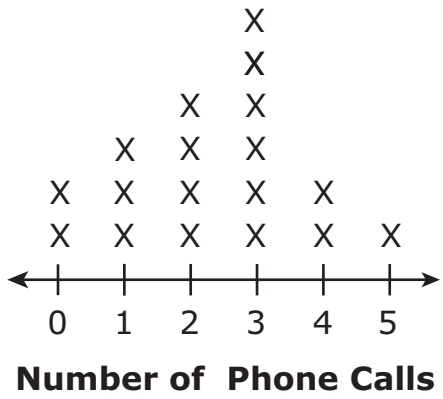
The probability that the outcome is green is 0.35.

The probability that the outcome is orange or green is $\frac{3}{5}$.

The probability that the outcome is not orange is 25%.

The student gave the probability of orange instead of not orange for the last blank.

30 **The line plot shows the number of phone calls made in one day by students in Dorothy's class.**



Based on the information in the line plot, what is the probability a student chosen at random made 2 or 3 phone calls that day?

A $\frac{1}{3}$

B $\frac{1}{10}$

C $\frac{2}{9}$

D $\frac{5}{9}$

Standard: 7.D.2.2 Calculate probability as a fraction of sample space or as a fraction of area. Express probabilities as percents, decimals and fractions.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to extract information from the line plot in order to find the probability of making 2 or 3 phone calls per day.

Distractor Rationale:

A. The student compared the number of phone calls asked about, 2, to the total number of phone calls shown, 6.

B. Balance distractor

C. Balance distractor

D. Correct. The student demonstrated an ability to express probability as a fraction.

31 **A fair coin is tossed 30 times with the results being either heads or tails. How many times should the result be tails?**

A 15

B 20

C 25

D 30

Standard: 7.D.2.3 Use proportional reasoning to draw conclusions about and predict relative frequencies of outcomes based on probabilities.

Depth-of-Knowledge: 2

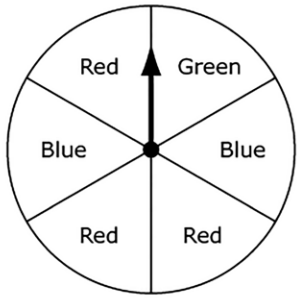
This item is a DOK 2 because it requires the student to understand a probability experiment with a fair coin and then determine the expected outcome of tails.

Distractor Rationale:

A. **Correct. The student demonstrated an ability to predict outcomes based on probabilities.**
B. The student made a calculation error or tried to estimate the answer.
C. The student did not understand the probability of fair coin events.
D. The student reported the total number of events.

32

A spinner is divided into 6 congruent sections and labeled, as shown.



The arrow on the spinner will be spun one time.

Drag and drop an outcome into each box to correctly complete each statement about probability.

To drag an outcome, click and hold the outcome, and then drag it to the desired space. To change an outcome, click and hold it, and then drag it back to the original location. You may use each outcome once or not at all.

blue | green | red | green or red

The probability that the arrow will stop on a section that is labeled [ ] is $\frac{1}{6}$.

The probability that the arrow will stop on a section that is labeled [ ] is $\frac{1}{3}$.

The probability that the arrow will stop on a section that is labeled [ ] is $\frac{2}{3}$.

Standard: 7.D.2.1 Determine the theoretical probability of an event using the ratio between the size of the event and the size of the sample space; represent probabilities as percents, fractions and decimals between 0 and 1.

Depth-of-Knowledge: 2
This item is a DOK 2 because it requires the student to determine the probabilities of various outcomes, including combining colors.

Sample Distractor Rationales:

Correct
The probability that the arrow will stop on a section that is **green** is 1/6.
The probability that the arrow will stop on a section that is **blue** is 1/3.
The probability that the arrow will stop on a section that is **green or red** is 2/3.

Incorrect
The probability that the arrow will stop on a section that is **green** is 1/6.
The probability that the arrow will stop on a section that is **blue** is 1/3.
The probability that the arrow will stop on a section that is **red** is 2/3.

The student saw three sections for red and focused on the denominator of 2/3.

The probability that the arrow will stop on a section that is green **or red** is 1/6.
The probability that the arrow will stop on a section that is **red** is 1/3.
The probability that the arrow will stop on a section that is **blue** is 2/3.

The student focused on the denominators and chose 1/6 for green or red because that is the greatest denominator and 1/3 for red because that has 3 parts on the spinner. Then the student focused on the numerator and chose 2/3 for blue because there are 2 parts for blue on the spinner.

Cluster Items

The following sample items are part of a cluster. The cluster is presented first and then the two items that follow require use of the cluster. The two items are from different standards.

Use this information to answer the following two questions.

Three expressions are shown.

Expression 1	$\frac{36}{20}$
Expression 2	$5(3x - 1)$
Expression 3	$-\frac{1}{2}(4x - 2)$

33 **Which number is equivalent to Expression 1?**

A $\frac{5}{9}$

B $\frac{9}{5}$

C $\frac{9}{4}$

D $\frac{21}{5}$

Standard: 7.N.1.3 Recognize and generate equivalent representations of rational numbers, including equivalent fractions.

Depth-of-Knowledge: 1

This item is a DOK 1 because it requires the student to complete a simple procedure, finding an equivalent fraction.

Distractor Rationale:

A. The student confused the numerator and denominator.

B. Correct. The student demonstrated an ability to recognize equivalent representations of rational numbers.

C. The student made a multiplication error in the denominator.

D. The student subtracted 15 from both the numerator and denominator.

34 **Which expression is equivalent to the sum of Expression 2 and Expression 3?**

A $7x-6$

B $7x-4$

C $13x-4$

D $13x-6$

Standard: 7.A.4.1 Use properties of operations (limited to associative, commutative, and distributive) to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents.

Depth-of-Knowledge: 2

This item is a DOK 2 because it requires the student to find the sum of multi-step expressions using the order of the operations and mathematical properties.

Distractor Rationale:

A. The student computed $-\frac{1}{2} \cdot 4x$ as $8x$ instead of $-2x$ and $-\frac{1}{2}x \cdot -2$ as $-1x$ instead of $1x$.

B. The student computed $-\frac{1}{2} \cdot 4x$ as $8x$ instead of $-2x$.

C. Correct. The student demonstrated an ability to use the properties of operations to generate equivalent algebraic expressions.

D. The student computed $-\frac{1}{2} \times -2$ as -1 instead of 1.

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