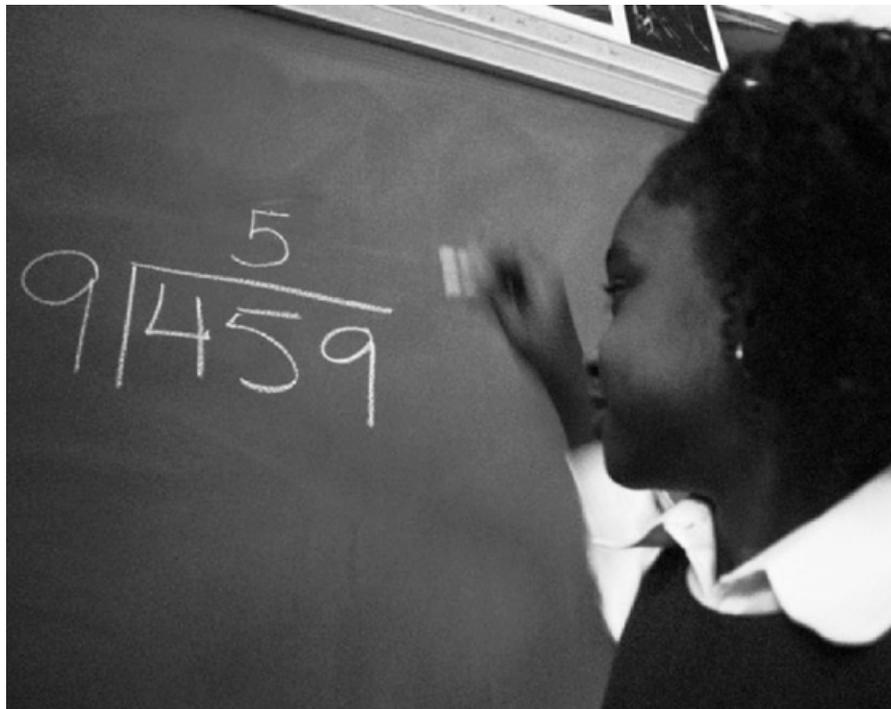


**OKLAHOMA SCHOOL TESTING PROGRAM
OKLAHOMA MODIFIED ALTERNATE
ASSESSMENT PROGRAM**

Test and Item Specifications

Mathematics
Grade 8



2012–2013 Edition

Oklahoma State Department of Education
Oklahoma City, Oklahoma

Revised
March 2013

OKLAHOMA MODIFIED ALTERNATE ASSESSMENT PROGRAM

TEST AND ITEM SPECIFICATIONS

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Purpose

The purpose of this test is to measure Oklahoma eighth-grade students' level of proficiency in mathematics. On the Grade 8 Mathematics Test, students are required to respond to a variety of items linked to the eighth-grade mathematics content standards identified in the *Oklahoma College, Career, and Citizen Ready (C³) Standards*. All Mathematics Test test forms will assess the identified standards and objectives listed below. The following standards and objectives are intended to summarize the knowledge as identified in the *Oklahoma C³ Standards*.

<i>Oklahoma C³ Content Standards and Objectives</i>
Algebraic Reasoning: Patterns and Relationships <ul style="list-style-type: none"> • Equations (1.1) • Inequalities (1.2)
Number Sense and Operation <ul style="list-style-type: none"> • Number Sense (2.1) • Number Operations (2.2)
Geometry <ul style="list-style-type: none"> • Three Dimensional Figures (3.1) • Pythagorean Theorem (3.2)
Measurement <ul style="list-style-type: none"> • Surface Area and Volume (4.1) • Ratio and Proportions (4.2) • Composite Figures (4.3)
Data Analysis <ul style="list-style-type: none"> • Data Analysis (5.1) • Central Tendency (5.3)



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General Considerations

It is necessary to create test items that are reliable, fair, and targeted to the *Oklahoma C³* 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 listed in the Test Blueprint for eighth-grade mathematics.
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 eighth-grade students can relate to and understand.
4. Test items are worded precisely and clearly.
5. All items are reviewed to eliminate language that shows bias or is otherwise likely to disadvantage a particular group of students. That is, items do not display unfair representations of gender, race, disability, culture, or religion, nor do items contain elements that are offensive to any such group.
6. All answer choices in multiple-choice items (the key and all distractors) are similar in length and syntax. Students should not be able to rule out a wrong answer or identify a correct response solely because it looks or sounds different from the other answer choices. Distractors are created so that students reason their way to the correct answer rather than simply identify incorrect responses because of a distractor's obviously inappropriate nature. Distractors should always be plausible (but incorrect) in the context of the item stem. Correct responses are approximately equally distributed among A's, B's, and C's.

Universal Test Design Considerations

Universal design, as applied to assessments, is a concept that allows the widest possible range of students to participate in assessments and may even reduce the need for accommodations and alternative assessments by expanding access to the tests themselves. In the Oklahoma Modified Alternate Assessment Program, modifications have been made to some items that simplify and clarify instructions and provide maximum readability, comprehensibility, and legibility.

Universal Modifications

- Minimize the number of questions on the page (limit to 2 or 3).
- Use a larger font size.
- Provide only three answer options instead of four.
- Highlight the main points in the question or passage by underlining and using boldface.
- Allow for the same accommodations as in the standard assessment.
- Avoid questions that require students to select the better/best answer.
- Eliminate answer choices that give students the option of making no changes to the item.
- Be consistent in wording of directions across grades and subjects.
- Minimize the use of pronouns and prepositional phrases.
- Avoid the use of multiple-meaning words and words that can function as more than part of speech .
- Enlarge art when possible.
- Simplify art when possible, (i.e. removing unnecessary labels, use less gray scale, use thicker lines when outlining, etc.).
- Box informational text in an item.
- Bullet information when possible (e.g. bullet detailed information or processes).
- Reduce reading load of stem, stimuli, and answer options when possible.
- Use Verdana font.
- Revise answer options to address parallelism and minimize outliers.

Mathematics Items

- Allow for read-aloud and calculators format.
- For lower grades, display numbers on all sides of figures for questions about perimeter.
- Unless required by standard, avoid items with negative and positive answer choices that use the same number.
- Place any items with coordinate grids on one page.
- For lower grades, use grids for questions.
- Be consistent with qualifiers in the stem and answer choices.
- Avoid questions that use best or closest.
- Avoid complicated art.
- List coordinate grids in answer options vertically with plenty of space between the answer options to make the grid more accessible to the visually impaired (however, avoid spanning item over two pages).
- Simplify reading load, including vocabulary, when possible.
- Eliminate stimuli sets.
- Delete one part of a compound answer choice when possible.
- Delete griddable items, negative items, and items that cannot be modified based on guidelines.

- Delete extraneous information including irrelevant material and unnecessary words in items or graphics.
- Simplify complex sentence structure and vocabulary in item and answer choices without eliminating math vocabulary.
- Change passive voice to active voice when appropriate.
- Add precise language to provide additional context for clarification.
- Use consistent language within an item in order to focus student attention on what is being asked.
- Revise text as necessary to maintain the authenticity and logic of the item due to modifications.
- Use bullets to clearly organize complex items into smaller, meaningful parts.
- Direct student attention to graphics.
- Simplify visual complexity of graphics.

Universal Modifications

- Provide new text and/or reorganize existing text within the question to explain or clarify the graphic.
- Provide additional graphics to support text, emphasize ideas, and facilitate comprehension.
- Reduce the number of variables and simplify digits in item when appropriate.
- Limit the number of steps and/or operations in multi-step problems.
- Provide appropriate formula and/or conversion near the item.
- Provide explicit directions to explain a process such as measuring (as long as it does not impact reading load).

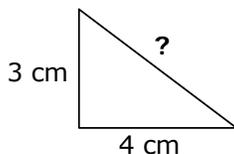
Below is an example of an OCCT item followed by a modified version of the item. The modified version of the item was created using the modification list on pages 5 and 6.

OCCT Oklahoma C³ 3.2 Sample Item:

Depth of Knowledge: 1

Correct Answer: A

What is the length of the side that is not labeled in this right triangle?



$$a^2 + b^2 = c^2$$

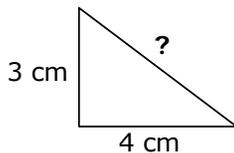
- A 5 cm
- B 6 cm
- C 7 cm
- D 8 cm

Modified OMAAP Oklahoma C³ 3.2 Sample Item:

Depth of Knowledge: 1

Correct Answer: A

What is the missing length in this right triangle?



$$a^2 + b^2 = c^2$$

- A 5 cm
- B 6 cm
- C 7 cm

Multiple-Choice Item Rules

- All items clearly indicate what is expected in a response and help students focus on their response.
- Each multiple-choice item has a stem (question, statement, or incomplete statement, and/or graphic component) and three answer (or completion) options, only one of which is correct.
- Multiple-choice item stems present a complete problem so that students know what to do before looking at the answer choices; students should not need to read all answer choices before knowing what is expected.

In summary, mathematics-test items assess whether students understand mathematical concepts and procedures, communicate their understandings effectively in mathematical terms, approach problems, and develop viable solutions.

All items developed using these specifications are reviewed by Oklahoma educators and approved by the Oklahoma State department of Education. The distribution of newly developed or modified items is based on content and process alignment, 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.

Test Structure, Format, and Scoring

The test will consist of 40 operational multiple-choice items, which will be written at a reading level two grade levels below an eighth-grade audience and will include three responses from which to choose: the correct answer and two distractors.

Each multiple-choice item is scored as correct or incorrect. The student's raw score is converted to a scaled score using the number correct scoring method.

Test Alignment with Oklahoma C³ Standards

Criteria for Aligning the Test with the <i>Oklahoma C³</i> Standards and Objectives	
1. Categorical Concurrence	The test is constructed so that there are at least six items measuring each <i>Oklahoma C³</i> standard, with the content category consistent with the related standard. 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. Depth of Knowledge Consistency	The test is constructed using items from a variety of Depth of Knowledge levels that are consistent with the processes students need in order to demonstrate proficiency for each <i>Oklahoma C³</i> objective.
3. Range of Knowledge Correspondence	The test is constructed so that at least 50% of the objectives for an <i>Oklahoma C³</i> standard have at least one corresponding assessment item.
4. Balance of Representation	The test is constructed according to the Test Blueprint, which reflects the degree of representation given on the test to each <i>Oklahoma C³</i> standard and objective in terms of the percentage of total test items measuring each standard and the number of test items measuring each objective.
5. Source of Challenge	Each test item is constructed in such a way that the major cognitive demand comes directly from the targeted <i>Oklahoma C³</i> objective or concept being assessed, not from specialized knowledge or cultural background that the test-taker may bring to the testing situation.

Test Blueprint

The Test Blueprint reflects the degree to which each *Oklahoma C³* standard and objective is represented on the test. The overall distribution of operational items in a test form is intended to look as follows:

<i>Oklahoma C³</i> Standards & Objectives	Ideal Number of Items for Alignment to <i>Oklahoma C³</i> *	Ideal ¹ Percentage of Items
Algebraic Reasoning: Patterns and Relationships	13–14	30%–33%
Equations (1.1)	8–9	
Inequalities (1.2)	4–5	
Number Sense and Operation	8–9	19%–21%
Number Sense (2.1)	2–3	
Number Operations (2.2)	5–6	
Geometry	7–8	16%–19%
Three Dimensional Figures (3.1)	4–5	
Pythagorean Theorem (3.2)	2–3	
Measurement	6–7	14%–16%
Surface Area and Volume (4.1)	1–3	
Ratio and Proportions (4.2)	1–3	
Composite Figures (4.3)	1–3	
Data Analysis	6–7	14%–16%
Data Analysis (5.1)	2–4	
Central Tendency (5.3)	2–4	
Total Test	40–43²	100%

¹ Percentages are approximations and may result in a sum other than 100 due to rounding.

² The actual number of items scored for a student may be slightly lower pending a review of item statistics.

- Student performance on the Multiple-Choice test will be reported at the standard level. A minimum of six items is required to report a standard. While the actual numbers of items on the test may not match the blueprint exactly, each future test will move toward closer alignment with the ideal blueprint.
- The *Oklahoma C³ Standards* correspond to the *PASS* standards. In 2014–2015 the Common Core State Standards will be assessed.

Overview of Item Specifications

For each *Oklahoma C³* standard, item specifications are organized under the following headings:

- *Oklahoma C³* Standard and *Oklahoma C³* Objective
- Item Specifications
 - a. Emphasis
 - b. Stimulus Attributes
 - c. Format
 - d. Content Limits
 - e. Distractor Domain
 - f. Sample Test Items

The headings “*Oklahoma C³* Standard” and “*Oklahoma C³* Objective” state the standard and objective being measured as found in the eighth-grade mathematics section of the *Oklahoma C³Standards* document.

The heading “Item Specifications” highlights important points about the items’ emphasis, stimulus attributes, format, content limits, and distractor domain. 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 content standard as the primary concept.

All items will assess objectives using only depth-of-knowledge levels 1, 2, or 3. Descriptions of the depth-of-knowledge levels for Mathematics are as follows:

Level 1 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 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 requires complex reasoning, planning, developing, using evidence, and a higher level of thinking. Level 3 activities include making conjectures, drawing conclusions from observations, citing evidence, developing a logical argument for concepts, explaining phenomena in terms of concepts, and using concepts to solve nonroutine problems

Depth of Knowledge Assessed by Test Items

The test will approximately reflect the following depth of knowledge distribution of items:

Depth of Knowledge	Percentage of Items
Level 1—Recall	20–25%
Level 2—Basic Reasoning	60–65%
Level 3—Complex and Extended Reasoning	10–15%

This is the ideal depth of knowledge distribution of items. There may be slight differences in the actual distribution of the upcoming testing session.

Note about the Item Specifications and Sample Items:

With the exception of content limits, the item specifications give suggestions of what might be included and do not give an exhaustive list of what can be included.

These sample test items are not intended to be definitive in nature or construction, as the stimuli and test items may differ from one test form to another, as may their presentation.

MATHEMATICS PROCESS STANDARDS

Grades 6–8

The National Council of Teachers of Mathematics (NCTM) has identified five process standards: Problem Solving, Reasoning and Proof, Communication, Connections, and Representation. Active involvement by students using these processes is likely to broaden mathematical understandings and lead to increasingly sophisticated abilities required to meet mathematical challenges in meaningful ways.

Process Standard 1: Problem Solving

1. Develop and test strategies to solve practical, everyday problems which may have single or multiple answers.
2. Use technology to generate and analyze data to solve problems.
3. Formulate problems from situations within and outside of mathematics and generalize solutions and strategies to new problem situations.
4. Evaluate results to determine their reasonableness.
5. Apply a variety of strategies (e.g., restate the problem, look for a pattern, diagrams, solve a simpler problem, work backwards, trial and error) to solve problems, with emphasis on multistep and non-routine problems.
6. Use oral, written, concrete, pictorial, graphical, and/or algebraic methods to model mathematical situations.

Process Standard 2: Communication

1. Discuss, interpret, translate (from one to another) and evaluate mathematical ideas (e.g., oral, written, pictorial, concrete, graphical, algebraic).
2. Reflect on and justify reasoning in mathematical problem solving (e.g., convince, demonstrate, formulate).
3. Select and use appropriate terminology when discussing mathematical concepts and ideas.

Process Standard 3: Reasoning

1. Identify and extend patterns and use experiences and observations to make suppositions.
2. Use counter examples to disprove suppositions (e.g., all squares are rectangles, but are all rectangles squares?).
3. Develop and evaluate mathematical arguments (e.g., agree or disagree with the reasoning of other classmates and explain why).
4. Select and use various types of reasoning (e.g., recursive [loops], inductive [specific to general], deductive [general to specific], spatial, and proportional).

Process Standard 4: Connections

1. Apply mathematical strategies to solve problems that arise from other disciplines and the real world.
2. Connect one area or idea of mathematics to another (e.g., relate equivalent number representations to each other, relate experiences with geometric shapes to understanding ratio and proportion).

Process Standard 5: Representation

1. Use a variety of representations to organize and record data (e.g., use concrete, pictorial, and symbolic representations).
2. Use representations to promote the communication of mathematical ideas (e.g., number lines, rectangular coordinate systems, scales to illustrate the balance of equations).
3. Develop a variety of mathematical representations that can be used flexibly and appropriately (e.g., base-10 blocks to represent fractions and decimals, appropriate graphs to represent data).
4. Use a variety of representations to model and solve physical, social, and mathematical problems (e.g., geometric objects, pictures, charts, tables, graphs).

OKLAHOMA COLLEGE, CAREER, AND CITIZEN READY(C³) STANDARDS**Grade 8****Mathematics**

Asterisks (*) have been used to identify standards and objectives that are not assessed by the Oklahoma School Testing Program (OSTP) in the original *Oklahoma C³* curriculum.

The student applies a wide range of strategies to describe, interpret, evaluate, and analyze a variety of math problems and contexts.

Standard 1: Algebraic Reasoning—The student will graph and solve linear equations and inequalities in problem solving situations.

1. Equations

- a. Model, write, and solve multi-step linear equations with one variable using a variety of methods to solve application problems.
- b. Graph and interpret the solution to one- and two-step linear equations on a number line with one variable and on a coordinate plane with two variables.
- c. Predict the effect on the graph of a linear equation when the slope or y-intercept changes (e.g., make predictions from graphs, identify the slope or y-intercept in the equation $y = mx + b$ and relate to a graph).
- d. Apply appropriate formulas to solve problems (e.g., $d = rt$, $I = prt$).

2. Inequalities: Model, write, solve, and graph one- and two-step linear inequalities with one variable.

Standard 2: Number Sense and Operation—The student will use numbers and number relationships to solve a variety of problems.

1. Number Sense: Represent and interpret large numbers and numbers less than one in exponential and scientific notation.

2. Number Operations

- a. Use the rules of exponents, including integer exponents, to solve problems (e.g., $7^2 \cdot 7^3 = 7^5$, $3^{-10} \cdot 3^8 = 3^{-2}$).
- b. Solve problems using scientific notation.
- c. Simplify numerical expressions with rational numbers, exponents, and parentheses using order of operations.

Standard 3: Geometry—The student will use geometric properties to solve problems in a variety of contexts.

1. Construct models, sketch (from different perspectives), and classify solid figures such as rectangular solids, prisms, cones, cylinders, pyramids, and combined forms.
2. Develop the Pythagorean Theorem and apply the formula to find the length of line segments, the shortest distance between two points on a graph, and the length of an unknown side of a right triangle.

Standard 4: Measurement—The student will use measurement to solve problems in a variety of contexts.

1. Develop and apply formulas to find the surface area and volume of rectangular prisms, triangular prisms, and cylinders (in terms of π).
2. Apply knowledge of ratio and proportion to solve relationships between similar geometric figures.
3. Find the area of a “region of a region” for simple composite figures and the area of cross sections of regular geometric solids (e.g., area of a rectangular picture frame).

Standard 5: Data Analysis and Statistics—The student will use data analysis and statistics to interpret data in a variety of contexts.

1. Data Analysis: Select, analyze and apply data displays in appropriate formats to draw conclusions and solve problems.
3. Central Tendency: Find the measures of central tendency (mean, median, mode, and range) of a set of data and understand why a specific measure provides the most useful information in a given context.

Sample Test Items by Specifications**Oklahoma C³ Standard:**

Standard 1: Algebraic Reasoning: Patterns and Relationships—The student will graph and solve linear equations and inequalities in problem solving situations.

Oklahoma C³ Objective:

1. Equations
 - a. Model, write, and solve multi-step linear equations with one variable using a variety of methods to solve application problems.

Item Specifications:Emphasis:

Identify, translate, and analyze attributes of algebraic and geometric representations of lines. Write and solve linear equations in mathematical and real-world situations.

Stimulus Attributes:

Test items may include illustrations of the following: coordinate graphs, number lines, balances, and other diagrams.

Format:

Identify, write, and solve multi-step linear equations involved in mathematical and real-world situations.

Content Limits:

- Limit to integer or common fraction coefficients.
- Limit linear equations to one variable.
- Limit linear equations to one-step or two-step equations.
- Limit the range of 4–quadrant coordinate graphs to between -10 and 10.
- Limit the interpretation of solutions to linear equations to simple graphs that require identification of y-intercepts and positive and negative slopes (only the sign may change in the options).

Distractor Domain:

- Common errors
- Incorrect procedures
- Inappropriate operations with variables

Modified Oklahoma C³ 1.1a Sample Item:

Depth of Knowledge: 2

Correct Answer: C

$$4x - 10 = 18$$

What value of x makes this equation true?

- Ⓐ 2
- Ⓑ 4
- Ⓒ 7

Oklahoma C³ Standard:

Standard 1: Algebraic Reasoning: Patterns and Relationships—The student will graph and solve linear equations and inequalities in problem solving situations.

Oklahoma C³ Objective:

1. Equations
 - b. Graph and interpret the solution to one- and two-step linear equations on a number line with one variable and on a coordinate plane with two variables.

Item Specifications:Emphasis:

Identify, translate, and analyze attributes of algebraic and geometric representations of lines.

Stimulus Attributes:

Test items may include illustrations of the following: coordinate graphs, number lines, balances, and other diagrams.

Format:

- Translate between algebraic and geometric representations of linear equations
- Graph points on a coordinate plane from a table.
- Analyze attributes of algebraic and geometric representations of linear equations.

Content Limits:

- Limit coefficients to integers or common fractions.
- Limit equations to slope-intercept form.
- Limit linear equations to one-step or two-step equations.
- Limit the range of 4–quadrant coordinate graphs to between -10 and 10.
- Limit the interpretation of solutions to linear equations to simple graphs that require identification of y-intercepts and positive and negative slopes (only the sign may change in the options).

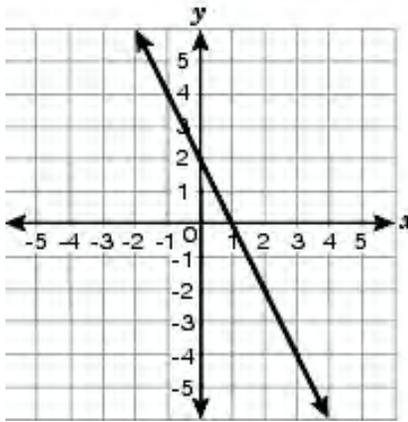
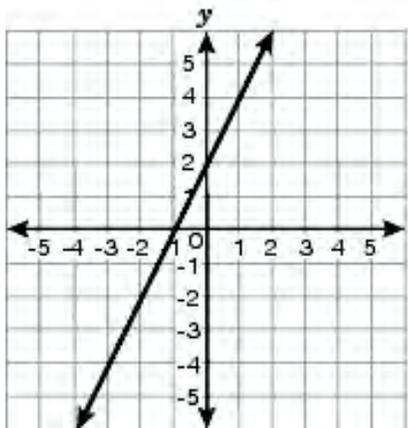
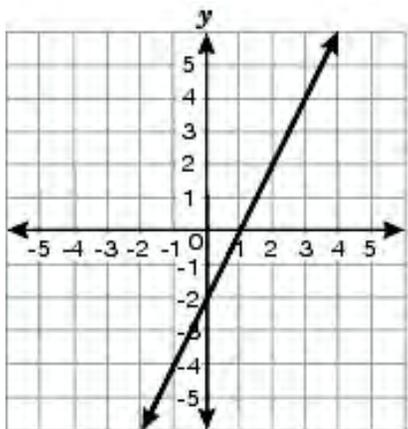
Distractor Domain:

- Common errors
- Incorrect procedures
- Inappropriate operations with variables

Modified C³ 1.1b Sample Item:

Depth of Knowledge: 2

Correct Answer: C

Which graph best represents the equation $y = 2x - 2$?**(A)****(B)****(C)**

Oklahoma C³ Standard:

Standard 1: Algebraic Reasoning: Patterns and Relationships—The student will graph and solve linear equations and inequalities in problem solving situations.

Oklahoma C³ Objective:

1. Equations
 - c. Predict the effect on the graph of a linear equation when the slope or y-intercept changes (e.g., make predictions from graphs, identify the slope or y-intercept in the equation $y = mx + b$ and relate to a graph).

Item Specifications:Emphasis:

Identify, translate, and analyze attributes of algebraic and geometric representations of lines.

Stimulus Attributes:

Test items may include illustrations of the following: coordinate graphs, number lines, balances, and other diagrams.

Format:

- Translate between algebraic and geometric representations of linear equations
- Graph points on a coordinate plane from a table.
- Analyze attributes of algebraic and geometric representations of linear equations.

Content Limits:

- Limit coefficients to integers or common fractions.
- Limit equations to slope-intercept form.
- Limit linear equations to one-step or two-step equations.
- Limit the range of 4–quadrant coordinate graphs to between -10 and 10.
- Limit change of slope to opposites, integers, and common fractions, or simple identification of steepness, or closer to vertical or horizontal (without calculation).
- Limit the interpretation of solutions to linear equations to simple graphs that require identification of y-intercepts and positive and negative slopes (only the sign may change in the options).

Distractor Domain:

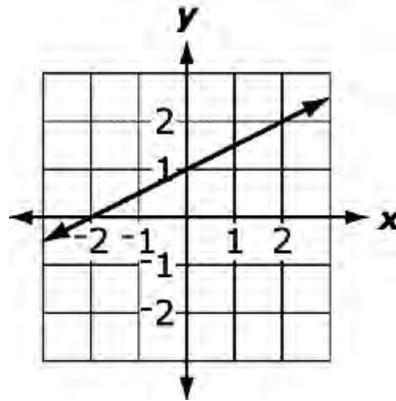
- Common errors
- Incorrect procedures
- Inappropriate operations with variables

Modified Oklahoma C³ 1.1c Sample Item:

Depth of Knowledge: 2

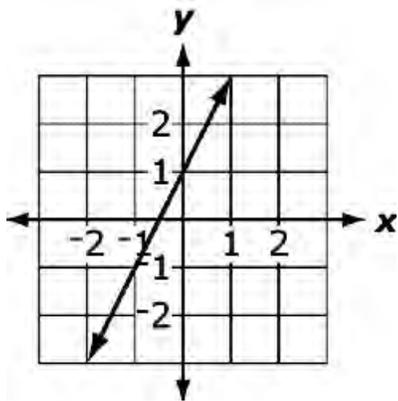
Correct Answer: C

The graph of $y = \frac{1}{2}x + 1$ is shown.

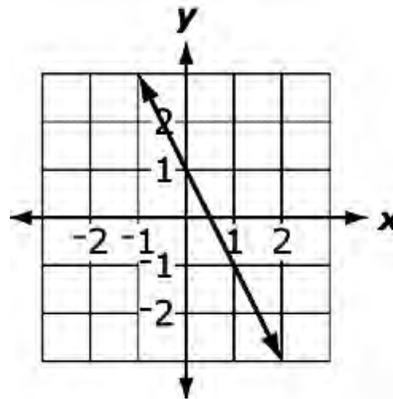


Which graph represents the result when the equation is changed to $y = -\frac{1}{2}x + 1$?

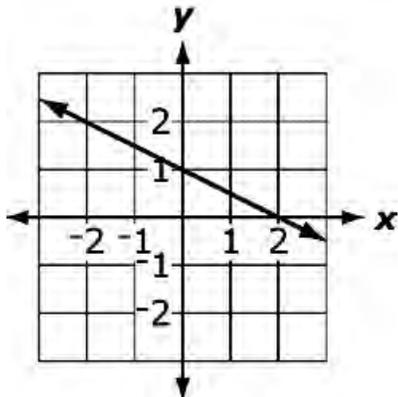
Ⓐ



Ⓑ



Ⓒ



Oklahoma C³ Standard:

Standard 1: Algebraic Reasoning: Patterns and Relationships—The student will graph and solve linear equations and inequalities in problem solving situations.

Oklahoma C³ Objective:

1. Equations
 - d. Apply appropriate formulas to solve problems (e.g., $d = rt$, $I = prt$).

Item Specifications:Emphasis:

Apply appropriate formulas.

Stimulus Attributes:

- Test items may include illustrations of the following: coordinate graphs, number lines, balances, and other diagrams.
- Test items may include formulas other than geometric formulas.

Format:

- Apply appropriate formulas for mathematical and real-world situations
- Formulas may be common formulas such as simple interest and distance-rate-time.
- Formulas may be less familiar (created for a real-world situation).
- Formulas needed for problems should be provided to the student.
- Formulas may or may not be given.

Content Limits:

- Limit coefficients to integers or common fractions.
- Limit linear equations to one-step or two-step equations.
- Limit the range of 4–quadrant coordinate graphs to between -10 and 10.
- Limit the interpretation of solutions to linear equations to simple graphs that require identification of y-intercepts and positive and negative slopes (only the sign may change in the options).
- Limit multi-step processes to no more than two steps for each component stage.
- Limit formulas to those used in real-world situations.

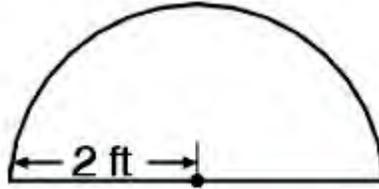
Distractor Domain:

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

Modified Oklahoma C³ 1.1d Sample Item:

Depth of Knowledge: 2

Correct Answer: A



What is the area, in square feet (sq ft), of the semicircle?

$$A_{\text{circle}} = \pi r^2$$

- Ⓐ 2π sq ft
- Ⓑ 4π sq ft
- Ⓒ 8π sq ft

Depth of Knowledge: 3

Correct Answer: A

- Frank walks $\frac{1}{2}$ mile home from school each day.
- He walks at an average rate of 3 miles per hour.
- He walks home for 60 days.

What is the total number of hours Frank spends walking home?

$$d = rt$$

- Ⓐ 10 hours
- Ⓑ 20 hours
- Ⓒ 40 hours

Oklahoma C³ Standard :

Standard 1: Algebraic Reasoning: Patterns and Relationships—The student will graph and solve linear equations and inequalities in problem solving situations.

Oklahoma C³ Objective:

2. Inequalities: Model, write, solve, and graph one- and two-step linear inequalities with one variable.

Item Specifications:Emphasis:

Identify, write, solve, and graph the solutions to one-step linear inequalities.

Stimulus Attributes:

Test items may include illustrations of the following: number lines, balance scales, pulleys, and other diagrams.

Format:

- Write one-step and two-step linear inequalities with one variable.
- Solve and graph the solution to a one-step and two-step linear inequality.
- Identify one-step and two-step inequalities that model mathematical and real-world situations.

Content Limits:

- Limit inequalities to 2 steps.
- Limit inequalities to only one variable.
- Limit inequalities to those involving only integers.
- Limit multiplication and division by a variable to positive integers.

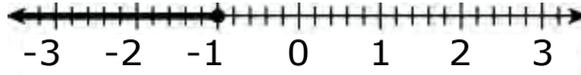
Distractor Domain:

- Common errors
- Incorrect procedures
- Inappropriate operations with variables

Modified Oklahoma C³ 1.2 Sample Item:

Depth of Knowledge: 1

Correct Answer: B



Which inequality represents the solution set shown on the number line?

- Ⓐ $n < -1$
- Ⓑ $n \leq -1$
- Ⓒ $n > -1$

Depth of Knowledge: 2

Correct Answer: C

$$4x \geq 68$$

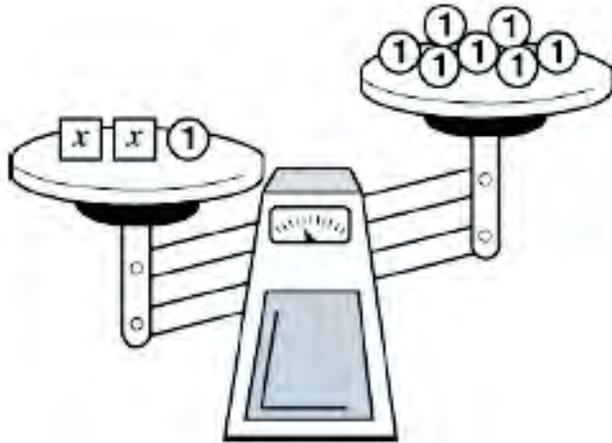
Which of these shows all of the solutions to this inequality?

- Ⓐ $x \geq 64$
- Ⓑ $x \leq 17$
- Ⓒ $x \geq 17$

Depth of Knowledge: 2

Correct Answer: A

The picture of the balance shown models an inequality.



Which solution makes the inequality true?

- A $x > 3$
- B $x = 3$
- C $x < 3$

Oklahoma C³ Standard:

Standard 2: Number Sense and Operation—The student will use numbers and number relationships to solve a variety of problems.

Oklahoma C³ Objective:

1. Number Sense: Represent and interpret large numbers and numbers less than one in exponential and scientific notation.

Item Specifications:Emphasis:

Demonstrate an understanding of how exponents are utilized in representing all numbers, especially numbers with extreme quantities.

Stimulus Attributes:

Test items may include illustrations of the following: calculator displays, tables, graphs, and charts.

Format:

- Demonstrate an understanding of the magnitude of very large and very small numbers and the role of scientific and exponential notations in the representation of these numbers.
- Demonstrate the concepts of positive and negative exponents using patterns.

Content Limits:

- Limit mathematical and real-life contexts to age-appropriate situations.
- Limit to integer exponents with the same base.

Distractor Domain:

- Computational errors
- Incorrect use of rules or properties

Modified Oklahoma C³ 2.1 Sample Item:

Depth of Knowledge: 1

Correct Answer: B

Astronomers estimate the temperature of part of the sun to be 15,000,000 degrees Kelvin.

What is 15,000,000 written in scientific notation?

- A 1.5×10^8
- B 1.5×10^7
- C 1.5×10^6

Depth of Knowledge: 2

Correct Answer: C

The table shows the masses of three planets.

Planets by Mass

Planet	Mass (kg)
Jupiter	1.9×10^{27}
Mercury	3.3×10^{23}
Earth	5.98×10^{24}

Which lists these planets in order from least to greatest mass?

- A Earth, Jupiter, Mercury
- B Jupiter, Mercury, Earth
- C Mercury, Earth, Jupiter

Depth of Knowledge: 3

Correct Answer: B

Which number shows 92×10^4 written in correct scientific notation?

- A** 9.2×10^4
- B** 9.2×10^5
- C** 9.2×10^6

Oklahoma C³ Standard:

Standard 2: Number Sense and Operation—The student will use numbers and number relationships to solve a variety of problems.

Oklahoma C³ Objective:

2. Number Operations
 - a. Use the rules of exponents, including integer exponents, to solve problems (e.g., $7^2 \cdot 7^3 = 7^5$, $3^{-10} \cdot 3^8 = 3^{-2}$).

Item Specifications:Emphasis:

Demonstrate an understanding of how exponents are utilized in representing and applying operations to all numbers, especially numbers with extreme quantities.

Stimulus Attributes:

Test items may include illustrations of the following: calculator displays, tables, graphs, and charts.

Format:

- Use the rules of exponents in mathematical and real-life contexts.
- Demonstrate the concepts of positive and negative exponents using patterns.

Content Limits:

- Limit mathematical and real-life contexts to age-appropriate situations.
- Limit to no more than two operations on exponential or scientific numbers.
- Limit to integer exponents with the same base.

Distractor Domain:

- Computational errors
- Incorrect use of rules or properties

Modified Oklahoma C³ 2.2a Sample Item:

Depth of Knowledge: 1

Correct Answer: B

What is the simplified form of $\frac{a^8}{a^2}$ when $a \neq 0$?

- Ⓐ a^{10}
- Ⓑ a^6
- Ⓒ $2a^4$

Oklahoma C³ Standard:

Standard 2: Number Sense and Operation—The student will use numbers and number relationships to solve a variety of problems.

Oklahoma C³ Objective:

2. Number Operations
 - b. Solve problems using scientific notation.

Item Specifications:**Emphasis:**

Demonstrate an understanding of how exponents are utilized in representing and applying operations to all numbers, especially numbers with extreme quantities.

Stimulus Attributes:

Test items may include illustrations of the following: calculator displays, tables, graphs, and charts.

Format:

Demonstrate an understanding of the magnitude of very large and very small numbers and the role of scientific and exponential notation in the representation of these numbers

Content Limits:

- Limit mathematical and real-life contexts to age-appropriate situations.
- Limit to no more than two operations on exponential or scientific numbers.
- Limit to integer exponents with the same base.

Distractor Domain:

- Computational errors
- Incorrect use of rules or properties

Modified Oklahoma C³ 2.2b Sample Item:

Depth of Knowledge: 2

Correct Answer: C

Which expression is a simplified form of the product shown?

$$(3 \times 10^2)(4 \times 10^3)$$

- Ⓐ 1.2×10^4
- Ⓑ 1.2×10^5
- Ⓒ 1.2×10^6

Oklahoma C³ Standard:

Standard 2: Number Sense and Operation—The student will use numbers and number relationships to solve a variety of problems.

Oklahoma C³ Objective:

2. Number Operations
 - c. Simplify numerical expressions with rational numbers, exponents, and parentheses using order of operations.

Item Specifications:Emphasis:

Demonstrate an understanding of how exponents are utilized in representing and applying operations to all numbers, especially numbers with extreme quantities.

Stimulus Attributes:

Test items may include illustrations of the following: calculator displays, tables, graphs, and charts.

Format:

- Demonstrate an understanding of the magnitude of very large and very small numbers and the role of exponential notations in the representation of these numbers.
- Use the rules of exponents in mathematical and real-life contexts.
- Demonstrate the concepts of positive and negative exponents using patterns.

Content Limits:

- Limit mathematical and real-life contexts to age-appropriate situations.
- Limit decimals to ten-thousandths.
- Limit to no more than four steps.
- Limit to integer exponents with the same base.
- Limit computations involving fractions to halves, thirds, fourths, fifths, sixths, eighths, tenths, and twelfths.

Distractor Domain:

- Computational errors
- Incorrect use of rules or properties

Modified Oklahoma C³ 2.2c Sample Item:

Depth of Knowledge: 2

Correct Answer: A

$$24 - 2(1 + 3^2)$$

What is the value of this expression?

- Ⓐ 4
- Ⓑ 31
- Ⓒ 220

Oklahoma C³ Standard:

Standard 3: Geometry—The student will use geometric properties to solve problems in a variety of contexts.

Oklahoma C³ Objective:

1. Construct models, sketch (from different perspectives), and classify solid figures such as rectangular solids, prisms, cones, cylinders, pyramids, and combined forms.

Item Specifications:Emphasis:

Identify solid figures such as rectangular solids, prisms, cones, cylinders, and pyramids.

Stimulus Attributes:

Test items may include illustrations of the following: rectangular solids, prisms, cones, cylinders, and pyramids.

Format:

Identify and describe three-dimensional objects using their defining properties.

Content Limits:

- Limit combined forms to no more than two different three-dimensional solids.
- Limit solid figures to rectangular solids, prisms, cones, cylinders, and pyramids.

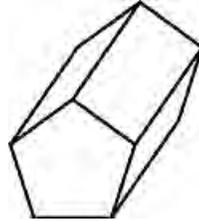
Distractor Domain:

Common errors

Modified Oklahoma C³ 3.1 Sample Item:

Depth of Knowledge: 1

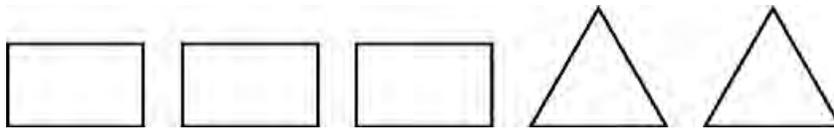
Correct Answer: B

**What is the name of this geometric solid?**

- Ⓐ hexagonal prism
- Ⓑ pentagonal prism
- Ⓒ rectangular prism

Depth of Knowledge: 2

Correct Answer: C

The faces of a geometric solid are shown.**What geometric solid can be formed using all of the faces shown?**

- Ⓐ Rectangular pyramid
- Ⓑ Rectangular prism
- Ⓒ Triangular prism

Depth of Knowledge: 2

Correct Answer: A

Which geometric solid has 5 faces, 8 edges, and 5 vertices?

- A** square pyramid
- B** rectangular prism
- C** triangular pyramid

Oklahoma C³ Standard:

Standard 3: Geometry—The student will use geometric properties to solve problems in a variety of contexts.

Oklahoma C³ Objective:

2. Develop the Pythagorean Theorem and apply the formula to find the length of line segments, the shortest distance between two points on a graph, and the length of an unknown side of a right triangle.

Item Specifications:**Emphasis:**

Demonstrate the ability to apply the Pythagorean Theorem to find lengths of sides and line segments in various contexts.

Stimulus Attributes:

Test items may include plane geometric figures and word problems.

Format:

Identify situations in which the use of the Pythagorean Theorem is appropriate in finding the missing lengths of the sides of geometric figures and line segments given in various contexts through age-appropriate word problems.

Content Limits:

- Limit geometric figures to right triangles, rectangles, or combined forms that include triangles, rectangles, or circles.
- Limit final answer choices to whole numbers (after rounding) and radicals (simplification not needed, except for perfect squares).
- Limit real-life and mathematical contexts to age appropriate situations.

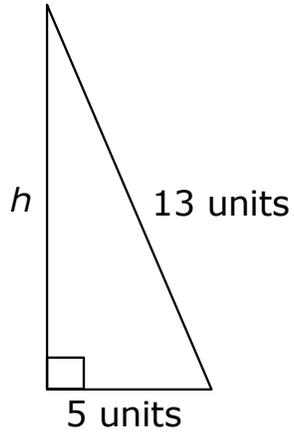
Distractor Domain:

- Computational errors
- Incorrect procedures

Modified Oklahoma C³ 3.2 Sample Item:

Depth of Knowledge: 2

Correct Answer: C



$$a^2 + b^2 = c^2$$

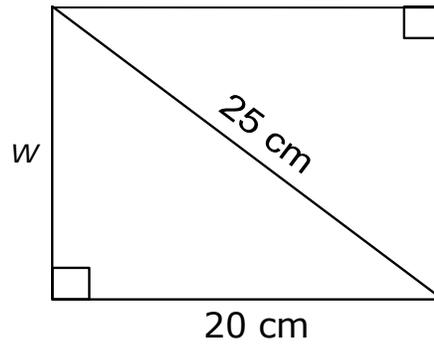
What is the length of side h in this right triangle?

- Ⓐ 18 units
- Ⓑ 14 units
- Ⓒ 12 units

Depth of Knowledge: 2

Correct Answer: B

This rectangle has a length of 20 cm and a diagonal measure of 25 cm.



What is w , the width of the rectangle?

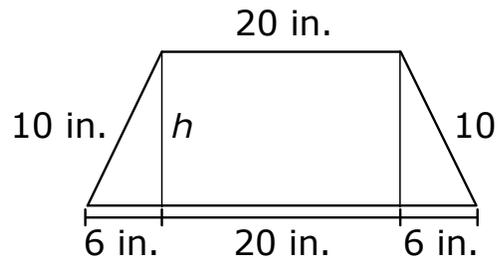
$$a^2 + b^2 = c^2$$

- Ⓐ 5 cm
- Ⓑ 15 cm
- Ⓒ 45 cm

Depth of Knowledge: 3

Correct Answer: A

The figure shows an isosceles trapezoid.



What is h , the height of the trapezoid?

$$a^2 + b^2 = c^2$$

- Ⓐ 8 in.
- Ⓑ 12 in.
- Ⓒ 13 in.

Oklahoma C³ Standard:

Standard 4: Measurement—The student will use measurement to solve problems in a variety of contexts.

Oklahoma C³ Objective:

1. Develop and apply formulas to find the surface area and volume of rectangular prisms, triangular prisms, and cylinders (in terms of pi).

Item Specifications:Emphasis:

Apply the concepts of surface area and volume to real-world settings.

Stimulus Attributes:

Test items may include illustrations of rectangular prisms, triangular prisms, and cylinders.

Format:

- Determine the surface area of right rectangular prisms, triangular prisms, and cylinders.
- Identify and apply strategies for determining volume and surface area of other three-dimensional solids.
- Formulas may or may not be provided.

Content Limits:

- Limit solids to rectangular prisms, triangular prisms, and cylinders.
- Limit numbers used in calculations to 1- and 2-digit numbers to avoid testing computation skills.

Distractor Domain:

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

Modified Oklahoma C³ 4.1 Sample Item:

Depth of Knowledge: 2

Correct Answer: C

A box is 10 inches long, 3 inches wide, and 4 inches high. What is the surface area, in square inches (sq in.), of the box?

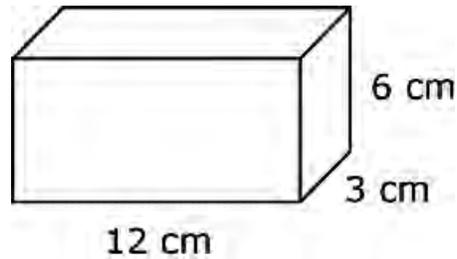
$$SA_{\text{rectangular prism}} = 2(lw + lh + wh)$$

- Ⓐ 120 sq in.
- Ⓑ 134 sq in.
- Ⓒ 164 sq in.

Depth of Knowledge: 2

Correct Answer: B

This figure shows the dimensions of a rectangular prism.



What is the surface area, in square centimeters (sq cm), of the rectangular prism?

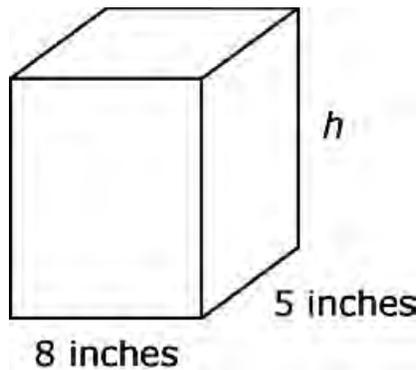
$$SA_{\text{rectangular prism}} = 2(lw + lh + wh)$$

- Ⓐ 42 sq cm
- Ⓑ 252 sq cm
- Ⓒ 432 sq cm

Depth of Knowledge: 3

Correct Answer: B

This rectangular prism has a total surface area of 340 square inches.



- Five of the faces have a total surface area of 290 square inches.
- The missing side of the surface area is the right side of the prism.

What is the height of the prism?

$$SA_{\text{rectangular prism}} = 2(lw + lh + wh)$$

- Ⓐ 8.5 inches
- Ⓑ 10 inches
- Ⓒ 300 inches

Oklahoma C³ Standard:

Standard 4: Measurement—The student will use measurement to solve problems in a variety of contexts.

Oklahoma C³ Objective:

2. Apply knowledge of ratio and proportion to solve relationships between similar geometric figures.

Item Specifications:Emphasis:

Solve problems involving scale factors of geometric figures using ratio and proportion.

Stimulus Attributes:

Test items may include illustrations of the following: maps, two- and three-dimensional figures, and scale drawings.

Format:

Apply the concepts of similarity to geometric and real-world settings.

Content Limits:

Limit to ratios of length.

Distractor Domain:

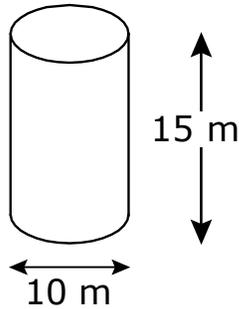
- Common errors
- Incorrect procedures or use of proportions

Modified Oklahoma C³ 4.2 Sample Item:

Depth of Knowledge: 2

Correct Answer: B

The diagram shows the dimensions of a cylinder in meters (m).



Which of these could be the dimensions, in meters (m), of a different cylinder that is similar to the one shown in the diagram?

- Ⓐ diameter = 20 m, height = 25 m
- Ⓑ diameter = 20 m, height = 30 m
- Ⓒ diameter = 25 m, height = 30 m

Depth of Knowledge: 2

Correct Answer: C

Albert has a rectangular poster.

- **The poster has a length of 12 inches and a width of 9 inches.**
- **He makes a smaller, proportional copy of the poster**
- **The copy has a width of 3 inches.**

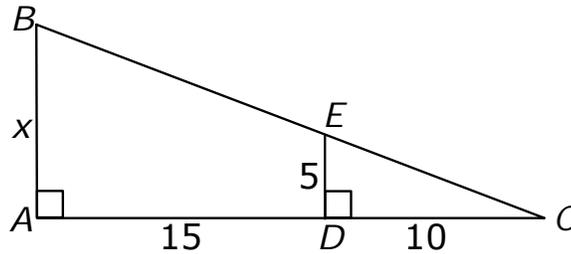
What is the length of the copy?

- Ⓐ 6 inches
- Ⓑ 5 inches
- Ⓒ 4 inches

Depth of Knowledge: 3

Correct Answer: A

The figure shows triangle ABC with \overline{ED} perpendicular to \overline{AC} .



- Triangle ABC is similar to triangle DEC .

Which proportion can be used to find x , the length of \overline{AB} ?

Ⓐ $\frac{5}{10} = \frac{x}{25}$

Ⓑ $\frac{10}{15} = \frac{x}{25}$

Ⓒ $\frac{5}{15} = \frac{x}{25}$

Oklahoma C³ Standard:

Standard 4: Measurement—The student will use measurement to solve problems in a variety of contexts.

Oklahoma C³ Objective:

3. Find the area of a “region of a region” for simple composite figures and the area of cross sections of regular geometric solids (e.g., area of a rectangular picture frame).

Item Specifications:Emphasis:

Identify, select, and apply appropriate formulas.

Stimulus Attributes:

Test items may include formulas other than geometric formulas.

Format:

- Select and apply appropriate formulas for mathematical and real-world situations.
- Identify new formulas and apply combinations of formulas to determine the area of irregular regions.
- Formulas may or may not be provided.

Content Limits:

- Limit composite shapes to those made up of squares, triangles, rectangles, and circles.
- Limit non-composite items to one formula.
- Limit multi-step processes to no more than two steps for each component stage.

Distractor Domain:

- Common errors
- Use of inappropriate formulas
- Incorrect procedures

Modified Oklahoma C³ 4.3 Sample Item:

Depth of Knowledge: 2

Correct Answer: B

The diagram shows a walkway that goes all the way around a rectangular garden.



What is the area, in square feet (sq ft), of the walkway?

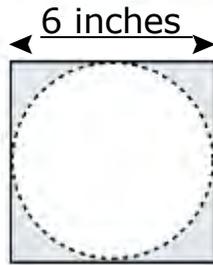
$$A = lw$$

- Ⓐ 300 sq ft
- Ⓑ 500 sq ft
- Ⓒ 800 sq ft

Depth of Knowledge: 2

Correct Answer: C

Juan cut the largest possible circle out of a 6-inch square as shown.



What is the area of the remaining shaded region of the square?

$$A_{\text{square}} = s^2$$

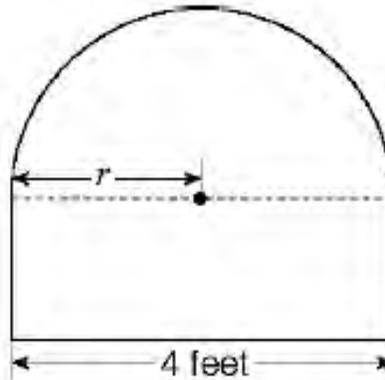
$$A_{\text{circle}} = \pi r^2$$

- Ⓐ $24 - 9\pi$
- Ⓑ $36 - 6\pi$
- Ⓒ $36 - 9\pi$

Depth of Knowledge: 3

Correct Answer: A

The figure shown is made up of a rectangle and a semicircle.



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

$$A_{\text{circle}} = \pi r^2$$

- Ⓐ 2π square feet
- Ⓑ 8π square feet
- Ⓒ 16π square feet

Oklahoma C³ Standard:

Standard 5: Data Analysis—The student will use data analysis, probability, and statistics to interpret data in a variety of contexts.

Oklahoma C³ Objective:

1. Data Analysis: Select, analyze and apply data displays in appropriate formats to draw conclusions and solve problems.

Item Specifications:Emphasis:

Demonstrate an understanding of a wide variety of graphing formats for displaying data.

Stimulus Attributes:

Test items may include graphs of a variety of types.

Format:

- Select and apply graphs to display data.
- Read and interpret information from various representations of collected data.

Content Limits:

- Limit data to age-appropriate situations.
- Limit representations of data to tables, frequency charts, line graphs, bar graphs, line plots, pictographs, stem-and-leaf plots, scatter plots, histograms, and circle graphs.

Distractor Domain:

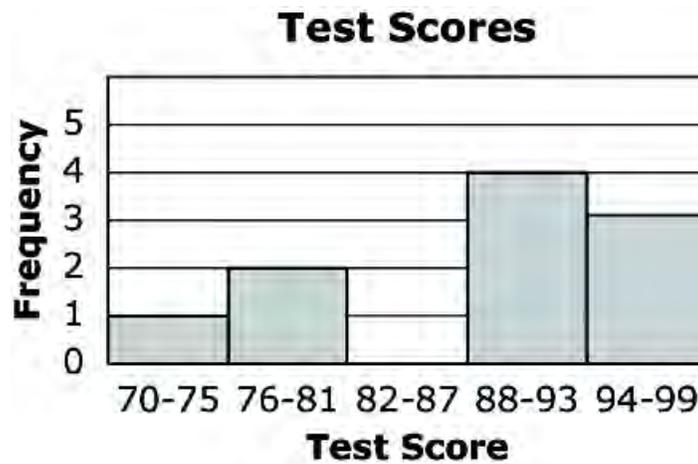
- Common misconceptions
- Incorrectly organized data sets

Modified *Oklahoma C³* 5.1 Sample Item:

Depth of Knowledge: 1

Correct Answer: B

Kate displayed her test scores in this histogram.



Which table did Kate use to make the histogram?

Ⓐ

Test Scores	70-75	76-81	82-87	88-93	94-99
Frequency	2	1		3	4

Ⓑ

Test Scores	70-75	76-81	82-87	88-93	94-99
Frequency	1	2		4	3

Ⓒ

Test Scores	70-75	76-81	82-87	88-93	94-99
Frequency	1	2	4		3

Depth of Knowledge: 2

Correct Answer: C

This line plot shows the number of goals scored by a soccer team during each game last season.



In how many games did the team score more than 1 goal?

- A 4 games
- B 7 games
- C 9 games

Depth of Knowledge: 3

Correct Answer: C

Jill plans to conduct a survey to study the relationship between the number of hours students watch television and their quiz scores.

Which would be the best way for Jill to display the survey data?

- A stem-and-leaf plot
- B circle graph
- C scatter plot

Oklahoma C³ Standard:

Standard 5: Data Analysis—The student will use data analysis, probability, and statistics to interpret data in a variety of contexts.

Oklahoma C³ Objective:

3. Central Tendency: Find the measures of central tendency (mean, median, mode, and range) of a set of data and understand why a specific measure provides the most useful information in a given context.

Item Specifications:Emphasis:

- Find the measures of central tendency (mean, median, mode, and range) of a set of data.
- Demonstrate an understanding of the mean, median, mode, and range.

Stimulus Attributes:

Test items may include illustrations of the following: charts, tables, graphs, and data sets.

Format:

- Find the measures of central tendency in a given context.
- Identify how measures of central tendency are affected by a change in a set of data.
- Identify why a specific measure provides the most useful information in a given context.
- Analyze the appropriate use of the mean in comparison with other measures of central tendency.

Content Limits:

Limit data sets to no more than 10 data points.

Distractor Domain:

- Common errors
- Incorrect procedures
- Use of median, mode, or range in place of mean

Modified Oklahoma C³ 5.3 Sample Item:

Depth of Knowledge: 2

Correct Answer: B

1, 1, 5, 6, 7, 8, 42

Which measure of central tendency best describes the data set?

- A mean
- B median
- C mode

Depth of Knowledge: 2

Correct Answer: A

The scores of 7 players from a golf tournament are listed below.

5, -4, 6, 2, -3, 5, 3

What is the mean of these scores?

- A 2
- B 2.5
- C 3

Depth of Knowledge: 3

Correct Answer: C

There are 5 students in a chorus group.

- **The median score made by the group on the last test was 85.**
- **The scores for 4 students are shown.**

85, 80, 95, 80

What could have been the score for the 5th student?

- Ⓐ 75
- Ⓑ 80
- Ⓒ 90