OKLAHOMA SCHOOL TESTING PROGRAM

TEST BLUEPRINT AND ITEM SPECIFICATIONS

MATHEMATICS

2016-2017 GRADE 5

OKLAHOMA STATE DEPARTMENT OF
EDUCATION
— CHAMPION EXCELLENCE —

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OKLAHOMA SCHOOL TESTING PROGRAM TEST AND ITEM SPECIFICATIONS

Grade 5 Mathematics Test

Purpose

The purpose of the Grade 5 test is to measure Oklahoma students' levels of proficiency over the Oklahoma Academic Standards. Students are required to respond to a variety of items that assess identified content strands and standards outlined in the Grade 5 Test Blueprint.

Test Structure, Format, and Scoring

The Grade 5 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 5 audience, and includes four responses from which to choose: the correct answer and three distractors. The total 60 items will be divided into two test sections.

Each item is scored as correct or incorrect. Only operational items contribute to the total test score. Thus, for example, if a test contains 50 operational items, only those 50 items (not the 10 field-test items) contribute to a student's scaled score on the test.

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

Test Alignment with Oklahoma Academic Standards

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 five 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
2016-2017 GRADE 5

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	IDEAL # OF ITEMS	STRANDS AND STANDARDS
46%	23	**NUMBER AND OPERATIONS**
	7	5.N.1 Division of Multi-digit Numbers
	8	5.N.2 Fractions and Decimals
	8	5.N.3 Add and Subtract Rational Numbers
18%	9	**ALGEBRAIC REASONING AND ALGEBRA**
	9	5.A.1 Numerical Patterns and Graphs (4)
		5.A.2 Equations and Inequalities (5)
24%	12	**GEOMETRY AND MEASUREMENT**
		5.GM.1 Polygons and Polyhedra (4)
	12	5.GM.2 Volume and Surface Area (4)
		5.GM.3 Angles (4)
12%	6	**DATA AND PROBABILITY**
	6	5.D.1 Data Analysis
100%	50	**TOTAL**

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

OKLAHOMA STATE DEPARTMENT OF
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Depth-of-Knowledge Assessed by Test Items

The Grade 5 test will approximately reflect the following "depth-of-knowledge (DOK)" distribution of items:

Depth-of-Knowledge	Percent of Items
Level 1—Recall and Reproduction	20–30%
Level 2—Skills and Concepts	65–75%
Level 3—Strategic Thinking	5–15%

DOK Ranges are based on the DOK of the new OAS standards. The standards increase grade-level expectations, increase rigor, and set the expectation 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.

- **Level 4** (Extended Thinking) requires complex reasoning, planning, developing, and thinking most likely requiring an extended amount of time. The cognitive demands of the item should be high and the work should be very complex. Students are required to make several connections (relate ideas within the content area or among content areas) and have to select one approach among many alternatives on how the situation should be solved in order to be at this highest level.

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 http://facstaff.wcer.wisc.edu/normw/TILSA/INFO and INSTR Align Anal 513.pdf

Universal 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 Grade 5 tests, modifications have been made to some items to simplify and clarify instructions as well as to provide maximum readability, comprehensibility, and legibility. This includes such things 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.

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 5 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.

Section 1 Grade 5 Mathematics Test Time Schedule	
Distributing Grade 5 Mathematics Test Booklets, reading directions	Approximately 15 minutes
Administering the Mathematics Test	30–40 minutes
Total:	45–55 minutes

Section 2 Grade 5 Mathematics Test Time Schedule	
Distributing Grade 5 Mathematics Test Booklets, reading directions	Approximately 15 minutes
Administering the Mathematics Test	30–40 minutes
Total:	45–55 minutes

Item Types

The test will consist of multiple choice 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.

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 either on the same page as the 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. The four choices are approximately the same length, have the same format, and are syntactically and semantically parallel; 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.

8. 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.

9. Distractors should always be plausible (but, of course, incorrect) in the context of the stimulus.

10. Order of presentation of item types is dictated by logic (chronologically, spatially, etc.).

11. 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.

12. The range of items measuring an OAS standard consisting of more than one skill will provide a balanced representation of those skills.

13. Items should be focused on what all students should know and be able to do as they complete their Grade 5 coursework.

14. The responses "Both of the above," "All of the above," "None of the above," and "Neither of the above" will not be used.

15. The material presented is balanced, culturally diverse, well written, and of interest to Grade 5 test level students. The stimuli and items are fairly presented in order to gain a true picture of students' skills.

16. Across all forms, a balance of gender and active/passive roles by gender is maintained.

17. Forms attempt to represent the ethnic diversity of Oklahoma students.

18. Calculators, formula sheets, and other resource materials may not be used on the Grade 5 Mathematics test. More information regarding the calculator policy can be found at http://sde.ok.gov/sde/assessment-administrator-resources-administrators.

19. The stimuli avoid subject matter that might prompt emotional distress on the part of the students.

20. Permission to use stimuli from copyrighted material is obtained as necessary by testing vendor.

Considerations Specific to the Grade 5 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 5 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.

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 standard 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 5.N.1

<table>
<tr>
<td>OAS STANDARD</td>
<td>5.N.1</td>
<td>Divide multi-digit numbers and solve real-world and mathematical problems using arithmetic.</td>
</tr>
<tr>
<td rowspan="4">OAS OBJECTIVES</td>
<td>5.N.1.1</td>
<td>Estimate solutions to division problems in order to assess the reasonableness of results.</td>
</tr>
<tr>
<td>5.N.1.2</td>
<td>Divide multi-digit numbers, by one- and two-digit divisors, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</td>
</tr>
<tr>
<td>5.N.1.3</td>
<td>Recognize that quotients can be represented in a variety of ways, including a whole number with a remainder, a fraction or mixed number, or a decimal and consider the context in which a problem is situated to select and interpret the most useful form of the quotient for the solution.</td>
</tr>
<tr>
<td>5.N.1.4</td>
<td>Solve real-world and mathematical problems requiring addition, subtraction, multiplication, and division of multi-digit whole numbers. Use various strategies, including the inverse relationships between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</td>
</tr>
<tr>
<td>ITEM SPECIFICATIONS</td>
<td colspan="2">

Emphasis:
- Estimate solutions to division problems.
- Determine the reasonableness of solutions to arithmetic problems.
- Use the context of a problem to determine the best format to represent a quotient.
- Solve real-world and mathematical problems requiring addition, subtraction, multiplication, and division of multi-digit whole numbers.

Stimulus Attributes:
- Test items may include tables, charts, pictures, counters, graphs, base-10 blocks, cubes, and other counting manipulatives.

Format:
- Use estimation of quotients
- Divide multi-digit whole numbers by one- and two-digit divisors with and without remainders expressed as whole numbers or fractions
- Use addition, subtraction, multiplication, or division to solve real-world problems
- Assess the reasonableness of results
- Identify and interpret the context of a problem to find the best form of a quotient for the solution

</td>
</tr>
</table>

ITEM SPECIFICATIONS

Content Limits:
- Limit divisors to two digits
- Limit dividends to two or three digits
- Limit items to three-digit by three-digit multiplication
- Limit to operations on whole numbers
- Limit decimal quotients to hundredths
- 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 a Deep and Flexible Conceptual Understanding

Distractor Domain:
- Computational errors
- Error in expression of remainder as fraction
- Rounding errors
- Regrouping errors
- Error in using inverse operation

---

1 **The art teacher had 450 sheets of construction paper on the first school day. The art students used 18 sheets during each school day. How many school days did the construction paper last?**

A 21

B 22

C 24

D 25

Correct Response: D
Depth-of-Knowledge: 2

---

2 **A student sorted 950 crayons into boxes that hold 36 crayons each. How many more crayons will the student need to completely fill the last box?**

A 6

B 14

C 22

D 30

Correct Response: C
Depth-of-Knowledge: 3

OAS STRAND—NUMBER & OPERATIONS (N): STANDARD 5.N.2

<table>
<tr><td>**OAS STANDARD**</td><td>**5.N.2**</td><td>Read, write, represent, and compare fractions and decimals; recognize and write equivalent fractions; convert between fractions and decimals; use fractions and decimals in real-world and mathematical situations.</td></tr>
<tr><td rowspan="4">**OAS OBJECTIVES**</td><td>**5.N.2.1**</td><td>Represent decimal fractions (e.g., $\frac{1}{10}, \frac{1}{100}$) using a variety of models (e.g., 10 × 10 grids, rational number wheels, base-10 blocks, meter sticks) and make connections between fractions and decimals.</td></tr>
<tr><td>**5.N.2.2**</td><td>Represent, read, and write decimals using place value to describe decimal numbers including fractional numbers as small as thousandths and whole numbers as large as millions.</td></tr>
<tr><td>**5.N.2.3**</td><td>Compare and order fractions and decimals, including mixed numbers and fractions less than one, and locate on a number line.</td></tr>
<tr><td>**5.N.2.4**</td><td>Recognize and generate equivalent decimals, fractions, mixed numbers, and fractions less than one in various contexts.</td></tr>
</table>

ITEM SPECIFICATIONS

Emphasis:
- Translate among different representations of decimals and fractions.
- Demonstrate knowledge of the connections among rational numbers represented as fractions and decimals.
- Represent, read, and write decimals using place value.
- Compare and order fractions and decimals, including mixed numbers.
- Recognize and generate equivalent decimals, fractions, and mixed numbers.

Stimulus Attributes:
- Test items may include rational number wheels, pictures, models, fraction strips, diagrams, tables, graphs, number lines, base-10 blocks, 10 × 10 grids, cubes, sticks, other counting manipulatives, and meter sticks.

Format:
- Read decimals in words
- Write decimals as words
- Write decimals using place value
- Represent decimals and using place value
- Represent decimals using a variety of models
- Identify connections among representations of decimals
- Organize representations of decimals
- Translate among representations of decimals
- Recognize and generate equivalent forms of fractions and decimals
- Generate equivalent fractions
- Locate fractions and decimals on a number line

Content Limits:
- Limit whole numbers to seven digits
- Limit to not-repeating decimals through the thousandths place
- Limit fractions to halves, thirds, fourths, fifths, eighths, and tenths in items that include both decimals and fractions
- Limit comparison to three objects
- Limit ordering to four objects

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:
- Misrepresentation of numbers
- Error in translation
- Computational errors
- Conversion errors
- Incorrect models
- Misrepresentation of place value
- Conceptual errors in number sense

---

3 **Which point on the number line below <u>best</u> represents the location of 4.82?**
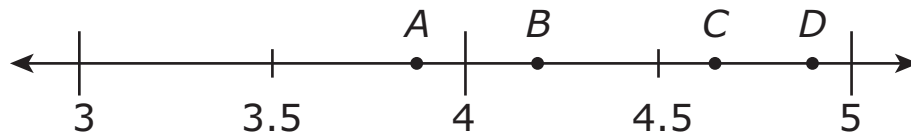
A point *A*
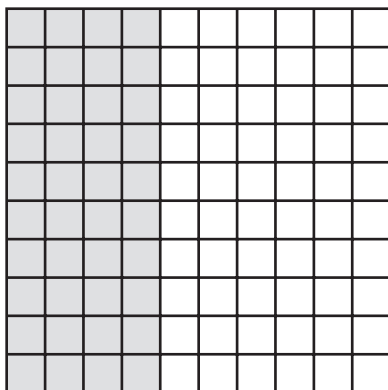
B point *B*

C point *C*

D point *D*

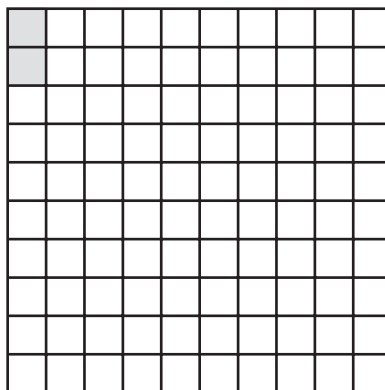**Correct Response:** D
Depth-of-Knowledge: 2

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4 In Tara's class, $\frac{2}{5}$ of the students had cereal for breakfast. Which grid has $\frac{2}{5}$ of its area shaded?

A
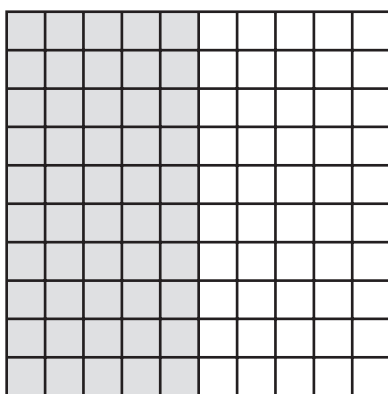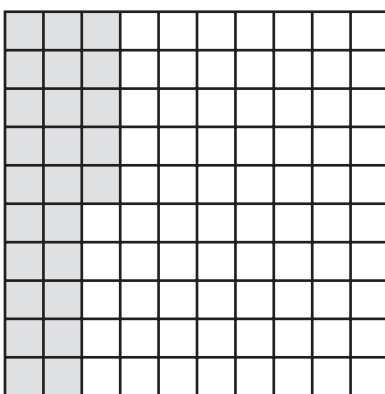
B

C

D

Correct Response: A
Depth-of-Knowledge: 2

OAS STRAND—NUMBER & OPERATIONS (N): STANDARD 5.N.3

<table>
<tr>
<td rowspan="1">OAS STANDARD</td>
<td>5.N.3</td>
<td>Add and subtract fractions with like and unlike denominators, mixed numbers, and decimals to solve real-world and mathematical problems.</td>
</tr>
<tr>
<td rowspan="4">OAS OBJECTIVES</td>
<td>5.N.3.1</td>
<td>Estimate sums and differences of fractions with like and unlike denominators, mixed numbers, and decimals to assess the reasonableness of the results.</td>
</tr>
<tr>
<td>5.N.3.2</td>
<td>Illustrate addition and subtraction of fractions with like and unlike denominators, mixed numbers, and decimals using a variety of representations (e.g., fraction strips, area models, number lines, fraction rods).</td>
</tr>
<tr>
<td>5.N.3.3</td>
<td>Add and subtract fractions with like and unlike denominators, mixed numbers, and decimals, using efficient and generalizable procedures, including but not limited to standard algorithms in order to solve real-world and mathematical problems including those involving money, measurement, geometry, and data.</td>
</tr>
<tr>
<td>5.N.3.4</td>
<td>Find 0.1 more than a number and 0.1 less than a number. Find 0.01 more than a number and 0.01 less than a number. Find 0.001 more than a number and 0.001 less than a number.</td>
</tr>
</table>

ITEM SPECIFICATIONS

Emphasis:
- Apply estimation or computation skills to find or estimate sums and differences using fractions, mixed numbers, and decimals.
- Illustrate addition and subtraction of fractions, mixed numbers, and decimals.
- Find more than and less than a number using tenths, hundredths, and thousandths.

Stimulus Attributes:
- Test items may include base-10 blocks, cubes, counting manipulatives, finding the LCD, fraction strips, two-dimensional figures, tables, graphs, charts, maps, scale drawings, data sets, and other diagrams.

Format:
- Use estimation to determine solutions to real-world situations involving decimals
- Add or subtract decimal numbers with the same or different place values
- Use fractions and mixed numbers to solve problems involving sums and differences in mathematical and real-world contexts (money, measurement, geometry, and data)
- Use estimation of fractions and mixed numbers in real-world applications (money, measurement, geometry, and data)
- Items may include fractions with different denominators
- Items may include conversion from improper fractions to mixed numbers
- Illustrate addition and subtraction of fractions

Content Limits:
- Limit decimal numbers to the thousandths place
- Limit fractions to halves, thirds, fourths, fifths, sixths, eighths, tenths, and twelfths
- Limit mathematical and real-world contexts to age appropriate situations

ITEM SPECIFICATIONS

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

Distractor Domain:
- Computational errors
- Failure to discriminate place value
- Error in placement of decimal point
- Rounding errors
- Incorrect procedures
- Computational errors
- Scaling errors in estimation
- Use of incorrect equivalencies

---

5 Todd bought a coat on sale for $29.95. He gave the clerk $40. Which is <u>closest</u> to the amount of change he should have received?

A $60

B $20

C $15

D $10

Correct Response: D
Depth-of-Knowledge: 2

---

6 Anna's assignment is to read for a total of 5 hours (hr) in two days. She read $2\frac{1}{4}$ hours on the first day. How many hours does Anna need to read on the second day to complete her assignment?

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

B $2\frac{3}{4}$ hr

C $3\frac{1}{4}$ hr

D $3\frac{3}{4}$ hr

Correct Response: B
Depth-of-Knowledge: 2

OAS STRAND—ALGEBRAIC REASONING & ALGEBRA (A): STANDARD 5.A.1

<table>
<tr><td>OAS STANDARD</td><td>5.A.1</td><td>Describe and graph patterns of change created through numerical patterns.</td></tr>
<tr><td rowspan="2">OAS OBJECTIVES</td><td>5.A.1.1</td><td>Use tables and rules of up to two operations to describe patterns of change and make predictions and generalizations about real-world and mathematical problems.</td></tr>
<tr><td>5.A.1.2</td><td>Use a rule or table to represent ordered pairs of whole numbers and graph these ordered pairs on a coordinate plane, identifying the origin and axes in relation to the coordinates.</td></tr>
</table>

ITEM SPECIFICATIONS

Emphasis:
- Use tables and rules to describe patterns of change.
- Relate a rule or table to ordered pairs.
- Make predictions and generalizations about patterns.
- Demonstrate a working knowledge of the location of points on a coordinate plane.

Stimulus Attributes:
- Test items may include number lines, patterns, counting manipulatives, base-10 blocks, cubes, coordinate graphs, two-dimensional geometric figures, protractors, geoboards, other geometric manipulatives, tables, graphs, charts, maps, data sets, diagrams, and other diagrams.

Format:
- Use variables as unknowns
- Use variables as changing quantities
- Use variables in generalizations of patterns
- Use variables to describe general rules
- Identify the basic properties of arithmetic and use them to compute with whole numbers
- Identify mathematical and nonmathematical situations that are facilitated by the use of the arithmetic properties
- Identify the coordinates of an identified point on a coordinate plane or map
- Identify the point located at identified coordinates on a coordinate plane or map

Content Limits:
- Limit patterns to an extension of, at most, four places
- Limit required operations to addition, subtraction, multiplication, and division
- Limit description of rules to one variable
- Limit to 2 operations in order of operations from left to right
- Limit numbers to three-digit whole numbers
- Limit situations to using two of the basic properties of arithmetic
- Limit geometric figures to two dimensions
- Limit ordered pairs on the coordinate plane to whole numbers
- Limit real-world and mathematical contexts to age appropriate situations

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:
- Computational errors
- Predictable misrepresentation of the pattern
- Computational errors
- Failure to generalize or specify the appropriate property
- Common errors
- Incorrect procedures
- Incorrect use of rules or properties
- Incorrect interpretation of data display

---

7 **Misty created the number pattern below.**

$$32, 28, 24, 20, \ldots$$

If *n* represents a number in this pattern, which rule could be used to find the next number in the pattern?

A $n + 4$

B $n - 4$

C $n \cdot 4$

D $n \div 4$

Correct Response: B
Depth-of-Knowledge: 2

OAS STRAND—ALGEBRAIC REASONING & ALGEBRA (A): STANDARD 5.A.2

OAS STANDARD	**5.A.2**	Understand and interpret expressions, equations, and inequalities involving variables and whole numbers, and use them to represent and evaluate real-world and mathematical problems.
OAS OBJECTIVES	**5.A.2.1**	Generate equivalent numerical expressions and solve problems involving whole numbers by applying the commutative, associative, and distributive properties and order of operations (no exponents).
	5.A.2.2	Determine whether an equation or inequality involving a variable is true or false for a given value of the variable.
	5.A.2.3	Evaluate expressions involving variables when values for the variables are given.

ITEM SPECIFICATIONS

Emphasis:
- Apply the use of the properties of arithmetic and the order of operations to solve problems.
- Determine whether an equation or inequality is true or false for a given value of a variable.
- Evaluate an expression for a given value of a variable.

Stimulus Attributes:
- Test items may include 10 blocks, cubes, other counting manipulatives, tables, graphs, sticks, number lines, charts, data sets, equivalency statements, algebraic expressions and equations, and strict and non-strict inequalities.

Format:
- Identify the basic properties of arithmetic and use them to compute with whole numbers
- Use variables as unknowns
- Substitute numerical values for variables in algebraic expressions
- Use the rules for order of operations with rational numbers to find the value of algebraic expressions
- Substitute a value for a variable and determine whether an equation or inequality is true or false
- Items may include parentheses

Content Limits:
- Limit numbers to three-digit whole numbers
- Limit situations to using two of the basic properties of arithmetic
- Limit unknowns to 2-digit whole numbers
- Limit algebraic equations to one type of operation
- Limit operations to addition, subtraction, multiplication, and division
- Limit the number of variables in an expression to one
- Limit values of the variable to two-digit whole numbers

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:
- Computational errors
- Inappropriate operations selected
- Common errors
- Incorrect procedures
- Incorrect use of rules or properties
- Order of operations errors
- Misidentification of related operations

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8 **Which expression is equivalent to (4 × 8) + (4 × 3)?**

   A $4 + (8 × 3)$

   B $4 + (8 + 3)$

   C $4 × (8 × 3)$

   D $4 × (8 + 3)$

Correct Response: D
Depth-of-Knowledge: 2

OAS STRAND—GEOMETRY & MEASUREMENT (GM): STANDARD 5.GM.1

OAS STANDARD

5.GM.1   Describe, classify, and draw representations of two- and three-dimensional figures.

OAS OBJECTIVES

5.GM.1.1   Describe, classify, and construct triangles, including equilateral, right, scalene, and isosceles triangles. Recognize triangles in various contexts.

5.GM.1.2   Describe and classify three-dimensional figures including cubes, rectangular prisms, and pyramids by the number of edges, faces, or vertices, as well as the shapes of faces.

5.GM.1.3   Recognize and draw a net for a three-dimensional figure (e.g., cubes, rectangular prisms, pyramids).

ITEM SPECIFICATIONS

Emphasis:
- Describe, classify, and construct triangles.
- Describe and classify three-dimensional figures.
- Recognize and draw a net for a three-dimensional figure.

Stimulus Attributes:
- Test items may include illustrations of the following: tables, graphs, protractors, two-dimensional geometric shapes, three-dimensional geometric shapes, geoboards, and other geometric manipulatives.

Format:
- Identify, compare, and analyze attributes of triangles
- Construct triangles based on given attributes
- Classify triangles by their attributes
- Identify, compare, and analyze attributes of three-dimensional figures
- Classify three-dimensional figures by their attributes
- Recognize and draw a net for a three-dimensional figure

Content Limits:
- Triangles can include equilateral, right, scalene, and isosceles
- Three-dimensional figures can include cubes, rectangular prisms, and rectangular pyramids

Primary Process Standards:
- 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:
- Failure to discriminate figures or figure characteristics
- Failure to identify characteristics of the net

9 **Lorelei counted the faces on some three-dimensional figures. She found two figures with exactly 5 faces each. Which two figures have exactly 5 faces each?**

A rectangular prism and triangular prism

B rectangular pyramid and triangular pyramid

C rectangular prism and triangular pyramid

D rectangular pyramid and triangular prism

Correct Response: D
Depth-of-Knowledge: 2

10 **Wade drew a square pyramid for his art project.**
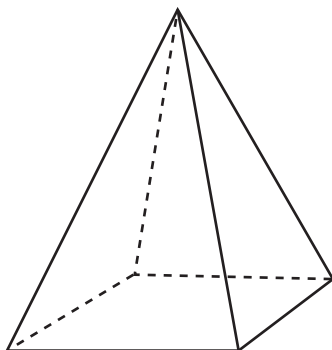
Which statement is true of the square pyramid?

A The square pyramid has 8 faces.

B The square pyramid has 2 bases.

C The square pyramid has 5 vertices.

D The square pyramid has a triangular base.

Correct Response: C
Depth-of-Knowledge: 1

OAS STRAND—GEOMETRY & MEASUREMENT (GM): STANDARD 5.GM.2

<table>
<tr><td>OAS STANDARD</td><td>5.GM.2</td><td>Understand how the volume of rectangular prisms and the surface area of shapes with polygonal faces are determined by the dimensions of the object, and that shapes with varying dimensions can have equivalent values of surface area or volume.</td></tr>
<tr><td rowspan="3">OAS OBJECTIVES</td><td>5.GM.2.1</td><td>Recognize that the volume of rectangular prisms can be determined by the number of cubes (n) and by the product of the dimensions of the prism ($a \times b \times c = n$). Know that rectangular prisms of different dimensions (p, q, and r) can have the same volume if $a \times b \times c = p \times q \times r = n$.</td></tr>
<tr><td>5.GM.2.2</td><td>Recognize that the surface area of a three-dimensional figure with rectangular faces with whole numbered edges can be found by finding the area of each component of the net of that figure. Know that three-dimensional shapes of different dimensions can have the same surface area.</td></tr>
<tr><td>5.GM.2.3</td><td>Find the perimeter of polygons and create arguments for reasonable values for the perimeter of shapes that include curves.</td></tr>
</table>

ITEM SPECIFICATIONS

Emphasis:
- Determine the volume of a rectangular prism.
- Determine the surface area of a three-dimensional figure with rectangular faces by finding the area of each component of the net of that figure.
- Find the perimeter of polygons and estimate the perimeter of a curved shape.

Stimulus Attributes:
- Test items may include rectangular prisms, other geometric solids, diagrams of rectangles or squares, dot grids, geoboards, and other geometric manipulatives.

Format:
- Determine the surface area of right rectangular prisms
- Identify and apply strategies for determining volume and surface area of other three-dimensional solids
- Use the formula to find the perimeter of a polygon
- Determine the number of square tiles that would be needed to build a rectangle of a certain area or perimeter
- Compare the dimensions and volumes of different rectangular prisms
- Compare the dimensions and surface area of different three-dimensional shapes
- Estimate the perimeter of a curved shape

Content Limits:
- Limit solids to rectangular prisms and three-dimensional shapes that have rectangular faces.
- Limit dimensions of figures to whole 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
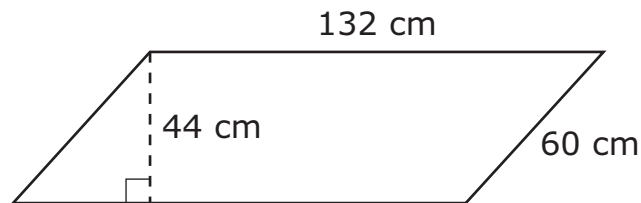- Develop the Ability to Make Conjectures, Model, and Generalize

STANDARD 5.GM.2 continued

Distractor Domain:
- Computational errors
- Incorrect procedures
- Interchange volume and surface area
- Inappropriate formulas

11 **What is the perimeter, in centimeters (cm), of this parallelogram?**

132 cm

44 cm

60 cm

A 192

B 236

C 384

D 428

Correct Response: C
Depth-of-Knowledge: 2

OAS STRAND—GEOMETRY & MEASUREMENT (GM): STANDARD 5.GM.3

OAS STANDARD	**5.GM.3**	Understand angle and length as measurable attributes of real-world and mathematical objects. Use various tools to measure angles and lengths.

OAS OBJECTIVES	**5.GM.3.1**	Measure and compare angles according to size.
	5.GM.3.2	Choose an appropriate instrument and measure the length of an object to the nearest whole centimeter or 1/16-inch.
	5.GM.3.3	Recognize and use the relationship between inches, feet, and yards to measure and compare objects.
	5.GM.3.4	Recognize and use the relationship between millimeters, centimeters, and meters to measure and compare objects.

ITEM SPECIFICATIONS

Emphasis:
- Measure and compare angles according to size.
- Choose an appropriate instrument and measure the length of an object.
- Make conversions among metric measurements and among customary measurements.

Stimulus Attributes:
- Test items may include coordinate graphs, geometric figures, protractors, geoboards, other geometric manipulatives, measuring instruments, tables, graphs, charts, pictures, diagrams, maps, scale drawings, circle graphs, other diagrams, diagrams of two- and three-dimensional figures, rulers, protractors, thermometers, beakers, or other measuring instruments.

Format:
- Identify and compare angle measures in mathematical situations and in real-world contexts
- Identify appropriate unit and instrument of measure needed to solve a length problem
- Compute simple metric unit conversions
- Compute simple customary unit conversions
- Use a ruler to measure length to the nearest whole centimeter or 1/16-inch
- Compare lengths of objects

Content Limits:
- Limit angle measures to whole numbers no greater than 180 degrees
- Limit units of length to millimeter, centimeter, meter, inch, foot, or yard
- Limit conversion to inches to feet and feet to inches
- Limit conversion to feet to yards and yards to feet
- Limit conversion to millimeters to centimeters and centimeters to millimeters
- Limit conversion to centimeters to meters and meters to centimeters
- Limit length to nearest whole centimeter or 1/16-inch

ITEM SPECIFICATIONS

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

Distractor Domain:
- Common errors
- Computational errors
- Inappropriate procedure or incorrect value in conversion
- Identify inappropriate unit of measure
- Incorrect use of measurement instrument
- Select inappropriate measurement instrument
- Inaccurate reading of measurement instrument

12 **Which angle has the <u>greatest</u> measure?**

A

B

C

D
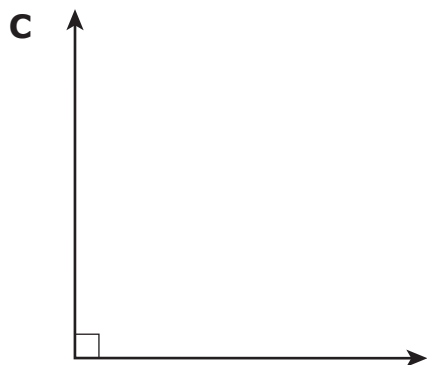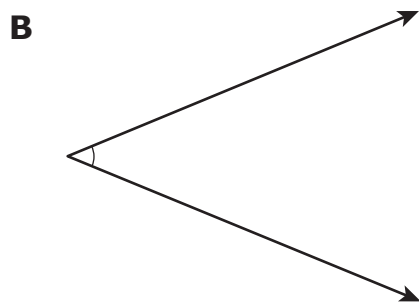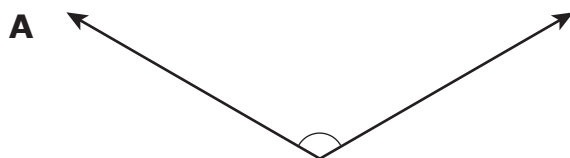
Correct Response: A

Depth-of-Knowledge: 2

13 **On their first flight, the Wright brothers traveled a distance of about 120 feet. How many yards are equal to 120 feet?**

    A 30 yd

    B 40 yd

    C 240 yd

    D 360 yd

Correct Response: B
Depth-of-Knowledge: 2

OAS STRAND—DATA & PROBABILITY (D): STANDARD 5.D.1

OAS STANDARD

5.D.1   Display and analyze data to find the range and measures of central tendency (mean, median, and mode).

OAS OBJECTIVES

5.D.1.1   Find the measures of central tendency (mean, median, or mode) and range of a set of data. Understand that the mean is a "leveling out" or central balance point of the data.

5.D.1.2   Create and analyze line and double-bar graphs with whole numbers, fractions, and decimal increments.

ITEM SPECIFICATIONS

Emphasis:
- Find the mean, median, mode, and range of a set of data.
- Create and analyze line and double-bar graphs.

Stimulus Attributes:
- Test items may include lists, tables, graphs, charts, middle, data sets, number lines, line graphs, bar graphs, pictographs, frequency charts, Venn diagrams, line plots, scatter plots, stem-and-leaf plots, histograms, circle graphs, spreadsheets, other diagrams, and any of the following terms: range, spread, mode, most often, median, or average.

Format:
- Translate information in data through spread, frequency, and middle
- Compare how representations of data support inferences and predictions
- 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
- Translate between representations of data
- Solve mathematical and real-world problems based on data presented in a variety of formats
- Read and interpret data presented in a variety of formats
- Analyze how representations of data influence inferences and predictions
- Item may include model or names of graphs in options
- Compare how graphic representations of data support inferences and predictions
- Select appropriate representations of data, such as line and double-bar graphs
- Use data to create and analyze line and double-bar graphs

Content Limits:
- Limit to descriptor of range, mode, mean and median
- Limit median items to an odd number of pieces of data
- Limit data sets to 20 pieces of data
- Limit data sets to numerical data
- Limit graphs to line and double-bar graphs

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

14 **This table shows the high temperatures for some Oklahoma cities in January 2010.**

High Temperatures

City	Temperature (°F)
Arnett	67
Beaver	70
Boise City	64
Buffalo	68
Goodwell	67
Kenton	64
Slapout	70

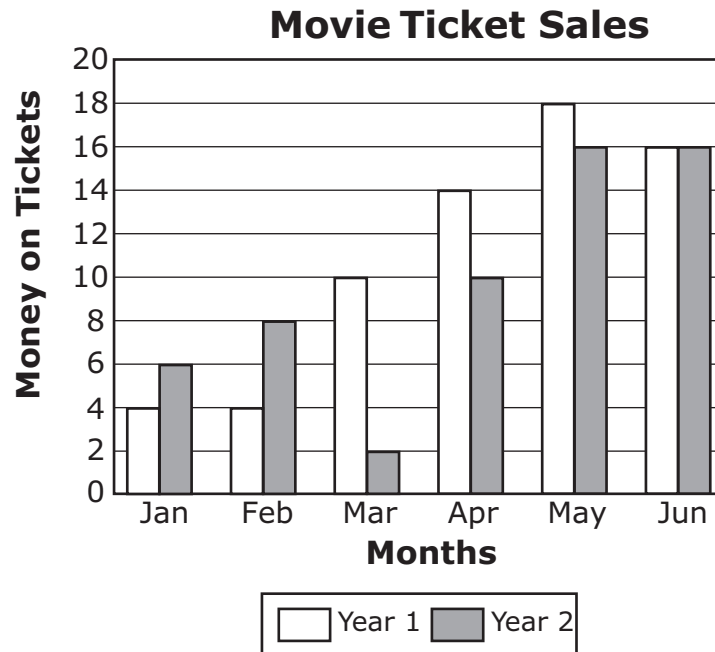**What is the range of these high temperatures?**

A 2°

B 3°

C 4°

D 6°

Correct Response: D
Depth-of-Knowledge: 2

15 **The graph below shows how much Tisha spent on movie tickets for the first six months of two different years.**

Movie Ticket Sales

Which month had the greatest difference in the amount of money spent on movie tickets between year 1 and year 2?

A March

B April

C May

D June

Correct Response: A
Depth-of-Knowledge: 2

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