Wyoming Department of Education

Assessment Descriptions

Math

Grade 5

Wyoming Assessment Descriptions
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I. The Instructional Focus of Wyoming's State Assessment System

Wyoming believes it is possible to build statewide assessments that comply with the requirements of the *No Child Left Behind Act of 2001 (P.L. 107-110)* while still providing teachers information that is critical to improving instruction for individual students. To this end, Wyoming has embraced the requirements outlined in the October 2001 report written by The Commission on Instructionally Supportive Assessment and has constructed its statewide assessment system using the guidance provided by the report.

Instructionally supportive assessments are assessments intended to promote more effective classroom instruction.

Teachers will receive PAWS (Proficiency Assessment for Wyoming Students) results by skill for each of their students in each content area tested. These results are intended to help educators make informed decisions about curriculum and instruction. Since PAWS is aligned to academic content and student performance standards, student results can reveal strengths and weaknesses in curricula or instructional methodology. Thus, it can also help educators target specific areas necessary for school and district improvement. The use of assessment results to support informed decision-making for improved teaching and learning in Wyoming schools is an expectation of the PAWS design approach.

PAWS Testing Overview

All Wyoming public school students in grades three through eight and grade eleven will test in reading, writing and mathematics, and students in grades four, eight and eleven will test in science during the testing window. Adequate yearly progress (AYP) determinations will be made using the data received from the reading, writing and mathematics assessment results.

Grade 10: Students in grade ten are allowed to take advantage of an early testing opportunity. Students may "bank" their mathematics and/or reading and writing scores during their tenth grade year. AYP will be determined only for students in grade eleven using their "banked" scores or scores achieved during the official testing window, whichever is higher. In order to bank a language arts score, students must complete the reading and writing tests during the same testing window

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II. Purpose of Assessment Descriptions and Content Limits

In the past, teachers have been faced with the perplexing task of trying to prepare their students to take the state test without knowing which standards/skills will or will not be assessed on a given form of the test. To ensure that PAWS is instructionally supportive, assessment descriptions and content limits have been developed to clearly and thoroughly describe the knowledge and skills that will be tested and the evaluative criteria to be used to assess the skill.

III. Explanation of PAWS Content Area Skills

The Wyoming Content and Performance Standards serve as the foundation for a set of comprehensive, measurable PAWS content area skills. The PAWS skills were created through the analysis and categorization of highly related Wyoming Content Standards and Benchmarks. These standards and benchmarks, when used successfully to guide instruction, build students' understanding of the major concepts and principles within each content area. These major concepts and principles comprise the substance of the PAWS content area skills. The PAWS skills described for educators in the Wyoming Assessment Descriptions meet the following set of criteria:

- The skills are organized into major concepts and principles that encompass highly related Wyoming content standards and benchmarks.
- The skills support a variety of instructional strategies administered by Wyoming teachers.
- The skills can be defined as somewhere between the breadth of a content standard and the specificity of a benchmark.
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Through the use and measurement of the PAWS content area skills, PAWS successfully fulfills two major purposes. First, it provides information about student attainment of the knowledge and skills within the Wyoming Content and Performance Standards in reading, writing, mathematics, and science over time. Second, and equally important, it provides additional skill-level reporting categories aligned to the Wyoming Content and Performance Standards as organized by the Wyoming Assessment Descriptions to assist teachers in interpreting and addressing specific academic needs of students.

IV. Skills for Mathematics

The Wyoming Mathematics Content and Performance Standards ask students to demonstrate basic computational skills along with the higher-level thinking skills of reasoning and problem solving. To achieve this end, the PAWS assessment asks students to analyze, reason, and communicate ideas effectively as they pose, formulate, solve, and interpret mathematical problems in a variety of situations.

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Wyoming's framework for assessing mathematical skills is based upon mathematical problem solving.

A. Skills for Number Operations and Concepts Standard

1. **Understand the meaning of arithmetic operations and make reasonable estimates**

   Students interpret numbers to solve problems and estimate reasonable results using the relationships among operations and knowledge about the base-ten system.

2. **Understand ways to represent numbers, relationships among numbers, and number systems**

   Students interpret and represent numbers in a number system.

3. **Develop the connection between conceptual understanding and computational proficiency**

   Students perform computations fluently and in different ways, including mental calculations and paper/pencil calculations.

   Students develop, record, and explain strategies for solving computational problems, supported by an understanding of numbers and operations.

B. Skills for Geometry Standard

1. **Specify locations and describe spatial relationships using coordinate geometry and other representational systems**

   Students specify locations and describe spatial relationships using coordinate geometry and other representational systems to analyze mathematical situations.

2. **Analyze characteristics and properties of two- and three-dimensional geometric shapes**

   Students analyze two- and three-dimensional geometric shapes to formulate mathematical arguments using visualization, spatial reasoning, and geometric modeling.

3. **Apply transformations and use symmetry to analyze mathematical situations**

Students interpret their physical environment to study symmetry, congruence, and similarity of geometric shapes and solve problems involving transformations in size, position, and orientations of shapes.

C. Skills for Measurement Standard

1. Understand measurable attributes of objects and the units, systems, and processes of measurement

Students apply numerical values to attributes of objects to interpret other areas of mathematics such as number operations, geometric ideas, statistical concepts, and notions of function.

2. Apply appropriate techniques, tools, and formulas to determine perimeter, area or volume

Students apply techniques, tools, formulas, unit systems, and processes of measurement to solve for perimeter, areas, and volume.

D. Skills for Algebra Standard

1. Understand patterns, relations, and functions

Students formulate and solve problems involving multiple representations of patterns, relations, and functions.

2. Use mathematical models to represent and understand quantitative relationships

Students formulate and solve problems using modeling and algebraic symbols to represent quantitative relationships and mathematical situations.

E. Skills for Data Analysis and Probability Standard

1. Collect, organize, and display relevant data to answer questions and use appropriate statistical methods to analyze the data

Students formulate questions that can be addressed by collecting, organizing, and displaying data using statistical methods to solve the question.

2. Develop and evaluate inferences and predictions based on data

Students define an appropriate sample, collect data from that sample, describe the sample, and make reasonable inferences relating the sample and the population.

V. Cognitive Processes for Math

The cognitive processes for the math assessments have been developed based on the concept of mathematical literacy. A mathematically literate student has moved beyond computation, manipulation, and symbolic knowledge and is able to put mathematical knowledge into functional use in a multitude of different situations and contexts, in varied, reflective, and insightful ways. An analysis of the National Council of Teachers of Mathematics (NCTM) Standards, the Wyoming Mathematics Content and Performance Standards, the proceedings of the English-language Expert Panel on Student Success in Ontario, and the elements of the Organization for Economic Cooperation and Development – Programme for International Student Assessment (OECD PISA) definition of mathematical literacy has resulted in the following elements being clustered into three more holistic criteria described below.

Recollection

Solving familiar, routine problems, utilizing practiced knowledge, standard methods, and straightforward calculations.

This criterion includes standard representations and definitions, routine computations, routine procedures, and routine problem solving.

Connection

Solving problems which, although set in a familiar situation, do not present an immediately recognizable solution involving a greater degree of interpretation for their solution than those in the previous criteria.

This criterion includes modeling, standard problem solving translation and interpretation, and use of multiple well-defined methods to solve problems.

Reflection

Using some insight, reflection, and creativity to solve problems and explaining and justifying reasoning and methods.

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This criterion includes complex problem solving, reflection and insight, original mathematical approach, and multiple complex methods.

The cognitive processes reflect conceptual categories of increasing cognitive demand and complexity, but do not strictly reflect a hierarchy of student performances based on item difficulty. Conceptual complexity is only one component of item difficulty that influences levels of performance. Others include familiarity, recent opportunity to learn, and practice. As far as possible, items with a range of difficulties within each criterion will be included in the assessment.

VI. Context for Math

All math assessments will be in a problem solving format, with limited routine calculations in the lower grade levels. The mathematical content can be described as areas that encompass the kinds of problems that arise through interaction with day to day phenomena and the mathematical skills used to navigate a solution.

VII. Evaluative Criteria for Mathematical Skills

"Evaluative Criteria" are the factors to be used in determining the acceptability of a student's responses to multiple choice items or to constructed response items.

These general evaluative criteria for mathematics are:

Accuracy
How *accurate* is the student's use of numbers and symbols to calculate the solution to mathematical problems?

Appropriateness
How *appropriate* is the student's use of mathematical concepts, skills, properties and relationships to investigate and solve problems?

Adequacy of Communication
Does the student *adequately communicate* mathematically to explain reasoning and solution?

The evaluative criteria associated with a particular skill can prove invaluable to teachers as they promote their students' mastery of skills. Moreover, if students also understand the nature of a particular skill's evaluative criteria, they can become more adept at monitoring their own emerging mastery of skills. Great care has been given to the isolation of appropriate evaluative criteria for each skill assessed by PAWS. These

criteria constitute one of the key instructionally relevant features of an assessment system that has been designed from its inception to enhance instruction in Wyoming's schools.

VIII. Explanation of Coding

The assessment descriptions use a standard code for ease of reference. Codes are provided at the skill level. The sequence is:
Grade/Standard/Skill

Key to Skill Codes:

In math, the skill code refers to the standard and specific skill in that standard.

6. G.1   Grade 6/Geometry/Specify locations and describe spatial relationships using coordinate geometry and other representational systems

IX. Assessment Descriptions

The Assessment Descriptions along with the Content Limits can now be found by grade level.

Mathematics Content Assessed by PAWS
GRADE 5

Wyoming Content Standard 1. Number Operations and Concepts		
Skill 1. Understand the meaning of arithmetic operations and make reasonable estimates.		
Benchmark	**Context**	**Content Limits:**
05.1.4 Students explain their choice of estimation or problem-solving strategies and justify results when performing number operations in problem- solving situations.	**N1 is embedded in N2 and N3.**	
05.1.6 Students demonstrate an understanding of fractions as parts of wholes.		

Mathematics Content Assessed by PAWS
GRADE 5

Scoring Rubrics

<u>**Standard:**</u> Number Operations and Concepts

- <u>**Skill:**</u> Understand the meaning of arithmetic operations and make reasonable estimates

- **N1 embedded in N2 and N3.**

Mathematics Content Assessed by PAWS
GRADE 5

Wyoming Content Standard 1. Number Operations and Concepts		
Skill 2. Understand ways to represent numbers, relationships among numbers, and number systems.		
Benchmark	**Context**	**Content Limits:**
05.1.1 Students use the concept of place value to read and write whole numbers (in words, standard, and expanded form) and decimals (10ths and 100ths). **05.1.6** Students demonstrate an understanding of fractions as parts of wholes. **05.1.7** Students order, compare, add, and subtract fractions with like denominators.	Problem solving situations will include ordering and comparing fractions with like denominators; using place value to read and write whole numbers in words, standard, and expanded forms, and decimals to hundredths.	• Items may compare whole numbers and proper fractions greater than zero. • The data presented to students may be either precise values, a range of values, or a combination of precise values and estimates of other values. • Numbers in the stimulus should not be presented in numerical order. • Items may compare smaller or larger numbers, or compare the order of magnitude between numbers. • Items involving comparison of fractions should be limited to use of whole numbers and fractions with like denominators (1/2 through 1/12). • Numbers being compared may be in the same form or in two different forms (i.e., word or standard). • Words, number lines, drawings, numerals, or symbols (<,>, =) may be used. • An item may utilize one format or a variety of formats, such as fractions or decimals. • Items may include the relationships among whole numbers and decimals given a real-world context. • The place values of the fractional part of decimal numbers should range from tenths through hundredths. • Items may contain multiple forms of a given value. (word, standard and expanded or whole number, fraction and decimal) • Items will not include repeating decimals. • Some items should include word names as well as numerals. • Items should be set in either a real-world or mathematical context. • CR items may have students "Show your work or explain your answer." • Graphics should be used in some of these items, as appropriate.

Mathematics Content Assessed by PAWS
GRADE 5

Scoring Rubrics

Standard: Number Operations and Concepts

- **Skill:** Understand ways to represent numbers, relationships among numbers, and number systems

Cognitive Processes:

- **Recollection –** The student identifies standard representations and definitions; uses routine procedures to demonstrate an understanding of relative size through ordering and comparing fractions with like denominators.

- **Connection –** The student demonstrates a connection between various representations of numbers such as quantities of real-world objects.

- **Reflection –** The student demonstrates a connection between various representations of numbers such as quantities and quantifiable attributes of real-world objects; and explains logical relationships.

Rubric:

Score	Definition
2	The response is complete, accurate, includes labeling answer if required, and based on appropriate methods for representing, ordering or comparing whole numbers, decimals to hundredths, or fractions with like denominators. Evidence of work involves sound reasoning and is adequate to support the solution. Any errors present in the response do not detract from the student's demonstration of understanding of ways to represent numbers, relationships among numbers, and number systems.
1	The response is inaccurate or incomplete. Evidence of work based on representing, ordering or comparing whole numbers, decimals to hundredths, or fractions with like denominators is present, but is incompletely or inaccurately applied to the problem. Justification involves some reasoning, but is inadequate to support an accurate solution.
0	The response shows very little or no understanding of how to successfully complete the task.

Mathematics Content Assessed by PAWS
GRADE 5

Wyoming Content Standard 1. Number Operations and Concepts		
Skill 3. Develop the connection between conceptual understanding and computational proficiency.		
Benchmark	**Context**	**Content Limits:**
05.1.2 Students demonstrate computational fluency with basic facts for all four operations, including identifying multiples and factors of designated numbers up to 100. **05.1.3** Students demonstrate an understanding of whole number operations by: - explaining the relationships between the operations of addition, subtraction, multiplication, and division; and - multiplying by two-digit whole numbers and dividing by single-digit whole numbers. **05.1.5** Students add and subtract decimals to hundredths and solve problems in the context of money. **05.1.4** Students explain their choice of estimation or problem-solving strategies and justify results when performing number operations in problem- solving situations.	Problem solving situations with computational fluency requiring explanation of the relationships among the four operations and determination of multiples and factors of numbers up to 100; adding and subtracting fractions with like denominators; adding and subtracting decimals to hundredths; solving problems in the context of money; and multiplying by two digit whole numbers and dividing by single digit whole numbers.	- Items should include any operation with whole numbers; or addition and subtraction of decimals (tens through hundredths) and fractions (with like denominators of 2 through 12). - Items will be limited to no more than two operation problems. - Items will assess factors and multiples of numbers to 100; rules of divisibility for 2, 3, 4, 5, 9, and 10; and least common multiples up to 100. - Items will not include whole numbers with more than four digits, positive fractions with more than two-digit numerators and denominators, and/or decimals greater than hundredths. - Items should not involve division by a fraction. - Items should not assess abstract constructs. - Items may use drawings, symbols, algorithms, number sentences, or real-world problem situations. - Graphics should be used in some of these items, as appropriate. - Items involving estimation should be limited to use of whole numbers and fractions with like denominators (1/2 through 1/12). - CR items may have students "Show your work or explain your answer." - Rounding will be limited to the nearest tenths, ones, tens and hundreds.

Mathematics Content Assessed by PAWS
GRADE 5

Scoring Rubrics

Standard: Number Operations and Concepts

- **Skill:** Develop the connection between conceptual understanding and computational proficiency

Cognitive Processes:

- **Recollection –** The student uses routine computations, procedures, or routine problem solving.

- **Connection –** The student shows connection with standard problem solving and multiple well-defined methods to evaluate whole numbers in unfamiliar contexts.

- **Reflection –** The student uses advanced reasoning or generalization to evaluate problem situations using new forms of representation in new contexts.

Rubric:

Score	Definition
2	The response is complete, accurate, includes labeling answer if required, and based on appropriate methods for determination of multiples or factors; addition or subtraction with decimals or fractions; or multiplication or division with whole numbers. Evidence of work involves sound reasoning and is adequate to support the solution. Any errors present in the response do not detract from the student's demonstration of understanding of arithmetic concepts.
1	The response is inaccurate or incomplete. Evidence of work based on fluency with basic number combinations or strategies with multidigit numbers is present, but is incompletely or inaccurately applied to the problem. Justification involves some reasoning, but is inadequate to support an accurate solution.
0	The response shows very little or no understanding of how to successfully complete the task.

Mathematics Content Assessed by PAWS
GRADE 5

Wyoming Content Standard 2. Geometry		
Skill 1. Specify locations and describe spatial relationships using coordinate geometry and other representational systems.		
Benchmark	**Context**	**Content Limits:**
05.2.1 Students describe, draw, and classify two-dimensional geometric figures such as triangles, quadrilaterals, and circles.	Problem solving situations will include identifying and classifying lines (parallel, perpendicular, and intersecting) and angles (acute, right, and obtuse).	• Items will assess identifying parallel and perpendicular lines, and types of angles. • Items will assess identifying basic properties of lines and various types of angles. • Items may assess understanding and application of perpendicularity and parallelism. • Items should assess only geometric concepts of two-dimensional figures. • Items should be set in either a real-world or mathematical context. • CR items may have students "Show your work or explain your answer." • Graphics should be used in most of these items, as appropriate.

Mathematics Content Assessed by PAWS
GRADE 5

Scoring Rubrics

Standard: Geometry

- **Skill:** Specify locations and describe spatial relationships using coordinate geometry and other representational systems

Cognitive Processes:

- **Recollection –** The student identifies standard geometrical representations and definitions; reproduces practiced material to solve problems by routine procedures.

- **Connection –** The student shows a connection between familiar geometrical representations and slightly different contexts; makes modest extension of multiple well-defined methods of problem solving.

- **Reflection –** The student uses reflection and insight; translates unfamiliar context or real-world representation into mathematical structures; complex problem solving.

Rubric:

Score	Definition
2	The response is complete, accurate, includes labeling answer if required, and based on appropriate methods for identifying or classifying parallel, perpendicular, and intersecting lines or acute, right, and obtuse angles. Evidence of work involves sound reasoning and is adequate to support the solution. Any errors present in the response do not detract from the student's demonstration of understanding of spatial relationships.
1	The response is inaccurate or incomplete. Evidence of work based on identifying or classifying parallel, perpendicular, and intersecting lines or acute, right, and obtuse angles is present, but is incompletely or inaccurately applied to the problem. Justification involves some reasoning, but is inadequate to support an accurate solution.
0	The response shows very little or no understanding of how to successfully complete the task.

Mathematics Content Assessed by PAWS
GRADE 5

Wyoming Content Standard 2. Geometry		
Skill 2. Analyze characteristics and properties of two- and three-dimensional geometric shapes.		
Benchmark	**Context**	**Content Limits:**
05.2.1 Students describe, draw, and classify two-dimensional geometric figures such as triangles, quadrilaterals, and circles. **05.2.2** Students describe, identify, and classify three-dimensional geometric figures such as cylinders, cones, pyramids, rectangular prisms, and spheres.	Problem solving situations will include geometrical attributes of quadrilaterals, triangles and 3-dimensional figures, such as cylinders, cones, pyramids, rectangular prisms, and spheres allowing students to use spatial reasoning and geometric modeling to identify, classify, and describe.	• Items will assess identifying basic properties and attributes of regular polygons or solid figures: such as sides, faces, edges, bases, and vertices, and diagonals of polygons. • Items assessing three-dimensional figures will use right prisms, right circular cylinders, cones, pyramids or spheres. • Items assessing three-dimensional figures will use various types of drawings and perspectives (e.g., flat patterns/nets, isometric drawings). • Items may use coordinate planes. • Items should be set in either a real-world or mathematical context. • Items may include pictures that represent geometric properties. • CR items may have students "Show your work or explain your answer." • Graphics should be used in most of these items, as appropriate.

Mathematics Content Assessed by PAWS
GRADE 5

Scoring Rubrics

Standard: Geometry

- **Skill:** Analyze characteristics and properties of two- and three-dimensional geometric shapes

Cognitive Processes:

- **Recollection –** The student reproduces and recognizes similarities and differences when analyzing shapes in familiar contexts and dimensions. Interpretation of standard representation of familiar objects.

- **Connection –** The student makes the connection between shapes, images, or visual representations such as photographs. Demonstrates the ability to distinguish between different forms of representation.

- **Reflection –** Student understands and interprets less familiar representations of mathematical objects, such as three dimensional objects represented in two dimensions. Demonstrates an ability to reflect upon different forms of representation according to situation and purpose.

Rubric:

Score	Definition
2	The response is complete, accurate, includes labeling answer if required, and based on appropriate methods for identifying, classifying or describing the geometrical attributes of quadrilaterals, triangles or 3-dimensional figures. Evidence of work involves sound reasoning and is adequate to support the solution. Any errors present in the response do not detract from the student's demonstration of understanding of geometric shapes.
1	The response is inaccurate or incomplete. Evidence of work based on characteristics and properties of geometric shapes is present, but is incompletely or inaccurately applied to the problem. Justification involves some reasoning, but is inadequate to support an accurate solution.
0	The response shows very little or no understanding of how to successfully complete the task.

Wyoming Content Standard 2. Geometry		
Skill 3. Apply transformations and use symmetry to analyze mathematical situations.		
Benchmark	**Context**	**Content Limits:**
05.2.3 Students describe and compare various geometric objects using congruency and lines of symmetry appropriate to grade level.	Problem solving situations will include demonstrating an understanding of symmetry and/or congruency by drawing, comparing, and identifying these characteristics in polygons, including quadrilaterals and triangles.	• Items may assess properties and relationships pertaining to regular two-dimensional shapes, and the concepts of symmetry or congruency. • Items may assess understanding and application of symmetry and congruency. • Items will not assess three-dimensional figures. • Items should assess only geometric concepts of two-dimensional figures. • Items may present a coordinate plane to locate and/or describe objects. • Items will assess reflections and their results on a geometric figure or a real-world item shaped similarly to a geometric figure. • Polygons may include regular or irregular polygons up to 10 sides. • Regular polygons must be presented with distinct markings that enable the identification of reflections. • Items may be set in either a real-world or mathematical context. • CR items may have students "Show your work or explain your answer." • Graphics should be used in all of these items.

Mathematics Content Assessed by PAWS
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Scoring Rubrics

Standard: Geometry

- **Skill:** Apply transformations and use symmetry to analyze mathematical situations

Cognitive Processes:

- **Recollection –** The student identifies standard geometrical representations and definitions; solves problems by routine procedures.

- **Connection –** The student shows a connection between familiar geometrical representations and slightly different contexts; makes modest extension of multiple well-defined methods of problem solving.

- **Reflection –** The student uses reflection and insight; translates unfamiliar context and between representations; and uses complex problem solving.

Rubric:

Score	Definition
2	The response is complete, accurate, includes labeling answer if required, and based on appropriate methods for identification, representation or comparison of symmetrical and/or congruent characteristics of polygons, including quadrilaterals and triangles. Evidence of work involves sound reasoning and is adequate to support the solution. Any errors present in the response do not detract from the student's demonstration of understanding of similarity and/or congruency.
1	The response is inaccurate or incomplete. Evidence of work based on similarity and/or congruency is present, but is incompletely or inaccurately applied to the problem. Justification involves some reasoning, but is inadequate to support an accurate solution.
0	The response shows very little or no understanding of how to successfully complete the task.

Mathematics Content Assessed by PAWS
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Wyoming Content Standard 3. Measurement		
Skill 1. Understand measurable attributes of objects and the units, systems, and processes of measurement.		
Benchmark	**Context**	**Content Limits:**
05.3.1 Students apply estimation and measurement of length to content problems using actual measuring devices and express the results in U.S. customary units (parts of an inch-halves/fourths/eighths, inches, feet, yards, and miles). **05.3.2** Students apply estimation and measurement of weight to content problems using actual measuring devices and express the results in U.S. customary units (ounces and pounds). **05.3.3** Students apply estimation and measurement of capacity in real-world problem-solving situations using actual measuring devices and express the results in U.S. customary units (teaspoons, tablespoons, cups, pints, quarts, and gallons). **05.3.4** Students demonstrate relationships within the U.S. customary units, given an equivalence chart, in problem-solving situations appropriate to grade level. **05.3.6** students use time, in problem-solving situations to: • compare relationships among seconds, minutes, hours, and days, and • use elapsed time to the nearest minute.	Problem solving situations will include the use of appropriate methods, tools, and units to solve problems involving estimation and measure of length, weight and capacity using customary units (miles, yards, feet, half-inch, quarter-inch, eighth-inch, ounces, pounds, teaspoons, tablespoons, cups, pints, quarts, and gallons); conversion of customary measurements; and conversion among seconds, minutes, and hours.	• Items will assess the measurements defined in Grades 3 and 4 and the additional measurement units of length (eighth-inch, mile) and weight/mass. • Items may include standard units of measurement in inches, feet, yards, or miles; ounces, pounds; cups, pints, quarts, or gallons. • Time may include years, months, days, hours, minutes, or seconds, and elapsed time (in minute intervals). • Items may require students to solve real-world problems, including distance, using a scale drawing. • Items may include scale model conversions appropriate for fifth graders. • Items may assess capacity. • All conversions of units must be within the customary system of measurement. • Items should involve up to two-unit conversions except with items involving time (three step conversions are allowed only if leading quantity is a single unit (i.e. one gallon to ounces). • Ounce conversions in capacity items will include a conversion chart. • Items should not assess vocabulary (i.e. definition of terms). • Items should be set in a real-world context. • CR items may have students "Show your work or explain your answer." • Graphics should be used in most of these items, as appropriate.

Mathematics Content Assessed by PAWS
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Standard: Measurement

- **Skill:** Understand measurable attributes of objects and the units, systems, and processes of measurement

Cognitive Processes:

- **Recollection –** The student engages in standard problem solving procedures involving routine application of U.S. and metric systems with regard to length, weight, and capacity.

- **Connection –** The student shows evidence of linking different representations of a problem; makes a connection using modeling; and uses multiple well-defined methods of problem solving.

- **Reflection –** The student interprets between models and real-world situation; engages in complex communication of results in new contexts.

Rubric:

Score	Definition
2	The response is complete, accurate, includes labeling answer if required, and based on appropriate methods for estimating, measuring or converting weight, capacity, or length using customary units or conversion among units of time. Evidence of work involves sound reasoning and is adequate to support the solution. Any errors present in the response do not detract from the student's demonstration of understanding of measurement.
1	The response is inaccurate or incomplete. Evidence of work based on measurable attributes of objects or time is present, but is incompletely or inaccurately applied to the problem. Justification involves some reasoning, but is inadequate to support an accurate solution.
0	The response shows very little or no understanding of how to successfully complete the task.

Wyoming Content Standard 3. Measurement		
Skill 2. Apply appropriate techniques, tools, and formulas to determine perimeter, area or volume.		
Benchmark	**Context**	**Content Limits:**
05.3.5 Students determine area and perimeter of triangles, rectangles, and squares using models in problem-solving situations using appropriate units.	Problem solving situations will include calculating or estimating the perimeter and area of rectangles and squares without grids and of triangles with grids.	• For area of triangles or parallelograms, pictorial models should be used. • Items may assess the area of squares and rectangles, the area of figures made by combining sections of a grid, or the perimeter of any polygon when dimensions are provided. • Items should use geometric properties and formulas for two-dimensional shapes only; three-dimensional shapes will not be assessed under this context. • Only simple formulas should be used. • The number of two-dimensional figures assessed in an item cannot exceed two. • Dimensions included in items should be numbers appropriate for this grade level. • Items may assess the relationship between the area and perimeter of an original figure and that of a newly created figure, or how perimeter or area is affected by changes in the dimensions of the figure. • The changes in dimensions of a figure that are increased should use scale factors that are whole numbers. • The changes in dimensions of a figure that are decreased should use scale factors that are common-unit fractions with denominators of 2, 3, or 4. • Graphics should be used in most of these items, as appropriate. • CR items may have students "Show your work or explain your answer." • Items may be set in either a real-world or mathematical context.

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<u>**Standard:**</u> Measurement

- <u>**Skill:**</u> Apply appropriate techniques, tools, and formulas to determine perimeter, area or volume

<u>**Cognitive Processes:**</u>

- **Recollection –** The student interprets standard representations of well- known mathematical objects; engages in standard problem- solving procedures involving perimeter and area in familiar contexts.

- **Connection –** The student interprets non-standard representations of mathematical objects; engages in routine problem solving procedures involving perimeter and area in familiar contexts.

- **Reflection –** The student interprets non-standard representations of mathematical objects; engages in original problem solving procedures involving perimeter and area in problem settings that include multiple elements.

<u>**Rubric:**</u>

Score	Definition
2	The response is complete, accurate, includes labeling answer if required, and based on appropriate methods for calculating or estimating the perimeter or area of rectangles, squares, and triangles. Evidence of work involves sound reasoning and is adequate to support the solution. Any errors present in the response do not detract from the student's demonstration of understanding of measurement strategies.
1	The response is inaccurate or incomplete. Evidence of work based on perimeter or area of rectangles, squares, and triangles is present, but is incompletely or inaccurately applied to the problem. Justification involves some reasoning, but is inadequate to support an accurate solution.
0	The response shows very little or no understanding of how to successfully complete the task.

Mathematics Content Assessed by PAWS
GRADE 5

Wyoming Content Standard 4. Algebra		
Skill 1. Understand patterns, relations, and functions.		
Benchmark	**Context**	**Content Limits:**
05.4.1 Students recognize, describe, extend, create, and generalize patterns by using manipulatives, numbers, and graphic representations, including charts and graphs. **05.4.2** Students apply knowledge of patterns when solving problems appropriate to grade level.	Problem solving situations will include the use of sound reasoning to identify, describe, create growing and extended patterns, such as number or graphic sequences including charts and graphs.	• Items will assess numerical and graphical patterns. • A repeating pattern set should contain no more than 7 elements. • Items may use pictures and graphics to present one-step linear equations. • Students should not be asked to extend the pattern more than 5 steps beyond what is given or to provide more than 3 missing elements within a pattern. • Items should not use more than one variable or include more than two operations. • The pattern given should be shown with at least two examples of the pattern repeated, unless it is clearly explained in the stem of the item. • Operations in patterns such as function tables will be limited to effects of the four basic operations on whole numbers. • Variables used to represent numbers in problem situations should be geometric symbols or lowercase italicized letters. • Items may use drawings, tables, lists, charts, graphs, T-charts, diagrams, or calendars. • Items may be set in either a real-world or mathematical context. • CR items may have students "Show your work or explain your answer." • Graphics should be used in most of these items, as appropriate.

Mathematics Content Assessed by PAWS
GRADE 5

Scoring Rubrics

<u>**Standard:**</u> Algebra

- <u>**Skill:**</u> Understand patterns, relations, and functions

<u>**Cognitive Processes:**</u>

- **Recollection –** The student solves and extends familiar numerical patterns. Recognizes and interprets simple models with elementary communication about results.

- **Connection –** The student solves and extends familiar numerical patterns containing numbers or symbols. Interprets and connects models and reality; includes aspects of models in communication about results.

- **Reflection –** The student solves and extends complex numerical patterns containing numbers or symbols. Interprets and connects complex models and reality; includes aspects of models and explains computations in communication about results.

<u>**Rubric:**</u>

Score	Definition
2	The response is complete, accurate, includes labeling answer if required, and based on appropriate methods for identifying, describing or creating extended or growing patterns. Evidence of work involves sound reasoning and is adequate to support the solution. Any errors present in the response do not detract from the student's demonstration of understanding of patterns.
1	The response is inaccurate or incomplete. Evidence of work based on identifying, describing or creating extended or growing patterns is present, but is incompletely or inaccurately applied to the problem. Justification involves some reasoning, but is inadequate to support an accurate solution.
0	The response shows very little or no understanding of how to successfully complete the task.

Mathematics Content Assessed by PAWS
GRADE 5

Wyoming Content Standard 4. Algebra		
Skill 2. Use mathematical models to represent and understand quantitative relationships.		
Benchmark	**Context**	**Content Limits:**
05.4.3 Students represent the idea of a variable as an unknown quantity, a letter, or a symbol within addition and subtraction sentences using whole numbers.	Problem solving situations will include using symbolic reasoning to represent the concepts of a variable as an unknown quantity, letter, or symbol in addition or subtraction sentences using whole numbers.	• Items may include only one variable limited to whole numbers up to 3 digits. • Variables used to represent numbers in problem situations should be geometric symbols or lowercase italicized letters. • Items should rely primarily on translating among written descriptions, expressions, and graphic representations. • Items may be assessed in either a real-world or mathematical context. • CR items may have students "Show your work or explain your answer." • Graphics should be used in most of these items, as appropriate

Mathematics Content Assessed by PAWS
GRADE 5

Scoring Rubrics

<u>**Standard:**</u> Algebra

- **<u>Skill:</u>** Use mathematical models to represent and understand quantitative relationships

<u>**Cognitive Processes:**</u>

- **Recollection –** The student decodes and interprets standard and applied equations containing symbols or variables in well-known contexts; uses standard representation with elementary communication about results.

- **Connection –** The student decodes and interprets standard and applied equations containing symbols or variables in well-known contexts. Distinguishes between different forms of representation; includes aspects of models in communication about results.

- **Reflection –** The student decodes and interprets complex and formal equations containing symbols or variables. Interprets and connects complex models and reality; includes explanation of models and computations in communication about results.

<u>**Rubric:**</u>

Score	Definition
2	The response is complete, accurate, includes labeling answer if required, and based on appropriate symbolic reasoning to represent unknown quantities in addition or subtraction sentences involving whole numbers. Evidence of work involves sound reasoning and is adequate to support the solution. Any errors present in the response do not detract from the student's demonstration of understanding of representing quantitative relationships.
1	The response is inaccurate or incomplete. Evidence of work based on models and quantitative relationships is present, but is incompletely or inaccurately applied to the problem. Justification involves some reasoning, but is inadequate to support an accurate solution.
0	The response shows very little or no understanding of how to successfully complete the task.

Mathematics Content Assessed by PAWS
GRADE 5

Wyoming Content Standard 5. Data Analysis and Probability		
Skill 1. Collect, organize, and display relevant data to answer questions and use appropriate statistical methods to analyze the data.		
Benchmark	**Context**	**Content Limits:**
05.5.1 Students systematically collect, organize, and describe/represent categorical data using bar graphs. **05.5.2** Students find and interpret mode for data sets in a problem-solving setting appropriate to grade level. Students communicate their findings.	Problem solving situations will include finding and interpreting mode for data sets of no more than five pieces of data in real-world situations; and collecting, organizing, describing, and representing data using a variety of data displays including bar graphs.	- Data sets that do not include finding the mode should contain no more than 7 two-digit numbers (with the exception of time and money) and a sum that can easily be divided without a remainder. - Items will use sets of numerical data presented in a list, picture, chart, graph, or plot. - Items will assess finding the mode of a set of data presented in a list, chart, table, graph or plot. - Data contained in these items need not be ordered. - Items will assess: - interpreting and comparing information from single-bar graphs, single-line graphs, stem-and-leaf plots, or Venn diagrams; - recognizing appropriate displays for different kinds of data; - using and recognizing appropriate scale increments; - choosing reasonable titles, labels, scales, and intervals for data on pictographs and bar or line graphs; - generating questions, collecting responses, and displaying data on graphs; - analyzing and explaining in writing the implications of graphed data. - Graphics should be used in most of these items, as appropriate. - Graphs presented for students to interpret should contain all elements of a correct graph. - Scale increments are limited to units of 1, 2, 4, 5, 10, 20, 25, 50, 100 or 1000. - CR items may have students "Show your work or explain your answer." - Items should be set in a real-world context.

Mathematics Content Assessed by PAWS
GRADE 5

Scoring Rubrics

Standard: Data Analysis and Probability

- **Skill:** Collect, organize, and display relevant data to answer questions, and use appropriate statistical methods to analyze the data

Cognitive Processes:

- **Recollection –** The student interprets and analyzes simple data represented in bar graphs to predict outcomes in common problem representations.

- **Connection –** The student interprets and analyzes realistic data represented in bar graphs to predict outcomes and connect reality into mathematical representations.

- **Reflection –** The student interprets and analyzes realistic data represented in bar graphs to predict outcomes and connect real-world situation into mathematical representations.

Rubric:

Score	Definition
2	The response is complete, accurate, includes labeling answer if required, and based on appropriate statistical reasoning for making inferences about a population based on mode or collecting, organizing, describing or representing data. Evidence of work involves sound reasoning and is adequate to support the solution. Any errors present in the response do not detract from the student's demonstration of understanding of data analysis.
1	The response is inaccurate or incomplete. Evidence of work based on statistical methods of analyzing data is present, but is incompletely or inaccurately applied to the problem. Justification involves some reasoning, but is inadequate to support an accurate solution.
0	The response shows very little or no understanding of how to successfully complete the task.

Mathematics Content Assessed by PAWS
GRADE 5

Wyoming Content Standard 5. Data Analysis and Probability		
Skill 2. Develop and evaluate inferences and predictions that are based on data.		
Benchmark	**Context**	**Content Limits:**
05.5.3 Students predict and record outcomes of probability experiments or simulations.	Problem solving situations will include simple probability and recording the outcomes/combinations from experiments or simulations limited to 12 or fewer outcomes using the language: certain, most likely, equally likely, least likely, and impossible.	• In items involving the determination and/or listing of all possible outcomes, the number of outcomes should not exceed 12. • Mathematical expectations of probabilities will be assessed using simple empirical data or theoretical probabilities. • Most items developed for this context should assess simple events. • Probabilities should be based on whole numbers. • Items will assess the likelihood or probability of an outcome occurring. • Probabilities may be expressed as certain, most likely, equally likely, least likely, unlikely and impossible. • Items may include numeric probabilities of simple events with 12 or fewer outcomes. • Items should be set in a real-world context. • Items may use models such as organized lists, charts, or tree diagrams. • CR items may have students "Show your work or explain your answer." • Graphics should be used in most of these items, as appropriate.

Mathematics Content Assessed by PAWS
GRADE 5

Scoring Rubrics

Standard: Data Analysis and Probability

- **Skill:** Develop and evaluate inferences and predictions that are based on data

Cognitive Processes:

- **Recollection –** The student uses prediction in problem solving in familiar contexts; communicates results citing computations in not more than one way.

- **Connection –** The student uses prediction in problem solving in unfamiliar contexts; communicates results in more than one way.

- **Reflection –** The student uses prediction in problem solving in unfamiliar contexts; communicates results citing computations in more than one way and generalizes to other situations.

Rubric:

Score	Definition
2	The response is complete, accurate, includes labeling answer if required, and based on appropriate methods for estimating the probability of outcomes as being certain, most likely, equally likely, least likely or impossible. Evidence of work involves sound reasoning and is adequate to support the solution. Any errors present in the response do not detract from the student's demonstration of understanding of inferences and predictions.
1	The response is inaccurate or incomplete. Evidence of work based on simple probability is present, but is incompletely or inaccurately applied to the problem. Justification involves some reasoning, but is inadequate to support an accurate solution.
0	The response shows very little or no understanding of how to successfully complete the task.