

# **Minnesota Test of Academic Skills (MTAS)**

**An Alternate Assessment for Students with the Most  
Significant Cognitive Disabilities**

## **Test Specifications for Mathematics, Grades 3-8**

**Based on the Minnesota K-12 Academic Standards  
in Mathematics, 2007**



**July 2011**

Minnesota Department of Education

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# THE MINNESOTA TEST OF ACADEMIC SKILLS (MTAS)

## Introduction

The Minnesota Test of Academic Skills (MTAS) is Minnesota’s alternate assessment for students with the most significant cognitive disabilities. It is designed exclusively for use with students who receive special education services and whose participation has been determined on an individual basis by an Individualized Education Program (IEP) team. The Mathematics MTAS is aligned to the Minnesota Academic Standards and the Minnesota Comprehensive Assessments-Series III (MCA-III) in mathematics. A document titled *Alternate Assessment Eligibility Requirements* provides guidance to assist IEP teams in identifying students with the most significant cognitive disabilities who would be appropriately assessed with the MTAS. This document can be found on the Research and Assessment Division page of the Minnesota Department of Education Website at [Minnesota Department of Education website](#) > Accountability Programs > Assessment and Testing > Assessments > Alternate Assessments. Participation information for the MTAS is also included in Chapter 5 of the *Procedures Manual for Minnesota Assessments* at [Minnesota Department of Education website](#) > Accountability Programs > Assessment and Testing > DAC Corner > Policies, Procedures & Guidelines.

As required by the Elementary and Secondary Education Act (ESEA), this assessment is aligned with grade-level content standards in mathematics. ESEA requires that all students—including those with the most significant cognitive disabilities—be measured by an assessment aligned to grade-level academic standards, although the breadth, depth and complexity of the grade-level standards may be reduced for alternate assessments or modified to include prerequisite skills.

The Mathematics MTAS is administered to eligible students in grades 3–8 and 11. Students taking the MTAS must be administered the appropriate assessment for their enrolled grade.

## Purpose of the MTAS

The MTAS serves a number of purposes:

- It meets the requirements of ESEA by providing Minnesota students who meet the eligibility guidelines for the MTAS with an alternate assessment based on alternate achievement standards that are aligned with grade-level academic standards.
- It promotes access to the general education curriculum for students with significant cognitive disabilities, as required by both ESEA and the Individuals with Disabilities Education Act (IDEA).
- It provides educators with a tool for measuring the progress students are making toward proficiency on academic standards in mathematics.
- It provides results that can be used to inform instruction at the classroom level.

## Test Specifications

The test specifications for the grades 3-8 MTAS in mathematics are presented in this document. Test specifications for the grade 11 MTAS in mathematics can be found in *Minnesota Test of Academic Skills: Test Specifications for Mathematics, Grade 11*. Beginning in 2011, assessments in grades 3-8 are based on the 2007 revision of the *Minnesota K-12 Academic Standards in Mathematics*. Pending federal or state changes in legislation, the grade 11 assessment will continue to be based on the 2003 version of the academic standards through the 2012-2013 school year.

All tests—from off-the-shelf, norm-referenced tests to customized, standards-based tests like those given in Minnesota—have test specifications. The primary purpose of a set of test specifications is to help test developers build a test that stays consistent over time. Test specifications clarify, define and/or limit how test items will be written to any given strand, substrand, standard or benchmark. Test specifications for the MTAS indicate which strands, standards and benchmarks have been selected as priorities for students with the most significant cognitive disabilities. For each benchmark, task specifications clarify, define and limit

how performance tasks should address the extended benchmarks; they are intended to represent essential understandings and are not intended to describe all instruction.

Test specifications indicate only what is assessed, not what should be taught. Test specifications do not indicate how children should be taught; this remains the responsibility of the classroom teacher who best knows the child.

The MTAS test specifications help achieve the goal of a technically sound instrument that respects teachers' concern for the time students spend taking tests. They have taken into account the impact of the students' cognitive disabilities, their needs for extensive supports, their varying modes of communication, their age and their right to access grade-level curriculum.

As with any test, the MTAS is a sampling of student knowledge and does not test every standard or benchmark. There are standards and benchmarks that cannot be assessed with a standardized test as well as standards and benchmarks that have not been identified as the top priorities for students with the most significant cognitive disabilities. This does not mean that these skills should not be taught or assessed. Students with the most significant cognitive disabilities should receive instruction on the full range of grade-level academic standards to the extent appropriate. The IEP team is responsible for developing an individualized program for each student that addresses identified needs, including, but not limited to, how students will access the general education curriculum as outlined by the Minnesota Academic Standards, which can be obtained from the Department of Education Website at [link to Minnesota Department of Education website](#) > Academic Excellence > Academic Standards.

## **Prioritizing the Grade-Level Academic Standards**

When Minnesota educators helped design the original MTAS, the first step was to prioritize the grade-level academic standards for students with the most significant cognitive disabilities. Panel members, including special educators and content specialists in mathematics, identified

benchmarks that, in their view, represented the most critical learning outcomes for this population. The following criteria were established for prioritizing the benchmarks:

- The benchmark is assessed on the MCA.
- The benchmark reflects the pattern of emphasis on the test blueprint for the MCA.
- Proficiency on the benchmark will help the student in the next age-appropriate environment (i.e., the next grade in school or a post-school setting).
- Proficiency on the benchmark will aid future learning in the content area.
- The benchmark can be written as a performance task without creating bias against a particular student population.

In developing the Mathematics MTAS based on the 2007 academic standards, the standards and benchmarks at each grade that are identical or close to those selected for inclusion under the previous academic standards and test specifications were carried forward. Some standards and benchmarks are now assessed in different grade levels than they were for the 2003 academic standards. There are standards and benchmarks that did not appear in the previous academic standards, and MDE evaluated these benchmarks using the criteria described above.

## **Extended Standards and Extended Benchmarks**

Extensions of standards and benchmarks represent a reduction in depth and complexity while maintaining a clear link to the grade-level content standard. For the Mathematics MTAS based on the 2007 academic standards, both extended standards and extended benchmarks were written. Counts of tasks per test form were determined at the standard level rather than at the benchmark level, as was done in the previous version of the MTAS.

## **Performance Tasks**

The MTAS is designed to allow for appropriate flexibility within a standardized assessment environment. Each student will be given a number of tasks to complete in a one-on-one test administration. The test administrator, who will most likely be the child's classroom teacher, will present each task in a way that allows the student to understand what is being asked (i.e.,

an appropriate *presentation mode*). It is imperative that each student be given an opportunity to access the content in a way that is appropriate for the individual. For example, students may need manipulatives or illustrations to aid their understanding of the mathematics tasks. Tactile, visual and auditory presentation modes are allowable on the MTAS.

## Student Responses

It is critical that students with the most significant cognitive disabilities have a way to show what they know and can do. Clearly, students who meet the guidelines for this alternate assessment would not be appropriately assessed with a multiple-choice test that is designed for general education students. Students with the most significant cognitive disabilities often have ways of communicating what they know and can do that are different from the general education population. Students may communicate through a variety of modes which include, but are not limited to, speaking, using gestures such as eye blinks or using assistive technology such as a language-based augmentative communication device. The critical feature of a meaningful response is that the student clearly communicates a message.

## Evaluating Student Performance on Tasks

The teacher uses a scoring rubric to evaluate the student’s performance. Test administrators are trained on the use of the scoring rubric in the spring of each year.

**Minnesota Test of Academic Skills (MTAS) Scoring Rubric**

<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>Correct Response</b>	<b>Correct Response with Additional Support</b>	<b>Incorrect Response</b>	<b>Unrelated or No Response</b>
The student responds correctly without assistance.	The student responds correctly to the task after the teacher provides additional support as indicated in the task script.	The student responds incorrectly to the task after the teacher provides additional support as indicated in the task script.	The student does not respond to the task, or the student’s response is unrelated to the task.

## Overall Considerations

Overall considerations are broad development issues that should be addressed during the development of performance tasks. Each of these issues is considered for all of the tasks developed for the Mathematics MTAS.

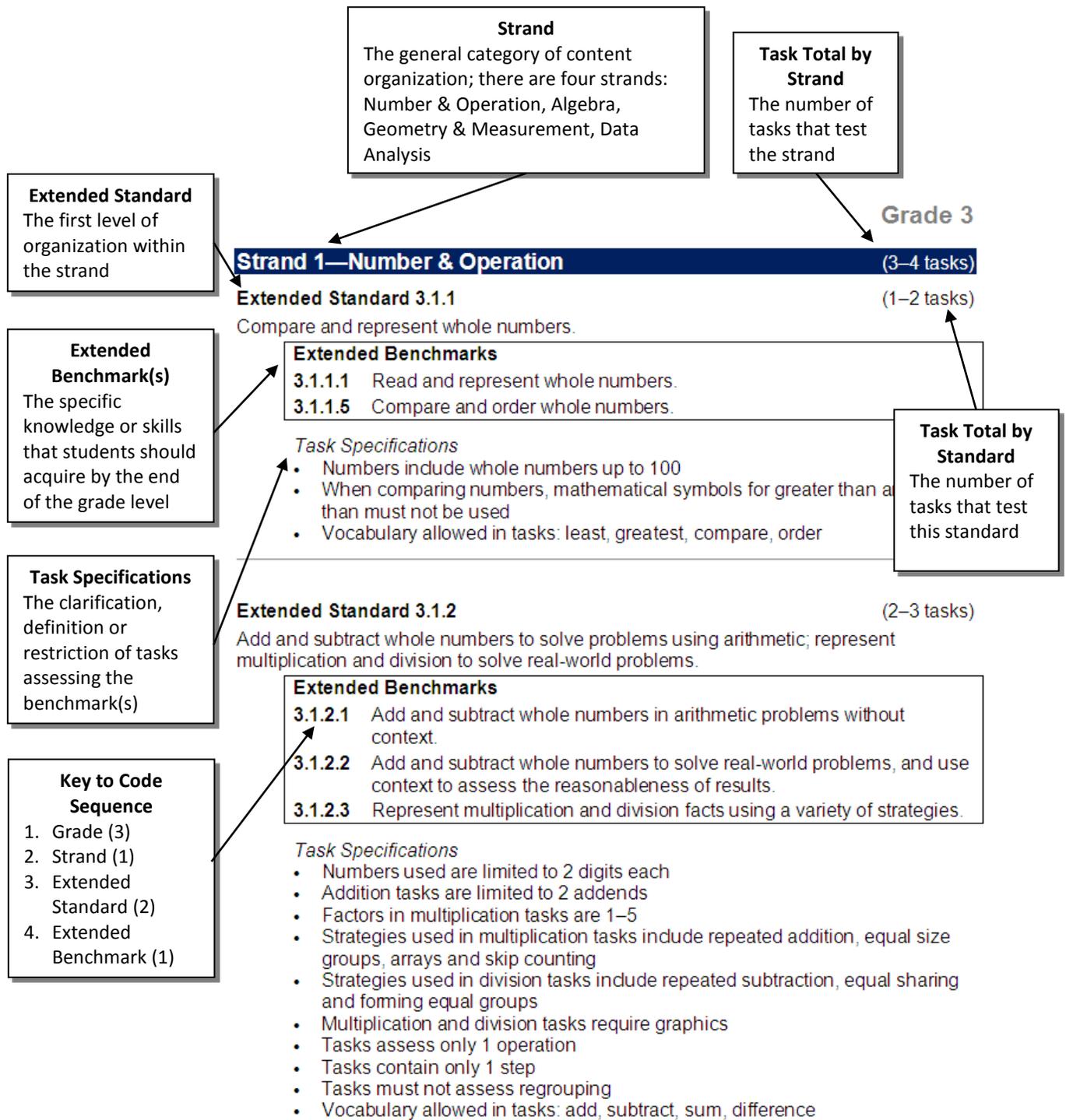
1. Each task is written to primarily measure one benchmark; however, other benchmarks may also be reflected in the content of the performance task.
2. Tasks are appropriate for students in terms of grade-level content, age and typical life experiences for the majority of this population.
3. Tasks are developed to allow students with varying modes of communication to demonstrate proficiency, given sufficient instruction and opportunity to learn.
4. Tasks do not disadvantage or offend any segment of the population in regard to age, gender, race, ethnicity, language, religion, socioeconomic status, disability or geographic region.
5. Each task is written to clearly and unambiguously elicit the desired response.
6. A calculator, or any tool functioning as a calculator, may be used on any of the tasks.
7. Tasks are reviewed for content characteristics, potential bias and any issues that may be of concern. Minnesota educators with experience and expertise in special education instruction, mathematics instruction and serving the needs of students with the most significant cognitive disabilities review the performance tasks for each passage in terms of content, bias (gender, racial/ethnic, linguistic, religious, geographic, socioeconomic and issues related to individuals with disabilities) and psychometric data collected from field testing.
8. Students may use all necessary supports during testing as identified in the IEP. Supports include, but are not limited to, manipulatives, visual aids, number lines, multiplication charts and assistive technology.

## Test Design by Grade Level

Each operational administration of the MTAS consists of nine tasks distributed across the four strands of the academic standards as shown below. Additional tasks are field tested during each administration in order to construct assessments in future years.

Grade	Strand	By Strand, Number of:		
		Tasks	Extended Standards	Extended Benchmarks
3	1: Number & Operation	3-4	2	4
	2: Algebra	1-2	2	3
	3: Geometry & Measurement	2-3	1	2
	4: Data Analysis	1-2	1	1
4	1: Number & Operation	3-4	2	5
	2: Algebra	1-2	2	3
	3: Geometry & Measurement	2-3	1	1
	4: Data Analysis	1-2	1	1
5	1: Number & Operation	2-3	2	4
	2: Algebra	2-3	2	5
	3: Geometry & Measurement	1-2	1	1
	4: Data Analysis	1-2	1	1
6	1: Number & Operation	2-3	1	4
	2: Algebra	2-3	1	2
	3: Geometry & Measurement	1-2	2	2
	4: Data Analysis	1-2	1	2
7	1: Number & Operation	1-2	2	4
	2: Algebra	3-4	2	5
	3: Geometry & Measurement	1-2	1	2
	4: Data Analysis	1-2	1	2
8	1: Number & Operation	1-2	1	1
	2: Algebra	3-4	3	6
	3: Geometry & Measurement	1-2	1	1
	4: Data Analysis	1-2	1	2

# Guide to Reading the Test Specifications



## Explanation of Terms Related to the Grade-Level Tables

**Strand:** This is the most general categorization of content in the Minnesota Academic Standards. There are four strands in mathematics:

1. Number & Operation
2. Algebra
3. Geometry & Measurement
4. Data Analysis

**Extended Standard:** Within each strand, standards describe the expectations in mathematics that students must satisfy to meet state requirements. Extended standards represent reductions in the depth, breadth and complexity of the academic standards.

**Extended Benchmark:** Each standard is divided into several benchmarks. The purpose of benchmarks is to provide details about “the academic knowledge and skills that schools must offer and students must achieve to satisfactorily complete the standards” (Minn. Stat. § 120B.023 (2006)). Benchmarks are intended to “inform and guide parents, teachers, school districts and other interested persons and for use in developing tests consistent with the benchmarks” (Minn. Stat. § 120B.023 (2006)). Extended benchmarks represent reductions in the depth, breadth and complexity of the benchmarks of the academic standards.

**Code:** Test developers use this code to identify the grade, strand, standard and benchmark to which a performance task is aligned.

**Task Specifications:** These statements provide more specific clarifications, definitions or restrictions for the benchmark as it is assessed on the MTAS.

**Task Total by Strand:** This number is the possible number of tasks from a specific strand that could be on the operational test form.

**Task Total by Standard:** This number is the total number of tasks measuring the indicated standard that could be on the operational test. For example, in Grade 3 Mathematics, three to

four tasks are from Strand 1. Of those three to four Strand 1 tasks, one to two tasks are from Standard 1 (3.1.1) and two to three tasks are from Standard 2 (3.1.2).

## Grade 3

**Strand 1—Number & Operation****(3–4 tasks)****Extended Standard 3.1.1****(1–2 tasks)**

Compare and represent whole numbers.

**Extended Benchmarks****3.1.1.1** Read and represent whole numbers.**3.1.1.5** Compare and order whole numbers.*Task Specifications*

- Numbers include whole numbers up to 100
- When comparing numbers, mathematical symbols for greater than and less than must not be used
- Vocabulary allowed in tasks: least, greatest, compare, order

**Extended Standard 3.1.2****(2–3 tasks)**

Add and subtract whole numbers to solve problems using arithmetic; represent multiplication and division to solve real-world problems.

**Extended Benchmarks****3.1.2.2** Use addition and subtraction to solve real-world and mathematical problems, and use context to assess the reasonableness of results.**3.1.2.3** Represent multiplication and division facts using a variety of strategies.*Task Specifications*

- Numbers used are limited to 2 digits each
- Addition tasks are limited to 2 addends
- Factors in multiplication tasks are 1–5
- Strategies used in multiplication tasks include repeated addition, equal size groups, arrays and skip counting
- Strategies used in division tasks include repeated subtraction, equal sharing and forming equal groups
- Multiplication and division tasks require graphics
- Tasks assess only 1 operation
- Tasks contain only 1 step
- Tasks must not assess regrouping
- Vocabulary allowed in tasks: add, subtract, sum, difference

## Grade 3

### Strand 2—Algebra

(1–2 tasks)

#### Extended Standard 3.2.1

(0–1 tasks)

Use single-operation rules to represent patterns and relationships and to solve problems.

##### Extended Benchmark

**3.2.1.1** Identify and apply single-operation rules to represent patterns and relationships.

##### *Task Specifications*

- The first 4 terms must be given
  - Tasks may only require identification of 1 term beyond what is given
  - Tasks use only addition or subtraction
  - Addition and subtraction rules are limited to 2, 5 and 10
  - Vocabulary allowed in tasks: rule, pattern
- 

#### Extended Standard 3.2.2

(0–1 tasks)

Use number sentences to represent and solve problems; identify real-world situations corresponding to number sentences.

##### Extended Benchmarks

**3.2.2.1** Identify a real-world situation represented by a number sentence using addition, subtraction or multiplication.

**3.2.2.2** Find an unknown value in a number sentence involving multiplication.

##### *Task Specifications*

- Tasks use 1- and 2-digit whole numbers
- Boxes or blanks may be used to represent unknown numbers
- All values, including unknowns, are whole numbers
- Tasks involving multiplication must include graphics and allow students to apply strategies such as repeated addition and skip counting
- Vocabulary allowed in tasks: number sentence, equation

**Strand 3—Geometry & Measurement****(2–3 tasks)****Extended Standard 3.3.1****(2–3 tasks)**

Use geometric attributes to describe and create shapes.

**Extended Benchmarks**

**3.3.1.1** Identify and use parallel and perpendicular lines to describe and sort geometric shapes.

**3.3.1.2** Create geometric shapes with a given number of sides or angles.

*Task Specifications*

- Tasks may include examples of parallel and perpendicular lines
- Shapes may be sorted using only 1 geometric criterion
- Shapes may be sorted into no more than 2 sets
- Vocabulary allowed in tasks: parallel, perpendicular, triangle, rectangle, square, parallelogram, pentagon, side, corner, angle

**Strand 4—Data Analysis****(1–2 tasks)****Extended Standard 3.4.1****(1-2 tasks)**

Collect, display, label and interpret data.

**Extended Benchmark**

**3.4.1.1** Collect, display, label and interpret data in bar graphs and pictographs.

*Task Specifications*

- Scales are in increments of 1, 2 and 5
- Pictograph keys are 1, 2 and 5
- Data categories are limited to 3
- Total number on graph or chart is limited to 30
- Vocabulary allowed in tasks: pictograph, bar graph

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## Grade 4

**Strand 1—Number & Operation****(3–4 tasks)****Extended Standard 4.1.1****(1–2 tasks)**

Solve real-world and mathematical problems using arithmetic.

**Extended Benchmark****4.1.1.5** Add, subtract, multiply and divide whole numbers to solve problems.*Task Specifications*

- Numbers in addition and subtractions tasks must not exceed 2 digits
- Multiplication and division must use 1-digit factors and divisors
- Multiplication tasks may use strategies such as repeated addition, equal size groups, arrays and skip counting
- Division tasks are represented by strategies such as repeated subtraction, equal sharing and forming equal groups
- Tasks assess only 1 operation
- Tasks must not require the use of algorithms
- Vocabulary allowed in tasks: add, subtract, multiply, sum, difference, product

**Extended Standard 4.1.2****(2–3 tasks)**

Identify, compare and order fractions and decimals in real-world and mathematical situations.

**Extended Benchmarks**

- 4.1.2.1** Recognize or represent equivalent fractions using fraction models.
- 4.1.2.2** Locate or order fractions on a number line.
- 4.1.2.4** Read and write decimals.
- 4.1.2.5** Compare and order decimals and whole numbers using models or a number line.

*Task Specifications*

- Denominators are limited to 2, 3, 4, 5 and 10
- Tasks must not include improper fractions
- In contexts other than money, place values are limited to tens, ones and tenths
- In money contexts, place values are limited to hundreds, tens, ones, tenths and hundredths
- When comparing numbers, mathematical symbols must not be used for greater than or less than
- Sequence of ordered numbers is limited to 3 numbers
- Vocabulary allowed in tasks: fraction, numerator, denominator, decimal, order, greater than, less than, greatest, least

## Grade 4

### Strand 2—Algebra

(1–2 tasks)

#### Extended Standard 4.2.1

(0–1 tasks)

Use input-output rules to represent patterns and relationships and to solve real-world and mathematical problems.

##### Extended Benchmark

**4.2.1.1** Use input-output rules to solve problems.

##### *Task Specifications*

- Three consecutive input-output pairs must be given
  - Tasks must not require more than 1 term or pair beyond what is given
  - Tasks may require identification of the rule
  - Tasks must not use division
  - Vocabulary allowed in tasks: rule, pattern
- 

#### Extended Standard 4.2.2

(0–1 tasks)

Use number sentences involving simple multiplication, division and unknowns to represent real-world problems; identify scenarios corresponding to number sentences.

##### Extended Benchmarks

**4.2.2.1** Interpret number sentences involving multiplication or division; identify real-world situations corresponding to number sentences.

**4.2.2.2** Use multiplication or division to find an unknown value in a number sentence.

##### *Task Specifications*

- Boxes or blanks may be used to represent unknown numbers
- Values, including unknowns, are whole numbers
- Factors and divisors are limited to 1 digit
- Tasks contain 1 step only
- Vocabulary allowed in tasks: number sentence, equatio

**Strand 3—Geometry & Measurement****(2–3 tasks)****Extended Standard 4.3.1****(2–3 tasks)**

Identify, describe and classify polygons.

**Extended Benchmark****4.3.1.2** Identify, describe and classify quadrilaterals.*Task Specifications*

- Recognition or naming of quadrilaterals is limited to square, rectangle, parallelogram, trapezoid and kite
- Shapes may be sorted using only 1 geometric criterion
- Allowable notation:  $90^\circ$ , right angle symbol (square in corner)
- Vocabulary allowed: equal, side, angle, parallel, perpendicular

**Strand 4—Data Analysis****(1–2 tasks)****Extended Standard 4.4.1****(1–2 tasks)**

Display and interpret data, including data collected over a period of time and data represented by simple fractions and decimals.

**Extended Benchmark****4.4.1.1** Use and interpret tables and graphs displaying data.*Task Specifications*

- Graphic displays of data may include tables, bar graphs, pictographs and simple line plots
- Scales are in increments of 1, 2 and 5
- Pictograph keys are 1, 2 and 5
- Data categories are limited to 4
- Total of data represented on graph or chart must not exceed 50
- Decimals are limited to monetary data
- Denominators in fractions are limited to 2, 3, 4, 5 and 10
- Vocabulary allowed: data, table, bar graph, pictograph, line plot

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## Grade 5

**Strand 1—Number & Operation****(2–3 tasks)****Extended Standard 5.1.1**

(1–2 tasks)

Solve real-world and mathematical problems using arithmetic.

**Extended Benchmark**

**5.1.1.4** Solve problems using addition, subtraction, multiplication and division of whole numbers. Use the inverse relationships between operations and the context of the problem to assess the reasonableness of results.

*Task Specifications*

- Solutions are less than 1,000
- Tasks can assess up to 2 operations using addition and/or subtraction
- Addition/subtraction tasks may contain no more than 1 3-digit number.
- Tasks assess only 1 operation using multiplication or division
- Multiplication is limited to no more than 2-digit numbers by no more than 1-digit numbers
- Division is limited to no more than 2-digit numbers by 1-digit numbers
- Division solutions must not include remainders
- Vocabulary allowed in tasks: sum, difference, product, quotient

**Extended Standard 5.1.2**

(1–2 tasks)

Read, represent and compare fractions and decimals; recognize equivalent fractions and decimals in real-world and mathematical situations.

**Extended Benchmarks**

- 5.1.2.1** Read decimals using place value.
- 5.1.2.3** Order fractions and decimals or locate them on a number line.
- 5.1.2.4** Find equivalent decimals and fractions.

*Task Specifications*

- Decimal tasks are limited to hundreds, tens, ones, tenths and hundredths
- Tasks must not include improper fractions
- Denominators in fractions are limited to 2, 3, 4, 5, 6, 8, 10 and 20
- Mixed numbers are less than 10
- Vocabulary allowed in tasks: fraction, decimal, place value, mixed number, order, numerator, denominator

## Grade 5

### Strand 2—Algebra

(2–3 tasks)

#### Extended Standard 5.2.1

(1–2 tasks)

Recognize and represent patterns of change; use patterns, tables, graphs and rules to solve real-world and mathematical problems.

##### Extended Benchmarks

- 5.2.1.1** Use rules, tables and graphs to describe patterns of change and solve problems.
- 5.2.1.2** Use a rule or table of ordered pairs of whole numbers to identify points on a coordinate system.

##### Task Specifications

- Tasks may contain patterns that grow or repeat
- In a growing pattern, 3 consecutive applications of the rule must be shown
- In a repeating pattern, 3 applications of the rule must be shown
- In a table or graph, 3 input-output pairs must be given
- Scales are in increments of 1
- Rules may be expressed using 1 variable
- Vocabulary allowed in tasks: growing, repeating, pattern, rule, input, output, ordered pair, graph

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#### Extended Standard 5.2.3

(1–2 tasks)

Understand and interpret equations involving a variable and whole numbers, and use them to represent and solve real-world and mathematical problems.

##### Extended Benchmarks

- 5.2.3.1** Determine whether an equation is true or false for a given value of a variable.
- 5.2.3.2** Represent real-world situations using expressions or equations with variables.
- 5.2.3.3** Evaluate expressions involving a variable when a value for the variable is given.

##### Task Specifications

- Tasks must not include inequalities
- Variables are used for unknown numbers
- Tasks must not include more than 1 variable
- Values, including variables, are whole numbers, with the exception of monetary values
- Tasks use 1- and 2-digit numbers
- Vocabulary allowed in tasks: equation, expression, true, variable

**Strand 3—Geometry & Measurement****(1–2 tasks)****Extended Standard 5.3.1****(1–2 tasks)**

Describe and classify representations of 3-dimensional figures.

**Extended Benchmark**

**5.3.1.1** Describe and classify 3-dimensional figures by the number of edges and number and types of faces.

*Task Specifications*

- Three-dimensional shapes that are assessed include cubes, triangular prisms, rectangular prisms and square pyramids; other shapes such as cones and cylinders may be shown but will not be assessed.
- Only 1 geometric criterion may be assessed within a task
- Vocabulary allowed in tasks: face, edge, cube, prism, pyramid, triangular, rectangular

**Strand 4—Data Analysis****(1–2 tasks)****Extended Standard 5.4.1****(1–2 tasks)**

Display and interpret data.

**Extended Benchmark**

**5.4.1.2** Display and interpret data in tables, double-bar graphs and line graphs.

*Task Specifications*

- Double-bar graphs are limited to 3 categories
- Line graphs are limited to 5 data points
- Scales are in increments of 1, 2 and 5
- Vocabulary allowed in tasks: data, double-bar graph, line graph, table

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## Grade 6

**Strand 1—Number & Operation****(2–3 tasks)****Extended Standard 6.1.1****(2–3 tasks)**

Read, represent and compare positive rational numbers expressed as fractions, decimals and ratios, and use these representations in real-world and mathematical situations.

**Extended Benchmarks**

- 6.1.1.1** Locate positive rational numbers on a number line, and locate pairs of whole numbers on a coordinate grid.
- 6.1.1.2** Compare positive rational numbers represented in various forms. Use the symbols  $<$ ,  $=$  and  $>$ .
- 6.1.1.4** Identify equivalences between fractions and decimals.
- 6.1.1.7** Find equivalent positive rational numbers when converting within a single representation (fractions or decimals).

*Task Specifications*

- Both axes in coordinate grids must have the same scale
- Numbers in ordered pairs must be less than 10
- Mixed numbers are less than 10
- Denominators in fractions are limited to 2, 3, 4, 5, 6, 8, 10 and 20
- Tasks must not require students to know the meaning of the symbols  $<$ ,  $=$  and  $>$  without assistance
- Allowable notation:  $\frac{1}{4}$ , 0.25
- Vocabulary allowed in tasks: x-axis, y-axis, horizontal axis, vertical axis, coordinate grid, greater than, less than, equivalent, fraction, decimal, greatest, least, mixed number, numerator, denominator

## Grade 6

### Strand 2—Algebra

(2–3 tasks)

#### Extended Standard 6.2.1

(1–2 tasks)

Recognize relationships between varying quantities; use patterns, tables, graphs and rules to solve real-world problems.

##### Extended Benchmarks

- 6.2.1.1** Understand that a variable can be used to represent a quantity that can change in relation to another changing quantity in real-world contexts.
- 6.2.1.2** Represent the relationship between 2 varying quantities with rules, graphs and tables.

##### Task Specifications

- 6.2.1.1: Familiar real-world contexts must be used in tasks
- All values, including variables, are whole numbers
- Tasks must not include more than 2 variables
- Allowable multiplication notation:  $3x$ ,  $3 \cdot x$  and  $3 \cdot 4$
- Tasks must not include multiplication of 2 variables
- Tasks must not include inequalities
- Equations must not contain exponents
- Vocabulary allowed in tasks: coordinate grid, ordered pair, variable, equation, rule

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#### Extended Standard 6.2.3

(1–2 tasks)

Understand and interpret equations involving variables. Use equations to represent real-world problems. Use the idea of maintaining equality to solve equations.

##### Extended Benchmarks

- 6.2.3.1** Represent real-world situations using equations involving variables.
- 6.2.3.2** Solve equations using number sense, properties of arithmetic and the idea of maintaining equality on both sides of the equation.

##### Task Specifications

- 6.2.3.1: Familiar, real-world contexts must be used in tasks
- All values, including variables, are whole numbers
- Tasks must not include more than 1 variable
- Allowable multiplication notation:  $3x$ ,  $3 \cdot x$  and  $3 \cdot 4$
- Tasks must not include inequalities
- Equations must not contain exponents
- Vocabulary allowed in tasks: equation, represent, variable, value

**Strand 3—Geometry & Measurement****(1–2 tasks)****Extended Standard 6.3.1**

(0–1 tasks)

Calculate perimeter and area of 2-dimensional figures to solve real-world and mathematical problems.

**Extended Benchmark****6.3.1.2** Calculate the perimeter and area of quadrilaterals.*Task Specifications*

- Quadrilaterals include squares, rectangles, rhombuses and parallelograms
  - Vocabulary allowed in tasks: area, perimeter, square, rectangle, rhombus, parallelogram
- 

**Extended Standard 6.3.3**

(0–1 tasks)

Choose appropriate units of measurement, and use ratios to convert within measurement systems to solve real-world and mathematical problems.

**Extended Benchmark****6.3.3.1** Solve problems involving conversion of capacities, geometric measurements and time within measurement systems using appropriate units.*Task Specifications*

- Conversions are within the U.S. customary system only
- Tasks are limited to conversions of adjacent measures only (e.g., no inches to yards)
- Geometric measurement units are limited to inches, feet and yards
- Capacity units are limited to cups, pints, quarts and gallons
- Customary capacity conversions must be given within the problem
- Time units are limited to seconds, minutes, hours, days and weeks
- Vocabulary allowed in tasks: inch, foot, feet, yard, cup, pint, quart, gallon, second, minute, hour, day, week

## Grade 6

### Strand 4—Data Analysis

(1–2 tasks)

#### Extended Standard 6.4.1

(1–2 tasks)

Use probabilities to solve real-world problems; represent probabilities using fractions and ratios.

#### Extended Benchmark

- 6.4.1.1** Determine the set of possible outcomes for a given experiment. The set of possible outcomes may be determined by the use of tree diagrams, tables or pictorial representations.
- 6.4.1.2** Understand that probabilities measure likelihood; represent probabilities as fractions and ratios.

#### *Task Specifications*

- Size of the set of possible outcomes is limited to 9 when the task requires listing all possible outcomes
- Allowable probability representations:  $\frac{1}{2}$ , 1 to 3, 1:4, 1 out of 6
- Vocabulary allowed in tasks: probability, outcome, likely, combination, spinner, number cube, fraction, ratio

## Grade 7

**Strand 1—Number & Operation****(1–2 tasks)****Extended Standard 7.1.1****(0–1 tasks)**

Read, represent and compare integers.

**Extended Benchmark**

**7.1.1.3** Locate integers on a number line and a coordinate grid; understand the concept of opposites.

*Task Specifications*

- Integers are limited to 1 digit
- Vocabulary allowed in tasks: opposite, coordinate, plot

**Extended Standard 7.1.2****(0–1 tasks)**

Calculate with positive and negative rational numbers to solve real-world and mathematical problems.

**Extended Benchmarks**

- 7.1.2.1** Add, subtract, multiply and divide positive and negative rational numbers that are integers, fractions and terminating decimals.
- 7.1.2.4** Solve various problems in various contexts involving calculations with positive and negative rational numbers.
- 7.1.2.5** Use proportional reasoning to solve problems involving ratios in various contexts.

*Task Specifications*

- 7.1.2.1 tasks must not have context
- Denominators in fractions are limited to 2, 3, 4, 5, 6, 8 and 10
- Vocabulary allowed in tasks: simple interest, compound interest, proportion, positive, negative, numerator, denominator, decimal

## Grade 7

### Strand 2—Algebra

(3–4 tasks)

#### Extended Standard 7.2.2

(1–2 tasks)

Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions and graphs; solve problems involving proportional relationships.

##### Extended Benchmarks

- 7.2.2.1** Identify proportional relationships represented in tables, verbal descriptions, equations and graphs; translate from 1 representation to another. Determine the unit rate (constant of proportionality or slope) given any of these representations.
- 7.2.2.2** Solve problems involving proportional relationships in familiar contexts.
- 7.2.2.4** Represent real-world or mathematical situations using equations and inequalities involving variables.

##### Task Specifications

- Contexts may include (but are not limited to) discounts, tax, similar geometric figures and conversions
- Equations and inequalities are limited to 1 variable
- All values, including variables, are whole numbers; money contexts are an exception to this specification
- Vocabulary allowed in tasks: proportional, origin, slope, inequality, equation, represent, equivalent, variable

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#### Extended Standard 7.2.4

(1–2 tasks)

Represent real-world and mathematical situations using equations with variables and positive integers. Solve equations graphically, numerically and using the properties of equality.

##### Extended Benchmarks

- 7.2.4.1** Represent relationships with equations involving variables and positive integers. Use the properties of equality to solve for the value of a variable.
- 7.2.4.2** Solve equations resulting from proportional relationships in familiar contexts.

##### Task Specifications

- 7.2.4.1: multiplication is not required
- 7.2.4.2: must use multiplication; may use multiplication and division in the same task
- Equations are limited to 1 variable
- Vocabulary allowed in tasks: solve, variable, represent, value, equivalent, proportional, equation

**Strand 3—Geometry & Measurement****(1–2 tasks)****Extended Standard 7.3.2****(1–2 tasks)**

Analyze the effect of change of scale, translations and reflections on the attributes of 2-dimensional figures.

**Extended Benchmark**

- 7.3.2.3** Use proportions and ratios to solve problems involving scale drawings and models and conversions of measurement units.
- 7.3.2.4** Identify translations and reflections of figures on a coordinate grid, and determine the coordinates of the vertices of the figure after the transformation.

*Task Specifications*

- Conversions are limited to no more than 2 per item
- Images may be reflected over only vertical or horizontal lines
- Tasks may use models
- Include manipulatives for coordinate grid tasks
- Vocabulary allowed: similar, corresponding, scale drawing, transformation, reflection, grid

**Strand 4—Data Analysis****(1–2 tasks)****Extended Standard 7.4.3****(1–2 tasks)**

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

**Extended Benchmark**

- 7.4.3.2** Calculate probability as a fraction of the set of possible outcomes or as a fraction of area.
- 7.4.3.3** Use proportional reasoning to draw conclusions about and predict relative frequencies of outcomes based on probabilities.

*Task Specifications*

- Size of the set of possible outcomes is limited to 12 when the task requires listing possible outcomes
- The total of relative frequencies is limited to 30
- Vocabulary allowed in tasks: frequency, predict, probability, outcome, likely, combination, spinner, number cube

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## Grade 8

**Strand 1—Number & Operation****(1–2 tasks)****Extended Standard 8.1.1****(1–2 tasks)**

Read, compare, classify and represent real numbers, and use them to solve problems.

**Extended Benchmark**

**8.1.1.2** **Compare** rational numbers; locate fractions on a number line.

*Task Specifications*

- Denominators in fractions are limited to 2, 3, 4, 5, 6, 8 and 10
- Tasks must not include square roots
- Vocabulary allowed in tasks: fraction, number line

**Strand 2—Algebra****(3–4 tasks)****Extended Standard 8.2.2****(1–2 tasks)**

Recognize linear functions in real-world situations; represent linear functions and other functions with tables, verbal descriptions and graphs; solve problems involving these functions.

**Extended Benchmarks**

- 8.2.2.1** Represent linear functions with tables, verbal descriptions, equations and graphs; translate from 1 representation to another.
- 8.2.2.4** Represent arithmetic sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems.
- 8.2.2.5** Represent geometric sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems.

*Task Specifications*

- At least 3 applications of the rule must be given
- Vocabulary allowed in tasks: equation, ordered pair, sequence

## Grade 8

### Strand 2—Algebra (continued)

#### Extended Standard 8.2.3

(1–2 tasks)

Use algebraic properties to evaluate expressions.

##### Extended Benchmark

**8.2.3.1** Evaluate algebraic expressions at specified values of their variables.

##### *Task Specifications*

- Expressions are limited to 2 operations
  - Expressions are limited to 2 variables
  - Vocabulary allowed in tasks: variable, value, expression
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#### Extended Standard 8.2.4

(1–2 tasks)

Represent real-world and mathematical situations using equations and inequalities involving linear expressions; solve problems using equations and inequalities.

##### Extended Benchmarks

**8.2.4.1** Use linear equations to represent situations involving a constant rate of change.

**8.2.4.4** Use linear inequalities to represent relationships in real-world contexts.

##### *Task Specifications*

- Inequalities must contain no more than 1 variable
- Inequalities must contain no more than 1 operation
- Vocabulary allowed in tasks: solve, variable, represent, value, equivalent, expression, equation

**Strand 3—Geometry & Measurement****(1–2 tasks)****Extended Standard 8.3.2****(1–2 tasks)**

Solve problems involving parallel lines on a coordinate system.

**Extended Benchmark**

**8.3.2.1** Understand and apply the relationships between the slopes of parallel lines.

*Task Specifications*

- Vocabulary allowed in tasks: slope, parallel

**Strand 4—Data Analysis****(1–2 tasks)****Extended Standard 8.4.1****(1–2 tasks)**

Interpret data using scatterplots, and approximate lines of best fit. Use lines of best fit to draw conclusions about data.

**Extended Benchmarks**

**8.4.1.1** Display and interpret data using scatterplots. Use the shape of the scatterplot to informally estimate a line of best fit.

**8.4.1.2** Use a line of best fit to make predictions about values not in the original data set.

*Task Specifications*

- Data sets are limited to no more than 30 data points
- Scales are in increments of 1, 2 or 5
- Vocabulary allowed in tasks: scatterplot, line of best fit