

**Hartford School District
Elementary Mathematics Curriculum
2006**

Kindergarten

7.6 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

When counting, numbers have a sequential order (cardinal numbers).

Numbers have a name (numeral).

Numerals are a way to record how many.

Counting objects involves 1:1 correspondence.

Comparing groups of objects can show more or less.

A number can be made up of other, smaller numbers.

The number of objects in a group remains the same, no matter how they are arranged.

Without counting, a group of objects can be estimated.

Coins have names.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What is the number sequence 1-20?

How are numerals written 1-10?

What are numeral names 1-20?

How are objects counted and labeled with an appropriate numeral?

How can objects be compared quantitatively?

What are some different combinations of numbers 1-10? (10 is 5 and 5 or 8 and 2)

How can a group of objects be estimated?

How are coins labeled?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations MK:1, MK:2, MK:3, MK:4, MK:5, MK:7 & Hartford Curriculum Bullets

- Counts to 20
- Sequences numbers to 20
- Recognize numbers 1 – 20
- Writes numbers 1 - 10
- Demonstrates understanding of numbers 1 – 20
- Matches 1 to 1, numbers to pictures and/or objects
- Compares-more, less using pictures and/or objects
- Solves simple problems to ten using objects or pictures
- Solves addition and subtraction problems in a group
- Subitizes a group of objects
- Recognizes pennies, nickels, dimes and quarters

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Kindergarten

7.7 Geometric and Measurement Concepts Students use geometric and measurement concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Shapes have a name.

Objects can be sorted and classified by color, shape or size.

Events have a sequence of time. (yesterday, today and tomorrow)

Time can be measured using a clock and/or calendar.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What are the names of different shapes?

How can shapes be sorted and classified?

In a sequence of events, what comes first, next and last?

What tools measure time?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations MK:9, MK:15, MK:16, MK:18 & Hartford Curriculum Bullets

- Identifies, labels, and draws circles, squares, triangles, and rectangles,
- Sort and classify objects by color, size, or shape
- Demonstrates understanding of before and after.
- Demonstrates understanding of a sequence of events (first, next, last)
- Identifies clock and calendar as measurement tools

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Kindergarten

7.8 Functions and Algebra Concepts Students use function and algebra concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

The world around us is full of different patterns.
Patterns can be described and labeled.
Patterns can be extended.
Patterns can be created.
Living things grow and change over time.
Number problems can be solved using objects or pictures.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What is a pattern?
Where can patterns be located?
How are patterns different?
How can a pattern be extended?
How can you create and record a pattern?
How do living things grow and change over time?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations MK:19, MK:20, MK:22 & Hartford Curriculum Bullets

- Recognize, describe, and complete patterns and sequences
- Create, record, and extend patterns
- Demonstrates understanding of change over time (growth – animal or plant)

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Kindergarten

7.9 Statistics and Probability Concepts - Students use statistics and probability concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Graphing involves collecting data.

Data can be represented in many different ways (i.e. pictures, tally marks).

Data can be interpreted, analyzed, and compared.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can data be collected?

How can data be displayed and organized?

How is data sorted?

What do you notice about the data?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations MK:23, MK:24, MK:25, MK:28 & Hartford Curriculum Bullets

- Interprets data (models, charts, graphs) to answer questions
- Describes data using “more”, “less”, or “equal”

PRE-K

- Introduce language of more, less, same, different
- Organizes data using pictographs (whole class activity)
- Uses pictures to collect and analyze data to solve problems (ex. Make a big class graph using a picture of a car for students who ride with parents and a picture of a bus for students who ride on a bus. “Tell one thing that our graph shows.”)
- Collects data
- Makes observations about the data

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Kindergarten – Problem Solving

7.10 Mathematical Problem Solving and Reasoning – Applications

Enduring Understandings (The major concepts intended to last a student's lifetime.)
Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)
Indicators (The skills and concepts that support the enduring understandings.) Vermont Grade Expectations MK:30 & Hartford Curriculum Bullets <ul style="list-style-type: none">• Uses pictures/diagrams as an approach to solving the problem.• Identifies a pattern or number combination in solution• Solution includes work that supports the answer• Makes an appropriate diagram (labels dictated) with numbers as labels• Circles or highlights the answer.

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Grade 1- Number Sense

7.6 Arithmetic, Number and Operations Concepts Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Any number can be represented with objects in many different ways.
Numerals are a way to record how many.
Numbers can be ordered and compared.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can numbers be ordered? (i.e. least to greatest and greatest to least, ordinal, odd/even)
How can numbers be recorded? (i.e. number, symbol, concrete objects)
How can objects be organized & counted? (i.e. ones, twos, fives, tens)
How can benchmark numbers help in understanding the magnitude of whole numbers?(10, 25, 50)
How can estimation help to obtain a reasonable solution?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M1:1, M1:2, M1:7, M2:19 & Hartford Curriculum Bullets

- Reads and writes numbers from 0 – 100
- Demonstrates understanding of ordinal numbers
- Groups objects to count
- Demonstrates understanding of concept of greater than or lesser than
- Counts to 100
- Demonstrates understanding of relationship between number, symbol, and concrete objects
- Demonstrates understanding of concepts of greater than and lesser than
- Orders whole numbers
- Compares whole numbers to benchmark numbers (10, 25, 50)
- Given two choices can evaluate the reasonableness of possible solutions.
- Sequence numbers

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Grade 1—Place Value

7.6 Arithmetic, Number and Operations Concepts Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Putting objects into groups of tens and ones makes it easier to know how many without counting one by one.

Two digit numbers can be represented as groups of tens and ones.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can 2 digit numbers be expanded to tens and ones? (composition & decomposition)

How can the location of a digit within a number affect the value?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M1:1 & Hartford Curriculum Bullets

- Demonstrates understanding of expanded notation ($10+7=17$) (*composition and decomposition*)
- Demonstrates understanding of place value – ones (extras, units), tens, hundreds

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Grade 1--Addition and Subtraction

7.6 Arithmetic, Number and Operations Concepts Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Equations are a way to put numbers together or take them apart.
Strategies can be used for computation.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can mental math strategies help in computation? (i.e. sums to 10, doubles)

How does estimation help to determine the reasonableness of an answer?

How can fact families help in computation? ($5+3=8$, $8-5=3$)

How can equations be written? (+, -, =)

How are numbers used in the real world?

How can numbers be used to solve problems?

How can knowing two numbers allow for solving an equation? ($8+?=10$)

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M1:3, M1:4, M1:6, M1:7, M1:8 & Hartford Curriculum Bullets

- Demonstrates understanding of addition and subtraction
- Uses mental math strategies
- Demonstrates understanding of =, +, -
- Identifies real world uses of numbers
- Solves addition and subtraction story problems and equations (*in and out of context*)
- Memorizes sums of 10 ($9+1$, $8+2$, etc.), and doubles to $5 + 5$
- Uses mental math strategies.
- Estimates sums and differences
- Demonstrates understanding of commutative property of addition ($5+3=3+5$)
- Demonstrates understanding of the identity property ($n+0=n$)
- Demonstrates understanding of the associative property through the composition and decomposition of numbers ($17=9+8$, $17-8=9$)

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Grade 1—Fractions

7.6 Arithmetic, Number and Operations Concepts Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Fractions are equal parts of a whole.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can you show two, three or four equal parts of a whole using manipulatives?
Given a model, can you identify $\frac{1}{2}$, $\frac{2}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{3}$, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$ and $\frac{4}{4}$?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M1:1 & Hartford Curriculum Bullets

- Recognizes $\frac{1}{2}$, $\frac{2}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{3}$, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$
- Shows two, three, or four equal parts in a whole with manipulatives
- Recognizes equal parts of a whole

Grade 1—Money

7.6 Arithmetic, Number and Operations Concepts Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Different coins have different values.
Coin names are penny, nickel, dime and quarter.
Coins can be counted.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can coins of like value be counted?
How can coins of unlike value be counted?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M1:5 & Hartford Curriculum Bullets

- Counts like coins – pennies, nickels, dimes, quarters
- Counts unlike coins (pennies, nickels, dimes, quarters) up to a value of \$1.00

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Grade 1—Geometry

7.7 Geometric and Measurement Concepts Students use geometric and measurement concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Shapes can be classified by number of sides regardless of position in space.

3-dimensional shapes can be identified in environment.

Locations can be found using simple relationships (i.e., near, far, above, below etc.)

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How do the attributes of a shape allow for identification and sorting of 2-dimensional shapes?

How do the attributes of a 3-dimensional shape allow for identification in their environment?

How can locations be found using simple relationship words?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M1:9, M1:11, M1:18 & Hartford Curriculum Bullets

- Recognizes shapes in environment and in different orientations
- Sorts by one or two attributes
- Recognizes and names squares, rectangles, triangles, circles, rhombi, trapezoids, and hexagons
- Matches cylinders, rectangular prisms, triangular prisms, spheres, and cubes to objects in their environment
- Can follow one step directions containing simple relationships using location (near, far, above, below, next to, up, down, right, left)

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Grade 1—Measurement

7.7 Geometric and Measurement Concepts Students use geometric and measurement concepts

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Length, temperature, weight and volume can be measured.
Time can be measured using a clock and/or calendar.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What is a thermometer used to measure?
What is a ruler used to measure?
What are measuring cups used to measure?
What are scales used to measure?
How can you use a calendar to show elapsed time? (Days, weeks, months, seasons etc.)
How do you use a clock to tell time to the hour and half hour?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M1:15, M1:16 & Hartford Curriculum Bullets

- Estimates and uses standard and non-standard units to compare and order objects
- Recognizes scales, thermometers, rulers, and measuring cups, and understands what they measure.
- Demonstrates understanding of hours, days, and weeks
- Tells time to the hour and half hour
- Sequences events – days, months, and seasons
- Tells days of the week in sequence
- Demonstrates understanding of yesterday, today, tomorrow

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Grade 1

7.8 Functions and Algebra Concepts Students use function and algebra concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Patterns can be expressed in a variety of ways: symbolically, physically, verbally and with objects.

The same pattern can be translated from one medium to another.

Numbers have patterns.

Living things grow and change over time.

Equivalency can be shown between two equations.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can pattern rules be identified? (ABAB, 1212 etc.)

What are the counting patterns for 2s, 5s and 10s?

What are ways to extend and analyze patterns?

How can patterns be used to solve problems?

How do living things grow and change over time?

How do you show equivalency between two equations? ($4+1=3+2$)

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M1:19, M1:20, M1:22 & Hartford Curriculum Bullets

- Counts to 100 by 2s, 5s, and 10s
- Extend, analyze, and describe patterns (and identify rule that generates the pattern)
- Make predictions by using patterns
- Demonstrates understanding of change over time (growth-animal or plant)
- Demonstrates understanding of a constant rate of change in problem solving situations
- Explores balancing number sentences
- Explores number relationships with concrete materials

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Grade 1

7.9 Statistics and Probability Concepts - Students use statistics and probability concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Organizing information makes it easier to talk about and understand.

Data can be presented using pictures and symbols.

Data can be interpreted, analyzed and compared.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can data be collected?

How do graphs communicate information?

How can data be displayed and organized?

How do you compare data?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M1:23, M1:24, M1:25, M1:27, M1:28 & Hartford Curriculum Bullets

- Interprets data (models, charts, graphs) to answer questions
- Describes data using “more”, “less” or “equal”
- Collects, sorts, displays, and interprets data
- Records data using tallies, organized lists, charts, pictographs or bar graphs (whole class activity)
- Describes probability of an event using “more likely”, or “less likely”
- Collects data
- Makes observations about data

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Grade 2 – Number Sense

7.6 Arithmetic, Number and Operations Concepts Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Patterns that can be found in the numbers 1-100 reveal relationships between the numbers.

Making and refining estimates can be a useful problem solving tool.

Numbers can be ordered and compared.

Numbers can be seen in the real world.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can numbers be ordered? (i.e. Least to greatest, greatest to least, ordinal, odd,even)

How can numbers be recorded? (i.e. number, symbol, concrete numbers)

How can numbers be organized and counted? (i.e. ones, twos, threes, fives, tens, twenty-fives, hundreds)

How do benchmark numbers help in understanding the magnitude of whole numbers?
(10, 25, 50, 75, 100, 125, 150, 175)

How can estimation help obtain a reasonable solution?

Where can numbers be found in the real world?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M2:1, M2:2, M2:8 & Hartford Curriculum Bullets

- Reads and writes numbers from 1 – 1000
- Demonstrates understanding of ordinal numbers
- Counts to 1000
- Compares whole numbers to benchmark numbers (10, 25, 50, 75, 100, 125, 150, or 175)
- Sequences and orders whole numbers to 199
- Demonstrates understanding of commutative property of addition ($25+43=43+25$)
- Demonstrates understanding of even and odd

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Grade 2- Place Value

7.6 Arithmetic, Number and Operations Concepts Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Grouping by hundreds, tens and ones is helpful when counting.

Two-digit and three-digit numbers can be represented as groups of hundreds, tens and ones.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can 2 and 3 digit numbers be expanded to hundreds, tens and ones?(composition and decomposition)

How can the location of a digit within a number affect the value?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M2:1 & Hartford Curriculum Bullets

- Demonstrates understanding of expanded notation of whole numbers 0-199
($141=100+40+1$) (*composition decomposition of numbers*)
- Groups objects to count
- Demonstrates understanding of place value – ones, tens, hundreds

**Hartford School District
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Grade 2 –Addition and Subtraction

7.6 Arithmetic, Number and Operations Concepts Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Equations are a way to put numbers together or to take them apart.
Unknown sums can be determined by the use of mental counting strategies.
Strategies can be used for computation.
True equations can be generated by fact families.
Objects shown in equal groups can be used to model multiplication and division.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can strategies help in computation?(i.e. sums to 20, doubles plus 1, doubles minus 1, fast 10s)
How can fact families help in computation? ($140 + 3 = 143$, $143 - 3 = 140$)
How does estimation help determine the reasonableness of an answer?
How do you add and subtract?(i.e. join, separate, part-part whole, compare)
Using manipulatives, how can you add sums greater than 10?(regrouping)
How can knowing two numbers allow for solving an equation? (identity property)
What are all the different combinations to convey value of a number?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M2:3, M2:3, M2:6, M2:7 & Hartford Curriculum Bullets

- Demonstrates understanding of addition and subtraction (see Appendix A, page M34, of GEs)
- Regroups with the use of manipulatives
- Explores beginning multiplication (repeated addition) and division concepts (fair shares).
- Uses mental math strategies
- Memorizes basic facts to sums of 20
- Estimates sums and differences
- Given two choices can evaluate the reasonableness of possible solutions

**Hartford School District
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Grade 2 – Fractions

7.6 Arithmetic, Number and Operations Concepts Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Fractions are equal parts of a whole.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can you show two, three or four equal parts of a whole using manipulatives?
Given a model, can you identify $\frac{1}{2}$, $\frac{2}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{3}$, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$ and $\frac{4}{4}$?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M2:1 & Hartford Curriculum Bullets

- Recognizes $\frac{1}{2}$, $\frac{2}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{3}$, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$
- Shows two, three, or four equal parts in a whole with manipulatives
- Recognizes equal parts of a whole

**Hartford School District
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Grade 2 - Money

7.6 Arithmetic, Number and Operations Concepts Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Different coins have different values.
Different coins can be used to represent the same value.
Coins can be used to make change using benchmark amounts.
Money can be added and subtracted in equations.
The decimal point separates the whole from the part.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can the value of money be written in dollar notation?
How can you make change from \$1.00 using benchmark amounts? (\$.25, \$.50, \$.75, and multiples of \$.10).
What does the decimal point represent?
What are some strategies for counting money?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M2: 5 & Hartford Curriculum Bullets

- Recognizes and writes amounts of money in dollar notation.
- Adds and subtracts amounts of money to \$1.99.
- Makes change from \$1.00 using benchmark amounts (\$.25, \$.50, \$.75, and multiples of \$.10).
- Recognizes equivalent coin representations of the same value.

**Hartford School District
Elementary Mathematics Curriculum
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Grade 2 – Geometry

7.7 Geometric and Measurement Concepts Students use geometric and measurement concepts

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Shapes can be classified by number of sides regardless of position in space.
Objects can be sorted or classified by a combination of two or more attributes.
Three dimensional objects can be identified in the environment.
Locations can be found on a grid using 2-dimensional coordinates.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How do the attributes of a shape allow for the identification and sorting of a three-dimensional shape?
How do the attributes of a 3-dimensional shape allow for identification in the environment?
How can the appearance of a shape change using flips, slides and turns?
What is symmetry?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M2:9, M2:11, M2:18 & Hartford Curriculum Bullets

- Explore symmetry and transformations (flips, slides, and turns)
- Sorts or classifies objects by a combination of two or more attributes
- Recognizes and names rectangular prism, triangular prisms, cylinders, or spheres and matches them to objects in the environment.
- Uses coordinates to locate points on a grid
- Labels grids with x and y axis

**Hartford School District
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Grade 2 – Measurement

7.7 Geometric and Measurement Concepts Students use geometric and measurement concepts

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Area and perimeter can be measured.
Time can be measured using a clock and/or calendar.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can you measure using inches and centimeters? (nearest inch or centimeter etc.)
How many inches in 1 foot?
How many centimeters in a meter?
How do you tell time in 15 minute intervals?
How can you measure elapsed time? (i.e. days, weeks, months, years etc.)
How do you use a clock to tell time to the nearest minute?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M2:15, M2:16 & Hartford Curriculum Bullets

- Measures to the nearest inch
- Explores measuring to the nearest half inch
- Measures to the nearest centimeter
- Knows 12 inches in 1 foot
- Knows 100 centimeters in 1 meter
- Tells time to the fifteen minute interval
- Uses coordinates to locate points on a grid
- Labels grids with x and y axis

**Hartford School District
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Grade 2 – Functions and Algebra Concepts

7.8 Functions and Algebra Concepts Students use function and algebra concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Patterns are predictable and can be extended.

The same pattern can be translated from one medium to another.

Numbers have patterns.

Equivalency can be shown between two equations.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can pattern rules be identified?

What are ways to extend and analyze a pattern?

How can patterns be used to solve problems?

How can models, tables and graphs be used to show patterns?

What are the counting patterns for 2s, 5s and 10s and how do these patterns help find a missing element?

How can you equivalency be shown between two equations? ($2 + _ = 3 + 4$)

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M2: 19, M2:20, M2:22 & Hartford Curriculum Bullets

- Counts to 1000 by 2s, 5s, and 10s
- Recognizes and creates number patterns
- Finds the missing element in patterns and number sequences
- Discover, invent, describe, generalize, extend and represent a variety of patterns
- Identifies the rule that generates the pattern
- Use models, tables, and graphs to show mathematical relationships
- Demonstrates understanding of change over time (growth –animal or plant)
- Demonstrates understanding of a constant rate of change in problem solving situations
- Uses numbers and equations to represent change
- Balances number sentences
- Find the missing addend

**Hartford School District
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Grade 2 - Data Analysis and Probability

7.9 Statistics and Probability Concepts - Students use statistics and probability concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Data can be displayed and organized so it can be easily read or analyzed.

Organization of information shows relationships.

Data can be interpreted, analyzed and compared.

Sorting and organizing data is a helpful tool for analyzing and comparing that data.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How does data help make predictions?

How do graphs communicate information?

What are some ways to organize and display data?

How can you describe the probability of an outcome? (i.e. more likely, less likely, etc.)

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M2:23, M2:24, M2:25, M2:27, M2:28 & Hartford Curriculum Bullets

- Interprets data (tallies, organized lists, pictographs, bar graphs, or Venn diagrams) to answer questions
- Describes data using “more”, “less” or “equal”
- Collects and organizes data
- Represents and interprets data using tallies, organized lists, pictographs, bar graphs, and Venn diagrams
- Explores creating own graph
- Solves problems involving combinations using a variety of strategies (diagram, organized lists, tables, tree diagram)
- Describes probability of an event using “more likely”, “less likely”, “equally likely”, “certain” or “impossible”
- In response to a question
 - Collects data
 - Organizes data
 - Displays/represents data
 - Makes observations to draw conclusions from data

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Grade 3 – Place Value

7.6 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

The position of a digit in a number determines its value.
The relationship in the place value system is where each place is based on groups of ten.
The groupings of 1's, 10's and 100's for a number can be taken apart or combined in different ways.
Patterns can grow and be repeated using the place value system.
Numbers can represent order.
Rounding and estimating are not exact amounts.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How does the position of a digit in a number affect its value?
What kind of strategies can be used to compare numbers?
What different ways can numbers be grouped to represent a specific value?
How is ordering numbers useful?
When is it appropriate to use rounding and estimating?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M3:1, M3:2, M4:7, M3:8 & Hartford Curriculum Bullets

- Reads and writes numbers to 100,000
- Demonstrates understanding of numbers and place value to a minimum of 999
- Reads and writes numbers in expanded form to 999 (*composition and decomposition*)
- Demonstrates understanding of base 10 (10 tens in 100, 10 hundreds in 1000)
- Demonstrates understanding of ordinal numbers
- Compares numbers to each other and to benchmark numbers (100, 250, 500, 750)
- Orders numbers
- Rounds to the nearest 100
- Rounds whole numbers to the nearest 100
- Demonstrates understanding of the identity property ($n+0=0$)
- Demonstrates understanding of properties – commutative, ($2+3=5$ so $20+30=50$) associative ($5-2=3$ so $50-20=30$)

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Grade 3- Addition and Subtraction

7.6 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator and computer

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Quantity relationships can be expressed in a variety of ways.
Numbers can be regrouped to compute easily.
Estimates are approximate values or reasonable but NOT exact.
Strategies for computation are based on place value.
Fact families provide a foundation for math concepts.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What happens to a number with composition and decomposition?
How are relationships of numbers like a balancing scale in an equation?
How can numbers be rearranged or regrouped to compute easily?
What is the relationship of numbers in a fact family?
How does knowing a fact family help solve math problems?
What strategies can be used to FIND or CHECK or verify sums and differences?
When can an estimate be used?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M3:1, M3:3, M3:4, M3:6, M3:7, M3:8 & Hartford Curriculum Bullets

- Reads and writes numbers in expanded form to 999 (*composition and decomposition*)
- Demonstrates understanding of order of operations with addition and multiplication
- Demonstrates understanding of fact families in addition and subtraction
- Adds 3 digit numbers with or without regrouping
- Subtracts 3 digit numbers with or without regrouping
- Memorizes basic facts to sums of 20
- Demonstrates understanding of basic fact families
- Uses mental math strategies
- Estimates sums and differences
- Checks for understanding and accuracy
- Uses inverse operation to check solutions

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Grade 3 Multiplication & Division

7.6 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Multiplication and division are inverse operations.
Multiplication is repeated addition and related to division.
Strategies for multiplying and dividing are based on place value.
The order of the factors does not change the product.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What items in the real world come in groups?
How can patterns help with learning multiplication or division facts?
What is the relationship among factors, products, quotients and multiples?
How can linear, area or set models be used for multiplication/division?
What strategies can be used to learn basic multiplication and division facts?
How can a model show that the order of factors does not change the product?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M3:3, M3:4, M3:6 & Hartford Curriculum Bullets

- Demonstrates understanding of multiplication by using repeated addition, real life situations, arrays and area models
- Demonstrates understanding of factors and multiples
- Demonstrates understanding of multiples of ten
- Uses repeated addition or arrays when solving multiplication problems

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Grade 3 – Money

7.6 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

- The money system is a decimal system.
- Money can be represented as fractional parts.
- Operations with money and numbers are similar.
- Money can be represented in different ways.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

- What is the relationship between coins and dollars?
- What are good strategies for counting money?
- Why is it important to show money in different ways or combinations?
- Why is the dollar the basic unit of our number system?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M3:1, M3:4 & Hartford Curriculum Bullets

- Relates decimals to money
- Relates decimals to money in addition and subtraction

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Grade 3 – Fractions

7.6 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Fractions are equal shares of a region or a set.
Numerator and denominator represent different concepts.
One whole can be represented in many ways.
Fractional parts can be represented using area, set or linear model.
Currency can be represented as fractional parts.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What different ways can a fraction be represented to show equivalency?
How can a whole be represented in fractional parts using an area, set or linear model?
How are fractions represented on a number line?
How can unit fractions be compared?
What is the relationship between different coins and dollars?
What are some ways of using manipulatives to compare fractions?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M3:1, M3:2 & Hartford Curriculum Bullets

- Reads and writes fractions ($\frac{1}{2}$, $\frac{2}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{3}$, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$, $\frac{1}{6}$, $\frac{2}{6}$, $\frac{3}{6}$, $\frac{4}{6}$, $\frac{5}{6}$, $\frac{6}{6}$, $\frac{1}{8}$, $\frac{2}{8}$, $\frac{3}{8}$, $\frac{4}{8}$, $\frac{5}{8}$, $\frac{6}{8}$, $\frac{7}{8}$, $\frac{8}{8}$)
- Demonstrates understanding of equal parts of a whole
- Demonstrates understanding of equal parts of a group
- Compares fractions with like and unlike denominators using unit fractions
- Explores equivalent fractions

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Grade 3 – Geometry

7.7 Geometric and Measurement Concepts Students use geometric and measurement concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

- Attributes of a shape determine its classification.
- Objects can be compared using geometric attributes.
- Changing a position of an object does not affect its attributes.
- Geometry provides a way to describe our environment.
- Rectangular objects can be measured using area or perimeter.
- Coordinates help represent a location.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

- What are the attributes of a shape?
- How are plane shapes different from solids?
- How are angles classified?
- How are area and perimeter different?
- Why is area measured in square units?
- How are geometric properties used to solve problems in everyday life?
- What makes a shape symmetrical?
- What makes a shape congruent?
- In what ways can the position of geometric figures be changed?
- How are points, lines, line segments, rays and angles related?
- How do you measure and compare the area or perimeter of rectangular objects?
- How do you locate and describe points on a coordinate grid?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M3:9, M3:11, M3:12, M3:14, M3:18 & Hartford Curriculum Bullets

- Explores angles
- Uses attributes to describe or distinguish among triangles, squares, rectangles, rhomboid, trapezoids, hexagons, or circles.
- Identifies plane shapes by number of angles, number of sides or length of sides.
- Recognizes segments, lines, rays, parallel and intersecting lines
- Identifies solid shapes by number of bases or number of lateral faces.
- Uses attributes to compare or describe three dimensional shapes (rectangular prisms, triangular prisms, cylinders, or spheres)
- Demonstrates understanding of congruency using
 - Flips, slides or turns
 - Shape of polygons
 - Size of polygons
- Demonstrates understanding of perimeter of polygons using appropriate units of measure
- Demonstrates understanding of area of rectangles using appropriate units of measure.
- Uses coordinates to locate points on a grid
- Labels grids with x and y axes.

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Grade 3 – Measurement

7.7 Geometric and Measurement Concepts Students use geometric and measurement concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Objects can be measured using appropriate tools/systems (length and temperature).
Elapsed/accrued time is the measure of the duration of an event.
Standard/metric units communicate measurement.
Measurement systems contain a number and unit.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can models and manipulatives be used to determine weight, time, length, and temperature?
How can elapsed and accrued time be measured?
How are the units of measure related?
When is an estimate more appropriate than an actual measurement?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M3:15, M3:16 & Hartford Curriculum Bullets

- Uses measuring tools
- Measures to the nearest inch, $\frac{1}{2}$ inch
- Measures to the nearest centimeter
- Knows 12 inches in 1 foot; 100 centimeters in 1 meter
- Tells time to the nearest 5 minute interval
- Knows 24 hours equals a day; 7 days in 1 week; 365 days in 1 year
- Uses degrees ($^{\circ}\text{C}$ and $^{\circ}\text{F}$) to tell temperature
- Measures using quarts
- Measures to the nearest kilogram
- Measures to the nearest gram
- Measures to the nearest pound
- Demonstrates understanding of quarter after, quarter of and half past an hour
- Demonstrates time lapse using manipulatives
- Demonstrates understanding of A.M. and P.M

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Grade 3 – Pattern and Rules

7.8 Functions and Algebra Concepts Students use functions and algebra concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

A variety of patterns can be extended.
Number patterns and relationships can be represented using variables.
Quantity relationships are expressed in a variety of ways.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can a pattern be generalized?
Why are variables used?
What strategies can be used to solve for unknowns in algebraic equations?
How are parentheses used in numeric expressions?
How do symbols represent mathematical relationships?
How can constant rate of change over time be represented?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M3:19, M3:20, M3:22 & Hartford Curriculum Bullets

- Demonstrates understanding of patterns (by 2s, 5s, and 10s)
- Recognizes and creates number patterns
- Finds the missing element in patterns and number sequences
- Discover, invent, describe, generalize, extend and represent a variety of patterns
- Identifies the rule that generates the pattern
- Uses rule to complete a table (i.e. In/Out boxes, function tables, T-charts)
- Use models, tables, and graphs to show mathematical
- Demonstrates understanding of change over time (growth –animal or plant)
- Demonstrates understanding of a constant rate of change in problem solving situations
- Uses numbers and equations to represent change
- Explore solutions to simple equations
- Explore algebra by balancing equations (find the missing addend or factor)
- Understand that a number sentence is true when both sides are equal

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Grade 3

7.9 Statistics and Probability Concepts - Students use statistics and probability concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Organization of data shows relationships.

Data displays involve scales.

Trends show direction of change over time.

Patterns help to make predictions and solve problems.

Ordered pairs show a location on a coordinate plane.

Data can be used to determine and convey the probability of an event occurring.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What are some ways to organize data?

How can the elements of a graph help people understand and interpret data?

How can you find a pattern and how can identifying a pattern help to make a prediction?

How is a trend found?

How does changing the scale affect how data is communicated?

How is the location of a point on a grid described?

How can data be used to generate a hypothesis of a particular outcome?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M3:23, M3:24, M3:25, M3:26, M3:27, M3:28, M3:29 & Hartford Curriculum Bullets

- Interprets pictographs, line graphs, Venn diagrams, line plots, tally charts, tables, or bar graphs
- Analyzes data and predicts results
- Describes trends or distributions in data using “most frequent” (mode), “least frequent” or “largest” or “smallest”
- Sorts and organizes data
- Records data by graphing
- Analyzes data to form conclusions or make predictions
- Recognizes line graphs show change over time
- Recognizes bar graphs and pictographs show categorical data
- Solves problems involving combinations using a variety of strategies (diagram, organized lists, tables, tree diagram)
- Describes probability of an event using “more likely”, “less likely”, “equally likely”, “certain” or “impossible”

In response to a question

- Collects data
- Organizes data
- Displays/represents data
- Makes observations to draw conclusions from data
- Uses experimental probability to determine chance using “more likely,” “less likely,” “equally likely,” “certain,” or “impossible.”

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Fourth Grade – Place Value

7.6 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Numbers work with a base ten system ~ each digit's place has its own value.

The digit zero is a place holder for large numbers.

There are 3 ways to write numbers: standard, written and expanded form.

Numbers can be compared and ordered.

Numbers can be rounded and estimated using a variety of methods.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How does place value location determine the value of a digit and/or number? What is the value of zero and how does it change when placed within other digits?

How can numbers be expressed in different ways? Why would you choose to use a different form?

How does comparing and ordering numbers help to understand their values?

How do landmark numbers help to estimate the value?

What are some examples of estimation used in the real world?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M4:1, M4:2, M4:7 & Hartford Curriculum Bullets

- Demonstrates understanding and place value of numbers to 1,000,000
- Reads and writes numbers to 1,000,000 in standard form
- Writes numbers in expanded form (*composition and decomposition*)
- Compares and orders whole numbers
- Demonstrates understanding of ordinal numbers
- Rounds numbers to the nearest multiple of 100
- Demonstrates understanding of the concept of using front-end digits in mental math
- Estimates by rounding

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Fourth Grade – Addition / Subtraction

7.7 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Addition can cause numbers to increase and subtraction can cause numbers to decrease.

Addition and subtraction are inverse operations.

When adding or subtracting, numbers need to be combined with like place values.

When adding or subtracting, digits need to be manipulated in order to maintain the single digit place value system.

There is a proper order of operations when parentheses are used.

Some sums and differences can be computed mentally, knowledge of facts is crucial.

Estimation can be used when finding sums and differences.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How does addition and subtraction change number values?

How are addition and subtraction inverse operations? How can they be used to verify answers?

Why is place value important when adding and subtracting? How is the place value system manipulated when regrouping?

How do parentheses impact the order of operations?

Why are facts important, and how do they help to mentally compute sums and differences?

How does estimation help to determine the reasonableness of an answer?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M4:4, M4:6, M4:7, M4:8 & Hartford Curriculum Bullets

- Adds and subtracts up to 4 digit numbers with or without regrouping
- Subtracts across zeroes with or without regrouping
- Demonstrates understanding of order of operations as applied to parentheses
- Uses mental math strategies
- Estimates sums, differences
- Uses inverse operations to check solutions

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Fourth Grade – Multiplication / Division

7.8 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

There is a proper order of operations when parentheses are used.
Estimation can be used when finding products and quotients.
Fact families provide a foundation for multiplication and division concepts.
Some products and quotients can be computed mentally, knowledge of facts is crucial.
Multiplication and division are inverse operations.
Multiplication and division are life skills and used in the real world.
Multiples are used when multiplying and dividing.
Multiplication and division can be represented in a variety of ways and have many symbols to show the operations.
Pictures, such as arrays, groups, repeated addition / subtraction, can be used to show thinking, and calculate answers.
When using whole numbers, multiplication causes numbers to increase and division causes numbers to decrease.
When multiplying by zero, the product is zero, and zero can never be a divisor.
Division does not always yield a whole number quotient, remainders need to be expressed and interpreted appropriate to the problem.
Numbers can be prime and composite.
There are rules for divisibility which are helpful when dividing larger numbers.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How do parentheses impact the order of operations?
How does estimation help to determine the reasonableness of an answer?
Why are facts important and how do they help to mentally compute products and quotients?
How are multiplication and division inverse operations? How can they be used to verify answers?
What are some examples of multiplication and division in the real world?
How are multiples used when multiplying and dividing?
What is the commutative property? Associative? How is it used when multiplying?
Why would you choose a specific representation or symbol to show your thinking?
How does zero affect products and quotients?
How are remainders expressed? Fractions? Whole numbers? What does the remainder mean?
What are the characteristics of prime and composite numbers?
What are the rules for divisibility? How are they used?

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Fourth Grade – Multiplication / Division

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M4:3, M4:4, M4:6, M4:7, M4:8 & Hartford Curriculum Bullets

- Demonstrates understanding of multiplication by using real life situations, arrays and area models
- Demonstrates understanding of multiples of 10
- Expresses remainders as they are appropriate to the situations (left over, fractions, # to complete the set)
- Demonstrates understanding of divisibility rules (for 2, 3, 5, 6 and 10)
- Recognizes different symbols for multiplication and division ($4 \times n$, $4n$, $4 \cdot n$, $n \div 4$, $4/n$, etc.)
- Multiplies 2 digit numbers by 2 digit multipliers
- Divides up to 3 digit numbers by single digit divisors with or without remainders
- Identifies prime and composite numbers
- Demonstrates understanding of order of operations as applied to parentheses
- Memorizes (multiplication and division) facts through 12
- Uses mental math strategies
- Estimates products
- Demonstrates understanding of commutative and associative properties of multiplication and division
- Uses inverse operations to check solution

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Fourth Grade – Fractions

7.9 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Fractions are a single number that represent a quantity or value.
There is a part to whole relationship within fractions and whole number reasoning does not apply.
Fractions can be represented by area, set and linear models.
Estimation can be useful when operating with fractions to determine value.
Fractions can be renamed. There are an infinite number of equivalences. Whole numbers can be expressed as fractions.
There are an infinite number of fractions between any two integers.
Fractions can be compared and ordered.
Operations can be performed on fractions.
Fractions can be a symbol for division and a way to express remainders when dividing.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What is a fraction? Numerator? Denominator? What do they represent?
How does the size of the whole affect the value of a fraction?
What are area, set and linear models? When would they be used?
How can you find equivalent fractions?
How can estimation help you to determine the reasonableness of a fractional value?
How can you use fractional values to compare and order?
What are the rules for adding and subtracting fractions with like denominators? How does this affect their value?
How are fractions used when expressing and interpreting remainders? When dividing?
What does the fractional remainder mean?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M4:1, M4:2, M4:3, M4:4 & Hartford Curriculum Bullets

- Demonstrates understanding of fractions ($a/2$, $a/3$, $a/4$, $a/5$, $a/6$, $a/8$, or $a/10$) as they relate to area, set, and linear models
- Renames a fraction as an equivalent fraction
- Compares and orders fractions
- Recognizes different symbols for multiplication and division ($4 \times n$, $4n$, $4 \cdot n$, $n \div 4$, $4/n$, etc.)
- Adds and subtracts fractions with like denominators

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Fourth Grade – Time / Money

7.10 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

7.7 Geometric and Measurement Concepts Students use geometric and measurement concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Time and money are represented, read and interpreted in a variety of ways.
Time and money are divided into larger segments that have equivalences.
Operations can be applied to time and money.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How is time represented and read on a clock?
What are common time equivalences? AM/PM?
How does time/elapsed time apply to scheduling?
What are the different ways to read a given time? (Quarter after, etc.)
How is money (time) added or subtracted?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M4:15,M4:16 & Hartford Curriculum Bullets

- Can tell time to the nearest 5 minute interval
- Knows 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour
- Demonstrates understanding of quarter after, quarter of and half past an hour
- Applies time concepts to schedules and time tables
- Demonstrates understanding of A.M. and P.M.

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Fourth Grade – Measurement

7.7 Geometric and Measurement Concepts Students use geometric and measurement concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Length, temperature, capacity, mass/weight can be measured in standard or metric systems.

Units of measure have equivalences.

Measurement also includes the use of a 4 quadrant coordinate grid and map scales.

The area and perimeter of polygons or irregular shapes can be calculated and estimated.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How do you measure length in the standard and metric system? Temperature? Capacity? Mass/Weight?

What are common conversions for measurement (12"= 1 ft, etc)?

How can you use coordinates to locate points on a coordinate grid? How do axes help with plotting?

How do map scales help to locate points on a map? Estimate distances? Represent a large area?

How do you calculate the area and perimeter of polygons and/or irregular shapes? What does that tell you?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations, M4:13, M4:14 M4:15 & M4:18 Hartford Curriculum Bullets

- Measures length using inches (to 1/4 in.); feet; yards; centimeters (to the nearest 0.5 cm); meters; Mile (use in scale questions); kilometer (use in scale questions)
- Knows 12 inches in 1 foot; 100 centimeter in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard
- Measure temperature in C° and F°
- Measures capacity using quarts (to whole quart)
- Measures mass using kilograms (the nearest whole km.) and grams (to the nearest whole gram)
- Measures weight using pounds (to the nearest lb.)
- Uses coordinates to locate points on a grid
- Labels grids with x and y axes.
- Explores locating coordinates on a 4 quadrant grid
- Demonstrates understanding of perimeter of polygons
- Demonstrates understanding of area of polygons or irregular shapes on grids
- Uses formulas to calculate area and perimeter
- Demonstrates understanding of similarity using scales on maps

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Fourth Grade – Geometry

7.8 Geometric and Measurement Concepts Students use geometric and measurement concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)
Polygons and solid figures have specific characteristics that allow them to be compared..
There are a variety of lines; each has its own trait.
Angles can be measured using protractors or by estimating.
Figures can be symmetrical, congruent and/or similar and manipulated in a variety of ways.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)
What are the characteristics of 2D and 3D objects? How are they alike and different?
What are the characteristics of lines, angles, and rays?
How do you use a protractor to measure angles? How are angle values estimated?
What constitutes a line of symmetry?
How are figures congruent or similar?
What happens to a figure when it is flipped? Slid? Turned?

Indicators (The skills and concepts that support the enduring understandings.)
Vermont Grade Expectations M4:9, M4:11, M4:12, M4:13 & Hartford Curriculum Bullets

- Uses attributes to describe or distinguish among triangles, squares, rectangles, rhombi, trapezoids, hexagons, or octagons.
- Identifies plane shapes by number of angles, number of sides, length of sides, parallelism, or perpendicularity.
- Estimates the size of an angle relative to 90°
- Recognizes segments, lines, rays, parallel and intersecting lines
- Uses symmetry to identify and classify figures
- Demonstrates understanding of 2D and 3D objects
- Examines, compares, and analyzes the relationships between solids and plane geometric figures and shapes and between parts and the rest
- Demonstrates understanding of vertex of an angle
- Identifies solid shapes by number of bases or number of lateral faces.
- Uses attributes to compare or describe three dimensional shapes (rectangular prisms, triangular prisms, cylinders, or spheres)
- Demonstrates understanding of components (faces, edges, vertices) of three dimensional shapes.

Demonstrates understanding of congruency using

- Flips, slides or turns
- Shape of polygons
- Size of polygons

Demonstrates understanding of similarity using

- Similar figures (same shape, but not necessarily same size)

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Fourth Grade – Algebra

7.8 Functions and Algebra Concepts Students use function and algebra concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Patterns are the basis for algebra and can be solved using simple equations.

Patterns can contain missing elements that are expressed as variables.

Patterns can be identified, extended and written as rules.

Rules can be expressed in words or algebraic terms.

Number relationships can be represented within models, tables, and/or a variety of graphs.

Patterns within tables can help to generate rules.

There are a variety of strategies that can be used to find missing information in simple equations and problems.

Rules for the order of operations apply when solving an algebraic sentence.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can you solve problems to find missing information?

How can you use patterns to identify a rule that leads to a solution and extension?

What are variables and how do they help you write equations?

What are different ways that patterns can be expressed?

How can models, tables, and graphs be used to show mathematical relationships? Write rules?

How do you know which strategy is most efficient to use when solving a problem?

How do you use order of operations to solve algebraic equations?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M4:19,M4:20, M4:21, & M4:22Hartford Curriculum Bullets

- Recognizes and creates number patterns
- Finds the missing element in patterns and number sequences
- Extends patterns and identifies the rule that generates the pattern
- Uses rule to complete a table (i.e. In/Out boxes, function tables, T-charts)
- Use models, tables, and graphs to show mathematical relationships
- Expresses a rule with words or algebraic terms
- Demonstrates understanding of change over time (growth –animal or plant)
- Demonstrates understanding of a constant rate of change in problem solving situations
- Uses numbers and equations to represent change
- Uses simple concepts of variables
- Explores solutions to simple equations($ax = c$, $x \pm b = c$)
- Develops strategies for finding missing information in simple equations and problems
- Uses order of operations to solve simple equations [i.e. $14 - (2 \times 5)$]

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Grade 4 - Data Analysis and Probability

7.9 Statistics and Probability Concepts - Students use statistics and probability concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Data can be collected, sorted, organized, displayed, analyzed, and interpreted.

Data can be displayed in a variety of representations.

Sample size affects results.

Probability involves predictions, recording data, and testing hypotheses.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What data display is appropriate for given information?

How can mode, median, and range be used to summarize data to draw conclusions?

What conclusions can be gathered from data?

How does sample size effect results?

What is the difference between a guess and a prediction?

How does a data set and/or representation influence your prediction?

Why would you test out your hypothesis?

How do you use information to draw conclusions?

How do you convey your understanding of the analyzed data?

Grade 4 - Data Analysis and Probability

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M4:23, M4:24, M4:25, M4:26, M4:27, M4:28, M4:29 & Hartford Curriculum Bullets

- Interprets graphs line plots, tally charts, tables, bar graphs, line graphs, circle graphs, frequency charts, or Venn diagrams
- Analyzes and compares data and predicts results
- Use simple situations involving median, mode and range
- Explores determining the mean
- Sorts and organizes data
- Records data using pictures, bar graphs, or line graphs
- Records data using coordinate grid
- Analyzes and compares data to form conclusions or make predictions
- Recognizes line graphs represent change over time
- Recognizes bar graphs and pictographs represent categorical_data
- Solves problems involving combinations or simple permutations using a variety of strategies (diagram, organized lists, tables, tree diagram)
- Develops systematic ways to generate list of all possible outcomes
- Determines theoretical probability of an event
- Describes probability of an event as part to whole (two out of five) or in fractional form

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In response to a question

- Designs survey for the purpose of collecting data
- Collects data
- Organizes data
- Displays/represents data
- Makes observations to draw conclusions from data
- Uses experiment to determine probability of an event
- Describes probability of an event as part to whole (two out of five) or in fractional form
- Predict outcomes based on collected data
- Recognizes reliability of results based on sample size
- Recognizes limitation of sample, fairness of data represented
- Compare data in sample to data from larger population
- Analyze single data set in multiple ways (graphing)

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Grade 5 – Place Value/Addition/Subtraction

7.6 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Where a digit is placed in a number defines its value.
Numbers can be compared by looking at the number of digits and the value of each digit.
Where a decimal point is placed has an effect on the value of the number.
An understanding of place value is needed in order to add and subtract accurately.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What are the different ways a number can be written (i.e., words, expanded notation, standard form, decimals, percents)?
What do you need to think about to order whole numbers and numbers with decimals?
What do you need to know to add and subtract numbers accurately (e.g., regrouping, counting up)?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M5:1,M5:2,M5:4,M5:6,M5:7,M5:8 & Hartford Curriculum Bullets

- Demonstrates understanding of numbers and place value of numbers to millions
- Reads and writes numbers to millions
- Writes numbers in expanded notation
- Demonstrates understanding of place value (decimals)– to thousandths
- Reads, records, and orders decimals given different values
- Demonstrates understanding of equivalent decimals
- Adds and subtracts up to 5 and 6 digit numbers
- Adds, subtracts, multiplies decimals to thousandths with regrouping
- Uses mental math strategies
- Estimates to check reasonableness of answers
- Rounds numbers to 10,000
- Uses inverse operations to check solutions

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Grade 5 – Multiplication/Division

7.7 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Division is the opposite of multiplication.

Multiplication and division can be done mentally.

The order of factors doesn't matter when multiplying (commutative property).

Whole numbers get larger faster when you multiply rather than add.

Decimals cause whole numbers to get smaller when multiplying.

One way to multiply is to break the factors into parts and multiply the parts (distributive property).

You can use parentheses and brackets to group calculations to be sure that some calculations are done in a special order.

Estimation helps check the reasonableness of products and quotients.

Memorization of multiplication facts helps when dividing.

The context of the situation has to be considered when determining the meaning of the remainder.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What are three ways you can show division?

What is the meaning of the remainder when you divide?

How can estimation help check the reasonableness of your answer?

How can you use properties of numbers (factor, multiple, prime, composite, divisibility) when solving problems?

How does a factor with a decimal point effect the relative size of the product?

How do the rules of order of operation effect the process and answer when solving a problem?

How can multiplication be used to check the accuracy and reasonableness of a quotient?

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Grade 5 – Multiplication/Division

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M5:3, M5:4, M5:5, M5:6, M5:7 & Hartford Curriculum Bullets

- Demonstrates understanding of three ways of showing division (ratios, fractions, algorithm)
- Demonstrates understanding of the meaning of a remainder with respect to division of whole numbers
- Multiplies and divides three or more digit numbers by two digits
- Calculates division problems with zeroes in quotient
- Identifies prime and composite numbers using a strategy (factor trees, divisibility rules) up to 50
- Computes multiplication and division using money
- Uses order of operation using operations and parentheses
- Adds, subtracts, multiplies decimals to thousandths with regrouping
- Uses mental math strategies
- Memorizes multiplication and division facts up to 12
- Estimates products and quotients
- Uses inverse operations to check solutions
- Uses and identifies multiples and factors
- Determines if numbers are composite or prime

7.6 Arithmetic, Number and Operations Concepts: Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Fractions represent part of a larger whole.

The value of 1 can be written in many fractional forms.

Understanding that fractions are a single value is necessary when operating with them.

Fractions can be represented as an area, a set, or on a line.

The size of the whole needs to be considered when comparing fractions.

Between any two rational numbers there are an infinite amount of rational numbers.

There are different ways to write equivalent fractions.

Estimation helps check the reasonableness when operating with fractions.

Putting fractions in simplest form makes them easier to understand.

Fractions can be written as a decimal or percent.

Fractions are commonly used in measurement.

Knowledge of fractions and percents is used when solving word problems.

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Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What does form of 1 mean?

How can you find the simplest form of a fraction?

What is the relationship between fractions and division?

What do you need to know to order fractions?

What do you need to know to add and subtract fractions?

How do you find a fractional part of a set or group?

How does knowledge of prime, composite, factors and multiples help when operating with fractions?

How are fractions, decimals and percents connected?

Grade 5 – Fractions and Percents

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M5:1, M5:2, M5:4, M5:8 & Hartford Curriculum Bullets

- Demonstrates understanding and uses form of one concept ($2/2$, $5/5$)
- Demonstrates understanding of fractions as ratios
- Demonstrates understanding of benchmark percents (10%, 25%, 50%, 75%, 100%)
- Explores percent = decimal = fraction based on 100ths
- Recognizes proper, improper and mixed numbers
- Changes mixed numbers to improper
- Changes improper fractions to mixed numbers
- Compares and orders all types of fractions
- Estimates size of fractions (less than half, almost a whole)
- Reduces fractions to simplest form using factoring or greatest common factor
- Renames fractions using manipulatives or using an algorithm
- Renames benchmark decimals as fractions and percents
- Adds and subtracts with common denominators
- Multiplies fractions
- Finds common denominators by finding lowest common multiples or factoring
- Adds and subtracts proper fractions with unlike denominators
- Finds fractional parts of a group (ex. $\frac{1}{2}$ of 12)
- Applies fractions in problem solving and measurement
- Figures 10%, 25%, 50%, 75%, 100% of whole numbers up to 100
- Finds common denominators by finding lowest common multiples or prime factoring

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Grade 5 – Geometry

7.9 Geometric and Measurement Concepts Students use geometric and measurement concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Shapes have sides that are parallel, perpendicular, or neither.

Shapes can be similar, congruent, or neither.

Coordinate systems can be used to describe locations.

There is a relationship between two and three dimensional figures.

Triangles and quadrilaterals can be identified using properties of angles and sides.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What makes shapes alike and different?

What is a line of symmetry?

How do you use coordinates to describe positions on a grid?

How can you use parallelism or perpendicularity to classify quadrilaterals and triangles?

What is the proportional effect on the length and width of polygons when scaling up or down while preserving the angles?

If you know if two figures are congruent do you know if their corresponding parts are congruent?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M5:9, M5:11, M5:12, M5:13 & Hartford Curriculum Bullets

- Uses attributes of angles or sides to distinguish among different types of triangles (right, acute and obtuse).
- Uses attributes of angles or sides to distinguish among different types of quadrilaterals (rectangles, squares, rhomboid, trapezoids, or parallelograms).
- Recognizes perpendicular, parallel and intersecting lines
- Uses tools to construct angles and polygons
- Uses tools to construct triangles (right, acute, obtuse) and quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).
- Uses symmetry to identify and classify figures
- Identifies solid shapes by shape of bases, number of lateral faces, or number of bases.
- Uses attributes to compare or describe three dimensional shapes (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones)

Demonstrates understanding of congruency using

- Flips, slides or turns
- Shape of polygons
- Size of polygons

Demonstrates understanding of similarity by

- Exploring the proportional effect on the linear dimensions of polygons when scaling up or down while preserving the angles of polygons
- Solving related problems (including applying scales on maps)
- Drawing similar (but not congruent) polygons.
- Finding the length of the sides of similar figures and compares as a ratio.

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Grade 5 – Measurement

7.10 Geometric and Measurement Concepts Students use geometric and measurement concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Area is the measurement of the space inside a region (square units).

Perimeter is the distance around a figure.

Volume is the amount of space an object takes up (cubic units).

A figure can have no lines of symmetry, one line of symmetry, or more than one line of symmetry.

Understanding of elapsed time is an essential life skill.

Sometimes when you compute with measures you operate with different units (conversion).

Cartesian Coordinate systems can be used to describe locations on a 4 quadrant grid.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What are situations where you would need to find the area, perimeter, or volume?

What do you need to know to find elapsed time?

In measurement do units need to be the same when operating with them?

What are common conversions in measurement?

How do you use coordinates to describe positions on a grid?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M5:9, M5:11, M5:12, M5:13, M5:16, M5:17 & Hartford Curriculum Bullets

- Demonstrates understanding of perimeter of polygons
- Demonstrates understanding of area of rectangles or right triangles (through models or formulas), the area of polygons or irregular figures (on grids)
- Demonstrates understanding of the volume of rectangular prisms (cubes)
- Expresses all measures using appropriate units
- Measures length in inches (to 1/8 in.); feet; centimeters (to 0.5 cm.); yards; miles (use in scale questions; kilometers (use in scale questions)
- Knows 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard; 10 millimeters in 1 centimeter
- Tells time to 1 minute
- Knows 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour
- Measures temperature in C° and F°
- Measures capacity using quarts (to 1 oz.) gallons, pints
- Knows 32 ounces in 1 quart; 4 quarts in 1 gallon; 2 pints in 1 quart
- Measures mass using kilograms; and grams (to whole gram)
- Measures weight using pounds (to 1 oz.)
- Knows 16 ounces in 1 pound
- Measures angles and rotation in degrees (to 2 degrees)

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7.9 Functions and Algebra Concepts Students use function and algebra concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Logical patterns exist and are a regular occurrence in mathematics.
Variables are symbols that take the place of numbers or ranges of numbers.
The equal sign is used to express the relationship between two quantities.
A function is a rule that explains a pattern in a range of data.
A linear relationship describes a constant rate of change.
You can use parentheses and brackets to group calculations to be sure that some calculations are done in a special order.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

How can the relationship in a series of numbers help you find a rule?
What are variables and how do they help you write equations?
How do models, tables, and graphs be used to show patterns and relationships?
How can you find the value of the variable that makes the equation true?
What is a linear relationship?
How do the rules of order of operation effect the process and the answer when solving a problem?

Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M5:19, M5:20,M5:21,M5:22 & Hartford Curriculum Bullets

- Recognizes and creates number patterns
- Finds the missing element in patterns and number sequences
- Identifies the rule that generates the pattern
- Uses rule to complete a table (i.e. In/Out boxes, function tables, T-charts)
- Use models, tables, and graphs to show mathematical relationships
- Expresses a rule with words or algebraic terms
- Demonstrates understanding of change over time (growth –animal or plant)
- Demonstrates understanding of a constant rate of change in problem solving situations
- Uses numbers and equations to represent change
- Uses variables in simple functions and geometric formulas
- Uses order of operations to solve simple equations [i.e. $14-(2 \times 5)$]
- Explore solutions of unknown quantities in simple equations using distributive property
- Determines which value makes an equation a true statement (i.e. $2x + 3 = 11$, $\{x: x = 2, 3, 4, 5\}$).

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Grade 5 - Data Analysis and Probability

7.9 Statistics and Probability Concepts - Students use statistics and probability concepts.

Enduring Understandings (The major concepts intended to last a student's lifetime.)

Data can be used to make inferences and predictions.

Categorical and numerical data are represented differently.

Measures of central tendency can be used to analyze data.

Sample size can effect the nature of a set of data.

The measure of the likelihood of an event can be represented by a number from 0 to 1.

Essential Questions (Questions used to focus student inquiry on the major concepts of the unit.)

What is the best way to organize and display categorical or numerical data?

How can mode, median, mean, and range be used to draw conclusions and make decisions?

How does sample size effect results?

What is the difference between a guess and a prediction?

How does a data set and/or representation influence your prediction?

Why would you test out your hypothesis?

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Indicators (The skills and concepts that support the enduring understandings.)

Vermont Grade Expectations M5:23, M5:24, M5:25, M5:26, M5:27, M5:28, M5:29 & Hartford Curriculum Bullets

- Interprets line plots, tally charts, tables, bar graphs, pictographs, line graphs, circle graphs, frequency charts, histograms, or Venn diagrams
- Analyzes data and predicts results
- Uses measures of central tendency (median, mode, mean) and range to solve problems
- Sorts and organizes data
- Records data using pictures, bar graphs, or line graphs
- Records data using coordinate grid
- Analyzes data to form conclusions or make predictions
- Recognizes line graphs represent change over time
- Recognizes bar graphs and pictographs represent categorical data
- Solves problems involving combinations or simple permutations using a variety of strategies (diagram, organized lists, tables, tree diagram, etc.)
- Develops systematic ways to generate list of all possible outcomes
- Recognize equally likely outcomes
- Determines theoretical probability of an event
- Describes probability of an event as part to whole (two out of five) or in fractional form

In response to a question

- Designs survey for the purpose of collecting data
- Collects data
- Organizes data
- Displays/represents data
- Makes observations to draw conclusions from data
- Uses experiment to determine probability of an event
- Describes probability of an event as part to whole (two out of five) or in fractional form
- Predict outcomes based on collected data
- Recognizes reliability of results based on sample size
- Recognizes limitation of sample, fairness of data represented
- Compare data in sample to data from larger population (using fractions, decimals, and percent)
- Analyze single data set in multiple ways (graphing)