**Kindergarten Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Number and Number Sense**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Whole Number Concepts and Introduction to Fractions**

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| **K.1** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Match each member of one set with each member of another set, using the concept of one-to-one correspondence to compare the number of members between sets, where each set contains 10 or fewer objects |  |  |  |  |  |  |
| b. Compare and describe two sets of 10 or fewer objects, using the terms *more*, *fewer*, and *the same* |  |  |  |  |  |  |
| c. Given a set of objects, construct a second set which has more, fewer or the same number of objects |  |  |  |  |  |  |

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| **K.2** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Count orally the number of objects in a set containing 15 or fewer concrete objects, using one-to-one correspondence, and identify the corresponding numeral |  |  |  |  |  |  |
| b. Identify written numerals from 0 through 15 represented in random order |  |  |  |  |  |  |
| c. Select the numeral from a given set of numerals that corresponds to a set of 15 or fewer concrete objects |  |  |  |  |  |  |
| d. Write the numerals from 0 through 15 |  |  |  |  |  |  |
| e. Write a numeral that corresponds to a set of 15 or fewer concrete objects |  |  |  |  |  |  |
| f. Construct a set of objects that corresponds to a given numeral, including an empty set |  |  |  |  |  |  |

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| **K.3** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Identify the ordinal positions first through **tenth** using ordered sets of **ten** concrete objects and/or pictures of such sets presented from |  |  |  |  |  |  |
| 1. left-to-right |  |  |  |  |  |  |
| 2. right-to-left |  |  |  |  |  |  |
| 3. top-to-bottom |  |  |  |  |  |  |
| 4. bottom-to-top |  |  |  |  |  |  |

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| **K.4** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Count forward from **0** to **100** |  |  |  |  |  |  |
| b. Count backward from 10 to **0** |  |  |  |  |  |  |
| c. Recognize the relationships of **one more than** and **one less than** a number using objects (i.e., five and one more is six; and one less than ten is nine) |  |  |  |  |  |  |
| d. Group 100 or fewer objects together into sets of fives or tens and then count them by fives or by tens |  |  |  |  |  |  |
| e. Investigate and recognize the pattern of counting by fives to **100**, using a variety of tools |  |  |  |  |  |  |
| 1. Investigate and recognize the pattern of counting by tens to **100**, using a variety of tools |  |  |  |  |  |  |

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| **K.5** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. **Recognize fractions as representing parts of equal size of a whole** |  |  |  |  |  |  |
| b. **Given a region, identify half and/or a fourth of the region** |  |  |  |  |  |  |
| c. **Given a set, identify half and/or a fourth of the set** |  |  |  |  |  |  |

**Kindergarten**

**Computation and estimation**

***Essential Knowledge Skills and Processes- At a Glance***

**Target for Understanding: Whole Number Operations**

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| **K.6** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Combine two sets with known quantities in each set, and count the combined set using up to 10 concrete objects, to determine the sum, where the sum is not greater than 10 |  |  |  |  |  |  |
| 1. Given a set of **10 or fewer concrete objects**, remove, take away, or separate part of the set and determine the result |  |  |  |  |  |  |

**Kindergarten**

**Measurement**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Instruments and Attributes**

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| **K.7** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Describe the properties/characteristics (e.g., color, relative size) of a penny, nickel, dime, and quarter |  |  |  |  |  |  |
| b. Identify a penny, nickel, dime, and quarter |  |  |  |  |  |  |
| c. Identify that a nickel is the same value as five pennies |  |  |  |  |  |  |
| 1. Count a randomly placed collection of pennies and/or nickels (or models of pennies and/or nickels) whose value is 10 cents or less, and determine the value of the collection |  |  |  |  |  |  |

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| **K.8** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Identify a ruler as an instrument to measure length |  |  |  |  |  |  |
| 1. Identify different types of scales as instruments to measure weight |  |  |  |  |  |  |
| 1. Identify different types of clocks (analog and digital) as instruments to measure time |  |  |  |  |  |  |
| 1. Identify the components of a calendar, including days, months, and seasons |  |  |  |  |  |  |
| 1. Identify different types of thermometers as instruments used to measure temperature |  |  |  |  |  |  |

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| **K.9** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Tell time on an analog clock to the hour |  |  |  |  |  |  |
| b. Tell time on a digital clock to the hour |  |  |  |  |  |  |

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**Kindergarden Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **K.10** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Compare and describe lengths of two objects (as shorter or longer), using direct comparison or nonstandard units of measure (e.g., foot length, hand span, new pencil, paper clip, block) |  |  |  |  |  |  |
| b. Compare and describe heights of two objects (as taller or shorter), using direct comparison or nonstandard units of measure (e.g., book, hand span, new pencil, paper clip, block) |  |  |  |  |  |  |
| c. Compare and describe weights of two objects (as heavier or lighter), using direct comparison or nonstandard units of measure (e.g., book, cubes, new pencil, paper clip, block) |  |  |  |  |  |  |
| d. Compare and describe temperatures of two objects or environment (as hotter or colder), using direct comparison |  |  |  |  |  |  |

**Kindergarten**

**geometry**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Identify Plane Shapes**

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| **K.11** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Identify a circle, triangle, square, and rectangle |  |  |  |  |  |  |
| b. Describe the characteristics of triangles, squares, and rectangles, including number of sides and number of angles |  |  |  |  |  |  |
| c. Describe a circle using terms such as round and curved |  |  |  |  |  |  |
| d. Trace a circle, triangle, square, and rectangle |  |  |  |  |  |  |
| 1. **Compare and group plane geometric figures (circle, triangle, square, and rectangle) according to their relative sizes (larger, smaller)** |  |  |  |  |  |  |
| 1. **Compare and group plane geometric figures (circle, triangle, square, and rectangle) according to their shapes** |  |  |  |  |  |  |
| 1. **Distinguish between examples and nonexamples of identified geometric figures (circle, triangle, square, and rectangle)** |  |  |  |  |  |  |

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| **K.12** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify pictorial representations of a circle, triangle, square, and rectangle, regardless of their position and orientation in space |  |  |  |  |  |  |
| 1. Describe the location of one object relative to another, using the terms *above*, *below*, and *next to* |  |  |  |  |  |  |

**Kindergarten**

**probability and statistics**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Data Collection and Display**

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| **K.13** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Use counting and tallying to gather data on categories identified by the teacher and/or student (e.g., favorites, number of days of various types of weather during a given month, types of pets, types of shoes) |  |  |  |  |  |  |

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| **K.14** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Display data by arranging concrete objects into organized groups to form a simple object graph |  |  |  |  |  |  |
| 1. **Display gathered data**, using pictures to form a simple picture graph (e.g., a picture graph of the types of shoes worn by students on a given day) |  |  |  |  |  |  |
| 1. Display gathered data in tables, either in rows or columns |  |  |  |  |  |  |
| 1. **Answer questions related to the gathered data** displayed in object graphs, picture graphs, and tables by: |  |  |  |  |  |  |
| 1. Describing the categories of data and the data as a whole (e.g., the total number of responses) and its parts |  |  |  |  |  |  |
| 1. Identifying parts of the data that represent numerical relationships, including categories with the greatest, the least, or the same |  |  |  |  |  |  |

**Kindergarten**

**patterns, functions, and algebra**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Attributes and Patterning**

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| **K.15** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Sort objects into appropriate groups (categories) based on one attribute |  |  |  |  |  |  |
| 1. Classify sets of objects into groups (categories) of one attribute |  |  |  |  |  |  |
| 1. Label attributes of a set of objects that has been sorted |  |  |  |  |  |  |
| 1. Name multiple ways to sort a set of objects |  |  |  |  |  |  |

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| **K.16** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Observe and identify the basic repeating pattern (core) found in repeating patterns of common objects, sounds, and movements that occur in practical situations |  |  |  |  |  |  |
| 1. Identify the core in a repeating pattern |  |  |  |  |  |  |
| 1. Extend a repeating pattern by adding at least two repetitions to the pattern |  |  |  |  |  |  |
| 1. Create a repeating pattern |  |  |  |  |  |  |
| 1. Compare similarities and differences between patterns |  |  |  |  |  |  |

**Grade 1 Target for Understanding**

**Number and Number Sense**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Place Value and Fraction Concepts**

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| **1.1** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Count by rote from **0** to 100, using the correct name for each numeral |  |  |  |  |  |  |
| 1. Use the correct oral counting sequence to tell how many objects are in a set |  |  |  |  |  |  |
| 1. Write numerals correctly |  |  |  |  |  |  |
| 1. Write each numeral from **0** to 100 |  |  |  |  |  |  |
| 1. Read two-digit numbers when shown a numeral, a Base-10 model of the number, or a pictorial representation of the number |  |  |  |  |  |  |
| 1. Identify the place value (ones, tens) of each digit in a two-digit numeral (e.g., The place value of the 2 in the number 23 is tens. The value of the 2 in the number 23 is 20) |  |  |  |  |  |  |
| 1. **Group a collection of objects into sets of tens and ones. Write the numeral that corresponds to the total number of objects in a given collection of objects that have been grouped into sets of tens and ones** |  |  |  |  |  |  |

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| **1.2** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Count by ones, **twos**, fives, and tens to 100, using concrete objects, such as counters, connecting cubes, pennies, nickels, and dimes |  |  |  |  |  |  |
| 1. Demonstrate a one-to-one correspondence when counting by ones with concrete objects or representations |  |  |  |  |  |  |
| 1. Skip count orally by **twos**, fives and tens to 100 starting at various multiples of **2**, 5, or 10 |  |  |  |  |  |  |
| d. Count backward by ones from **30** |  |  |  |  |  |  |

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**Grade 1 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **1.3** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Represent a whole to show it having **two equal parts** and identify one half (, and two halves ( ) |  |  |  |  |  |  |
| 1. Represent a whole to show it having **three equal parts** and identify one third ( ), two thirds ( ) and three thirds ( ) |  |  |  |  |  |  |
| 1. Represent a whole to show it having **four equal parts** and identify one fourth ( ), two fourths ( ), three fourths ( ) and four fourths ( ) |  |  |  |  |  |  |
| 1. **Identify and model halves, thirds, and fourths** of a whole, using the set model (e.g., connecting cubes and counters), and region/area models (e.g., pie pieces, pattern blocks, geoboards, paper folding, and drawings) |  |  |  |  |  |  |
| 1. Name and write fractions represented by drawings or concrete materials for **halves, thirds, and fourths** |  |  |  |  |  |  |
| 1. Represent a given fraction using concrete materials, pictures, and symbols for **halves, thirds, and fourths**. For example, write the **symbol for one-fourth**, and represent it with concrete materials and pictures |  |  |  |  |  |  |

**Grade 1**

**Computation and estimation**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Whole Number Operations**

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| **1.4** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Select a reasonable order of magnitude for a given set from three given quantities: a one-digit numeral, a two-digit numeral, and a three-digit numeral (e.g., 5, 50, and 500 jelly beans in jars) in a familiar problem situation |  |  |  |  |  |  |
| 1. Given a familiar problem situation involving magnitude, explain why a particular estimate was chosen as the most reasonable from three given quantities: a one-digit numeral, a two-digit numeral, and a three-digit numeral |  |  |  |  |  |  |

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| **1.5** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify + as a symbol for addition, as a symbol for subtraction, and = as a symbol for equality |  |  |  |  |  |  |
| 1. Recall and state orally the basic addition facts for sums with two addends to **18** or less and the corresponding subtraction facts |  |  |  |  |  |  |
| 1. Recall and write the basic addition facts for sums to **18** or less and the corresponding subtraction facts, when addition or subtraction problems are presented in either horizontal or vertical written format |  |  |  |  |  |  |

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| **1.6** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Interpret and solve oral or written story and picture problems involving one-step solutions, using basic addition and subtraction facts (**sums to 18** or less **and the corresponding subtraction facts**) |  |  |  |  |  |  |
| 1. Identify a correct number sentence to solve an oral or written story and picture problem, selecting from among basic addition and subtraction facts |  |  |  |  |  |  |

**Grade 1**

**Measurement**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Time and Measurement**

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| **1.7** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Identify the value of a nickel, a dime, and a quarter in terms of pennies |  |  |  |  |  |  |
| b. Recognize the characteristics of pennies, nickels, and dimes (e.g., color, size) |  |  |  |  |  |  |
| c. Count by ones to determine the value of a collection of pennies whose total value is 100 cents or less |  |  |  |  |  |  |
| d. Count by fives to determine the value of a collection of nickels whose total value is 100 cents or less |  |  |  |  |  |  |
| 1. e. Count by tens to determine the value of a collection of dimes whose total value is 100 cents or less |  |  |  |  |  |  |
| 1. Count by ones, fives, and tens to determine the value of a collection of pennies and nickels, pennies and dimes, and nickels and dimes whose total value is 100 cents or less |  |  |  |  |  |  |
| 1. Count by ones, fives, and tens to determine the value of a collection of pennies, nickels, and dimes whose total value is 100 cents or less |  |  |  |  |  |  |

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| **1.8** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Tell time shown on an analog clock to the half-hour |  |  |  |  |  |  |
| 1. Tell time shown on a digital clock to the half-hour |  |  |  |  |  |  |
| 1. **Match a written time to the time shown on a digital and analog clock to the half-hour** |  |  |  |  |  |  |

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| **1.9** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Measure the length of objects, using various nonstandard units (e.g., connecting cubes, paper clips, erasers) |  |  |  |  |  |  |
| b. **Measure the weight/mass of objects, using a balance scale with various nonstandard units (e.g., paper clips, bean bags, cubes)** |  |  |  |  |  |  |
| c. **Measure the volume of objects, using various nonstandard units (e.g., connecting cubes, blocks, rice, water)** |  |  |  |  |  |  |

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**Grade 1 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **1.10** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Compare the volumes of two containers to determine if the volume of one is more, less, or equivalent to the other, using nonstandard units of measure (e.g., a spoonful or scoopful) |  |  |  |  |  |  |
| 1. Compare the volumes of two containers to determine if the volume of one is more, less, or equivalent to the other by pouring the contents of one container into the other |  |  |  |  |  |  |
| 1. **Compare the weight/mass of two objects, using the terms *lighter, heavier,* or *the same*, using a balance scale. The pan containing less weight/mass will rise and the pan containing more weight/mass will fall. If the objects are of equivalent weight/mass, the two pans will balance** |  |  |  |  |  |  |

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| **1.11** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Read a calendar to locate a given day or date** |  |  |  |  |  |  |
| 1. **Identify the months of the year** |  |  |  |  |  |  |
| 1. **Identify the seven days in a week** |  |  |  |  |  |  |
| 1. **Determine the days/dates before and after a given day/date (e.g., yesterday, today, tomorrow)** |  |  |  |  |  |  |
| 1. **Determine the date that is a specific number of days or weeks in the past or in the future from a given** **date, using a calendar** |  |  |  |  |  |  |
| 1. **Identify specific dates (e.g., the third Monday in a given month)** |  |  |  |  |  |  |

**Grade 1**

**geometry**

***Essential Knowledge Skills and Processes At a Glance***

**Target for Understanding: Geometric Property Development**

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| **1.12** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Describe a circle |  |  |  |  |  |  |
| 1. Trace triangles, squares, rectangles, and circles |  |  |  |  |  |  |
| 1. Describe triangles, squares, and rectangles by the number of sides, vertices, and right angles |  |  |  |  |  |  |
| 1. Sort plane geometric figures into appropriate subsets (categories) based on characteristics (number of sides, vertices, angles, curved, etc.) |  |  |  |  |  |  |
| 1. Identify the name of the geometric figure when given information about the number of sides, vertices, and right angles |  |  |  |  |  |  |

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| **1.13** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Construct plane geometric figures** |  |  |  |  |  |  |
| 1. **Identify models of representations of circles, squares, rectangles, and triangles in the environment at school and home and tell why they represent those figures** |  |  |  |  |  |  |
| 1. **Describe representations of circles, squares, rectangles, and triangles in the environment and explain the reasonableness of the choice** |  |  |  |  |  |  |

**Grade 1**

**probability and statistics**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Data Collection and Interpretation**

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| **1.14** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Investigate various forms of data collection, including counting and tallying, informal surveys, observations, and voting |  |  |  |  |  |  |
| 1. Identify and describe various forms of data collection in practical situations (e.g., recording daily temperature, lunch count, attendance, and favorite ice cream.) |  |  |  |  |  |  |

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| **1.15** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Compare one category to another in a graph, indicating which has more or which has less, or which is equal to |  |  |  |  |  |  |
| 1. Interpret information displayed in object graphs and picture graphs, using the words *more, less, fewer, greater than, less than,* and *equal to* |  |  |  |  |  |  |
| 1. Find answers to questions, using graphs (e.g., “Which category has more?”, “How many more?”, and “How many in all?” |  |  |  |  |  |  |

**Grade 1**

**patterns, functions, and algebra**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Patterning and Equivalence**

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| **1.16** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Sort and classify objects into appropriate subsets (categories) based on one or two attributes, such as size, shape, color, or thickness |  |  |  |  |  |  |

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| **1.17** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Recognize the pattern in a given rhythmic, color, geometric figure, or numerical sequence |  |  |  |  |  |  |
| 1. Describe the pattern in a given rhythmic, color, geometric figure, or numerical sequence in terms of the core (the part of the sequence that repeats) |  |  |  |  |  |  |
| 1. Extend a pattern, using manipulatives, geometric figures, numbers, or calculators |  |  |  |  |  |  |
| 1. Transfer a pattern from one form to another |  |  |  |  |  |  |
| 1. Create a repeating or growing pattern, using manipulatives, geometric figures, numbers, or calculators (e.g., the growing patterns 2, 3, 2, 4, 2, 5, 2, 6, 2, …) |  |  |  |  |  |  |

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| **1.18** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Identify the equality (=) symbol** |  |  |  |  |  |  |
| 1. **Recognize that the equations 4 + 2 = 2 + 4 and 6 + 1 = 4 + 3 represent the relationship between two expressions of equal value** |  |  |  |  |  |  |
| 1. **Model an equation that represents the relationship of two expressions of equal value** |  |  |  |  |  |  |
| 1. **Identify equivalent values (e.g., 3 = 3, 4 + 3 = 8 – 1, 7 = 2 + 5, etc.)** |  |  |  |  |  |  |

**Grade 2**

**Number and Number Sense**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Place Value, Number Patterns, and Fraction Concepts**

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| **2.1** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Demonstrate the understanding of the ten-to-one relationships among ones, tens, and hundreds, using manipulatives (e.g., beans and cups, Base-10 blocks, bundles of 10 sticks) |  |  |  |  |  |  |
| b. Determine the place value of each digit in a three-digit numeral presented as a pictorial representation (e.g., a picture of Base-10 blocks) or as a physical representation (e.g., actual Base-10 blocks) |  |  |  |  |  |  |
| c. Write numerals, using a Base-10 model or picture |  |  |  |  |  |  |
| d. Read three-digit numbers when shown a numeral, a Base-10 model of the number, or a pictorial representation of the number |  |  |  |  |  |  |
| e. Identify the place value (ones, tens, hundreds) of each digit in a three-digit numeral |  |  |  |  |  |  |
| f. Determine the value of each digit in a three-digit numeral (e.g., in 352, the 5 represents 5 tens and its value is 50) |  |  |  |  |  |  |
| g. Round two-digit numbers to the nearest ten |  |  |  |  |  |  |
| h. **Compare two numbers between 0 and 999 represented pictorially or with concrete objects (e.g., Base-10 blocks), using the words *greater than, less than* or *equal to*** |  |  |  |  |  |  |

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| **2.2** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Count an ordered set of objects, using the ordinal number words *first* through *twentieth* |  |  |  |  |  |  |
| b. Identify the ordinal positions first through twentieth, using an ordered set of objects |  |  |  |  |  |  |
| c. Identify the ordinal positions first through twentieth, using an ordered set of objects presented in lines or rows from   1. left to right 2. right to left 3. top to bottom 4. bottom to top |  |  |  |  |  |  |
| d. **Write 1st, 2nd, 3rd, through 20th in numerals** |  |  |  |  |  |  |

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**Grade 2 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **2.3** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Recognize fractions as representing equal-size parts of a whole |  |  |  |  |  |  |
| 1. Identify the fractional parts of a whole or a set for , , , , , , etc. |  |  |  |  |  |  |
| 1. Identify the fraction names (halves, thirds, fourths, sixths, eighths, tenths) for the fraction notations , , , , , , etc. |  |  |  |  |  |  |
| d. **Represent fractional parts of a whole for halves, thirds, fourths, sixths, eighths, tenths** using   1. region/area models (e.g., pie pieces, pattern blocks, geoboards 2. sets (e.g. chips, counters, cubes) 3. measurement models (e.g., fraction strips, rods, connecting cubes) |  |  |  |  |  |  |
| 1. **Compare unit fractions** ( , , , , and ) using the words *greater than, less than* or *equal to* and the symbols ( >, <, =) |  |  |  |  |  |  |

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| **2.4** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine patterns created by counting by twos, fives, and tens on a hundred chart |  |  |  |  |  |  |
| 1. Skip count by twos, fives, and tens to 100, using manipulatives, a hundred chart, mental mathematics, a calculator, and/or paper and pencil |  |  |  |  |  |  |
| c. Skip count by twos, fives, and tens to 100 |  |  |  |  |  |  |
| d. Count backward by tens from 100 |  |  |  |  |  |  |
| e. Use objects to determine whether a number is odd or even |  |  |  |  |  |  |

**Grade 2**

**Computation and estimation**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Number Relationships and Operations**

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| **2.5** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Recall and write the basic addition facts for sums to 20 or less and the corresponding subtraction facts, when addition or subtraction problems are presented in either horizontal or vertical written format |  |  |  |  |  |  |

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| **2.6** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Regroup 10 ones for 1 ten, using Base-10 models, when finding the sum of two whole numbers whose sum is 99 or less |  |  |  |  |  |  |
| 1. Estimate the sum of two whole numbers whose sum is 99 or less and recognize whether the estimation is reasonable |  |  |  |  |  |  |
| 1. Find the sum of two whole numbers whose sum is 99 or less, using Base-10 models, such as Base-10 blocks and bundles of tens |  |  |  |  |  |  |
| 1. Solve problems presented vertically or horizontally that require finding the sum of two whole numbers whose sum is 99 or less, using paper and pencil |  |  |  |  |  |  |
| 1. Solve problems, using mental computation strategies, involving addition of two whole numbers whose sum is 99 or less |  |  |  |  |  |  |

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| **2.7** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Regroup 1 ten for 10 ones, using Base-10 models, such as Base-10 blocks and bundles of tens |  |  |  |  |  |  |
| 1. Estimate the difference of two whole numbers each 99 or less and recognize whether the estimation is reasonable |  |  |  |  |  |  |
| 1. Find the difference of two whole numbers each 99 or less, using Base-10 models, such as Base-10 blocks and bundles of tens |  |  |  |  |  |  |
| 1. Solve problems presented vertically or horizontally that require finding the difference between two whole numbers each 99 or less, using paper and pencil |  |  |  |  |  |  |
| 1. Solve problems, using mental computation strategies, involving subtraction of two whole numbers each 99 or less |  |  |  |  |  |  |

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**Grade 2 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **2.8** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify the appropriate data and the operation needed to solve an addition or subtraction problem where the data are presented in a simple table, picture graph, or bar graph |  |  |  |  |  |  |
| 1. Solve addition and subtraction problems requiring a one- or **two-step** solution, using data from simple tables, picture graphs, bar graphs, and everyday life situations |  |  |  |  |  |  |
| 1. Create a one- or **two-step** addition or subtraction problem using data from simple tables, picture graphs, and bar graphs whose sum is 99 or less |  |  |  |  |  |  |

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| **2.9** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine the missing number in a number sentence (e.g., 3 + \_\_ = 5 or \_\_+ 2 = 5; 5 – \_\_ = 3 or 5 – 2 = \_\_) |  |  |  |  |  |  |
| 1. Write the related facts for a given addition or subtraction fact (e.g., given 3 + 4 = 7, write 7 – 4 = 3 and 7 – 3 = 4) |  |  |  |  |  |  |

**Grade 2**

**Measurement**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Time and Measurement**

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| **2.10** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine the value of a collection of coins and one-dollar bills whose total value is $2.00 or less |  |  |  |  |  |  |
| 1. Compare the values of two sets of coins and one-dollar bills (each set having a total value of $2.00 or less), using the terms *greater than, less than*, or *equal to* |  |  |  |  |  |  |
| 1. **Simulate everyday opportunities** to count and compare a collection of coins and one-dollar bills whose total value is $2.00 or less |  |  |  |  |  |  |
| 1. Use the cent (¢) and dollar ($) symbols and decimal point (.) to write a value of money which is $2.00 or less |  |  |  |  |  |  |

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| **2.11** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Estimate and **measure** the length of various line segments and objects to the nearest inch and centimeter |  |  |  |  |  |  |
| 1. **Estimate and then measure the weight/mass of objects to the nearest pounds/ounces and kilograms/grams, using a scale** |  |  |  |  |  |  |
| 1. **Estimate and measure liquid volume in cups, pints, quarts, gallons, and liters** |  |  |  |  |  |  |

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| **2.12** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Show, tell, and write time to the **nearest five minutes**, using an analog and digital clock |  |  |  |  |  |  |
| 1. Match a written time to a time shown on a clock face to the **nearest five minutes** |  |  |  |  |  |  |

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**Grade 2 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **2.13** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine the days/dates before and after a given day/date |  |  |  |  |  |  |
| 1. Determine the day that is a specific number of days or weeks in the past or in the future from a given date, using a calendar |  |  |  |  |  |  |
| 1. Identify specific **days** and dates (e.g., the third Monday in a given month or what day of the week does May 11 fall on) |  |  |  |  |  |  |
| 1. Compare and describe temperatures of two objects or environment (as hotter or colder), using direct comparison |  |  |  |  |  |  |

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| **2.14** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Read temperature to the nearest 10 degrees from real Celsius and Fahrenheit thermometers and from physical models (including pictorial representations) of such thermometers |  |  |  |  |  |  |

**Grade 2**

**geometry**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Symmetry and Plane and Solid Figures**

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| **2.15** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify figures with at least one line of symmetry, using various concrete materials |  |  |  |  |  |  |
| 1. **Draw a line of symmetry — horizontal, vertical, and diagonal — in a figure** |  |  |  |  |  |  |
| 1. Create figures **with at least one line of symmetry** using various concrete materials |  |  |  |  |  |  |
| 1. Trace a circle, triangle, square, and rectangle |  |  |  |  |  |  |

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| **2.16** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine similarities and differences between related plane and solid figures (e.g., circle/sphere, square/cube, rectangle/rectangular **prism**), using models and cutouts |  |  |  |  |  |  |
| 1. Trace faces of solid figures (e.g., cube and rectangular solid) to create the set of plane figures related to the solid figure |  |  |  |  |  |  |
| 1. **Identify and describe** plane and solid figures (e.g., circle/sphere, square/cube, and rectangle/rectangular **prism**), according to the number and shape of their faces, edges, and vertices using models |  |  |  |  |  |  |
| 1. Compare and contrast plane and solid geometric figures (e.g., circle/sphere, square/cube, and rectangle/rectangular **prism**) according to the number and shape of their faces (sides, bases), edges, vertices, and angles |  |  |  |  |  |  |

**Grade 2**

**probability and statistics**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Applications of Data**

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| **2.17** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Organize data from experiments, using lists, tables, objects, pictures, symbols, tally marks, and charts, in order to construct a graph |  |  |  |  |  |  |
| 1. Read the information presented horizontally and vertically on picture graphs, pictographs, and bar graphs |  |  |  |  |  |  |
| 1. Collect no more than 16 pieces of data to answer a given question |  |  |  |  |  |  |
| 1. Represent data from experiments by constructing picture graphs, pictographs, and bar graphs |  |  |  |  |  |  |
| 1. Label the axes on a bar graph, limiting the number of categories (categorical data) to four and the increments to multiples of whole numbers (e.g., multiples of 1, 2, or 5) |  |  |  |  |  |  |
| 1. On a pictograph, limit the number of categories to four and include a key where appropriate |  |  |  |  |  |  |

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| **2.18** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Conduct probability experiments, using multicolored spinners, colored tiles, or number cubes and use the data from the experiments to predict outcomes if the experiment is repeated |  |  |  |  |  |  |
| 1. Record the results of probability experiments, using tables, charts, and tally marks |  |  |  |  |  |  |
| 1. Interpret the results of probability experiments (e.g., the two-colored spinner landed on red 5 out of 10 times) |  |  |  |  |  |  |
| 1. Predict which of two events is more likely to occur if an experiment is repeated |  |  |  |  |  |  |

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**Grade 2 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **2.19** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Analyze information from simple picture graphs, pictographs, and bar graphs by writing at least one statement that covers one or both of the following: |  |  |  |  |  |  |
| 1. Describe the categories of data and the data as a whole (e.g., the total number of responses) |  |  |  |  |  |  |
| 2. Identify parts of the data that have special characteristics, including categories with the greatest, the least, or the same |  |  |  |  |  |  |
| b. Select the best analysis of a graph from a set of possible analyses of the graph |  |  |  |  |  |  |

**Grade 2**

**patterns, functions, and algebra**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Patterning and Numerical Sentences**

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| **2.20** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify a growing and/or repeating pattern from a given geometric or numeric sequence |  |  |  |  |  |  |
| 1. Predict the next number, geometric figure, symbol, picture, or object in a given pattern |  |  |  |  |  |  |
| 1. Extend a given pattern, using numbers, geometric figures, symbols, pictures, or objects |  |  |  |  |  |  |
| 1. Create a new pattern, using numbers, geometric figures, pictures, symbols, or objects |  |  |  |  |  |  |
| 1. Recognize the same pattern in different manifestations |  |  |  |  |  |  |

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| **2.21** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Solve problems by completing a numerical sentence involving the basic facts for addition and subtraction (e.g., 3 + \_\_ = 7, or 9 – \_\_ = 2) |  |  |  |  |  |  |
| b. Create a story problem for a given numerical sentence |  |  |  |  |  |  |

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| **2.22** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Identify the equality (=) and inequality (≠) symbols** |  |  |  |  |  |  |
| 1. **Identify equivalent values and equations (e.g., 8 = 8 and 8 = 4 + 4)** |  |  |  |  |  |  |
| 1. **Identify nonequivalent values and equations (e.g., 8 ≠ 9 and 4 + 3 ≠ 8)** |  |  |  |  |  |  |
| 1. **Identify and use the appropriate symbol to distinguish between equal and not equal quantities. (e.g., 8 + 2 = 7 + 3 and 1 + 4 ≠ 6 + 2)** |  |  |  |  |  |  |

**Grade 3 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Number and Number Sense**

***Essential Knowledge Skills and Processes – A Record of Understanding***

**Target for Understanding: Place Value and Fractions**

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| **3.1** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Investigate/identify place & value for each digit in a six-digit numeral, using Base-10 manipulatives (e.g., Base-10 blocks) |  |  |  |  |  |  |
| b. Use the patterns in the place value system to read and write numbers |  |  |  |  |  |  |
| c. Read six-digit numerals orally |  |  |  |  |  |  |
| d. Write six-digit numerals that are stated verbally or written in words |  |  |  |  |  |  |
| e. **Round a given whole number, 9,999 or less, to the nearest ten, hundred, and thousand** |  |  |  |  |  |  |
| f. **Solve problems, using rounding of numbers, 9,999 or less, to the nearest ten, hundred, and thousand** |  |  |  |  |  |  |
| g. **Determine which of two whole numbers between 0 and 9,999 is greater** |  |  |  |  |  |  |
| h. **Determine which of two whole numbers between 0 and 9,999 is less** |  |  |  |  |  |  |
| i. **Compare two whole numbers between 0 and 9,999, using the symbols >, <, or =** |  |  |  |  |  |  |
| j. **Use the terms *greater than, less than*, and *equal to* when comparing two whole numbers** |  |  |  |  |  |  |

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| **3.2** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Use the inverse relationships between addition/subtraction and multiplication/division to solve related basic fact sentences. For example, 5 + 3 = 8 & 8 – 3 = \_\_; 4 x 3 = 12 &12 ÷ 4 = \_\_ |  |  |  |  |  |  |
| b. Write three related basic fact sentences when given one basic fact sentence for addition/subtraction and for multiplication/division. For example, given 3 x 2 = 6, solve the related facts \_\_ x 3 = 6, 6 ÷ 3 = \_\_, and 6 ÷ \_\_ = 3 |  |  |  |  |  |  |

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| **3.3** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. **Name and write fractions (including mixed numbers) represented by a model to include halves, thirds, fourths, eighths, tenths, and twelfths** |  |  |  |  |  |  |
| b. **Use concrete materials and pictures to model at least halves, thirds, fourths, eighths, tenths, and twelfths** |  |  |  |  |  |  |
| c. **Compare fractions using the terms greater than, less than, or equal to & the symbols ( <, >, and =). Comparisons are made between fractions with both like & unlike denominators, using models, concrete materials & pictures** |  |  |  |  |  |  |

**Grade 3 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Computation and estimation**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Computation and Fraction Operations**

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| **3.4** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Determine whether an estimate or an exact answer is an appropriate solution for practical addition and subtraction problem situations involving single-step and **multistep** problems |  |  |  |  |  |  |
| b. Determine whether to add or subtract in practical problem situations |  |  |  |  |  |  |
| c. Estimate the sum or difference of two whole numbers, each 9,999 or less when an exact answer is not required |  |  |  |  |  |  |
| d. Add or subtract two whole numbers, each 9,999 or less |  |  |  |  |  |  |
| e. Solve practical problems involving the sum of two whole numbers, each 9,999 or less, with or without regrouping, using calculators, paper and pencil, or mental computation in practical problem situations |  |  |  |  |  |  |
| f. Solve practical problems involving the difference of two whole numbers, each 9,999 or less, with or without regrouping, using calculators, paper and pencil, or mental computation in practical problem situations |  |  |  |  |  |  |
| g. Solve single-step and **multistep** problems involving the sum or difference of two whole numbers, each 9,999 or less, with or without regrouping |  |  |  |  |  |  |

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| **3.5** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Recall and state the multiplication and **division** facts through the **twelves** table |  |  |  |  |  |  |
| b. Recall and write the multiplication and **division** facts through the **twelves** table |  |  |  |  |  |  |

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| **3.6** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Model multiplication, using area, set, and **number line models** |  |  |  |  |  |  |
| b. Model division, using area, set, and **number line models** |  |  |  |  |  |  |
| c. Solve multiplication problems, using the multiplication algorithm, where one factor is 99 or less and the second factor is 5 or less |  |  |  |  |  |  |
| d. Create and solve word problems involving multiplication, where one factor is 99 or less and the second factor is 5 or less |  |  |  |  |  |  |

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**Grade 3 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **3.7** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Demonstrate a fractional part of a whole, using |  |  |  |  |  |  |
| 1. region/area models (e.g., pie pieces, pattern blocks, geoboards, drawings) |  |  |  |  |  |  |
| 2. set models (e.g., chips, counters, cubes, drawings) |  |  |  |  |  |  |
| 3. length/measurement models (e.g., nonstandard units such as rods, connecting cubes, and drawings) |  |  |  |  |  |  |
| b. Name and write fractions and mixed numbers represented by drawings or concrete materials |  |  |  |  |  |  |
| c. Represent a given fraction or mixed number, using concrete materials, pictures, and symbols. For example, write the symbol for one-fourth and represent it with concrete materials and/or pictures |  |  |  |  |  |  |
| d. Add and subtract with proper fractions having like denominators of **12** or less, using concrete materials and pictorial models representing area/regions (circles, squares, and rectangles), length/measurements (fraction bars and strips), and sets (counters) |  |  |  |  |  |  |

**Grade 3 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Measurement**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: U.S. Customary and Metric Units, Area and Perimeter, Time**

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| **3.8** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Count the value of collections of coins and bills up to $5.00 |  |  |  |  |  |  |
| b. Compare the values of two sets of coins or bills, up to $5.00, using the terms *greater than, less than*, and *equal to* |  |  |  |  |  |  |
| c. Make change from $5.00 or less |  |  |  |  |  |  |

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| **3.9** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Estimate and use U.S. Customary and metric units to measure lengths of objects to the nearest **of an inch**, inch, foot, yard, centimeter, and meter |  |  |  |  |  |  |
| b. Determine the actual measure of length using U.S. Customary and metric units to measure objects to the nearest of an inch, foot, yard, centimeter, and meter |  |  |  |  |  |  |
| c. Estimate and use U.S. Customary and metric units to measure liquid volume to the nearest cup, pint, quart, gallon, and liter |  |  |  |  |  |  |
| d. Determine the actual measure of liquid volume using U.S. Customary and metric units to measure to the nearest cup, pint, quart, gallon, and liter |  |  |  |  |  |  |
| e. Estimate and use U.S. Customary and metric units to measure the weight/mass of objects to the nearest ounce, pound, gram, and kilogram |  |  |  |  |  |  |
| f. Determine the actual measure of weight/mass using U.S. Customary and metric units to measure the weight/mass of objects to the nearest ounce, pound, gram, and kilogram |  |  |  |  |  |  |
| g. Estimate and use U.S. Customary and metric units to measure area and perimeter |  |  |  |  |  |  |
| h. **Determine the actual measure of area or perimeter using U.S. Customary and metric units** |  |  |  |  |  |  |

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| **3.10** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. **Measure each side of a variety of polygons and add the measures of the sides to determine the perimeter of each polygon** |  |  |  |  |  |  |
| b. **Determine the area of a given surface by estimating and then counting the number of square units needed to cover the surface** |  |  |  |  |  |  |

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**Grade 3 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **3.11** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Tell time to the nearest minute, using analog and digital clocks |  |  |  |  |  |  |
| b. Match the times shown on analog and digital clocks to written times and to each other |  |  |  |  |  |  |
| c. **When given the beginning time and ending time, determine the elapsed time in one-hour increments within a 12-hour period (times do not cross between a.m. and p.m.)** |  |  |  |  |  |  |
| d. **Solve practical problems in relation to time that has elapsed** |  |  |  |  |  |  |

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| **3.12** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Identify equivalent relationships observed in a calendar, including the number of days in a given month, the number of days in a week, the number of days in a year, and the number of months in a year |  |  |  |  |  |  |
| b. Identify the number of minutes in an hour and the number of hours in a day |  |  |  |  |  |  |

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| **3.13** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Read temperature to the nearest degree from real Celsius and Fahrenheit thermometers and from physical models (including pictorial representations) of such thermometers |  |  |  |  |  |  |

**Grade 3 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**geometry**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Properties and Congruence**

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| **3.14** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Identify models and pictures of plane geometric figures (circle, square, rectangle, and triangle) and solid geometric figures (cube, rectangular prism, square pyramid, sphere, cone, and cylinder) by name |  |  |  |  |  |  |
| b. Identify and describe plane geometric figures by counting the number of sides and angles |  |  |  |  |  |  |
| c. **Identify and describe solid geometric figures by counting the number of angles, vertices, edges, and by the number and shape of faces** |  |  |  |  |  |  |
| d. **Compare and contrast** characteristics of plane and solid geometric figures (e.g., circle/sphere, square/cube, triangle/square pyramid, and rectangle/rectangular prism), by counting the number of sides, angles, vertices, edges, and the number and shape of faces |  |  |  |  |  |  |
| e. **Compare and contrast** characteristics of solid geometric figures (i.e., cube, rectangular prism, square pyramid, sphere, cylinder, and cone) to similar objects in everyday life (e.g., a party hat is like a cone) |  |  |  |  |  |  |
| f. Identify characteristics of solid geometric figures (cylinder, cone, cube, square pyramid, and rectangular prism) |  |  |  |  |  |  |

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| **3.15** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Identify examples of **points**, line segments, **rays**, angles, and **lines** |  |  |  |  |  |  |
| b. Draw representations of **points**, line segments, **rays**, angles, and **lines**, using a ruler or straightedge |  |  |  |  |  |  |

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| **3.16** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Identify examples of congruent and **noncongruent** figures. Verify their congruence by laying one on top of the other **using drawings or models** |  |  |  |  |  |  |
| b. Determine and explain why plane figures are congruent or **noncongruent**, using tracing procedures |  |  |  |  |  |  |

**Grade 3 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**probability and statistics**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Application of Data and Chance**

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| **3.17** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Formulate questions to investigate |  |  |  |  |  |  |
| b. Design data investigations to answer formulated questions, limiting the number of categories for data collection to four |  |  |  |  |  |  |
| c. Collect data, using surveys, polls, questionnaires, scientific experiments, and observations |  |  |  |  |  |  |
| d. Organize data & construct a bar graph on grid paper representing 16 or fewer data points for no more than four categories |  |  |  |  |  |  |
| e. Construct a line plot with no more than 30 data points |  |  |  |  |  |  |
| f. Read, interpret and analyze information from line plots by writing at least one statement |  |  |  |  |  |  |
| g. Label each axis on a bar graph and give the bar graph a title. Limit increments on the numerical axis to whole numbers representing multiples of 1, 2, 5, or 10 |  |  |  |  |  |  |
| h. Read information presented on a simple bar or picture graph (e.g., the title, the categories, the description of the two axes) |  |  |  |  |  |  |
| i. Analyze and interpret information from picture and bar graphs, with up to 30 data points and up to 8 categories, by writing at least one sentence |  |  |  |  |  |  |
| j. Describe the categories of data and the data as a whole (e.g., data were collected on four ways to cook or prepare eggs ⎯ scrambled, fried, hard boiled, and egg salad ⎯ eaten by students) |  |  |  |  |  |  |
| k. Identify parts of the data that have special characteristics, including categories with the greatest, the least, or the same (e.g., most students prefer scrambled eggs) |  |  |  |  |  |  |
| l. Select a correct interpretation of a graph from a set of interpretations of the graph, where one is correct and the remaining are incorrect. For example, a bar graph containing data on four ways to cook or prepare eggs ⎯ eaten by students show that more students prefer scrambled eggs. A correct answer response, if given, would be that more students prefer scrambled eggs than any other way to cook or prepare eggs |  |  |  |  |  |  |

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| **3.18** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Define probability as the chance that an event will happen |  |  |  |  |  |  |
| b. List all possible outcomes for a given situation (e.g., heads and tails are the two possible outcomes of flipping a coin) |  |  |  |  |  |  |
| c. Identify the degree of likelihood of an outcome occurring using terms such as *impossible*, *unlikely*, *as likely as*, *equally likely*, *likely*, and *certain* |  |  |  |  |  |  |

**Grade 3 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**patterns, functions, and algebra**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Patterns and Property Concepts**

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| **3.19** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Recognize repeating and growing numeric and geometric patterns (e.g., skip counting, addition tables, and multiplication tables) |  |  |  |  |  |  |
| b. Describe repeating and growing numeric and geometric patterns formed using numbers, tables, and/or pictures, using the same or different forms |  |  |  |  |  |  |
| c. Extend repeating and growing patterns of numbers or figures using concrete objects, numbers, tables, and/or pictures |  |  |  |  |  |  |

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| **3.20** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| a. Investigate the identity property for addition and determine that when the number zero is added to another number or another number is added to the number zero, that number remains unchanged. Examples of the identity property for addition is 0 + 2 = 2; 5 + 0 = 5 |  |  |  |  |  |  |
| b. Investigate the identity property for multiplication and determine that when the number one is multiplied by another number or another number is multiplied by the number one, that number remains unchanged. Example of the identity property for multiplication is 1 x 3 = 3; 6 x 1 = 6 |  |  |  |  |  |  |
| c. **Recognize that the commutative property for addition is an order property. Changing the order of the addends does not change the sum (5 + 4 = 9 and 4 + 5 = 9)** |  |  |  |  |  |  |
| d. **Recognize that the commutative property for multiplication is an order property. Changing the order of the factors does not change the product (2 × 3 = 3 × 2)** |  |  |  |  |  |  |
| e. **Write number sentences to represent equivalent mathematical relationships (e.g., 4 x 3 = 14 - 2)** |  |  |  |  |  |  |
| f. Identify examples of the identity and **commutative properties** for addition and multiplication |  |  |  |  |  |  |

**Grade 4 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Number and Number Sense**

***Essential Knowledge Skills and Processes – A Record of Understanding***

**Target for Understanding: Place Value, Fractions, and Decimals**

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| **4.1** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify and communicate, both orally and in written form, the placed value for each digit in whole numbers expressed through the one millions place. |  |  |  |  |  |  |
| 1. Read whole numbers through the one millions place that are presented in standard format, and select the matching number in written format. |  |  |  |  |  |  |
| 1. Write whole numbers through the one millions place in standard format when the numbers are presented orally or in written format. |  |  |  |  |  |  |
| 1. Identify and use the symbols for *greater than*, *less than*, and *equal to*. |  |  |  |  |  |  |
| 1. Compare two whole numbers expressed through the one millions, using symbols >, <, or =. |  |  |  |  |  |  |
| 1. Round whole numbers expressed through the one millions place to the nearest thousand, ten thousand, and hundred-thousand place. |  |  |  |  |  |  |
| 1. Identify and communicate, both orally and in written form, the placed value for each digit in whole numbers expressed through the one millions place. |  |  |  |  |  |  |
| 1. Read whole numbers through the one millions place that are presented in standard format, and select the matching number in written format. |  |  |  |  |  |  |
| 1. Write whole numbers through the one millions place in standard format when the numbers are presented orally or in written format. |  |  |  |  |  |  |
| 1. Identify and use the symbols for *greater than*, *less than*, and *equal to*. |  |  |  |  |  |  |

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**Grade 4 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 3***

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| **4.2** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Compare and order fractions having denominators of 12 or less, using manipulative models and drawings, such as region/area models. |  |  |  |  |  |  |
| 1. Compare and **order** fractions with like denominators by comparing number of parts (numerators) (e.g., < ). |  |  |  |  |  |  |
| 1. Compare and **order** fractions with like numerators and unlike denominators by comparing the size of the parts (e.g., < ). |  |  |  |  |  |  |
| 1. Compare and **order** fractions having unlike denominators of 12 or less by comparing the fractions to benchmarks (e.g., 0, or 1) to determine their relationships to the benchmarks or by finding a common denominator. |  |  |  |  |  |  |
| 1. Compare and **order** mixed numbers having denominators of 12 or less. |  |  |  |  |  |  |
| 1. Use the symbols >, <, and = to compare the numerical value of fractions and mixed numbers having denominators of 12 or less. |  |  |  |  |  |  |
| 1. Represent equivalent fractions through twelfths, using region/area models, set models, and measurement models. |  |  |  |  |  |  |
| 1. **Identify the division statement that represents a fraction (e.g., means the same as 3 divided by 5).** |  |  |  |  |  |  |

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**Grade 4 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 3***

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| **4.3** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Investigate the ten-to-one place value relationship for decimals **through thousandths**, using Base-10 manipulatives (e.g., place value mats/charts, decimal squares, Base-10 blocks, money). |  |  |  |  |  |  |
| 1. Represent and identify decimals expressed **through thousandths**, using Base-10 manipulatives, pictorial representations, and numerical symbols (e.g., relate the appropriate drawing to 0.05). |  |  |  |  |  |  |
| 1. Identify and communicate, both orally and in written form, the position and value of a decimal **through thousandths**. For example, in 0.385, the 8 is in the hundredths place and has a value of 0.08. |  |  |  |  |  |  |
| 1. Read and write decimals expressed through thousandths, using Base-10 manipulatives, drawings, and numerical symbols. |  |  |  |  |  |  |
| 1. **Round decimals to the nearest whole number, tenth, and hundredth.** |  |  |  |  |  |  |
| 1. Compare decimals, using the symbols >, <, =. |  |  |  |  |  |  |
| 1. **Order a set of decimals from least to greatest or greatest to least**. |  |  |  |  |  |  |
| 1. Represent fractions for halves, fourths, fifths, and tenths as decimals through hundredths, using concrete objects (e.g., demonstrate the relationship between the fraction and its decimal equivalent 0.25). |  |  |  |  |  |  |
| 1. Relate fractions to decimals, using concrete objects (e.g., 10-by-10 grids, meter sticks, number lines, decimal squares, decimal circles, money [coins]). |  |  |  |  |  |  |
| 1. **Write the decimal and fraction equivalent for a given model (e.g., = 0.25 or 0.25 = ).** |  |  |  |  |  |  |

**Grade 4**

**Computation and estimation**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Whole Number, Fraction, and Decimal Operations, & Estimation**

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| **4.4** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Estimate whole number sums, differences, products, and quotients.** |  |  |  |  |  |  |
| 1. **Refine estimates by adjusting the final amount, using terms such as *closer to, between*, and *a little more than*.** |  |  |  |  |  |  |
| 1. **Determine the sum or difference of two whole numbers, each 999,999 or less, in vertical and horizontal form with or without regrouping, using paper and pencil, and using a calculator.** |  |  |  |  |  |  |
| 1. **Estimate and find the products of two whole numbers when one factor has two digits or fewer and the other factor has three digits or fewer, using paper and pencil and calculators.** |  |  |  |  |  |  |
| 1. **Estimate and find the quotient of two whole numbers, given a one-digit divisor and a two- or three-digit dividend.** |  |  |  |  |  |  |
| 1. **Solve single-step and multistep problems using whole number operations.** |  |  |  |  |  |  |
| 1. **Verify the reasonableness of sums, differences, products, and quotients of whole numbers using estimation.** |  |  |  |  |  |  |

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**Grade 4**

**Computation and estimation**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Whole Number, Fraction, and Decimal Operations, & Estimation**

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| **4.4** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Estimate whole number sums, differences, products, and quotients.** |  |  |  |  |  |  |
| 1. **Refine estimates by adjusting the final amount, using terms such as *closer to, between*, and *a little more than*.** |  |  |  |  |  |  |
| 1. **Determine the sum or difference of two whole numbers, each 999,999 or less, in vertical and horizontal form with or without regrouping, using paper and pencil, and using a calculator.** |  |  |  |  |  |  |
| 1. **Estimate and find the products of two whole numbers when one factor has two digits or fewer and the other factor has three digits or fewer, using paper and pencil and calculators.** |  |  |  |  |  |  |
| 1. **Estimate and find the quotient of two whole numbers, given a one-digit divisor and a two- or three-digit dividend.** |  |  |  |  |  |  |
| 1. **Solve single-step and multistep problems using whole number operations.** |  |  |  |  |  |  |
| 1. **Verify the reasonableness of sums, differences, products, and quotients of whole numbers using estimation.** |  |  |  |  |  |  |

**Grade 4**

**Measurement**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Equivalence between U.S. Customary and Metric Units**

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| **4.6** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine an appropriate unit of measure (e.g., ounce, pound, **ton,** gram, kilogram) to use when measuring everyday objects in both metric and U.S. Customary units. |  |  |  |  |  |  |
| 1. Measure objects in both metric and U.S. Customary units (e.g., ounce, pound, **ton**, gram, or kilogram) to the nearest appropriate measure, using a variety of measuring instruments. |  |  |  |  |  |  |
| 1. Record the mass of an object including the appropriate unit of measure (e.g., 24 grams). |  |  |  |  |  |  |

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| **4.7** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine an appropriate unit of measure (e.g., inch, foot, yard, **mile**, millimeter, centimeter, and meter) to use when measuring everyday objects in both metric and U.S. Customary units. |  |  |  |  |  |  |
| 1. Estimate the length of everyday objects (e.g., books, windows, tables) in both metric and U.S. Customary units of measure. |  |  |  |  |  |  |
| 1. Measure the length of objects in both metric and U.S. Customary units, measuring to the nearest inch (, , ), foot, yard, **mile**, millimeter, centimeter, or meter, and record the length including the appropriate unit of measure (e.g., 24 inches). |  |  |  |  |  |  |
| 1. Compare estimates of the length of objects with the actual measurement of the length of objects. |  |  |  |  |  |  |
| 1. Identify equivalent measures of length between units within the U.S. Customary measurements and between units within the metric measurements. |  |  |  |  |  |  |

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**Grade 4 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **4.8** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine an appropriate unit of measure (cups, pints, quarts, gallons) to use when measuring liquid volume in U.S. Customary units. |  |  |  |  |  |  |
| 1. Estimate the liquid volume of containers in U.S. Customary units of measure to the nearest cup, pint, quart, and gallon. |  |  |  |  |  |  |
| 1. Measure the liquid volume of everyday objects in U.S. Customary units, including cups, pints, quarts, and gallons, and record the volume including the appropriate unit of measure (e.g., 24 gallons). |  |  |  |  |  |  |
| 1. Identify equivalent measures of volume between units within the U.S. Customary system. |  |  |  |  |  |  |

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| **4.9** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Determine the elapsed time in hours and minutes within a 12-hour period (times can cross between a.m. and p.m.).** |  |  |  |  |  |  |
| 1. **Solve practical problems in relation to time that has elapsed.** |  |  |  |  |  |  |

**Grade 4**

**geometry**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Geometric Property Development**

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| **4.10** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Identify and describe representations of points, lines, line segments, rays, and angles, including endpoints and vertices.** |  |  |  |  |  |  |
| 1. **Understand that lines in a plane can intersect or are parallel. Perpendicularity is a special case of intersection.** |  |  |  |  |  |  |
| 1. **Identify practical situations that illustrate parallel, intersecting, and perpendicular lines.** |  |  |  |  |  |  |

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| **4.11** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Recognize the congruence of plane figures resulting from geometric transformations such as translation, reflection, and rotation, using mirrors, paper folding and tracing. |  |  |  |  |  |  |

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| **4.12** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Define and identify properties of polygons with 10 or fewer sides.** |  |  |  |  |  |  |
| 1. **Identify polygons by name with 10 or fewer sides in multiple orientations (rotations, reflections, and translations of the polygons).** |  |  |  |  |  |  |

**Grade 4**

**probability and statistics**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Outcomes**

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| **4.13** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Model and determine all possible outcomes of a given simple event where there are no more than 24 possible outcomes, using a variety of manipulatives, such as coins, number cubes, and spinners. |  |  |  |  |  |  |
| 1. Write the probability of a given simple event as a fraction, where the total number of possible outcomes is 24 or fewer. |  |  |  |  |  |  |
| 1. Identify the likelihood of an event occurring and relate it to its fractional representation (e.g., impossible/0; **equally likely**/; certain/1). |  |  |  |  |  |  |
| 1. Determine the outcome of an event that is least likely to occur (less than half) or most likely to occur (greater than half) when the number of possible outcomes is 24 or less. |  |  |  |  |  |  |
| 1. **Represent probability as a point between 0 and 1, inclusively, on a number line.** |  |  |  |  |  |  |

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**Grade 4 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **4.14** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Collect data, using, for example, observations, measurement, surveys, scientific experiments, polls, or questionnaires. |  |  |  |  |  |  |
| 1. Organize data into a chart or table. |  |  |  |  |  |  |
| 1. Construct and display data in bar graphs, labeling one axis with equal whole number increments of 1 or more (numerical data) (e.g., 2, 5, 10, or 100) and the other axis with categories related to the title of the graph (categorical data) (e.g., swimming, fishing, boating, and water skiing as the categories of “Favorite Summer Sports”). |  |  |  |  |  |  |
| 1. Construct and display data in line graphs, labeling the vertical axis with equal whole number increments of 1 or more and the horizontal axis with continuous data commonly related to time (e.g., hours, days, months, years, and age). Line graphs will have no more than 10 identified points along a continuum for continuous data. For example, growth charts showing age versus height place age on the horizontal axis (e.g., 1 month, 2 months, 3 months, and 4 months). |  |  |  |  |  |  |
| 1. Title or identify the title in a given graph and label or identify the axes. |  |  |  |  |  |  |
| 1. Interpret data from simple line and bar graphs by describing the characteristics of the data and the data as a whole (e.g., the category with the greatest/least, categories with the same number of responses, similarities and differences, the total number). Data points will be limited to 30 and categories to 8. |  |  |  |  |  |  |
| 1. Interpret the data to answer the question posed, and compare the answer to the prediction (e.g., “The summer sport preferred by most is swimming, which is what I predicted before collecting the data.”). |  |  |  |  |  |  |
| 1. Write at least one sentence to describe the analysis and interpretation of the data, identifying parts of the data that have special characteristics, including categories with the greatest, the least, or the same. |  |  |  |  |  |  |

**Grade 4**

**patterns, functions, and algebra**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Geometric Patterns, Equality, Properties**

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| **4.15** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Describe geometric and numerical patterns, using tables, symbols, or words. |  |  |  |  |  |  |
| 1. Create geometric and numerical patterns, using concrete materials, number lines, tables, and words. |  |  |  |  |  |  |
| 1. Extend geometric and numerical patterns, using concrete materials, number lines, tables, and words. |  |  |  |  |  |  |

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| **4.15** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Recognize and demonstrate that the equals sign (=) relates equivalent quantities in an equation. |  |  |  |  |  |  |
| 1. Write an equation to represent equivalent mathematical relationships (e.g., 4 × 3 = 2 × 6). |  |  |  |  |  |  |
| 1. Recognize and demonstrate appropriate use of the equals sign in an equation. |  |  |  |  |  |  |
| 1. **Investigate and describe the associative property for addition as (6 + 2) + 3= 6 + (2 + 3).** |  |  |  |  |  |  |
| 1. **Investigate and describe the associative property for multiplication as (3 x 2) x 4 = 3 x (2 x 4).** |  |  |  |  |  |  |

**Grade 5**

**Number and Number Sense**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Factors and Multiples, Fractions, Decimals**

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| **5.1** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Round decimal numbers to the nearest whole number, tenth, or hundredth.** |  |  |  |  |  |  |

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| **5.2** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Represent fractions (halves, fourths, fifths, eighths, tenths, and twelfths) in their equivalent decimal form and vice versa. |  |  |  |  |  |  |
| 1. Recognize and name equivalent relationships between decimals and fractions with denominators up to 12. |  |  |  |  |  |  |
| 1. **Compare and** order from least to greatest and greatest to least a given set of no more than five numbers written as decimals, fractions, and mixed numbers with denominators of 12 or less. |  |  |  |  |  |  |

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| **5.3** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Identify prime numbers less than or equal to 100.** |  |  |  |  |  |  |
| 1. **Identify composite numbers less than or equal to 100.** |  |  |  |  |  |  |
| 1. **Explain orally and in writing why a number is prime or composite.** |  |  |  |  |  |  |
| 1. **Identify which numbers are even or odd.** |  |  |  |  |  |  |
| 1. **Explain and demonstrate with manipulatives, pictorial representations, oral language, or written language why a number is even or odd.** |  |  |  |  |  |  |

**Grade 5**

**Computation and estimation**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Computation Operations and Estimations**

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| **5.4** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Select appropriate methods and tools from among paper and pencil, estimation, mental computation, and calculators according to the context and nature of the computation in order to compute with whole numbers. |  |  |  |  |  |  |
| 1. Create **single-step and multistep problems** involving the operations of addition, subtraction, multiplication, and division with and without remainders of whole numbers, using practical situations. |  |  |  |  |  |  |
| 1. Estimate the sum, difference, product, and quotient of whole number computations. |  |  |  |  |  |  |
| 1. **Solve single-step and multistep problems** involving addition, subtraction, multiplication, and division with and without remainders of whole numbers, using paper and pencil, mental computation, and calculators in which 2. sums, differences, and products will not exceed five digits; 3. multipliers will not exceed two digits; 4. divisors will not exceed two digits; or 5. dividends will not exceed four digits. |  |  |  |  |  |  |
| 1. **Use two or more operational steps to solve a multistep problem. Operations can be the same or different.** |  |  |  |  |  |  |

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**Grade 5 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 3***

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| **5.5** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine an appropriate method of calculation to find the sum, difference, product, and quotient of two numbers expressed as decimals through thousandths, selecting from among paper and pencil, estimation, mental computation, and calculators. |  |  |  |  |  |  |
| 1. Estimate to find the number that is closest to the sum, difference, and product of two numbers expressed as decimals through thousandths. |  |  |  |  |  |  |
| 1. Find the sum, difference, and product of two numbers expressed as decimals through thousandths, using paper and pencil, estimation, mental computation, and calculators. |  |  |  |  |  |  |
| 1. Determine the quotient, given a dividend expressed as a decimal through thousandths and a single-digit divisor. For example, 5.4 divided by 2 and 2.4 divided by 5. |  |  |  |  |  |  |
| 1. Use estimation to check the reasonableness of a sum, difference, product, and quotient. |  |  |  |  |  |  |
| 1. **Create and solve single-step and multistep problems.** |  |  |  |  |  |  |
| 1. **A multistep problem needs to incorporate two or more operational steps (operations can be the same or different).** |  |  |  |  |  |  |

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| **5.6** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Solve single-step and multistep practical problems involving addition and subtraction with fractions having like and unlike denominators. Denominators in the problems should be limited to 12 or less (e.g., + ) and answers should be expressed in simplest form.** |  |  |  |  |  |  |
| 1. **Solve single-step and multistep practical problems involving addition and subtraction with mixed numbers having like and unlike denominators, with and without regrouping. Denominators in the problems should be limited to 12 or less, and answers should be expressed in simplest form.** |  |  |  |  |  |  |
| 1. Use estimation to check the reasonableness of a sum or difference. |  |  |  |  |  |  |

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**Grade 5 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 3 of 3***

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| **5.7** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Simplify expressions by using the order of operations in a demonstrated step-by-step approach. |  |  |  |  |  |  |
| 1. **Find the value of numerical expressions, using the order of operations.** |  |  |  |  |  |  |
| 1. **Given an expression involving more than one operation, describe which operation is completed first, which is second, etc.** |  |  |  |  |  |  |

**Grade 5**

**Measurement**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Perimeter, Area, Volume, and Equivalent Measures**

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| **5.8** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine the perimeter of a polygon, with or without diagrams, when    1. the lengths of all sides of a polygon that is not a rectangle or a square are given;    2. the length and width of a rectangle are given; or    3. the length of a side of a square is given. |  |  |  |  |  |  |
| 1. Estimate and determine the perimeter of a polygon, and area of a square, rectangle, and right triangle following the parameters listed above, using only whole number measurements given in metric or U.S. Customary units, and record the solution with the appropriate unit of measure (e.g., 24 square inches). |  |  |  |  |  |  |
| 1. Estimate and determine the area of a square, with or without diagrams, when the length of a side is given. |  |  |  |  |  |  |
| 1. Estimate and determine the area of a rectangle, with or without diagrams, when the length and width are given. |  |  |  |  |  |  |
| 1. Estimate and determine the area of a right triangle, with or without diagrams, when the base and height are given. |  |  |  |  |  |  |
| 1. **Differentiate among the concepts of area, perimeter, and volume.** |  |  |  |  |  |  |
| 1. **Estimate and determine the perimeter of a polygon, and area of a square, rectangle, and right triangle following the parameters listed above, using only whole number measurements given in metric or U.S. Customary units, and record the solution with the appropriate unit of measure (e.g., 24 square inches).** |  |  |  |  |  |  |
| * 1. **Develop a procedure for finding volume using manipulatives (e.g., cubes).** |  |  |  |  |  |  |
| 1. **Determine volume in standard units.** |  |  |  |  |  |  |
| 1. **Describe practical situations where area, perimeter, and volume are appropriate measures to use, and justify their choices orally or in writing.** |  |  |  |  |  |  |
| 1. **Identify whether the application of the concept of perimeter, area, or volume is appropriate for a given situation.** |  |  |  |  |  |  |
| 1. **Identify equivalent measurements within the metric system for the following:** 2. **length: millimeters, centimeters, meters, and kilometers;** 3. **mass: grams and kilograms;** 4. **liquid volume: milliliters, and liters.** |  |  |  |  |  |  |
| 1. **Solve problems involving measurement by selecting an appropriate measuring device and a U.S. Customary or metric unit of measure for the following:** 2. **length: part of an inch (, , ), inches, feet, yards, millimeters, centimeters, meters, and kilometers;** 3. **weight: ounces, pounds, and tons;** 4. **mass: grams and kilograms;** 5. **liquid volume: cups, pints, quarts, gallons, milliliters, and liters;** 6. **area: square units; and** 7. **temperature: Celsius and Fahrenheit units.** 8. **Water freezes at 0°C and 32°F.** 9. **Water boils at 100°C and 212°F.** 10. **Normal body temperature is about 37°C and** 11. **98.6°F.** |  |  |  |  |  |  |

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| **5.9** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify and describe the diameter, radius, chord, and circumference of a circle. |  |  |  |  |  |  |
| 1. Describe the relationship between    1. diameter and radius;    2. diameter and chord;    3. radius and circumference; and    4. diameter and circumference. |  |  |  |  |  |  |
| 1. The length of the diameter of a circle is twice the length of the radius. |  |  |  |  |  |  |

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| **5.10** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine elapsed time in hours and minutes within a 24-hour period. |  |  |  |  |  |  |

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**Grade 5 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 3 of 3***

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| **5.11** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify the appropriate tools (e.g., protractor and straightedge or angle ruler as well as available software) used to measure and draw angles and triangles. |  |  |  |  |  |  |
| 1. Measure right, acute, **straight,** and obtuse angles, using appropriate tools, and identify their measures in degrees. |  |  |  |  |  |  |
| 1. Recognize angle measure as additive. When an angle is decomposed into nonoverlapping parts, the angle measure of the whole is the sum of the angle measures of the parts.† |  |  |  |  |  |  |
| 1. Solve addition and subtraction problems to find unknown angle measures on a diagram in practical and mathematical problems, (e.g., by using an equation with a symbol for the unknown angle measure).† |  |  |  |  |  |  |

**Grade 5**

**geometry**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Classification and Subdividing**

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| **5.12** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Classify angles as right, acute, straight, or obtuse. |  |  |  |  |  |  |
| 1. **Classify triangles as right, acute, or obtuse.** |  |  |  |  |  |  |
| 1. **Classify triangles as equilateral, scalene, or isosceles.** |  |  |  |  |  |  |

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| **5.13** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Develop definitions for squares, rectangles, triangles, parallelograms, rhombi, and trapezoids. |  |  |  |  |  |  |
| 1. Investigate and describe the results of combining and subdividing **plane** figures. |  |  |  |  |  |  |

**Grade 5**

**probability and statistics**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Outcomes and Measures of Center**

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| **5.14** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Construct a sample space, using a tree diagram to identify all possible outcomes of a single event. |  |  |  |  |  |  |
| 1. Construct a sample space, using a list or chart to represent all possible outcomes of a single event. |  |  |  |  |  |  |
| 1. **Predict** and determine the probability of an outcome by constructing a sample space. The sample space will have a total of 24 or less possible outcomes. |  |  |  |  |  |  |

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| **5.15** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Formulate the question that will guide the data collection. |  |  |  |  |  |  |
| 1. Collect data, using observations (e.g., weather), measurement (e.g., shoe sizes), surveys (e.g., hours watching television), or experiments (e.g., plant growth). |  |  |  |  |  |  |
| 1. Organize the data into a chart, table, stem-and-leaf plots, and line graphs. |  |  |  |  |  |  |
| 1. Display data in line graphs and stem-and-leaf plots. |  |  |  |  |  |  |
| 1. Construct line graphs, labeling the vertical axis with equal whole number, decimal, or fractional increments and the horizontal axis with continuous data commonly related to time (e.g., hours, days, months, years, and age). Line graphs will have no more than six identified points along a continuum for continuous data (e.g., the decades: 1950s, 1960s, 1970s, 1980s, 1990s, and 2000s). |  |  |  |  |  |  |
| 1. Construct a stem-and-leaf plot to organize and display data, where the stem is listed in ascending order and the leaves are in ascending order, with or without commas between leaves. |  |  |  |  |  |  |
| 1. Title the given graph or identify the title. |  |  |  |  |  |  |
| 1. Interpret the data in a variety of forms (e.g., orally or in written form). |  |  |  |  |  |  |

***continued on next page***

**Grade 5 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **5.16** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Describe and find the mean of a group of numbers representing data from a given context as a measure of center.** |  |  |  |  |  |  |
| 1. **Describe and find the median of a group of numbers representing data from a given context as a measure of center.** |  |  |  |  |  |  |
| 1. **Describe and find the mode of a group of numbers representing data from a given context as a measure of center.** |  |  |  |  |  |  |
| 1. **Describe mean as fair share.** |  |  |  |  |  |  |
| 1. Describe and find the range of a group of numbers representing data from a given context as a measure of variation. |  |  |  |  |  |  |
| 1. Describe the impact on measures of center when a single value of a data set is added, removed, or changed.† |  |  |  |  |  |  |

**Grade 5**

**patterns, functions, and algebra**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Equations and Properties**

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| **5.17** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Describe numerical and geometric patterns formed by using concrete materials and calculators. |  |  |  |  |  |  |
| 1. Describe the relationship found in patterns, using words, tables, and **symbols** to express the relationship. |  |  |  |  |  |  |

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| **5.18** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Describe the concept of a variable (presented as boxes, letters, or other symbols) as a representation of an unknown quantity. |  |  |  |  |  |  |
| 1. Write an open sentence with addition, subtraction, multiplication, or division, using a variable to represent a missing number. |  |  |  |  |  |  |
| 1. **Model one-step linear equations using a variety of concrete materials such as colored chips on an equation mat or weights on a balance scale.** |  |  |  |  |  |  |
| 1. **Create and write a word problem to match a given open sentence with a single variable and one operation.** |  |  |  |  |  |  |

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| **5.19** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Investigate and recognize the distributive property of whole numbers, limited to multiplication over addition using diagrams and manipulatives.** |  |  |  |  |  |  |
| 1. **Investigate and recognize an equation that represents the distributive property, when given several whole number equations, limited to multiplication over addition.** |  |  |  |  |  |  |

**Grade 6**

**Number and Number Sense**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Relationships among Fractions, Decimals, and Percents**

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| **6.1** |
| 1. Describe a relationship within a set by comparing part of the set to the entire set. |
| 1. Describe a relationship between two sets by comparing part of one set to a corresponding part of the other set. |
| 1. Describe a relationship between two sets by comparing all of one set to all of the other set. |
| 1. Describe a relationship within a set by comparing one part of the set to another part of the same set. |
| 1. Represent a relationship in words that makes a comparison by using the notations , *a*:*b*, and  *a to b.* |
| 1. Create a relationship in words for a given ratio expressed symbolically. |

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| **6.2** |
| 1. **Identify the decimal and percent equivalents for numbers written in fraction form including repeating decimals.** |
| 1. **Represent fractions, decimals, and percents on a number line.** |
| 1. **Describe orally and in writing the equivalent relationships among decimals, percents, and fractions that have denominators that are factors of 100.** |
| 1. **Represent, by shading a grid, a fraction, decimal, and percent.** |
| 1. **Represent in fraction, decimal, and percent form a given shaded region of a grid.** |
| 1. Compare two decimals through thousandths using manipulatives, pictorial representations, number lines, and symbols (<,>, =). |
| 1. Compare two fractions with denominators of 12 or less using manipulatives, pictorial representations, number lines, and symbols (<,>, =). |
| 1. **Compare two percents using pictorial representations and symbols (<,>, =).** |
| 1. **Order no more than 3 fractions, decimals, and percents (decimals through thousandths, fractions with denominators of 12 or less), in ascending or descending order.** |

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| **6.3** |
| 1. **Identify an integer represented by a point on a number line.** |
| 1. **Represent integers on a number line.** |
| 1. Order and compare integers using a number line. |
| 1. **Compare integers, using mathematical symbols (<, >, =).** |
| 1. **Identify and describe the absolute value of an integer.** |

**Number and Number Sense**

***Essential Knowledge Skills and Processes – At a Glance***

***continued***

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| **6.4** |
| 1. **Demonstrate multiplication and division of fractions using multiple representations.** |
| 1. **Model algorithms for multiplying and dividing with fractions using appropriate representations.** |

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| **6.5** |
| 1. **Recognize and describe patterns with exponents that are natural numbers, by using a calculator.** |
| 1. **Recognize and describe patterns of perfect squares not to exceed 20, by using grid paper, square tiles, tables, and calculators.** |
| 1. **Recognize powers of ten by examining patterns in a place value chart: 104 = 10,000, 103 = 1000, 102 = 100, 101 = 10, 10=1.** |

**Grade 6**

**Computation and estimation**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Applications of Operations with Rational Numbers**

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| **6.6** |
| 1. **Multiply and divide with fractions and mixed numbers. Answers are expressed in simplest form.** |
| 1. Solve single-step and multistep practical problems that involve addition and subtraction with fractions and mixed numbers, with and without regrouping, that include like and unlike denominators of 12 or less. Answers are expressed in simplest form. |
| 1. **Solve single-step and multistep practical problems that involve multiplication and division with fractions and mixed numbers that include denominators of 12 or less. Answers are expressed in simplest form.** |

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| **6.7** |
| 1. Solve **single-step** and multistep practical **problems involving addition, subtraction, multiplication and division with decimals** expressed to thousandths with no more than two operations. |

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| **6.8** |
| 1. **Simplify expressions by using the order of operations in a demonstrated step-by-step approach. The expressions should be limited to positive values and not include braces { } or absolute value | |.** |
| 1. **Find the value of numerical expressions, using order of operations, mental mathematics, and appropriate tools. Exponents are limited to positive values.** |

**Grade 6**

**MEASUREMENT**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Problem-solving with Area, Perimeter, Volume, & Surface Area**

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| **6.9** |
| 1. Estimate the conversion of units of length, weight/mass, volume, and temperature between the U.S. Customary system and the metric system by using ballpark comparisons.   Ex: 1 L 1qt. Ex: 4L 4 qts. |
| 1. Estimate measurements by comparing the object to be measured against a benchmark. |

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| **6.10** |
| 1. **Derive an approximation for pi (3.14 or ) by gathering data and comparing the circumference to the diameter of various circles, using concrete materials or computer models.** |
| 1. **Find the circumference of a circle by substituting a value for the diameter or the radius into the formula *C* = π*d* or *C* = 2π*r*.** |
| 1. **Find the area of a circle by using the formula  *A* = π*r*2.** |
| 1. **Apply formulas to solve practical problems involving area and perimeter of triangles and rectangles.** |
| 1. **Create and solve problems that involve finding the circumference and area of a circle when given the diameter or radius.** |
| 1. **Solve problems that require finding the surface area of a rectangular prism, given a diagram of the prism with the necessary dimensions labeled.** |
| 1. **Solve problems that require finding the volume of a rectangular prism given a diagram of the prism with the necessary dimensions labeled.** |

**Grade 6**

**GEOMETRY**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Properties and Relationships**

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| **6.11** |
| 1. **Identify and label the axes of a coordinate plane.** |
| 1. **Identify and label the quadrants of a coordinate plane.** |
| 1. **Identify the quadrant or the axis on which a point is positioned by examining the coordinates (ordered pair) of the point.** |
| 1. **Graph ordered pairs in the four quadrants and on the axes of a coordinate plane.** |
| 1. **Identify ordered pairs represented by points in the four quadrants and on the axes of the coordinate plane.** |
| 1. **Relate the coordinate of a point to the distance from each axis and relate the cordinates of a single point to another point on the same horizontal or vertical line.†** |

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| **6.12** |
| 1. Characterize polygons as congruent and noncongruent according to the measures of their sides and angles. |
| 1. Determine the congruence of segments, angles, and polygons given their attributes. |
| 1. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving practical and mathematical problems.† |

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| **6.13** |
| 1. **Sort and classify polygons as quadrilaterals, parallelograms, rectangles, trapezoids, kites, rhombi, and squares based on their properties. Properties include number of parallel sides, angle measures and number of congruent sides.** |
| 1. **Identify the sum of the measures of the angles of a quadrilateral as 360°.** |

**Grade 6**

**PROBABILITY AND STATISTICS**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Practical Applications of Statistics**

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| **6.14** |
| 1. **Collect, organize and display data in circle graphs by depicting information as fractional.** |
| 1. **Draw conclusions and make predictions about data presented in a circle graph.** |
| 1. **Compare and contrast data presented in a circle graph with the same data represented in other graphical forms.** |

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| **6.15** |
| 1. Find the mean for a set of data. |
| 1. Describe the three measures of center and a situation in which each would best represent a set of data. |
| 1. **Identify and draw a number line that demonstrates the concept of mean as balance point for a set of data.** |

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| **6.16** |
| 1. **Determine whether two events are dependent or independent.** |
| 1. **Compare and contrast dependent and independent events.** |
| 1. **Determine the probability of two dependent events.** |
| 1. **Determine the probability of two independent events.** |

**Grade 6**

**PATTERNS, FUNCTIONS, AND ALGEBRA**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Variable Equations and Properties**

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| **6.17** |
| 1. Investigate and apply strategies to recognize and describe the change between terms in arithmetic patterns. |
| 1. Investigate and apply strategies to recognize and describe geometric patterns. |
| 1. Describe verbally and in writing the relationships between consecutive terms in an arithmetic or geometric sequence. |
| 1. Extend and apply arithmetic and geometric sequences to similar situations. |
| 1. Extend arithmetic and geometric sequences in a table by using a given rule or mathematical relationship. |
| 1. Compare and contrast arithmetic and geometric sequences. |
| 1. Identify the common difference for a given arithmetic sequence. |
| 1. Identify the common ratio for a given geometric sequence. |

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| **6.18** |
| 1. Represent and solve a one-step equation, using a variety of concrete materials such as colored chips, algebra tiles, or weights on a balance scale. |
| 1. Solve a one-step equation by demonstrating the steps algebraically. |
| 1. Identify and use the following algebraic terms appropriately: *equation*, v*ariable, expression, term,* and *coefficient*. |

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| **6.19** |
| 1. **Identify a real number equation that represents each property of operations with real numbers, when given several real number equations.** |
| 1. **Test the validity of properties by using examples of the properties of operations on real numbers.** |
| 1. **Identify the property of operations with real numbers that is illustrated by a real number equation.** |
| **NOTE: The commutative, associative and distributive properties are taught in previous grades.** |

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| **6.20** |
| 1. **Given a simple inequality with integers, graph the relationship on a number line.** |
| 1. **Given the graph of a simple inequality with integers, represent the inequality two different ways using symbols (<, >, <, >).** |

**GRADE 7**

**Number and Number Sense**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Scientific Notation and Square Roots**

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| **7.1** |
| 1. Recognize powers of 10 with **negative exponents** by examining patterns. |
| 1. Write a power of 10 with a **negative exponent** in fraction and decimal form. |
| 1. Write a number **greater than 0** in scientific notation. |
| 1. Recognize a number **greater than 0** in scientific notation. |
| 1. **Compare and determine equivalent relationships between numbers larger than 0 written in scientific notation.** |
| 1. **Represent a number in fraction, decimal, and percent forms.** |
| 1. **Compare, order, and determine equivalent relationships among fractions, decimals, and percents. Decimals are limited to the thousandths place, and percents are limited to the tenths place. Ordering is limited to no more than 4 numbers.** |
| 1. **Order no more than 3 numbers greater than 0 written in scientific notation.** |
| 1. **Determine the square root of a perfect square less than or equal to 400.** |
| 1. **Demonstrate absolute value using a number line.** |
| 1. **Determine the absolute value of a rational number.** |
| 1. **Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle to solve practical problems.†** |

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| **7.2** |
| 1. **Analyze arithmetic and geometric sequences to discover a variety of patterns.** |
| 1. **Identify the common difference in an arithmetic sequence.** |
| 1. **Identify the common ratio in a geometric sequence.** |
| 1. **Given an arithmetic or geometric sequence, write a variable expression to describe the relationship between two consecutive terms in the sequence.** |

**GRADE 7**

**Computation and estimation**

***Essential Knowledge Skills and Processes- At a Glance***

**Target for Understanding: Application of Rational Operations and Proportional Reasoning**

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| **7.3** |
| 1. **Model addition, subtraction, multiplication and division of integers using pictorial representations of concrete manipulatives.** |
| 1. **Add, subtract, multiply, and divide integers.** |
| 1. **Simplify numerical expressions involving addition, subtraction, multiplication and division of integers using order of operations.** |
| 1. **Solve practical problems involving addition, subtraction, multiplication, and division with integers.** |

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| **7.4** |
| 1. **Write proportions that represent equivalent relationships between two sets.** |
| 1. **Solve a proportion to find a missing term.** |
| 1. **Apply proportions to convert units of measurement between the U.S. Customary System and the metric system. Calculators may be used.** |
| 1. **Solve practical problems involving addition, subtraction, multiplication, and division with integers.** |
| 1. **Apply proportions to solve practical problems, including scale drawings. Scale factors shall have denominators no greater than 12 and decimals no less than tenths. Calculators may be used.** |
| 1. **Using 10% as a benchmark, mentally compute 5%, 10%, 15%, or 20% in a practical situation such as tips, tax and discounts.** |
| 1. **Solve problems involving tips, tax, and discounts. Limit problems to only one percent computation per problem.** |

**GRADE 7**

**Measurement**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Volume and Surface Area**

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| **7.5** |
| 1. **Determine if a practical problem involving a rectangular prism or cylinder represents the application of volume or surface area.** |
| 1. Find the surface area of a rectangular prism. |
| 1. **Solve practical problems that require finding the surface area of a rectangular prism.** |
| 1. Find the surface area of a cylinder. |
| 1. **Solve practical problems that require finding the surface area of a cylinder.** |
| 1. Find the volume of a rectangular prism. |
| 1. **Solve practical problems that require finding the volume of a rectangular prism.** |
| 1. Find the volume of a cylinder. |
| 1. Solve practical problems that require finding the volume of a cylinder. |
| 1. **Describe how the volume of a rectangular prism is affected when one measured attribute is multiplied by a scale factor. Problems will be limited to changing attributes by scale factors only.** |
| 1. **Describe how the surface area of a rectangular prism is affected when one measured attribute is multiplied by a scale factor. Problems will be limited to changing attributes by scale factors only.** |

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| **7.6** |
| 1. **Identify corresponding sides and corresponding and congruent angles of similar figures using the traditional notation of curved lines for the angles.** |
| 1. **Write proportions to express the relationships between the lengths of corresponding sides of similar figures.** |
| 1. **Determine if quadrilaterals or triangles are similarby examining congruence of corresponding angles and proportionality of corresponding sides.** |
| 1. **Given two similar figures, write similarity statements using symbols such as , *A* corresponds to *D*, and corresponds to .** |

**GRADE 7**

**geometry**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Relationships between Figures**

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| **7.7** |
| 1. Compare and contrast attributes of the following quadrilaterals: parallelogram, rectangle, square, rhombus, and trapezoid. |
| 1. Identify the classification(s) to which a quadrilateral belongs, using deductive reasoning and inference. |

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| **7.8** |
| 1. Identify the coordinates of the image of a right triangle or rectangle that has been translated either vertically, horizontally, or a combination of a vertical and horizontal translation. |
| 1. Identify the coordinates of the image of a right triangle or rectangle that has been rotated 90° or 180° about the origin. |
| 1. **Identify the coordinates of the image of a right triangle or a rectangle that has been reflected over the x- or y-axis.** |
| 1. **Identify the coordinates of a right triangle or rectangle that has been dilated. The center of the dilation will be the origin.** |
| 1. Sketch the image of a right triangle or rectangle translated vertically or horizontally. |
| 1. Sketch the image of a right triangle or rectangle that has been rotated 90° or 180° about the origin. |
| 1. **Sketch the image of a right triangle or rectangle that has been reflected over the x- or y-axis.** |
| 1. **Sketch the image of a dilation of a right triangle or rectangle limited to a scale factor of,, 2, 3 or 4.** |

**GRADE 7**

**probability and statistics**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Applications of Statistics and Probability**

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| **7.9** |
| 1. Determine the theoretical probability of an event. |
| 1. Determine the experimental probability of an event. |
| 1. Describe changes in the experimental probability as the number of trials increases. |
| 1. **Investigate and describe the difference between the probability of an event found through experiment or simulation versus the theoretical probability of that same event.** |

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| **7.10** |
| 1. Compute the number of possible outcomes by using the Fundamental (Basic) Counting Principle. |
| 1. Determine the probability of a compound event containing no more than 2 events. |

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| **7.11** |
| 1. **Collect, analyze, display, and interpret a data set using histograms. For collection and display of raw data, limit the data to 20 items.** |
| 1. **Determine patterns and relationships within data sets (e.g., trends).** |
| 1. **Make inferences, conjectures, and predictions based on analysis of a set of data.** |
| 1. **Compare and contrast histograms with line plots, circle graphs, and stem-and-leaf plots presenting information from the same data set.** |

**GRADE 7**

**patterns, functions, and algebra**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Attributes and Patterning**

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| **7.12** |
| a. Describe and represent relations and functions, using tables, graphs, rules, and words. Given one representation, students will be able to represent the relation in another form. |

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| **7.13** |
| 1. Write verbal expressions as algebraic expressions. Expressions will be limited to no more than 2 operations. |
| 1. Write verbal sentences as algebraic equations. Equations will contain no more than 1 variable term. |
| 1. **Translate algebraic expressions and equations to verbal expressions and sentences. Expressions will be limited to no more than 2 operations.** |
| 1. **Identify examples of expressions and equations.** |
| 1. **Apply the order of operations to evaluate expressions for given replacement values of the variables. Limit the number of replacements to no more than 3 per expression.** |

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| **7.14** |
| 1. Represent and demonstrate steps for solving one- **and two-step** equations in one variable using concrete materials, pictorial representations and algebraic sentences. |
| 1. Solve one- **and two-step** linear equations in one variable. |
| 1. Solve practical problems that require the solution of a one- or **two-step** linear equation. |

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| **7.15** |
| 1. Represent and demonstrate steps in solving inequalities in one variable, using concrete materials, pictorial representations, and algebraic sentences. |
| 1. **Graph solutions to inequalities on the number line.** |
| 1. Identify a numerical value that satisfies the inequality. |

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| **7.16** |
| 1. **Identify properties of operations used in simplifying expressions.** |
| 1. **Apply the properties of operations to simplify expressions.** |

**GRADE 8**

**Number and Number Sense**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Relationships within the Real Number System**

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| **8.1** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Simplify numerical expressions containing: 2. exponents (where the base is a rational number and the exponent is a positive whole number); |  |  |  |  |  |  |
| 1. Fractions, decimals, integers, and square roots of perfect squares |  |  |  |  |  |  |
| 1. Grouping symbols (no more than 2 embedded grouping symbols)   Note: Order of operations and properties of operations with real numbers should be used. |  |  |  |  |  |  |
| 1. Compare and order no more than five fractions, decimals, percents, and numbers written in scientific notation using positive and negative exponents. Ordering may be in ascending or descending order |  |  |  |  |  |  |

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| **8.2** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Describe orally and in writing the relationships among the sets of natural or counting numbers, whole numbers, integers, rational numbers, irrational numbers, & real numbers. |  |  |  |  |  |  |
| 1. Illustrate the relationships among the subsets of the real number system by using graphic organizers such as Venn diagrams. Subsets include rational numbers, irrational numbers, integers, whole numbers, and natural or counting numbers. |  |  |  |  |  |  |
| 1. Identify the subsets of the real number system to which a given number belongs. |  |  |  |  |  |  |
| 1. Determine whether a given number is a member of a particular subset of the real number system, and explain why. |  |  |  |  |  |  |
| 1. Describe each subset of the set of real numbers and include examples and nonexamples. |  |  |  |  |  |  |
| 1. Recognize that the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.† |  |  |  |  |  |  |

**GRADE 8 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Computation and estimation**

***Essential Knowledge Skills and Processes- At a Glance***

**Target for Understanding: Practical Applications of Operations with Real Numbers**

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| **8.3** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Write a proportion given the relationship of equality between two ratios. |  |  |  |  |  |  |
| 1. Solve practical problems by using computation procedures for whole numbers, integers, fractions, percents, ratios, and proportions. Some problems may require the application of a formula. |  |  |  |  |  |  |
| 1. Maintain a checkbook and check registry for five or fewer transactions. |  |  |  |  |  |  |
| 1. Compute a discount or markup and the resulting sale price for one discount or markup. |  |  |  |  |  |  |
| 1. **Compute the percent increase or decrease for a one-step equation found in a real life situation.** |  |  |  |  |  |  |
| 1. Compute the sales tax or tip and resulting total. |  |  |  |  |  |  |
| 1. Substitute values for variables in given formulas. For example, use the simple interest formula to determine the value of any missing variable when given specific information. |  |  |  |  |  |  |
| 1. Compute the simple interest and new balance earned in an investment or on a loan for a given number of years. |  |  |  |  |  |  |

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| **8.4** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Substitute numbers for variables in algebraic expressions and simplify the expressions by using the order of operations. Exponents are positive and limited to whole numbers less than 4. Square roots are limited to perfect squares. |  |  |  |  |  |  |
| 1. Substitute numbers for variables in algebraic expressions and simplify the expressions by using the order of operations. Exponents are positive and limited to whole numbers less than 4. Square roots are limited to perfect squares. |  |  |  |  |  |  |

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**Grade 8 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **8.5** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify the perfect squares from 0 to 400. |  |  |  |  |  |  |
| 1. Identify the two consecutive whole numbers between which the square root of a given whole number from 0 to 400 lies (e.g., lies between 7 and 8 since 72 = 49 and82 = 64). |  |  |  |  |  |  |
| 1. Define a perfect square. |  |  |  |  |  |  |
| 1. **Find the positive or positive and negative square roots of a given whole number from 0 to 400. (Use the symbol to ask for the positive root and when asking for the negative root.)** |  |  |  |  |  |  |

**GRADE 8 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Measurement**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Problem Solving**

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| **8.6** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Measure angles of less than 360° to the nearest degree, using appropriate tools. |  |  |  |  |  |  |
| 1. Identify and describe the relationships between angles formed by two intersecting lines. |  |  |  |  |  |  |
| 1. Identify and describe the relationship between pairs of angles that are vertical. |  |  |  |  |  |  |
| 1. Identify and describe the relationship between pairs of angles that are supplementary. |  |  |  |  |  |  |
| 1. Identify and describe the relationship between pairs of angles that are complementary. |  |  |  |  |  |  |
| 1. **Identify and describe the relationship between pairs of angles that are adjacent.** |  |  |  |  |  |  |
| 1. **Use the relationships among supplementary, complementary, vertical, and adjacent angles to solve practical problems.†** |  |  |  |  |  |  |

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| **8.7** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Distinguish between situations that are applications of surface area and those that are applications of volume. |  |  |  |  |  |  |
| 1. Investigate and compute the surface area of a square or triangular pyramid by finding the sum of the areas of the triangular faces and the base using concrete objects, nets, diagrams and formulas. |  |  |  |  |  |  |
| 1. Investigate and compute the surface area of a cone by calculating the sum of the areas of the side and the base, using concrete objects, nets, diagrams and formulas. |  |  |  |  |  |  |
| 1. Investigate and compute the surface area of a right cylinder using concrete objects, nets, diagrams and formulas. |  |  |  |  |  |  |
| 1. Investigate and compute the surface area of a rectangular prism using concrete objects, nets, diagrams and formulas. |  |  |  |  |  |  |
| 1. Investigate and compute the volume of prisms, cylinders, cones, and pyramids, using concrete objects, nets, diagrams, and formulas. |  |  |  |  |  |  |
| 1. Solve practical problems involving volume and surface area of prisms, cylinders, cones, and pyramids. |  |  |  |  |  |  |
| 1. **Compare and contrast the volume and surface area of a prism with a given set of attributes with the volume of a prism where one of the attributes has been increased by a factor of 2, 3, 5 or 10.** |  |  |  |  |  |  |
| 1. **Describe the two-dimensional figures that result from slicing three-dimensional figures parallel to the base (e.g., as in plane sections of right rectangular prisms and right rectangular pyramids).†** |  |  |  |  |  |  |

**GRADE 8 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**geometry**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Problem Solving with 2- and 3- Dimensional Figures**

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| **8.8** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Demonstrate the reflection of a polygon over the vertical or horizontal axis on a coordinate grid.** |  |  |  |  |  |  |
| 1. **Demonstrate 90°, 180°, 270°, and 360°clockwise and counterclockwise rotations of a figure on a coordinate grid. The center of rotation will be limited to the origin.** |  |  |  |  |  |  |
| 1. **Demonstrate the translation of a polygon on a coordinate grid.** |  |  |  |  |  |  |
| 1. **Demonstrate the dilation of a polygon from a fixed point on a coordinate grid.** |  |  |  |  |  |  |
| 1. Identify practical applications of transformations including, but not limited to, tiling, fabric, and wallpaper designs, art and scale drawings. |  |  |  |  |  |  |
| 1. Identify the type of transformation in a given example. |  |  |  |  |  |  |

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| **8.9** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Construct three-dimensional models, given the top or bottom, side, and front views. |  |  |  |  |  |  |
| 1. Identify three-dimensional models given a two-dimensional perspective. |  |  |  |  |  |  |

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| **8.10** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify the parts of a right triangle (the hypotenuse and the legs). |  |  |  |  |  |  |
| 1. Verify a triangle is a right triangle given the measures of its three sides. |  |  |  |  |  |  |
| 1. Verify the Pythagorean Theorem, using diagrams, concrete materials, and measurement. |  |  |  |  |  |  |
| 1. Find the measure of a side of a right triangle, given the measures of the other two sides. |  |  |  |  |  |  |
| 1. Solve practical problems involving right triangles by using the Pythagorean Theorem. |  |  |  |  |  |  |

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**Grade 8 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **8.11** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Subdivide a figure into triangles, rectangles, squares, trapezoids and semicircles. Estimate the area of subdivisions and combine to determine the area of the composite figure.** |  |  |  |  |  |  |
| 1. **Use the attributes of the subdivisions to determine the perimeter and circumference of a figure.** |  |  |  |  |  |  |
| 1. **Apply perimeter, circumference and area formulas to solve practical problems.** |  |  |  |  |  |  |

**GRADE 8**

**probability and statistics**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Statistical analysis of Graphs and Problem Situations**

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| **8.12** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Determine the probability of no more than three independent events.** |  |  |  |  |  |  |
| 1. **Determine the probability of no more than two dependent events without replacement.** |  |  |  |  |  |  |
| 1. **Compare the outcomes of events with and without replacement.** |  |  |  |  |  |  |

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| **8.13** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Collect, organize, and interpret a data set of no more than 20 items using scatterplots. Predict from the trend an estimate of the line of best fit with a drawing. |  |  |  |  |  |  |
| 1. **Interpret a set of data points in a scatterplot as having a positive relationship, a negative relationship, or no relationship.** |  |  |  |  |  |  |

**GRADE 8**

**patterns, functions, and algebra**

***Essential Knowledge Skills and Processes – At a Glance***

**Target for Understanding: Linear Relationships**

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| **8.14** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Graph in a coordinate plane ordered pairs that represent a relation. |  |  |  |  |  |  |
| 1. Describe and represent relations and functions, using tables, graphs, words, and rules. Given one representation, students will be able to represent the relation in another form. |  |  |  |  |  |  |
| 1. **Relate and compare different representations for the same relation.** |  |  |  |  |  |  |

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| **8.15** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Solve **two- to four-step** linear equations in one variable using concrete materials, pictorial representations, and paper and pencil illustrating the steps performed. |  |  |  |  |  |  |
| 1. **Solve two-step inequalities in one variable by showing the steps and using algebraic sentences.** |  |  |  |  |  |  |
| 1. **Graph solutions to two-step linear inequalities on a number line.** |  |  |  |  |  |  |
| 1. **Identify properties of operations used to solve an equation from among:**    1. **the commutative properties of addition and multiplication;**    2. **the associative properties of addition and multiplication;**    3. **the distributive property;**    4. **the identity properties of addition and multiplication;**    5. **the zero property of multiplication;**    6. **the additive inverse property; and** 2. **the multiplicative inverse property.** |  |  |  |  |  |  |

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**Grade 8 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **8.16** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Construct a table of ordered pairs by substituting values for *x* in a linear equation to find values for *y*. |  |  |  |  |  |  |
| 1. Plot in the coordinate plane ordered pairs (*x*, *y*) from a table. |  |  |  |  |  |  |
| 1. Connect the ordered pairs to form a straight line (a continuous function). |  |  |  |  |  |  |
| 1. Interpret the unit rate of the proportional relationship graphed as the slope of the graph, and compare two different proportional relationships represented in different ways.† |  |  |  |  |  |  |

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| **8.17** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. **Apply the following algebraic terms appropriately: *domain, range, independent variable,* and *dependent variable.*** |  |  |  |  |  |  |
| 1. **Identify examples of domain, range, independent variable, and dependent variable.** |  |  |  |  |  |  |
| 1. **Determine the domain of a function.** |  |  |  |  |  |  |
| 1. **Determine the range of a function.** |  |  |  |  |  |  |
| 1. **Determine the independent variable of a relationship.** |  |  |  |  |  |  |
| 1. **Determine the dependent variable of a relationship** |  |  |  |  |  |  |

**ALGEBRA I Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**expressions and operations**

**# of items: 12**

***Essential Knowledge Skills and Processes – At a Glance***

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| **A.1** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Translate verbal quantitative situations into algebraic expressions and vice versa. |  |  |  |  |  |  |
| 1. Model real-world situations with algebraic expressions in a variety of representations (concrete, pictorial, symbolic, verbal). |  |  |  |  |  |  |
| 1. Evaluate algebraic expressions for a given replacement set to include rational numbers. |  |  |  |  |  |  |
| 1. Evaluate expressions that contain absolute value, square roots, and cube roots. |  |  |  |  |  |  |

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| **A.2a-c** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Simplify monomial expressions and ratios of monomial expressions in which the exponents are integers, using the laws of exponents. |  |  |  |  |  |  |
| 1. Model sums, differences, products, and quotients of polynomials with concrete objects and their related pictorial representations. |  |  |  |  |  |  |
| 1. Relate concrete and pictorial manipulations that model polynomial operations to their corresponding symbolic representations. |  |  |  |  |  |  |
| 1. Find sums and differences of polynomials. |  |  |  |  |  |  |
| 1. Find products of polynomials. The factors will have no more than five total terms (i.e. (4*x*+2)(3*x*+5) represents four terms and (*x*+1)(2*x*2 +*x*+3) represents five terms). |  |  |  |  |  |  |
| 1. Find the quotient of polynomials, using a monomial or binomial divisor, or a completely factored divisor. |  |  |  |  |  |  |
| 1. Factor completely first- and second-degree polynomials with integral coefficients. |  |  |  |  |  |  |
| 1. Identify prime polynomials. |  |  |  |  |  |  |
| 1. Use the *x*-intercepts from the graphical representation of the polynomial to determine and confirm its factors. |  |  |  |  |  |  |

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**Algebra i Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **A.3** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Express square roots of a whole number in simplest form. |  |  |  |  |  |  |
| 1. Express the cube root of a whole number in simplest form. |  |  |  |  |  |  |
| 1. Express the principal square root of a monomial algebraic expression in simplest form where variables are assumed to have positive values. |  |  |  |  |  |  |

**ALGEBRA I Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**equations and inequalities**

**# of items: 18**

***Essential Knowledge Skills and Processes – At a Glance***

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| **A.4a-f** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Solve a literal equation (formula) for a specified variable. |  |  |  |  |  |  |
| 1. Simplify expressions and solve equations, using the field properties of the real numbers and properties of equality to justify simplification and solution. |  |  |  |  |  |  |
| 1. Solve quadratic equations. |  |  |  |  |  |  |
| 1. Identify the roots or zeros of a quadratic function over the real number system as the solution(s) to the quadratic equation that is formed by setting the given quadratic expression equal to zero. |  |  |  |  |  |  |
| 1. Solve multistep linear equations in one variable. |  |  |  |  |  |  |
| 1. Confirm algebraic solutions to linear and quadratic equations, using a graphing calculator. |  |  |  |  |  |  |
| 1. Given a system of two linear equations in two variables that has a unique solution, solve the system by substitution or elimination to find the ordered pair which satisfies both equations. |  |  |  |  |  |  |
| 1. Given a system of two linear equations in two variables that has a unique solution, solve the system graphically by identifying the point of intersection. |  |  |  |  |  |  |
| 1. Determine whether a system of two linear equations has one solution, no solution, or infinite solutions. |  |  |  |  |  |  |
| 1. Write a system of two linear equations that models a real-world situation. |  |  |  |  |  |  |
| 1. Interpret and determine the reasonableness of the algebraic or graphical solution of a system of two linear equations that models a real-world situation. |  |  |  |  |  |  |
| 1. Determine if a linear equation in one variable has one, an infinite number, or no solutions.† |  |  |  |  |  |  |

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**Algebra i *page 2 of 2* Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **A.5a-d** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Solve multistep linear inequalities in one variable. |  |  |  |  |  |  |
| 1. Justify steps used in solving inequalities, using axioms of inequality and properties of order that are valid for the set of real numbers. |  |  |  |  |  |  |
| 1. Solve real-world problems involving inequalities. |  |  |  |  |  |  |
| 1. Solve systems of linear inequalities algebraically and graphically. |  |  |  |  |  |  |

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| **A.6a-b** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Graph linear equations and inequalities in two variables, including those that arise from a variety of real-world situations. |  |  |  |  |  |  |
| 1. Use the parent function *y* = *x* and describe transformations defined by changes in the slope or *y*-intercept. |  |  |  |  |  |  |
| 1. Find the slope of the line, given the equation of a linear function. |  |  |  |  |  |  |
| 1. Find the slope of a line, given the coordinates of two points on the line. |  |  |  |  |  |  |
| 1. Find the slope of a line, given the graph of a line. |  |  |  |  |  |  |
| 1. Recognize and describe a line with a slope that is positive, negative, zero, or undefined. |  |  |  |  |  |  |
| 1. Use transformational graphing to investigate effects of changes in equation parameters on the graph of the equation. |  |  |  |  |  |  |
| 1. Write equation of a line when given the graph of a line. |  |  |  |  |  |  |
| 1. Write an equation of a line when given two points on the line whose coordinates are integers. |  |  |  |  |  |  |
| 1. Write an equation of a line when given the slope and a point on the line whose coordinates are integers. |  |  |  |  |  |  |
| 1. Write an equation of a vertical line as *x* = a. |  |  |  |  |  |  |
| 1. Write the equation of a horizontal line as *y* = *c*. |  |  |  |  |  |  |

**ALGEBRA I Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Functions and statistics**

**# of items: 20**

***Essential Knowledge Skills and Processes – At a Glance***

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| **A.7a-f** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Solve a literal equation (formula) for a specified variable. |  |  |  |  |  |  |
| 1. Simplify expressions and solve equations, using the field properties of the real numbers and properties of equality to justify simplification and solution. |  |  |  |  |  |  |
| 1. Solve quadratic equations. |  |  |  |  |  |  |
| 1. Identify the roots or zeros of a quadratic function over the real number system as the solution(s) to the quadratic equation that is formed by setting the given quadratic expression equal to zero. |  |  |  |  |  |  |
| 1. Solve multistep linear equations in one variable. |  |  |  |  |  |  |
| 1. Confirm algebraic solutions to linear and quadratic equations, using a graphing calculator. |  |  |  |  |  |  |
| 1. Given a system of two linear equations in two variables that has a unique solution, solve the system by substitution or elimination to find the ordered pair which satisfies both equations. |  |  |  |  |  |  |
| 1. Given a system of two linear equations in two variables that has a unique solution, solve the system graphically by identifying the point of intersection. |  |  |  |  |  |  |
| 1. Determine whether a system of two linear equations has one solution, no solution, or infinite solutions. |  |  |  |  |  |  |
| 1. Write a system of two linear equations that models a real-world situation. |  |  |  |  |  |  |
| 1. Interpret and determine the reasonableness of the algebraic or graphical solution of a system of two linear equations that models a real-world situation. |  |  |  |  |  |  |
| 1. Determine if a linear equation in one variable has one, an infinite number, or no solutions.† |  |  |  |  |  |  |

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**Algebra i *page 2 of 3* Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **A.8** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Given a situation, including a real-world situation, determine whether a direct variation exists. |  |  |  |  |  |  |
| 1. Given a situation, including a real-world situation, determine whether an inverse variation exists. |  |  |  |  |  |  |
| 1. Write an equation for a direct variation, given a set of data. |  |  |  |  |  |  |
| 1. Write an equation for an inverse variation, given a set of data. |  |  |  |  |  |  |
| 1. Graph an equation representing a direct variation, given a set of data. |  |  |  |  |  |  |

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| **A.9** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Analyze descriptive statistics to determine the implications for the real-world situations from which the data derive. |  |  |  |  |  |  |
| 1. Given data, including data in a real-world context, calculate and interpret the mean absolute deviation of a data set. |  |  |  |  |  |  |
| 1. Given data, including data in a real-world context, calculate variance and standard deviation of a data set and interpret the standard deviation. |  |  |  |  |  |  |
| 1. Given data, including data in a real-world context, calculate and interpret z-scores for a data set. |  |  |  |  |  |  |
| 1. Explain ways in which standard deviation addresses dispersion by examining the formula for standard deviation. |  |  |  |  |  |  |
| 1. Compare and contrast mean absolute deviation and standard deviation in a real-world context. |  |  |  |  |  |  |

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| **A.10** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Compare, contrast, and analyze data, including data from real-world situations displayed in box-and-whisker plots. |  |  |  |  |  |  |

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**Algebra i *page 3 of 3* Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **A.11** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Write an equation for a curve of best fit, given a set of no more than twenty data points in a table, a graph, or real-world situation. |  |  |  |  |  |  |
| 1. Make predictions about unknown outcomes, using the equation of the curve of best fit. |  |  |  |  |  |  |
| 1. Design experiments and collect data to address specific, real-world questions. |  |  |  |  |  |  |
| 1. Evaluate the reasonableness of a mathematical model of a real-world situation. |  |  |  |  |  |  |

**geometry Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**reasoning, lines, and transformations**

**# of items: 18**

***Essential Knowledge Skills and Processes – At a Glance***

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| **G.1a-d** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify the converse, inverse, and contrapositive of a conditional statement. |  |  |  |  |  |  |
| 1. Translate verbal arguments into symbolic form, such as (*p* → *q*) and (~*p* → ~*q*). |  |  |  |  |  |  |
| 1. Determine the validity of a logical argument. |  |  |  |  |  |  |
| 1. Use valid forms of deductive reasoning, including the law of syllogism, the law of the contrapositive, the law of detachment, and counterexamples. |  |  |  |  |  |  |
| 1. Select and use various types of reasoning and methods of proof, as appropriate. |  |  |  |  |  |  |
| 1. Use Venn diagrams to represent set relationships, such as intersection and union. |  |  |  |  |  |  |
| 1. Interpret Venn diagrams. |  |  |  |  |  |  |
| 1. Recognize and use the symbols of formal logic, which include →, ↔, ~, , , and . |  |  |  |  |  |  |

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| **G.2a-c** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Use algebraic and coordinate methods as well as deductive proofs to verify whether two lines are parallel. |  |  |  |  |  |  |
| 1. Solve problems by using the relationships between pairs of angles formed by the intersection of two parallel lines and a transversal including corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles. |  |  |  |  |  |  |
| 1. Solve real-world problems involving intersecting and parallel lines in a plane. |  |  |  |  |  |  |

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**geometry Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **G.3a-d** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Find the coordinates of the midpoint of a segment, using the midpoint formula. |  |  |  |  |  |  |
| 1. Use a formula to find the slope of a line. |  |  |  |  |  |  |
| 1. Compare the slopes to determine whether two lines are parallel, perpendicular, or neither. |  |  |  |  |  |  |
| 1. Determine whether a figure has point symmetry, line symmetry, both, or neither. |  |  |  |  |  |  |
| 1. Given an image and preimage, identify the transformation that has taken place as a reflection, rotation, dilation, or translation. |  |  |  |  |  |  |
| 1. Apply the distance formula to find the length of a line segment when given the coordinates of the endpoints. |  |  |  |  |  |  |

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| **G.4a-g** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Construct and justify the constructions of 2. a line segment congruent to a given line segment; 3. the perpendicular bisector of a line segment; 4. a perpendicular to a given line from a point not on the line; 5. a perpendicular to a given line at a point on the line; 6. the bisector of a given angle; 7. an angle congruent to a given angle; and 8. a line parallel to a given line through a point not on the given line. |  |  |  |  |  |  |
| 1. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.† |  |  |  |  |  |  |
| 1. Construct the inscribed and circumscribed circles of a triangle.† |  |  |  |  |  |  |
| 1. Construct a tangent line from a point outside a given circle to the circle.† |  |  |  |  |  |  |

**geometry Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**triangles**

**# of items: 14**

***Essential Knowledge Skills and Processes – At a Glance***

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| **G.5a-d** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Order the sides of a triangle by their lengths when given the measures of the angles. |  |  |  |  |  |  |
| 1. Order the angles of a triangle by their measures when given the lengths of the sides. |  |  |  |  |  |  |
| 1. Given the lengths of three segments, determine whether a triangle could be formed. |  |  |  |  |  |  |
| 1. Given the lengths of two sides of a triangle, determine the range in which the length of the third side must lie. |  |  |  |  |  |  |
| 1. Solve real-world problems given information about the lengths of sides and/or measures of angles in triangles. |  |  |  |  |  |  |

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| **G.6** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Use definitions, postulates, and theorems to prove triangles congruent. |  |  |  |  |  |  |
| 1. Use coordinate methods, such as the distance formula and the slope formula, to prove two triangles are congruent. |  |  |  |  |  |  |
| 1. Use algebraic methods to prove two triangles are congruent. |  |  |  |  |  |  |

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| **G.7** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Use definitions, postulates, and theorems to prove triangles similar. |  |  |  |  |  |  |
| 1. Use algebraic methods to prove that triangles are similar. |  |  |  |  |  |  |
| 1. Use coordinate methods, such as the distance formula, to prove two triangles are similar. |  |  |  |  |  |  |

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**geometry Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **G.8** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Determine whether a triangle formed with three given lengths is a right triangle. |  |  |  |  |  |  |
| 1. Solve for missing lengths in geometric figures, using properties of 45°-45°-90° triangles. |  |  |  |  |  |  |
| 1. Solve for missing lengths in geometric figures, using properties of 30°-60°-90° triangles. |  |  |  |  |  |  |
| 1. Solve problems involving right triangles, using sine, cosine, and tangent ratios. |  |  |  |  |  |  |
| 1. Solve real-world problems, using right triangle trigonometry and properties of right triangles. |  |  |  |  |  |  |
| 1. Explain and use the relationship between the sine and cosine of complementary angles.† |  |  |  |  |  |  |

**geometry Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**polygons, circles, and three-dimensional figures**

**# of items: 18**

***Essential Knowledge Skills and Processes – At a Glance***

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| **G.9** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Solve problems, including real-world problems, using the properties specific to parallelograms, rectangles, rhombi, squares, isosceles trapezoids, and trapezoids. |  |  |  |  |  |  |
| 1. Prove that quadrilaterals have specific properties, using coordinate and algebraic methods, such as the distance formula, slope, and midpoint formula. |  |  |  |  |  |  |
| 1. Prove the characteristics of quadrilaterals, using deductive reasoning, algebraic, and coordinate methods. |  |  |  |  |  |  |
| 1. Prove properties of angles for a quadrilateral inscribed in a circle.† |  |  |  |  |  |  |

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| **G.10** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Solve real-world problems involving the measures of interior and exterior angles of polygons. |  |  |  |  |  |  |
| 1. Identify tessellations in art, construction, and nature. |  |  |  |  |  |  |
| 1. Find the sum of the measures of the interior and exterior angles of a convex polygon. |  |  |  |  |  |  |
| 1. Find the measure of each interior and exterior angle of a regular polygon. |  |  |  |  |  |  |
| 1. Find the number of sides of a regular polygon, given the measures of interior or exterior angles of the polygon. |  |  |  |  |  |  |

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**geometry Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 3***

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| **G.11a-c** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Find lengths, angle measures, and arc measures associated with 2. two intersecting chords; 3. two intersecting secants; 4. an intersecting secant and tangent; 5. two intersecting tangents; and 6. central and inscribed angles. |  |  |  |  |  |  |
| 1. Calculate the area of a sector and the length of an arc of a circle, using proportions. |  |  |  |  |  |  |
| 1. Solve real-world problems associated with circles, using properties of angles, lines, and arcs. |  |  |  |  |  |  |
| 1. Verify properties of circles, using deductive reasoning, algebraic, and coordinate methods. |  |  |  |  |  |  |

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| **G.12** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify the center, radius, and diameter of a circle from a given standard equation. |  |  |  |  |  |  |
| 1. Use the distance formula to find the radius of a circle. |  |  |  |  |  |  |
| 1. Given the coordinates of the center and radius of the circle, identify a point on the circle. |  |  |  |  |  |  |
| 1. Given the equation of a circle in standard form, identify the coordinates of the center and find the radius of the circle. |  |  |  |  |  |  |
| 1. Given the coordinates of the endpoints of a diameter, find the equation of the circle. |  |  |  |  |  |  |
| 1. Given the coordinates of the center and a point on the circle, find the equation of the circle. |  |  |  |  |  |  |
| 1. Recognize that the equation of a circle of given center and radius is derived using the Pythagorean Theorem.† |  |  |  |  |  |  |

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**GEometry *page 3 of 3* Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **G.13** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Find the total surface area of cylinders, prisms, pyramids, cones, and spheres, using the appropriate formulas |  |  |  |  |  |  |
| 1. Calculate the volume of cylinders, prisms, pyramids, cones, and spheres, using the appropriate formulas. |  |  |  |  |  |  |
| 1. Solve problems, including real-world problems, involving total surface area and volume of cylinders, prisms, pyramids, cones, and spheres as well as combinations of three-dimensional figures. |  |  |  |  |  |  |
| 1. Calculators may be used to find decimal approximations for results. |  |  |  |  |  |  |

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| **G.14a-d** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Compare ratios between side lengths, perimeters, areas, and volumes, given two similar figures. |  |  |  |  |  |  |
| 1. Describe how changes in one or more dimensions affect other derived measures (perimeter, area, total surface area, and volume) of an object. |  |  |  |  |  |  |
| 1. Describe how changes in one or more measures (perimeter, area, total surface area, and volume) affect other measures of an object. |  |  |  |  |  |  |
| 1. Solve real-world problems involving measured attributes of similar objects.. |  |  |  |  |  |  |

**algebra ii Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**expressions and operations**

**# of items: 13**

***Essential Knowledge Skills and Processes – At a Glance***

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| **AII.1a-d** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Add, subtract, multiply, and divide rational algebraic expressions. |  |  |  |  |  |  |
| 1. Simplify a rational algebraic expression with common monomial or binomial factors. |  |  |  |  |  |  |
| 1. Recognize a complex algebraic fraction, and simplify it as a quotient or product of simple algebraic fractions. |  |  |  |  |  |  |
| 1. Simplify radical expressions containing positive rational numbers and variables. |  |  |  |  |  |  |
| 1. Convert from radical notation to exponential notation, and vice versa. |  |  |  |  |  |  |
| 1. Add and subtract radical expressions. |  |  |  |  |  |  |
| 1. Multiply and divide radical expressions not requiring rationalizing the denominators. |  |  |  |  |  |  |
| 1. Factor polynomials by applying general patterns including difference of squares, sum and difference of cubes, and perfect square trinomials. |  |  |  |  |  |  |
| 1. Factor polynomials completely over the integers. |  |  |  |  |  |  |
| 1. Verify polynomial identities including the difference of squares, sum and difference of cubes, and perfect square trinomials.† |  |  |  |  |  |  |

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**ALgebra ii Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 2 of 2***

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| **AII.3** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Recognize that the square root of –1 is represented as *i*. |  |  |  |  |  |  |
| 1. Determine which field properties apply to the complex number system. |  |  |  |  |  |  |
| 1. Simplify radical expressions containing negative rational numbers and express in a+b*i* form. |  |  |  |  |  |  |
| 1. Simplify powers of *i*. |  |  |  |  |  |  |
| 1. Add, subtract, and multiply complex numbers. |  |  |  |  |  |  |
| 1. Place the following sets of numbers in a hierarchy of subsets: complex, pure imaginary, real, rational, irrational, integers, whole, and natural. |  |  |  |  |  |  |
| 1. Write a real number in a+b*i* form. |  |  |  |  |  |  |
| 1. Write a pure imaginary number in a+b*i* form. |  |  |  |  |  |  |

**algebra II Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**equations and inequalities**

**# of items: 13**

***Essential Knowledge Skills and Processes – At a Glance***

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| **AII.4a-d** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Solve absolute value equations and inequalities algebraically and graphically. |  |  |  |  |  |  |
| 1. Solve a quadratic equation over the set of complex numbers using an appropriate strategy. |  |  |  |  |  |  |
| 1. Calculate the discriminant of a quadratic equation to determine the number of real and complex solutions. |  |  |  |  |  |  |
| 1. Solve equations containing rational algebraic expressions with monomial or binomial denominators algebraically and graphically. |  |  |  |  |  |  |
| 1. Solve an equation containing a radical expression algebraically and graphically. |  |  |  |  |  |  |
| 1. Verify possible solutions to an equation containing rational or radical expressions. |  |  |  |  |  |  |
| 1. Apply an appropriate equation to solve a real-world problem. |  |  |  |  |  |  |
| 1. Recognize that the quadratic formula can be derived by applying the completion of squares to any quadratic equation in standard form.† |  |  |  |  |  |  |

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| **AII.5** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Predict the number of solutions to a nonlinear system of two equations. |  |  |  |  |  |  |
| 1. Solve a linear-quadratic system of two equations algebraically and graphically. |  |  |  |  |  |  |
| 1. Solve a quadratic-quadratic system of two equations algebraically and graphically. |  |  |  |  |  |  |

**algebra ii Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**functions and statistics**

**# of items: 24**

***Essential Knowledge Skills and Processes – At a Glance***

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| **AII.2** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Distinguish between a sequence and a series. |  |  |  |  |  |  |
| 1. Generalize patterns in a sequence using explicit and recursive formulas. |  |  |  |  |  |  |
| 1. Use and interpret the notations ∑, *n*, *n*th term, and *an*. |  |  |  |  |  |  |
| 1. Given the formula, find *an* (the *n*th term) for an arithmetic or a geometric sequence. |  |  |  |  |  |  |
| 1. Given formulas, write the first *n* terms and find the sum, *Sn*, of the first *n* terms of an arithmetic or geometric series. |  |  |  |  |  |  |
| 1. Given the formula, find the sum of a convergent infinite series. |  |  |  |  |  |  |
| 1. Model real-world situations using sequences and series. |  |  |  |  |  |  |

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| **AII.6** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Recognize graphs of parent functions. |  |  |  |  |  |  |
| 1. Given a transformation of a parent function, identify the graph of the transformed function. |  |  |  |  |  |  |
| 1. Given the equation and using a transformational approach, graph a function. |  |  |  |  |  |  |
| 1. Given the graph of a function, identify the parent function. |  |  |  |  |  |  |
| 1. Given the graph of a function, identify the transformations that map the preimage to the image in order to determine the equation of the image. |  |  |  |  |  |  |
| 1. Using a transformational approach, write the equation of a function given its graph. |  |  |  |  |  |  |

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**ALGEBRA II *page 2 of 4* Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **AII.7a-h** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically. |  |  |  |  |  |  |
| 1. Describe restricted/discontinuous domains and ranges. |  |  |  |  |  |  |
| 1. Given the graph of a function, identify intervals on which the function is increasing and decreasing. |  |  |  |  |  |  |
| 1. Find the equations of vertical and horizontal asymptotes of functions. |  |  |  |  |  |  |
| 1. Describe the end behavior of a function. |  |  |  |  |  |  |
| 1. Find the inverse of a function. |  |  |  |  |  |  |
| 1. Graph the inverse of a function as a reflection across the line *y* = *x*. |  |  |  |  |  |  |
| 1. Investigate exponential and logarithmic functions, using the graphing calculator. |  |  |  |  |  |  |
| 1. Convert between logarithmic and exponential forms of an equation with bases consisting of natural numbers. |  |  |  |  |  |  |
| 1. Find the composition of two functions. |  |  |  |  |  |  |
| 1. Use composition of functions to verify two functions are inverses. |  |  |  |  |  |  |

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| **AII.8** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Describe the relationships among solutions of an equation, zeros of a function, *x*-intercepts of a graph, and factors of a polynomial expression. |  |  |  |  |  |  |
| 1. Define a polynomial function, given its zeros. |  |  |  |  |  |  |
| 1. Determine a factored form of a polynomial expression from the x-intercepts of the graph of its corresponding function. |  |  |  |  |  |  |
| 1. For a function, identify zeros of multiplicity greater than 1 and describe the effect of those zeros on the graph of the function. |  |  |  |  |  |  |
| 1. Given a polynomial equation, determine the number of real solutions and nonreal solutions. |  |  |  |  |  |  |

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**ALGEBRA II Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

***page 3 of 4***

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| **AII.9** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Collect and analyze data. |  |  |  |  |  |  |
| 1. Investigate scatterplots to determine if patterns exist and then identify the patterns. |  |  |  |  |  |  |
| 1. Find an equation for the curve of best fit for data, using a graphing calculator. Models will include polynomial, exponential, and logarithmic functions. |  |  |  |  |  |  |
| 1. Make predictions, using data, scatterplots, or the equation of the curve of best fit. |  |  |  |  |  |  |
| 1. Given a set of data, determine the model that would best describe the data. |  |  |  |  |  |  |

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| **AII.10** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Translate “*y* varies jointly as *x* and *z*” as *y* = *kxz*. |  |  |  |  |  |  |
| 1. Translate “*y* is directly proportional to *x*” as *y* = *kx*. |  |  |  |  |  |  |
| 1. Translate “*y* is inversely proportional to *x*” as *y* = . |  |  |  |  |  |  |
| 1. Given a situation, determine the value of the constant of proportionality. |  |  |  |  |  |  |
| 1. Set up and solve problems, including real-world problems, involving inverse variation, joint variation, and a combination of direct and inverse variations. |  |  |  |  |  |  |

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**ALGEBRA II *page 4 of 4* Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **AII.11** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Identify the properties of a normal probability distribution. |  |  |  |  |  |  |
| 1. Describe how the standard deviation and the mean affect the graph of the normal distribution. |  |  |  |  |  |  |
| 1. Compare two sets of normally distributed data using a standard normal distribution and z-scores. |  |  |  |  |  |  |
| 1. Represent probability as area under the curve of a standard normal probability distribution. |  |  |  |  |  |  |
| 1. Use the graphing calculator or a standard normal probability table to determine probabilities or percentiles based on z-scores. |  |  |  |  |  |  |

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| **AII.12** | **PA1** | | **PA2** | | **PA3** | |
| **T1** | **ML** | **T2** | **M2** | **T3** | **M3** |
| 1. Compare and contrast permutations and combinations. |  |  |  |  |  |  |
| 1. Calculate the number of permutations of *n* objects taken *r* at a time. |  |  |  |  |  |  |
| 1. Calculate the number of combinations of *n* objects taken *r* at a time. |  |  |  |  |  |  |
| 1. Use permutations and combinations as counting techniques to solve real-world problems. |  |  |  |  |  |  |