Grade – Sixth

Standard: Number Operations and Concepts

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

Context: Problem solving situations will include the use of place value to read and write decimals (to thousandths) in word and standard form; ordering and comparison of whole numbers and decimals (tenths, hundredths, and thousandths) greater than zero or integers; and representation of whole numbers, fractions, or decimals greater than zero, or integers on the number line.

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Remind students in all standards, reading for "math" understanding is a part of what they are expected to do.

- Use problem solving situations, manipulatives, visual models, sketches, and journals to model fraction/decimal relationships. Key vocabulary includes conversion, equivalent, mixed number, reduce, simplest form, estimate, improper fraction, proper fraction rounding, average, and decimals (tenths, hundredths, and thousandths).

- Provide opportunities for students to learn equivalent fractions. Have students fold strips of paper to show fractions and equivalent fractions.

- Have students use a number line to make benchmark comparisons of fractions.

- Provide opportunities for students to convert fractions to decimals. Number lines are a good tool to use for this skill.

Grade – Sixth

Standard: Number Operations and Concepts

Skill: Develop the connection between conceptual understanding and computational proficiency

Context: Problem solving situations will include computational fluency with decimals, multiplication of whole numbers, and division of two-digit whole numbers greater than zero.

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Use real life scenarios to connect math to everyday experience. Practice making change.

- Give students a group of math problems; have them sort by operation and justify their sorting to the group.

- Have students use a variety of manipulatives and visual models and sketches/journals to add and subtract decimals, multiply whole numbers and divide 2-digit whole numbers. Key vocabulary includes average, least to greatest, total, difference, quotient, and product.

- Teach students to find information for problem solving using charts, tables, and graphs and apply the information to multi-step problems.

- Place value is a key to this skill. Teach students to relate decimals to money and use graph paper to line up decimals when using an algorithm.

Grade – Sixth

Standard: Geometry

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

Context: Problem solving situations will include identifying, classifying, and drawing lines (parallel, perpendicular, and intersecting) and angles (acute, right, and obtuse).

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Use a variety of manipulatives (tangrams, pattern blocks, tiles, geoboards, poly-strips), visual models and sketches to label, locate and manipulate figures for identifying and creating mathematical images.

- Use problem solving tasks to develop key math terms - *parallel, perpendicular, and intersecting lines, acute, obtuse, right angles,.*

- Create a grid on the classroom floor with tape. Have students make angles with their bodies. Students can also do this standing and in pairs or teams.

- Each student has a geometry flip chart. Stack paper layered with 1" overlap & fold (pattern is available online). Include vocabulary, drawings, examples, and qualities for reference and practice.

- Use drawings including multiple connected polygons for students to identity different shapes, parallels, intersections, etc. and practice. Also use for practice labeling angles using three points and shapes.

- Use maps to identify spatial relationships.

Grade - Sixth

<u>Standard:</u> Geometry

<u>Skill:</u> Analyze characteristics and properties of two- and three-dimensional geometric shapes

<u>Context:</u> Problem solving situations will include geometrical attributes of circles and regular polygons to allow students to use spatial reasoning and geometric modeling.

<u>Instructional suggestions:</u> (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Use a variety of manipulatives, visual models and sketches to label, locate and manipulate a variety of figures.

- Use problem solving tasks to identify and create mathematical images that are connected to the key math terms – *regular/irregular polygons, common names of polygons, circumference, radius, diameter, circle, chord, nets (2-D representations for 3-D shapes).*

- Have students sort and classify geometric shapes by specific attributes and properties. For example: triangles should be sorted by their angles as well as their sides (equilateral, scalene, isosceles).

- Identify parts within a circle: label and name diameter, radius, circumference and chords within one illustration that may contain multiple segments.

- Have students justify their sorting schema orally with peers using a think-pair-share structure and journal their thinking in written form. Emphasis is on clear and coherent math language.

- Use a variety of manipulatives to build and examine nets (2-D) for (3-D) shapes, perhaps in functional text like plans for a book case.

- Use manipulatives and pictures to expose students to the concepts of regular and irregular shapes. Give students 5 straws & ask to make a pentagon, etc. Use "Nets" from the internet to build 3-D shapes allowing students to see the shape in all dimensions.

- Students should practice identifying congruent and non-congruent flipped and turned shapes, including corresponding sides and angles.

- Compare and contrast visuals as well as definitions for geometric shapes.

- Use mnemonic devices and movement to teach shapes and symbols.

- Teacher led activity: Have students create a personal reference sheet of geometric shapes, which includes regular and irregular polygons.

Grade – Sixth

Standard: Geometry

Skill: Apply transformations and use symmetry to analyze mathematical situations

Context: Problem solving situations will include communicating with mathematical language to identify and classify congruent objects when properties of shapes are provided.

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Use a variety of manipulatives, visual models and sketches to identify and classify congruent figures in (flip, slide, rotational) transformations. **It is important to label the sketches (points, segments, angles and vertices).**

- Use a variety of problem solving tasks to explore key math terms – *flip or mirror symmetry, slide or rotational symmetry, congruent, base, segment, side and corresponding sides, points, angles and vertices.*

- Have students justify their reasoning orally with peers using a think-pair-share structure and journal their thinking in written form. Emphasis is on clear and coherent math language.

- Include terms like "congruent and incongruent" in vocabulary.

- Use drawings including multiple connected polygons to identify congruent shapes. Practice labeling shapes and angles.

Grade – Sixth

Standard: Measurement

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

Context: Problem solving situations will include the use of appropriate methods, tools, and units to solve problems involving estimation and measure of length, weight, and capacity using metric units; and conversion of measurements of length within the metric system and weight and capacity in the U.S. customary system.

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Use manipulatives to practice fractions and conversions. Include measurement tools used in various settings: measuring cups, rulers, liter jars, etc. Include measurement terms in vocabulary.

- Use a variety of tools to estimate and measure length (cm-m) weight and capacity. Practice conversions include some "broken ruler" problems. This would include instruments that start somewhere other than zero. Pick the right tool or unit to make a reasonable estimate.

- Give students opportunities to weigh and measure, using metric and customary scales.

- Create a chart that visually represents the jumps made in converting units of measurement that includes the prefixes (kilo, mili, centi, deci), the number and decimal equivalents. Fo example, the font for KILO is much larger than the font for meter. The font for mili is much smaller than the font for meter, etc.

Grade – Sixth

Standard: Measurement

Skill: Apply appropriate techniques, tools, and formulas to determine perimeter, area or volume

Context: Problem solving situations will include calculating the perimeter of regular polygons with no more than 8 sides and the area of parallelograms with and without models.

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Use a variety of manipulatives, visual models and sketching tasks to label diagrams by identifying the base, side and height of parallelograms. The labels should include dimensions and area units. Students should understand the concept and calculation of perimeter and area of the parallelograms.

- Have students practice figuring area, perimeter, and volume using a wide variety of shapes and graph paper.

- Given perimeter or area, have the students practice finding side lengths given additional information as is necessary.

- Print the PAWS formula sheet from the website and use when teaching so students are exposed to the same language and format used on the assessment.

- Practice using just the story problem without the graphic provided so students have experience drawing and labeling shapes.

Grade – Sixth

Standard: Algebra

Skill: Understand patterns, relations, and functions

Context: Problem solving situations will require the use of sound reasoning to recognize, describe, and extend numeric patterns in a problem solving situation.

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Use a variety of manipulatives, visual models and sketching tasks to explore growing numeric patterns. These patterns should be modeled and discussed in a variety of forms using real world tables (such as calendars) and charts with letters to find and explain the rule.

- Use a variety of problem solving tasks to explore key math terms such as the following: n^{th} term *(to describe the next number or symbol in a pattern), repeating, growing, variable, value, (x), (y), pattern, increase, decrease, represents, algebraic expression, constant, rate, expression, sequence, preceding and consecutive numbers, emphasize the use of the word* **term** *when teaching patterns.*.

- Have students justify their predictions and expressions orally with peers using a think-pair-share structure and journal their thinking in written form. Emphasis is on clear and coherent math language.

- Students should create a chart to identify changes in patterns.

- Students should practice and use in-and-out charts to identify a rule. Guess my function is a good game to support this skill.

■ Use number operations and objects to practice extending patterns

Grade – Sixth

Standard: Algebra

Skill: Use mathematical models to represent and understand quantitative relationships

Context: Problem solving situations will require using symbolic reasoning to represent the concepts of a variable as an unknown quantity, letter, or symbol within any one-step whole number operation.

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Make sure vocabulary includes the difference between expression and equation.

- Use vocabulary methods to teach the different ways of representing operations. (Practice going from the words to mathematical symbols: a number is increased by four { n + 4})

- Use a variety of manipulatives, visual models, story problems and sketching tasks/ journal tasks to explore quantitative relationships. Students should be able to use variables to create and use variables in a variety of notations – 13 x b, 13b, 13•b, 64 ÷s or 64/s.

- Stress inverse operations. One strategy might be the use of Fact Triangles.

Grade – Sixth

Standard: Data Analysis and Probability

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

Context: Problem solving situations will require finding and interpreting mean and mode for data sets of no more than 10 pieces of data in real-world situations; and collecting, organizing, describing, and representing data using a variety of data displays including line graphs.

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Have students justify their predictions and outcomes orally with peers using a think-pair-share structure and journal their thinking in written form. Emphasis is on clear and coherent math language.

- Have students bring in a wide variety of graphs from the community or media to analyze. Have students create their own graphs from information gathered in the classroom (e.g. student heights, how many birthdays in each month, etc.).   Provide practice for students to distinguish between mean, median & mode in all graphs.

Grade – Sixth

Standard: Data Analysis and Probability

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

Context: Problem solving situations with simple probability and will require communicating the likelihood of events from experiments or simulations of 2 independent events using the language: certain, most likely, equally likely, least likely, and impossible.

Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Use a variety of scenarios to explore and experience the theoretical and experimental probability of the same experiment.

- Include in vocabulary: likely, unlikely, certain, impossible, least likely, most likely, likelihood, equally likely. Pair terms with related fractions. (1/2 = equally likely; ¾ = likely, etc.)

- Use dice, number cubes, cards, bag drawing, spinners etc. to provide opportunities to predict, record and explain the results using key math terms - impossible, less likely, equally likely and unlikely, likely and certain.

- Practice with multiple variables and up to 2 independent events. (From a box of 12 new crayons, how many different ways can you select two different crayons to color a picture?)

- Create a container covered with a sock. Put various items in the container and have students predict the probability of pulling different items out of the container.

- Use dice and spinners to predict outcomes. Have students use smart board to create a spinner that will only spin one color.

- Use a variety of scenarios to explore and experience the theoretical and experimental probability of an outcome. Use dice, number cubes, cards, bag drawing etc. to provide opportunities to predict, record and explain the results using math vocabulary and notation. The notation represented in words fractions (simplified fractions) or ratios. Key vocabulary includes least likely, most likely, impossible, certain, equally likely.

- Predict, record and explain the results of these investigations using words (one out of six), fractions (2/12 or 1/6, simplified fractions) and ratios (1:6).

- Dig into definitions and explanations of probability math terms. Clarify an understanding of the number equivalence for likely or unlikely.