Grade – Fifth

Standard: Number Operations and Concepts

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

Context: Problem solving situations will include ordering and comparing fractions with like denominators; and using place value to read and write whole numbers in words, standard and expanded forms, and decimals to the hundredths.

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.
- Have students practice showing the relationship between fractions and decimals.
- Have students practice converting fractions to whole numbers and whole numbers to fractions. (e.g. — is the same as what whole number?, or How many thirds are there in 8?)
- Provide practice in using place value manipulative charts to read and write decimals to hundredths in words, standard form, and expanded form.
    - Have students construct place value flip charts. Practice modeling numbers and have students locate and discuss where the numbers are found in the flip chart.
    - To strengthen vocabulary, have students play a matching game with cards. Students match cards printed with numbers written in standard and expanded forms to cards printed with numbers in standard form and written form.

- Teach place value using decimals to indicate value of money
  Which would be more money: $.04 (4 cents) vs. $.56 (56 cents)

- Teach the value of a comma and how to label it (what to say) when it is in a whole number or decimal.

- Use both decimals and fractions to represent the same number. (e.g. “Write three-fourths in fraction and decimal notation.”

Grade – Fifth

Standard: Number Operations and Concepts

Skill: Develop the connection between conceptual understanding and computational proficiency

Context: Problem solving situations with computational fluency requiring explanation of the relationships among the four operations, and determination of multiples and factors of numbers up to 100; adding and subtracting fractions with like denominators; adding and subtracting decimals to hundredths; solving problems in the context of money; and multiplying by two digit whole numbers and dividing by single digit whole numbers.

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 make a journal or notebook with graphic organizers to define math vocabulary words relating to math operations using pictures, numbers, and words.
  - Examples:
    - Addition – sum, total, altogether, in all, add
    - Subtraction – difference, how many more, subtract
    - Multiplication – product, of, multiply
    - Division – divide, groups of
  - Provide activities for students to conceptualize these key vocabulary terms. For example, students read and illustrate story problems.

- Have students practice analyzing word problems with limited information and/or non-essential information.

- Have students practice adding and subtracting fractions with like denominators in word problems.
    - Example: There are 80 fourth grade students and 100 fifth grade students at Washington Elementary School. If there are four fourth grade teachers, how many students will be in each fourth grade classroom?

- Factor Rainbows - A way of showing factor pairs in a list of all the factors of a number. This can be helpful in checking whether a list of factors is correct. (This is a factor rainbow for 24)

- Teach the divisibility rule: if divisible by 2, then the number is even.

Grade – Fifth

Standard: Geometry

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

Context: Problem solving situations will include identifying and classifying 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.)

- Through reflection (journaling, think/pair/share, etc.) provide time for students' explanation of their knowledge and understanding of the application of the concept in abstract and real world situations.

- Teach the vocabulary of geometry. [Parallel, perpendicular, angles (right, obtuse, acute)]

    - Use physical/kinesthetic movements to learn key geometric terms.
    - Students go on a scavenger hunt (classroom, playground, in the community) to hunt for real life situations of acute, right and obtuse angles or perpendicular and parallel lines. Students take pictures of and identify/label angles and lines in the outside world with disposable or digital cameras.

- Use functional text such as a map. (Find two parallel streets. Find two perpendicular streets. Identify streets as specified angles to each other using a protractor.)

Grade - Fifth

Standard: Geometry

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

Context: Problem solving situations will include geometrical attributes of quadrilaterals, triangles, and 3-dimensional figures, such as cylinders, cones, pyramids, rectangular prisms, and spheres allowing students to use spatial reasoning and geometric modeling to identify, classify, and describe.

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 make a journal or notebook with graphic organizers to illustrate two- and three-dimensional geometric shapes by finding similarities and differences.
- Implement interactive word walls with geometric shapes represented by pictures, numbers, and words.
- Teach the concept of congruency (congruent angles, edges, faces) by having students construct and deconstruct three dimensional shapes (e.g. origami, gumdrops and toothpicks).
    - Students practice drawing three-dimensional shapes.
    - Students use three-dimensional objects as stamps (sponges, blocks). Students stamp the faces of three-dimensional shapes onto paper to transfer the concept of a three-dimensional shape to a two-dimensional shape. Ask the following:
        - How many edges? How many faces? How many angles?
        - How many congruent edges? How many congruent faces? How many congruent angles?

- Students construct and deconstruct two-dimensional cut-outs of three-dimensional shapes using a Venn diagram or T-chart.

- Orally describe a geometric shape using the vocabulary of geometry and have the student draw the shape.

- Play “I have, Who has?” with students. Student #1 reads a description of a shape from his or her card. Student #2 matches the description to the shape printed on his or her card.

Grade – Fifth

Standard: Geometry

Skill: Apply transformations and use symmetry to analyze mathematical situations

Context: Problem solving situations will include demonstrating an understanding of similarity and/or congruency by drawing, comparing, and identifying these characteristics in polygons, including quadrilaterals and triangles.

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

- Compare and contrast abstract and real world geometric objects.
- Draw shapes and practice looking for shapes within other shapes and label the shapes symmetrical, congruent, similar
- Have students create and fold two-dimensional cut-outs to determine lines of symmetry.
    - Students create art relationships by drawing the symmetrical sides of faces, letters, and animals.
- Have students plot relationships between characteristics of shapes, and make predictions about the number of lines of symmetry for a shape based on the number of congruent angles and sides.

# of Lines of Symmetry	# of Vertices	# of Congruent Sides

Grade – Fifth

Standard: Measurement

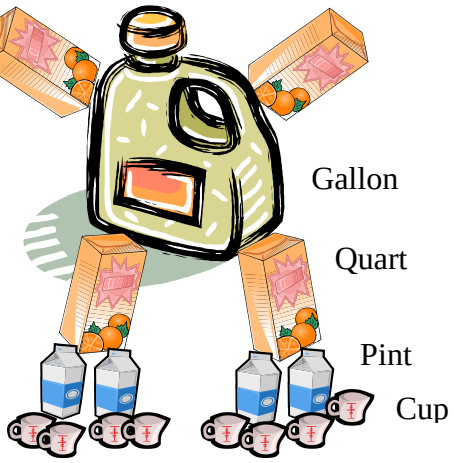
Skill: Understand measurable attributes of objects and the units, systems, and processes of measurement

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 customary units (miles, yards, feet, half-inch, quarter-inch, eighth-inch, ounces, pounds, teaspoons, tablespoons, cups, pints, quarts, and gallons); conversion of customary measurements; and conversion among seconds, minutes, and hours.

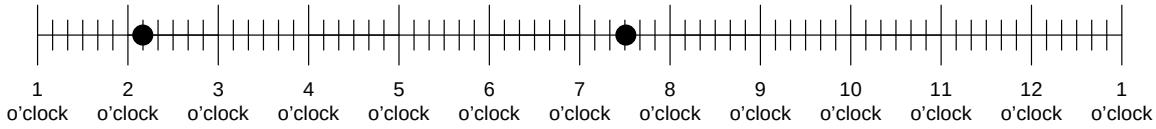
Instructional suggestions: (Created to be user-friendly, teachers should be able to read these ideas and put them into practice in their classroom.)

- Practice real world, hands-on application of the conversions of the U.S. customary system. Have conversion charts available for student use. (See PAWS content Limits for expected conversions).
  - Have students create a "Gallon Guy" using juice and milk jugs, and additional food containers.

"Gallon Guy"
1 gallon = 4 quarts
= 8 pints
= 16 cups
1 quart = 2 pints
= 4 cups
1 pint = 2 cups



- Use a number line with hours and minutes for students to solve problems in which they calculate elapsed time. (e.g. Find the elapsed time between the two dots.



- Given a problem involving measurement, express the answer in multiple units to provide more frequent practice of conversions.

- Have students fold and label strips of paper to compare fractions.

1 inch							
1/2 inch				1/2 inch			
1/4 inch		1/4 inch		1/4 inch		1/4 inch	
1/8 inch	1/8 inch	1/8 inch	1/8 inch	1/8 inch	1/8 inch	1/8 inch	1/8 inch

Grade – Fifth

Standard: Measurement

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

Context: Problem solving situations will include calculating or estimating the perimeter and area of rectangles and squares without grids and of triangles with grids.

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 practice solving problems with missing variables.
  - 8 ft x n = 32 ft^2
  - A rectangular living room has an area of 300 ft^2 and a length of 20 ft. What is the width of the room?

- Use area models, real world examples, and manipulatives to help visualize area, perimeter, and volume.
  - Provide students with a set of dimensions. Students construct a farm or backyard on graph paper with the appropriate dimensions.
  - Students create a layout of their house on graph paper by measuring the dimensions of their living room, dining room, bedroom, etc. Students share their layouts with the class.
  - Ask students to distinguish between area and perimeter using real world examples:
    - "If you need to lay sod, would you need to know area or perimeter?"
    - "If you need to build a fence, would you need to know perimeter or area?"
    - Design a house plan with or without specifications; requires students to draw the plan and then they can find the measurements of the spaces within the house. (Could provide the area and/or perimeter of

spaces required within the house plan and have the students create the spaces.)

- Measure lengths using a string and then measure the length of the string using a standard measure.

- Given two congruent right triangles, determine the perimeter and area of each; then put them together to form a rectangle; find the new perimeter and area.

- Give students a real life design scenario: You are a builder and have been hired to design a playground for your school. The specifications for each piece of equipment and of the total space are given and must be followed.

- Use graph paper to compute the area of irregular shapes.
- On all problems make sure students include the correct units.

- peRIMeter as a Mnemonic device

Grade – Fifth

Standard: Algebra

Skill: Understand patterns, relations, and functions

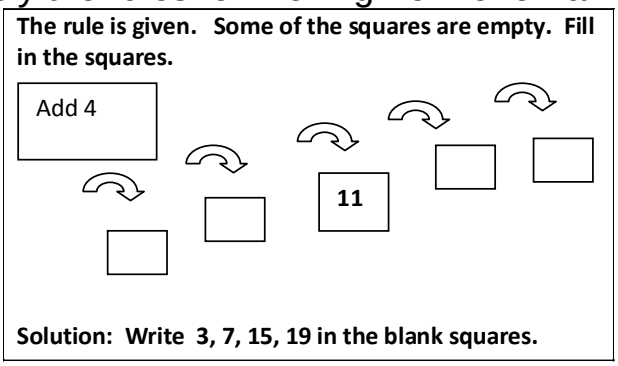
Context: Problem solving situations will include the use of sound reasoning to identify, describe, and create growing and extended patterns, such as number or graphic sequences including charts and graphs.

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

- Utilize graphic representations such as graphs, tables, and charts to identify and create simple, complex (multi-step), and growing patterns.
    - Create a function machine and have students determine input and output.

- Teacher and student model their thinking process and demonstrate how this can be written into a constructed response answer.
    - Create a flow chart with questions to model think-aloud.
        - Are the numbers increasing or decreasing?
        - Are the numbers increasing or decreasing at regular intervals?
        - If so, is this addition or subtraction? If not, is this multiplication or division?

- Use a T Chart or diagram to represent number sequences – sets of numbers ordered according to a rule. The charts or diagrams consist of frames in which numbers are written and arrows that apply the rules for moving from one frame to another.



- Present a completed diagram or T Chart and have the student identify the rules

Input	Output
1	3
4	12
6	18
8	24

- Increase vocabulary: variable, output, input, doubling is X 2

- Have students use manipulatives to create patterns. The manipulatives create a representation that can then be transferred into symbols and words.

- Have students practice developing a story problem from a given algebraic equation.

    - "I get $1 a day for an allowance. How many days will it take until I can afford to buy a $3 magazine?" leads to 1 x n = 3
    - "Jill has eighteen cookies that she has to divide evenly with her 5 brothers. How many cookies will each person get?" leads to 18/n=6

Grade – Fifth

Standard: Algebra

Skill: Use mathematical models to represent and understand quantitative relationships

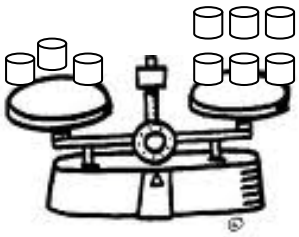
Context: Problem solving situations will include using symbolic reasoning to represent the concepts of a variable as an unknown quantity, letter, or symbol in addition or subtraction sentences using whole numbers.

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 use manipulatives to represent the unknown in equations. The manipulatives create a representation of the unknown quantity.

- Utilize the concept of balance to model balancing equations to find the unknown variable.

3+x=6



- Present the same problem with the variable in different places for all operations. (ex. X + 13 = 24; 11 + X = 24: 11 + 13 = X)

- Dictate a problem and have students write it down as they hear it (order of operations, use of mathematical symbols)

- Use the same numbers in different positions in equations and see how the answer varies. (ex. 9 + X = 31; 31 + X = 9 X + 31 = 9)

- Have students play “I have, who has.” Write an equation on one card (x+3=13) and give the card to a student. Write the answer to the equation on another card (10) and give the card to another student. Repeat until each student has a card. Students must find the card that corresponds with their card.

- Have students translate equations into written form.
    - n+3=13 “Some number plus three equals thirteen.”
    - z-5=15 “Five less than an unknown number equals 15.”

Grade – Fifth

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 include finding and interpreting mode for data sets of no more than five pieces of data in real-world situations; and collecting, organizing, describing, and representing data using a variety of data displays including bar graphs.

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 generate questions and make interpretations about what a graph, chart, or table represents.
- Have students build classroom graphs (e.g. toothbrush colors), and discuss mean, median, and mode.
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- Students choose information from a graph or set of data (e.g. baseball statistics) to suit their needs/manipulate data. Students decide whether they would need to determine mode, median, or mean.
- Have students use cross-curricular data and represent it in a variety of ways (charts, graphs, and tables) to demonstrate that it doesn't change how you interpret the information.
- Have students include vocabulary related to data analysis and probability in their math journals (e.g. range, mean, median, mode, pictograph, scale, pie graph).
- Implement interactive word walls with pictures, numbers, and words including mode.

- Use mnemonics to teach mean, median, and mode together (Mode=most often, Median=median of the highway, middle)

Grade – Fifth

Standard: Data Analysis and Probability

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

Context: Problem solving situations will include simple probability and recording the outcomes/combinations from experiments or simulations limited to 12 or fewer outcomes using the language: certain, most likely, equally likely, least likely, and impossible.

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 use data from the problem to drive their predictions. Have them support their prediction verbally (with a partner) and in writing.
- Teach probability using weather reports, coins (heads/tails), spinners, skittles, etc.
- Have students use manipulatives (e.g. spinners) in game-like situations. Students discuss and record outcomes. Discuss the likelihoods of spinning different numbers.
- Have students practice using problem-solving strategies (e.g. organized lists).
- Provide opportunities to learn the language related to probability found in ads as well as alternate terms (probably, likely, most likely, etc)

- Create a table that lists terms related to evaluating data and have students create numerical expressions for fractions, decimals and percents.

	Fraction	Decimal	Percent
Most likely	¾	.75	75%
Possible	½	.50	50%
Least Likely	¼	.25	25%

- Students play a dice rolling game in which they 1) roll two dice, 2) add the sum of the two dice, and 3) tall the sums on a scale of two to twelve. Discuss why numbers in the middle typically have higher numbers of tallies.

- Have students determine the total number of combinations possible when given a set of ingredients

  <u>Example: Ice cream</u>

Chocolate	Chocolate sauce	Nuts
Vanilla	Caramel sauce	Cherries
Strawberry		