Grade – Seventh

Standard: Number Operations and Concepts

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

Context: Problem solving situations will include representing, ordering, and comparing rational numbers that are greater than or equal to 0, percentages, and a variety of models to allow students to develop arguments to support conclusions.

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 number lines for ordering fractions rather than whole numbers. Include the use of visuals.
- TI-73 calculators have a number line function that is great (under applications). You can use fractions and decimals on this feature.
- Help students develop a deeper understanding of rational numbers by looking at questions from a different approach. (Which is larger, 3/4 or 5/7? {3/4 is 2/8 from 1 and 5/7 is 2/7 from 1 so which is closer to 1?})
- Use quick class period "openers" to help students strengthen their understanding of division steps, basic multiplication facts and decimal/fraction/percent conversions.
    - Kids use deck of cards to play "War" and multiply card faces – winner gets the cards.
    - Kids create a ruler on the classroom wall or in their notebooks to scale different representations (decimals, percents and fractions all scaled on the same ruler.)

Grade – Seventh

Standard: Number Operations and Concepts

Skill: Develop the connection between conceptual understanding and computational proficiency

Context: Problem solving situations will include rational numbers; fractions and mixed numbers with like denominators, multiplying and dividing decimals to hundredths, dividing whole numbers by 2-digit divisors; and computational fluency with integers and applying the order of operations in real-world problems involving whole numbers, excluding roots and powers, requiring inductive reasoning to justify results.

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

- Use actual sales ads around the holidays and have kids “go on a shopping spree” and calculate the sales tax on their purchases. This could be done for grocery lists or menus (calculate tips too).
- Change a recipe so that it feeds 20 people instead of 4 or cut a recipe in half.

Grade – Seventh

Standard: Geometry

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

Context: Problem solving situations requiring spatial reasoning and modeling to discuss perpendicularity, parallelism, and objects such as lines, rays, segments, and angles.

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

- Students should be taught vocabulary and should have practice with application problems.
- Encourage students to practice visualizing and drawing items described in written text. Teach students to step through the written problem by drawing out each component to build the bigger picture required to solve the problem.
- Use a two-column graphic organizer (shapes vocabulary and symbols etc. on one side—definitions on the other) to help students learn the vocabulary. Teacher keeps a master list, and covers two definitions per day with students, drills, etc.
- Visit www.ThatQuiz.org to look at pre-slugged vocabulary test items; or develop and customize a formative geometry vocabulary test using items where students are struggling in their vocabulary.

Grade - Seventh

Standard: Geometry

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

Context: Problem solving situations will include geometrical attributes of spheres, prisms, cylinders, cones, and pyramids to allow students to use spatial reasoning and geometric modeling.

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

- To reinforce and teach circle concepts, set the scenario by saying, “Someone once said that the ratio of circumference to the diameter of a circle is always the same regardless of the size of the circle.” Ask students if they think this is true? Why or why not? Have them make predictions and then discover the truth for themselves.

- Take them to the science room (if near Halloween) and cut and clean guts out of a variety of sized pumpkins. (Easter eggs could be used near Easter). Let them see what the ratio of weights after/before is for these “real-life” objects.

- Be sure to discuss how far you can go with the Pi concept. For example, use NASA and the moon. If 3.14 is good enough for NASA then it is good enough for us? Always make them carry out pi to 5 decimals **if** they have access to a calculator.

- Use the many children’s picture books that are available for math concepts for example “Sir Cumference,” “What’s Your Angle Pythagoras?,” “The Greedy Triangle,” and “How Much is a Million?”.

- Have students identify shape of the base (and in a prism, identify shape of the two parallel bases).

- Have students cut a layer cake (or ‘Zebra Cakes’) along different axes to identify the base of the cake’s three-dimensional shape.

- Have students use stackable items like coins or poker chips to show the relationship between base and height, and to demonstrate the consistency of the base’s shape.

- Make radius squares to cover a circle so students can discover a little more than 3 but not quite 4. Use a string to measure diameters on various objects like a soup can. Have a variety of sizes and let them discover with a string that this is not a “fluke.”

- Build familiarity of parallelism beyond lines; use shapes, objects, etc.

Grade – Seventh

Standard: Geometry

Skill: Apply transformations and use symmetry to analyze mathematical situations

Context: Problem solving situations will include communicating with mathematical language to interpret, analyze, and/or illustrate congruency and similarity and comparison of polygons.

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

- Use figures on graph paper for students to reflect, translate and rotate. Allow them to find their own ways to do them.

- Use 'Patty Paper" (or transparencies) to model or demonstrate transformation and symmetry properties students; this technique can also be used to model rotation, reflections translation.
    - The teacher has students create their own figures and shapes using the patty paper; engage students in a 'Stump the Class' competition, etc. based on their patty paper figures, for example "this figure is a transformation of _____?"

- Review, define and discuss the vocabulary of congruency, similarity and transformations.

Grade – Seventh

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 conversion of weight and capacity using metric units and conversion of measurements of length within the metric and customary systems.

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 solve problems by looking at the units involved. (What is my speed in KPH (Kilometers per Hour) if I travel 3245 meters in 10 minutes? Since per means divide, I need kilometers divided by hours so I must change meters to kilometers and minutes to hours and then divide.)
- Use conversion charts; have students create their own conversion charts as graphic organizers and have them share them with the rest of the class
- Relate a common object with a metric measure, (e.g., the weight of a paper clip is about 1 gram.) Have students pick their own objects and prove or disprove the object's metric measure
- Review metric system prefixes with students and their specific meanings, e.g., centi-, milli, kilo-, deci-.

Grade – Seventh

Standard: Measurement

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

Context: Problem solving situations will include calculating circumference of circles and interpreting models and real-world situations involving area of triangles and trapezoids.

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

- Use the PAWS formula sheet. Have students highlight one formula and make up problems for that formula. Use the sheet to focus on one area, but make sure to cover all.
- Have students solve for different parts of the formula. Rotate variables and be sure students can be flexible when what is being solved for is changed.

Grade – Seventh

Standard: Algebra

Skill: Understand patterns, relations, and functions

Context: Problem solving situations will include 1-step equations with whole number coefficients and solutions; and algebraic expressions and formulas using the order of operations given positive integer values for variables.

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

- Provide kids with PAWS formula sheet early in the year to ensure they are comfortable and familiar with using it. Have them practice using all of the formulas on the sheet.

- In solving equations have your students always remember, "you must make a zero before you can make a 1". Here is how this will work. In the equation 3x-20=10 students will often take the steps to solve this equation out of order. Some may want to divide by three before adding 20. If they remember they must make a "0" before a "1" this will help prevent them from making this mistake. They must make the -20 a zero before they can make the x a 1, etc… When you divide the 3x by 3, be sure to put a line through it and refer to it as a "1". This "1" can't happen until "0".

- Continuously emphasize the steps in solving equations. They will be able to solve some simple problems by "plugging" in numbers/trial and error, but this won't work on more complex problems.

- Always give comprehensive tests so they are constantly reviewing what they have already learned.

- Use newspaper and magazines to bring in real-life examples or situations where students can apply a pattern or function relation.

  - Ask students to bring in a sales advertisement, and then ask them to write an equation for unit costs, price savings, etc.

- Practice order of operations by having students use the proper operations to make true mathematical statements.

  - What makes 4 5 3 1 = 2? {(4+5)/3-1=2}

Grade – Seventh

Standard: Algebra

Skill: Use mathematical models to represent and understand quantitative relationships

Context: Problem solving situations with the coordinate system to plot and identify points in all four quadrants; and use of symbolic reasoning to translate word phrases involving addition and subtraction into algebraic expressions.

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

- Have your students write their own story problems which they can also write formulas from. Share your story problems with another class to solve.
- Build awareness of terms that have mathematical meanings for operations. For example, increase is plus, of is times, per is divide, etc.
- Build greater understanding of the rectangular coordinate system.
    - Practice by splitting room and have kids plot a point that describes the location of their seats.(Divide room w/ duct tape if possible—duct tape does not leave gunky residue on the rug, and masking tape doesn't work—or use chalk on carpet).
    - Play battleship game, have kids draw graphs where the size of ship is up to them and then work in probability twist or concept wherein the size of their ship changes their probability of being hit.

- Make a birthday coordinate grid with months vs days (no negative #s)

- Use online line activities of drawing figures via coordinate points (Crayola website).

Grade – Seventh

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 with mean, median, mode, and range. Contexts will allow students to make observations, inferences, conjectures, and use statistical reasoning to make generalizations about a population from data presented in a variety of ways, including histograms.

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

- Practice seeing how additional data changes statistics.
    - Have the students collect the data for the shoe size {cars they would buy and their price from the web, height, or head size (could connect to radius, circumference problems)}, of the people in the class and find the mean, median, mode and range. Then have them predict what will happen to those values when the teacher's information is included. Redo the calculations with the teacher included.

Grade – Seventh

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 communicating the likelihood of events from experiments or simulations of 2 independent events, and to communicate the likelihood of events using the language: certain, most likely, equally likely, least likely, and impossible or report as ratios.

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

- Use experimental probability to make predictions.
    - Place 6-red, 3-blue and 1-yellow block in a bag. Tell the students there are 10 blocks in the bag and have them collect data by drawing one block at a time from the bag until they feel confident they can accurately say how many of each colored blocks are in the bag.)
    - Use spinner games to help with understanding how probabilities don't predict individual events
    - Play the 'Pig Game' wherein kids role two dice, a winning score is set, and kids lose points for a turn if they roll a "1" or lose their total points if they roll double "1's". Have the kids keep a record of how often a "1" or a "double 1" is rolled and then figure the probability of it happening.
- Google Skittles or M&M for websites and probability games and lesson plans.