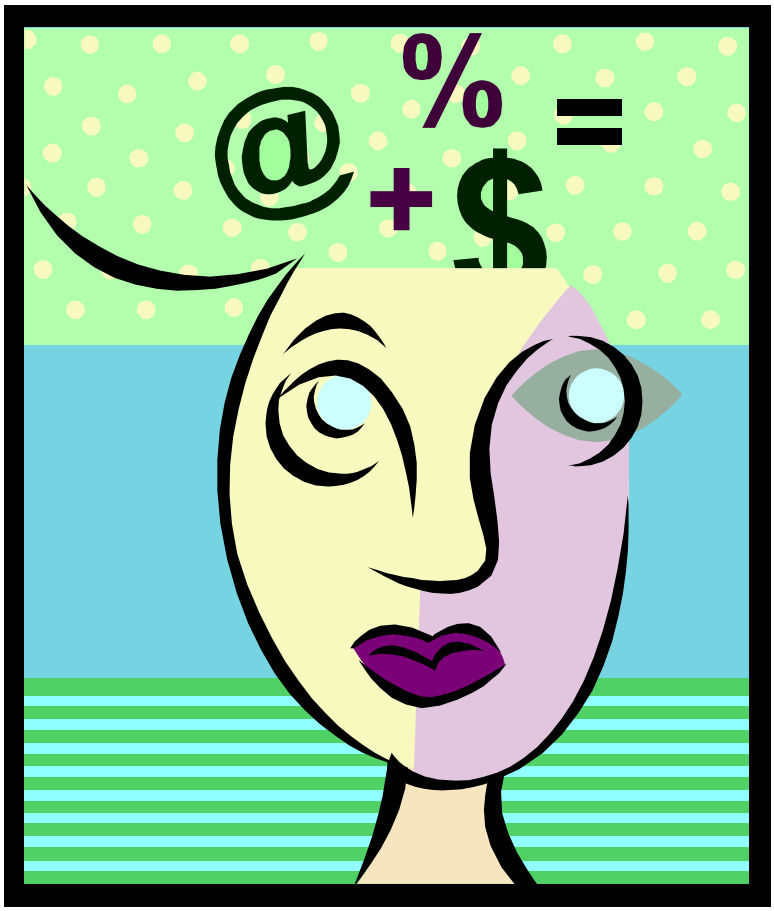
BEST PRACTICES

and

TEACHING IDEAS

for the



MATHEMATICS CLASSROOM

NORTH DAKOTA DEPARTMENT OF PUBLIC INSTRUCTION
Dr. Wayne G. Sanstead, State Superintendent
600 E Boulevard Avenue, Dept. 201
Bismarck, ND 58505-0440
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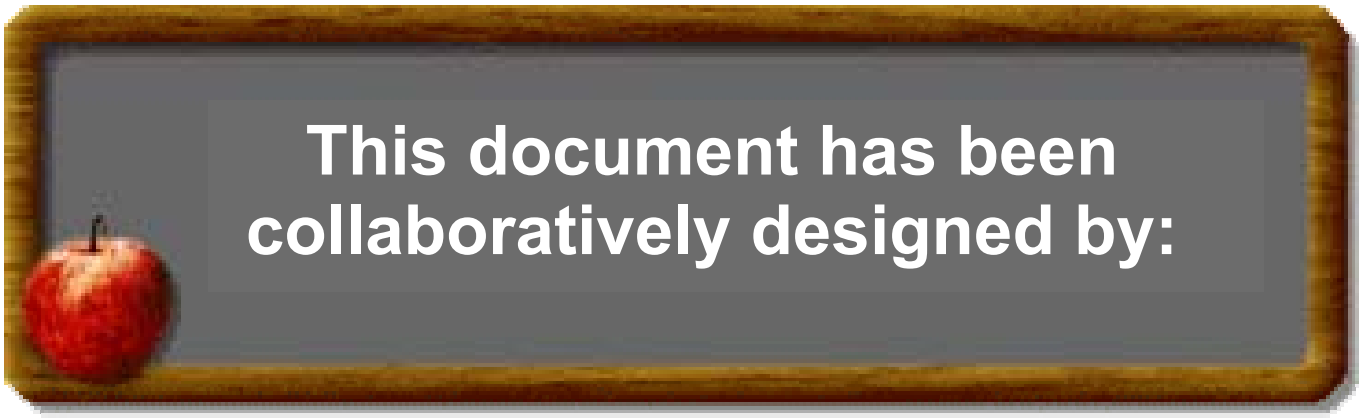
The State Title I office is pleased to provide Title I teachers and other school personnel with this resource document entitled “Best Practices and Teaching Ideas for the Mathematics Classroom”.

As a part of the *No Child Left Behind* Act, many new reforms and concepts are sweeping across our educational systems. One concept is for schools to use and implement programs and practices based on scientific research. This is more commonly known as scientifically-based research (SBR). For a further description of scientifically-based research, please refer to page 3 of this document.

The United States Department of Education has been working to assist states across the nation with implementing this concept. However, due to the fact there is little scientific research in many content areas, including mathematics, their assistance may take quite some time.

Until there is more guidance available on Scientifically-Based Research in Mathematics, the Department of Public Instruction Title I office decided to contract with our own mathematic experts throughout the teaching field in North Dakota. These teachers included: Lori Gibson, Yvonne Timian, and Ronda Wisthoff. Through their expertise and dedication, these teachers have compiled information from a variety of resources and developed this tool.

This document is available through the North Dakota Department of Public Instruction Title I office and can also be found online at:
http://www.dpi.state.nd.us/title1/resource/mathinit.shtm.



Lori Gibson
Simle Middle School
Bismarck, ND
701-221-3570
lori_gibson@educ8.org

Yvonne Timian
Madison Elementary School
Fargo, ND
701-446-5100
timian@fargo.k12.nd.us

Ronda Wisthoff
Glenburn Elementary School
Glenburn, ND
701-362-7426
Ronda.J.Wisthoff@sendit.nodak.edu

Definition of Scientifically–Based Research

(as defined in the *No Child Left Behind* Act)

SEC.9101.(37)

The term scientifically-based research –

(A) means research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs; and

(B) includes research that –

i. employs systematic, empirical methods that draw on observation or experiment;

ii. involves rigorous data analyses that are adequate to test the stated hypotheses and justify the general conclusions drawn;

iii. relies on measurements or observational methods that provide reliable and valid data across evaluations and observers, across multiple measurements, and observations, and across studies by the same or different investigators;

iv. is evaluated using experimental or quasi-experimental designs in which individuals, entities, programs, or activities are assigned to different conditions and what appropriate controls to evaluate the effects of the condition of interest, with a preference for random-assignment experiments, or other designs to the extent that those designs contain within-condition or across-condition controls;

v. ensures that experimental studies are presented in sufficient detail and clarity to allow for replication or, at a minimum, offer the opportunity to build systematically on their findings; and

vi. has been accepted by a peer-reviewed journal or approved by a panel of independent experts a comparably rigorous, objective, and scientific review.

Ten Best Practices Associated with Student's Success in Mathematics

The following is a list of practices associated with student success in mathematics suggested by Grouws and Cebulla in the article entitled Improving Student Achievement in Mathematics. These practices are supported by research.

1. **Opportunity to Learn (OTL) –** OTL includes the scope of material, student's prior knowledge, and the presentation of new material. The total time allowed for mathematics is important in OTL.
   Suggestions for the classroom include:
   - Provide ample time for instruction.
   - Avoid textbooks that spend a majority of time on review.
   - Provide all students with the opportunity to learn problem solving and higher-order thinking skills, regardless of their level.

2. **Focus on meaning –** Emphasis on teaching for meaning has positive effects including better initial learning, greater retention, and an increased likelihood that ideas will be used in new situations.
   Suggestions for the classroom include:
   - Emphasize the meaning of ideas, including how they are connected to other mathematics ideas.
   - Relate concepts to what the child knows and has experienced. This makes mathematics reasonable and helps children to better understand the material.
   - Make explicit connections between mathematics by giving clear examples such as, relating data to public opinion polls.

3. **Learning new concepts and skills while solving problems –** Students who develop conceptual understanding early perform best on procedural knowledge later.
   Suggestions for the classroom include:
   - Use examples in which students intuitively know the answers.
   - Teach skills and problem solving together. They do not need to be taught separately.

4. **Opportunities for both invention and practice –** The average classroom spends 90% of the time practicing routine procedures. The remaining 10% is spent on applying procedures in new situations. Children need to spend generous amounts of time doing both.
   Suggestions for the classroom include:
   - Give students the opportunity to engage in activities that not only include routine and procedures, but also include exploration of new ideas. Be mindful of the appropriate proportions and appropriate ways to present the activities.

5. **Openness to student solution methods and student interaction –** Student achievement improves when teachers are aware of how children learn. Children should have opportunity to use their own solutions, methods, and strategies.
   Suggestions for the classroom include:
   - Present problems with multiple solutions and have students find their own methods to solve them. Students need to then justify their answers to others.
   - Keep track of the students' solutions and the strategies used. This allows teachers the chance to better understand each child's learning process.

6. **Small group learning –** Students in classrooms where small group settings are used significantly outscore those that use traditional whole-class instruction.

   Suggestions for the classroom include:

   - Monitor the selection of appropriate tasks for group work.
   - Have students initially work individually on a task and then follow with group work where students share and build on their individual ideas.
   - Emphasize expectations, group goals, and individual accountability.
   - Use flexible grouping rather than thinking of small groups as something that must always be or may never be used.

7. **Whole-class discussion –** Whole-class discussion is effective when it is used for sharing and explaining a variety of solutions by which individual students have solved problems.

   Suggestions for the classroom include:

   - Follow whole-class instruction with individual work.
   - Use whole-class discussion as an effective diagnostic tool in determining the depth of student understanding and identifying student misconceptions.

8. **Number sense –** The intuitive feel for number size and combinations include the use of mental math and reasonableness of answers.

   Suggestions for the classroom include:

   - Develop number sense in all classroom activities, from the development of computational procedures to mathematical problem solving.

9. **Concrete materials –** Concrete materials should be used to teach and introduce concepts. They can help with student concept development. Teachers who use manipulative materials in mathematics instruction allow students hands-on experiences that help them construct useful meanings for the mathematical ideas they are learning.

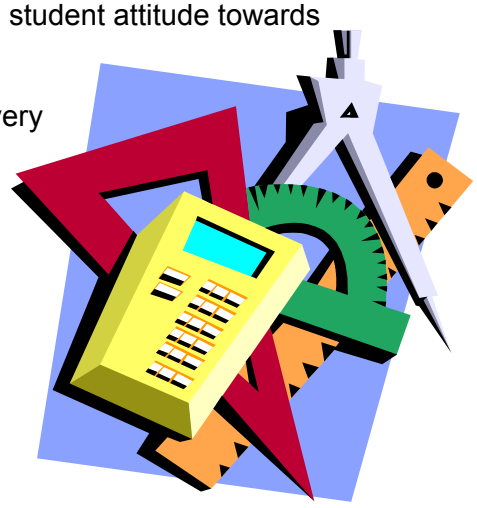
   Suggestions for the classroom include:

   - Use concrete materials beyond demonstrations. Children should use concrete materials to help them see mathematical connections.
   - Help students understand the two-way relationship between concrete embodiments of a mathematical concept and the notational system used for representation.

10. **Students' use of calculators –** Many studies support the thoughtful use of calculators in mathematics classes. This practice improves student mathematics achievement and student attitude towards mathematics.

    Suggestions for the classroom include:

    - Emphasize calculators as a tool to use in exploration and discovery in problem-solving situations and when introducing new mathematical content.
    - By reducing computation time and giving fast feedback, calculators help students focus on understanding their work and justifying their methods and results.



Summary of National Research Council Mathematics Strands

- Understanding Mathematics
- Computing Fluently
- Applying Concepts to Solve Problems
- Reasoning Logically
- Engaging with Mathematics

Conceptual understanding of mathematics *is an integrated and functional grasp of mathematical ideas. Students with conceptual understanding know more than isolated facts and methods.*

Why is it important for students to develop conceptual understanding?

- Conceptual understanding increases students' retention.
- Students can easily apply their understanding to a variety of concepts and problem solving situations.
- It helps students avoid many critical errors.
- Students will have less to learn because they can see deeper similarities between superficially unrelated situations.
- If students are unsure of a certain algorithm, they may rely on other strategies to reach an answer.

As teachers, how can we help students develop conceptual understanding?

- We can encourage students to explore a variety of methods to solve problems.
- We can emphasize "thinking strategies" by explaining how procedures work and examining their benefits.
- We can allow students time to work individually on procedures for problems. Students should then be encouraged to work in small groups, following with whole class discussion on the different strategies and methods tried. The teacher's role at this time is a facilitator, allowing students to explore and share different strategies. This becomes more meaningful to the students because they have ownership in their learning.

Computing fluently *is having and using efficient and accurate methods for computing.*

Why is it important for students to compute fluently?

- Computational fluency makes problem solving easier.
- Computing fluently builds confidence in the student's power to do math reasoning.

As a teacher, how can we help students develop computational fluency?

- We can provide many exploratory experiences and time to identify the relationship between numbers.
- We can help children develop thinking strategies for learning basic facts. This enables students to understand relationships and to reason mathematically.
- We can place computation skills in problem-solving contexts to motivate students to learn computational skills.
- We can provide a variety of computational methods and strategies to develop a deeper understanding of mathematical concepts.
- We can allow for time to practice mathematical computing which helps to improve speed and accuracy, but do not make this the main focus.

Computing fluently is an essential component of mathematics. Students in grades K-2 are expected to fluently compute with addition and subtraction; grades 3-5 are expected to fluently compute addition, subtraction, multiplication, and division; and students in grades 6-8 are expected to compute the above mentioned as well as decimals, fractions, and percents fluently.

Applying concepts to solve problems *is the ability to formulate, represent, and solve mathematical problems.*

Why is it important for students to be able to apply concepts to solve problems?

- Problem solving focuses on the meaning of arithmetic operations.
- Problem solving is used in everyday living.

As teachers, how can we help students apply concepts?

- Provide a plan for students to solve problems.

  Sample Plan

  1) Understand the problem
     - Ask students, "What do you know?"
     - Have students identify what is being questioned.

  2) Devise a plan
     - Have students choose an appropriate strategy or strategies.
       - ❖ Write as equation
       - ❖ Draw a picture
       - ❖ Look for a pattern
       - ❖ Use manipulatives
       - ❖ Make it simpler
       - ❖ Guess and check
       - ❖ Act it out

  3) Carry out the plan

  4) Look back
     - Have students reread the problem.
     - Have students check the solution to see if the answer is reasonable.

Reasoning logically *is to have the capacity for logical thought, reflection, explanation, and justification.*

Why is it important for students to be able to reason logically?

- Reasoning logically allows us to use prior knowledge to solve problems.
- It permits us to reason about numbers and their properties.
- It becomes a tool that enables students to justify and explain their solutions.
- It ensures that the student's reasoning is valid.
- Reasoning logically develops our ability to find patterns in problems.

As teachers, how can we help students to reason logically?

- We can present problems, discuss the mathematical thinking, and discuss what is observed.
- We can give fewer problems at a time and expect justification.
- We can practice justification and relate problems to student's prior knowledge.
- We can offer open-ended questions with multiple solutions.
- Good problem solvers continuously connect their computation to the situation and the question presented.

Engaging with mathematics *is seeing mathematics as sensible, useful, and doable.*

Why is it important for students to be engaged?

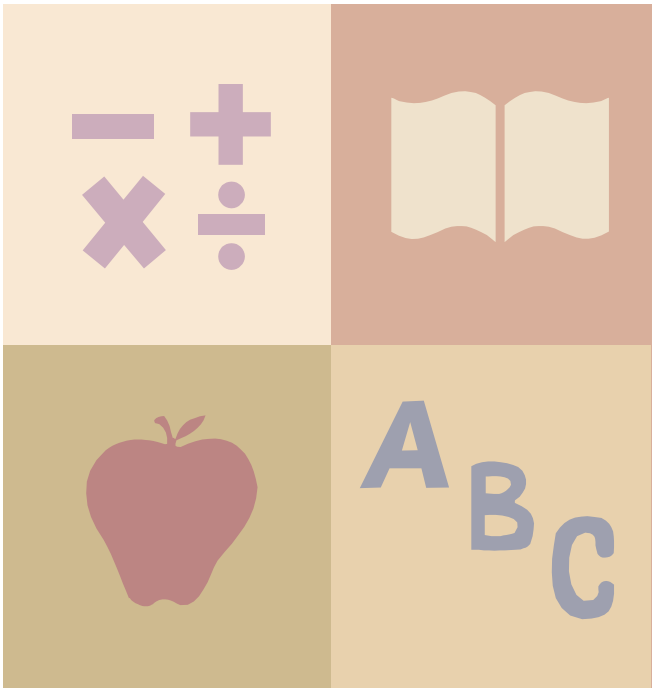
- It helps children to make sense of their surrounding world. Mathematics is understandable, not arbitrary.
- It allows students to perceive mathematics as useful and worthwhile.
- Children learn and begin to believe that steady effort and experience result in learning.
- Engaging with math increases the student's confidence, knowledge, and ability.

As teachers, how can we help students engage in mathematics?

- We can keep learning challenging and meaningful.
- We can encourage students to maintain a positive attitude by maintaining one ourselves.
- We can encourage meaningful discourse.
- We can focus on both process and justifying answers rather than answers alone.

Best Practices and Teaching Strategies Aligned with the North Dakota Mathematics Standards

- Number and Operation
- Geometry and Spatial Sense
- Data Analysis, Statistics, and Probability
- Measurement
- Algebra, Functions, and Patterns



Number and Operations: *Students understand and use basic and advanced concepts of number and number systems.*

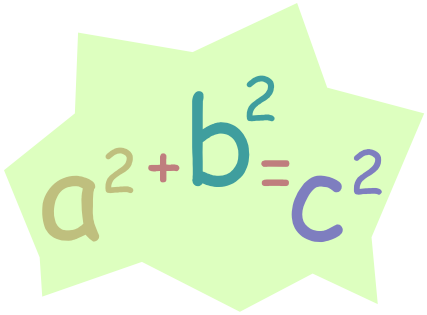
Addition and Subtraction Teaching Ideas:

- Combinations: Learn the facts to be able to add to 10 or to 5, this will make it easier when you are adding many numbers because it will give you a method for grouping. Break numbers apart to make adding easier. [28+56=(28+2)+54=30+54=84]
- Base 10 blocks to show regrouping.
- Number line for addition and subtraction.
- Touch points for counting on to add and counting backwards to subtract.
- Doubles: (2+2, 3+3, 9+9) Easy to memorize and can be used as the building block for the other facts. Double +1 and Double +2: [7+8=(7+7)+1=15] or [6+8=(6+6)+2=14]
- Plus one: Practice telling the number that comes after a number. Plus Two: Count 2 past a number.

- Count up from the number being subtracted to the larger number. [15-11=? Start at 11 and count up 12, 13, 14, 15. The difference is 4.]
- Doubles subtraction strategy: The doubles facts are easy to memorize. [14-7=7, 16-8=8]
- Fact families: Addition and subtraction are opposites. [15-7=8, 15-8=7, 8+7=15, 7+8=15]
- Zero strategy: Any number plus or minus 0 is that number.
- Standard algorithm should be introduced after the student has an understanding of base ten system. Regrouping needs to make number sense—use manipulatives or base ten blocks or cards for a visual interpretation.
- Mental math for making a tens number and subtracting. [82-53 = (82-50=32) and 32-3=29]
- Tens strategy: Count up from the addend to make 10, add this number to the amount needed to make the answer. [14-8=? Say 8+2=10, add the 2 to the 4 needed to reach 14. 2+4=6]
- Count down strategy: Count backwards from the bigger number. This is usually used when subtracting 1, 2, or 3.
- Adding the tens first: [54+36=? (50+30=80) and (4+6=10) so 80+10=90]
- Adding 9 to a number: Take a 1 from the addend to make 10. A similar process is used for adding 8. [9+6=(10+5)=15] and [8+6=(10+4)=14]

Multiplication and Division Teaching Ideas

- Skip count by 2, 3, 4, 5, 10 etc. Also use different numbers as a starting point. Count by 5's starting with 3. [3, 8, 13, 18, etc.]
- Look for patterns for multiples on a hundreds chart.
- Zero multiplied by any number is zero.
- One multiplied by any number is that number.
- Multiplication by 2 consists of the "doubles" for addition.



- Multiplications arrays: Use graph paper and make a grid for 3x4, 3x5, 6x6, etc. Graph all the ways to make 16, 20, 36, etc. This is a geometric model to show multiplication.
- Fingers each have 3 spaces for counting by threes.
- Fact families assist in developing the relationship between multiplication and division. [7x6=42, 6x7=42, 42÷7=6, 42÷6=7]
- Count by fives: Relate to the clock [5x2=10 minutes, 5x6=30 minutes] and relate to nickels and counting money. All products or quotients end in 0 or 5.
- Nines finger strategy: Hold up 10 fingers, put down the finger of the number you are multiplying 9 by, count the fingers on each side of the downed finger [5x9, put down the fifth finger (which would be the thumb on your left hand). You will then count 4 fingers on the left hand and 5 on the right hand. The answer is 45.]
- Nines strategy: The sum of the digits in the quotient is equal to 9. [9x5=45 (45 is 4+5=9)] [9x2=18 (1+8=9)]
- Find the missing factor in multiplication. [72÷9=?, 9x___= 72]
- Repeated addition. [3x5=15 or 5+5+5=15]
- If a number is divisible by 2 then the ones digit is an even number.
- If a number is divisible by 3 then the sum of the digits is divisible by 3. [14=1+4=5. 5 is not divisible by 3.] [36=3+6=9. 9 is divisible by 3.]

- A number is divisible by 6 then the number must be divisible by 2 and 3.
- If a number is divisible by 9 then the sum of its digits is divisible by 9. [378÷9=? (3+7+8=18) 18 is divisible by 9, so 378 is also divisible by 9.]
- Provide students with a variety of counters to use to show as many ways as possible to make 24, 36, 45, etc.

Geometry and Spatial Sense: *Students experience the concepts of shape, size, symmetry, congruence, similarity in two-dimensional and three-dimensional space, and develop generalizations about geometric relationships.*

Geometry and Spatial Sense Teaching Ideas

- Use physical objects and tools to explore shape. Examples include: pattern blocks, attribute blocks, tangrams, geoboards, geometric solids, miras, pentominoes, and color tiles.
- Sorting shapes using properties.
- Create shapes using manipulatives both with and without patterns to follow.
- Conduct a geometry walk to find shapes in the environment such as playground, hallways, or on clothing.
- Always use math terms such as lines, sides, faces, etc. to describe shapes.
- Study art projects to look for design, line, shapes, etc.
- Read books such as The Patchwork Quilt by V. Floutley and The Greedy Triangle by M. Burns that emphasize geometry.
- Use origami to help students learn to visualize.
- Build congruent and symmetrical designs.
- Brainstorm and list real objects that are a particular shape – spheres would be globes, basketball, marbles, pearls, etc.
- Use quilts in geometry
  - Have students list the shapes found on the quilt.
  - Classify the triangles found on the quilt according to degree and like sides.
  - Create quilt design on graph paper.
- Use photographs to show shapes. Cylinder is a can of Pringles. Cone is ice cream cone.
- Battleship game.
- Provide problem-solving situations that lead them to investigate patterns and structures in shapes and to develop reasoning processes in spatial contests.
- Allow for experiences that relate geometry to ideas in measurement, number, and patterns.
- Have students choose a shape and write a story describing some characteristics about their shape. Encourage them to decorate their paper with shapes they may trace from pattern blocks.
- Students can design different shapes with geoboards. They can draw their shape on dot paper and describe its characteristics.
- Explore figures using flips, turns, and slides.
- Geometry Building – have students build geometric structures using a variety of materials (spaghetti noodles, marshmallows, toothpicks, blocks, books, etc.)

Data Analysis, Statistics, and Probability: *Students collect, sort, represent, analyze, and interpret information. This information is then used for predicting, drawing inferences, and making decisions.*

The teaching of probability and statistics should stem from real problems or real life interests.

Teaching Concepts to Develop Meaningful Learning

- Collecting Data: Students need experience gathering both factual data and data that involves opinions.
  - Children may gather information about birthdays, shoe sizes (types and colors), height, hair and eye colors, favorite foods, favorite television shows, favorite sports stars, clothing (types and colors), favorite video games, and favorite recordings or musical artists.

- Sampling: Students need to learn the difference between random and nonrandom samples and the importance this difference makes in statistical studies.
  - For example, to determine the percentage of people in the general population who are left-handed, you would not poll professional baseball players as a random sample.

- Organizing and Representing Data: Students need experience organizing data and representing it graphically using a variety of graphs, tables, and charts.

- Interpreting Data: Students should learn to read graphs, make quick visual summaries as well as further interpretations and comparisons of data through finding means, medians, and modes.

- Assigning Probabilities: Initial experiences with measuring uncertainty should be informal and should include discussion of whether a result is possible or likely, or whether outcomes are equally or not equally likely.

- Making Inferences: Students need to draw conclusions based on their interpretation of data. They should learn to justify their thinking using numerical information they've collected and analyzed.

Data, Statistics, and Probability Teaching Ideas

- Alphabetical Probability: Have students predict the five letters that come up most frequently. Then have students pick a sentence from a book and tally how many times each letter appears in the sentence. Have groups compile the information and then compare the class results with their predictions.

- Sampling Bean Populations: Materials needed are one bag of white beans and three bags of brown beans. Mix all beans together. (Choose beans that are about the same size.)
  - Ask each student or group of students to predict which of the following they think they would most likely get if they were to take 4 beans from the bag with their eyes closed. [ex. 3 white and 1 brown, 2 white and 2 brown, 1 white and 3 brown, 4 white, 4 brown.]
  - Have students discuss their predictions and reasoning. Have each student pick 4 beans without looking, record results on a class graph, and then discuss.

- Two-Coin Toss: Materials needed include two different coins. Have students toss two coins together 25 times. After each toss, have students record what comes up – two heads, two tails, or one head and one tail. Have students predict and then complete the experiment.

- Predict future outcomes based on graphs.

- Finding the Average of States: Have students investigate mean, median, and mode by listing 5 or more states. Have students count the number of letters in each state and then compare the numbers to find the mean, median, and mode. Finally, have them examine how each average is affected by extremes in the data.

Measurement: *Key to the development of skills in measurement is ample experience with measuring activities. Children acquire measuring skills through firsthand practice and estimation. Students also make comparisons using concepts and tools to describe and quantify the world.*

Measurement Teaching Ideas

- Comparing objects with nonstandard units. Children use a variety of objects for measuring such as, parts of the body, straws, cubes, books, and whatever else is readily available.

- Choosing suitable units for specific measurements. Children select the appropriate tool, and use correct units of measurement needed for specific applications.

- Making comparisons between objects by matching. Children compare and order objects, without the use of other tools of measurement.
  - For example, students may compare their height with other students in the classroom by standing by one another to determine who is taller, shorter or the same. They then record their findings.

- Comparing objects with standard units.
  - Standard units should emerge as a convenient extension of nonstandard units, useful for the purpose of communication.

- Relating Metric Units to Body Measures: Have students find some measure on their bodies that matches the three lengths (centimeter, decimeter, and meter) so they'll always have a reminder of those measurements with them.

- Foot Area and Perimeter: Have students trace their foot on centimeter-squared paper. Have them figure the area of their foot in square centimeters and the perimeter of their foot with string. Measure the string in centimeters.

- Round Things: Have students look for circular shapes in the class and around school. For each one (at least ten shapes), have them measure its diameter and its circumference. Record results on a chart. Key question:
  - What is the relationship between the diameter and circumference?

- Practicing Measuring: Have students make a chart with headings of Estimate, Measurement, and How far off? Have them estimate how many centimeters or inches their length of foot is, measure it, and then compute how far off they were from their estimation. Findings should be recorded as they work. Have them perform the same experiment with the circumference of their wrist, circumference of their head, length of arm, and length of their pencil. They are to use a ruler and string.

- Exploring Volume with Mittens: Read <u>The Mitten</u> by Jan Brett to the students. Have students bring in mittens prior to the lesson and have "junk boxes" on hand. Junk boxes may have assorted items such as: unifix cubes, teddy bear counters, milk caps, tiles, crayons, or rocks. The potential capacity or space of the mitten is explored through fitting items of the same size into a mitten. Have students predict the amount of each item and then record their findings after discovering how many can fill the mitten. NOTE: Worksheets for this unit may be found in AIMS Education Foundation Journal, January, 1991.

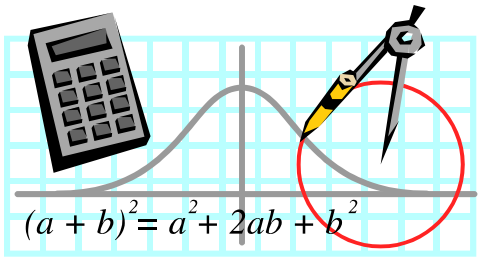
- Are you a Square?: Have students compare their height with their reaches, both arms outstretched. Compare what works best with string. Post a graph for them to record their names in the proper place. Squares have equal heights and reaches. Squares have equal heights and reaches. Tall rectangles have heights that are longer than reaches. Wide rectangles have longer reaches than heights.
  - Students can also compare: forearm to foot, circumference of neck to circumference of calf, and circumference of head to height.
  - An interesting fact to share with students is that Michael Jordan is a wide rectangle.
  - The majority of people will be a square.

Algebra, Functions, and Patterns: *Students use algebraic concepts, functions, patterns, and relationships to solve problems.*

Algebra Teaching Ideas

- Variables
  1. Tell students to take a collection of cubes that contains three yellow, six green, and nine pink.
  2. "What are some statements you can make about this collection that don't tell the actual numbers of cubes?" Whole-group discussion is suggested in the beginning.
     Students may suggest:
     - There are eighteen cubes altogether.
     - There are three more green than yellow.
     - There are twice as many green as yellow.
  3. What are some equations you can write about this collection?
     y + g + p = 18
     y + 3 = g
     2y = g
  4. Try a few more examples, then tell the students to make up their own collections and clues.

- Use variables as a placeholder. [27=4X+3]
- Conversions: X takes on different values. Y may also take on different values. [Y=3X]
- Use concrete object and symbols to represent quantity to explore variables.
- Determine missing addends. [3+□=6]
- Verbalize about a pattern to find a rule.
- Write and solve simple equations using an unknown.
- Explore inequalities.



Function Teaching Ideas

- Paper Tearing and Folding: Tear or fold paper in half and predict how many sections you will have. Continue process-noting patterns. Make a chart with folds and sections.
- Dot Connecting: With one dot you have zero lines, with 2 dots you can draw one line. How many lines will you draw with 3?, 4? Make a chart.
- The Diagonal Problem: If you have a 12-sided polygon how many diagonals can you draw? Pentagon? Hexagon?

- Squares from Squares: If you build larger and larger squares, how many squares will you need to build one that measures 12 on a side? Look for patterns. Make a chart.
- Have children come to the front of the room and count their eyes. One child has two eyes, two children have four eyes, three children have six eyes, and so on. The number of eyes depends on the number of children and therefore the number of eyes is a function of the number of children.

Pattern teaching ideas

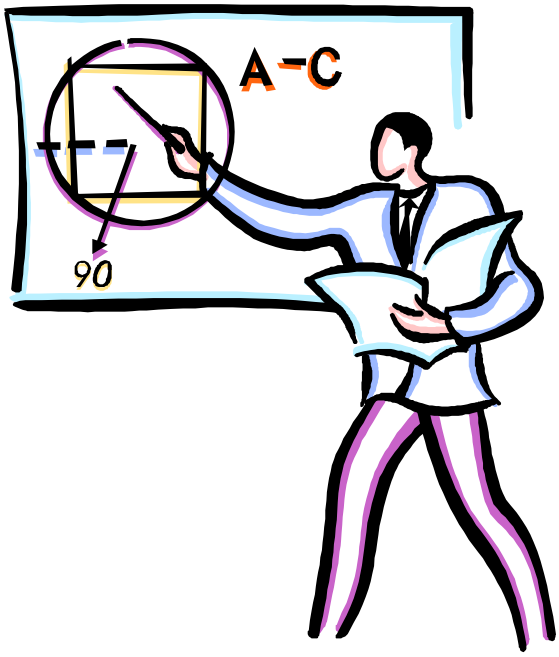
- Rhythmic patterns: snap, clap, clap, snap, clap.
- Shape patterns: box, square, triangle, box, square, triangle.
- Letter patterns: abc, abc, abc.
- Number patterns: 6, 12, 18, ___, 30. Odd and even patterns.
- Skip count by any number and mark on a 100 grid, could include color coding.
- Look for patterns in music, poetry, art, and nature.
- Find patterns using a calculator.
- Give students materials that can represent a pattern [i.e. make a train of interlocking red-blue-red-blue-red cubes.]

Connecting patterns, functions, and algebra in one lesson.

- Ask students how many wheels are on six tricycles. Encourage students to make a table to help organize their information. One column could be number of tricycles and the second column could be the number of wheels. Students should then look for patterns going horizontally and vertically. A whole-group discussion is suggested.

  Lead students into exploring functions by having them record the information in ordered pairs: (1, 3), (2, 6), etc. Students can then graph the information on a coordinate plane to see the relationship between the number of tricycles and wheels.

  To connect patterns and functions to algebra, students can now make an equation with variables. *T* can represent the number of tricycles and *W* can represent the number of wheels. One example of an equation is *T* x 3 = *W.*



Definitions

Algebra – Representation of patterns and functions through the investigation of numbers, geometric patterns, verbal description, tables, symbols, graphs, predictions, and generalizations.

Area – The measurement of the amount of surface a flat object has.

Attribute blocks – Blocks that can be sorted by shape, color, size, and/or thickness.

Circumference – The distance around the outside of a circle.

Data – The facts, or numbers, that describe something.

Diameter – The distance from one side to the other side of a circle.

Function – Allows students to predict results.

Geometry – Study of shape and size in our world.

Mean – The sum of the set of numbers divided by the number of numbers in the set.

Median – The middle number of an odd collection of numbers; the average of the two middle numbers in an even collection of numbers.

Mira – Reflective tool used in discovering symmetry.

Mode – The number that occurs most frequently in a collection of numbers. If two numbers tie for most frequent occurrence, the collection is said to be bimodal.

Patterns – Key factor in understanding mathematical concepts. This allows students to visualize relationships and understand order and the logic of math.

Pentominoes – Similar to dominoes, but with five connected parts.

Probability – The ratio of successful outcomes to the total number of outcomes of the event.

Spatial sense – Spatial visualization is the ability to visualize relationships of objects in space. Note: These skills are important both in math classes and in everyday life. Early experiences using real objects will help develop these skills.

Statistics – A field of mathematics that organizes large collections of data in ways that can be used to understand trends and make predictions.

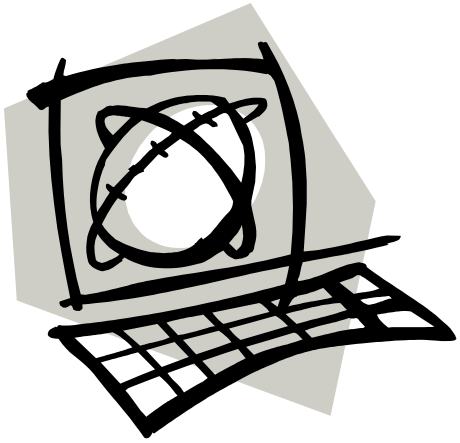
Variable – A letter or symbol that stands for one or more numbers.

Volume – The measure of the space enclosed by a solid.

Internet Math Sites

Interactive sites for children

- www.funbrain.com
- www.aaamath.com
- www.aplusmath.com
- www.mrsalphabet.com
- www.coolmath4kids.com
- www.k111.k12.il.us/king/math.htm
- www.visualfractions.com
- www.arcytech.org/java
- www.dositey.com
- www.learningplanet.com
- www.kidport.com
- www.primarygames.com
- www.funschool.com
- www.edu4kids.com
- www.kidsdomain.com/games/math2.html
- www.netrover.com/~kingskid
- www.perry-lake.k12.oh.us/pes/GradeLevelWebsites/Kindergarten/kohl/Math/shapes.htm



Teacher sites

- www.edHelper.com
- www.aplusmath.com
- www.lizardpoint.com
- www.schoolexpress.com/
- www.learningfirst.org/mathaction.html
- www.mathforum.com
- www.math.com
- www.kidsdomain.com/games/math2.html
- Children's Literature in Mathematics - http://fcit.usf.edu/math/resource/bib.html

Resources

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