MATH

MAKING A BUDGET

GRADES: 4-8

This activity can be used at the holiday time or for the students' birthdays

MATERIALS:

- writing materials
- video: The Homecoming—A Christmas Story (optional)

METHOD:

1. I introduce the lesson by asking them to make a list of ALL the things they want for their birthday. (They go hog wild!).
2. Then we discuss the difference between a want and a need.
3. Next: they divide their lists into two categories, wants and needs. We discuss their lists and then they revise it (some things are deleted)
4. Now we make a list of all of the standard household bills their parents receive each month. I impress upon them that I do not want to know their family's business, keep $$ amounts private.
5. We form a class list on the board or overhead.
6. Next we place estimated $$ amounts by each bill: ex. electricity $$, grocery $$, car payment $$, etc.
7. Then we arrive at a grand total of the average monthly bills that their parents must pay before gifts may be purchased. (this is a real eye opener!!)
8. We discuss wisdom and how it is obtained over a period of years, not learned form a text book.

9. I assign them a project of finding a wise person (someone over the age of 60) to interview. They are to ask: What was Christmas/your birthdays like for you as a child? Then they are to record their story and any other information about their family traditions. Their information my be turned in as a video taped interview, written as a new paper article, written in story form, etc.You will be amazed at how these kids are touched by their experiences with these “wise” people.
10. Hand back their original birthday list and ask them if the want to add or delete any of the items. They (9 out of 10 of them) will want to delete items.
11. Rent a copy of the Film THE HOMECOMING – A CHRISTMAS STORY (Walton’s Mountain family) to show the class. They will love it! (Even if it’s not Christmas time)
12. I have done this project for the past 7 years and find it to be a true learning experience for all kids!!!

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CHILD-MADE JIGSAW

GRADES: K-2

All children can do this activity, even at the kindergarten level with help. I have never had a problem with children completing this activity and the children take pride in their finished jigsaws.

MATERIALS:

- old birthday or Christmas cards

- 1 sheet of white A4 copy paper per child
- wallpaper or other paste and glue brushes
- 1 pair of scissors for each child

METHOD:

1. Collect enough old Christmas, birthday and other greeting cards for each member of the class with pictures that will appeal to both sexes. The children take great pride in their work and choose their pictures with care.
2. Cut the card so that the front is separate from the back. You should have one piece of card with a picture which is single thickness. Keep the commercial greeting part of the card for other activities.
3. On the back of the card, draw 5 triangles. One should be the largest and will be made by placing a ruler from one corner diagonally across the card. The remainder of the card will consist of 4 triangles of different sizes.
4. Each child looks carefully at the picture prior to cutting it out. Then each spice is cut out and placed carefully into position on the A4 paper. DO NOT ALLOW THE CHILDREN TO GLUE AT THIS STAGE.
5. When the children have pieced their jigsaws together in the right position, then they can glue the card pieces onto the paper.
6. Display on the pin board.

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GETTING TO KNOW YOU GRAPHING JOURNAL

GRADES: 3-8

This lesson is a good one to do during the first week of school as it helps breaks the ice for your class and introduces or reinforces various forms of graphs.

MATERIALS:

- graph sheets
- pencils or crayons

METHOD:

1. The first week of school I teach 5 major forms of graphs. I do one form a day. The first day I teach single bar graphs. Then double bar graphs, single line graphs, double line graphs, and circle graphs. Each day I have the class make 3 graphs. The first one we all make together, the second one is guided, and the third graph is made independently. To gather the information post the question and record the data on the board or overhead.
2. On the first day the 3 bar graphs we make are: hair color, types of pets, and the year each child entered our school for the first time.
3. When we make the double bar graph we use information gathered by the row. One of these is the number of brothers and sisters per row. This is set up across the x-axis using these identifiers: row 1 brothers, row 1 sisters, row 2 brothers, etc. Other graphs of this type that we do are # of aunts and uncles and # of cats and dogs.
4. Single line graphs are very simple to do and there is a variety of info to be gathered. When we do double line

graphs, we use information gathered by gender. The ones we are doing this year are birth month, favorite color, and height. Use two different colors to form the lines.

5. Our final graphs are circle or pie ones. I created mine on the computer so that I could have a circle divided with the number of sections that correlated with the number of kids in my class. We are doing favorite soda pop, favorite outdoor activity, and favorite dessert.
6. At the end of the week we have accomplished several major objectives. The class is now ready to use this essential tool throughout the year instead of waiting for the math book to introduce this. Also, put all of the wonderful graphs into a portfolio or journal which will be wonderful for Back to School Night. You can also use this data for a number of writing and language activities (biographies, interviews, web pages, etc.)

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SOME IDEAS FOR SIMPLIFYING YOUR MATH CLASS

GRADES: 4-12

MATERIALS:

- none

METHOD:

1. When teaching requires the use of tools, such as rulers, compasses, protractors, etc., try to get the whole class to have the same instrument. I had some class funds to use recently & bought enough protractors & compasses for everyone in the class to use. They will be re-used from year to year. When I went to teach the lesson, I didn't have to run around the room trying to show everyone how "theirs" worked. Also – try to use clear protractors. The new purple & green plastic ones are cute, but hard for beginners to use.
2. Another idea for protractors: Use a small drill (like a Dremel tool) to put a small hole at the crosshairs. Some protractors come with a hole already there. Tie a string through the hole. When the knot is lined up over the crosshairs, the student can then pull the string up along the angle side they are measuring & the string points to the correct number of degrees.
3. Use the overhead! Write to the publisher to get permission to make overhead transparencies of difficult lessons. This way everyone can watch what you're doing on the overhead. (I had a couple of difficult lessons on scale drawings & map distances that I taught this way. They weren't difficult lessons – just difficult to teach when everyone couldn't see what I was doing). Make a ruler out of transparency film or photocopy onto a transparency. Slide overhead transparencies into clear plastic sheet protectors. They can then be stored in a 3-ring binder, and the sheet protectors can be easily written on & erased.
4. Use examples from real life, whenever possible. For a lesson on sales tax, photocopy a receipt from a recent purchase. Have the students figure out if the tax was correct. Copy your electric bill & talk about the way kilowatts are measured & billed. For a lesson on scale drawings, visit a new home development & take a copy of

the floor plans of a new house. I found a really neat book about the way carpenters have to use math – such as measuring the angle & pitch of a staircase, etc. Challenge the students to think of a profession that doesn't use math (farmers have to measure acreage, pounds of fertilizer, etc., lawyers have to be able to bill accurately, etc. Every job requires that employees be able to check to see if their paycheck is correct!)

5. Take math grades once a week instead of daily. I correct math lessons orally daily, usually with students marking their own mistakes, but I only collect them weekly – usually on test days. Of course I have to watch for cheating, but I know my kids' ability pretty well & it becomes obvious to spot. I record the grades while the students are testing. Since my school uses workbooks & I do not allow the students to tear out the pages, this is the only way I have found to be able to glance over their work for neatness, completeness, similar errors, skipping problems, etc. without keeping their books overnight. I also clip the corners of pages I've checked to help me go the the right lesson next time.
6. Use manipulatives, even in middle school & high school. I was a straight-A student, but didn't really understand most math concepts until a college professor let us "play" with his 5th grade manipulatives. Use fraction pieces, counters, graph paper, etc. Go ahead & make 5 groups of 4 with edible manipulatives like Cheerios. It's the first time I really understood the concept of multiplication! Use "fun" manipulatives like m&m's, Skittles, pennies, etc. – they don't have to be boring bean counters. ***submitted by*****C. DAMIGO**
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DAILY STORY PROBLEM

GRADES: 3-8

This approach to story problems made a tremendous difference in my classroom this year. Test scores shot up both on proficiency tests and standardized tests. Although the instructions are designed for an elementary self-contained classroom, they can easily be adapted for middle school and departmentalized programs.

MATERIALS:

- tagboard
- small incentive charts
- stickers

METHOD:

1. While this will take some preparation time, the pay-off is worth it! I have a daily story problem that is written on tagboard to put up in my class every morning. (It is worth the effort to put these on tag because there is no effort in future years to keep this going.)
2. The problem is read aloud no matter what the grade level and students have until after lunch to solve the problem.
3. Children keep a file folder with their answer papers inside. I give a new sheet a week and make sure the children are aware of having substantial space to work.
4. All answers must have labels i.e. feet, puppies, centimeters, etc.
5. After lunch, 3 or 4 students go to the board to solve the problem. They talk aloud as to how they solved the problem.

6. When children use different methods to reach the same answer, we spend time discussing how and why that works.
7. Each child has an incentive chart up in the class. Each day 2 students are assigned the task of collecting those papers with correct answers. A sticker is put on the chart for each student who was correct. When a child gets 20 stickers, he/she gets a prize and a new chart goes up on the wall.

HELPFUL HINTS:

1. I do not discourage children from talking to each other about ways to attempt to solve the problem. They may not copy each other though.
2. I do not make up nonsense problems. If we are studying a specific unit, I look for information about that to create my problems. So, we did 3 weeks of problems about ancient Egypt and 3 weeks of insect problems.
3. I vary the targeted math skill. So in one week, we may do one long division, one simple fraction, two on working with money, and one on decimals.
4. I make sure that once and awhile the daily problem is very simple so that everyone is having success.
5. I also made up a lot of trivia problems using the Guiness Book of World Records. My kids enjoyed reading about things like the largest pizza ever made.

Finally, the students' ability to locate and use mathematical language improved tremendously. Many of my kids are second language learners and need constant practice in looking for key vocabulary—in addition to the daily review and practice of math skills.

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THE BASIC PRACTICE MODEL

GRADES K-12

The Basic Practice Model is the traditional behavioral approach utilized by many school districts which is a standard, traditional, direct lesson plan where the teacher presents to the whole class and the students practice. Many administrators evaluate teachers with this model in mind, so it is a good idea to have some good lessons prepared that utilize it. Besides, in this "day of constructivism," this model has its place and use.

Here are the steps:

1. ORIENTATION: Teacher establishes content, continuity with previous activities and future activities, establishes the objective of the lesson.
2. PRESENTATION: The teacher presents both visually and orally to the whole class; students listen and watch.
3. STRUCTURED PRACTICE: Teacher essentially presents again with the students working along with the presentation.
4. GUIDED PRACTICE: Students work on another example while teacher circulates and offers assistance.
5. INDEPENDENT PRACTICE: Students do another example without assistance.
6. FEEDBACK: Hey, you "gotta" reflect and debrief. ***submitted by*****ROB SCHUCK**
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SETTING A FOUNDATION FOR PROBLEM SOLVING

GRADES 3-12

The beginning of the school year is a crucial time to begin the problem solving process—a process that is a central component of all new Math texts adopted today. The following are a number of stages, approaches and steps for problem. They should be discussed with the students, and if possible, put onto charts for display throughout the year. Examples should be chosen in accordance with the age and level of your students.

6 STAGES OF THE PROBLEM SOLVING PROCESS

1. Define the problem
2. Brainstorm possible solutions
3. Evaluate and prioritize the possible solutions
4. Choose the best solution
5. Determine how to implement the solution
6. Assess how well solution solved the problem

7 APPROACHES TO PROBLEM SOLVING

1. Guess and check
2. Find a pattern
3. Use a systematic list (charts & tables)
4. Use a drawing or a model
5. Eliminate possibilities
6. Work backwards
7. Use a similar, simpler problem

5 STEPS TO PROBLEM SOLVING

1. Read and understand the problem
2. Organize the information
3. Determine the operations needed, establish equation
4. Solve and check answer
5. State and label your answer ***submitted by*****ROB SCHUCK**
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THE FOLLOWING ARE SOME VERY POPULAR PROBLEM SOLVING LESSONS THAT WE RAN LAST YEAR. THESE ARE AN EXCELLENT WAY TO CONDITION YOUR STUDENTS INTO HIGHER LEVEL THINKING SKILLS FROM THE BEGINNING OF THE YEAR!

TEACHING THE "GUESS AND CHECK" METHOD

GRADES 3-12

Guess and check is an important critical thinking process that is becoming increasingly prevalent within new math texts. It is usually introduced in some form in third grade, and is used in some form all the way up through senior high.

There are four major steps involved in the "Guess and Check" method:

1. Make a plan
2. Create a chart or table
3. Eliminate possibilities
4. Look for a pattern

The following are a number of examples you can use. (Additional examples can be found in virtually any math text book). They are listed in developmental order, less sophisticated to those more sophisticated. Pick those most appropriate to your students. (The numbers can easily be changed to provide additional examples).

With practice your students will develop a self confidence that will enable them to obtain solutions ranging from a variety of correct answers to one correct answer. This will serve as a preparation for high order thinking skills as those used in Algebra, Geometry, etc.

EXAMPLE 1

Using pennies, nickles and dimes, how many different combinations can be used to obtain 25 cents? (HINT: there are 12 ways)

Make a chart with pennies, nickles, dimes and “total” as column headings.

> *TEACHER NOTE: This problem introduces all four of the steps and adherence to ONE CONDITION—the combination must total 25 cents. The students should be able to put these combinations in any order they choose. As they practice this type of problem, they will find that using a particular system or order, (i.e. concentrating on pennies from greatest to least) will emerge as a faster, more accurate method. Initially, in the earlier grades, students should use actual coins and record their findings.*

EXAMPLE 2

Using nickles, dimes and quarters, how many different combinations (where at least one of each coin is used), can make 50 cents? Before you start, make a prediction. Compare your prediction to your findings.

TEACHER NOTE: There are only 2 combinations. This example introduces TWO CONDITIONS—at least one of each coin AND a total of 50 cents.

EXAMPLE 3

Using 17 coins—including AT LEAST ONE NICKLE, DIME AND QUARTER—how many different combinations can be used to make $2.25? Before you start, make a prediction. Compare your prediction to your findings.

TEACHER NOTE: There are only 3 combinations. This example introduces THREE CONDITIONS—at least one of each coin, 17 coins AND a total of $2.25.

EXAMPLE 4

Using 17 coins—including AT LEAST ONE NICKLE, DIME AND QUARTER—how many different combinations can be used to make $2.25—WHERE THERE ARE 4 MORE DIMES THAN NICKELS? Before you start, make a prediction. Compare your prediction to your findings.

TEACHER NOTE: There is only 1 combination. This example introduces FOUR CONDITIONS—at least one of each coin, 17 coins, a total of $2.25 AND a relationship of one variable (dimes) to another (nickles).

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USING A SYSTEMATIC APPROACH TO THE GUESS AND CHECK METHOD

GRADES 3-12

Last time we traced the developmental stages of guess and check ("Teaching the Guess and Check Method"), utilizing four components. These components involved:

- Making a plan
- Creating a chart or table
- Eliminating possibilities
- Looking for a pattern

The purpose of these components is to demonstrate to the student that through an organized, *systematic* process, answers to seemingly "impossible" problems can be found. The key is the *systematic approach*, because all four components evolve around the system.

Having already explored the wonderful world of coin problems, the following examples are concerned with consecutive numbers and age problems. Also available are very basic problem solving examples that highlight each of the seven approaches originally addressed two weeks ago ("Setting a Foundation for Problem Solving").

EXAMPLE 1

5 years ago, Jay was seven times older than Mary. In five years, Mary will be half as old as Jay (or Jay will be twice as old as Mary). How old is each now?

Make a horizontal chart with the following headings. (discuss the construction of the heading with the students):

J5YA–M5YA–J7XOLDER?–JNOW–MNOW–JIN5Y–MIN5Y–M1/2J?

KEY:

J5YA (John's age 5 years ago)
M5YA (Mary's age 5 years ago)
J7XOLDER? (Is John 7 times Mary's age?)
JNOW (John's age now)
MNOW (Mary's age now)
JIN5Y (John's age in five years)
MIN5Y (Mary's age in five years)
M1/2J? (Is Mary half of John's age?)

TWO POSSIBLE ANSWERS: (Numbers are in order of the columns above)

7–1–YES–12–6–17–11–NO

14–2–YES–19–7–24–12–YES

Therefore, Jay is 19 and Mary is 7

EXAMPLE 2

Make a chart similar to the one above.

Let's make up a consecutive number problem–your choice.

- Using whole numbers: Four consecutive whole numbers have a sum of 14 and a product of 120. What is the second number? (2, 3, 4, 5)
- Using odd, whole numbers: Three consecutive odd, whole numbers have a sum of 9 and a product of 15. What is the third number? (1, 3, 5)
- Using even whole numbers: Three consecutive even, whole numbers have a sum of 12 and a product of 48. What are the numbers? (2, 4, 6)

- Using integers: Three consecutive integers have a sum of 0 and a product of 0. What is the first consecutive integer? (-1, 0, 1) ***submitted by*****ROB SCHUCK**
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GUESS AND CHECK–FINAL PROJECT–

MULTIPLE VARIABLES AND CONDITIONS

GRADES: 6-12

This is the last of the problem solving contributions that will be submitted, unless there is a sudden outcry for more! more! more! I hope that what has been presented so far has been of use for some of you. So…for the grand finale of problem solving utilizing the guess and check (trial and error) method, I present to you the infamous chickens, pigs, and sheep problem.

TEACHER NOTE: Remember that the "guess and check" method utilizes four components. These components involve:

1. Making a plan
2. Creating a chart or table
3. Eliminating possibilities
4. Looking for a pattern

The purpose of these components is to demonstrate to the student that through an organized, systematic process, answers to seemingly "impossible" problems can be found. The key is the systematic approach because all four components evolve around the system. Also, by using a systematic approach, it becomes increasingly easier to eliminate possibilities. This

is especially true of the problem presented here.

THE PROBLEM: You are given $100 to buy 100 farm animals (at least one each of three animals—chickens, pigs, and sheep). If chickens cost 10 cents, pigs cost $2, and sheep cost $5, how many of each animal must you purchase so that the total is 100 animals for $100?

THE CHART: There should be five (5) column headings to represent the problem components. You might want to add a few more to make the students check to see which direction they need to make their "guesses".

CHICKENS (.10)——PIGS ($2)——SHEEP ($5)——100 ANIMALS?——$100

CHICKENS: 35 ($3.50)
PIGS: 40 ($80)
SHEEP: 25 ($125)
100 ANIMALS?: YES
$100: NO ($208.50)

CHICKENS: 50 ($5)
PIGS: 35 ($70)
SHEEP: 15 ($75)
100 ANIMALS?: YES
$100: NO ($150)

TEACHER NOTE: These two lines represent a wealth of information. In addition to each column beginning to show a potential pattern of direction for future guesses, a viewer should be able to see the plan I am using. Also, what possibilities have already been eliminated? What other possibilities can be eliminated as a result? If your students become frustrated with their own attempts, you might consider using these two lines (or your own) to help them get back on track.

THE SOLUTION: Do you really want me to tell you? Okay, I'll

meet you half way. The number of chickens is a multiple of 10 (Why must this be so?). It is not 50 chickens. The number of pigs feet is almost = the number of chickens. There are less sheep than the other two animals (approximately 1/7 of chickens and 1/2 of pigs).

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