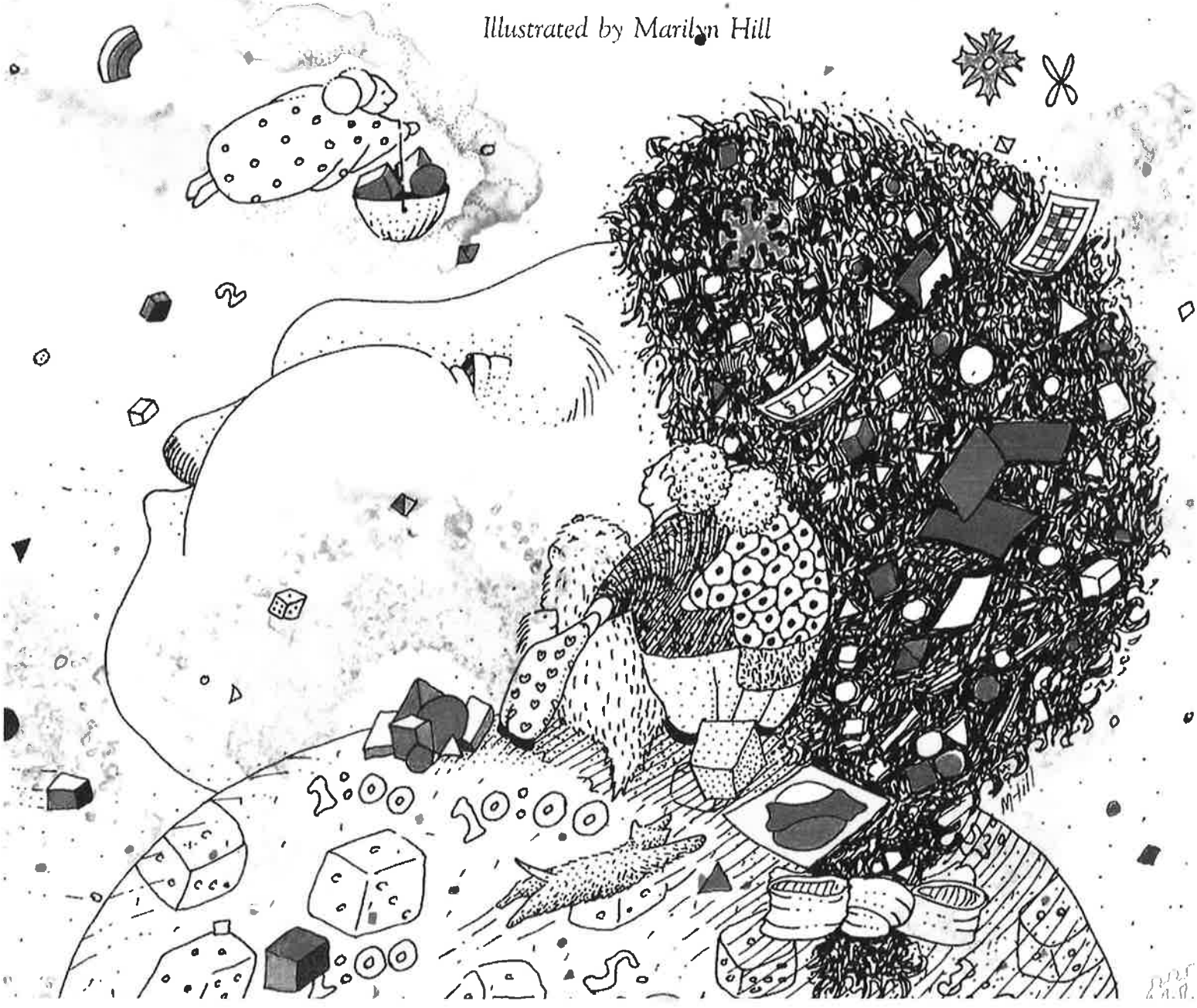
# FAMILY MATH

*Jean Kerr Stenmark*
*Virginia Thompson*
*and*
*Ruth Cossey*

*Illustrated by Marilyn Hill*



# S A M P L E

## FAMILY MATH

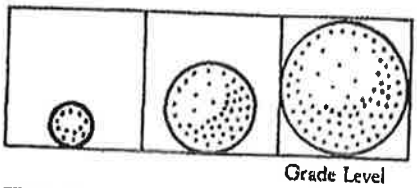
## SESSION I

| Time | Activity | Reference Page In Family Math |
|---|---|---|
| 7:00 p.m. | Name Tags – Write Your Own | 284 |
| | Sign In Sheets (Venn Diagram) | 59 |
| | Estimation Contest | |
| 7:10 p.m. | Welcome & Introduction | |
| | Opener – Value of Words | 33 |
| 7:20 p.m. | Double Digit | 111 |
| 8:00 p.m. | Cookie Break | |
| 8:10 p.m. | Create a Puzzle | 187 |
| | Useful Math Skills | 271-273 |
| 8:20 p.m. | Evaluation | |
| 8:30 p.m. | Closure | |

# Value of Words

## Why

To practice mental arithmetic and estimation while problem-solving



Grade Level

TOOLS

**Pencil**
**Paper**

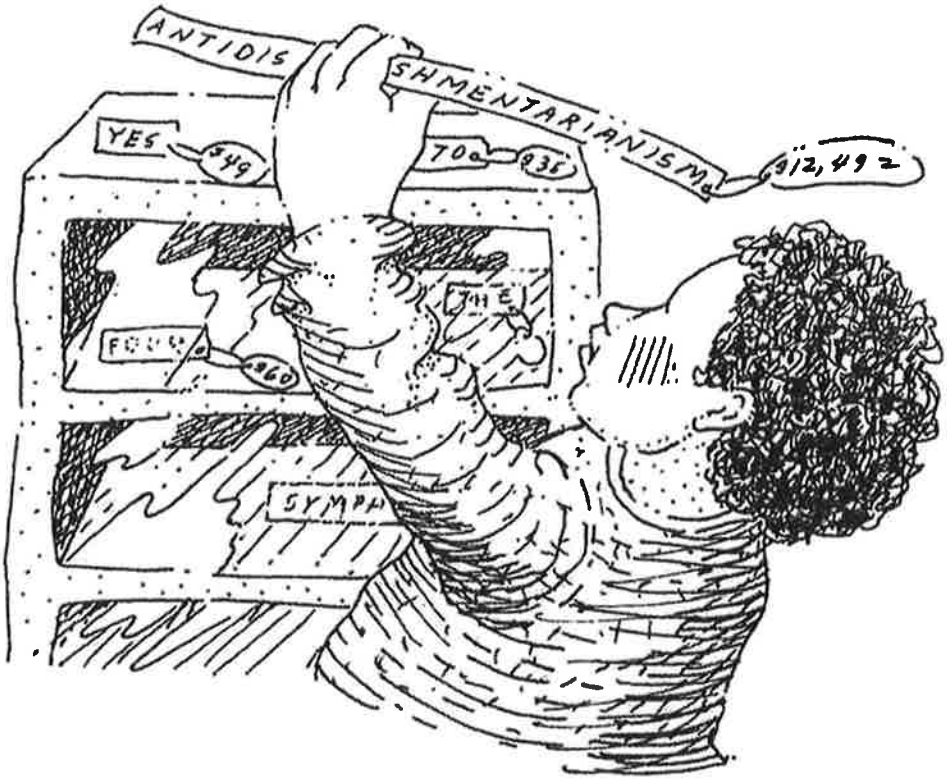
## How

- ☐ Assign values to the letters of the alphabet, as shown:
- ☐ Have each person in your family find the value of his or her first name.
- ☐ Add up the numbers without using paper and pencil if you can.
- ☐ What is the most expensive word each of you can find?
- ☐ Can you find a word worth exactly $50? $100?

| | |
|---|---|
| A = $ 1 | N = $14 |
| B = $ 2 | O = $15 |
| C = $ 3 | P = $16 |
| D = $ 4 | Q = $17 |
| E = $ 5 | R = $18 |
| F = $ 6 | S = $19 |
| G = $ 7 | T = $20 |
| H = $ 8 | U = $21 |
| I = $ 9 | V = $22 |
| J = $10 | W = $23 |
| K = $11 | X = $24 |
| L = $12 | Y = $25 |
| M = $13 | Z = $26 |

## *More Ideas*

- ☐ You and your child may want to make up different activities, such as:
  - ☐ Hold a week's contest to find the most expensive word.
  - ☐ Use penny values instead of dollars.
  - ☐ Find the difference between your first and last names.
  - ☐ Multiply the values instead of adding them.
  - ☐ Use fractional values, so that A=1/26, B=2/26, etc.



# *Value of Words*

How much is your name worth?

| | | | | |
|---|---|---|---|---|
| **A** 2¢ | **F** 12¢ | **K** 22¢ | **P** 5¢ | **U** 15¢ |
| **B** 4¢ | **G** 14¢ | **L** 24¢ | **Q** 7¢ | **V** 17¢ |
| **C** 6¢ | **H** 16¢ | **M** 26¢ | **R** 9¢ | **W** 19¢ |
| **D** 8¢ | **I** 18¢ | **N** 1¢ | **S** 11¢ | **X** 21¢ |
| **E** 10¢ | **J** 20¢ | **O** 3¢ | **T** 13¢ | **Y** 23¢ |
| | | | | **Z** 25¢ |

PLEASE - Calculate the value of your ***first name*** using this pattern.

How much is your friend's name worth?

Find a name with a value more than yours.

Find a name with a value less than yours.

In your class, whose name do you think is worth the most?

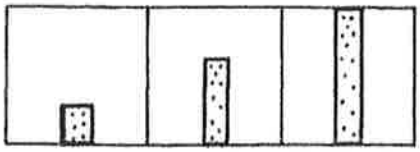
Can you find a word worth exactly $1.00?

# Double Digit

## Why

To practice place value and estimation skills

*Both skill and chance play important roles in this game. The dice rolls make it difficult to use a consistent winning strategy. However, an intuitive understanding of probability, or what* usually *happens, will allow children to find a strategy that will be successful more often than not. Development of estimation skills will increase a child's chances for success in other areas of mathematics.*



Grade Level

TOOLS

**Pencil**
**Paper for scoresheets**
**Dice**

*A game for*
*2–6 players*

## How

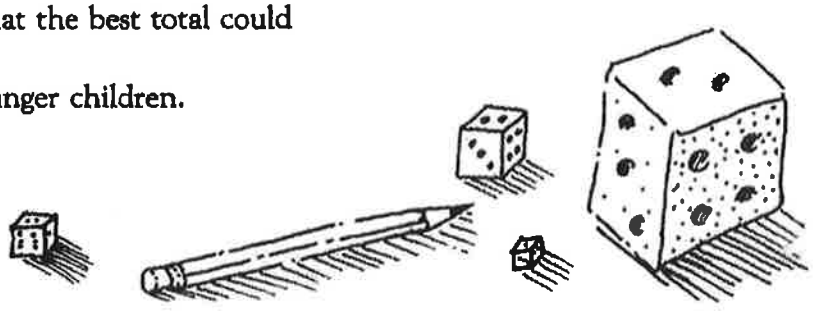
- You will need one die for the group and a scoresheet for each person in your family, like this one:

| TENS | ONES |
|---|---|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |
| 6. | |
| 7. | |

- Each person takes a turn rolling the die.
- The number may be written in either the tens' column or the ones' column of the scoresheet.
  - When a number is entered in the tens' column, "0" is written next to it in the ones' column. Thus, 4 written in the tens' column counts as 40.
- After each player has rolled the die **seven** times, the players add up their numbers.
- The players who are left in the game compare their totals.
- The player who is closest to 100 without going over is the winner.

## *More Ideas*

- At the end of the game, talk about what the best total could have been with those seven rolls.
- See also the game Dollar Digit, for younger children.



*Double Digit*

| Tens | Ones |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| Total | |

*Double Digit*

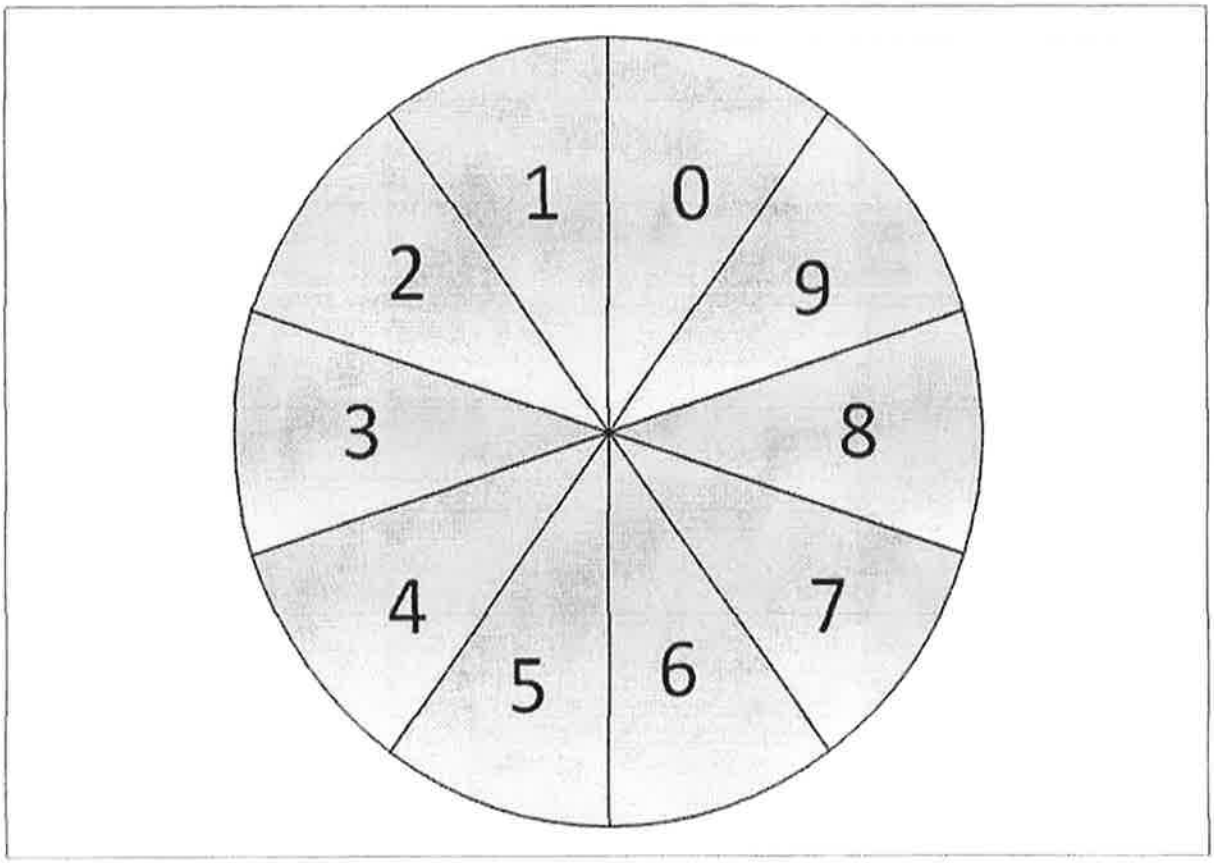
| Tens | Ones |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| Total | |

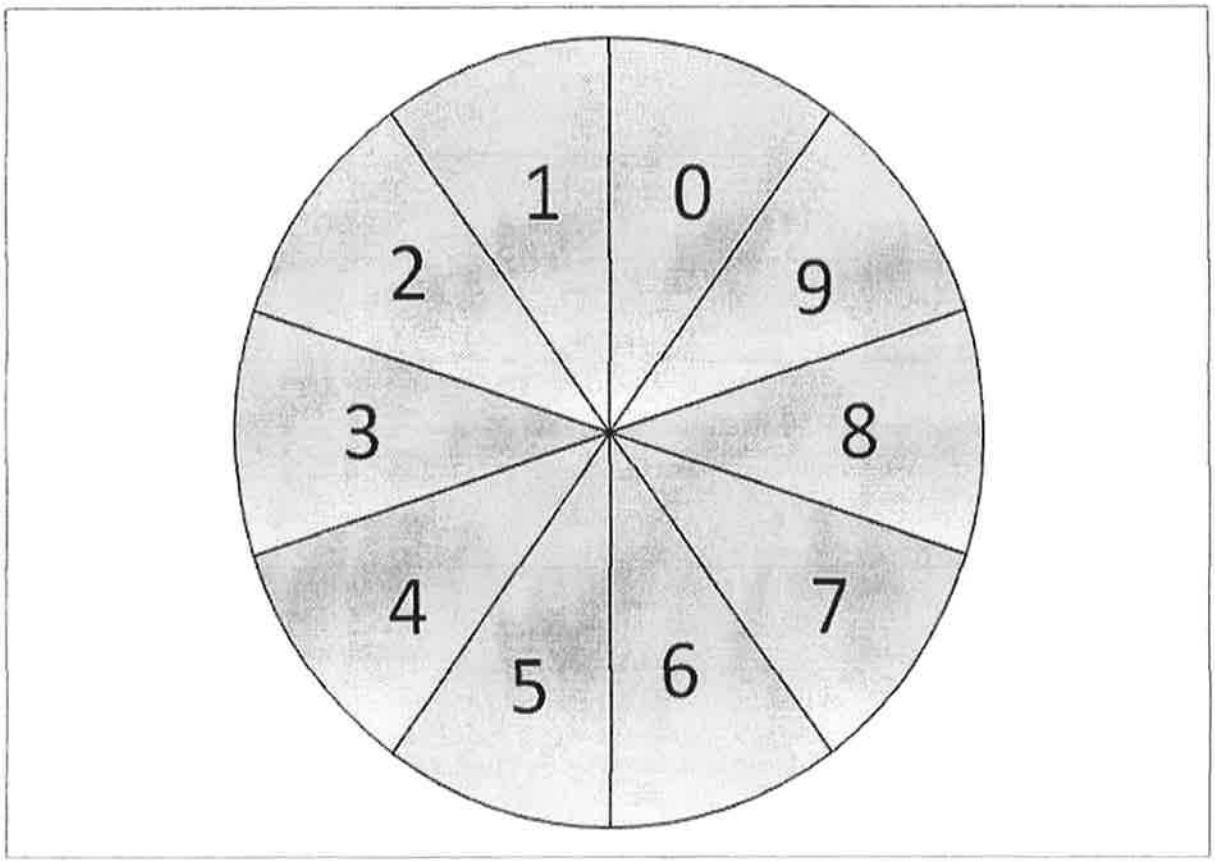
*Double Digit*

| Tens | Ones |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| Total | |

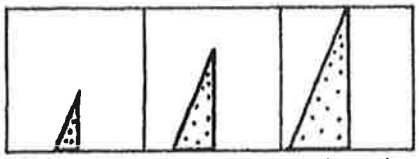
*Double Digit*

| Tens | Ones |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| Total | |


0
1
2
3
4
5
6
7
8
9


0
1
2
3
4
5
6
7
8
9

# Create a Puzzle



Grade Level

TOOLS

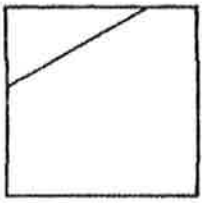
**Scissors**
**Cardboard or**
**Heavy paper**

## Why

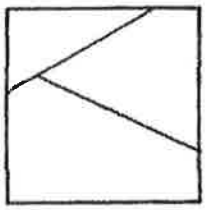
To explore the attributes of geometric shapes by building and solving a sequenced series of puzzles

## How

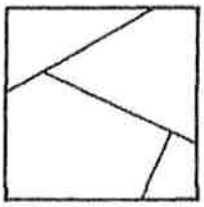
- ☐ Start with a square or any other shape you find pleasing.
- ☐ Make one straight cut in any direction. For example:

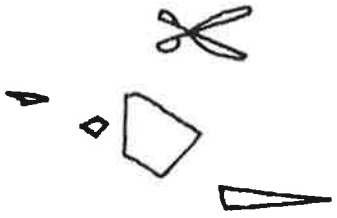


- ☐ Make a second cut. For example:



- ☐ Fit the three pieces together to make sure you can solve this puzzle.
- ☐ Make any third cut. For example:





- ☐ Practice with the four pieces, then give your puzzle to a friend to solve.
- ☐ Special Note: If you wish to make your puzzle a little easier to solve, color the backs of the pieces differently from the front.

# MATH USED IN JOBS

Name _____

Ranking Sheet

Rank the 10 math skills according to how many people in the following occupations said they used the skill. Place number 1 by the math skill used most often, number 2 by the skill used second most frequently, and so on through number 10, which is the math skill used the least.

| Use Of | Your Answer | Actual Answer | Percentage |
|---|---|---|---|
| Fractions | | | |
| Basic geometric concepts | | | |
| Calculators | | | |
| Formulas | | | |
| Decimals | | | |
| Averaging | | | |
| Ratio and proportion | | | |
| Estimation | | | |
| Per cent | | | |
| Statistical graphs | | | |

**Occupations**

Accountant
Accounting systems Analyst
Administrator: Shopping Mall
Advertising Agent
Airline Passenger Service Agent
Airplane Mechanic
Airplane Pilot
Air Traffic Controller
Appraiser (Land)
Architect
Artist (Graphic)
Attorney
Auditor
Auto Mechanic
Bank Teller
Biologist (Environmental)
Carpenter
Carpet Cleaner
Cartographer
Chiropractor
Computer Programmer
Computer Systems Engineer
Contractor (General)
Controller (Hospital)
Counter Clerk (Building Materials)
Data Processor
Dentist
Dietician
Doctor (G.P.)
Drafter
Economist
Electrician
Electrical Engineer
Electronics Technician
(Civil) Engineer
(Electronics) Engineer
(Industrial) Engineer
(Petroleum) Engineer
Environmental Analyst
Farm Advisor
Fire Prevention Officer
Fire Fighter
Forestry Land Manager
Forestry Recreation Manager
Geologist (Environmental)
Highway Patrol Officer
Hydrologist
Income Tax Preparer
Insurance Agent
Insurance Claims Supervisor
Interior Decorator
Investment Counselor
Landscape Architect
Librarian
Machinist
Manager: Appliance Store
Manager: Temp. Employment Service
Marketing Rep. (Computers)
Masonry Contractor
Medical Lab Technician
Meteorologist
Motorcycle Sales and Repair
Navigator
Newspaper: Circulation
Newspaper: Production
Newspaper: Reporter
Nurse
Oceanographer (Biological)
Optician
Orthopedic Surgeon
Painting Contractor
Payroll Supervisor
Personnel Administrator
Pharmacist
Photographer
Physical Therapist
Plumber
Police Officer
Political Campaign Manager
Printer
Psychologist (Experimental)
Publishing: Order Manager
Publishing: Production Manager
Purchasing Agent
Radio Technician
Real Estate Agent
Roofer
Savings Counselor
Sheet Metal/Heating Specialist
Social Worker
Stock Broker
Surveyor
Technical Researcher
Title Insurance Officer
Travel Agent
T.V. Repair Technician
Urban Planner
Veterinarian
Waitress/Waiter
Wastewater Treatment Operator

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| Decimals | | | |
| Averaging | | | |
| Ratio and proportion | | | |
| Estimation | | | |
| Per cent | | | |
| Statistical graphs | | | |

**Occupations**

Accountant
Accounting systems Analyst
Administrator: Shopping Mall
Advertising Agent
Airline Passenger Service Agent
Airplane Mechanic
Airplane Pilot
Air Traffic Controller
Appraiser (Land)
Architect
Artist (Graphic)
Attorney
Auditor
Auto Mechanic
Bank Teller
Biologist (Environmental)
Carpenter
Carpet Cleaner
Cartographer
Chiropractor
Computer Programmer
Computer Systems Engineer
Contractor (General)
Controller (Hospital)
Counter Clerk (Building Materials)
Data Processor
Dentist
Dietician
Doctor (G.P.)
Drafter
Economist
Electrician
Electrical Engineer
Electronics Technician
(Civil) Engineer
(Electronics) Engineer
(Industrial) Engineer
(Petroleum) Engineer
Environmental Analyst
Farm Advisor
Fire Prevention Officer
Fire Fighter
Forestry Land Manager
Forestry Recreation Manager
Geologist (Environmental)
Highway Patrol Officer
Hydrologist
Income Tax Preparer
Insurance Agent
Insurance Claims Supervisor
Interior Decorator
Investment Counselor
Landscape Architect
Librarian
Machinist
Manager: Appliance Store
Manager: Temp. Employment Service
Marketing Rep. (Computers)
Masonry Contractor
Medical Lab Technician
Meteorologist
Motorcycle Sales and Repair
Navigator
Newspaper: Circulation
Newspaper: Production
Newspaper: Reporter
Nurse
Oceanographer (Biological)
Optician
Orthopedic Surgeon
Painting Contractor
Payroll Supervisor
Personnel Administrator
Pharmacist
Photographer
Physical Therapist
Plumber
Police Officer
Political Campaign Manager
Printer
Psychologist (Experimental)
Publishing: Order Manager
Publishing: Production Manager
Purchasing Agent
Radio Technician
Real Estate Agent
Roofer
Savings Counselor
Sheet Metal/Heating Specialist
Social Worker
Stock Broker
Surveyor
Technical Researcher
Title Insurance Officer
Travel Agent
T.V. Repair Technician
Urban Planner
Veterinarian
Waitress/Waiter
Wastewater Treatment Operator

# Does math make good homework?

## Sure! Here's how to make it work for you!

Marilyn Burns
INSTRUCTOR, September 1986

For both students and teachers, math homework can become drudgery—pages of assignments with no direct tie to a child's world, no appeal to discovery and imagination.

Is there a better way? Can math make the sort of homework parents' respect, kids enjoy, and you savor?

The answer is an emphatic *yes*.

Is your class studying measurement? Ask kids to measure all family members' feet and bring back their findings. Are you working on division? Suggest that students figure out how many towels—or forks, or pillows—their families have per head.

As you develop homework strategies for the year ahead, remember that the math assignments children bring home communicate strongly with parents about your goals. When you assign work that promotes problem-solving and involves a wide range of activities, you give parents the message that their children's thinking and reasoning abilities are being addressed. Problem-solving activities also offer experiences that parents themselves find interesting as they help with their children's math learning.

Early in the year, send parents a set of suggestions for helping kids with math homework. Here's some of the advice offered to parents in a new book, *Family Math* (see box):

1. Let your child know that you believe he or she can succeed.
2. Be ready to talk with your child about mathematics, and listen to what he or she says. Ask your child to explain the *meaning* of each part of a problem.
3. Be more concerned with the *processes* of doing mathematics than getting a correct answer. The answer to a particular problem has little importance, but knowing *how* to find answers is a lifetime skill.
4. Try not to tell your child how to solve the problem. It's better to ask questions and help your child Find his or her own methods of working it through.
5. Practice estimation with your child whenever possible. Estimation helps the thinking about a problem that *precedes* the doing, and it helps kids answers make sense.
6. Provide a special place for study. Allow your child to help gear the place to his or her learning style.
7. Encourage group study, especially as your children grow older.
8. Expect that homework will be done, and look at completed homework regularly, but keep your comments positive. Praise your child for asking questions about the work.
9. Try not to drill your child on math content or create hostilities by insisting that math work be done at any one specific time or in a specific way.
10. Don't expect that all homework will be easy for your child or be disappointed that it seems difficult.
11. Let your child see you enjoying mathematics. Include recreational mathematics in your family routine. Try to introduce math ideas (with a light touch!) at the dinner table, while traveling, or while at the grocery store.

Suggest that parents of younger children help with "how many" counting activities—household searches for the number of doors, doorknobs, TVs, radios, chairs, beds, and so on. Or send young students home with a paper showing two blank clock faces and instructions to work with parents to draw in the times when the child usually goes to bed and gets up. The idea is to involve the child in his or her environment and enlist parent support in a way that conveys the intrinsically interesting qualities of math.

Ask children to interview their parents to find out when they actually use arithmetic in their daily lives. Parents may mention check-book balancing, grocery shopping, cooking, figuring discounts, restaurant tipping, and calculating gas mileage.

Next, students and parents sort the situations they've listed three different ways. First they sort the situations as to when they occur—at work, at home, or at play. This helps students see that arithmetic skills are needed in a variety of ways. Second, parents indicate for each entry whether they generally do that arithmetic mentally, with a calculator, or by using paper and pencil. This helps kids see the need to learn their basic facts and to learn to calculate is needed—such as for a checkbook, or whether an estimate will do—such as for tipping at a restaurant. This shows the importance of knowing how and when to estimate.

Here are more homework ideas to broaden kids' understanding and prepare them for future learning:

*Geometry* Assign students the task of looking for geometric shapes at home. They investigate floors, wall-papered walls, fabric designs, tabletops, doors, mirrors, to find shapes, sizes, symmetry, congruence, and similarity. Kids make a list and illustrate it to show what they find. Or ask students to search their homes for as many examples as possible of one shape.

*Measurement* Ask kids to find out whether measurements are standard in their homes. Are doorknobs all the same distance from the floor? Are the seats of the chairs the same height? Are kitchen tabletops the same length? Bathroom sinks the same depth? Doors a standard height?

*Average/Predictions and Probability* Ask students to figure how many times, on the average, their home telephone rings after school. How many hours after dinner is the TV usually on? How many minutes in a half-hour TV shows are usually devoted to commercials? About how many different commercials are included in a half-hour show? Students can collect statistical information over a period of days to investigate questions such as these. Ask them to chart findings, figure averages, or make predictions for other days and times.

*Problems with money* Assign students the task of finding as many ways as they can to make change for a dollar bill. Younger children can be asked to find ways to make change for a quarter or half dollar. Older students can find how to use 100 coins to make $5 without using any nickels.

Ask the students to try to find words that are as close in value to a dollar as they can get. (*Wednesday* is worth exactly a $1, and so are *quarter, elephants, thirty, mittens* and *writing*. More than 500 words in the English language are worth exactly $1.)

understand whether their

*Teaching math games* Suggest that students teach their parents games they learn in school so kids can get help with strategies. For example, the game of Nim is easy to play, yet challenging to analyze, and provides the opportunity to develop logical thinking. A collection of objects is needed—13 to start with. Two players take turns, each removing one or two objects each turn. Whoever gets stuck having to take the last object loses. Another game is suggested in "Target addition" on page 94.

*Back in the classroom* There is less motivation for a child to put a great deal of effort into an assignment that won't be collected, corrected, and returned until several days later. By the time the assignment is returned, the student's involvement is drastically reduced and the teaching moment has been lost.

Students receive more immediate feedback whey they review the assignments cooperatively in small groups. For example, when practice pages of skills have been assigned, students compare answers, discuss difference, and turn in one joint assignment that each signs. While the groups are getting started, check in their heads. Third, the list should be sorted by whether an accurate answer that students have completed the assignment and assist groups with difference they cannot reconcile. Students who did not do the assignment learn some of what they missed from the group discussion. You can also get more out of math homework by using it for further exploration. Say the students' homework required them to write a word problem for each of five practice exercises. When small groups are reviewing homework the next day, ask each child to read his or her best problem aloud so others in their group can try to figure out which exercise fits the situation. Or say students were assigned to look for ways to make change for $1. The next day, ask kids in small groups to compare and discuss how they can be sure when they've found all possible ways.

If you've directed students to measure the diameter and circumference of three circular objects at home, then you can discuss their findings the next as your class investigates the relationship between diameter and circumference.

If you've asked younger children to count the number of chairs at home or draw in their bedtimes on blank clock faces, you can compare their answers in a lesson on ordering the next day. Finally, it's a good idea to check with students, once in a while, to find out how much time a math homework assignment took, what they feel they learned, what they enjoyed and didn't enjoy, what reactions they received from their families. It is from discussions such as these that students get a sense that they have an active role in play in their own learning.

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**Marilyn Burns** is the creator of The Math Solution in-service courses for teachers. She is also the author of the *The I Hate Mathematics! Book* (1975) and *Math for Smarty Pants* (1982), both published by Little, Brown.

# Answers to Parents'—and Teachers'—Questions About Calculators

*By James J. Landheer, coordinator of mathematics curriculum and instruction, East Hartford (Conn.) Public Schools*

Under attack because your first graders use calculators? Here are my responses to the 10 questions I'm most frequently asked by teachers and parents about calculators.

1. **At what age should children/students begin using calculators?**

The earlier, the better. Preschoolers enjoy pushing the buttons and watching the numbers appear. A child's natural curiosity will lead to exploring number recognition, counting, and concepts of larger and smaller. Formal instruction can start in kindergarten.

2. **What type of calculator should my child/student use?**

Purchasing a calculator is much like buying a bicycle. A child starts with a tricycle, moves on to a small two-wheeler with training wheels, then up to a 10-speed racer. In other words, calculators change as a child grows—depending on physical and cognitive needs, interest, and finances.

3. **If my child/students use calculators, will they ever learn their basic facts?**

No normal student should require a machine to do mental arithmetic. However, studies have shown that using calculators enhances young children's ability to learn basic facts.

4. **I've gotten along fine without calculators. Why should my child/students need them?**

In one word: progress. Progress has allowed the tractor to replace horse-drawn plow, electricity to replace oil lamps, and calculators to replace tedious paper and pencil computations. "Shopkeeper arithmetic" is no longer practical as the sole basis of math instruction. We must prepare students for *their* future, not *our* past.

5. **How much instruction do children need to use a calculator?**

The more complicated calculators require more instruction. If students use calculators only minimally, they miss opportunities for greater problem solving, better applications, and more involvement in how mathematics is done in the real world.

6. **Why should students use calculators in class and not be allowed to use them on tests?**

More tests are allowing students to use calculators to solve problems. Some states now use calculators as part of their standardized testing and more will move to that in the near future.

7. **Will using calculators decrease students' computational speed?**

Students need to learn how to determine which type of computation—estimation, mental arithmetic, paper and pencil computation, or calculator use—is appropriate to solving a problem. It takes longer to write down 450 + 530 then compute the sum, than it does to add the two numbers in your head. Likewise, it would make sense to multiply 4,326 by 674 on a calculator instead of using paper and pencil.

8. **Do calculators artificially enhance students' mathematical power?**

Calculators eliminate tedious computation and allow greater involvement in the learning process. First graders understand that addition allows them to find the cost of two shopping items, but their number facts are restricted to sums less than 10. The calculator allows them to explore the same concept with greater numbers than they are able to compute on their own. Likewise, in the past many trigonometric function problems revolved around standard angle measure measurements of 30, 45, t0, and 90 degrees. Calculators allow for the full realm of everyday problems.

9. **Does a school/district need a policy concerning calculators?**

All teachers, not just those who teach math, must understand that calculators are tools to use to solve problems and should, as any other tool, be used throughout the school. In math, they should be included in the curriculum. In other disciplines, calculators should be used as the need arises.

10. **How should calculators be used in the classroom?**

Calculators are instructional and problem solving tools. Teachers can use calculators with overhead projection devices. There should be a calculator for each student. If instruction on a particular topic includes calculators, then evaluating student learning should also include calculators. Calculator use must be incorporated into all phases of student activity.

Thinking it over . . .

I learned:

I liked ....

and I . . .

today was:

A problem I solved

★ ★ ★ ★ ★

I would have liked:

I plan to:

more about:

I would like to know

*optional*

I am:

Name _____

School _____