Math Monsters™

TEACHER'S GUIDE
Pre-K-2

Developed in cooperation with the
National Council of Teachers of Mathematics

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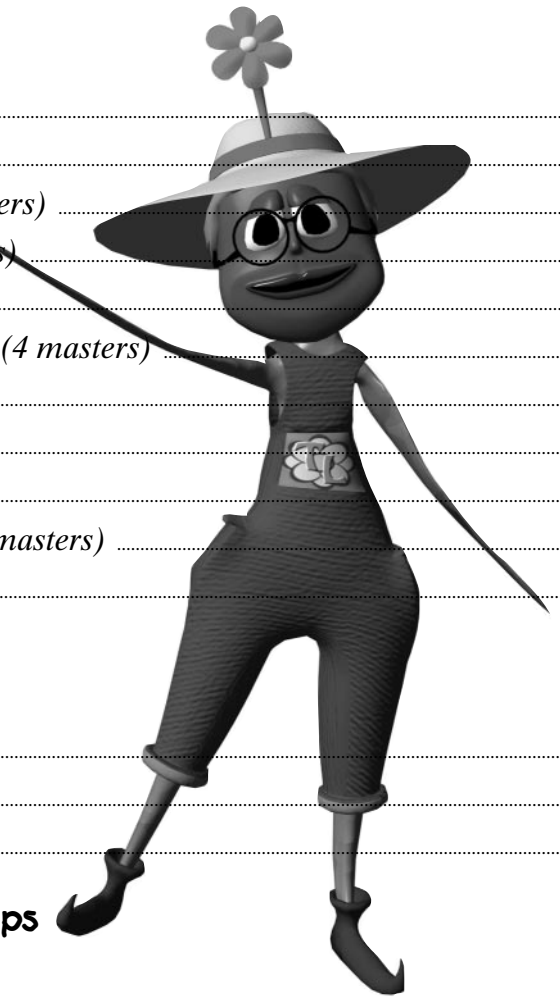
Table of Contents

Blackline Masters

Appendices



Math Monsters™ FRIENDS AND ADVISORS

Teacher's Guide Authors

Marti Wolfe

Marti Wolfe received the 1999 Presidential Award for Excellence in Mathematics and Science Teaching from the National Science Foundation. Marti also received a Project SEEDS Award in 1998 from the state of Maine for her innovative practices in mathematics teaching. She has presented at state level conferences and is active in state and local mathematics education forums. Marti has taught mathematics in elementary school for nineteen years. During her years in the classroom Marti has worked in numerous school settings. Her career has been enriched by her students and their variety of learning styles.

Kristi Hardy-Gilson

Kristi Hardy-Gilson is an elementary educator working with five- to eight-year olds in a multi-age classroom. She has been working in a developmentally appropriate setting for eight years. In 1991, she was recognized with the Sallie Mae First Year Teacher Award and Scholarship given to 50 beginning teachers across the United States. Ms. Hardy-Gilson worked for her district to create a K-8 math curriculum that incorporates the Maine State Learning Results with the NCTM Standards. She is a graduate of the University of Maine with a B.S. in elementary education.

Teacher's Guide Reviewers

Grace M. Burton

Dr. Grace Burton is a professor of Mathematics Education and Chair of the Department of Curricular Studies at the University of North Carolina at Wilmington. Dr. Burton earned a B.A. in Mathematics from Amhurst College, a M.A. in Mathematics Education from the University of Connecticut and a Ph.D. in Elementary Education/Mathematics Education from the University of Connecticut. Dr. Burton's interests include teaching about number sense, math anxiety and mathematics curriculum and instruction at the K-6 level.

Her books and articles include over 90 publications in professional journals; *Towards a Good Beginning*, an early childhood mathematics methods book; *Mathematics Plus*, Grades 1 and 2, pupil textbooks and teacher's editions published by Harcourt Brace; and *Anytime Math*, Grades K, 1 and 2, a constructivist-based mathematics program published by Harcourt Brace. She is also the Senior Author for Grades K-4 in the Harcourt Series, *Math Advantage*. She has delivered over 250 presentations on teaching mathematics at the pre-school to grade 6 level. She also reviews articles for several national journals.

Douglas H. Clements

Douglas H. Clements, Professor of Mathematics, Early Childhood, and Computer Education at SUNY/Buffalo, was a kindergarten teacher for five years. He received a Ph.D. in Elementary Education from the State University of New York at Buffalo in 1983. He has conducted research and published widely in the areas of the learning and teaching of geometry, computer applications in mathematics education, the early development of mathematical ideas, and the effects of social interactions on learning.

He has co-directed several NSF projects, producing *Logo Geometry, Investigations in Number, Data, and Space*, and over 70 referred research articles. Active in the NCTM, he is editor and author of the NCTM Addenda materials and was an author of NCTM's *Principles and Standards for School Mathematics (2000)*. He was chair of the Editorial Panel of NCTM's research journal, the *Journal for Research in Mathematics Education*. In his current NSF-funded project, *Building Blocks-Foundations for Mathematical Thinking, Pre-Kindergarten to Grade 2: Research-based Materials Development*, he and Julie Sarama are developing mathematics software and activities for young children.

Math Monsters™ FRIENDS AND ADVISORS

Project Consultant for NCTM

Pat Hess

As a former board member at the NCTM, Pat facilitated for the NCTM/Exxon K-3 Math Specialist Project. She is a former elementary mathematics teacher and math specialist for the Albuquerque Public School District in Albuquerque, New Mexico.

Senior Consultant for Video Series

Catherine Twomey Fosnot, Ed.D.

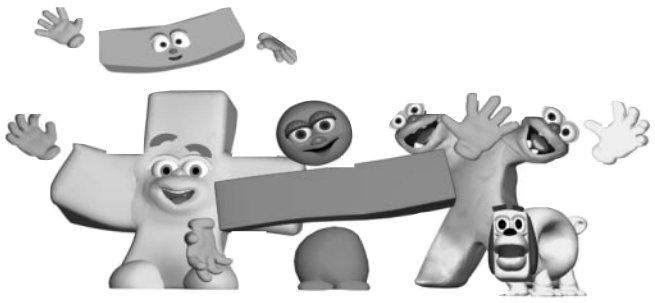
Catherine Twomey Fosnot is Professor of Mathematics Education at City College of the City University of New York where she helps elementary classroom teachers improve the way they teach mathematics. She has worked in the field of mathematics education for over fifteen years and is currently at work as Director of Mathematics in the City, a large scale National Science Foundation project on mathematics reform that helps teachers improve their practice.

She is the author of several books and articles on early childhood education, among them *Reconstructing Mathematics Education* (co-authored with D. Schifter); *Young Mathematicians at Work* (co-authored with M. Dolk); *Enquiring Teachers, Enquiring Learners; and Constructivism: Theory, Perspectives, and Practice.*

She has twice received awards from the American Educational Research Association/SIG, as well as the Young Scholar Award from the Association for Educational Communication and Technology.

Maarten Dolk, Ph.D.

Dr. Dolk, with the Freudenthal Institute at the Utrecht University in Holland, works with many different international research and development projects in mathematics education. He assists the institute in the areas of research, education, in-service training and societal service for primary and secondary education. The collaborative staff consists of mathematicians, physicists, psychologists, teachers, teacher trainers and educators from outside working together in an interdisciplinary approach with the Freudenthal Institute. Dr. Dolk has been highly instrumental in the United States with the development of materials for primary and secondary education and the in-service of primary school teachers.



Math Monsters™ Executive Producers

John Burstein

John Burstein has been producing award winning children's television programming for the past twenty years. Though best known for his work in the areas of health and fitness—he created the character of Slim Goodbody—Mr. Burstein has worked extensively in other subject areas including reading readiness, social studies, environmental education and corporate training.

Six television series, produced by Mr. Burstein, are currently airing on more than 150 public television stations nationwide. These include: *The Inside Story with Slim Goodbody*; *Well, Well, Well*; *All Fit*; *Goodbodies*, *The Outside Story* and *The Story of Read-Alee-Deed-Alee*, a fifteen-part reading readiness series developed in cooperation with the International Reading Association.

A recognized expert in delivering educational content for children in creative and imaginative ways, Mr. Burstein has worked with the American Academy of Pediatrics on a film introducing children to surgery, with Greenpeace on an environmental special co-produced with several nations, with Public Television on an AIDS education program for fourth- and fifth-graders and with HBO as the special children's interviewer for the Peabody Award-winning *How Do You Spell God*.

In addition to his television work, he has written seven books for McGraw-Hill and Coward McCann Publishers, composed music for several major children's labels and regularly performs his original young people's concert with symphony orchestras all across the United States and Canada. He is a two-time Parent's Choice Award winner. His other awards include: the New York, Milan, Houston, Chicago and Birmingham Film Festivals; Athens Video Festival; the Silver Cindy Award for audio visual achievement; and awards from the Odyssey Institute, Society for Technical Communication, Ohio State, as well as the Corporation for Public Broadcasting.

Tim Lawrence, Co-Executive Producer

Tim Lawrence has worked on and off in the Film and Television Industry for over thirty years. He has worked on various special effects projects for motion pictures and recently helped form the Camden Film Group. Raised in Australia, Mr. Lawrence brings a unique perspective to the Math Monsters™ series.

Math Monsters™ was:

Created, written and directed by John Burstein
Produced by John Burstein and Tim Lawrence
Animated by Destiny Images, Inc.

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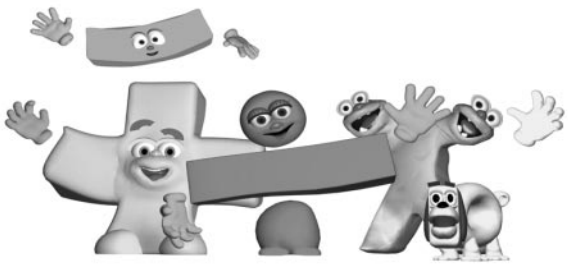
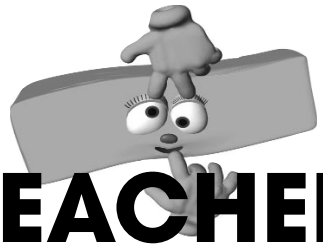




Math Monsters™

TEACHER'S GUIDE OVERVIEW

The Math Monsters™ series is an entertaining gateway to in-depth mathematical thinking and reasoning involving meaningful real-world problems. It is an educational opportunity for both teachers and students. Teachers will become familiar with the recently updated national standards and practices which fuel the curiosity of young mathematicians. Young students who are beginning to develop their own understanding of mathematical concepts can find support and comfort in the humorous and questioning approach the Monsters use to solve their mathematical problems.

NCTM STANDARDS

The Math Monsters™ series was developed in cooperation with the National Council of Teachers of Mathematics (NCTM) and is designed to meet and support NCTM Standards for Pre-K-2 mathematics content and process instruction. Towards that end, the following mathematical processes are interwoven into every episode:

- Problem Solving
- Reasoning and Proof
- Communication
- Connections
- Representation

MATH MONSTERS™ MATRIX

We have designed this guide carefully in order to enhance student learning. We begin with an outline of the NCTM Pre-K-2 Standards for teacher reference along with a **Math Monster™ Matrix cross-referencing the individual episodes with the NCTM standards that they support.** This Matrix is designed to help teachers integrate the episodes into their mathematics program.

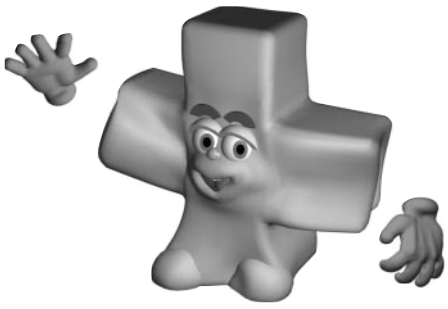
AVENUES OF ASSESSMENT

This is followed by a chapter called **Avenues for Assessment** that focuses helpful ways to observe students, study their work samples, and encourage them to talk about their strategies, so that you can best plan your next moves and give the feedback so necessary to students.

CORRELATING CHAPTERS

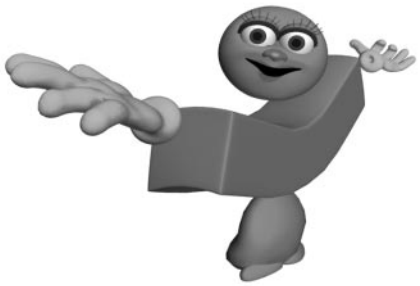
Following this are chapters that correlate with each of the programs in the Math Monster series. **Please note that the programs in the series are designed to "stand alone" and that the sequence of programs can be modified to meet your individual needs.** These chapters feature:

- The NCTM Standards addressed
- A Program Overview
- Student Objectives
- A list of vocabulary words
- A Program Synopsis
- Previewing Activities
- Pause Points Suggestions
- Post viewing Activities
- Sideline Suggestions to enhance instruction
- Reproducible blackline masters



LITERATURE CONNECTIONS AND TEACHER RESOURCES

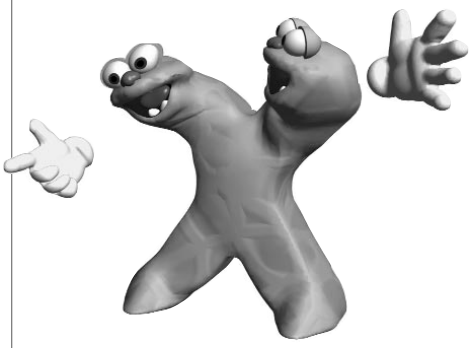
Finally, we have included two appendices: **Literature Connections** is intended to assist you in integrating reading and language arts into your mathematics program; and **Teacher Resources** lists many of the books and materials that we have found valuable to both our professional development and program planning for our young mathematicians.



POINTS TO REMEMBER

As you work with the Math Monsters™ videos along with this guide, please keep the following in mind :

- **Active Learning is at the heart of every Math Monster™ episode.** We believe children learn mathematics by doing and problem solving; by discussing and creating their own solutions.
- **It's helpfu**l for your students to make inquiries and construct meaning during the preview activities, episode and post viewing activities.



- **Pause Points** are indicated visually when a question mark (**?**) appears on the screen. They are important mathematical moments that provide opportunities for discussion with the children as they follow the Math Monsters' progress. If possible, it's best if you stop the program in order to spend more time exploring the question asked.
- **Sideline Suggestions** and comments are provided to guide discourse and give practical information to the teacher. Ultimately, every teacher will use and extend the content of each episode to match the particular group of students.
- **Field trips** connect the math in the segment to occupations in the real world.

TEACHER UTILIZATION TAPE

As part of the series, there is a Teacher's Utilization Tape that explains the foundation upon which the Math Monsters™ program is built. After viewing it, the user will better understand how to implement the Math Monsters™ program in the primary classroom.

Your students will have fun as they follow the Math Monsters through similar developmental stages in their thinking. **The Monsters communicate, reason, problem solve, create and use representations and make connections in mathematics the same way as young children.** Join our characters, Addison, Mina, Split and Multiplex, as they explore mathematics for all learners.

NCTM CONTENT STANDARDS

Instructional programs from pre-kindergarten through grade 12 should enable all students to:

NUMBER AND OPERATIONS

- **understand numbers, ways of representing numbers, relationships among numbers and number systems**
- **understand the meaning of operations and how they relate to each other**
- **compute fluently and make reasonable estimates**

MEASUREMENT

- **understand measurable attributes of objects and the units, systems and processes of measurement**
- **apply appropriate techniques, tools and formulas to determine measurements**

ALGEBRA

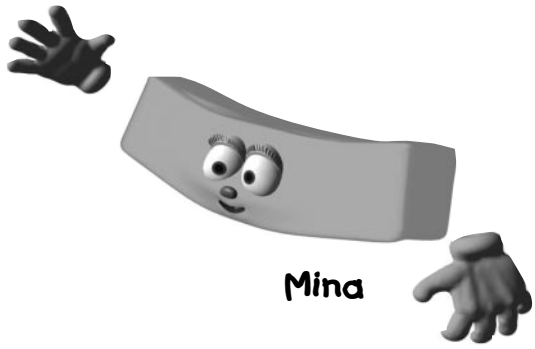
- **understand patterns, relations and functions**
- **represent and analyze mathematical situations and structures using algebraic symbols**
- **use mathematical models to represent and understand quantitative relationships**
- **analyze change in various contexts**

DATA ANALYSIS AND PROBABILITY

- **formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them**
- **select and use appropriate statistical methods to analyze data**
- **develop and evaluate inferences and predictions that are based on data**
- **understand and apply basic concepts of probability**

GEOMETRY

- **analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships**
- **specify locations and describe spatial relationships using coordinate geometry and other representational systems**
- **apply transformations and use symmetry to analyze mathematical situations**
- **use visualization, spatial reasoning and geometric modeling to solve problems**



NCTM PROCESS STANDARDS

Instructional programs from pre-kindergarten through grade 12 should enable all students to:

PROBLEM SOLVING

- **build new mathematical knowledge through problem solving**
- **solve problems that arise in mathematics and in other contexts**
- **apply and adapt a variety of appropriate strategies to solve problems**
- **monitor and reflect on the process of mathematical problem solving**

REASONING AND PROOF

- **recognize reasoning and proof as fundamental aspects of mathematics**
- **make and investigate mathematical conjectures**
- **develop and evaluate mathematical arguments and proofs**
- **select and use various types of reasoning and methods of proof**

COMMUNICATION

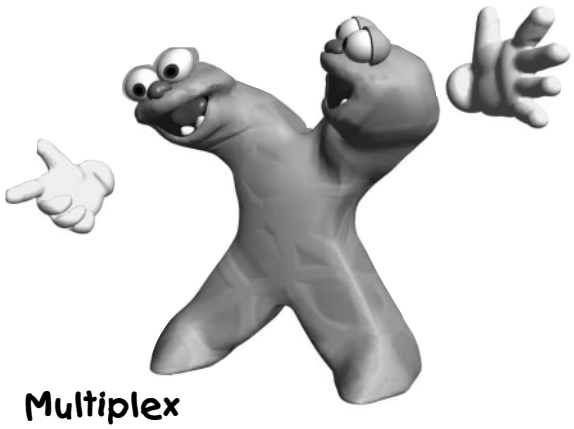
- **organize and consolidate their mathematical thinking through communication**
- **communicate their mathematical thinking coherently and clearly to peers, teachers and others**
- **analyze and evaluate the mathematical thinking and strategies of others**
- **use the language of mathematics to express mathematical ideas precisely**

CONNECTIONS

- **recognize and use connections among mathematical ideas**
- **understand how mathematical ideas interconnect and build on one another to produce a coherent whole**
- **recognize and apply mathematics in contexts outside of mathematics**

REPRESENTATION

- **create and use representations to organize, record and communicate mathematical ideas**
- **select, apply and translate among mathematical representations to solve problems**
- **use representations to model and interpret physical, social and mathematical phenomena**



Multiplex

Math Monsters™ MATRIX

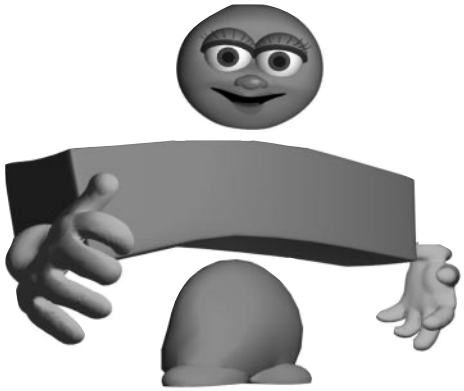
The Math Monster™ Matrix will help teachers integrate the episodes into their mathematics program. Each episode is cross-referenced with the NCTM standard that it supports. The NCTM Pre-K-2 Standards are also listed separately for teacher reference on page 3 and 4.

An asterisk after a process objective denotes particular emphasis in that episode.

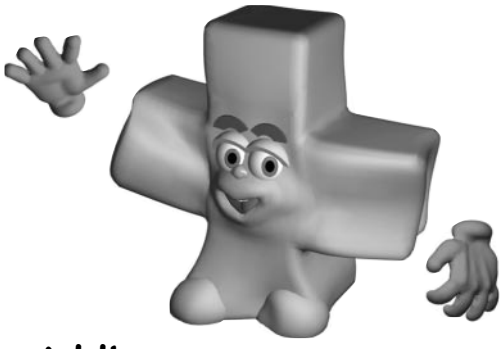
EPISODE	CONTENT STANDARD	PROCESS OBJECTIVES
Data Collection	Data Analysis and Probability	Problem Solving Reasoning and Proof Communication* Connections Representation*
Measurement	Measurement	Problem Solving* Reasoning and Proof Communication* Connections Representation*
Number Conservation	Number and Operations Measurement	Problem Solving* Reasoning and Proof Communication* Connections Representation*
The Making of Tens	Number and Operations Algebra	Problem Solving* Reasoning and Proof Communication Connections Representation*
Geometry	Geometry	Problem Solving* Reasoning and Proof* Communication Connections* Representation*
Doubles and Their Neighbors	Number and Operations Algebra	Problem Solving* Reasoning and Proof Communication Connections* Representation

Math Monsters™ MATRIX

EPISODE	CONTENT STANDARD	PROCESS OBJECTIVES
Mapping	Geometry Measurement	Problem Solving* Reasoning and Proof Communication Connections* Representation*
Time	Measurement	Problem Solving* Reasoning and Proof Communication* Connections* Representation*
Patterns	Algebra	Problem Solving Reasoning and Proof* Communication* Connections* Representation
Counting and Symbolizing	Number and Operations	Problem Solving Reasoning and Proof* Communication Connections* Representation*
Computers	Data Analysis and Probability Measurement Algebra	Problem Solving* Reasoning and Proof* Communication Connections Representation



Split



Addison

Math Monsters™

AVENUES OF ASSESSMENT

The Math Monsters™ program provides teachers with rich opportunities for informal assessment. **We believe that ongoing assessment practices during the Math Monsters™ episodes and activities will pave the way for optimal student growth.**

The first step in the assessment process is to become familiar with the learning standards and student objectives that apply to the episode. The NCTM standards are listed at the heading of the teacher's guide and the student objectives are contained in the overview of each guide. The assessment process continues as the teacher considers these questions:

- What are the learning standards that my students will be working towards?
- What are the instructional goals that will need to be assessed as the students work through the Math Monsters activities?
- What will the students need to experience before viewing the episode?
- Which preview activity from the guide is most appropriate for meeting the developmental and academic needs of your students?
- What modifications will need to be in place in order to provide all of the students with the opportunity to grow in mathematics?

The Math Monsters™ program lends itself well to the use of observation, conversation and analysis of student work as assessment tools for the teacher. As a result of using these tools, the teacher is continually aware of the developmental and academic levels of the students. This awareness will aid the teacher in making an informed decision about the next, most appropriate learning challenge for the student.

As you observe your students working with Math Monster™ activities, ask yourself:

- How students are using the materials available to solve problems?
- How easily students are moving from concrete representations to the abstract?
- Are students using a variety of problem-solving strategies?
- How well do they keep records?
- Do the students persevere in a problem-solving challenge?

Observation is a simple but powerful assessment tool.

The Math Monsters™ program engages the students in mathematical conversations with one another and with the teacher. **By asking probing questions the teacher gains a sense of how well students can explain their thinking, justify their solutions to problems and use the language of mathematics.** This is an ideal setting to find out how well the students understand that a problem may be solved in more than one way. **These conversations also allow students to demonstrate the connections they are making between mathematical ideas and mathematics in the world around them.**

The analysis of student products from Math Monster™ activities adds another dimension to measuring student achievement and growth:

- Do the students show their thinking using concrete or abstract symbols?
- Do students show more than one way to explain the same idea?
- How well can students organize ideas on paper?

Products from the Math Monster™ activities make a nice addition to student portfolios.

By employing these three assessment tools, **observation, conversation and analysis** of student work, the teacher is equipped to make effective Math Monster™ activity choices and monitor changes in student thinking and reasoning over time. **Each Math Monster™ activity will spiral into the next and build a chain of meaningful mathematics experiences for young children.**

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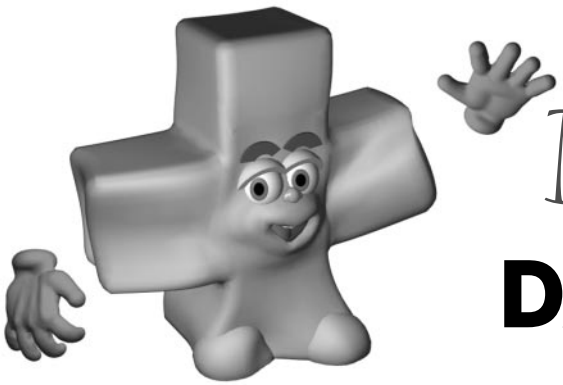


Math Monsters™

presents

DATA COLLECTION

NCTM CONTENT STANDARDS

Data Analysis and Probability

- pose questions and collect, organize and represent data to answer those questions
- interpret data using methods of exploratory data analysis
- develop and evaluate inferences, predictions, and arguments, that are based on data
- understand and apply basic notions of chance and probability

NCTM PROCESS STANDARDS

Problem Solving
Reasoning and Proof
Communication*
Connections
Representation*

**Indicates a strong emphasis in this episode*

OVERVIEW

This episode allows children to investigate the mathematics of data collection and graphic representation.

As a result of viewing this episode, the children will:

- **explore methods for collecting and organizing data**
- **interpret various representations of data**
- **design and create graphs**

VOCABULARY

data	**collection**
organize	**popular**
favorite	**graph**

PROGRAM SYNOPSIS

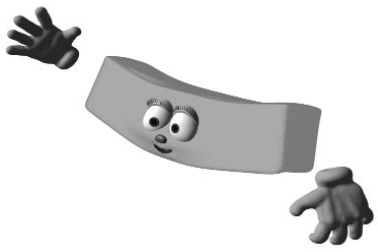
Addison makes the best pancakes around. Multiplex, Split, and Mina enjoy them so much that they think it may be time to open a pancake restaurant so that all the monsters in town can share in the tasty treat. The problem is that they can only serve three kinds of pancakes, and so they need to find out which three are the most popular among the monsters.

They decide to go door-to-door and collect the data. They record the information, but each monster represents the data differently. Multiplex draws a color-coded picture for each pancake that somebody names. Addison also draws a picture, but organizes his pancakes in piles. Split writes down the names of each pancake selected, and Mina makes a chart using check marks to represent the selected pancakes.

Now the monsters must figure out how to combine their various representations of data to determine which pancakes are the monster favorites. They accomplish this through the use of a bar graph.

Our field trip takes us to an animal farm where we see how and why data is collected.

The show is constructed so that the viewer joins the monsters as they figure out how to collect and organize the information they find in Monster Land. Let your students investigate, and problem solve with the monsters on their



PREVIEWING ACTIVITIES

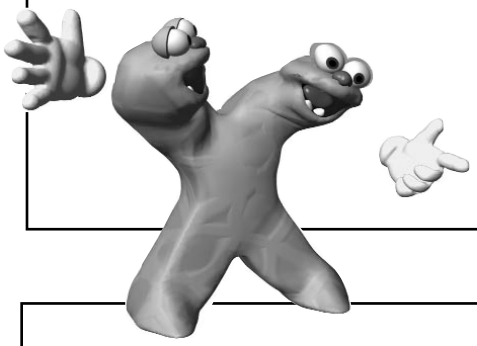
PREVIEWING ACTIVITY ONE

Sideline Suggestions

By actually problem solving and inventing themselves, children are involved in doing mathematics and in being young mathematicians.

You will probably witness your students working at various developmental stages as they discuss ways to gather information and represent it.

This activity will allow for the recommended concrete experiences that should precede a more pictorial or abstract one.



Measuring length using connecting cubes is a prerequisite for this activity.

YOU WILL NEED: a copy of the blackline master, Me-o-graph-y, some crayons, and connecting or unifix cubes for each student.

- **Ask your students** how long our feet are, our toes, our hands, and our thumbs? Do we all have the same size body parts? How can we show the lengths of our feet, hands, toes and thumbs using connecting cubes?
- **Let a student** model his/her idea for connecting and measuring using the cubes. **Distribute the Me-o-graph-y sheet** to the class, and allow them to share their ideas about recording this information on the graph sheet. Let them work alone or in pairs to complete the graph with their own personal measurements.
- **Bring your group** back together to compare and contrast the information on their personal graphs.
- **Did everyone** have the same foot length? How many different sizes of thumbs did we have? Have each student find a partner and figure out how their graphs are different, and how they are the same.

PREVIEWING ACTIVITY TWO

Sideline Suggestions

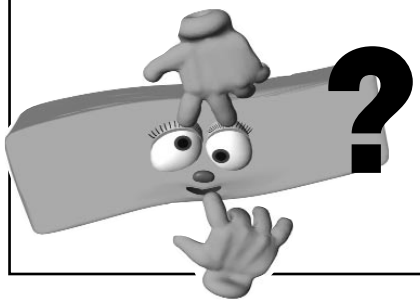
Before viewing this episode with your class you will want to gather materials to help with the exploration of data collection, types of graphs (real, picture, representational), and organization of information.

The episode and the preview activity present a real problem for to the children. You will want them to construct their own solutions, rather than making a type of representation you have explained.

YOU WILL NEED: pencils (colored, plain), paper, any relevant math manipulatives, graph paper and clipboards.

- **Pose a question** to the class similar to that which the monsters will face in the story. For example, you might present the following scenario: "The cafeteria staff wants to know the four most popular meals that are served to students here at school. They have asked our class to help them figure it out." You could use a similar scenario applied to popular fast food restaurants, favorite pizzas, popular ice cream flavors, etc.
- **Organize the students** into small groups and let them plan for answering the question posed earlier.
- **Discuss with students** the following points: What will we need to do first? What information do we need? How will we gather this information? How will we organize it? How will we show and share (represent) our information with the cafeteria staff when we are done?
- **Allow the children to discuss** their group plans or ideas for collecting information and representing it. They may use the tools you have put in front of them, and they may add to these resources as they wish.

PAUSE POINTS



PAUSE POINT ONE

The first time a question mark appears, the monsters have identified a challenge and a problem. They need to find out what the three most popular pancakes are in Monster Land. How might you go about gathering this information (data)? What strategies can you suggest for them to find out the most popular pancakes?

PAUSE POINT TWO

The second question mark appears when the monsters have collected all the data, but it's been represented in many different ways. Their problem now becomes one of organizing the information so they can understand and interpret it. Do you think the monsters have collected helpful information? Do they know the three most popular kinds of pancakes yet? Can this data be used even though it's in many different forms? What can you tell from each of the monsters' representations? How might you organize all of this data?

Sideline Suggestions

Encourage your students to reflect on their experiences in the Previewing Activities. How could the monsters find this information?

POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY ONE

- **What Works?** Have your class discuss what they saw happening in the story. Review strategies they saw the monsters use that they thought worked or didn't work. Were any methods more helpful to solving the monsters' problems?

POST VIEWING ACTIVITY TWO
Snack Shop

- **Give your class a challenge** similar to that of the monsters opening a restaurant: "We are going to open a classroom snack shop where we will sell some of the most popular and nutritious snacks. It is our job to find out the three most popular beverages, fruits and snacks that kids will buy."
- **Divide your class** into data collecting groups. Each team can be responsible for gathering data about the different items (fruits, beverages and snacks). Students should be prepared to present their information to the rest of the class in an organized format. They might choose from the various types of graphs they have seen or experiment with a new format.

Sideline Suggestions

Be aware that children often begin representing their data as pictures—a recording of the information with little or no organization. Later they categorize it, showing one type got six votes, while another got only four. Even here they might show the picture of four as larger than six, making counting necessary in order to tell how many are represented. They often make tables or charts showing how people voted, but these representations also do not readily show how many people voted for each type so counting once again may be necessary.

POST VIEWING ACTIVITY THREE

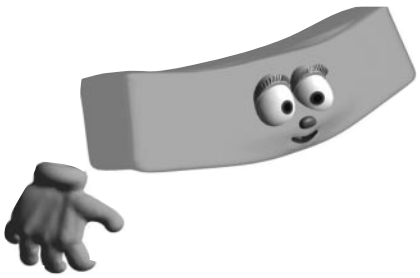
Research teams

Sideline Suggestions

The mathematical idea of arranging the data into a bar graph is the biggest idea for children, because this representation involves two axes. One vertically shows how many, and one horizontally shows the types.

- **For older students**, explain how social scientists (social studies) and scientists often use questionnaires to collect information and study a question they are interested in. Have children work in small research teams, designing a questionnaire, collecting data, and representing it. Have them report their information to classmates, teachers, parents or administrators depending on their question.
- **Topics could include:**
  - Intermural activity or sports offerings at school
  - Amount of paper recycled at the copy machine
  - Most popular types of books read in class (sports, bio, etc.)
  - Kids that walk, ride the bus, are dropped off, or ride bikes to school
  - Most/least popular subjects at school
- **Let your children experience** the dilemma of representing their data and trying to read each other's way of representing.

Basehound



Math Monsters™

presents

MEASUREMENT

NCTM CONTENT STANDARDS

Measurement

- understand measurable attributes of objects and the units, systems and processes of measurement
- apply appropriate techniques, tools and formulas to determine measurements

NCTM PROCESS STANDARDS

Problem Solving*
Reasoning and Proof
Communication*
Connections
Representation*

**Indicates a strong emphasis in this episode*

OVERVIEW

This episode illustrates the importance of measurement using standard and non-standard measures. Through trial and error, the Monsters will come to the conclusion that a standard measurement tool is very important. As a result of viewing this episode children will:

- **recognize the attributes of length and area**
- **explore the making and use of measurements in natural situations**
- **measure with the same size unit (standard and non-standard)**
- **observe the use of tools such as rulers to guide measurement**

VOCABULARY

size
width
height
standard
non-standard
measurement
ruler
length
exact

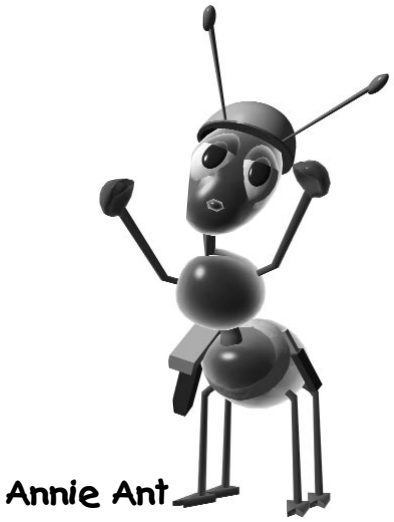
PROGRAM SYNOPSIS

There's nothing like playing ball outside on a beautiful day. The Monsters each have their own way of playing, too—kicking, rolling, throwing and bouncing. They want to know which of them moves the ball the farthest. This leads them to wonder about measuring distances.

Before they can explore the measurement challenge it begins to rain forcing them inside where it's not safe to play ball. They decide they need a playhouse so even if it rains they'll still have a place to play. They call Annie Ant at the Ant Hill Construction Company to come and build their new playroom. Multiplex tries to give Annie all the information she will need about the size of the playhouse. Annie explains to the Monsters that she needs numbers explaining how long, wide and tall the building needs to be. They give her the numbers she needs using Addison's steps as their measurement. The Monsters' problem arises when they return home to find a playhouse built 50 steps long, 30 steps wide, and 15 steps tall—in ant steps!

Join us on our field trip to meet a carpenter who relies heavily on standard measurement tools to perform his work each day.

The Monsters will try to understand measurement using non-standard and standard tools as they work with Annie Ant to create a playhouse they can use. Invite your students to join in the adventure.



PREVIEWING ACTIVITIES

PREVIEWING ACTIVITY ONE

Sideline Suggestions

For primary schoolchildren, experiences in introducing linear measurement should focus on the idea of an identifiable attribute (in this case length) that is determined by the distance between two points. This attribute can be compared, ordered and measured by students.

YOU WILL NEED: materials to fill a "mystery box"—pencil, chalk, toothbrush, paper clip, comb, popsicle stick, toothpick, etc. There should be one object that is clearly the shortest and one that is the longest. This should be obvious to students.

- **Explain** that you have a "mystery box" with objects inside and that there are many ways to sort these different objects. Say that you would like them to be thinking about how long the objects are.
- **Allow students to explore the materials** and talk about the attribute of length in relation to the objects. Question the students by asking them which one is the longest? Which is the shortest? Can you find two objects that are about the same length? Is it harder to tell which is longer when they look almost the same? Can you do it? How?
- **Copy the "Mystery Box" blackline master** to record answers.

PREVIEWING ACTIVITY TWO

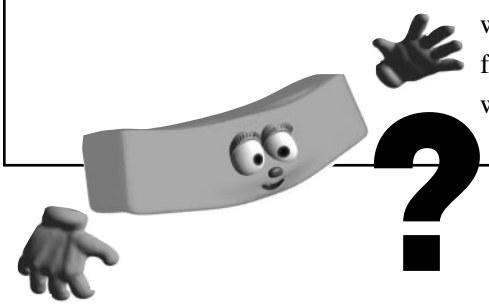
Sideline Suggestions

This may also be a good time to talk about the importance of estimation. The purpose of estimation activities are to help children begin to understand the attributes and process of measuring. Estimation also promotes the awareness of the sizes of units of measure. Exact measurements are not always needed for answering questions, and children should begin to recognize that it is often appropriate to share a measurement as an estimation.

- **Ask students to begin thinking** about distance. You will not need any materials for this quick question and answer activity to get students thinking about this attribute.
- **Generate questions appropriate to your school community such as:**
  - ➤Which is farther from your desk, the gym or the cafeteria?
  - ➤Is the library or the office closer to our classroom?
  - ➤Which is farther from our school, the grocery store or the fast food restaurant?
  - ➤How can you tell which is farther?
  - ➤Are there ways we can measure distance?
- **Think of a place that you have been** to that is even farther away than a neighboring town.

PAUSE POINTS

PAUSE POINT ONE



The first question for the Monsters arises when they would like to know which Monster sends the ball the farthest. Split wonders if there is a way the distances could be measured. Do you think they could measure to find out who sent the ball the farthest? What kind of tools could they use to help them?

PAUSE POINTS

PAUSE POINT TWO

The Monsters thought they had given Annie all of the information she needed to build them a new playroom. What she really needs to know is how long, how wide and how tall the room needs to be. How can the monsters find this information for Annie? Will they need any tools to help them? Would it make sense for the Monsters to measure the lengths in cubes, blades of grass, miles, feet, inches, or some other unit?

POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY ONE

Exploring measurement

Sideline Suggestions

These kinds of measuring activities can be emphasized at the first and second grade levels. The goal would be for children to recognize that using units of the same length is more reasonable than using individually created or selected ones.

We can't assume that young mathematicians understand measurement fully just because they complete a series of activities and worksheets that demonstrate skill competency. They will need many hands-on experiences to to develop their skills and understanding of concepts in measurement.

These suggestions apply to both Post Viewing Activity One and Two.

This activity will allow your students to explore different units of measurement when finding length. Students should be encouraged to compare their results and be questioned as to why their numbers aren't the same.

YOU WILL NEED: to set up two or three work stations for students to begin this measurement activity. At one station give students paper clips that can be linked together. At the second station give them linking cubes to create a measurement tool (a third table could be set up with even another unit for measure). Be sure that each table has objects for them to measure and that these objects are the same length. Pencils, markers, staplers, popsicle sticks, textbooks, paintbrushes, sheets of paper and desktops are some fairly standard size objects.

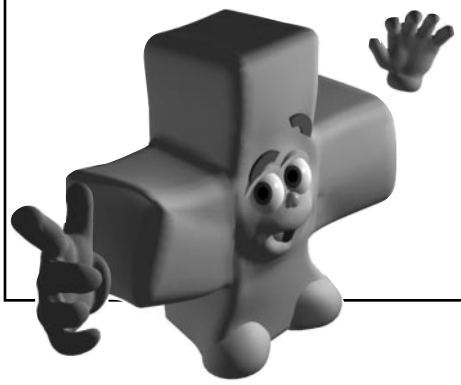
- **Divide your class** into groups to work at the different tables.
- **Have them measure** the objects on the table.
- **Copy My Measuring Record blackline** master and allow students to fill in the information they gather from measuring objects.
- **Students should be encouraged to share their numbers** with the group(s) that used a different unit of measure. Ask questions such as: What happened when the Math Monsters and Annie Ant didn't use the same unit of measure? Why aren't our numbers the same? Can you think of a reason why we would need to have the same information and numbers?

POST VIEWING ACTIVITY TWO
A standard Addison foot

Sideline Suggestions

Sometimes it's best not to emphasize various units of measurement too soon in measurement instruction. Go at a pace you feel is appropriate for your students.

You also might have children trace and cut out an outline of their own foot or hand to use for measuring.



YOU WILL NEED: to copy the"Standard" Addison Foot blackline master for your students and provide scissors.

- **Ask students to cut out** their copies of the "Standard" Addison Foot.
- **Have them measure** distances around the classroom. Have them measure a table top, the chalkboard, a door opening, the teacher's desk or the height of a bookshelf. They can record and share this information. Ask them if they now all have the same numbers when they measure using a standard unit.
- **How can we use this unit to measure how far it is to the gym**, the library or the cafeteria? Should we use one Addison foot at a time? If not, what can we do? Could we call this new unit something different?
- **Allow students to measure distances** to another part of the school using their newly created tool. Encourage students to share their knowledge about other standard units of measure.
- **A follow-up** for this activity in the next couple of days would be to **allow students to measure using other standard units** they brainstormed.

YOU WILL NEED: metric and customary tools available such as rulers, yardsticks, tape measures, meter and centimeter sticks etc. Allow the students to measure objects and distances that they have explored before and try adding some new ones.

Math Monsters™

presents

NUMBER CONSERVATION

NCTM CONTENT STANDARDS

Number and Operations

- understand numbers, ways of representing numbers, relationships among numbers and number systems
- compute fluently and make reasonable estimates

Measurement

- understand measurable attributes of objects and the units, systems and processes of measurement
- apply appropriate techniques, tools and formulas to determine measurements

NCTM PROCESS STANDARDS

Problem Solving*
Reasoning and Proof
Communication*
Connections
Representation*

**Indicates a strong emphasis in this episode*

OVERVIEW

In this episode, the Monsters decide to plant two gardens, each with an identical number of monster melons. From seed to harvest, the Monsters explore problems involving number conservation and one-to-one correspondence. As a result of viewing this episode, the children will:

- **apply one-to-one correspondence**
- **compare and contrast length, quantity and number of objects**
- **employ counting skill**

VOCABULARY

number	**length**
quantity	**arrangement**
equal	**longer**
more	**less**
same	**bigger**
smaller	**organize**

PROGRAM SYNOPSIS

It's spring. The Monsters are happy and excited because they are ready to plant their spring garden. Monster melons from Aunt Two Lips' shop are the favorite fruit for our foursome this season. They want to make two gardens on the castle grounds. Mina suggests two teams with two monsters each, and that they can draw straws to make the teams.

The monsters will need the same amount of space and the same number of seeds, but when the seeds are delivered it appears they have a problem. The piles don't look alike, so how can they each have the same amount? This introduces the concept of conservation of number. They decide that counting the seeds in each pile will help them to be sure they have equal amounts. Counting becomes a challenge when the seeds are all piled up in a big heap. Spreading the seeds out into two rows that can be easily counted proves that each pile is the same, just organized differently.

When the holes have been dug and the seeds have been planted and covered with dirt, it's time for the seeds to have a drink of water. This brings about a conservation of length challenge. There are two hoses at Uncle Fraction's home. One hose appears to be long enough while the other seems too short. The monsters will try to solve this confusion over length as they line the hoses up side-by-side and stretch them to the garden. Once again, objects that are equal but arranged differently lead to confusion, problem solving and an understanding of how this could be.

Our field trip takes us to the bakery where the baker explains that when making bread the same amount of dough can be used in

PREVIEWING ACTIVITY ONE

Sideline Suggestions

Before viewing this episode with your students, you will want to be knowledgeable about conservation of number, length and quantity.

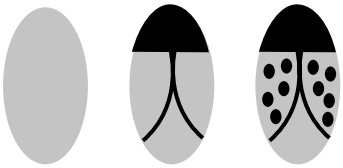
A child who conserves number knows that the number of objects does not change when the objects are moved, rearranged or hidden. Conservation of number typically occurs between the ages of five and seven.

Number conservation and one-to-one correspondence are explored in this preview activity. These concepts are essential for further development of number concepts.

Please remember that children can not be expected to master these types of conservation at the same age.

This activity, Lady Bugs and Leaves, is an active way to engage your students in thinking about number quantity and comparing numbers.

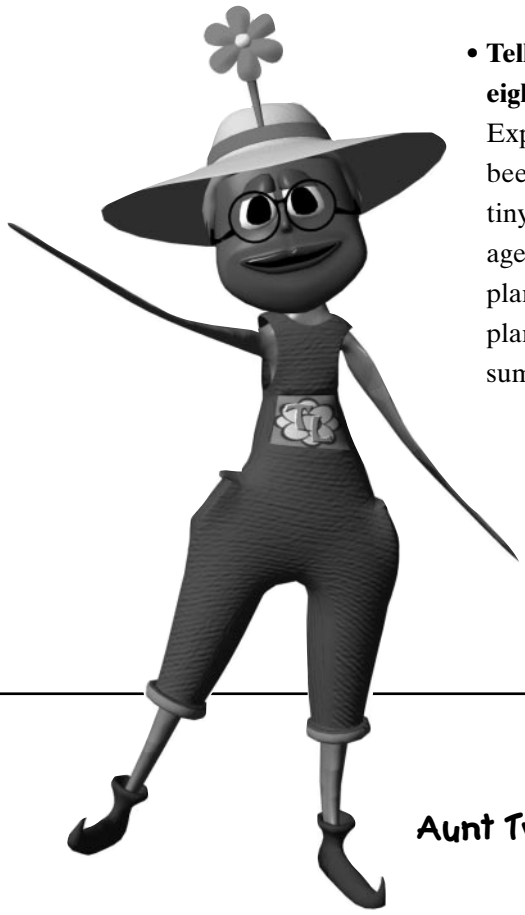
YOU WILL NEED: to copy the Lady Bugs and Leaves blackline master for this activity. Your students may cut out the lady bugs and use the remainder of the sheet as a work mat. You may wish to have students create their own leaves and use cubes or tiles to represent lady bugs. Or, you can spray paint small white beans red on both sides. Then decorate them with a permanent black marker.



- **Tell your students a story about eight lady bugs and two leaves.** Explain that Lady bugs are helpful beetles. They love to eat aphids, tiny little plant lice, that can damage plants. Lady bugs help to keep plants healthy. This is good for the plant and the creatures that consume it. You might tell this story:

"Once there was a lady bug who laid eight eggs on two different leaves. When the eggs hatched, little lady bug larva began to devour aphids. They grew and grew. These lady bug larva needed a rest, so they took a nap in a quiet corner. When they awoke, they had turned into beautiful red beetles with black spotted wings! And now there were four lady bugs on each of the two leaves."

- **Ask students** to suggest ways to find our how many lady bugs there are in all.
- **Create more lady bug stories for your students**. Ask them to show more lady bugs on one leaf than the other. How do you know which leaf has more and which leaf has less?
- **Try a story where some of the lady bugs are on one leaf** while the others are hiding under the other leaf. How many lady bugs are hiding? How can we find out without looking?
- **You may wish to challenge your students to find as many ways** as they can for eight lady bugs to sit on two leaves. Will there always be eight lady bugs no matter how they are arranged on two leaves? Create a chart to show the children's arrangements.



Aunt Two Lips

PREVIEWING ACTIVITIES

PREVIEWING ACTIVITY TWO

Sideline Suggestions

A child who conserves length will maintain that an object has the same length regardless of a change in its position, shape or form. Conservation of length typically occurs between the age of seven and eight.

An understanding of conservation of length will translate to other areas of mathematics such as: measuring distances on a map, using standard units of measurement, and interpreting a time line.

Assess the various stages of development and understanding your students have as they share responses and explain their work during the preview activities.

Conservation of length is explored in this activity, Garden Snakes.

YOU WILL NEED: six to twelve inches of string, yarn or chenille strips for each student

- **Ask them to cut two equal pieces** and verify that they are the same length.
- **Participate in the following story so that you may guide this activity**:

"Let's pretend that these strings are garden snakes. Are your garden snakes the same length? Is one longer? Is one shorter? Okay! They are the same length.

Now I will pretend that my little garden snakes are crawling along ... crawling along ... and this one is crawling out ahead of the other (make sure that snakes are coiled differently). Try this with your garden snakes. Do you think the snake ahead of his buddy is the same length?

Oh, here go the little snakes again! I will pretend that my little garden snakes are crawling along ... crawling along ... but the one out ahead is getting very tired. Look, he is curling up to take a nap (coil one string). Try this with your garden snakes. Do you think the curled up sleepy snake is the same length as his buddy? Do you think he is shorter? Do you think he is the same length?"

- **After each story problem**, one snake out in front and one sleepy curled up snake, ask your students to share their responses to the questions. Encourage them to explain their answers. Record their answers and explanations to fuel further discussion.
- **You may wish to provide tools for measurement** such as paper clips or color tiles for students who have conservation of length. Ask them how these tools could be used to answer the snake story problems.

PAUSE POINTS

Sideline Suggestions

"Hands on tools" of the "math trade" such as beans or counters should be handy during these pause points.

If possible, stop the program and explore the students ideas and solutions.

PAUSE POINT ONE

The Monsters' first problem arises when they must make equal gardening teams. Have your students think about and share strategies they have used to create fair working and playing teams. As they share, highlight the strategies that involve mathematics.

PAUSE POINT TWO

The two piles of monster melon seeds that Aunt Two Lips delivered are supposed to have the same number. They look very different because of the way they are arranged. Ask your students how they would find out if the same number of seeds are in each pile.

PAUSE POINTS

PAUSE POINT THREE

The Monsters thought they had come up with a perfect plan to check the number of seeds in each pile. Counting is a bit more difficult than they expected due to the arrangement of the seeds. Ask you students what ideas they have for making this counting easier and more accurate.

PAUSE POINT FOUR

The seed piles have been laid out straight for counting and each line has 35 seeds. The Monsters notice that one line is longer than the other. How can this be? Do both lines truly have 35 seeds? Ask your students to explain how both lines could have 35 seeds regardless of the length. How could you prove you are correct?

POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY ONE

Doing is believing

Sideline Suggestions

Children may not be convinced by the video enactment of the strategies. This activity will help them see it for themselves.

YOU WILL NEED: about 60 beans to reenact the portion of the video relating to the two piles of seeds that the Monsters had delivered**.**

- **Divide the beans into two equal piles.** Stack one of the piles high and spread the other out.
- **Encourage your students to experience for themselves** how these two seemingly different piles can contain the same number of beans.

POST VIEWING ACTIVITY TWO
Oh! Dough!

Sideline Suggestions

A child who conserves quantity recognizes that the amount of dough does not change when the shape is changed.

They also see that the amount of dough does not change when the shape is broken into many pieces. It is still the same amount of dough.

Conservation of quantity typically occurs between the ages of seven and eight.

Your student's responses during, "Oh! Dough," will give you insight about their conservation of quantity.

YOU WILL NEED: some dough. Here's a recipe.

OH! DOUGH RECIPE

This dough is a quick mix and keeps well when stored in an airtight container. You may double this recipe, however, batches larger than that can become difficult to handle.*

You will need:

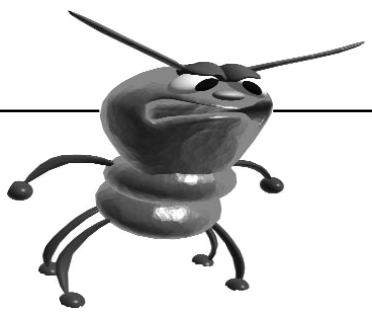
2 cups of unbleached flour
1 cup salt
1 tablespoon cream of tartar
1 tablespoon vegetable oil
2 cups boiling water
food coloring (optional)

You will:

- Mix the flour, salt and cream of tartar together.
- Add the oil, water and food coloring.
- Knead for 5 or 6 minutes until the consistency feels right for the job.

* "King Arthur's Flour 200th Anniversary Cookbook," 1991.

- **Guide your students** through conservation of quantity activities using a soft modeling dough. If you need to make your own dough, see the recipe that follows.
- **Give each student two balls of dough** that are the same size.
- **Ask your students** if they think the two balls are the same. Direct them to flatten one ball into a pancake shape and leave the other ball unchanged. Ask your students if the ball and the pancake are the same amount of modeling dough? What could you do to find out if you are correct?
- **Ask your students** to roll the pancake into a ball again. Now they will have two balls of clay that are the same size. Direct the children to roll one ball into a snake. Do the snake and ball have the same amount of dough? What could you do to find out if you are correct?
- T**ry other investigations.** Your students could create two smaller balls out of one of the larger balls. Now do you have the same amount of clay in the two smaller balls and one larger ball? What could you do to find out if you are correct?
- **Continue to explore conservation of quantity.** It is important that the children have one ball that remains constant and one that they change. This provides a reference for them.



POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY THREE
How does your garden grow?

Sideline Suggestions

The questions that follow will guide your class discussion. Your students' responses will illustrate their ability to conserve number.

How are the gardens the same/different?

Do any of the gardens have more plants than other gardens?

Why might it look like one student's garden has more plants than another student's garden?

How can we check to be sure that we still have the same number of plant in every garden?

YOU WILL NEED: to copy the How-Does-Your-Garden-Grow blackline master. You will also need coloring tools, glue, and scissors for your creative gardeners.

- **Distribute the how-does-your-garden-grow sheets** and ask the children to tell you what they see on the paper. They will notice that each paper has ten plants and one garden.
- **Ask the children to cut out the plant circles** in the garden rectangle. Direct them to design their garden by attaching their plants to the garden rectangle in any way they wish. Post each child's garden on a large board for group sharing and comparing.

POST VIEWING ACTIVITY FOUR
Choosing sides

Sideline Suggestions

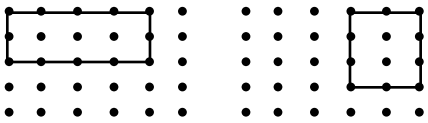
The questions that follow will guide your class discussion. Your students' responses will illustrate their ability to conserve length.

- How are these gardens the same/ different?
- Is there a garden that is larger than another?
- How can we find out?

This challenge will provide experience with conservation of length and spark a lively discussion about the size of gardens.

YOU WILL NEED: copies of the blackline master Garden Dot Paper, coloring tools, scissors and paper.

- **Tell the students** that they will design a garden plot that must be exactly 10 units all the way around, have only four sides, and form a rectangle.
- **Define a unit as the space between two dots** on the Garden Dot Paper. Model several incorrect garden plots using the Dot Paper.
- **Ask your students** to tell why these examples do not meet the three standards.
- **Allow the students time to explore** the two possible solutions to this puzzle. Ask them to draw their garden plot on the Garden Dot Paper.
- **Ask the children to cut out the five plant circles** and glue them onto the garden plot in any way they wish. Post each child's garden on a large board for group sharing and comparing.



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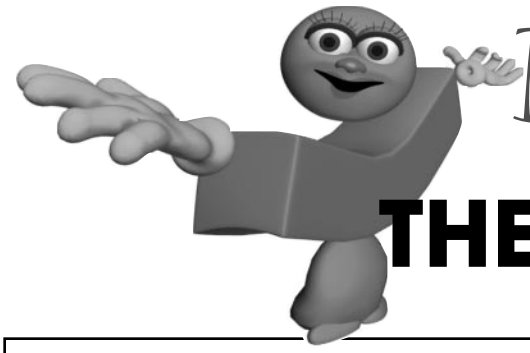


Math Monsters™

presents

THE MAKING OF TENS

NCTM CONTENT STANDARDS

Number and Operations

- understand numbers, ways of representing numbers, relationships among numbers and number systems
- understand the meaning of operations and how they relate to each other
- use computational tools and strategies and estimate appropriately

Patterns Functions and Algebra

- understand various types of patterns and functional relationships
- use symbolic forms to represent and analyze mathematical situations and structures
- use mathematical models and analyze change in both real and abstract contexts

NCTM PROCESS STANDARDS

Problem Solving*
Reasoning and Proof
Communication
Connections
Representation*

**Indicates a strong emphasis in this episode*

OVERVIEW

This episode illustrates how patterns are used to solve problems. The Monsters investigate all the different ways to make ten and they begin to notice patterns. Addition and subtraction are used to help the Monsters solve their problem. As a result of viewing this episode the children will:

- **look for patterns**
- **recognize the importance of organizing information**
- **apply skills of addition and subtraction**

VOCABULARY

add **more**
less **top**
bottom **next**
pattern **"in all"**
"how many"

PROGRAM SYNOPSIS

It is holiday time in Monster Land and the Monsters must do their holiday shopping. They ask Aunt Two Lips for gift ideas. She suggests Gollywomples, the special of the day in her shop. The Monsters agree that blue and green Gollywomples will make a sweet holiday treat for their friends. Soon, they find themselves with a sticky problem as they prepare gift boxes of Gollywomples.

The Math Monsters decide to give ten Gollywomples to each friend on their list, but no two packages will be exactly alike. Mina packs all green Gollywomples for Ivan Idea and Split packs nine green and one blue for Cousin Digit. As the Monsters continue to pack the boxes, Split discovers a pattern. A box of six green Gollywomples and four blue Gollywomples is the same when the box is turned the other way around!

How many ways are there to pack ten Gollywomples using combinations of blue and green ?

The Monsters become tangled in their quest. How will they know if they've found all the ways to make ten?

Join us on a field trip to a bank where many ways to make ten are demonstrated.

Invite your students to work along with the Monsters as they figure out how many ways there are to pack holiday treat boxes with ten Gollywomples.

PREVIEWING ACTIVITIES

PREVIEWING ACTIVITY ONE

Sideline Suggestions

Organizing mathematical thinking, communicating mathematical ideas and considering the ideas of others are powerful tools for problem solving.

In this episode, the Monsters model these skills.

YOU WILL NEED: a "pile" of ten cubes or tiles in two colors.

- **Ask your students to tell you** how many cubes they think are in the pile. How many blue cubes? How many green cubes? Ask your students to share ideas about how counting the cubes could be made simpler. Their suggestions may be to line up the cubes, snap them together by color or make two different piles of cubes by color. Model the outcomes of their solutions as they organize their mathematical thinking and communicate ideas to you and their classmates. Ask them to point out any patterns that may occur.

PREVIEWING ACTIVITY TWO

Sideline Suggestions

The Monsters use number representations and patterns to find combinations for the sum of ten.

Children who are familiar with combinations that make ten will use them to determine larger sums.

YOU WILL NEED: tiles in two colors and paper and coloring tools

- **Give students cubes or tiles in two colors.** Ask the students to find a way to make three using one or two colors and share their ideas with others.
- **Ask students** to record their solution on paper and display it for the group to see. It is best if the teacher refrains from "showing" the students how to record their information, but allow the children to construct their own representations.
- **Ask the students which drawings go together**. Why? Group the drawings as the children suggest. How many different ways did we find to make three? What did we

PAUSE POINTS

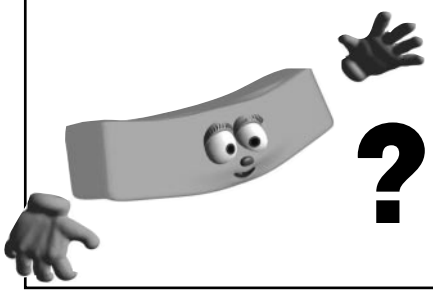
PAUSE POINT ONE

Sideline Suggestions

Encourage the children to reflect on their experiences in the Previewing Activities. How could the Monsters organize their information?

The first time a question mark appears Mina is wondering if there are any other ways to make ten. Do you think they have found all the ways? Can you think of any other ways?

PAUSE POINT TWO



Split comments that he "guesses" they have found all the ways to make ten. Addison notices that they have probably missed some of the ways.

What could the Monsters do to find out if they have found all the ways to make ten?

(**Teacher's note:** There are actually 11 ways: 0-10, 1-9, 2-8, 3-7, 4-6, 5-5, 6-4, 7-3, 8-2, 9-1, 10-0)

PAUSE POINTS

PAUSE POINT THREE

Sideline Suggestions

You and your students can build a colorful Gollywomple chart together. A Gollywomple chart is available as a blackline master for use with Pause Points Three and Four.

By seeing the decreasing number of green Gollywomples on a chart, the students may notice the increasing number of blue Gollywomples.

Mina and Addison notice that the green Gollywomples decrease by one as each box is filled (10,9,8,7). Addison predicts that the next box will have six green Gollywomples. But, how many blue Gollywomples are needed to make ten if there are six green? What did the Monsters notice about green Gollywomples? What do you notice about blue Gollywomples?

PAUSE POINT FOUR

The Monsters have built an organized model of their solution. Multiplex states that the last box will have one green and nine blues. Mina suggests that they are forgetting something. The Monsters need to take another look. What have they missed? How many ways are there to make ten?

POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY ONE

How many more make ten?

Sideline Suggestions

Opportunities to solve missing addend problems help children develop meaning for the operations of addition and subtraction.

You will probably witness a variety of communication styles and differing levels of sophistication in representations. (See student samples.) This is a good opportunity to see how children record information. Do they organize each turn they take with the spinner and blocks on paper? Do they choose to use two colors? Do they use numbers or number sentences? Do students apply the pattern of "turning it around" in this activity after viewing the episode? The students' responses will provide the teacher with valuable information from which to plan more mathematical investigations.

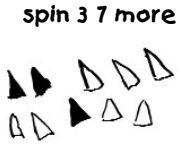
You may wish to extend this activity further in activity two.

This game will give your students experience in building models to solve a "making ten" problem.

YOU WILL NEED: to copy the Spinner blackline master on to tag board, counters in two colors, paper and coloring tools, paperclips and beaver clips.

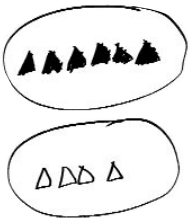
- **Your students may work in pairs** for this activity. Each student or pair will need a spinner marked (0-10). Attach the arrow to the face of the spinner with a brass fastener. Place a paper clip between the spinner face and the arrow for a smoother spin.
- **Spin to find out the number of counters to select.** Select that number of counters in one color. The student pairs will ask, "How many more make ten?" Now they will use a different color counter to find out how many more are needed to make ten. Ask the students to record what happened on paper.
- **Spin again** until the arrow lands on a different number and repeat the same procedure. How many more make ten? Record what happened.

Student sample one



Student sample two

Student sample three



POST VIEWING ACTIVITY TWO
How many more make ten?

Sideline Suggestions

This problem could go in many directions. Listen to your students and determine what the next step should be.

Do they want to arrange the papers by the addends 0 to 10 in order from left to right across the board?

Do some papers repeat the same information?

Are there any suggestions to write 10 + 0=10 and 0 + 10=10 on the bottom of each paper?

How Many More Make Ten? can be extended to explore mathematical concepts on a deeper level.

- After each student has worked through three or four spinner problems, **ask for volunteers to post their record sheets**. Collect a variety of responses. Ask the class if they have found all of the ways to make ten. How could we use our record sheets to help us? Encourage the students to communicate their ideas about organizing the information. How could we use patterns to help us?
- **Discuss what worked well.** Appreciate the diversity of

POST VIEWING ACTIVITY THREE
Explore ways to make other numbers

Sideline Suggestions

By showing all the ways to make consecutive numbers such as: 1, 2, 3, 4 and so on, your students can continue the study of patterns.

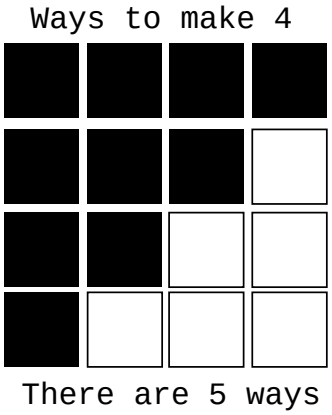
Ask your students how many ways there are to make each of the consecutive numbers. How many ways to make one? How many ways to make two? How many ways to make three? Can you find a pattern?

Allow the children to set up their own pages. In this way, they will rely on their own organization skills.

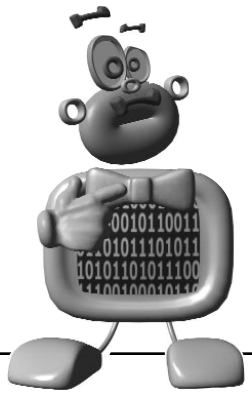
The students will create a book of ways to make many different numbers.

YOU WILL NEED: to copy the Grid Paper blackline master, color tiles or cubes, plain paper, glue, scissors and coloring tools.

- **Ask your students to find ways** to make one, two, three, four, five, six, seven, eight, nine and ten using the cubes or tiles. Ask the students to design a page showing the ways to make each number using the grid paper to represent a cube or tile.
- **On the right is a sample page for Ways to Make Four:**



- **Your students could make personal books** with one page for Ways to Make 1, one page for Ways to Make 2, one page for Ways to Make 3, and so on. Teams could create one page each for a class book.
- **There are many ways** to adapt this activity. For example, you may write the fact families for each page in their booklet of *Ways to Make Different Numbers*.



Math Monsters™

presents

GEOMETRY

NCTM CONTENT STANDARDS

Geometry

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships
- specify locations and describe spatial relationships using coordinate geometry and other representational systems
- apply transformations and use symmetry to analyze mathematical situations
- use visualization, spatial reasoning and geometric modeling to solve problems

NCTM PROCESS STANDARDS

Problem Solving*
Reasoning and Proof*
Communication
Connections*
Representation*

**Indicates a strong emphasis in this episode*

OVERVIEW

In this episode, Geometry, the Monsters decide to create a model of Monster Land. In order to make an accurate representation of their town they must take a good look at the different shapes and sizes of neighborhood buildings. As a result of viewing this episode the children will:

- **recognize, describe and compare two- and three-dimensional shapes**
- **recognize and locate geometric shapes and structures in their world**
- **predict the effects of transformations on shapes (rotation, flips and turns)**

VOCABULARY

rectangle	**size**	**shape**
triangle	**square**	**cube**
octagon	**cylinder**	**edge**
model	**triangular prism**	

PROGRAM SYNOPSIS

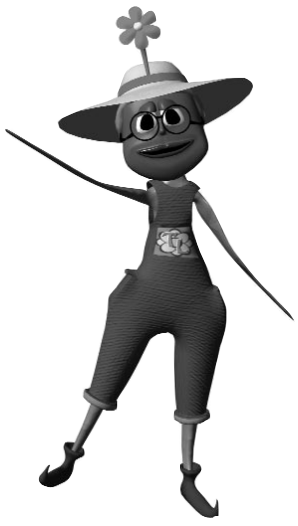
The Math Monsters think that Monster Town is the greatest town around. They decide to build a small model of their town called Mini-Monster Town. Addison suggests that they study the town from the top of the castle before they begin building. The Math Monsters find themselves puzzled by the appearance of an object's size up close and far away. How can Aunt Two Lips' shop be smaller than a birdhouse?

A visit to Aunt Two Lips' garden shop, which seemed so small from the top of the castle, helps the Monsters "figure out" the idea of perspective. Their plan takes shape as they examine the sides, top and bottom of a variety of buildings. They find many two-dimensional shapes such as, triangles, rectangles and octagons that form three-dimensional buildings.

Their quest takes an interesting turn when they discover that a shape remains the same when it is turned or rotated. For example, a cube is a cube, no matter which way one flips it.

Join the Monsters on a field trip to an architect who shows his process for drawing and modeling building ideas. He will demonstrate how technology helps an architect.

Invite your students to work along with the Monsters as they build a Mini-Monster Land.



PREVIEWING ACTIVITIES

Sideline Suggestions

Engaging students in making careful observations, describing similarities and differences, and creating representations of two- and three-dimensional shapes nurtures the development of geometric and spatial sense.

In this episode, the Monsters examine real buildings vs. pictures. It is suggested that your students work with real objects to study their attributes, the ways in which they are related to one another, and the kinds of actions that can be performed on them such as slides, flips and turns.

PREVIEWING ACTIVITY ONE

YOU WILL NEED: a large sheet of paper for one student trace the outline of another student's body, a pair of scissors to cut out the form and a second sheet of paper to make a second cutout exactly the same shape and size as the first.

- Ask your students if they think the two forms are the same. **When your students agree** that the forms are the same, hang one at the end of a long corridor. Hang the second form close to the area where the class is standing. How do the forms look the same? How do they look different? Walk down the hall to the first form and repeat this exercise. Modify this activity using the layout of your school building as a guide. Perhaps one form could be hung outdoors and the second form could be taken to the second floor with your class. Take a look out of a window at the form outside and compare it to the size of the second form.
- **How do they look the same?** How do they look different? Why do you think so?

PREVIEWING ACTIVITY TWO

YOU WILL NEED: a variety of containers such as a cereal box, oatmeal container and a cube-like gift box for this activity. **Ask your students to describe the containers.**

- **Make a chart** of the descriptive vocabulary your student use. The expressive language on this chart may help some students describe what they see during their investigations. Ask your students how these containers look the same or different when viewing from the top, side or bottom. How does the cylinder look when it is flipped upside down? How does the cereal box look when it is turned on its side?

PAUSE POINTS

Sideline Suggestions

A set of geoblocks, three-dimensional figures, such as a triangular prism, a rectangular prism, cube, octagonal prism and cylinder will enrich the pause point discussions in this episode. Some of these may be available in your classroom building block collection. Some are available as black line master patterns. If possible, stop the program and allow your students to examine the appropriate figure during the Pause Points.

PAUSE POINT ONE

Aunt Two Lips' garden shop appears very small when seen from the top of the castle. It looks smaller than Multiplex's thumb. Can you think of a reason why? If you could talk to the Monsters, what would you tell them right now?

PAUSE POINT TWO

Mina suggests that the Monsters surround the building and draw what they see. Addison and Split drew a triangle. Mina and Multiplex drew a rectangle. How could that be?

PAUSE POINTS

PAUSE POINT THREE

After observing and recording the shapes on Cousin Digit's house, the Monsters notice that they have drawn two triangles and three rectangles. This is just like Aunt Two Lips' garden shop! But they look so different! Can they really be made of the same shapes?

Sideline Suggestions

You may wish to turn the triangular prism with the triangular face down and then the rectangular face down. How do they look the same and different?

PAUSE POINT FOUR

Binary Bill's computer store is made of many squares. What shape do you think the floor will be? Why do you think so?

Sideline Suggestions

Ask your students to examine the cube. Turn it so that it sits on different faces. How does it look the same or different?

Did it change in the same way as the triangular prism?

PAUSE POINT FIVE

Multiplex suggest they go and find a house that is a cube turned on its side. Split wonders if that could be possible. What do you think?

PAUSE POINT SIX

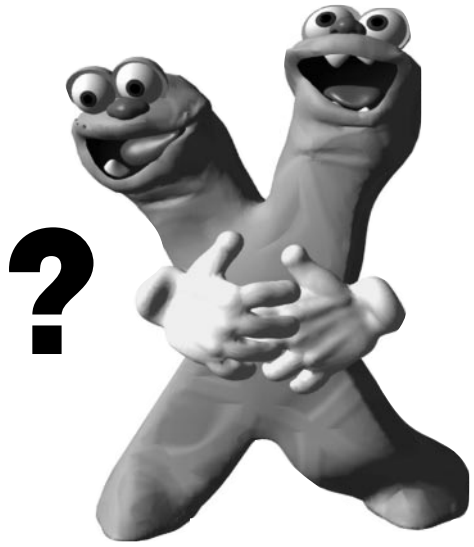
The Post Office has the Monsters perplexed. How can they see three sides at once. How many sides does this building have? What is going on? What do you think the Monsters should do?

PAUSE POINT SEVEN

Three Monsters counted three sides each on the Post Office building. Mina flew up to take a look at the roof and found an eight-sided shape, an octagon. How can the Post Office have a roof with eight sides and nine walls? Is that possible? What do you think the Monsters should do?

Sideline Suggestions

A hands-on experience with an octagonal prism would allow the children to touch the edges and feel the "walls touch the roof."



POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY ONE
Shape shuffle

Sideline Suggestions

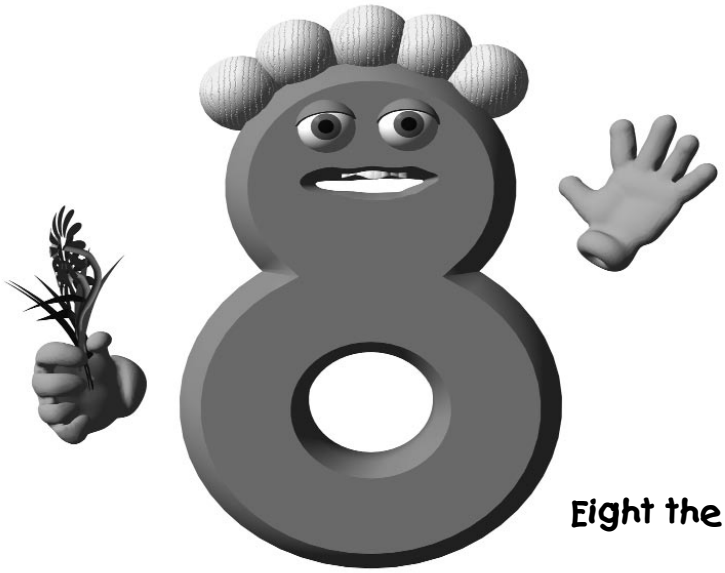
Children between the ages of four and seven begin to develop some concepts in geometry that include the studies of size, shape, direction and angle.

This activity requires students to categorize two-dimensional shapes. They must decide which characteristics they are going to focus on and which are irrelevant. Often the categories that young children create have some overlap. As students are challenged to clearly articulate the characteristics they are using to make their categories, they will make finer distinctions between shapes.

Shape Shuffle will give your students experience in classifying and describing shapes.

YOU WILL NEED: to copy the Shape Shuffle blackline master on to a set of tagboard shape cards.

- **This activity works well in a circle on the floor** so that the shape cards may be seen by all of the students. Shuffle the shape cards and deal one to each of your students.
- **Look at your shape card.** How would you describe your shape?
- **Ask a volunteer** to place his or her shape in the center of the circle and tell one thing about the shape. Ask your students to check their shape to see if it matches. Place the matching shape in the center of the circle.
- **Encourage the children to examine** all the shapes that don't match. Are there any changes that need to be made? Was a shape excluded that should be included? Why?
- **Repeat this activity** with a second volunteer. The discussions will lead students to being careful observers.



Eight the Great

POST VIEWING ACTIVITY TWO

Shape shuffle and sort

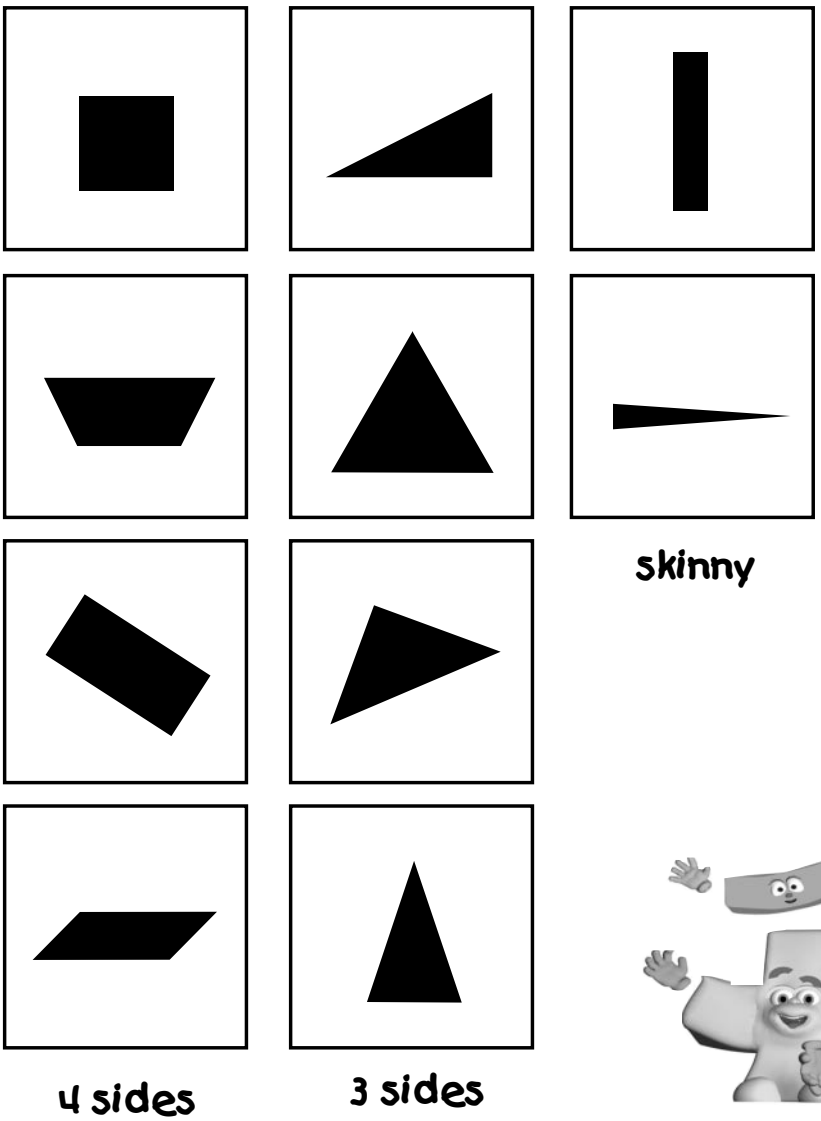
- **Shape Shuffle and Sort asks students to use a set of shape cards** to sort into two, three or four categories. Each card must be included in one of the categories. For younger students you may wish to limit the number of shape cards for sorting. Your students may work in pairs or individually for this activity.
- **You will need a copy of the Shape Shuffle Cards** from the blackline master for each group or individual. Chart paper, glue and writing utensils will be needed for the charts.
- **Ask your students to glue** each shape card group onto large paper. Ask them to write a description of each group. These charts may be displayed and used for further class discussion.

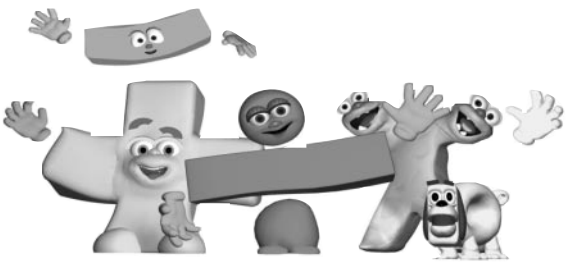
* *This activity is adapted from "Shapes, Halves and Symmetry." See Teacher Resources.*

Sideline Suggestions

Shape Shuffle and Sort provides a nice framework for assessing student understanding through dialogue. Here are some questions to help open up a mathematical conversation with your students:

- Which shapes seem to go together?
- If you're sorting this way, where does this shape go?
- What do you call this group of shapes?
- Why is this shape in this group and not in that group?





POST VIEWING ACTIVITY THREE
Building blocks and cereal boxes

Sideline Suggestions

Recognizing the relationship between two- and three-dimensional shapes connects geometry to real-world problems and applications. For example, a blueprint for building a house, a pattern for sewing a garment, a diagram for assembling a jungle gym are two-dimensional representations for three-dimensional objects.

Please note that the constructing the shapes on Cube, Triangular Prism and Cylinder Pattern blackline masters can be challenging for children and may require your helping hand. Also some shapes are repeated on the Shape Shuffle blackline masters.

Here is an opportunity to identify the two-dimensional shapes which make up a three-dimensional object.

YOU WILL NEED: to make several copies of the Shapes black line master for student pairs or individuals; to copy and assemble the shapes from the Cube, Triangular Prism and Cylinder Pattern blackline masters; an empty cereal box; and scissors.

- **Share the Shapes sheet with the students.** How are the shapes alike? How are they different? Many students will be able to name these shapes.
- **Ask your students** to watch you disassemble a cereal box. Take a cereal box and tear open the bottom being careful not to rip the flaps. Now cut along one of the folds or corners so that the box will lay flat. Ask your students if they can identify any of the Shapes that make up the box.
- **How many rectangles** do you count?
- **The teacher may build** the cube, triangular prism and cylinder using the blackline masters.
- **Ask your student which shapes they can find.** How many of each shape do you count?
- **This activity can also be extended into a shape scavenger hunt** in the classroom or at home. Ask your students to be shape detectives and identify some of the shapes that make up objects in the classroom? The children may work in teams and record what they find using pictures and shapes. Your students may circle up and share their discoveries with one another.

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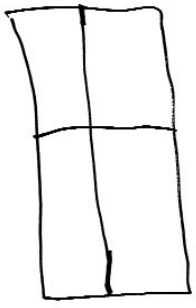

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Math Monsters™

presents

DOUBLES AND THEIR NEIGHBORS

NCTM CONTENT STANDARDS

Number and Operations

- understand numbers, ways of representing numbers, relationships among numbers and number systems
- understand the meaning of operations and how they relate to each other
- compute fluently and make reasonable estimates

Algebra

- understand patterns, relation, and functions
- use mathematical models to represent and understand quantitative relationships

NCTM PROCESS STANDARDS

Problem Solving*
Reasoning and Proof
Communication
Connections
Representation

**Indicates a strong emphasis in this episode*

OVERVIEW

This episode illustrates how mental math and patterns can be used to solve real-life problems. Children investigate the concept of using patterns to make predictions. Mental math strategies are demonstrated in the video and encouraged in the previewing and post viewing activities. As a result of viewing this episode, the children will:

- **make predictions based on patterns of numbers**
- **develop an understanding of the concept of "double"**
- **explore the notion of even and odd numbers**
- **employ mental math strategies to add numbers**

VOCABULARY

double	**pairs**	**twice**
weight	**change**	**add**
even	**take-off**	**minus**
penny	**dollar**	**cents**
odd	**calculate**	

PROGRAM SYNOPSIS

The Math Monsters are invited to join in the fun when the circus band and parade arrive in Monster Land. The Monsters are excited to share their talents and begin to practice their acts for the circus show.

Addison performs his doubling juggling act and leaves the audience wondering how many balls he will juggle next in the pattern. Mina gets into the juggling act too. Mina juggles six pairs of colorful balls. How many balls does that make?

Multiplex shows off his muscles as he lifts weights on a barbell. Addison and Mina double the weight of the barbell by adding a weight to each end of the bar. Finally, they add a weight to only to one side, and Mutiplex finds himself out of balance when the weight of the barbell is uneven.

Magic Mina uses her magic doubling hat to lead the audience in multi-step, real-life applications using doubles. At the conclusion of the program, the Monsters must figure out if an even sum always results when two addends are the same. What happens when one addend is one more than the other?

Our field trip will take us to a shopkeeper who explains how she uses mental math to help in her calculations.

Sideline Suggestions

Students in primary grades grades begin to develop strategies for combining and separating numbers.

Working with doubles offers a mental math strategy to support fluency in computation.

Before watching this episode, think about how numbers can be taken apart into more convenient pieces and put back together to find sums.

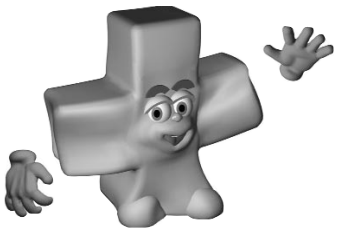
DOUBLE 12
10 + 10 = 20
2 + 2 = 4
20 + 4 = 24

You will also want to be knowledgeable about patterns and functions.

The episode will ask the students to construct their own solution to a problem which involves describing change quantitatively while looking for patterns.

Looking for patterns and searching for "what makes sense" are the basics to understanding mathematical concepts.

You might also use some of the excellent games that already exist involving doubling. For example, play "Double Parcheesi," which is just like the regular game, but you move is double what the number cube shows.



PREVIEWING ACTIVITY ONE

- **Tell this story or some variation to your children.** Pose the questions which follow to spark discussion of doubles and patterns.

"Once upon a time an old man and an old woman found a beautiful barrel at a neighborhood yard sale. They decided that it would make a wonderful container for firewood. Little did they know that the barrel was magic.

The next day, the old man placed the first stick of wood into the barrel. Instead of the usual "kerthunk" he heard a "kerthunkitythunk." He looked inside to see what may have caused the mysterious "kerthunkitythunk." To his surprise he found two pieces of wood!

He removed the wood from the barrel and was about to begin again when Old Tom, the family cat, jumped into the barrel. Instead of the usual "meow" he heard a "meow-meow;" what do you think happened? (student responses) Well, after retrieving the two Old Toms from the barrel, he fetched his wife to come and see the strange happenings! While she was wondering how they were going to feed two Old Toms, the old man got an idea. Being a very big fan of chocolate chip cookies, he dropped a pair of cookies into the barrel. The old woman saw this out of the corner of her eye. She couldn't understand why the old man would discard two of her delicious cookies. She peered into the barrel and what did she see? Four chocolate chip cookies!"

- **Ask children** what magic power does the barrel have? What do you think would happen if the old man dropped three cookies into the barrel? Four cookies?

ADDITIONAL PREVIEW SUGGESTIONS

YOU WILL NEED: cubes or counters, and to set up a magic barrel or box in your classroom to engage your students in thinking about doubles (Keep a stash of extras in the bottom of the barrel.). Have your students watch as you place two cubes or counters into the barrel. Ask your students how many cubes or counters will be in the box or barrel if it is magic, like the one in the story. What is double two? Reach inside the magic container and remove four cubes or counters to show double two. Try this with other numbers.

- **Let's see what kind of double adventures** our math friends, Addison, Multiplex, Split and Mina get into on their problem solving adventure, Doubles and Their Neighbors.

PAUSE POINTS

PAUSE POINT ONE

Sideline Suggestions

"Hands-on tools" of the "math trade" such as counters, snap cubes, play money, balance scales, paper and crayons should be available during this episode.

If possible, stop the program and explore the students ideas and solutions.

Young children often need to build a concrete model in order to gain understanding.

The monsters have set up a problem involving a pattern. They need to find out what the next double problem will be and its solution. What do we already know? How can we show what we know? What solution makes sense? Why?

PAUSE POINT TWO

Mina is juggling six pairs of balls. There are striped balls, star balls, red, green, yellow and purple balls. How can we find out how many balls she is juggling? Collect ideas from your students about how to approach this problem. How can we use what we know to find out how many balls Mina is juggling?

PAUSE POINT THREE

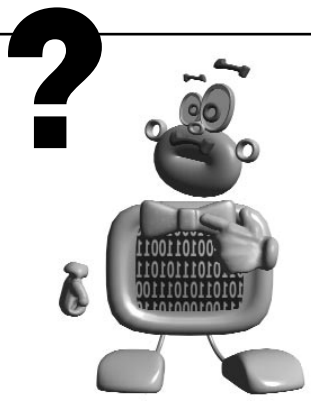
Multiplex has successfully lifted six and six as well as seven and seven when the same weight was added to both ends of the barbell. Now he finds himself with seven and eight. How many is that? What do you think might happen?

PAUSE POINT FOUR

Sideline Suggestions

This activity is more appropriate for Grades 1 and 2.

After a ten-monster buck and a five-monster buck are placed in the magic doubling hat, students are asked to tell what will happen. This two-step challenge could be re-enacted in the classroom using play money. It is a rich opportunity for students to demonstrate how several different strategies may lead to the same solution. Some may reason that $10 + $5 = $15, and double $15 is $30. Others may double $10 to $20 and double $5 to $10, adding $20 +$10 is $30. And some may recognize double $10 by seeing them side by side, and double $5 by seeing them side by side, and count the money to reach a total of $30.



POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY ONE
Balancing act

Sideline Suggestions

Balance Scales and counters will enhance the learning experience in Balancing Act. Try this thinking strategy for evens and odds:

Even numbers make "partners"
Odd numbers have a "leftover"

- **Ask your students to retell** what the Monsters noticed (anytime we add the same amount of weight to each side of the barbell, we get an even number). Is this true for other numbers? How could we find out? What happens if one side of the barbell has one more than the other side? What tools will we need? How will we record the information we gather?

POST VIEWING ACTIVITY TWO
Double games

Sideline Suggestions

Double Trouble problems illustrate for children alternative paths to one solution.

Ask students to solve the same Double Trouble problem. Look for differences in their strategies. Ask students to share their thinking and celebrate the variety of strategies used.

As you observe students at work, notice how well they use "math tools" to solve problem.

As they share, think about how well they articulate their strategies.

YOU WILL NEED: to copy the Double Game and Here's How blackline masters.

- **Create a class book of double games.** Ask your students to think of something that they wish to put in the Magic Barrel. Tell them that this will be doubling problem. Ask them to use a double game page to write a short story or sentence and/or draw a picture describing their problem.
- **Challenge your students to find the answer** to their double problem. Ask them to show how they solved their problem and write the solution on the Here's How sheets.
- **All of the students' double game problems may be put together into a class book.** You may wish to share the doubling problems a few at a time each day for the class to solve. The book could also be used for independent problem solving.

POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY THREE
Doubling larger numbers

• **Let's play the game of doubles.**

Ask students which doubles they can find in their heads? What is double two? Double three? Double four? Double ten? How can we use the doubles we know to find the double of larger numbers? What is double eleven? Double twelve? How can we take numbers apart so that we can find doubles of larger numbers in our heads?

• **Pennies and dimes are great tools** for facilitating the notion of taking apart two digit numbers. Use pennies and dimes to make eleven. What is the double for a dime? What is the double for a penny? How can we find the double for eleven? Try other two-digit numbers.

Sideline Suggestions

Students naturally develop the idea that numbers can be taken apart into pieces that are easier to add.

This activity also makes mathematical connections to place value concepts.

You may wish to limit the larger numbers to those with digits less than five. It may be appropriate to extend the activity further by using five, six, seven, eight or nine in the two-digit numbers.

POST VIEWING ACTIVITY FOUR
Mental-math flip cards

YOU WILL NEED: to copy the Flip Card blackline master onto construction paper or tag board.

• **Fold the cards on the dotted line** to form a flip card. You may choose the simple double or two digit double practice. A blank sheet also available for creating mental-math flip cards.

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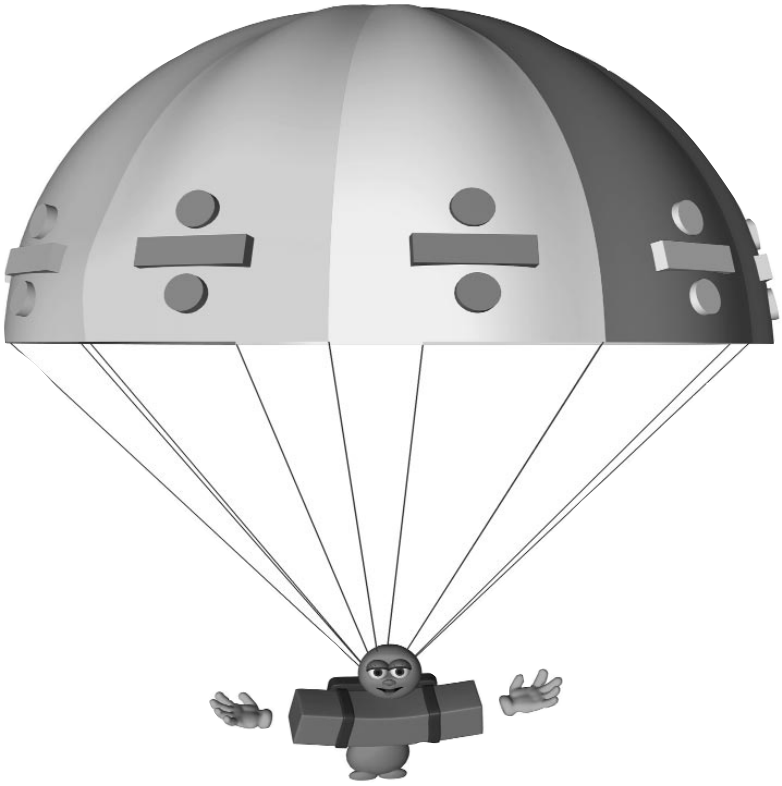
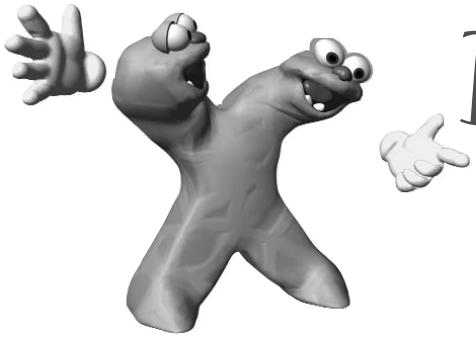




Math Monsters™

presents

MAPPING

NCTM CONTENT STANDARDS

Geometry

- specify locations and describe spatial relationships using coordinate geometry and other representational systems

Measurement

- apply appropriate techniques, tools and formulas to determine measurements

NCTM PROCESS STANDARDS

Problem Solving*
Reasoning and Proof
Communication
Connections*
Representation*

**Indicates a strong emphasis in this episode*

OVERVIEW

This episode brings the mathematics of mapping and graphic representation up for children to investigate. As a result of viewing this episode the children will:

- **describe, name, interpret and apply ideas of direction and distance in navigation using a map**
- **find and name locations with simple relations (next to)**
- **recognize the connection between mathematics and real-world applications; mapping and technology**

VOCABULARY

map	**scan**	**e-mail**
streets	**signs**	**right**
left	**north**	**south**
east	**west**	
forward	**landmark**	
mobile phone		
backward		

PROGRAM SYNOPSIS

It's **PARTY TIME** in Monster land and the Monsters have invited their friends and relations to the castle for dancing, tasty treats and good Monster company! Everything was headed in the right direction until Binary Bill called to find out how to get to the castle for the party.

Mina suggests that they draw a map for Binary Bill. Multiplex draws a map from memory showing how to get from Binary Bill's computer shop to the castle. Split scans the map and sends it to Binary Bill using e-mail.

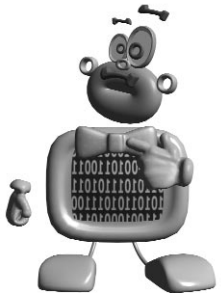
The map has just one curvy line and Binary Bill is confused. He calls and asks the Monsters to include some landmarks. Mina suggests she fly over Monster land and describe the landmarks she sees over the mobile phone.

The Monsters use teamwork to try and figure out how to draw a map that will help Binary Bill.

Finally, after a few more attempts, the Monsters create a map with the landmarks in correct places, street names and clear directions. Before sending the map to Binary Bill a fifth time, Mina flies over Monster land with the Monster-made map to verify that it makes sense.

Our field trip visit is to a fire house. The Chief explains how fire fighters work with maps to help them get to a fire as quickly as possible.

Invite your children to join the Monsters as they help Binary Bill find his way to the big Monster bash.



PREVIEWING ACTIVITIES

PREVIEWING ACTIVITY ONE

Sideline Suggestions

In this episode, the Monsters work together to solve a problem requiring them to use spatial sense. They model perseverance and make adjustments in their thinking and planning as they work to create a map for Binary Bill. Mina demonstrates how to verify a solution. Does it make sense? Does it work?

The development of spatial sense, the ability to structure space and to see relationships among the placement of objects occurs between the ages of four and seven. Children come to see objects in their world as having order vs. a random collection from which they are the center.

Children between the ages of seven and nine develop conservation of length and area. They begin to use both horizontal and vertical references. They can represent objects in space more realistically.

Here is a fun way to warm your students up to the idea of giving directions based on relative location (e.g. next to, around, under) and estimated distance (e.g.paces, footsteps).

- **Ask your students to cover their eyes** while you hide a stuffed bear or some other novel object. **Select a volunteer** to find the object by following the directions you give. Use relative location terms and distance in paces or footsteps to lead the student to the object. For example, give these directions one at a time:
  - ➤take four heel- to-toe footsteps toward the door
  - ➤turn toward the bookshelf
  - ➤take four big paces
  - ➤look under the table
- **A student may hide the object,** select a volunteer and give directions to the hidden item. Very young children will need guidance in giving simple, clear directions.

PREVIEWING ACTIVITY TWO

YOU WILL NEED: to collect familiar objects such as a ball, a book, a building block and a plant. A box is helpful too.

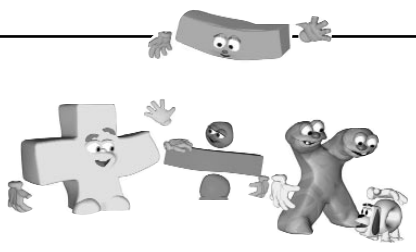
- **Place a variety of the items on a table**, about six in all. An object can be placed "inside" the box.
- **Tell the children** that you are thinking of one item on the table.
- **Ask for a volunteer** to follow your directions to select the correct item. Your directions will include words which describe the position and proximity of items in relation to one another. For example: the item is far away from the ball, it is next to the building block, and in front of the book.
- After the volunteer has identified the object, **repeat the activity**.

PREVIEWING ACTIVITY THREE

Sideline Suggestions

Previewing activities three and four link mathematics to the real world. By highlighting connections to mathematics outside of the classroom arena, children come to value mathematics as a part of their everyday life.

- Most schools and many homes are equipped with computers and e-mail access. **Share this technology** with the children. If possible, send a class-dictated e-mail to another class or a place of interest such as a children's museum. Explain to them that the message will arrive quickly but that a reply will depend on when the person receiving the message reads it and decides to respond.
- If your school is equipped with a scanner, **explain its purpose**. Perhaps some of the children could send pictures home via e-mail to their parents.



PREVIEWING ACTIVITIES

PREVIEWING ACTIVITY FOUR

YOU WILL NEED : to collect a variety of simple maps to share with your students.

- The collection may include a map of the classroom, the school, your neighborhood, county or state. Your selection will depend on the developmental level of your students. The younger the child, the closer to home you will need to stay.
- **Ask your students** what they know about maps. When they have established the basic understanding that maps tell us where things are in our world, ask them to name the people or jobs that require maps.

PAUSE POINTS

PAUSE POINT ONE

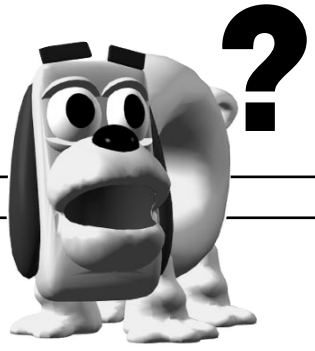
Binary Bill has a problem. He would LOVE to go to the party at the castle, but he doesn't know how to get there. What do you think the Monsters can do?

Sideline Suggestions

The Pause Point questions will require your students to rely on their mind's eye to help them think through problems which involve moving, adding or deleting mental images from Multiplex's map. If it is possible to stop the program, reconstruct each of Multiplex's maps using your students' input. This exercise will enhance both visualization and spatial sense.

PAUSE POINT TWO

Split sends the map to Binary Bill through the e-mail. Within minutes, Binary Bill has the map. But wait! Binary Bill can't follow the map. What can the Monsters do to help?



PAUSE POINT THREE

Binary Bill notices that the landmarks are in the wrong places on the revised map. Binary Bill explains that the Post Office is not next to the Monster Wash, it is on the other side of town. Now what?

PAUSE POINT FOUR

Binary Bill is still missing some important information on the map. He asks for street names and which direction he should turn. How will the Monsters figure this out?

Sideline Suggestions

This activity will engage your students in navigating their way around their classroom or playground. It requires students to describe the position of objects and give directions for a teammate to get from one place to another.

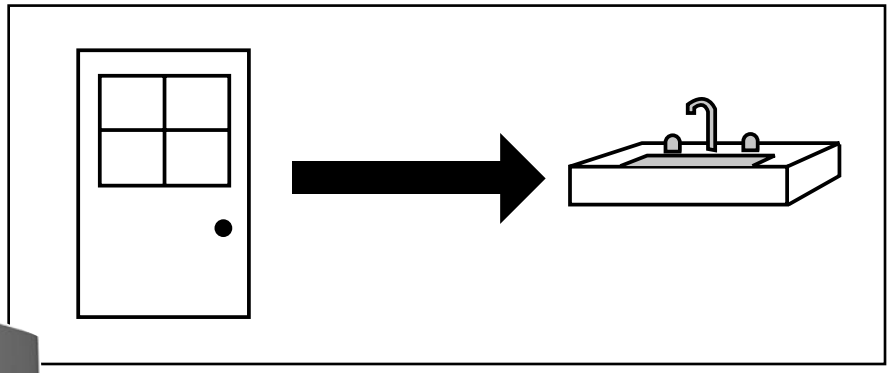
POST VIEWING ACTIVITY ONE
Navigating the classroom

YOU WILL NEED: to divide the class into pairs, to draw a picture problem on a slip of paper for each pair (see sample below) and a basket to hold the papers.

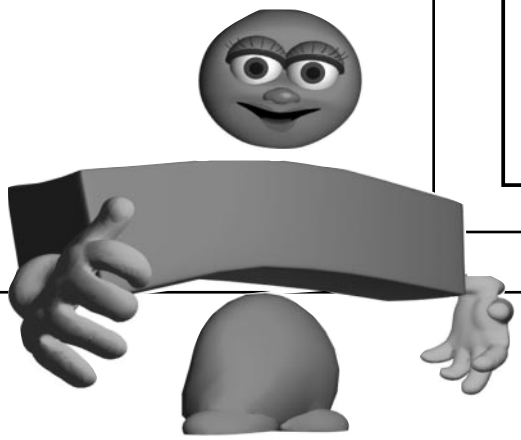
- **Give your students a challenge** such as "Mary is standing by the sink and she needs to get to her table. Let's pretend she doesn't know the way. Which directions will help her find her table? Are there important landmarks that we should use in the directions?
- **Ask your students to give one direction at a time** while the student, Mary in this case, follows each direction to get to her table.
- **Ask your students if there is another way** in which Mary can get from the sink to her table. Which way is best? Why?
- **You may wish to group your students in pairs.** Draw picture problems for each pair of students in your class and put them in a basket. The picture problems will be created by using landmarks in your classroom or, if you choose to work outdoors, landmarks in the playground.

Each student will solve the picture problem they select from the basket. One member of each team will give directions to the other student who will navigate from one place to another.

After the teams have solved their challenge, they may tell the class their problem and demonstrate the solution. The picture problems can be returned to the basket and the teams can change roles and select a new challenge.



Picture problem sample



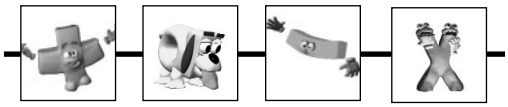
Sideline Suggestions

A String of Monsters is designed to give your students practice with order and proximity. This activity can be conducted in a large circle or in smaller groups of students. Many children have explored this concept with strings of beads.

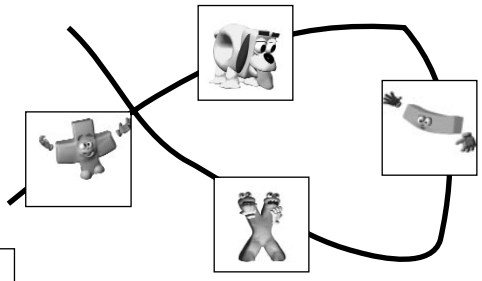
POST VIEWING ACTIVITY TWO
A string of monsters

YOU WILL NEED: to duplicate and cut out sets of four Monsters from the Monster Hop blackline masters, two-foot pieces of yarn and tape.

- **Using a the yarn**, space the Monster pictures out evenly. Tape the backs of the pictures onto the yarn.



- **Ask your students** to describe the position of the Monsters.
  - ➤Which monsters are on the end?
  - ➤Which monster is next to Mina?
  - ➤Which monster is beside Multiplex?
  - ➤Which monsters are far apart?
  - ➤Which are close together?
- **Now give the string a loop.**
- **Ask your students to explain** how



the position of Monsters have changed. Is Multiplex still far away from Aunt Two Lips? Continue to practice using different positions of the string and examining the order and proximity of the Monsters.

POST VIEWING ACTIVITY FOUR
Monster hop

Sideline Suggestions

This activity requires your students to use both horizontal and vertical references simultaneously. Thin skewers from the grocery store or chenille strips make superb markers for children who need to mark one direction at a time.

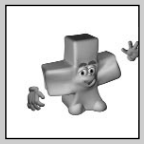
Simultaneously considering more than one reference at a time should be reserved for students who demonstrate readiness. By assessing your student's developmental level and conceptual understanding throughout the Math Monster episode and activities, you will know best what they are ready to experience.

The Monster Hop guides older students in using a coordinate system to identify the Math Monster in a particular position on a grid.

YOU WILL NEED: to duplicate the Monster Hop blackline master and get sets of skewers or chenille strips for each student.

- **Begin by modeling for your students the meaning of "row" and "column."** You may wish to cut out the Math Monster pictures that are on the "Monster Hop" coordinate graph and use them to show "row" and "column."
- **Ask a student** to move three Monster picture cards to form a new row or a new column with different characters. Practice using the vocabulary row and column.
  Teacher: "Where is Binary Bill?"
  Student: "In the row."
  Teacher: "Where is Mina?"
  Student: "In a column."

Example one: "This is a row."



Example two: "This is a column."

POST VIEWING ACTIVITY FIVE
Directions

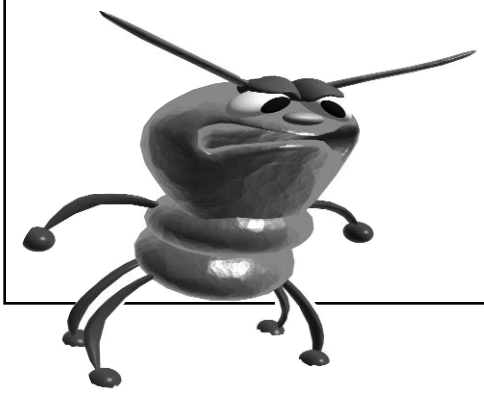
Sideline Suggestions

Your students may not be ready to move beyond naming Monsters in rows and columns. Therefore, the "Monster Hop" sheet can be used to make Monster Bingo boards. Ask your students to cut out the Monsters from the Monster Hop sheet and glue them onto the Monster Bingo Board in any order. Now they may play Monster Bingo to reinforce the ideas of row and column.

YOU WILL NEED: to duplicate the Monster Hop blackline master

- **Can You Find My Monster?** also uses the Monster Hop coordinate system activity sheet. This game is played in pairs. One student selects a Monster from the "Monster Hop" sheet and marks it with a counter. The second student asks yes or no questions, which may include directional language such as, row, column, above, below, or next to in order to find and name the secret Monster.
- **As the student asking questions receives a "yes" or "no" response**, he or she may mark the "Monster Hop" sheet to eliminate Monsters who are no longer possibilities. Deductive reasoning is used to "figure out" the secret Monster marked on the teammate's

POST VIEWING ACTIVITY SIX
Directions



YOU WILL NEED: to duplicate the Monster Hop blackline master

- **Introduce the coordinate system** on the Monster Hop sheet. Ask your students to name the Monsters in the first row. Name the Monsters in the second row. Name the Monsters in the first column? And so on.
- **Ask your students** if they think a Monster can be in a row and in a column at the same time. Why or why not? Allow your students to talk with one another or to think independently before responding to the question.
- **Practice finding Math Monsters on the coordinate system** using the skewers. Ask your students to place a skewer or pipe cleaner on the Monster Hop sheet so that it is on Aunt Two Lips and pointing to the top and bottom of the paper. Explain that this too is a column. Now place the second skewer on Aunt Two Lips but this time it will point to the sides of the paper. Tell your students that this is a row. Where do the skewers or pipe cleaners cross each other? Can a Monster be in a column and a row at the same time? Which column is Aunt Two Lips in? Which row?
- **Ask your students** to identify the Monster that is in the column and row that you name. Which Monster is in column A and row 3? Ask for a student volunteer to offer a column and row for his or her classmates to name the

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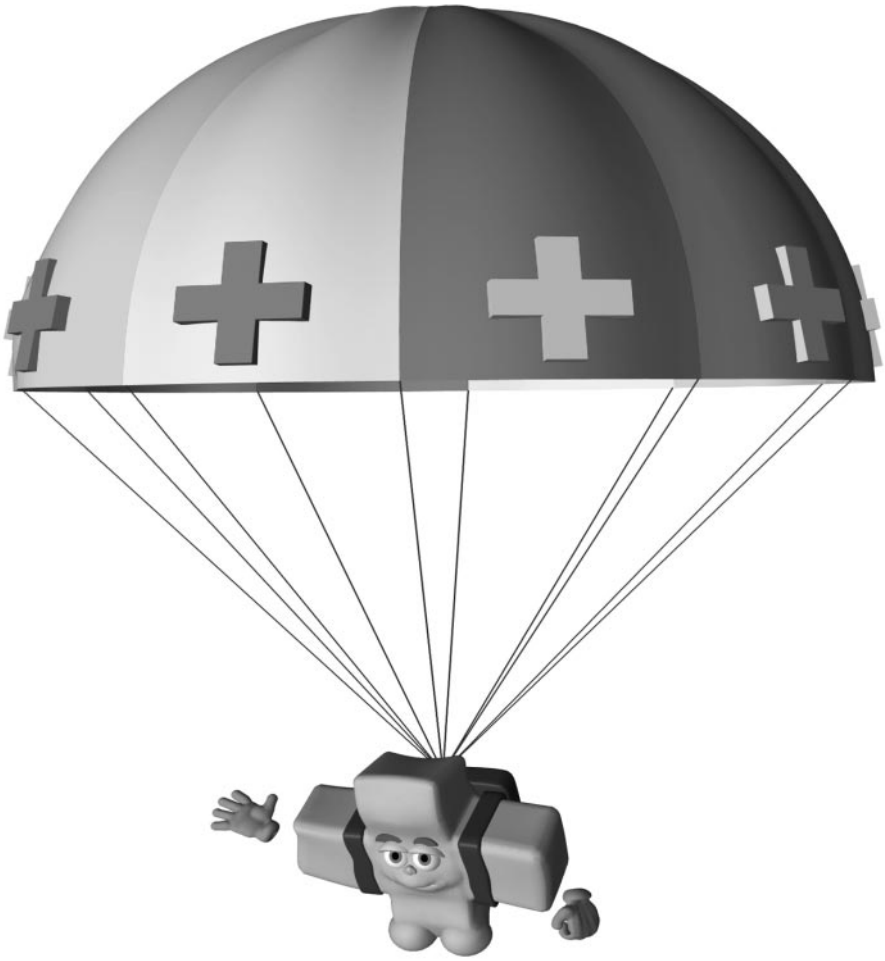


Math Monsters™

presents

TIME

NCTM CONTENT STANDARDS

Measurement

- understand measurable attributes of objects and the units, systems and processes of measurement
- apply appropriate techniques, tools and formulas to determine measurements

NCTM PROCESS STANDARDS

Problem Solving
Reasoning and Proof*
Communication
Connections
Representation

**Indicates a strong emphasis in this episode*

OVERVIEW

This episode explores concepts of time. The Monsters investigate ways to measure the duration of time. As a result of viewing this episode, the children will:

- **develop an understanding about the need for standard units**
- **develop a sense of time through estimation**
- **use non-standard tools to measure duration of time (counting, water clocks)**
- **identify standard tools for measuring time (clocks etc.)**

VOCABULARY

measure	**time**	**short**
long	**half**	**empty**
fewer	**months**	**digital**
bottom	**middle**	**years**
halfway	**hours**	**top**
minutes	**quarter**	
amount	**calendar days**	

PROGRAM SYNOPSIS

It is play time in Monster Land and the Monsters are off to fly a kite. The Monsters must take turns flying one kite in a fair way. How long should each of the turns last? How can they be fair?

Multiplex takes a turn with the kite first. Addison counts while Multiplex takes his turn. Split counts while Addison takes his turn. Mina notices that Split is counting too fast. Addison recognizes that he didn't have the same amount of time to fly the kite. Perplexed, the Monsters take a break to sip water and think it over.

Addison realizes his cup is dripping water. He suggests they measure time by counting the drips. The Monsters try it out and find their cups drip at different rates. They standardize the cup by making the hole in the bottom the same size hole in the bottom of all the cups.

When the Monsters return to kite flying, they must determine who will have the first turn. Addison suggest they a race around the castle, one at a time. The Monster who makes it around the castle in the fewest drips will be first. Addison runs around the castle in only ten drips (the cup takes twenty drips to empty). Now they must learn how to record shorter and quantifiable amounts of time on the twenty-drip water clock. They do this by marking the cup near the top, middle and bottom, much like dividing an hour into a half and quarters.

The Monsters wonder if human beings keep track of time. Our field trip is to a clock maker who introduces the viewers to the way human beings measure time. The clock maker demonstrates an hourglass. He also shows how hands and marks on the clock face help humans tell time.

PREVIEWING ACTIVITIES

PREVIEWING ACTIVITY ONE

Sideline Suggestions

Exploring concepts of time and finding ways to measure it using a variety of non-standard and standard tools will lead students to understand the nature of a unit and the mechanics of using clocks.

Time-related ideas in this episode include; sequencing events, duration of time periods, and passage of time.

- **Play a game of "hide and seek" with your students**. Divide them into two groups—one hiders and one finders. Count slowly and loudly as the hiders scramble to hide. Have the finders seek them out and then gather together as a whole group.
- **Now switch the groups.** Ask the finders group to hide and the others to seek. This time count very quickly and loudly. You are probably going to have some complaints from the students that didn't have as much time to hide. This activity will spark some lively discussion about how to play "hide and seek" in a fair way.
- **Ask your students** if they have ideas to help make the game fair for seekers and hiders. How can we give both teams have the same amount of time to hide? Try out some of the children's ideas. Play several successful rounds of "hide and seek."

PREVIEWING ACTIVITY TWO

Sideline Suggestions

Children should develop a sense of time between events such as the beginning of lunch and the end of the lunch, compared to the beginning of winter and the end of winter. In this exercise, they think about the interval of time between claps.

- **A game of "follow the leader"** using rhythms is a fun way to inspire children to think about timing. The leader will clap a rhythm such as clap, clap, clap, pause, clap, clap, clap. Ask your students to repeat what they heard.
- **The leader will change the speed** of clap, clap, clap, pause, clap, clap, clap. The children will repeat the pattern. How was the first rhythm different from the second? How were they the same?
- **Your students may enjoy taking turns** being the leader and inventing simple rhythms for their classmates to repeat.

PREVIEWING ACTIVITY THREE

Sideline Suggestions

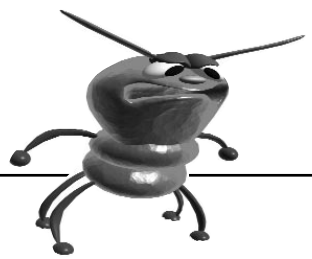
Daily schedules and routines support the development of understanding time intervals.

Talking about time with your students will reveal their understanding of time concepts.

Your daily classroom schedule and your monthly calendar will help to reinforce the concept of time intervals.

YOU WILL NEED: to duplicate the Analog Clock Faces blackline master.

- You probably share the daily schedule with your students each morning. **Use analog clock faces on your daily schedule alongside of the digital notation** when you post your schedule each day.
- **Before viewing this episode, discuss time intervals** with your students. Here are some questions to help you "talk time" with your students: What time do we eat lunch? How long is math class today? When does it begin when does it end? How long is the month of September? When does it begin when does it end? How many days? How many weeks?



PAUSE POINTS

PAUSE POINT ONE

Sideline Suggestions

Older students may suggest conventional ways for measuring time such as clocks, watches or stop watches.

The Monsters need a fair way to measure the kite flying turns. How can they tell if each Monster is flying the kite for the same amount of time? Do you have any ideas for the Monsters?

PAUSE POINT TWO

It is clear to Addison that he did not get the same amount of kite flying time as Multiplex. Why didn't counting solve the problem? What can the Monsters do?

PAUSE POINT THREE

Sideline Suggestions

Here is a good opportunity to explore time in larger units such as days, weeks and months.

Your classroom calendar is an excellent tool for discussion during this Pause Point. Multiplex suggests that they each take a turn for a day. Mina said, "Wait a minute! I don't want to wait that long." Show the students what it would look like if the four Monsters shared the kite on four consecutive days. Does that seem like a long time?

How can the Monsters measure time so that they each get to fly the kite fairly? Are there any new ideas for the chart? What do you think the Monster might try next?

PAUSE POINT FOUR

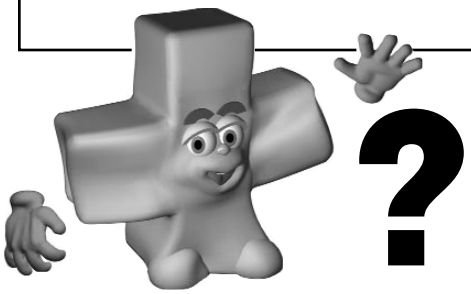
Sideline Suggestions

The purpose of standard units of measurement is illustrated in this portion of the episode. This concept will be revisited when the students explore the measurement of length, capacity, weight and area.

The Monsters created water clocks to measure a time fairly. But something went wrong. How could Addison's kite time be so short and Multiplex's kite time be so long? They both had water clocks. What went wrong?

PAUSE POINT FIVE

A race around the castle will determine who will fly the kite. The fastest Monster wins! But the path isn't wide enough for all of the Monsters and they must run one at a time. How will they know which Monster gets the kite? Do you have any suggestions?



POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY ONE
How long is a minute?

- **How Long is A Minute?** is a short activity that requires no special materials. **Ask your students to hide their eyes** while you time a minute. Tell them that when they think one minute has passed to raise their hand.
- **How many students thought a minute was shorter than it is?** How about longer? Repeat this activity several times over the next few days. Are your students becoming more accurate in estimating a minute?
- **Your students could also guess how many times they can do an activity in a minute** like writing their names or the numbers from one to 20. Time them to see how closely they came to estimating correctly.

POST VIEWING ACTIVITY TWO
Let's face it

- **Let's Face It uses a clock face to count intervals of time shorter than one hour.** A clock face blackline master is provided for this activity. It is marked in five minute intervals. Tell your students that each section represents five minutes. Ask them to color each section so that the same colors never touch. Use the clock face for counting aloud by fives. What is the last number we hear when we get all the way around the clock?
- **You may use the clock face to color thirty minute sections as well.** What does half an hour mean? How is it like half a cup of water in the water clock?
- **Another application of the clock face is to explore a quarter of an hour.** Ask your students to cut out a clock faces, fold it in half and then in half again. Open the clock face and cut the face on the creases. How many pieces do you have? Ask your students to place the four quarters of an hour on the whole clock face. What do you notice?
- **Manipulate the quarters** to show one quarter, two quarters or half past and three quarters of an hour.

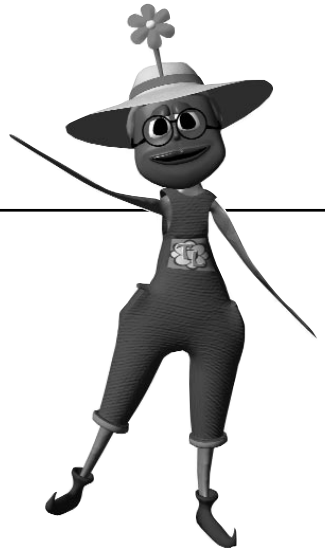
Sideline Suggestions

If your students are beginning to "tell time," you can use this activity to launch further investigations.

Young children learn to use the fraction 1/2 to describe concrete situations.

Using fractions to tell "how much "of an object one has, is the first idea that children develop.

This activity may be more appropriate for older students. You can best judge the academic developmental challenges your students require.



POST VIEWING ACTIVITY THREE
Water Clock Olympics

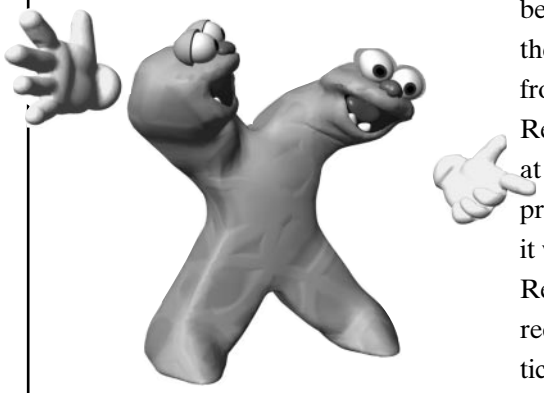
Sideline Suggestions

Water Clock Olympics is an active way for your students to engage in measuring the duration of time.

Your management style and the needs of your student will determine how you wish to structure this activity.

The simplest way to make a water clock is to take a paper cup and with a pin or pencil point make a hole in the bottom small enough for the water to drip through.

Water Clock Olympics is not intended to be a competitive experience, therefore, student names are not included on the record sheet.



Water Clock Olympics gives your students an opportunity to use water clocks to make predictions, measure the duration of time and record information.

YOU WILL NEED: to collect cotton balls, tape, cubes, two buckets, a pan to catch drips, a trash can, four scrap paper balls; to duplicate the Water Clocks Olympics blackline master to use as a record sheet; and to make two water clocks (Your students can help you test them. Do they drip at the same rate?)

- **Tell your students** that they will participate in the Water Clock Olympics. There will be three tasks and each child will have a turn to participate.

➤ **TASK ONE: MOVING CUBES**

Set up a bucket with twenty cubes in it and a second empty bucket beside it. Your students will move the twenty cubes, **one at a time**, from one bucket to another. Remind them to pick up one cube at a time. Ask your students to predict how many drips they think it will take to complete the task. Record their predictions on the record chart. Ask the student participant to begin the task while others count the drips. How many drips did it take? Record the information. Try this several times.

➤ **TASK TWO:**
COTTON BALL ROLL

Tape a starting line and a finish line six to eight feet apart on the floor. Your students will blow a cotton ball from start to finish. Remind them that they may not touch the cotton ball. Ask your students to predict how many drips they think it will take to complete the task. Record their predictions on the record chart. Ask the student participant to begin the task while others count the drips. How many drips did it take? Record the information. Try this several times.

➤ **TASK THREE:**
MAKE THE BASKET

Make four paper balls and clear a space for a round trash can to serve as the basket. Mark a place on the floor for the student to stand when making a shot for the basket. Your students will shoot the paper balls into the basket, one at a time. Ask your students to predict how many drips they think it will take to complete the task. Record their predictions on the record chart. Ask the student participant to begin the task while others count the drips. How many drips did it take? Record the information. Try this several times.

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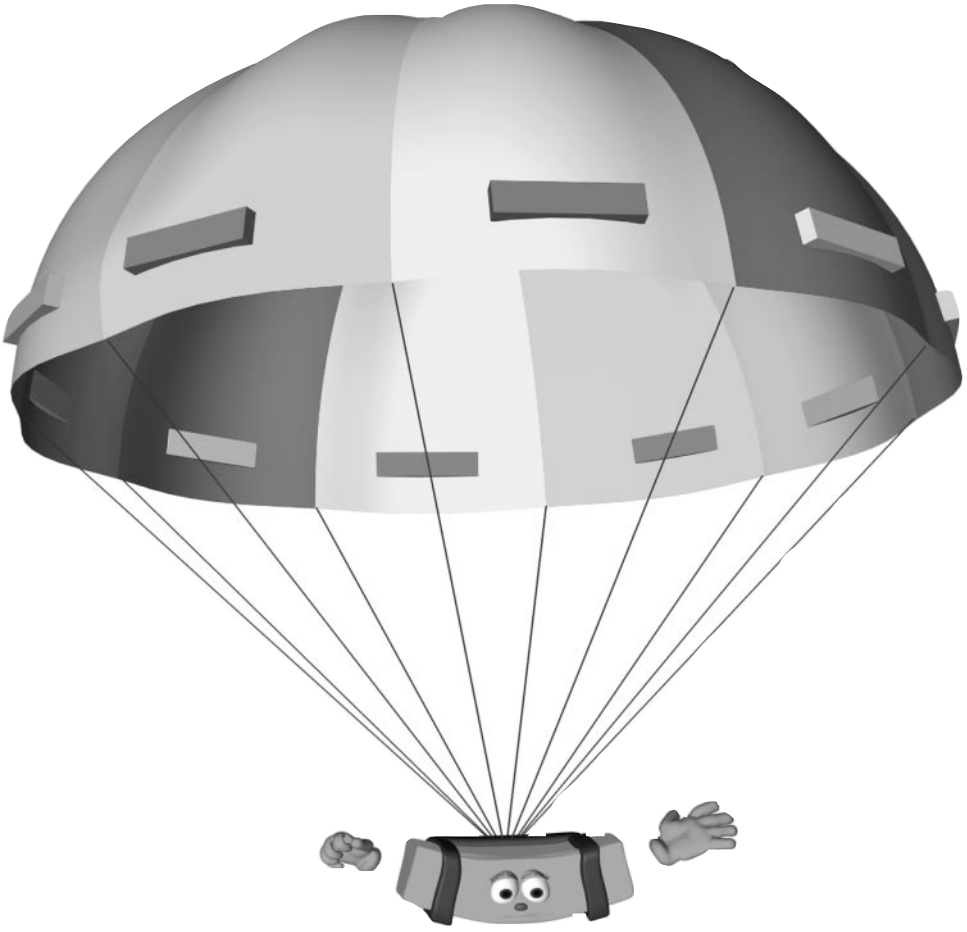
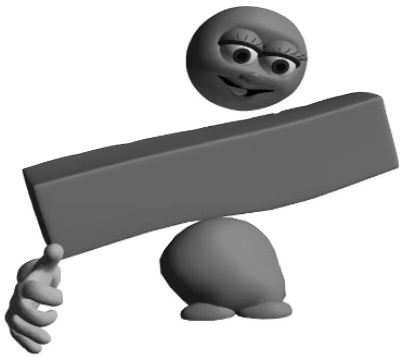




MATH MONSTERS™

presents

PATTERNS

NCTM CONTENT STANDARDS

Algebra

- understand patterns, relations and functions
- represent and analyze mathematical situations and structures using algebraic symbols
- use mathematical models to represent and understand quantitative relationships
- analyze change in various contexts

NCTM PROCESS STANDARDS

Problem Solving

Reasoning and Proof*

Communication*

Connections*

Representation

**Indicates a strong emphasis in this episode*

OVERVIEW

This episode, Patterns, will allow children to explore patterns with the characters. Patterns will be defined, and the audience will be challenged to figure out the next pieces of each pattern. As a result of viewing this episode the children will:

- **identify, analyze and extend patterns**
- **describe how repeating and growing patterns are created**
- **recognize the same pattern in different manifestations**

VOCABULARY

pattern **repeat**
same **different**
predict

PROGRAM SYNOPSIS

In the castle we find Split decorating with a pattern she has created all on her own. When she is interrupted the other monsters need to continue the pattern. Multiplex creates a random continuation of Mina's work and the monsters' first challenge is to clarify just what a pattern is. Next they need to figure out Split's pattern so that it may be extended.

This sparks an interest in patterns and each of the monsters decides to create their own type of pattern. They explore patterns using numbers, shapes and blocks. Some are repeating patterns and some are growing patterns. The patterns become more complex as the episode moves along. Each time there are visual and concrete models to assist the audience in predicting what will come next in the pattern.

Students can analyze, predict and extend patterns right along with the Monsters as they explore the world of patterns.

Join us on a field trip to a tile shop where students can see patterns applied in the real world.

PREVIEWING ACTIVITY ONE

Sideline Suggestions

Children organize their world through patterns. Their school day follows a schedule and their home lives resemble a pattern of daily routines such as: dinner, bath time, brush teeth, story, bedtime.

An understanding of patterns leads to the mathematical idea of functions for children. Recording information on tables and charts helps children see number patterns. By coloring the multiples of five on a hundreds chart, children recognize a predictable function or rule for fives.

Please remember that children may take a while to see the commonality among all the types of patterns named.

- **Introducing children to the concept of patterns** through rhythms can be a brief, entertaining and highly effective strategy. Try leading your students through the activities below. Once your students become proficient with these rhythms, allow them to create their own variations.
- **Demonstrate a rhythmic pattern and ask your students to join in** continuing the pattern. Eventually, your students can lead the motions and create the pattern.
- **Here are a few suggestions for rhythms:**
  - -snap, snap, clap, snap, snap, clap ...
  - -stomp, clap, clap, stomp, clap, clap ...
- **Try these movement patterns:** (touch)
  - ➤head, shoulders, knees, toes, head, shoulders, knees, toes ...
  - ➤eyes, ears, eyes, ears/ears, eyes, ears, eyes ...
- Try some Math Monster movement patterns. **Create motions for each of the characters** with your class. Here are some suggestions.
  - ➤Addison—arms straight out to the sides
  - ➤Multiplex—hands overhead and legs spread making an "X" with the body
  - ➤Mina—hands flat against sides
  - ➤Split—arms overhead making a circle
- **Now add some patterns**:
  - ➤Addison, Multiplex, Mina, Split, Addison, Multiplex, Mina, Split ...
  - ➤Mina, Mina, Split, Split, Split, Mina, Mina, Split, Split, Split ...

PREVIEWING ACTIVITY TWO

Sideline Suggestions

Wait time is very important for this activity since all of the children will not understand exactly what it is they are to do. As they observe their peers and are given several opportunities to practice building the pattern, they will find greater success and expand their problem-solving abilities.

After trying various rhythmic patterns encourage your students to interpret and represent the pattern using math materials.

YOU WILL NEED: linking cubes

- **Lead a familiar rhythmic pattern.** After repeating the pattern a few times, stop and ask students to represent the pattern using linking the cubes.
- **Draw attention to the linking patterns that replicate the rhythm**, and ask children to point to the colors and repeat their names for the group. Compare the patterns represented by different students. For example, the rhythm— clap, snap, snap, clap, snap, snap—could be represented by color cubes: red, green, green, red, green, green.

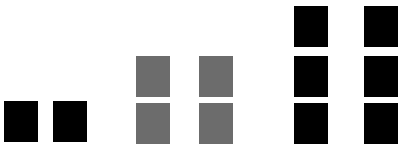
PREVIEWING ACTIVITIES

PREVIEWING ACTIVITY TWO

Your students may be ready to work with increasing or growing patterns.

YOU WILL NEED: dried beans to serve as counters

- **Build this pattern:**
  What do you think comes next?



1 and 1 2 and 2 3 and 3

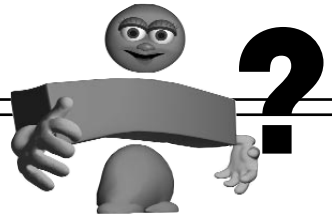
Sideline Suggestions

Learning to communicate strategies and ideas by talking and listening to others is essential for young children in mathematics. Ask your students to describe the pattern. How did we know what to build next? Where did we look? What did we find out?

Ask your students to build the next set in the pattern using the manipulatives. After building four and four, ask for the next set in the pattern.

PAUSE POINTS

PAUSE POINT ONE



Multiplex and Mina are trying to help Split paint a pattern border in her room using shapes. They are using four shapes, but it just doesn't look like Split's pattern. What do you think is wrong?

PAUSE POINT TWO

Split thinks that Addison has made a mistake in his pattern. Addison is certain that his pattern works and Split needs to figure it out.What do you think comes next in Addison's pattern?

PAUSE POINT THREE

Mina is so pleased with her tablecloth pattern. By flipping her stencil over she has created a pretty design. How can she use the same stencil but create a different pattern for her napkins?

Sideline Suggestions

If you are able to stop the program, you may wish to show your students a real stencil and demonstrate the different look that can be created by flipping or rotating the shape.

PAUSE POINT FOUR

Split adds a little number pattern to her room. What is her pattern? What comes next? Why do you think so?

Sideline Suggestions

For Pause Points four and five, a hundreds chart or number line will help your students identify the next numbers in the pattern.

PAUSE POINT FIVE

Multiplex is using blocks to build his pattern. He is building pyramid patterns. The first pyramid has one block, the second has three blocks and the third has six blocks. Mina has gone to get more blocks for Multiplex. How many blocks will he need for the next pyramid?

Sideline Suggestions

If you are able to stop the program, ask your students to build the same pattern as Multiplex using blocks. Ask them to describe how the pyramids change in the pattern. How can we find out how many blocks the next pyramid will need?

POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY ONE
Copying patterns

- **Make a pattern with color tiles and ask students to copy it** by coloring in squares on the copy-a-pattern section of the first blackline master.

POST VIEWING ACTIVITY TWO
Extending patterns

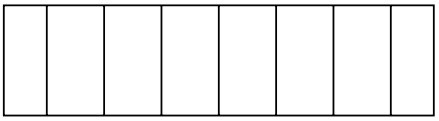
Sideline Suggestions

The ability to see patterns will help students transfer knowledge and understand relationships between one situation and another.These post viewing activities focus on extending linear patterns, growing patterns and number patterns. In each activity, the children are encouraged to make representations of the patterns they build.

Extending patterns with color tiles will give your students practice in predicting the next step in a linear sequence.

YOU WILL NEED: color tiles and coloring tools; to duplicate the Extend-a-Pattern black line master for your students to make representations of their patterns.

- **If you have access to an overhead projector**, you can make overhead tiles by photocopying the Extend-a-Pattern black line master on overhead film. Color the squares as needed and cut them out. Another option is to model the activity with the children while they are sitting in a large circle.
- **Model a pattern for your students** using color tiles or cubes. For example, line up: red cube, green cube, green cube, red cube. Ask the students to predict which cube they believe will be next in the sequence. Continue to build the sequence under the direction of your students. Ask them if the pattern makes sense. What makes the pattern work?
- **Make a representation of your pattern on chart paper.** Color the first square red, the next green, the next green, the next red. You can extend the activity by labeling the color squares with a letter representation. Write an "R" under the red square, a "G" under the green square and so on.
- **Give your students a small bag of eight to ten color tiles.** You may wish to limit the number of colors depending on the ability of your group to work with patterns. Ask your students to create a pattern using the tiles. Your students may share their pattern with a buddy and explain why they believe they have a pattern. After "talking out the pattern" ask your students to record their pattern on the Extend-a-Pattern black line master sheet. Try using letters to represent the color tiles below the boxes on the Extend-a-Pattern sheet.



R G G R G G R G

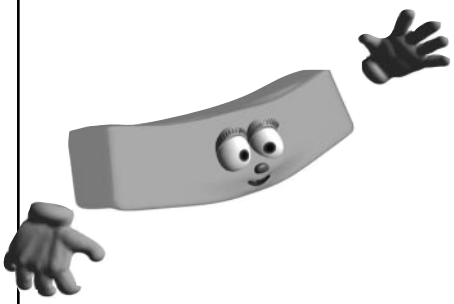
Example:

- **Post your students' patterns and share a few each day.** Encourage your students to talk about their patterns by asking them to describe their pattern to the class. Each student may ask the class to predict the next color for their

Understanding of mathematical concepts and procedures is nurtured when children see the same idea manifested in different ways. In this activity, color squares represent tiles, and letters represent both squares and tiles.

Sideline Suggestions

Skills in mathematical language and communication are sharpened as students have opportunities to explain and support their thinking. By listening to your students' "talk math" you will gain insight into their level of understanding.

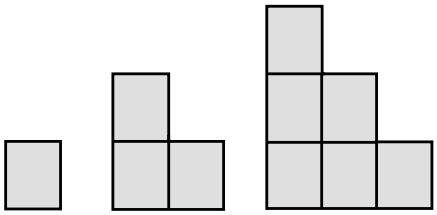


POST VIEWING ACTIVITY THREE
Growing patterns

Growing Patterns shows students that patterns can grow in a logical sequence in addition to repeating themselves.

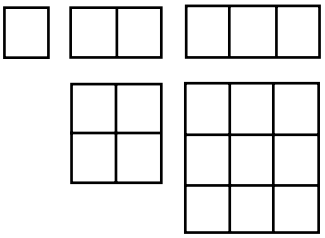
YOU WILL NEED: to make an overhead film of the Growing-patterns Squares blackline master and cut out the squares to use on the overhead. (An alternative is to use small tiles or to cut large squares out of construction paper to model this pattern for your students.); scissors and glue so that your students may build models of this growing pattern.

- **To engage your students in thinking** about growing patterns, model the sequence below by building each model in this order and leaving them all on display for your children to examine. By numbering each column, your students will see a more abstract representation of the same pattern.

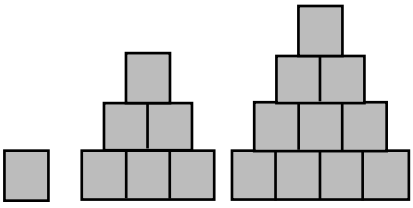


1 2 1 3 2 1

- **Tell your students** that these are the first three steps in a pattern. Ask them to cut out a model of each step using the Growing Pattern Squares black line master and glue them onto a large piece of paper in the correct order and orientation. Encourage them to record the number of squares for each of the columns on each step.
- After they have made a representation of the first three steps, **ask your students to predict the next step.** Encourage them to talk to each other about their predictions. What do you think? Why do you think so?
- **Ask your students to cut out the next steps** to the pattern. Some students may cut out step four and five, while others may go on to build the pattern further. As students are working, ask them to explain to you the pattern they are building.
- **This activity can be repeated** using different growing patterns. You may wish to use color tiles to build the pattern instead of cutting out the models. Here are some ideas for other growing patterns:



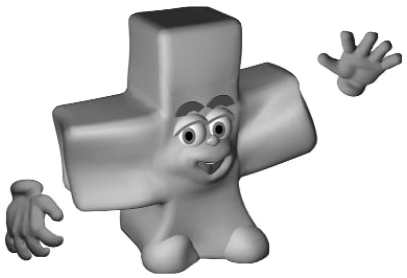
or



Sideline Suggestions

Here is an excellent opportunity to guide your students in developing clear and careful mathematical communication. If a student says, put a 15 by the 14, it is not clear if this means to the right or left. Guide your students in using clear directional phrases and correct terminology by making any mistake in placement that your students' language dictates. You may wish to label the blank chart with the words over, under right and left.

Young children are easily engaged in searching for patterns in the world around them. Take your children on a pattern hunt in your school building and/or around the neighborhood. Point out some examples of patterns such as the sidewalk, a tile wall, or a garden arrangement. Ask your students to find patterns and report them to a classmate. You may wish to group all the students together periodically so that they may share what they have found with the whole group. Your students will be amazed at what they find!



Some of your students will point out that they counted up or counted backward to find numbers. Others may have noticed the tens column or a row of numbers that increased by one in the tens place while the one's place numeral remained the same. This dialogue is a rich opportunity to assess your students' level of understanding.

POST VIEWING ACTIVITY FOUR

Number chart patterns

Number Chart Patterns gives your students an opportunity to experience a few of the many number patterns embedded in a 0-99 chart. **YOU WILL NEED:** copies of the 0-99 chart blackline master, an overhead of the blank 0-99 chart black line master and coloring tools for this activity.

- **Using the blank chart on an overhead projector** (an enlarged chart will do if you do not have access to an overhead) write in a few numbers at random in the correct position on the chart. (Your intended pattern is to write the numbers 0-99 in the correct sequence.) Use the 0-99 black line master chart to guide you. You may fill in the 2, 3, 10, 14, 21, and 30 to start. Ask your students if they can tell you some other numbers to write in other squares. Your student should not have access to a 0-99 chart at this time.
- **Continue to solicit responses to the request for other numbers** to write in other squares. Record correct responses and help to clarify incorrect responses by asking the student to describe the pattern that he/she has identified. There are many different patterns on the chart. Remind your students that their job is to figure out your number pattern.
- **Complete the 0-99 chart.** Once your students see that the chart simply counts from 0-99, their responses will fill the chart in quickly.
- **Tell the children** that they used patterns to fill in the boxes. You used the numbers you could see to figure out the missing numbers. What are some strategies you used to figure out a number for the chart? How did you figure out that a 10 belongs here?
- **Depending on the level of student understanding**, the 0-99 chart can be used to find patterns in many ways. You may wish to ask your students to find a pattern and outline the number boxes in their pattern with a coloring tool. Sharing discoveries with others is a priceless opportunity to practice mathematical communication. Here are a few samples of the patterns that your students may discover. These samples are listed from simple to more complex.
  - ➤If I count by twos, I will color every other square
  - ➤If I count by fives, I color two columns
  - ➤If I count by ten, all of numbers I color are in one column
  - ➤The number at the top of the column is the same as the number in the ones or units place value all the way down the column
  - ➤The tens place value increases by one for each number going down the column

*The activity is adapted from ***Mathematics a Way of Thinking*** listed under teacher resources.

Math Monsters™

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COUNTING AND SYMBOLIZING

NCTM CONTENT STANDARDS

Number and Operations

- understand numbers, ways of representing numbers, relationships among numbers and number systems
- compute fluently and make reasonable estimates

NCTM PROCESS STANDARDS

Problem Solving
Reasoning and Proof*
Communication
Connections*
Representation*

**Indicates a strong emphasis in this episode*

OVERVIEW

In this episode, Counting and Symbolizing, the Monsters help Cousin Cal take an inventory of the fish in his fish store. A variety of counting strategies are explored. As a result of viewing this episode the children will:

- **connect numbers to the quantities they represent**
- **combine sets to find the sum**
- **count by twos, fives and tens**
- **use symbols to represent objects in a set**
- **check to find the reasonableness of an answer**

VOCABULARY

count **inventory**
circle **numbers**
mark
"all together"
"how many"

PROGRAM SYNOPSIS

Cousin Cal Q. Lator gives his monster relatives a call to find out if they will help him take inventory of the fish in his store. He knows he can count on the Monsters to do a good job. The Monsters, just like young children, love to count everything!

The Monsters persevere to figure out how many fish are in each tank. The first tank contains fast swimmers and Split notices that the count seems too high. Addison suggests that some of the fish may have been counted twice. They decide to keep track of the fish by drawing each fish and counting them by color. The second tank contains so many fish that drawing them will take too much time. The monsters scale back their strategy and use color-coded tally marks instead. The third tank holds the jumping fish. These fish jump when they hear a whistle blow! The Monsters count these fish by ones, twos and fives using whistles to command a jump from one tank to the next. They successfully count to find the total.

The field trip is to a supermarket where we learn how electronic scanners and other tools help the store manager know how much food is bought and how much food is on the store's shelves.

PREVIEWING ACTIVITY ONE

Sideline Suggestions

Counting is the foundation for understanding our number system. Young children count everything they can with great enthusiasm. They count while they point, touch and reposition objects in their world.

In time, children learn that one number represents one object being counted and that the final number in the sequence represents the total quantity. They learn to keep track of what has been counted. They develop skills in grouping objects and counting by twos, fives and tens to find quantities.

As children grow and develop, they gain Conservation of Number. They recognize that four cubes are still four cubes whether they are spread out or lined up side by side. This is a cognitive process and while it cannot be taught, it will surface during challenges involving counting with young children.

- The idea of taking an "inventory" is the focus of this episode. One way to introduce this vocabulary is through role playing. **Demonstrate** for your children the meaning of "inventory."
- **Tell them that you are going to take an inventory** of the chairs in the classroom. Count the chairs while keeping track of which chairs have been counted. Announce that the "inventory" is complete and there are (blank) number of chairs in the room.
- **Ask your children to generate a definition of "inventory"** in their own words. Now, a student volunteer may role play, "taking an inventory" of another item in the room. Revisit the class definition of "inventory" before viewing this episode.
- **Try this activity with other classroom objects** and have the children perform the inventory.

PREVIEWING ACTIVITY TWO

Sideline Suggestions

Young children should be given opportunities to develop the ability to reason systematically and to explain their thinking. By asking students to find more than one way to solve a problem, they are encouraged to persevere, an important disposition for approaching mathematics.

In this activity, the students will count a collection of colored cubes from a fishbowl.

YOU WILL NEED: colored cubes and a fishbowl to parallel the theme of counting fish in the episode. However, another type of clear, see-through container will also work.

- **Place some number of colored cubes into the fishbowl.** The number you use will depend on the level of your students. For example, you may use six cubes of two colors for very young children or twenty cubes of four colors for older students and so on. Ask your students to take inventory of the cubes. How would you find out how many cubes there are in the bowl?
- **Try and solicit a variety of ideas for counting** the cubes from your students. Some may suggest that the cubes be poured out and simply counted. By probing for more strategies, your students will see and hear that there can be more than one way to solve a problem. Ask your students to explain why they believe their counting plan is a good one.

PAUSE POINTS

Sideline Suggestions

If possible, stop the program and engage your students in pursuing solutions for the Monsters. It is important to remind your students that often, there is more than one way to solve a problem or use representations to keep track while counting. A different way is not necessarily a wrong way.

PAUSE POINT ONE

The Monsters are helping Cousin Cal take inventory of the fish in his fish store. Multiplex is wondering how he will count the fish in one tank. Do you have any suggestions for him?

PAUSE POINT TWO

Multiplex counts the fish in the tank but another Monster notices that his count does not make sense. There are certainly fewer fish in the tank than the fourteen. What went wrong? How can the Monsters figure out how many fish are in the tank?

PAUSE POINT THREE

Mina drew a pictures to represent the fish in the tank. She drew red fish, green fish and blue fish. How many fish are in the tank? How can Multiplex find out?

PAUSE POINT FOUR

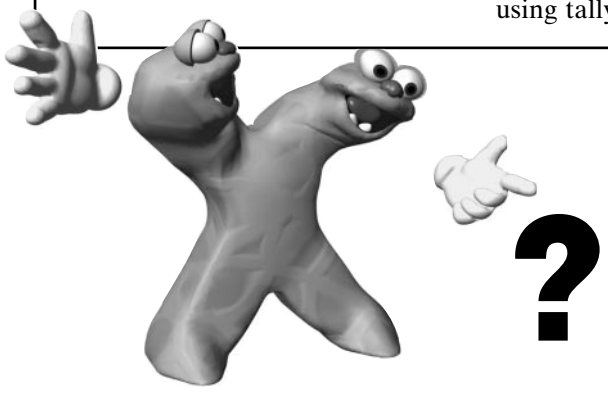
Split notices that there are a lot more fish in this tank than the first tank. Split recognizes that it will take too long to draw all the fish. Is there another way that SPLIT can keep track?

PAUSE POINT FIVE

There are jumping fish in this tank and they look exactly alike! These fish jump at the blow of a whistle! How can the Monsters figure out how many there are in this tank? Do you have any ideas?

PAUSE POINT SIX

The Monsters learn that they can count groups of two fish and groups of five fish and keep track using tally marks. Now there are so many marks on the paper. How can they find out how many marks there are all together?



POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY ONE

Building towers

Sideline Suggestions

Young children of similar age will demonstrate a wide range of counting and number skills. These Post Viewing Activities are arranged from more basic to complex in terms of developmental level and skill acquisition. By observing your students counting, keeping track of their counting and writing numbers to represent quantities, you will gain an understanding of their experiential and instructional needs.

Avoid the temptation to show children an easier or more efficient way to operate in these activities. They will develop a deeper understanding of the mathematical concepts and connect new concepts to old ideas through opportunities to see number relationships as they are developmentally ready.

Building Towers provides experience using one-to-one correspondence and subatizing, that is, recognizing an amount without counting. The students will also explore the notion of adding cubes and taking away cubes.

YOU WILL NEED: connecting cubes and a large number cube. A blackline master for building a large number cube is included and may be reproduced on tag board.

- **You may wish to demonstrate this game to the whole group** in a large circle, work with small groups, or pair students to support each other.
- **Ask your students to roll the number cube** and build a tower using the number of cubes shown. Now, roll again. Add cubes to your tower or take cubes off your tower so that you have the same number of cubes as the die indicates. This may be repeated many times for practice.
- **Watch to see if the children remove all the cubes** each time or add and take off cubes to make the new number on the die.
- **You may want** to have the children record the results of their investigations.

This activity is adapted from **Developing Number Concepts Using Unifis Cubes. See Teacher Resources.*

POST VIEWING ACTIVITY TWO

Counting fish

Sideline Suggestions

Watch and listen to your students' counting strategies. Do students count one by one and keep track accurately? Is there a student who groups the fish by color, counts by color and finds the total number of fish?

Older students may use the "Empty Tank" black line master to draw and color ten to twenty fish in pairs. For example, two blue, two green, etc. How will you count your fish? How many fish do you have?

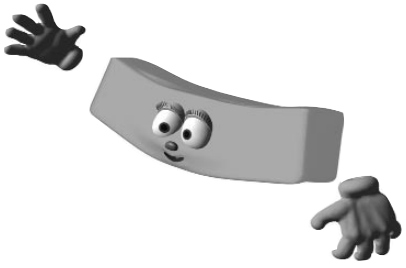
Repeat this activity by asking students to draw and color 15 or 20 fish in the "Empty Tank." Now how will you count your fish?

Do your students choose to count by two, fives or tens? Can they count fluently when counting groups of fish?

Counting fish is an activity for organizing a count and representing a quantity using a numeral.

YOU WILL NEED: to duplicate the Counting Fish and Empty Bowl blackline masters for each student; coloring tools will also be needed.

- **Distribute the Counting Fish sheet** to each student. Ask the children to color each fish one color using up to three different colors in all. The next step is to have the students cut out the fish. Ask them to exchange the entire set of fish with a partner and place them in the empty bowl on the Empty Bowl sheet.
- **Tell them that they are going to count** the fish in the tank. Ask them to think about the ways that the monsters counted fish. How will you count your fish? How many fish do you have?
- **Ask your students** to glue their fish onto the bowl and r**ecord the results** by writing the number which represents the total number of fish.



POST VIEWING ACTIVITY THREE
How many do you think?

Sideline Suggestions

As students share responses and suggestions, write them on a chart. This will reinforce the idea that there are many ways to approach a problem. Some students may refer the chart for new ideas during the problem solving process. Do your students include any of the strategies modeled by the monsters in the episode?

Showing and/or explaining how one finds a solution may seem like a daunting task for some of your students. Ask them to think about the ways that the Monsters recorded information.

By asking students to explain how they found a solution, they employ skills in communication, share representations and demonstrate reasoning and proof.

How Many Do You Think ...? is an activity which provides a broader classroom investigation created by the teacher. An example might be: suppose we wanted to take an inventory of how many ears we have in our whole class. How could we find out? An important component of the problem is to explain to your students that they will show how they found the solution on paper. **Create a problem** that fits the developmental and instructional needs of your student group.

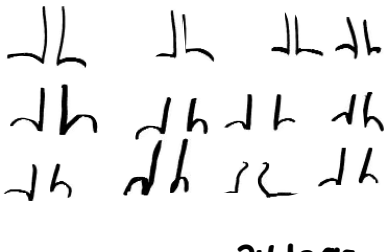
YOU WILL NEED: a variety of materials such as: a class list of first names, interlocking cubes, counters, paper and coloring tools.

- **Introduce** the "How Many" challenge to your students. Show them a variety of materials they may use to find a solution.
- **Remind them** that they must show how they solved the problem on paper.
- **Ask your students** to talk to a neighbor or think alone about ways to solve the problem. What tools would you use and how would you use them? How can you show the way you solved the problem on paper?

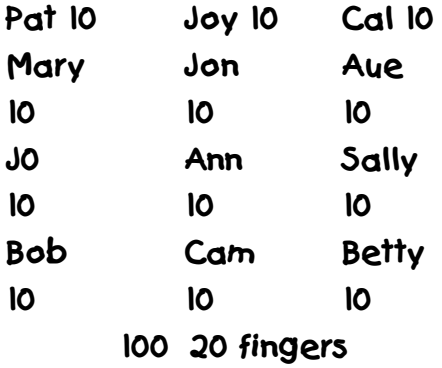
These examples show the variety of student responses which may arise during this problem solving adventure. Your own management style and group needs will dictate the procedures that you use in your classroom.

Example one: How many ears?

Example two: How many legs?



Example three: How many fingers?



POST VIEWING ACTIVITY THREE (CON'T)
How many do you think?

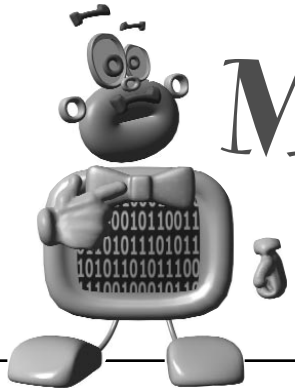
- After the students have finished, **ask for volunteers to share their written work** showing how they found their solution. Then, verify "How many ..." are in the whole class by counting together. Count in many different ways. Counting ears, for example, allows a class count by twos, counting fingers allows a class count by fives and tens.
- **Your students may enjoy creating their own** "How many do you think..." challenges to solve.
- Or, to continue practice, **you may make a collection of** "How many do you think ..." challenges and place them in the fishbowl. Your students may draw a problem to solve out of the bowl.

POST VIEWING ACTIVITY FOUR
A field trip

Sideline Suggestions

It is important to emphasize the ways in which mathematics is embedded our world. Your students will come to recognize mathematics in contexts outside of the classroom.

- **If possible, take a field trip to a local store** where inventories are conducted would further reinforce counting as a real-life event. Many stores inventory electronically and use an inventory sheet to organize the count. If the field trip is not practical, invite a local retailer to come to your class to talk about keeping track of inventory.
- You may wish to follow up the field trip experience by **asking students to use the play corner** to reenact what they learned on the field trip. Listen to their language as a telltale of their understanding.



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COMPUTERS

NCTM CONTENT STANDARDS

Data Analysis and Probability

- formulate questions that can be addressed with data and collect, organize and display relevant data to answer them
- select and use appropriate statistical methods to analyze data

Measurement

- understand measurable attributes of objects and the units, systems and processes of measurement
- apply appropriate techniques,tools and formulas to determine measurements

Algebra

- understand patterns, relations and functions

NCTM PROCESS STANDARDS

Problem Solving*

Reasoning and Proof*

Communication

Connections

Representation

**Indicates a strong emphasis in this episode*

OVERVIEW

This episode illustrates the use of a web site. The children observe the mechanics of using a computer and think about the most reasonable solutions to a variety of problems. As a result of viewing this episode, the children will:

- **name basic parts of computer**
- **review concepts and skills in collecting data, finding measurements and completing patterns from previous Math Monster episodes**
- **observe the Math Monsters using a web site on a computer**
- **select the most reasonable response to a Math Monster problem**

VOCABULARY

mouse **monitor**
keyboard **cursor**
icon **web site**
"surfing the net"

PROGRAM SYNOPSIS

Binary Bill delivers a mysterious box to the Math Monsters. Knowing how much the Monsters like to solve problems, he asks them to figure out what is in the box before they open it.

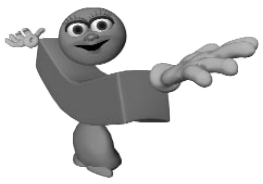
After examining the box carefully, the Math Monsters decide that it contains a computer. They follow the directions to set up the new computer, and successfully turn it on using the "power on" icon.

Binary Bill appears on the computer screen to congratulate the Monsters on setting up their computer successfully. He also instructs them on how to move items on the screen using the mouse.

The Math Monsters visit the **mathmonster.com** web site where they get a chance to figure more things out. On the web site, Binary Bill gives the Monsters a problem, time to think about a reasonable solution and three icon-choices of possible solutions. The Monsters click on the icon that represents the most reasonable solution. The click starts a video showing the Math Monsters solving the problem using the solution they chose.

The Monsters solve problems involving data collection, patterns and measurement using familiar scenes from previous episodes. The Math Monsters wonder if human beings ever use computers.

Our field trip will take us to a school computer lab where the the use of e-mail and web sites is demonstrated.



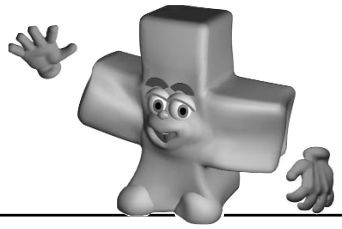
PREVIEWING ACTIVITIES

PREVIEWING ACTIVITY ONE

Sideline Suggestions

Children come to school with a broad range of experiences in using technological tools. By providing opportunities for all children to use technology in mathematics, the gap between the experienced and inexperience begins to close. All children can grow comfortable in the use of calculators, computers and electronic learning devices in both independent and directive settings.

- **Gather your students together and ask them to tell** where they have seen a computer or electronic tool being used in their world. This should open up a lively discussion which may include describing the difference between an electronic tool and a mechanical tool.
- **Your students may have seen computers at** home, at an office, in an automobile repair shop, at the doctor's office and in the library. They will probably conclude that computers are all around us.



PREVIEWING ACTIVITY TWO

- Before this activity, **find out where computers are used in your school building** and for what purpose.
- **Arrange to visit a variety of sites** in your school building with the students.
- **Your students may interview a variety of school personnel** to find out how computers help them do their job.

PAUSE POINTS

PAUSE POINT ONE

Sideline Suggestions

Young children understand and use language literally. The first two pause points will help your students understand the figurative language "mouse" and "keys" used to name computer equipment. If possible, have a computer close by so that the children may see the mouse and keyboard during the pause points.

Split is reading the directions for setting up their new computer. The first direction tells them to plug the mouse into the back of the computer. Mina calls out, "Here mousy, mousy, mousy," and no mouse appears. She asks is Spit and Multiplex if they are sure there is a mouse. What are they looking for? Is it a small furry animal?

PAUSE POINT TWO

Split suggests that they press the power button on the keyboard. Mina doesn't know what a keyboard is and Multiplex begins looking for keys. What is a keyboard?

PAUSE POINT THREE

Your students will have an opportunity to explore shapes. Which shape is an oval, a diamond, an octagon?

PAUSE POINTS

Sideline Suggestions

If possible, stop the episode and discuss the problems posed by Binary Bill in the following Pause Points. The mathematical conversations that develop will provide valuable information about what your students know and are able to do in the content areas of geometry, measurement and patterns.

PAUSE POINT FOUR

Binary Bill has another puzzle for the Math Monsters to figure out. This time it is about the pancake restaurant. They need to know what kind of pancakes the monsters like best. What would be the most helpful way to figure it out?
Binary Bill gives the Math Monsters three icons. Each icon represents a different problem solving strategy. **Which strategy would you select:** Guess? Collect information and data from Monsters in the neighborhood? Call up another restaurant and ask?

PAUSE POINT FIVE

The Monsters collect information about the monster's favorite pancakes. Now they need to organize the information on graph paper. How can the Monsters figure out which pancakes are the favorite by using graph paper and without counting?

PAUSE POINT SIX

Since the Math Monsters are eager to figure out more problems, Binary Bill explains that Split had just begun to paint a pattern on a border when she received an unexpected phone call and had to leave. She is not able to complete the border, however, Split pitches in to continue the painting, but, she doesn't follow the pattern. What did Split do wrong? What should the pattern look like?

PAUSE POINT SEVEN

Binary Bill continues to challenge the Math Monsters' mathematical minds. This time the problem involves Annie Ant the carpenter. Annie built a playhouse for the Monsters using the "number of steps" the monsters counted for the size of the playhouse. The playhouse turns out to be very very tiny. What went wrong, can you figure it out? Which icon should the monsters click?
She wrote down a couple of numbers wrong; Monster steps aren't the same size as ant steps. The building shrank in the rain.

PAUSE POINT EIGHT

Now that the Monsters understand that it takes ten Annie steps to equal one Addison step, Binary Bill asks the Monsters to figure out how many Annie feet are seven Addison feet long.

POST VIEWING ACTIVITIES

POST VIEWING ACTIVITY ONE
Monster E-mail

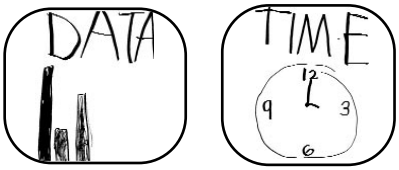
- **Integrate Math Monsters into your language arts program** by writing a class e-mail letter to the Math Monsters. The address is **mathmonster.com.**

POST VIEWING ACTIVITY TWO
Designing icons

Sideline Suggestions

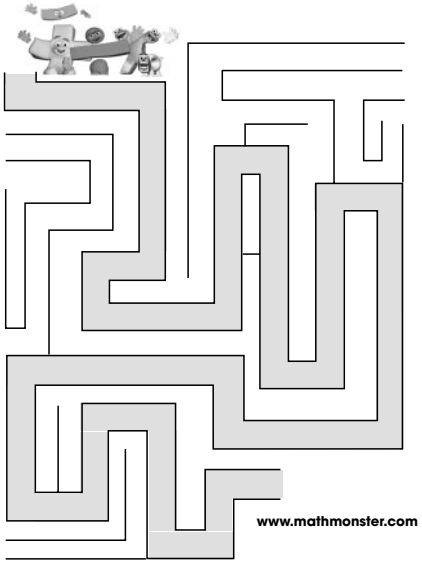
There are many fine programs designed for children to use on the computer. Speak with your librarian or computer specialist to see what is appropriate and available for your use.

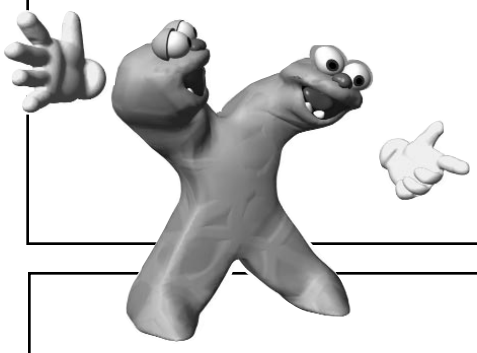
- Your students have probably viewed many of the Math Monsters episodes. **Ask your students to name their favorite episodes.** Read the synopsis of some of the programs aloud to help your students remember the problems that the monsters needed to solve.
- **Ask your students to design a computer icon to represent their favorite episode.** Use the Monster Episode Icon blackline master. One of your classroom bulletin boards may be set up as a giant computer screen with your students' Math Monster episode icons displayed.



POST VIEWING ACTIVITY THREE
Monster Math maze

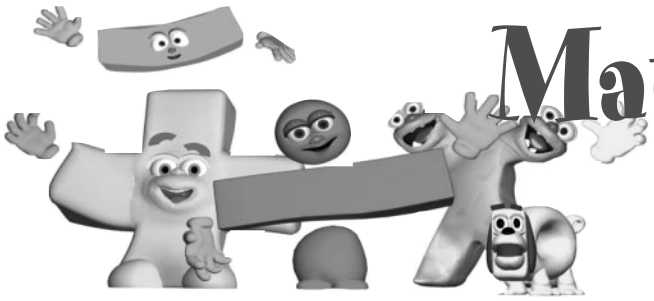
- **Ask your students to find their way through the maze** to connect the Math Monsters to the Math Monster web site. Use the Monster Maze blackline master for this activity.





POST VIEWING ACTIVITY FOUR
Calculators

- **Using calculators, have the students do some simple activities** such as counting, counting on and skip counting. You might explain the value of using the + and - keys to repeat operations.



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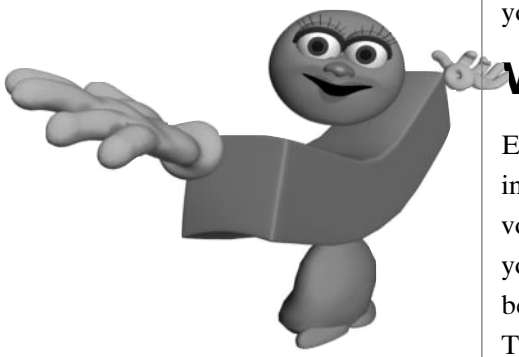
UTILIZATION

This Math Monsters™ Utilization Video is designed to support the teacher in planning rich and meaningful learning experiences tailored to each Math Monsters™ episode.

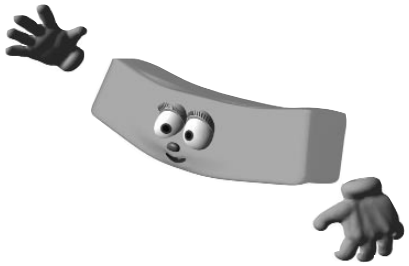
The video travels to a classroom to watch a master teacher demonstrate some of the ways to incorporate materials presented in the teacher's guide.

The guide provides a framework that clarifies learning standards and objectives, broadens opportunities for assessment, describes activities to enhance your students viewing experience and maximize student achievement in mathematics. The following components are contained in each of the Math Monster teacher guides:



NCTM STANDARDS

The NCTM content and process standards supported in the episode appear first in the teacher guide. The Principles and Standards for School Mathematics document is available through the National Council of Teachers of Mathematics and describes the content and process standards in detail. A matrix of the episodes and the corresponding standards is also a helpful planning tool.



OVERVIEW

A general description of the mathematical ideas for each of the Math Monsters episodes is given. The Overview also provides a list of specific learning objectives for the young viewers.

VOCABULARY

Each Math Monster™ episode is rich in mathematical vocabulary. The vocabulary list may be used to assess your students mathematical language before, during and after the program. The words may be posted in the classroom to revisit throughout your students experiences with the Math Monsters™ episode.

PROGRAM SYNOPSIS

It is always best to preview the episode before viewing, however, this may not always be possible. In the synopsis. the story line is described and the embedded mathematical challenges are outlined for the teacher.

SIDELINE SUGGESTIONS

The shaded sideline suggestions give the teacher practical information about the episode and activities. The suggestions are intended to assist the teacher in preparing materials, guiding discourse, applying assessment practices, and understanding developmental milestones of young learners in mathematics.

PREVIEWING ACTIVITIES

The preview activities are designed to prepare young viewers for the Math Monsters episode. The preview activities tap the students prior knowledge and experiences and to lay a foundation for new learning. By observing and listening to your students during the previewing activities, you will have a good idea of what they know and are able to do prior to viewing the episode.

PAUSE POINTS

Pause points occur in every episode and are highlighted with a question mark. Each pause point is described in the teacherπs guide. It is important to be aware of the problems the students will face with the Monsters. If possible, stop the program at the pause points and explore the childrenπs ideas and solutions.

POST VIEWING ACTIVITIES

A variety of post viewing activities are included in the teacherπs guide. These activities serve to sustain and cultivate student growth in the content and process areas represented in the episode. The teacher may select the activity which best matches the developmental and academic level of the children. The post viewing activities serve as an opportunity to assess the growth that young viewers have made as a result of viewing the episode.

REPRODUCIBLE BLACKLINE MASTERS

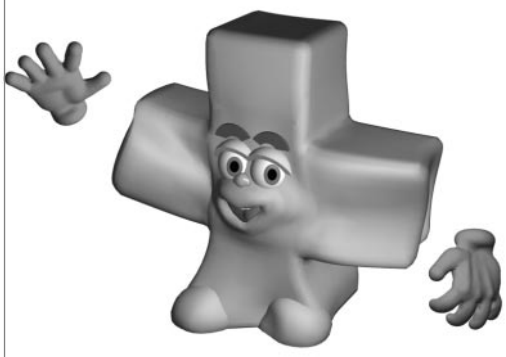
Many of the previewing and post viewing activities have a corresponding black line master to support the activity. The blackline masters can be found in the teacherπs guide of each episode.

LITERATURE CONNECTIONS

A list of suggested childrenπs literature is intended to assist the teacher in integrating reading and language arts into your mathematics program. Many of these titles may be available in your school or local public library.

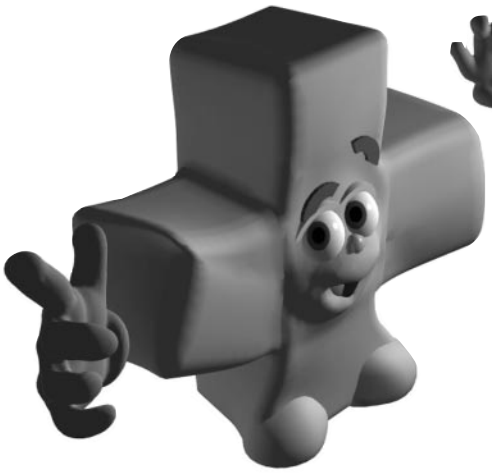
TEACHER RESOURCES

The teacher resource guide lists many of the books and materials that we have found valuable to both our professional development and



program planning for our young mathematicians.

These guides offer a teacher toolbox of information, ideas, and suggestions to assist the teacher in thoughtful planning and meaningful assessment of student growth. We hope your students enjoy their Math Monsters™ adventures.



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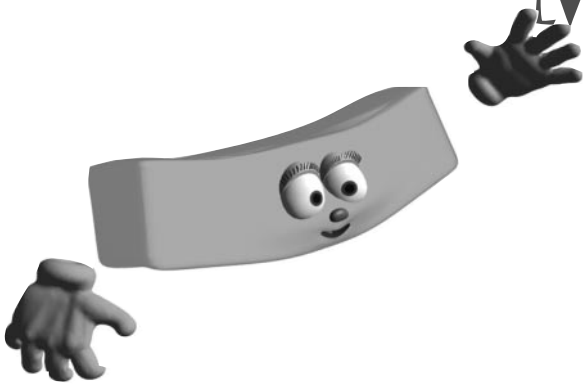

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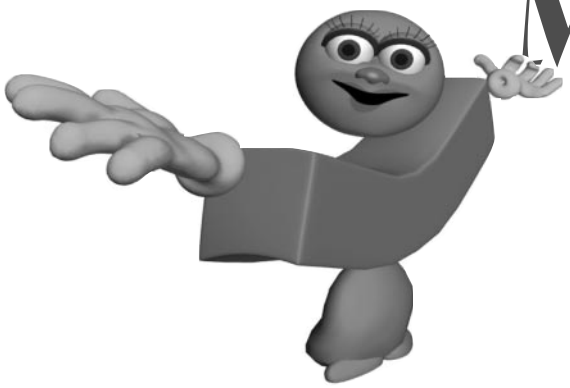

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