MIGHTY MATH NUMBER HEROES

SCHOOL VERSION

Riverdeep

Quick Start

Setup Instructions

Windows® 98, or Me

1. To install *Number Heroes*, insert the CD-ROM. If AutoPlay is not enabled, choose **Run** from the Start menu and type **d:\setup** (where **d** represents your CD-ROM drive).

2. To run *Number Heroes*, use the Start menu. (If AutoPlay is enabled, Number Heroes runs automatically when the CD-ROM is inserted.)

Windows 2000 Professional or XP

1. Log in as an administrator.

2. Follow the installation instructions listed under *Windows 98, or Me*, to the left.

Macintosh®

1. Insert the CD-ROM.

2. Double-click the *Number Heroes* program icon.

Navigating in Mighty Math Number Heroes

Fraction Fireworks
Identify, add, subtract, and multiply fractions to create a dazzling fireworks display.

Quizzo
Test your wits on the game show where mathematics problems are logic puzzles.

GeoComputer
Solve the GeoBot's geometry challenges and create original geometric art.

Probability
Set probabilities, predict outcomes, and read charts and graphs as you generate action figures.

Exit *Number Heroes.*

Switch users.

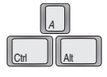

Enter the Explore Mode. You can experiment freely.


Enter the Question & Answer Mode. A hero guides your learning.


Choose a math topic or difficulty level.


Return to the Main Menu.

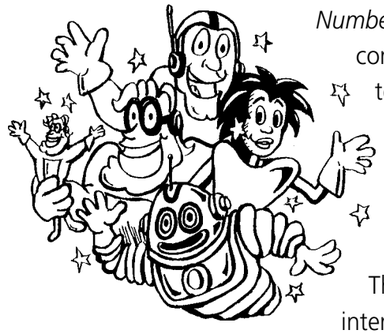
Windows



Macintosh

Customize the program for the user.

Welcome to Mighty Math® Number Heroes®



Number Heroes is one of six titles in the *Mighty Math Series*, a comprehensive line of math software for Kindergarten through tenth grade. In *Number Heroes*, every student is a hero and every challenge is an enjoyable opportunity for learning mathematics. *Number Heroes* and its companion program, *Calculating Crew*, cover all the major topics in the third, fourth, fifth, and sixth grade math curricula.

The blocks and counters that your students may be using are intended to foster a concrete understanding of mathematical principles. For many students, making the jump from concrete manipulatives to abstract numerals is difficult. Many of the activities in *Number Heroes* contain Virtual Manipulatives, a unique technology that uses the computer to help students make the connection between concrete and abstract mathematics. For example, in the Fraction Fireworks activity, a student can choose the written fraction ¼ and then see it burst into fireworks composed of four equal parts, one red and three blue. If the student colors a second section red, the written fraction changes to ²⁄₄. Your students will **learn math basics, understand the concepts behind the facts, and master the thinking skills necessary for successful problem solving**.

Number Heroes offers dozens of math topics and thousands of problems. Four engaging activities and two special-function calculators provide hours and hours of math learning and fun. As each student learns and succeeds, unique Grow Slides advance automatically, offering more challenging problems. You can also set an activity's Grow Slide for practice in a specific math topic. Because three of the activities feature both a Question & Answer Mode and an Explore Mode, students experience both directed and self-directed learning.

SCHOOL VERSION

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- System requirements, installation, and setup instructions

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- *Overview,* giving a summary of the activity and learning opportunities
- *Question & Answer Mode,* explaining how a character leads the way and is looking for a "correct" response. The character also offers help and fun rewards.
- *Explore Mode,* explaining how your students can learn by exploring, experimenting, and creating in the activity
- *Using the Calculator,* explaining the features and use of the special-function calculators in Fraction Fireworks and Quizzo
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- List of cross-curricular activities
- Suggested "at the computer" activities
- Suggested "away from the computer" activities, which can be integrated into many curricular areas. These activities strengthen the learning opportunities found in *Number Heroes.*

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Steps to Start

1. Check to be sure Mighty Math Number Heroes is installed (Windows users only).
- If the software has not been installed, see *Setup Instructions* (page 5).

2. Read the Teacher's Guide and become familiar with the program.
- *What's Inside Mighty Math Number Heroes* (pages 8–9) and *Math Topics* (pages 41–42) will give you a brief overview. Before you introduce the program to your students, read the *Program Information* (pages 8–31) as you try each activity at the computer.
- Use Adult Options (see pages 28–31) to customize the program for your students. You can adjust the Grow Slides, select math topics, turn scanning on or off, and more.
- Decide if you want to introduce the activities to your students one at a time, or let them explore at their own pace.
- Browse through the *Classroom Activities and Reproducible Worksheets* section to find suggestions for using the program with your students as well as numerous activities to extend the learning opportunities presented by the program.

3. Introduce Number Heroes to your students.
- Reproduce (for each student) or make overhead transparencies of the *Number Heroes Map* (page 34) and the Guided Tours to GeoComputer, Probability, and the Calculators (pages 35–39).
- See *Introducing Mighty Math Number Heroes to Your Students* (page 32) for more suggestions.

System Requirements

- Windows 98, Me, 2000 Professional, or XP
- Pentium II 200 Mhz or better
- 100 MB hard disk space for full installation or 5 MB for minimum installation
- 4 MB RAM (8 MB highly recommended)
- Super VGA, 640x480, 256 colors
- Double-speed (2X) or faster CD-ROM drive
- Windows-compatible sound-output device

Optional:

- Printer
- TouchWindow or Single Switch device

Setup Instructions

Windows 98, or Me

1. To install *Number Heroes*, insert the CD-ROM. If Autoplay is not enabled, choose **Run** from the Start menu and type **d:\setup** (where **d** represents your CD-ROM drive).

2. To run *Number Heroes*, use the Start menu. (If AutoPlay is enabled, *Number Heroes* runs automatically when the CD-ROM is inserted.)

Windows 2000 Professional or XP

1. Log in as an administrator

2. Follow the installation instructions listed under *Windows 98, or Me*, above.

System Requirements

- Mac OS 8.6 to Mac OS 10.2.x
- 55 MB hard disk space for full installation, or 5 MB for minimum installation
  G3 processor or better
- 4 MB RAM, (8 MB or more recommended)
- 13" or larger monitor, 256 or more colors
- Double-speed (2X) or faster CD-ROM drive

  Optional:
- Printer
- TouchWindow or Single Switch device

Setup Instructions

1. Insert the CD-ROM.

2. Double-click the *Number Heroes* program icon.

What's Inside Mighty Math Number Heroes

The Main Menu

Welcome to Mighty Math City! At the Main Menu, choose from four learning activities by clicking one of the heroes. Once you have entered an activity, click  to return to the Main Menu.

Fraction Fireworks with Fraction Man

GeoComputer with the GeoBot

Quizzo with Star Brilliant

Probability with Handsome Chance

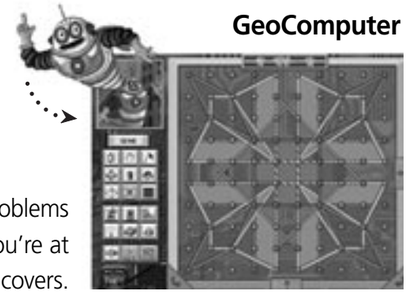
Click to leave *Number Heroes*.

Click to switch users.

Fraction Fireworks

Put on a fraction fireworks show with Fraction Man's help. Choose from four types of fireworks and use the control pad to enter a fraction. Launch the fireworks to watch your fractions light up the sky!

GeoComputer

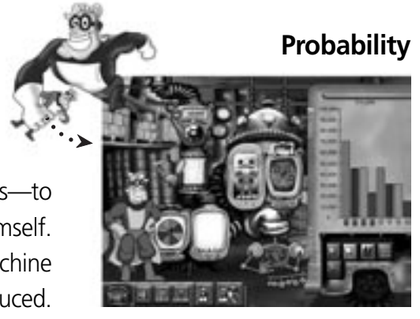


The GeoBot roams the city, searching for geometry problems and transmitting them to G.C., the GeoComputer. You're at G.C.'s controls; help solve the problems the GeoBot uncovers.

Quizzo

Join Star Brilliant, host of the hottest math game show in town. Compete against a friend or challenge one of the citizens of Mighty Math City. Remember—on Quizzo, brain power is the greatest superpower of all!

Probability



Leave it to Chance—Handsome Chance, that is—to use probabilities to make action figures of himself. Use the spinners and coins on his Probability Machine to determine which action figures are produced.

Using Mighty Math Number Heroes

It's easy to explore all of the activities in *Number Heroes*. To move from the Main Menu to an activity, click one of the heroes:

To return to the Main Menu from an activity, click  .

Question & Answer and Explore Modes

Fraction Fireworks, GeoComputer, and Probability have two modes: the Question & Answer Mode (find the answers to a character's questions) and the Explore Mode (explore, experiment, and create). Activities open in the Question & Answer Mode. **To switch modes** in an activity, click the button   for the mode you want to use.

Grow Slides

As a student successfully answers questions, the slider on the activity's Grow Slide automatically advances and more difficult questions are offered. (You can also adjust the Grow Slide manually.) There is a different Grow Slide for each activity.

Click the Topics button to see a list of the topics covered as the slider advances. You or your students can choose a specific topic for practice. (See pages 41 and 42 for a complete listing of the math topics covered in each activity.)

Grow Slide settings are saved separately for each student. You can also save settings for a group of students. See pages 29–31 for details.

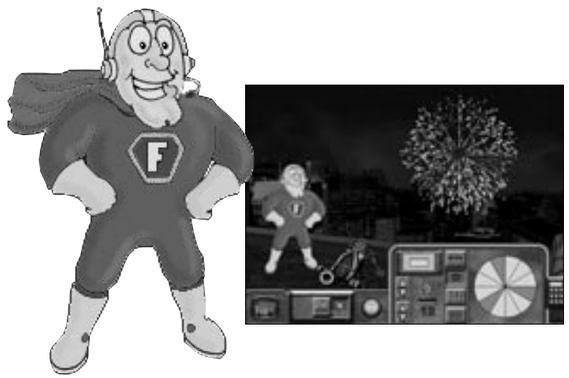
From an activity:
The student clicks the Grow Slide button  and then drags the slider to adjust the difficulty level or clicks "Topics" to choose a specific area for practice.

From Adult Options:
View the Grow Slides to monitor a student's progress. You can also manually adjust the difficulty level of an activity to suit an individual student or a student group. Or, use the "Topics" button to focus on a topic you are currently studying. (See *Math Topics* on pages 41–42 for a complete listing of the topics available in *Number Heroes*.) If you prefer, you can turn off your students' access to the Grow Slides. This will remove the Grow Slide buttons from the activities so that students cannot adjust the Grow Slides manually.

Adult Options

To enter Adult Options, Windows users hold down the Ctrl and Alt keys while pressing "A." Macintosh users hold down the Command⌘ and Option keys while pressing "A." Adult Options (see pages 28–30) allow you to customize *Number Heroes* to suit each student or group.

Fraction Fireworks Overview



Never fear, Fraction Man is here! In the Question & Answer Mode, Fraction Man asks students to identify, add, subtract, and multiply fractions to make fantastic fraction fireworks displays. He also helps them compare and order different fractions and challenges them to create hundred-burst grids with fractions and decimals. In the Explore Mode, students use mighty Fraction Power to put on their own fabulous fraction fireworks show!

Learning Opportunities

- Identify and compare fractions
- Find equivalent fractions
- Add and subtract fractions
- Multiply fractions
- Convert decimals to fractions

About Kids

Students learn to count and to talk about objects using whole numbers and, at a young age, they develop an understanding of the meaning of whole numbers and the relationships between them. Since they never count with fractions, students' understanding of fractional relationships builds more slowly. To become proficient with fractions, students need strong models for visualizing fractions, their different representations, and the relationships between them. To help your students "see" these mathematical ideas, encourage them to launch the same fraction in several different forms—bar, pie, cluster, and hundred-burst grid—noticing what changes and what remains the same. These experiences build a strong foundation for performing operations such as addition and multiplication of fractions.

Question & Answer Mode

- From the Main Menu, click  to work with Fraction Man.
- Fraction Man asks you to create a fraction.

"Let's launch a fraction firework that's $^1/_8$ green."

- Set the numerator and denominator to make the fraction. Click Fraction Man if you'd like a tip on solving the problem.

Setting the Denominator  ------ *denominator*

Click  to set the denominator. The denominator determines the number of sections your fireworks will have.

Setting the Numerator  ------ *numerator*

Click the section of the  ,  ,  , or  that you want to color. If you click five sections, the numerator of your fraction will be 5. Click a section again to erase the color from that section. You can also use  to set the numerator.

- Click  to select a color for your fireworks.
- Click  to launch your answer.

  -If the fraction is correct, your fireworks light up the sky.

  -If the fraction is incorrect, try again. Fraction Man will help you find the right answer.

- Click  to use the Fraction Calculator (see page 14).
- Click  to change the difficulty level of the problems or to select a fractions topic.
- Click  to design your own fireworks, or click  to return to the Main Menu.

Explore Mode

- Click  to enter the Explore Mode.
- Choose from four types of fireworks, then design your fraction fireworks by coloring the numerator and denominator sections. Launch your fireworks.

"Make your own fraction fireworks!"

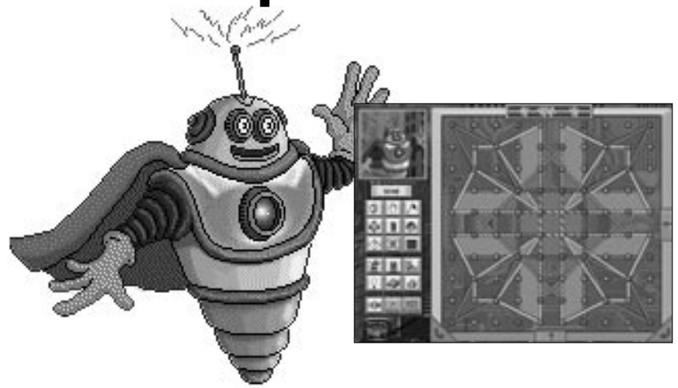
- Click  to make a row of firework bursts.
- Click  to make circular fireworks.
- Click  to make a cluster of firework bursts.
- Click  to make a dazzling pattern of 100 firework bursts.
- Click  to launch your fireworks.
- While the fireworks are exploding, click  to freeze your fireworks.
- You can relaunch the fireworks as many times as you like by clicking  .
- Click  to use the Fraction Calculator (see page 14).
- Click  to return to the Question & Answer Mode, or click  to return to the Main Menu.

Using the Fraction Calculator

- Click  to use the Fraction Calculator.

- To enter a number, click the number on the calculator or type it on your keyboard.
- To enter a simple fraction, click  , then enter the numerator. Click  again, then enter the denominator.
- To enter a mixed fraction, first enter the whole number. Then click  and enter the numerator. Click  again and enter the denominator.
- When you enter a fraction and click  , the fractional part is displayed on the right side of the calculator in three different ways—as a pie fraction, as a bar fraction, and as a decimal (on a 100-square grid).
- To simplify a fraction, click  .
- To convert fractions to decimals or to convert decimals to fractions, click  .
- When you enter a mathematical sentence and click  , the calculator shows the steps it took to work through the expression. To scroll up or down through a long series of steps, click  or  .
- To clear the entire display, click  . To use the backspace key, click  .
- Click  to turn off the calculator.

GeoComputer Overview



G.C., the Geometry Computer, is indispensable in helping the Mighty Math heroes solve their geometry problems. In the Question & Answer Mode, questions are transmitted from the roving GeoBot, who searches Mighty Math City for geometry challenges. Students use concepts such as area, perimeter, congruence, and tessellation to solve the GeoBot's puzzles. In the Explore Mode, students experiment with G.C.'s varied drawing and transformation tools as they create original geometric art.

Learning Opportunities

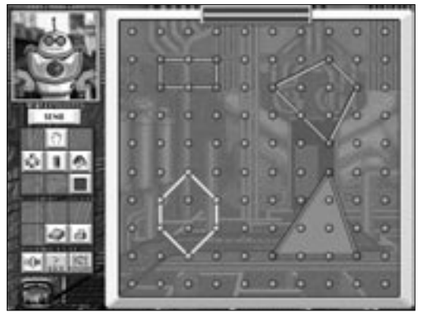
- Identify and create geometric shapes such as squares, triangles, and hexagons
- Identify and create shapes that are congruent
- Identify and create shapes that are similar
- Identify and create transformations (flips and turns) of shapes
- Create shapes with given angles
- Create shapes of a given perimeter or area

About Kids

The ability to visualize shapes in different positions is a thinking skill that requires both time and experience to develop. Because three-dimensional shapes are often encountered in the real world, students have a relatively easy time understanding how these shapes change as they move. Visualizing plane shapes (two-dimensional shapes) is more difficult, but is crucial in understanding the geometry proofs your students will encounter in the upper grades. By working with the GeoComputer, students gain experience in manipulating shapes on a plane and achieve an understanding of the parts that make up a shape. Encourage your students to browse the Fact Book and to use the vocabulary words found there to discuss their geometric creations together.

Question & Answer Mode

- From the Main Menu, click  to work with the GeoComputer.
- The GeoBot requests your help in solving geometry problems that he finds all over the city.



- Click  to look up a geometric term or idea.
- When you think you have solved the problem, press  to send your answer back to the GeoBot.

  -If your answer is correct, G.C. sends it to the GeoBot.

  -If your answer is incorrect, try again. G.C. will help you find the right answer.

- Click  to change the difficulty level of the problems or to select a different geometry topic.
- Click  to create your own geometric art in the Explore Mode, or click  to return to the Main Menu.

Drawing on the Geoboard

 Draw colored lines on the geoboard. A line can also be moved by grabbing the line near either endpoint and dragging the line to another peg.

 Choose the line color.

Erasing

 Erase a line, or remove the color from a filled-in area. If you hold down the Ctrl key (Windows) or Option key (Macintosh), you can delete the entire shape.

 Erase everything you have drawn.

Working with Shapes

 Move a line or shape.

 Duplicate a line or shape. Select this tool, then click a line or shape to copy it. Click anywhere on the geoboard to place the duplicate. To release the copy, click anywhere outside the geoboard.

 Change the color of a line, or fill any area that is fully enclosed. If you hold down the Ctrl key (Windows) or the Option key (Macintosh), you can change the color of the entire shape.

Transforming Shapes

 Turn or flip a shape or line. Select this tool, then click the shape or line you want to transform. Click  , ,  , or  on the side of the geoboard to flip or turn the shape or line.

Printing

 Print your shape design.

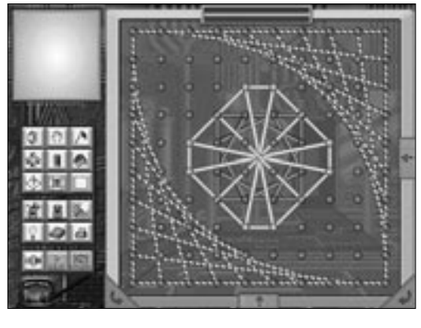
Geometry Fact Book

 Read about geometry terms and concepts.

Explore Mode

Click  to enter the Explore Mode.

- Draw free-form geometric shapes with the GeoComputer. Connect straight lines between any of the "pegs," change the color of the lines, or fill any fully enclosed area with color.



"Create your own geometric designs."

- Click  to return to the Question & Answer Mode, or click  to return to the Main Menu.
- In the Explore Mode, you can use all the tools you used in the Question & Answer Mode. Additionally, you can:

 Calculate the area of any shape fully bounded by lines by clicking inside the shape.

 Calculate the perimeter of any shape fully bounded by lines by clicking inside the shape.

 Rotate the entire geoboard clockwise or counterclockwise.

 Flip the entire geoboard.

 Cycle through shape design ideas created by others.

Saving

 To save your design, drag the miniaturized version (thumbnail) of the design to an empty rectangle. Click OK to save the design.

To delete a previously saved design, drag the thumbnail of the unwanted design to the trash can. Click OK to empty the trash can.

 To open a previously saved design, click the thumbnail of the design you wish to open. Click OK to view or change the design.

Hold down the Ctrl key (Windows) or Option key (Macintosh) while clicking  or  to save or open GeoComputer files on your hard drive. These files can then be transferred to other computers and traded with your friends.

Quizzo Overview

Quizzo is the hottest game show in Mighty Math City! Students join host Star Brilliant and other contestants as they use math and logic skills to identify numbers and shapes by their properties, complete sequences and analogies, and sort objects based on their attributes. Contestants also compete to solve addition, subtraction, multiplication, and division puzzles.

Learning Opportunities

- Recognize, compare, and contrast attributes
- Build a vocabulary of geometry terms
- Practice addition, subtraction, multiplication, and division
- Complete patterns and analogies
- Sort numbers and objects into Venn diagrams
- Develop skills in observing details and in visual scanning

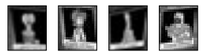
About Kids

Many students are able to recognize basic patterns, sort objects, and make simple analogies (as when they use a metaphor in speech). However, the logic skills of completing patterns, sorting and classifying based on attributes, and understanding and extending analogies require frequent use and new challenges to develop at the more advanced level required not just for algebra, geometry, and aptitude tests, but in everyday adult life. In Quizzo, students' love of games and urge to compete keep things interesting as they gain hours of practice with mathematical logic puzzles at increasing levels of complexity.

Question & Answer Mode

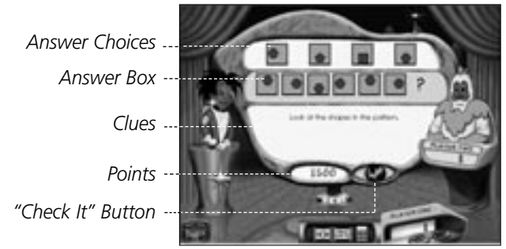
- From the Main Menu, click  to play Quizzo.

"Hey folks, welcome to Quizzo, the game show where brain power is the greatest superpower of all!"

- To play against the computer, click the opponent  you want to face. Each opponent has different strengths.
- To play against a friend or family member, click  . If you choose a two-player game, you will then select a level of difficulty for your first few questions  .
- Click a screen  to choose the category and difficulty level. The more difficult problems are worth more points.
- You and your opponent take turns selecting and answering questions.
  - If you answer correctly, you earn points.
  - If you answer incorrectly, Star offers you help and asks you to try again for fer points.
- After your opponent answers a question, you have a chance to earn a few extra points. Click  if you agree with your opponent's answer. Click  if you do not agree with your opponent's answer. If you are right, you receive bonus points. (You do not lose points if you are wrong.) If you and your opponent are both correct, you both earn points.
- Click  to use the Quizzo Calculator. (See page 22.)
- Click  to change the difficulty level of the problems. (This feature is available only in one-player games.) **Note:** Changing the difficulty level automatically restarts the game.
- Click  to start a game with a new competitor or to switch between one-player and two-player games.
- Click  to return to the Main Menu.

Categories

Patterns & Analogies

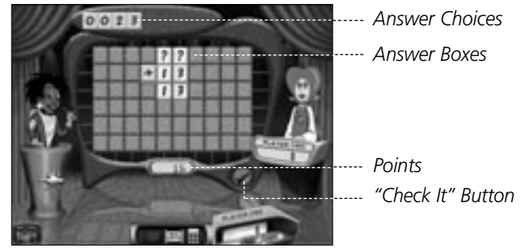


"The category is Patterns! Drag the answer onto the Question Mark to complete the pattern."

Click and drag the appropriate numbers or shapes onto the Question Mark to complete the pattern or analogy.

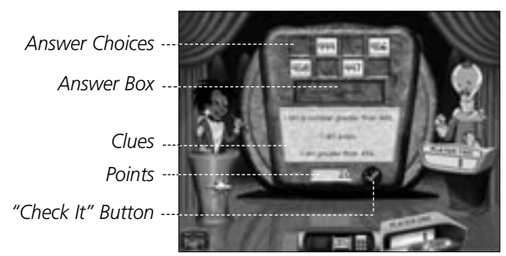
Add, Subtract, Multiply, & Divide

Click and drag the appropriate number(s) onto the Question Mark(s) to complete the number puzzle.



"It's time to add! Drag the numbers onto the Question Marks in the puzzle."

Shapes & Numbers



"The category is Numbers! Select the number or numbers that fit."

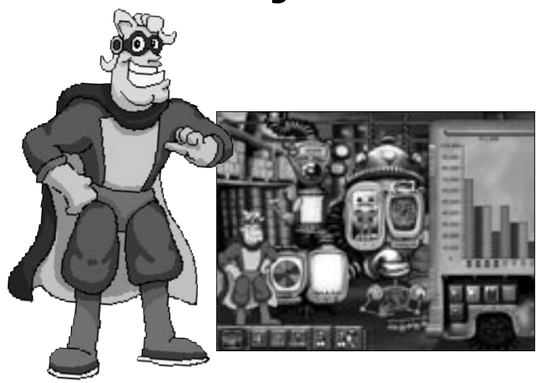
Click and drag the appropriate numbers or shapes into the Answer Box.

Using the Quizzo Calculator

- Click  to use the Quizzo Calculator.

- To enter a number, click the number on the calculator or type it on your keyboard.
- When you enter a mathematical sentence and click  , the calculator shows the steps it took to work through the expression. To scroll up or down through a long series of steps, click  or  .
- When you enter a number and click  , the display on the right side of the calculator presents the following information about the number: prime or composite, even or odd, factors, and multiples.
- To enter a negative number, first click  , then enter the number.
- To divide and see the answer with its remainder, use the  button rather than  .
- To clear the whole display, click  . To use the backspace key, click  .
- Click  to turn off the calculator.

Probability Overview



Handsome Chance, the handsomest crime-fighter in town, is making action figures of himself. He can't decide which colors and gear look best, so he's leaving it to chance. In the Question & Answer Mode, students use Handsome's Probability Machine to analyze and work through scenarios that develop and challenge their understanding of probabilities. In the Explore Mode, students can manipulate probability devices (spinners and coins) to experiment with different scenarios for producing action figures.

Learning Opportunities

- Analyze possible events and express their probabilities
- Conduct experiments
- Make predictions about experiments
- Evaluate a sample of a larger group
- Interpret graphs and charts

About Kids

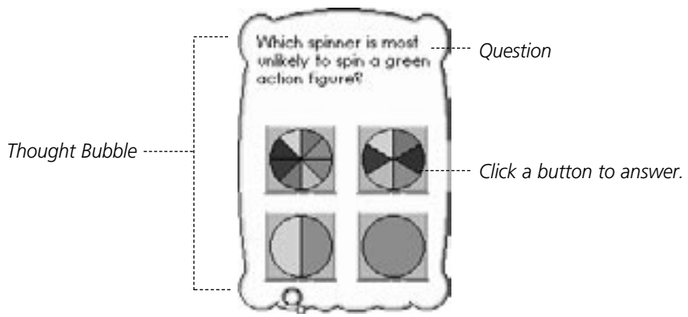
Learning about probability helps students recognize the value of prediction in decision making. Young children have very little understanding of the probability of different events. Through both real-world experiences and play with dice and board games, students begin to develop some intuitive understanding of chance and probability. But it is exposure to formal experiments in probability and the language for talking about the "chances" of events that truly develop a student's ability to make predictions based on experimentation, to read charts and graphs, and to understand how sample size influences outcomes. Encourage your students to use Handsome Chance's machines to experiment with probabilities and to form conclusions independently before answering the questions Handsome asks.

Question & Answer Mode

- From the Main Menu, click  to make action figures with Handsome Chance.
- Handsome Chance asks you a question about his Probability Machine and offers you several answers to choose from.

"Let's make some action figures of ME, and find out what you know about probability."

- Click  to open a machine.
- Set up the machine in several different ways to test each answer and see which is correct.
- Click Handsome Chance if you want a tip on solving this type of problem.
- When you are done, click the answer in Handsome's thought bubble.

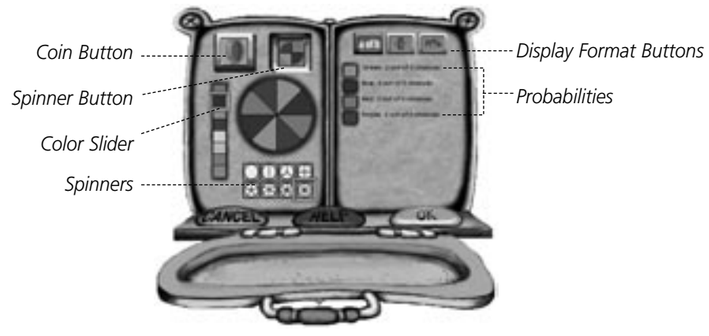


- If the answer is correct, Handsome Chance rewards you.
- If the answer is incorrect, try again. Handsome Chance will give you clues to help you solve the problem.

- Click  to change the difficulty level of the problems or to select a probability topic.
- Click  for the Explore Mode, or click  to return to the Main Menu.

Setting the Probabilities

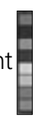
- Click the Color Gizmo  or the Gear Gizmo  to change the probabilities.
- Click  or  to choose between a coin and a spinner.



Using the Coin

- Click  to see the other side of the coin.
- If you are using the Color Gizmo, click the color you want  . Then click a coin face to change it to that color.
- If you are using the Gear Gizmo, click the accessory you want  . Then click a coin face to change it to that type of gear.
- Click  ,  , or  to change the way probabilities are displayed.

Using the Spinner

- Click the spinner  you want to use.
- If you are using the Color Gizmo, click the color you want  . Then click a spinner section to change it to that color.
- If you are using the Gear Gizmo, click the accessory you want  . Then click a spinner section to change it to that kind of gear.
- Click  ,  , or  to change the way probabilities are displayed.

Running the Probability Machine

- Click the arrows to increase or decrease the number of action figures the machine makes.
- Click to set the speed of the machine.
- Click GO to run the machine and begin making action figures.
- Click STOP at any time to stop the machine.

The Truck Display

- The Truck Display shows the different action figure types and indicates how many you've made of each.
- Click to view your results as a chart. Click to view your results as a graph.
- When the truck displays a graph, click any bar to see its exact value. You can also click to zoom in on the graph or to view the full graph.
- If you use the same probability settings to make more action figures, the Truck Display keeps updating the chart or graph. You can make up to 100,000 action figures of any given type. To start a new chart or graph, click NEW.

Note: If you change the probability settings, you automatically start with a new (empty) Truck Display.

Explore Mode

Click to enter the Explore Mode.

- Set the probabilities to determine what kind of action figures are made.

"My Probability Machine is at your disposal."

- Click the machine buttons to choose the machine you want to use: the Color Machine or the Color-and-Gear Machine.
- Open the Color Gizmo or the Gear Gizmo by clicking it. Then click the coin or the spinner to experiment with different probabilities.
- The Truck Display shows the different types of action figures and indicates how many you've made of each.
- Click Q&A to return to the Question & Answer Mode, or click to return to the Main Menu.

Adult Options

To enter the Adult Options, Windows users hold down the Ctrl and Alt keys while pressing "A." Macintosh users hold down the Command⌘ and Option keys while pressing "A."

Use the Adult Options to change preference settings for *Number Heroes*, control the Grow Slide settings, and modify the User List.

Preferences

Use the system volume or set the volume manually with the slider.

Allow students to save their GeoComputer creations, or check "Don't Allow Saving" or "No Save to Disk" to hide the Save button in the GeoComputer module.

If exit is allowed, the Stop Sign appears on the Main Menu. If exit is not allowed, the Stop Sign does not appear, but users can still exit by pressing Alt-F4 (Windows) or Command⌘-Q (Mac).

Turn printing off, or choose color/grayscale printing or black-and-white "coloring book" outlines.

Quit Number Heroes.

Single Switch Input Options for Children with Special Needs

Built-in scanning is available for single switch users in Fraction Fireworks and Probability. Turn "Single Switch Input" on (see page 28) and click Options....

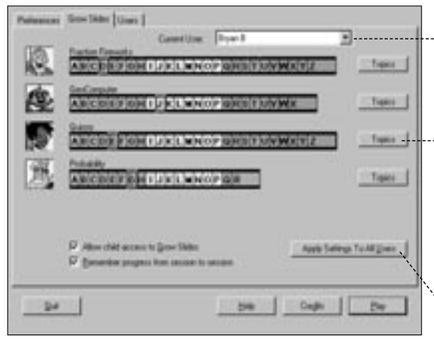
- Choose the type of Scan Progression.
  Automatic Progression: Scanning restarts automatically after each selection.
  Switch Activated Progression: Switch required to restart scanning after each selection.
- Select the scanning rate (in seconds): 1 (fastest) to 7 (slowest).

When scanning is on, you can temporarily suspend or resume scanning by pressing Ctrl-Alt-S (Windows) or Command⌘-Option-S (Macintosh).

Grow Slides/Activity Settings

Adjustable Grow Slides allow you to monitor each student's progress or set an activity to focus on a particular math topic you are studying in class. As a student successfully solves problems, the slider on the Grow Slide automatically advances to more difficult problems and more advanced topics.

Click the "Activity Settings" tab (Macintosh) or the "Grow Slides" tab (Windows) in Adult Options to adjust Grow Slide settings and options.



Grow Slide settings for this user are shown.

See a list of the math topics for this activity. You can choose to target a specific topic.

Clicking this button changes all users' settings to the currently displayed settings.

- Check "Remember progress from session to session" if you want *Number Heroes* to save this student's progress in each activity when he or she exits the program. If "Remember progress . . . " is unchecked, *Number Heroes* will always begin at the settings that are now displayed on the Grow Slides. (To change the settings, you will need to open the Grow Slides and change them manually.)
- Check "Allow child access to Grow Slides" if you want this student to be able to adjust the topic or the level of difficulty. If "Allow child access to Grow Slides" is unchecked, the Grow Slide buttons do not appear within the activities.

When you change Grow Slide settings and options, only the currently selected user is affected. If you want to use the same settings for all students, select the desired settings, then click the "Apply Settings To All Users" button.

User List

To remove a name from the User List, select the name and click Remove.

To rename a user, select the name and click Rename.

To add a name to the User List, click Add and type the name.

If the "Allow New Users to Add Themselves" box is checked, students can add their names to the User List at the Main Menu. Uncheck this box if you do not want students to add their own names.

Setting Up Student Groups

If you would like to select a math topic for a particular group of students to practice, you may want to set up a student group on the user list. To do this:

1. Click the "Users" tab in Adult Options and add the group's name (for example, "The Blue Group") to the User List.
2. Click the "Activity Settings" tab (Macintosh) or "Grow Slides" tab (Windows) in Adult Options.
3. Use the pull-down menu Current User: The Red Sox to select the name of the group.
4. Click each "Topics" button and select the math topics for this group.
5. You may want to turn off the "Remember Progress from Session to Session" feature, so that students in this group will always start each activity with the topic you have selected. When students are ready to move on to another topic, you can enter Adult Options and update the Grow Slide settings.
6. When students sign in at the Main Menu, they should select the group's name. (If students select their own names, they start with their individual Grow Slide settings, not the group's.)

Introducing Mighty Math Number Heroes to Your Students

Number Heroes is easy to use, but your introduction can help students get the most out of their learning experience. First, you may want to spend an hour or so exploring the software yourself, using pages 8–31 of this guide. Playing with *Number Heroes* is fun, and it familiarizes you with the program features, so you can better orient and assist your students.

At this time, you may also want to use the Adult Options (see pages 28–31) to enter your students' names and set the Grow Slides. Or, you can let students do this themselves while using the program.

Maximize Learning Opportunities

Most students are eager to explore all of the activities the first time they use the program. You may want to allow students to do this for their first session. Then, on subsequent sessions, you can focus on specific activities and skills.

Students can use *Number Heroes* for months without exhausting all of its possibilities. Each time students return to an activity, they make new discoveries and can work at higher levels. Allow students repeated, spaced blocks of computer time over several months to build their skills. You may want to let individual students or groups use *Number Heroes* during computer time, math time, or free time. *Number Heroes* can be used with many types of learners (visual learners, students with special needs, mathematically gifted students, students needing extra help, and others).

Enrich Computer Experiences

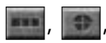
Pages 41 to 80 of this guide are filled with ideas that complement each of the four software activities of *Number Heroes.* Some are intriguing ideas for working with the software; others are activities for the classroom, playground, or gymnasium, to be completed away from the computer. Each activity idea in the guide is designed not only to educate, but to add fun to the day. The activities can be completed by the whole class, or they can be adapted for use with individuals (or small groups) who would benefit from enrichment or extension activities.

So Let's Begin!

Specific ideas for introducing each *Number Heroes* activity to your students follow. Demonstrate the software on a computer with a large-screen monitor if possible. Show students how to add or choose their names at the Main Menu. Then, tell students the name of each activity as you point to it on the Main Menu. You may also want to point out the Stop Sign.

When you enter the first activity, explain to the students that there are two modes: the Question & Answer Mode and the Explore Mode. (Quizzo has the Question & Answer Mode only.) Students enter each activity in Question & Answer Mode, where a character asks them click the Explore button at any time to enter the Explore Mode, where they can experiment freely.

If you would like students to adjust the Grow Slides themselves, enter the Question & Answer Mode of any activity and show students how to click the Grow Slide button and drag the slider to increase or decrease the difficulty level. Also demonstrate clicking the Topics button and choosing a math topic.

Fraction Fireworks (pages 11–14)
When you open this activity, Fraction Man briefly demonstrates making and launching fractions. Watch and listen as a class, then click the Explore button to enter the Explore Mode. Ask a student volunteer to name a fraction. Create the fraction on screen. Display a few other fractions that students suggest. Show students how to change the color of the fireworks by clicking  . Demonstrate the different fireworks patterns by clicking  ,  , , or  . Click the Q & A button to enter the Question & Answer Mode. Let students answer a few of Fraction Man's questions. Show students how to click Fraction Man for a general tip or the Clue button (when available) for a more specific tip. If you would like to introduce the Fraction Calculator, you can demonstrate it yourself, or duplicate the Guided Tour to the Calculators (pages 38–39) and let students explore the Fraction and Quizzo calculators independently.

GeoComputer (pages 15–18)
You can duplicate the Guided Tour (page 35) for students and let them follow the tour independently at the computer. If students need more guidance, follow the Guided Tour as a class. Encourage students to find new ways to use the tools in the Explore Mode and to share their discoveries with classmates. You may also want to let students make designs and then save or print them for others to view.

Quizzo (pages 19–22)
Enter the Quizzo activity and let the class choose an opponent. Point out the Play a Friend option as well. When the game begins, ask the class to solve the first problem in their heads. Find a consensus and then enter the answer on the computer. Finish the game as a class, or stop after a few problems. If you would like to introduce the Quizzo Calculator, you can demonstrate it yourself, or duplicate the Guided Tour to the Calculators (pages 38–39) and let students explore the Quizzo and Fraction calculators independently.

Probability (pages 23–27)
The Probability activity has a wide variety of features, so it can be helpful to walk the class through the Guided Tour (pages 36–37). (Some students may be able to follow the Guided Tour independently at the computer.) The first time you open the Color Machine, point out the Help button. Also point out that students must click   or  to close the machine. Once you have completed the Guided Tour, you may want to spend a few minutes discussing the Truck Display. Click any bar to see its exact value. Demonstrate how to zoom in on a section of the graph by clicking  . Show students how to start a new chart or graph by clicking  .

Number Heroes Map

Click the activity you want:

Fraction Fireworks

GeoComputer

Quizzo

Probability

Exit *Number Heroes*

Switch users.

Enter the Explore Mode. You can experiment freely.

Enter the Question & Answer Mode. A hero guides your learning.

Choose a math topic or difficulty level.

Return to the Main Menu.

Guided Tour—
GeoComputer

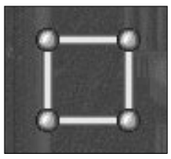
1. Click  from the Main Menu.

2. Click  to enter the Explore Mode.

Draw a Shape

3. Click  for the line-drawing tool. Click a dot on the geoboard and drag the cursor to the next dot. A line appears between the two dots.

4. Draw three more lines to make a square.



5. Click  , then click inside your square to find its area.

6. Click  , then click inside your square to find its perimeter.

Make a Design

7. Click  for the copying tool, then click your square. Drop a copy of your square next to the first one.

8. You can keep clicking different places on the board to drop as many squares as you want. To stop dropping squares, click anywhere outside the geoboard.

9. Click  and choose a different color. Then click  . Draw lines to make a design. Here's a design you can make inside your squares:

10. Click  for the translation tools. Then click your design. Click  ,  ,  , and  . Watch your design flip around.

11. Save your design by clicking  . Drag the miniature version of your design into an empty square and click  .

Explore Some More

12. Click  for the paint bucket. Click inside a shape to fill it with color.

13. Click  for the eraser tool. Try clicking a few lines to erase them. Try clicking inside a filled-in shape to take the paint out.

14. Click  to learn about geometry.

15. Click  to see some fun shape design ideas. Try using the tools to change one of these!

Master Geometry Challenges

16. Click  to enter the Question & Answer Mode, where the GeoBot asks you questions.

17. Use the tools to answer a question. When you have the answer, click  .

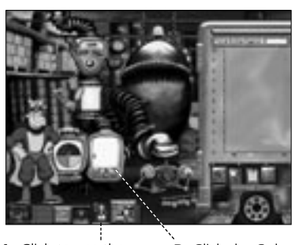
Guided Tour— Probability

1. From the Main Menu, click  . When Handsome Chance appears on the screen, he gives you a short explanation of his Probability Machine.

2. Click to enter the Explore Mode.

Into the Probability Machine!

3. You can set probabilities for the color of the action figures' outfits and for the gear that the action figures carry. Let's work with colors first.

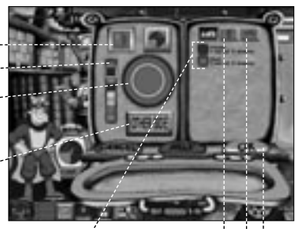


A. Click to use the Color Machine.

B. Click the Color Gizmo to open it.

Set Up the Coin

4. You can set the probabilities with the coin or the spinner. For now, we'll use the coin.



A. Choose the coin.

B. Select red.

C. Click the coin to make this side red.

D. See the other side of the coin.

E. Select purple, then click the coin to make the second side purple.

F. The probability of flipping red or purple is displayed.

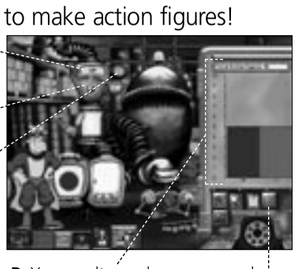
G. See the same probabilities written as fractions.

H. See the probabilities written as percentages.

I. When you're done, click here.

Make a Few Action Figures

5. You're ready to make action figures!



A. Set the number of action figures to 10.

B. Click the switch and set it to "Slow."

C. Run the machine to make action figures.

D. Your results are shown as a graph.

E. See your results as a chart.

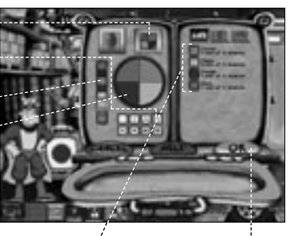
Make Many Action Figures

6. Click the arrows to set the number of action figures to 1,000. When you are making this many action figures, it's a good idea to set the switch to "Fast" and watch what happens.

Set Up the Spinner

7. Now try using a spinner to set the probabilities.

8. Click the Color Gizmo to open it.



A. Choose the spinner.

B. Choose the spinner with four sections.

C. Choose green.

D. Click a section to make it green.

E. Make each section of the spinner a different color.

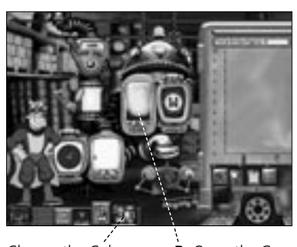
F. The probability of spinning each color is displayed.

G. When you're done, click here.

9. Make as many action figures as you like.

Gear Up

10. Handsome Chance action figures always come in different colors. If you want, you can make them with different gear, too.



A. Choose the Color-and-Gear Machine.

B. Open the Gear Gizmo.

11. Use a coin or a spinner to set the probabilities for the different types of gear.

The Gear Gizmo works exactly as the Color Gizmo does. (If you need help, see steps 4–6 of this Tour to use the coin. See steps 7–9 to use the spinner.) Click OK when you're done.

12. You can click to set the colors. Or, you can leave them the way they are now.

13. Set the number of action figures you want to make and the speed of the machine, then click GO.

Master Probability Challenges

14. Click to go to the Question & Answer Mode. Handsome Chance asks you a question. Use the Probability Machine to help you find the answer. You already know how to set up the machine—so go to it!

15. If you need a tip on answering the question, click Handsome Chance.

16. When you have the answer, click the answer you think is right.

Guided Tour—
The Calculators

Open the Fraction Calculator

1. From the Main Menu, click .

2. Click to use the Fraction Calculator.

Enter a Fraction

3. Try entering the fraction **1/4**.

A. Click .

B. Click **1**.

C. Click again.

D. Click **4**. The fraction 1/4 appears on the display.

E. Click **=**. The right side of the calculator shows 3 pictures of the fraction 1/4.

Enter a Mixed Fraction

4. Enter the fraction **2 1/5**.

A. First enter the whole-number portion (the number **2**).

B. Then, enter the fractional portion. Click , then click **1**. Click again, then click **5**.

C. Click **=**, and the mixed fraction is displayed. You can see the fractional part of the number in pictures on the right side of the screen.

Simplify a Fraction

5. Click Clear to clear the display.

6. Enter the fraction **4/6**.

7. Click Simplify. The fraction is simplified. Do the pictures of the fraction change when it is simplified? Can you explain why or why not?

8. Click Clear, then enter the fraction **5/9** and click **=**. Click Simplify. What happens? Can you explain why?

Use the calculator to simplify each fraction.

$\frac{2}{4}$ = _____ $\frac{6}{9}$ = _____

$\frac{3}{6}$ = _____ $\frac{4}{12}$ = _____

See Equivalent Fractions and Decimals

9. Enter the fraction **3/10** and click the **=** key.

10. Click F↔D. You will see **3/10** shown as a decimal. Click F↔D again to see the decimal as a fraction.

Use the calculator to convert these fractions to decimals.

$\frac{4}{10}$ = _____ $\frac{1}{2}$ = _____

$\frac{8}{10}$ = _____ $\frac{2}{5}$ = _____

Use the calculator to convert these decimals to fractions.

.5 = _____ .1 = _____

.2 = _____ .4 = _____

Turn the Calculator Off

11. Click to put the calculator away.

12. Click to go back to the Main Menu.

Try the Quizzo Calculator

13. From the Main Menu, click .

14. You don't need to start a game, so click CANCEL.

15. Click to use the Quizzo Calculator.

16. Enter the number **12**. Click the **=** key.

17. The calculator shows that the number 12 is even and composite, what its factors are, and what its multiples are.

Use the calculator to find out which of these numbers are prime. Circle the prime numbers.

2 3 4 5 6 7 8 9 10

Use the calculator to find the factors of 15. List them here:

Now find the factors of 24. List them here:

Divide

18. Clear the display. To divide **20** by **3** and find the remainder:

19. Click **20**.

20. Instead of using the regular ÷ key, click .

21. Click **3**, then click **=**.

Use the calculator to divide these numbers. Find the remainder.

5 ÷ 2 = _____ 12 ÷ 4 = _____

10 ÷ 3 = _____ 30 ÷ 4 = _____

Explore on Your Own

22. Most buttons on the Quizzo Calculator work the same way the buttons on the Fraction Calculator do! Experiment with the buttons to see what you can do. When you're done, click to turn the calculator off.

Students with Special Needs

Number Heroes includes built-in features that make it an extremely effective learning tool for a wide variety of students.

Access Options

Number Heroes is compatible with the Edmark TouchWindow and with single switch devices, allowing students with special access needs to interact with the software.

Direct Selection with the TouchWindow

Number Heroes is fully compatible with the TouchWindow, a portable touch-sensitive screen that attaches to the computer monitor, allowing direct and natural touch input.

Scanning for Single Switch Users

The Fraction Fireworks and Probability activities support single switch input with scanning. When scanning is turned on, a selection arrow automatically advances from choice to choice. (The scanning speed can be adjusted from Adult Options). Students make a selection by activating a single switch device. For more information about scanning, see page 29.

Depending upon the access needs of your students, you may wish to use any of the following:

1. **TouchWindow**—The entire TouchWindow can function as the single switch device. A student touches any part of the touch screen to make a selection. The TouchWindow can be placed in the user's lap or on a desktop.
2. **Mouse**—A student clicks the mouse button to make a selection.
3. **Keyboard**—(Windows users only). A student presses the Space Bar or the F5, F6, F7, or F8 key to make a selection.
4. **Switches**—A switch is a specialized input device for special needs users. (Most switches require a switch interface to connect them to the computer. A variety of switch interfaces is available commercially.)

Unique Features

Below are descriptions of a few of the features that make *Number Heroes* extremely effective for students with special needs.

- **A strong curriculum-based math content for grades 3–6** allows each student to work at his or her own skill level and pace, while providing access to identified learning tasks within all areas of the program. *Number Heroes* can be used in general, inclusive, and self-contained classrooms, for enrichment and for tutorial purposes.
- **Grow Slides** allow students to repeat and review difficult areas. Automatic progression on the Grow Slides ensures that students move to more challenging topics as they experience success. Teachers can use the Grow Slides to track individual student progress.
- **Virtual Manipulatives,** an innovative educational technology, increase students' ability to visualize and connect concrete and abstract math concepts.

Math Topics

The Grow Slides in each activity of *Number Heroes* allow you to choose from dozens of math topics, which are shown below. (For details on setting the Grow Slides, see page 30.)

Fraction Fireworks

A. Parts of a Whole
B. Compare Fractions
C. Parts of a Group
D. Equivalent Fractions
E. Multiply Whole Number by a Fraction
F. Parts of a Whole—Numerator ≥ 1
G. Compare Fractions—Numerator ≥ 1
H. Parts of a Whole & Group (to 10ths)
I. Multiply Whole Number by Fraction (to 8ths)
J. Compare Fractions (to 10ths)
K. Equivalent Fractions (to 10ths)
L. Add Like Denominators
M. Subtract Like Denominators
N. Add Like Denominators (to 9ths)
O. Subtract Like Denominators (to 9ths)
P. Equivalent Fractions (to 12ths)
Q. Decimal to Fraction—10ths
R. Parts of a Whole & Group (to 12ths)
S. Compare Fractions—7ths & 11ths
T. Add Fractions—Unlike Denominators
U. Subtract Fractions—Unlike Denominators
V. Multiply Whole Number by Fraction (to 12ths)
W. Add and Subtract Fractions (to 12ths)
X. Multiply Fraction by a Fraction
Y. Decimal to Fraction—-100ths
Z. Review

Geoboard

A. Sides and Corners
B. Angles
C. Polygons
D. Congruent Figures
E. Symmetry I
F. Flips, Slides, and Turns I
G. Perimeter and Area I
H. Line Segments, Endpoints, and Vertices
I. Types of Angles
J. Parallel/Perpendicular Line Segments
K. Polygons—Quadrilaterals and Octagons
L. Congruent and Similar Figures I
M. Symmetry II
N. Flips, Slides, and Turns II
O. Perimeter and Area II
P. Quadrilaterals
Q. Types of Triangles
R. Parallel/Perpendicular Line Segments II
S. Congruent and Similar Figures II
T. Symmetry III
U. Slides, Flips, and Turns III
V. Tessellations and Quilting
W. Perimeter and Area III
X. Review

Quizzo

A. Basic Starting Level for All Topics
B. Add 2-Digit Numbers
C. Patterns
D. Subtract 2-Digit Numbers
E. Basic Multiplication Facts
F. Identify Shapes
G. Identify Numbers
H. Basic Division Facts
I. Analogies
J. Add 3-Digit Numbers
K. Multiply Multiples of 10
L. Subtract 3-Digit Numbers
M. Add 3 or More Addends
N. Multiply 2-Digit Numbers
O. Identify Shapes—Advanced
P. Divide by Multiples of 10
Q. Add Decimals
R. Subtract Decimals
S. Multiply 3-Digit Numbers
T. Patterns—Advanced
U. Divide by 2-Digit Number
V. Multiply Decimals
W. Divide Decimals
X. Identify Numbers—Advanced
Y. Challenge
Z. Review

Probability

A. Certain/Possible/Impossible Outcome
B. Predict the Chance
C. Interpret Probability Data
D. Effects of Trial Size
E. Predict the Probability
F. Probability as a Fraction
G. Likely/Unlikely Probabilities
H. Certain/Impossible Outcomes
I. Identify Probability Machine from Data
J. Compare Probabilities
K. Possible Outcomes—Simple Event
L. Unequal Probability
M. Interpret Data—Unequal Probability
N. Probability—Independent Events
O. Interpret Data—Independent Events
P. Probability as a Percent
Q. Independent Events—Unequal Probability
R. Review

How Does Number Heroes Meet NCTM Standards?

Today, the ability to reason, solve problems, and communicate mathematically is as important as knowing basic arithmetic facts and formulas. In recognition of changing mathematical needs, the National Council of Teachers of Mathematics (NCTM) established standards in 1989 to reshape the K–12 mathematics curriculum. NCTM standards are woven into each activity of *Number Heroes* and its companion program, *Calculating Crew.* Through the use of Virtual Manipulatives, these programs allow students to solve problems and construct their own mathematical knowledge, fulfilling major NCTM goals.

Below you will find a chart showing the connections between these goals and each software activity in *Number Heroes* and *Calculating Crew.* The chart is followed by an explanation of the connections between *Number Heroes* and the major NCTM process (the way mathematics is taught) and content goals for grades 3–6.

	Process Goals				**Content Goals**										
	Mathematics as Problem Solving	Mathematics as Communication	Mathematics as Reasoning	Mathematical Connections	Number Sense and Number Relationships	Number Systems and Number Theory	Concepts of Whole Number Operations	Whole Number Computation	Estimation	Geometry and Spatial Sense	Measurement	Statistics and Probability	Fractions and Decimals	Patterns, Relationships, and Functions	Pre-Algebra
Number Heroes															
Fraction Fireworks	✓	✓	✓	✓	✓								✓		✓
GeoComputer	✓	✓	✓	✓					✓	✓	✓			✓	
Quizzo	✓	✓	✓		✓	✓		✓	✓	✓			✓	✓	✓
Probability	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓	✓
Calculating Crew															
Nautical Number Line	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Dr. Gee's 3D Lab	✓	✓	✓	✓						✓				✓	
Superhero Superstore	✓	✓	✓	✓	✓		✓	✓	✓				✓		✓
Nick Knack, Supertrader	✓	✓	✓	✓	✓		✓	✓	✓					✓	✓

Process Goals

Mathematics as Problem Solving

The NCTM Standards state that "problem solving should be the central focus of the mathematics curriculum" (NCTM *Standards,* p. 23*). All four activities in *Number Heroes* emphasize and develop problem-solving skills. Rather than simply memorizing answers, students are presented with a problem and the mathematical tools to solve it. For instance, Handsome Chance may ask students whether the dial on a given spinner is more likely to land on red or blue. Students can use an electronic spinner to experiment and develop an answer to the question themselves, then have Handsome Chance check their answer. An Explore Mode in each activity enables students to pose their own problems and find creative solutions. For example, students can use the GeoComputer tools to create their own geometric transformations, tessellations, and symmetric designs.

Mathematics as Communication

Students use *Number Heroes'* Virtual Manipulatives—such as fireworks fractions, a geoboard, and a probability machine—to represent and describe mathematics. The software ties these manipulatives to numerical representations; actions on the manipulatives always affect the numbers, and vice versa. This connection helps students grow from communicating mathematically through objects (for example, pushing two halves together to make a whole) to communicating through standard mathematical symbols (writing the equation ½ + ½ = 1).

Working at the computer with a partner provides wonderful opportunities for students to "talk math" and learn from one another as they solve a problem. Encourage students to explain their reasoning to you as well; you may gain valuable insights into their understanding of math concepts. *Mighty Math* activities can also serve as a basis for students' written communication. For example, after students have experimented with equivalent fractions in Fraction Fireworks, ask them to write a few sentences explaining how they decide if two fractions with different denominators are equivalent.

Mathematics as Reasoning

Work with manipulatives often encourages mathematical reasoning more than rote application of memorized facts and algorithms does. The Virtual Manipulatives in *Number Heroes* offer rich opportunities for conjecture, logical thinking, analysis, and drawing conclusions. For example, students working with the Probability module can gain insights into the effect of sample size by conducting experiments and studying a graph of the results.

Mathematical Connections

The activities in the *Mighty Math Series* help students make important connections between practical knowledge and formal mathematical operations, as they use Virtual Manipulatives to help them translate between concrete models and algorithms. For example, a student struggling to find the product of a whole number and a fraction receives a clue from Fraction Man: One way to solve the problem "¼ x 8" is to take 8 fireworks bursts and then count 1 in every 4 bursts to find the answer.

Connections are also made with other subject areas. The probability and graph-reading skills developed in the Probability module can be immediately applied to current events (polls and projections), science (graphing of results), and other subject areas.

Content Goals

Number Sense, Number Relationships, Number Systems, and Number Theory

Several *Number Heroes* activities help students develop their understanding of fractions, decimals, percents, and the relationships between them. In Quizzo, students analyze the properties of numbers as they solve number identity challenges, while the special-function calculators in both Quizzo and Fraction Fireworks allow students to find equivalent fractions and decimals with the click of a button.

Whole Number Concepts and Operations

In the intermediate grades, students refine their concepts of addition, subtraction, multiplication, and division and learn the related algorithms to efficiently solve problems. Play in Quizzo allows students to apply problem-solving skills to develop their understanding of these operations.

Estimation, Geometry, and Spatial Sense; Measurement, Statistics, and Probability; and Fractions and Decimals

Each activity in *Number Heroes* deals with at least one of the specific content areas included in the NCTM standards. Using the GeoComputer's geoboard, students build their understanding of 2D geometry and measurement concepts as they develop spatial sense. The Probability machine enables students to run experiments, interpret graphs and charts, determine probabilities, and make predictions. In Fraction Fireworks, students perform basic computational operations with fractions. Students apply estimation strategies as they work with measurement in GeoComputer, graphs in Probability, and problem solving in Quizzo.

Patterns, Relationships, Functions, and Algebra

"Activities...should continue to emphasize concrete situations that allow students to investigate patterns in number sequences, make predictions, and formulate verbal rules to describe patterns" (NCTM *Standards,* p. 102*). In *Number Heroes,* students investigate patterns, relationships, and functions as they analyze tessellations in GeoComputer and linear number and shape patterns in Quizzo. The NCTM standards also encourage informal exploration of algebra in grades 5 and 6 to provide a foundation for its formal study in later grades. Both Quizzo and Probability help students develop algebraic thinking as they solve for unknowns in problems.

* Source: National Council of Teachers of Mathematics. *Curriculum and Evaluation Standards for School Mathematics*. Reston: National Council of Teachers of Mathematics, 1989.