

Helping Your Child Do Mathematics

A Guide for Parents



Kindergarten to Grade 6

The Literacy and Numeracy Secretariat

Ministry of Education

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Dear Parents:

Developing strong skills in literacy and numeracy is critical to a child's success in early learning and beyond. That is why the Literacy and Numeracy Secretariat is committed to helping all children achieve a positive outcome from publicly funded education in the elementary years.

The Secretariat recognizes that parents play an important role in their children's learning. As a result, we have developed two new parent resources for schools across Ontario: *Helping Your Child with Reading and Writing* and *Helping Your Child Do Mathematics*.

These guides have been developed so that parents, guardians, caregivers and other family members can help our youngest learners further develop their reading, writing and math abilities. They include tips as well as practical activities that can be used at home and in your local community.

Later this year, the Secretariat will be making these guides available in 12 additional languages to schools and on the ministry's website. I encourage you to visit www.edu.gov.on.ca and www.ontario.ca/eduparents to access the many resources available online to help your child learn.

On behalf of the Secretariat, I would like to thank you for the work you do every day to help your child succeed.

Sincerely,

A handwritten signature in black ink that reads "Avis Glaze".

Avis E. Glaze
Chief Student Achievement Officer and CEO
The Literacy and Numeracy Secretariat

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A Word About This Guide

You are an important partner in your child's education. This guide is intended to help you work with your child to improve his or her achievement in mathematics. It contains activities that you, as a parent,* can do with your child to explore mathematics at home and within your local community. It will be most useful for parents of children in Junior Kindergarten through Grade 6.

You don't need to do every activity suggested in this guide! Choose the ones that you think your child will find interesting and that you and your child will find helpful. Also, choose ones that you and your child can easily do at home.

The activities in this guide have been organized under the five "strands," or areas of study, in the Ontario mathematics curriculum. Within these five areas, there are activities for children in Kindergarten through Grade 3 and activities for children in Grade 4 through Grade 6. Many of these activities can be made simpler or more challenging to meet the needs and interests of your child.

* In this guide, the word "parent" is meant to include guardians, caregivers, and other family members who can help children learn mathematics.



If you are the parent of a child who has special needs, you are encouraged to adapt the activities described in this guide to suit the particular needs of your child.

In addition to this guide, many resources are available to assist you in helping your child learn mathematics. You may wish to consult your child's teacher. You may also want to find out more about the Ontario mathematics curriculum and the province-wide tests conducted by the Education Quality and Accountability Office. See page 24 of this guide for more information about these resources.

If you and your child are more comfortable in a language other than English, please use it. Your child will understand concepts better in the language that he or she knows best. The important thing is to be enthusiastic about mathematics and to help your child learn mathematics.



Why Is It Important for My Child to Learn Mathematics?

Mathematics knowledge and skills contribute to a child's success – both at school and in everyday life. Understanding mathematics also builds confidence and opens doors to a range of jobs and careers.

In our everyday lives, understanding mathematics enables us to:

- solve problems and make sound decisions;
- explain how we solved a problem and why we made a particular decision;
- use technology (for example, calculators and computers) to help solve problems;
- understand patterns and trends in the world around us in order to make predictions (for example, keep track of how much milk is consumed to know how much milk to buy each week, notice the times when traffic is heavy to decide on the best time to travel);
- manage time and money, and handle everyday situations that involve numbers (for example, calculate how much time we need to get to work, how much food we need to make meals, and how much money we need to buy the food).



Understanding and knowing how to do mathematics makes our day-to-day lives easier. Understanding and using mathematics to make decisions and to take action builds confidence and joy!



How Will My Child Learn Mathematics?

Children learn mathematics best through activities that encourage them to:

- investigate;
- think about what they are investigating;
- gather information, organize it, and act on it;
- use information that they have gathered from a variety of sources to solve problems;
- explain how they reached their solutions.

Children learn more easily when they can connect mathematics concepts and procedures with their own experience. By using common household objects (such as measuring cups, bathroom scales, a deck of cards) and observing everyday events (such as weather trends over the course of a week), they can “see” the ideas that are being taught.

An important part of learning mathematics is learning how to understand and solve problems. Children are encouraged to use systematic trial and error and a variety of other strategies to develop their reasoning and to learn how to go about problem solving. They learn that there are many ways to solve problems and there is often more than one solution to any given problem. They also learn to communicate clearly as they explain their solutions. It does not matter what language they use when they are talking about mathematics.

At school, children learn the concepts and skills identified for each grade in the Ontario mathematics curriculum in five major areas, or strands, of mathematics. The names of the five strands are: Number Sense and Numeration, Measurement, Geometry and Spatial Sense, Patterning and Algebra, and Data Management and Probability. You will see these strand names on your child’s report card. The activities in this guide are connected with the different strands of the curriculum.

This guide contains suggestions for everyday mathematics activities that you and your child can have fun doing together. The activities include suggestions for questions that you might ask to help your child build mathematical understanding and problem-solving skills.



What Tips Can I Use to Help My Child?

Be positive about mathematics.

- Be positive, and talk about the ways you use mathematics every day. Sharing negative experiences (by saying, for example, “I was never good at math”) will not encourage your child to engage in mathematics and be confident about taking risks as he or she solves problems. Instead, try statements like this: “Okay, we can solve this if we work it out together. What are you thinking?”
- Let your child know that *you* think mathematics is important.
- Point out the ways in which different family members use mathematics in their jobs and at home.
- Let your child know that *everyone* can learn mathematics.
- Praise your child when he or she makes an effort and understands something for the first time, and share in the excitement when you and your child solve a problem together.
- Encourage your child to be persistent when a problem seems difficult.

Make mathematics part of your child’s day.

- Point out to your child the many ways in which mathematics is used throughout his or her day.
- Encourage your child to tell or show you how he or she uses mathematics.
- Include your child in everyday activities that involve mathematics – making purchases, measuring ingredients, counting out plates and utensils for dinner, measuring and calculating the area of a room.
- Play games and do puzzles with your child that involve mathematics. Such activities may focus on direction or time, logic, reasoning, sorting, classifying, and/or estimating.
- Work with your child to solve mathematics problems such as the ones in this guide. Problem solving helps your child develop mathematical thinking and reasoning.
- In addition to mathematics tools, such as a ruler and a calculator, use household objects, such as toothpicks, a measuring cup, and containers of various shapes and sizes, when doing mathematics with your child.



Encourage your child to give explanations.

- When you and your child are trying to solve a problem, have your child share his or her thinking aloud and talk about the strategies that he or she used to reach a solution. If some of your child's ideas are puzzling, ask your child to explain further. As children talk about their ideas and how they reach solutions, they are learning to reason mathematically.
- Suggest that your child act out a problem or draw a diagram to solve it. Have your child show how he or she reached a conclusion by drawing pictures and moving objects as well as by using words.
- Treat errors and misconceptions as opportunities to develop reasoning skills and new ideas. Identify which part of your child's reasoning is convincing and which part is less convincing. For example, "I like the way you organized the information. Can we look at the chart again to see if the numbers are accurate?" Also, prompt your child to think of another way to solve the problem.

The "activities" section of this guide offers suggestions for putting these tips into action, and for helping to build your child's mathematics skills.



What Mathematics Activities Can I Do With My Child?

Number Sense and Numeration

Numbers are used in describing quantities, in counting, and in carrying out numerical operations such as addition, subtraction, multiplication, and division. Understanding numbers and how they relate to each other, and knowing how to combine them to solve problems, help develop understanding in all areas of mathematics.

Kindergarten to Grade 3

How many toys are on the shelves? Opportunities for counting are all around us. Have your child estimate quantities and then count them aloud to check.

- Watch your child count toys, kitchen utensils, and items of clothing as they come out of the dryer. Help your child count by pointing to and moving the objects as he or she says each number aloud.
- Listen to your child count forwards and backwards from different starting places.
- Use household items to practise adding, subtracting, multiplying, and dividing.

How many number words are in this song or story? Sing counting songs and read counting books with your child. Counting games, rhymes, and songs exist in every culture. Popular counting rhymes in English include “One, Two, Buckle My Shoe” and “Ten Little Monkeys”. Counting books capture children’s imaginations by using pictures of interesting things to count and to add or by telling a story that involves numbers and counting. You can find counting books in English and many other languages in some bookstores, public libraries, and community centres.

What are 10 different ways in which numbers, numerals, or digits are used inside and outside the home? Take your child on a “number-numeral-digit hunt” in your home or neighbourhood. Discover the many ways in which numbers, numerals, or digits are used.

- Discover together whether numbers, numerals, or digits are used on the television set, the microwave, and the telephone.
- Spot numbers, numerals, or digits in books and newspapers.
- Look for numbers, numerals, or digits on signs in your neighbourhood.



Encourage your child to tell you whenever he or she discovers a new way in which numbers, numerals, or digits are used.

- A number represents a quantity of objects.
- A numeral is a symbol that represents a number. A numeral differs from a number just as a word differs from the thing it refers to.
- A digit is a symbol in a numeral used to represent a number.

Which number comes next in the skip count? Have your child practise skip counting.

- Together, count by 2's and 5's, using objects (for example, pasta pieces, pennies, toothpicks) or a one hundred chart. Then ask your child how far he or she can count by 10's. Or roll two regular dice, one to determine a starting number and the other to determine the counting interval for the skip count.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Ask your child to try skip counting backwards from 10, 20, or even 100, using objects (pasta pieces, pennies, toothpicks). Make it easier for your child to skip count backwards by using only smaller numbers. You can take turns with your child in saying the next number.



How does mathematics help with solving problems that come up during daily tasks? Ask your child to help you solve everyday number problems.

- Pose these problems: “We need 6 tomatoes to make our sauce for dinner, and we have only 2. How many more do we need to buy?” “You have 2 pillows in your room and your sister has 2 pillows in her room. How many pillowcases do I need to wash?” “Two guests are coming to eat dinner with us. How many plates will we need?”
- Make this task simpler by focusing on fewer problems to solve. Make it more challenging by increasing the numbers to be added or subtracted, or by adding and subtracting more than two numbers.

How many turns will it take to get to 100? Make up games using dice or playing cards.

- Try rolling dice and having your child add, subtract, or multiply the numbers that come up. Have your child add the totals until he or she reaches a target number – for example, 100.
- Play the game backwards to help your child practise subtraction.
- Make the task easier by using only one operation – for example, addition.

Is one half ($\frac{1}{2}$) always larger than one quarter ($\frac{1}{4}$)? Use household items to help with understanding fractions.

- Ask your child to show you $\frac{1}{2}$ of a slice of bread, and $\frac{1}{4}$ of the same slice. Ask, “Which is larger?” Repeat this activity with other fractions, such as $\frac{1}{3}$ and $\frac{2}{4}$.
- Compare $\frac{1}{2}$ of a slice of bread with $\frac{1}{2}$ of a blanket. Ask whether $\frac{1}{2}$ is always the same size.
- Compare $\frac{1}{2}$ of a slice of bread with $\frac{1}{4}$ of a blanket. Is $\frac{1}{2}$ always larger than $\frac{1}{4}$? Talk about this with your child.

How is it possible to generate a target number on a calculator? Play “Broken Calculator”.

- Ask your child to pretend that the number 8 key on the calculator is broken. Ask how he or she can make the number 18 appear on the screen without it. (Sample answers: $20 - 2$, $15 + 3$).
- Ask other questions of the same type, using different “broken” keys.
- Make this task easier or more challenging by varying the number key on the calculator or the target number.



Grade 4 to Grade 6

In what ways can different coins be combined to make up a given amount?

Use coins to practise mental mathematics.

- Gather some coins between you and your child. Tell your child, "I have 7 coins: 3 quarters, 2 dimes, 1 nickel, and 1 penny. How much money do I have?"
- For a different challenge, take some coins in your hand. Ask your child to guess which coins you hold by saying, "I have \$1.84. I hold 10 coins. What could they be?" Switch places with your child. Have your child take some coins, tell you the amount and the number of coins, and ask you to guess what the coins could be.
- Make the task easier or more difficult by varying the amount or the number of coins, or by restricting the types of coins.

What kinds of questions will help with finding a fraction or decimal number?

Play a quiz game with your child to help with understanding decimal numbers and fractions.

- Think of a fraction or a decimal number. Tell your child that the fraction or decimal number lies in the range between two numbers – for example, between 1 and 4. Invite your child to guess your number by asking questions that you may answer only by saying yes or no. For example, if your number is 3.13: "Is your number even?" "No." "Is your number between 3 and 4?" "Yes." "Is your number greater than 3.5?" "No."
- Make this task easier by narrowing the range, and more difficult by widening the range, starting the range at a higher number, or limiting the number of questions that your child may ask.

How can numbers and operations be combined to get the greatest number?

Try this number game.

- From a deck of playing cards, take the cards numbered from 2 to 10, shuffle them, and deal four cards to each player. Each player must create the greatest possible number by a combination of addition, subtraction, multiplication, and division of the numbers on his or her four cards. Discuss with your child the strategies that he or she used.
- Make this task easier by using fewer cards and addition or subtraction, and more difficult by using a greater number of cards and all four operations – addition, subtraction, multiplication, and division.



How does the ratio of sugar to water change the taste of the water?

Consumers, cooks, architects, engineers, and most people use ratios in everyday life. Experiment with ratios by making sugar water with your child. You can use ordinary tableware (small spoon, large spoon) for the measurements.

- Ask your child which of the following mixtures he or she would expect to have the strongest taste: Mixture A – 2 teaspoons of sugar, 3 tablespoons of water; Mixture B – 5 teaspoons of sugar, 8 tablespoons of water; Mixture C – 3 teaspoons of sugar, 4 tablespoons of water; or Mixture D – 1 teaspoon of sugar, 2 tablespoons of water. Record your child’s observations in a chart.

Sugar	Water	Taste

- Try a variation of this activity with drops of food colouring in water to determine which ratio of drops to water makes the water darkest.

Measurement

We can use measurements to determine the height, length, and width of objects, as well as the area that objects cover, the amount that objects hold (capacity), and the space that objects take up (volume).

We measure time and money. Developing reasonable estimates and taking precise measurements requires time and practice.

Kindergarten to Grade 3

In what ways can various items be compared and ordered? Organize household items.

- Take cereal boxes or canned goods from the cupboard and have your child line them up by height, from tallest to shortest.
- Change the task by varying the types of measurements used in comparing and ordering objects. For example, compare items by single measurements, such as length or width. Compare two boxes by surface area. Compare a soup can, a glass, and a cup according to capacity (how much they hold).



What is the relative size of different objects? Have your child measure items found around the home.

- Ask your child to find objects that are longer or shorter than a shoe or a string or a ruler.
- Ask your child to use a shoe to measure the length of a floor mat.
- Ask your child to order several different containers according to how much they hold (capacity). Fill the containers with sand in a sandbox or with water in the bath. Give your child a small scoop (for example, a coffee scoop or the cap from a bottle of liquid laundry detergent). Challenge your child to use the scoop to see which of the containers holds the most sand or water and which holds the least.

How does the estimate compare with the actual count? Skill in estimating is developed through many experiences of making an estimate and comparing it with the actual count.

- Estimate the number of steps from your apartment door to the front door of the building or from your front door to the edge of your yard, then walk with your child to find out how many steps there really are, counting them as you go.
- Ask your child to estimate how many bags of milk your family will need for the week. At the end of the week, have him or her count the number of bags actually used.
- Ask your child to estimate and then count the number of shapes he or she can draw in a minute. Ask if the total is more or less than your child thought it would be.
- Fill a jar with beans, buttons, or rubber bands. Ask your child to estimate, then count, the number of objects.
- Ask your child to estimate how many pieces of clothing will go into one load of laundry. Are there more items in a dark or light load?

Estimating may be easier for your child if objects are few, large, and spread apart, and more difficult if objects are many, small, and close together.



How long does it take to do everyday activities? Help your child develop a sense of time.

- Ask your child to check the clock to know how much time it takes to go to school, eat meals, and get ready for bed.
- Together, look up the time it will take to watch your child's television program.
- Have your child estimate the time needed for a trip, decide when he or she has to leave, and then check how long the actual trip takes.
- Record on a calendar the time it takes your child to do a favourite away-from-home activity, such as play a hockey game, visit a relative, or walk through a shopping mall.
- Ask your child to do something for a specified amount of time – for example, one minute (wash hands, comb hair, put on shoes).

By how much does the temperature change over a few weeks? Put an outdoor thermometer outside a window for you and your child to view together.

- With your child, record the temperature over a few weeks.
- Ask your child to look at the record, determine the lowest and highest temperatures, and calculate the difference between them.
- Talk with your child about how the temperature affected his or her activities.

What units of measurement would be used in measuring various objects?

Include your child in activities that involve measurements.

- Ask your child to measure the ingredients in a recipe. Talk about the different units of measurement used in the recipe (for example, teaspoons, cups, grams, kilograms, litres, millilitres).
- Have your child estimate whether a new bookcase or desk will fit in a room in the home.
- Have your child estimate how many shoes will fit in a grocery bag or how many shirts will fit in a laundry bag.



Grade 4 to Grade 6

Are bigger items always heavier than smaller ones? Take your child grocery shopping.

- Gather the fruits and vegetables you are purchasing. Ask your child to estimate their mass in grams and then to verify the actual mass on the scales in the fruits and vegetables section.
- Have your child hold two items, estimate which one is heavier, and then use the scales to check.
- Ask your child to estimate the mass of 1 apple, then of 6 apples. Will 6 apples be heavier than 6 oranges? than 2 grapefruits?

What is the relationship between various units of measurement? Discuss metric measures.

- When cooking or baking with your child, ask your child to help you discover what the measurements given in grams would be in kilograms, or the reverse.
- When building something, ask your child to find what the measurements given in metres would be in centimetres.
- When travelling, ask your child to find what the measurements given in kilometres would be in metres.

Ask your child to look for a pattern in the way the units relate to each other, and have your child describe this pattern to you.

Which period of time is longer? Have your child perform calculations with time.

- Ask your child to figure out how long he or she would have to stand in line if it takes one and a half minutes to buy a ticket and your child holds number 52. Or ask your child which is longer: 3 and a half months or 87 days.
- Make the task more challenging by posing this problem: If you started counting your heartbeat at midnight on January 1, and you had one heartbeat per second, when would you count your thousandth heartbeat? your millionth heartbeat?

How fast does a plant grow? Keep a record of growth over time.

- Plant a bean plant and keep a scientific journal about its growth with your child. Every day, ask your child to measure the different parts of the plant and draw them, including details of the stem and leaves.
- To add a challenge, plant two plants and have your child compare their amounts of growth over time.

Geometry and Spatial Sense

Many people, including those who work in construction, industrial design, and the visual arts, need to identify and describe shapes, sizes, positions, directions, and movement. Children who become familiar with shapes and spatial relationships in their environment will be prepared to understand the principles of geometry in later grades.

Kindergarten to Grade 3

What are the names of various shapes? When playing with your child, identify things by their shape and size: “Please pass me a sugar cube.” “Please take the largest box out of the cupboard.”

Are there objects around the home that have familiar shapes? Help your child focus on the many surfaces and solid figures that he or she sees every day.

- Ask your child to look for two-dimensional shapes, such as circles, squares, triangles, and rectangles, on objects at home or outside. For example, help your child find street signs in various shapes.
- Have your child look for three-dimensional objects – cubes, cones, spheres, prisms, pyramids, and cylinders. Talk about how a pop can is like a cylinder.
- With older children, include other shapes, such as parallelograms and hexagons, and other solids, such as rectangular prisms.

How can directional words be used in helping someone find a hidden object?

Challenge your child to find an object in your home.

- Give clues using words and phrases such as *up, down, over, under, between, through, and on top of*.
- Make this task more challenging by giving two-part directions – for example, “on top of the table and to the right of the notebook”.

Which shape best describes an object? Help your child become aware of ordinary shapes.

- Play “I spy” with your child, asking him or her to identify an object when you say, “I spy something that is round,” “I spy something that is rectangular,” or “I spy something that looks like a cone.”
- Make this task more challenging by stating two shapes: “I spy something that is round and has a square on it.”



What are the shapes that make up other shapes? Together with your child, choose a picture from a book, magazine, or newspaper. Examine the various shapes that are within the picture. Cover the picture. Then ask your child to represent his or her best visualization of the picture, using two-dimensional shapes such as squares, circles, parallelograms, and so forth.

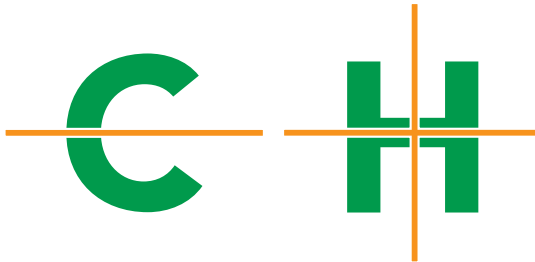
What would our community look like from the air? Talk with your child about where you live in relation to where a friend lives or in relation to the corner store. Use directional words and phrases like *beside* and *to the right of*. Together, build a map of your neighbourhood, marking landmarks and familiar places.

Grade 4 to Grade 6

How many words are made of letters that have two lines of symmetry?

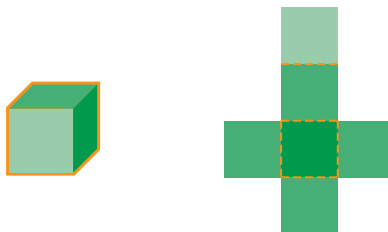
Identify with your child all the capital letters that have symmetry.

- Have your child sort the capital letters according to whether they have one or two lines of symmetry. For example, “C” has one horizontal line of symmetry; “H” has two lines of symmetry, one vertical and the other horizontal.



- Ask your child to create at least one word using only capital letters that have two lines of symmetry.

What do containers look like before they are glued into their final shape? Nets are flat, unfolded designs of three-dimensional objects.



Cube

Net of a Cube



- Collect a few boxes, cylinders, and other containers. Ask your child to imagine and draw what the objects might look like if they were cut apart at the edges and flattened. Check each of your child's predictions with the net of the flattened container.
- To make this task easier, use only objects that have square or rectangular faces. To make it more challenging, use objects that have curved faces, or faces in the shapes of triangles, parallelograms, pentagons, and so forth.

What shape or shapes make a tall structure stable? Building activities help your child think about how certain shapes keep things from falling down.

- Invite your child to use 50 straws and tape to build the tallest free-standing structure possible. The structure must not be attached to the floor or a wall or a piece of furniture. Talk with your child about which shapes (for example, rectangle, triangle, circle) will make the structure stable. Look together with your child at pictures of skeletal structures, such as hydroelectric towers, roller coasters, and suspension bridges.

Patterning and Algebra

We find patterns in nature, art, music, and literature. We also find them in numbers. Finding patterns is a key process in mathematics. The ability to recognize and identify patterns helps us make predictions based on our observations. Understanding patterns helps prepare children for the study of number sense, measurement, geometry, algebra, and data management in later grades.

In school, students are asked to describe patterns as repeating, growing, shrinking, and relational. As students examine patterns, they need to identify the attributes of patterns (such as colour, shape, and size) that change and those that stay the same. Such attributes are used in describing the patterns and writing pattern rules.

Kindergarten to Grade 3

How can hands and feet be used to make sound patterns? One kind of pattern that children enjoy making is the physical pattern.

- Clap your hands and stomp one foot in a particular sequence (clap, clap, stomp; clap, clap, stomp; clap, clap, stomp). Have your child repeat the same sequence. Then together create variations of the pattern.
- Teach your child simple dances that include a sequence of steps and movements.

In what ways do authors use patterns in songs and stories? Many children's books and songs repeat lines or passages in predictable ways, allowing children to recognize and predict the patterns.

- Together, look for patterns in various storybooks and songs.
- Add a challenge by asking your child to compose a new line for the pattern in a book or song.

What different types of shape patterns are there at home or in the neighbourhood? Your child will find patterns in clothing, in wallpaper, in tiles, on toys, and among trees and flowers in the park. Encourage your child to describe the patterns found. Try to identify the features of the pattern that are repeated.

What words can be used in describing patterns? In a repeating pattern, the pattern core is the part of the pattern that continuously recurs (for example, in the pattern ABB, ABB, ABB, the pattern core is ABB).

- Lay down a row of 9 spoons so that the handles point up or down in a pattern with a core of up, up, down (up, up, down; up, up, down; up, down, down). Ask your child to extend the pattern.
- Make this task more challenging by making the pattern core longer (for example, up, up, down, up; up, up, down, up; up, up, down, up) or by changing one of the elements in the pattern core (for example, up, up, down, sideways; up, up, down, sideways; up, up, down, sideways). Ask your child to describe the patterns.

What patterns are there in a one hundred chart? Make a one hundred chart by writing the numbers from 1 to 100 in rows of 10 (1 to 10 in the first row, 11 to 20 in the second row, and so on), or use the one hundred chart on page 9. Ask your child to look for the patterns up and down, across, or diagonally in the chart. For example, have your child pick out all the numbers that contain a 2 or a 7 and describe the different number patterns that he or she sees.

Grade 4 to Grade 6

Does knowing the pattern rule make it easier to predict the next number in a sequence? Create growing or shrinking numerical patterns.

- Create a growing numerical pattern by using a rule. For example, 5, 10, 15, 20, ..., where the rule is "start with 5 and add 5." Ask your child to guess your rule and write the next three numbers in the pattern.
- Make a pattern and ask your child to extend it. Make it fair by showing the repeating part at least three times. For example, 3, 6, 5, 10, 9, 18, 17, ...
- Switch roles and ask your child to create number patterns for you.



How is it possible to predict what numbers will come later in a pattern?

Create a numerical pattern. For example, ask your child to predict what number will be in the 8th place in a pattern such as 1, 4, 7, 10,

Place	1	2	3	4	5			
Number	1	4	7	10				

Your child might extend the pattern by writing the numbers past the 8th number in the pattern or by stating a pattern rule: "I start with 1 and add 3 each time, so for the 8th term I would have 1 plus 7 threes or $1 + (3 \times 7) = 1 + 21 = 22$."

What will the next palindrome be? Numbers that can be read the same way forwards and backwards are called palindromes. Two examples of palindromes are 1881 and 9560659.

- Ask your child to make a list of all the palindromes between 1 and 200 and describe all the patterns that he or she can find in the list.
- Make this task more challenging by asking your child to find palindromes to 1000.

Can your child write word palindromes?

What are the relationships among multiplication facts that can help with knowing other facts? Help your child use multiplication facts that he or she already knows to find other facts. For example, if your child cannot recall the product of 6×4 , he or she can think, I know that $6 \times 1 = 6$, so $6 \times 2 = 12$ and $6 \times 4 = 24$. If I can double the factor 1 twice to get 2 and then 4, I can double the product 6 twice to get 12 and then 24. Or if I know that $6 \times 2 = 12$, I can double one factor (2×2), which will double the product (12×2) and that gives me a product of $(6 \times 2) \times 2 = 12 \times 2 = 24$. If I forget the product of 3×7 , I can think $2 \times 7 = 14$, so $3 \times 7 = 21$. So, 3×7 is the same as 2×7 plus one more 7.

multiplication. An operation that can be represented by repeated addition, the combining of equal groups, or an array. The multiplication of factors gives a product. For example, 4 and 5 are factors of 20 because $4 \times 5 = 20$. The product is 20.



Data Management and Probability

Every day we are presented with a vast amount of information, much of it involving numbers. Learning to collect, organize, and interpret data at an early age will help children manage and interpret information, and use the critical thinking skills they have mastered to make sound decisions.

Kindergarten to Grade 3

What are all the different ways in which to sort groceries? Sort household items.

- Show your child how you organize food items in the fridge – fruit together, vegetables together, drinks on one shelf, condiments on another.
- As your child tidies up toys or clothing, discuss which items should go together and why.
- Encourage your child to sort other household items – crayons by colour, cutlery by type or shape, coins by denomination.
- Make this task more challenging by sorting according to two attributes. For example, put together all the coins that have a value of less than a dollar **and** have a value represented by an even number.

Are there more sunny days than rainy days? Have your child draw pictures on a calendar to record each day's weather. At the end of the month, make a picture graph showing how many sunny days, cloudy days, and rainy days there were in that month.

In which month are most people born? Create a graph to record the birthday month of each person your child knows. Are there months that are not represented in your graph? Which season has the most or least birthdays?

What words are useful in describing how likely something is to occur? Have your child draw pictures of things your family does often, things you do sometimes, and things you never do. Discuss why you never do some things (swim outside in January). Ask your child if it's likely to rain today. Is it likely that a pig will fly through the kitchen window?

When a coin is flipped, which is more likely, heads or tails? Have your child predict whether a coin will show a head or a tail when it is flipped. Together, record your results over 10 flips, and compare the results with the prediction. Then flip the coin 10 more times. Are the results the same? Would they be the same if you flipped the coins 100 more times?



Discuss whether it is fair in a game to choose who goes first by assigning heads to one player and tails to another, and then flipping a coin.

Grade 4 to Grade 6

How many times is the refrigerator door opened and closed in a week? Have your child estimate the number of times the refrigerator door is opened and closed each week. Ask your child to explain how he or she got the estimate. Discuss with your child ways to find out how many times the refrigerator door is opened and closed. You might make a chart in which the family members can record their tallies.

Name	M	T	W	T	F	S	S

Compare the recorded tallies with your child's estimate. What did you both find out?

Why are the letters on a keyboard arranged the way they are, with QWERTY in the top left row? Make a graph about letters of the alphabet.

- Select 100 words within a paragraph from a newspaper. Have your child make a graph that shows how many times each of the 26 letters appears. Which letters appear most frequently? least frequently? Do this again by choosing 100 words from a novel, then from a young child's storybook. Ask your child how the graphs are similar and how they are different.
- Ask your child to predict the results for text written in French or another language. Have your child explain his or her thinking.
- Ask your child to examine the layout of a keyboard to see where the most frequently used letters shown in his or her two graphs appear.

Is flipping two coins a fair way to make a decision? Test the fairness of a game.

- Flip two coins. If both coins show heads, or if both coins show tails, your child gets a point. If one coin shows heads and the other tails, you get a point. Flip the coins 50 times. Discuss what happens.

- Do the same thing again, but switch the way you and your child get points. Is this game fair? Ask your child to explain why or why not.
- If the game is not fair, can you change it to make it fair? Can you play again with three coins and make it fair for both players?

In how many ways can the digits in a telephone number be combined?

Making an ordered list helps in this activity.

- Ask your child to find all the possible ways to arrange the 7 digits in your telephone number. Have your child record the various combinations. Discuss with your child a way to make sure that you are not missing any combination.
- Make this task easier by using only the last 4 digits of your telephone number or more challenging by adding the area code.

Where Can I Get Help?

Many people are willing to support you in helping your child learn mathematics, and there are also many resources available.

Your Child's Teacher

Your child's teacher can provide advice about helping your child with mathematics. Here are some topics you could discuss with the teacher:

- your child's level of performance on mathematics assessment tasks
- the goals your child is working towards in mathematics, and how you can support your child in achieving them
- strategies you can use to assist your child in areas that he or she finds difficult
- activities to work on at home with your child
- other resources, such as books, games, and websites

Others in the Community

In addition to your child's teacher, you can talk to various other people in your community. Here are some suggestions that you may find helpful:

- Consider involving relatives and friends in helping to motivate your child to learn mathematics. Older siblings, grandparents, family friends, and your child's caregivers can add their support and encouragement.
- If your child attends a child care centre or early years centre, the staff there may be able to suggest additional mathematics activities to do with your child.



Government Resources

You may wish to refer to the Ministry of Education's curriculum documents entitled *The Kindergarten Program, 2006* (revised) and *The Ontario Curriculum, Grades 1-8: Mathematics, 2005* (revised). These documents are available on the ministry's website, at **www.edu.gov.on.ca**. To obtain copies, call Publications Ontario toll-free, at 1-800-668-9938, or order online, at **www.publications.serviceontario.ca**.

For information about the Grade 3 and Grade 6 tests administered by the Education Quality and Accountability Office (EQAO), visit the EQAO website, at **www.eqao.com**.

Some Internet Resources for Young People

The following website addresses are active at the time of publication. We suggest that you preview sites to determine whether the content is suitable for your child. Browsing sites with your child will increase his or her enjoyment and will also help your child develop the confidence to access websites independently later.

www.teachers.ash.org.au/jeather/maths/dictionary.html

mathforum.org/students/elem/probs.html

<http://www.tvokids.com/>

nlvm.usu.edu/en/nav/vlibrary.html

cemc.uwaterloo.ca/mathfrog

www.kidsites.com/sites-edu/math.htm

www.geocities.com/enchantedforest/tower/1217/math3.html

www.kids.gov/k_science.htm

www.bbc.co.uk/schools/laac/numbers/ch1.shtml

www.brainpop.com/math/seeall/







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