Handy math facts for the intermediate division

Characteristics of the intermediate division student

Most students in the intermediate division:

- Start thinking about the future.
- Thrive in settings that encourage them to interact with others and to develop strong friendships and close one-to-one relationships.
- Generally have longer attention spans than they used to, and are capable of high levels of abstract thought.
- Want to assert their individuality and independence, but want to conform, too—for example, by dressing and behaving like their peers.
- Can be highly critical of adults, often identifying with only one special adult mentor.
- Experience significant changes that affect them in many ways:
  - Physical changes affect personal appearance and often result in self-consciousness.
  - Psychological and emotional changes can result in mood swings and feeling insecure one minute, then testing limits with a "know it all" attitude the next.
  - Changing sleep patterns and diet can result in low energy levels.

Math milestones for the intermediate division student

By the end of grade 8, your child should be able to:

- Solve multi-step problems involving whole numbers, decimals, and percentages.
- Multiply and divide fractions and integers.
- Apply order of operations in math problems with brackets and exponents.
- Develop circumference and area relationships for a circle, surface-area relationships for cylinders, and angle relationships for parallel and intersecting lines.
- Solve equations involving one unknown—for example $2x + 3 = 11$.
- Display data using various graphs, such as histograms and scatter plots.
- Calculate the probability of complementary events—for example, what are the odds of rolling either an odd (1, 3, 5) or even (2, 4, 6) number with a die?

Supporting your intermediate learner at home

- Be supportive during this period of change in your child's life. Encourage your child to look forward to new friends, experiences, and learning.
- Help your child to look ahead to the future and to set goals.
- Encourage your child to keep doors open by taking math and science courses in secondary school.
- Ask your child to teach you how to use math software that is licensed for Ontario students to use at home, such as "The Geometer's Sketchpad," "Tinkerplots," or "Fathom."
- Show your child that math is important in everyday life:
  - Use a spreadsheet such as Excel to determine an affordable cell phone plan.
  - Calculate a reasonably priced take-out dinner for the family using coupons or discounts.
  - Review the latest hockey or baseball stats.
- If you believe that your child would benefit from extra help or tutoring:
  - Seek advice from a trusted adviser, such as your child's teacher or a member of a community outreach program.
  - MIT's "MathScore" is an example of a high quality remediation program. mathscore.com/mathInterventionRTI.html
- If you believe that your child would benefit from enrichment:
  - Ask your child's math teacher about *The Gauss* math competition at the University of Waterloo, or challenge your child to try questions from previous years. cemc.math.uwaterloo.ca/contests/past_contests.html
  - Talk to your child's teacher about the Ontario Mathematics Olympiad in your area, produced by the Ontario Association of Mathematics Education (OAME).
- Encourage your child to believe that success results from effort, determination, and learning from mistakes.

"Young people are in constant motion and tension between **being** and **becoming**. They are in process of **being** themselves in their everyday lives ... However, young people are also in a state of **becoming** young adults."

Kate Tilleczek,
Professor in the Faculty of Education,
University of Prince Edward Island

Recommended Resources
There is a wealth of information on the internet in addition to the links and other resources listed below. For an up-to-date list, please check our website.

Math support
TVO Independent Learning Centre
"Homework Help" is a free online resource for students in grades 7 to 10. Ontario teachers provide free, live, one-on-one tutoring.

homeworkhelp.ilc.org/

Ontario-based "gap closing" support
ePractice is a series of digital, interactive math activities. Students receive immediate feedback on their work.

edugames.ca/newsite/math/index.html

Mathies, a website designed for Ontario K–12 students and parents.
mathies.ca

Books

A Gebra Named Al, Wendy Isdell
Julie hates algebra until she meets a gebra named Al and, along with the Periodic horses, travels through the Land of Mathematics.

Chasing Vermeer, Blue Balliett
Two children work together to recover a famous Johannes Vermeer painting. The book explores themes of art, chance, coincidence, deception, and problem-solving.

Career Support

Career Cruising
This career-planning tool includes skills assessments, career profiles, interviews with real professionals, and information about university, college, and apprenticeship programs.
www.careercruising.com

Canadian Women in STEM Careers Videos
This website promotes science and engineering careers for girls.
wiseatlantic.ca/teachers.asp

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1123 Glenashton Drive
Oakville, Ontario L6H 5M1
Tel: 905.845.4254
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Module Five
Fact Sheet

Grades 7 and 8

Countless Opportunities

Handy math facts for the junior division

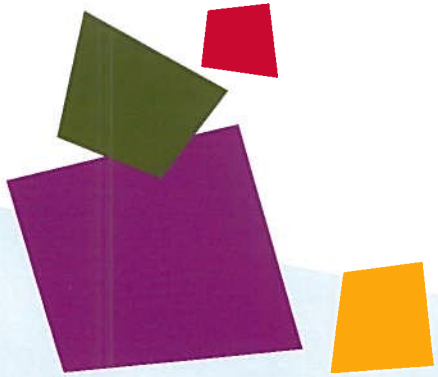
Characteristics of children in junior division

Children in junior division tend to be:

- Independent. They do not want to be treated like a child.
- Developing interests and hobbies.
- Social.
- Competitive.
- Comparing themselves to their peers in terms of appearance, achievement, and friends.
- Self-conscious about their academic, social, and athletic abilities.
- Likely to be physically animated and restless.

Most children in junior division enjoy:

- Learning.
- Talking.
- Contemplating abstract concepts and ideas. They have a good attention span.
- Teasing and testing boundaries. They have a sense of humour that often escapes adults around them.



Math milestones for children in junior division

It is important to remember that not all children learn the same way or on the same day. Milestones, or learning expectations, are meant to broadly describe what your child should know, based on the curriculum, by the end of junior division.

Always remember to talk to your child's teacher or teaching team (including educational assistants, special resource teachers, and the school principal) if you have any concerns about your child's development.

By the end of grade 6, your child should be able to:

- Add and subtract decimal amounts to thousandths.
- Multiply and divide four-digit and two-digit whole numbers by two-digit whole numbers.
- Multiply and divide fractions.
- Calculate rates, ratios and proportions.
- Explain the relationship between simple fractions, decimals, and percentages.
- Convert large metric units to small metric units (for example, metres to centimetres).
- Develop and apply geometric formulas to find perimeter, area, and volume.
- Predict the frequency of an outcome in a probability game (such as rolling dice) by calculating and using the theoretical probability of that outcome.



Parents and caregivers are not expected to be math experts. It will never be your responsibility to teach a specific math lesson. But you can help your child to stay motivated and develop a positive attitude!



Supporting your junior learner at home

- It is important for both you and your child to have an open mind and a positive attitude about math.
- Remember that children use their emotions to tell them what is important to learn and remember. Positive emotions inspire us to pay attention. Negative emotions (such as frustration, fear, and anxiety) "turn off" the brain's switch for learning.
- Be a coach. Praise your child's efforts. Encourage your child to learn from mistakes. Celebrate correct solutions and encourage your child to take new risks.
- Talk math. Ask your child to explain what they have learned. Ask them to show you how to do a math problem.
- Encourage your children to double-check their work.
- Bring the classroom into your home. Post helpful posters. File handouts with math strategies in a reference folder or notebook.
- Help your child manage allowance money by creating a budget together.
- Make math fun! Read math-themed books and play math games together (including those that involve using technology).

Remember that before children can become interested in math, they have to be comfortable with it. And before they can be comfortable with it, they must believe that they can succeed!

Recommended Resources

There is a wealth of information on the internet in addition to the links and other resources listed below. For an up-to-date list, please check our website.

Math support

Mathies, a website designed for Ontario K–12 students and parents.
mathies.ca

Enrichment

The Problem of the Week (Grades 5/6). You can sign up for emails that contain weekly math problems.
cemc.math.uwaterloo.ca/resources/potw.php

Online games and apps

MathFrog—**MATH**ematics **F**un **R**esources and **O**nline **G**ames (in English and French)
Free activities for grade 4, 5, and 6 students and their parents.
cemc2.math.uwaterloo.ca/mathfrog

Tumbletown Shop Around. This site helps children learn about financial literacy.
tvokids.com/games/tumbletown shoparound

What are the Chances? Children experiment with spinners and dice.
tvokids.com/videos/whatarechances

The Prime Radicals Pentomino App.
tvokids.com/apps/primeradicals pentominos

Iluminations: Resources for teaching math.
illuminations.nctm.org

Books

Mathemagic: Number Tricks, Lynda Colgan

Counting on Frank, Rod Clement

The Math Curse, Jon Scieszka and Lane Smith

What's Faster than a Speeding Cheetah? Robert E. Wells

Module Four Fact Sheet

Junior (Grades 4, 5, and 6)

Counting Ahead



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1123 Glenashton Drive
Oakville, Ontario L6H 5M1
Tel: 905.845.4254
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Handy math facts for primary division

Characteristics of children in primary division

Children in primary division tend to be:

- Curious, creative, and imaginative.
- Improving their fine motor skills. They are getting better at tasks such as holding a pencil and catching a ball.
- Improving their listening skills.
- Still quite egocentric. They might react without thinking, or lash out by saying, "I don't want to!"

Most children in primary division:

- Love math!
- Begin to make connections between school math and the world around them ("Snowflakes are made of geometric shapes and have symmetry").
- Take risks in new situations, but like the security of groups, organized play, and clubs.
- Like routine, step-by-step instructions, and games with clear rules.
- Tend to work quickly. Sometimes they reverse letters (b/d) and numbers ("31" instead of "13").
- Need to change activities and tasks often.

Math milestones for children in primary division

It is important to remember that not all children learn the same way or on the same day! Milestones, or learning expectations, are meant to describe what your child should know by the end of primary division in very broad brushstrokes.

Always remember to talk to your child's teacher or teaching team (including educational assistants, special resource teachers, and the school principal) if you have any concerns about your child's development.

By the end of grade 3, your child should be able to:

- Count forwards by 1s, 2s, 5s, 10s, 25s, and by 100s to 1,000.
- Multiply to "7 times 7" and divide to "49 divided by 7."
- Solve word problems with addition and subtraction of single- and multi-digit numbers.
- Represent fractions and money amounts to $10.
- Read time to the nearest 5 minutes using analog clocks (6:55).
- Estimate and measure perimeter and area of regular shapes.
- Compare standard units of measurement (centimetre, metre, kilometre).
- Compare and sort two-dimensional shapes and three-dimensional figures.
- Determine the missing number in equations involving addition and subtraction of one- and two-digit number (25 – 4 = 15 + ? = ?).
- Predict the frequency of an outcome in a probability game (such as rolling dice).

Supporting your primary learner at home

Establish homework routines

- Make sure that your child has a quiet space, such as the kitchen table, for doing homework. It should be close to you and free from distractions.
- Schedule homework at the same time and location each day.
- Create a homework drawer. Fill it with items that your child needs to use often, such as pencils, erasers, scissors, rulers, graph paper, construction paper, and a calculator.
- Use refrigerator or pantry doors as home bulletin boards. Write on scrap paper or sticky notes and create math "word walls" about the topics your child is studying at school.

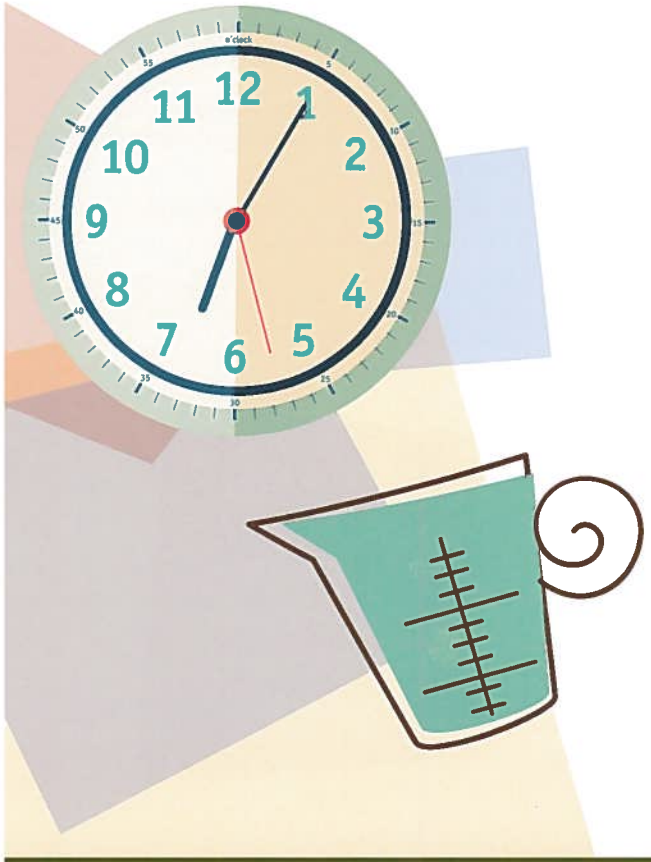
Show an interest

- Talk with your child about their math school work. Show an interest in what they are learning in class.
- Help your child with (but do not do) math homework. Ask your child to teach you how to do the homework problems.
- If your child makes an error:
  - Try not to react in a negative way.
  - Ask your child to show you why their answer is correct.
  - If your children become very frustrated, stop, then remind them of all the things that they can do successfully.
  - Tell your child that you have made mistakes, too, but you learned from them.
  - Allow your child enough time to work out math problems. Solving math problems should never be a race against time.

Recite this phrase out loud together: "Mistakes are opportunities to learn!"

Math in everyday activities

- Use and talk about the math tools that you have around the house already—such as thermometers, clocks, measuring cups, measuring tapes, and coins.
- Read books and play games with math themes.
- Keep the lines of communication open with your child's teacher:
  - Find the best way to communicate with your child's teacher.
  - If you are puzzled by the method your child is using, ask the teacher for clarification.
  - If you think your child needs remedial or enrichment support, ask where to find such programs.
  - Stay positive!



Recommended Resources

There is a wealth of information on the internet in addition to the links and other resources listed below. For an up-to-date list, please check our website.

Ontario curriculum

edu.gov.on.ca/eng/curriculum/elementary/math18curr.pdf

Doing math with your child

- *Doing Mathematics with Your Child, Kindergarten to Grade 6, A Parent Guide* (Ontario Ministry of Education, 2014) edu.gov.on.ca/eng/literacynumeracy/parentGuideNumEn.pdf
- TVOParents resources to support math learning at home. tvoparents.tvo.org/topic/school-learning#/1185/math
- Fun and educational math activities. familymathcanada.org

Fun online math games

- TVOKids shows about math for children aged 6 to 11. tvoparents.tvo.org/article/tvokids-shows-ages-6-11-teaching-math
- The Odd Squad. Kids use math to complete the puzzle. tvokids.com/games/oddsquad

Books

- **Number** *Two of Everything: A Chinese Folktale*, Lily Toy Hong
- **Measurement** *How Much, How Many, How Far, How Heavy, How Long, How Tall Is 1000?*, Helen Nolan
- **Probability** *Do You Wanna Bet? Your Chance to Find Out About Probability*, Jean Cushman
- **Geometry** *The Greedy Triangle*, Marilyn Burns
- **Patterning/Algebra** *Pattern Bugs*, Trudy Harris

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1123 Glenashton Drive
Oakville, Ontario L6H 5M1
Tel: 905.845.4254
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Module Three
Fact Sheet

Primary (Grades 1, 2, and 3)

Making It Count



Handy math facts for kindergarten

Characteristics of children in kindergarten

- Kindergarten children learn best by doing—playing, experimenting, and discovering.
- Kindergarten children are curious and energetic. They enjoy using physical materials to solve problems—"how many grapes will I have left after sharing with a friend?"
- Kindergarten children love to talk and they love the challenge of learning new (and big) words.
- Kindergarten children learn through experiences, concrete situations, and explorations—at home, school, the zoo, the library, and the playground.
- Kindergarten children need opportunities every day to practice everything from drawing and printing, to buttoning and zipping, to cutting with scissors, and holding a pencil.
- Kindergarten children develop new knowledge by building on past experiences and using knowledge that they have already.
- Kindergarten children's different cultural and linguistic backgrounds and daily realities contribute to the different ways that they develop and show their learning.
- Kindergarten children each develop differently —not in the same way or on the same day!

Yes, you can really help your child succeed in math!

Math milestones for children in kindergarten

By the end of kindergarten, children should be able to:

- Show that there are many ways to count.
- Use numbers for counting and measuring.
- Show that numbers represent quantities that can become bigger or smaller.
- Use language to describe position—first, second, third, etc.
- Measure and compare length, weight, and temperature. For example, children can line up toys from shortest to tallest or heaviest to lightest. They can compare an outdoor to an indoor thermometer to describe warmer and colder.
- Compare and identify two-dimensional and three-dimensional objects found at home, school, and in other environments. For example, a globe is a sphere, a stop sign is an octagon, a can of soup is a cylinder, dice are cubes, a floor tile may have a square, or a rectangular or irregular shape, etc.
- Sort and compare two- and three-dimensional objects by size.
- Identify, create, describe, and complete growing and shrinking patterns using a variety of attributes, such as size, shape, texture, etc. They can make patterns with symbols, shapes, numbers, or actions to represent their thinking—hop/clap/jump/clap; hop/clap/jump/clap.
- Use measurement terms such as tall/short, big/small and empty/full to describe length, size, and quantity.
- Use language to describe spatial relationships—for example, inside/outside and above/below.
- Sort objects (find differences) or group them (find similarities) using rules such as the same number of right angles, sides, etc.

Kindergarten math skills and processes

Problem-solving:

Children learn that there is more than one way to solve a problem.

Reasoning and proving

Children develop their own mathematical strategies for solving problems by collaborating with others and explaining their thinking to the teaching team (which can include educational assistants, special resource teachers and the school principal).

Reflecting

Children reflect on and monitor their own thinking to help clarify a problem.

Selecting tools and strategies

Children select an appropriate learning strategy and learning tool, such as blocks, to help solve a problem.

Connecting

Children make connections between math and everyday life—how many plates do you need so that each of your classmates will have one at lunchtime?



Supporting your kindergarten learner at home

- Have a **positive attitude** about math.
- Use **math words** and concepts at home as you measure ingredients for cooking and baking ("cups," "double"), cut lengths of wrapping paper ("rectangle") or ribbon ("three times the length of the box") to wrap gifts, or make a family schedule ("days," "weeks," "hours").
- Go for a walk and look for different **shapes around the neighbourhood**—a soccer ball is a sphere; a stop sign is an octagon; paving stones are rectangles or irregular shape, etc.
- Roll, throw, catch, and kick balls of different sizes and talk about which one is bigger and which is smaller, which ones are heaver and lighter, and which one travels the longest or shortest distance.
- Visit the park or playground to look for different shapes—what shape is a baseball diamond? What **shape** is the running track? —and **patterns** (numbers on a hopscotch grid, numbers on license plates and the number of squares on a four-square grid).
- Ask your children questions about play —for example, what, where, why, when, who, and how? This will help them learn to self-reflect, and it will encourage problem-solving skills.
- Encourage play with measuring cups and rulers to stimulate interest in mathematical and scientific concepts.
- Talk about the things you have seen together.
- Take your child to the **grocery store** and point out the scales in the produce section.
- Show your child **how to use money** or gift cards to pay for things.
- Bake, cook, and prepare food with your child.

Recommended Resources

There is a wealth of information on the internet in addition to the links and other resources listed below. For an up-to-date list, please check our website.

Ontario curriculum

- Full-Day Early Learning Kindergarten Program. edu.gov.on.ca/eng/curriculum/elementary/kindergarten_english_june3.pdf

Fun math games for kindergarten children

- Chateau Meddybemps. Activities and stories for young children. meddybemps.com
- Caterpillar Count. Kids learn to recognize numbers and count. tvokids.com/games/caterpillarcount
- Shapeville. Kids learn about shapes. tvokids.com/games/shapeville
- A Lotta Dessert. Kids learn about patterns. tvokids.com/games/lottadessert
- EduGAINS (additional material for parents). edugains.ca/newsite/earlyPrimary/schoolleader/parent_info_sheets.html

Doing math activities with your child

- Fun and educational videos and resources. familymathcanada.org
- Information and advice for doing math at home. tvoparents.tvo.org
- Math activity placemats, games, and songs. educ.queensu.ca/coc/resources
- The Prime Radicals Snowflake app. tvokids.com/apps/primeradicalssnowflakes

Books

- ***Counting and Computations*** *Two Ways to Count to Ten*, Ruby Dee
- ***Patterning*** *Beep, Beep, Vroom, Vroom*, Stuart Murphy
- ***Sorting*** *The Button Box*, Marguerite Reid
- ***Measurement*** *The Best Bug Parade*, Stuart Murphy
- ***Data and Chance*** *The Best Vacation Ever*, Stuart Murphy
- ***Geometry*** *Captain Invincible and the Space Shapes*, Stuart Murphy

Module Two Fact Sheet

Kindergarten

Count Together



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Oakville, Ontario L6H 5M1
Tel: 905.845.4254
Fax: 905.845.2044

Did you know?

- Research shows that early math literacy helps children to succeed in school and improves their future career prospects.
- 70 percent of Canada's top jobs require science, technology, engineering, and math (STEM) education. This includes careers we may not expect, such as culinary arts, animation, and fitness.
- When children are positively engaged and successful, they are more likely to stick with an activity and keep searching for a solution to a problem.
- Early success in problem-solving will build your child's confidence.

Why "Mathitude" Matters

Positive thinking

Students who are encouraged to have a positive attitude about math from an early age will develop positive feelings about the subject.

Keep them engaged

Students who are engaged in the learning process will learn more and be open to further learning.

Motivation

Students who believe that math is important for their future will be more motivated to learn math.

Build confidence

Students who feel confident in their own ability to do well in math will be more likely to perform well.

Yes, you can really help your child succeed in math!

Parent involvement and math achievement "How can I help?"

Be positive

Choose your words carefully. When parents (and other adults) say they aren't good at math—sometimes to make children feel better—they may be giving children permission to stop learning.

Avoid math anxiety

Math anxiety (unproductive tension and stress) is real and occurs in children as well as adults. Pressure from timed tests and the risk of failure are major sources of math anxiety. Try not to over-react when your child makes a mistake. Making mistakes is an important part of learning!

Learn from mistakes

Homework time can be a more positive experience if you help your children learn from mistakes: praise their efforts, ask them to explain their answer, ask them to think about why the mistake happened, and encourage them to try again.

Help set the tone

Be relaxed and engaged as your child does math homework. You are not expected to be an expert, but you can offer support and ask questions: "How did you do that?"; "Why did you do that?"; "How do you know if you are right or wrong?"; and "Would you teach me how to do another question like this one?"

Be patient and build confidence

If your child becomes frustrated, stop. Remind them of things that they have already learned how to do successfully, such as riding a bicycle or playing a musical instrument.

Ask a teacher

Ask your child's teacher or other member of the teaching team for strategies to use at home. If your child asks for help and you do not know the answer, be honest and say, "I don't know but let's figure it out together. If we can't, we'll ask your teacher for help together so we can both learn."

Make math part of everyday life!

"What are some math activities I can do to support my child's math learning at home?"

Math games

On no-homework days, quiet evenings, and during vacations, play math games. Math puzzles and games can show that math is fun. They also require trial-and-error thinking, enhance numeracy and logical thinking, and promote discussion. Many mathematicians say a love of puzzles and games inspired their math abilities.

Math on TV

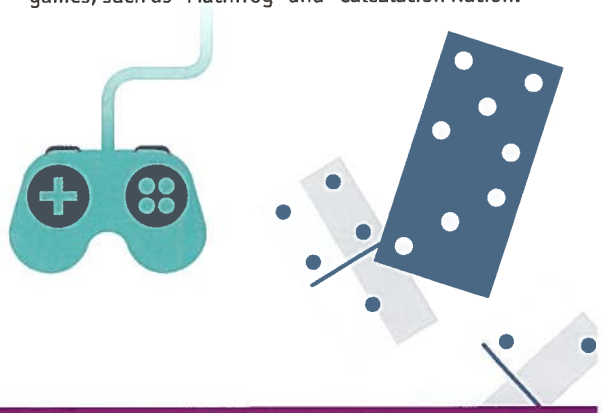
Watch educational television programs. Many offer websites with activities to do together, including free games, apps, math crafts, and songs.

Math at the grocery store

Take your child grocery shopping. The grocery store is full of great math opportunities. You can talk to your child about how to weigh fruit on a scale or how to estimate the total cost of items as you fill your cart.

Math in computer games

If your children enjoy playing on the computer, introduce them to fun and educational web-based games, such as "Mathfrog" and "Calculation Nation."



> ***You are their idol. They look up to you. They don't do a good job listening to you, but they do a fantastic job imitating you.***
>
> – Karl Subban, retired Toronto school principal and father of three

Calculating Time Children Spend at Home vs. School (Birth–Age 18)

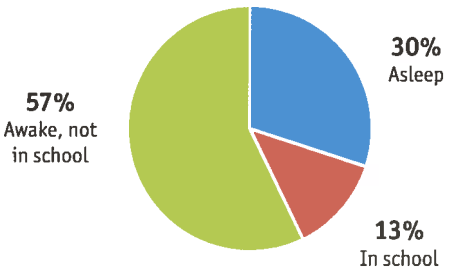
If a child sleeps for 8 hours in each 24-hour day:

- 8 hours asleep and 16 hours awake
- 365 days/year x 18 years = 6,570 days
- 6,570 days x 16 waking hours/day =105,120 waking hours at age 18
- Average 6 hours/day at school
- Average 180 school days/year
- 180 school days/year x 6 hours/school day = 1,080 hours/school year
- 1,080 hours/school year x 13 school years [kindergarten + 12 years through high school] = 14,040 school hours
- 14,040 school hours ÷ 105,120 waking hours = .13356

OR

Just 13.36% of all waking hours by age 18 have been spent in school!

How children really spend their time
(Birth–18 years)



Recommended Resources

There is a wealth of information on the internet in addition to the links and other resources listed below. For an up-to-date list, please check our website.

- *Family Math Canada*
  familymathcanada.org
- *Doing Mathematics with Your Child, Kindergarten to Grade 6, A Parent Guide* (Ontario Ministry of Education, 2014)
  edu.gov.on.ca/eng/literacynumeracy/parentGuideNumEn.pdf
- *Parent Resources* (Education, Quality and Accountability Office)
  eqao.com/Parents/parents.aspx?Lang=E
- *Mathies*, a website designed for Ontario K–12 students and parents
  mathies.ca
- *TVOParents* resources to support math learning at home.
  tvoparents.tvo.org/topic/school-learning#/1185/math
- TVOKids shows about math for children aged 6 to 11.
  tvoparents.tvo.org/article/tvokids-shows-ages-6-11-teaching-math
- *Family Resources* (NCTM)
  old.nctm.org/resources/content.aspx?id=7928
- *Calculation Nation* (NCTM)
  calculationnation.nctm.org
- *Illuminations Games, PreK-Gr 12* (NCTM)
  illuminations.nctm.org/allgames.aspx
- *Mathfrog*
  cemc2.math.uwaterloo.ca/mathfrog

Module One
Fact Sheet

General Overview

Count Yourself In



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Funded By: Ontario

1123 Glenashton Drive
Oakville, Ontario L6H 5M1
Tel: 905.845.4254
Fax: 905.845.2044