



**Esso**

# **FAMILY MATH**

**Resources for  
Grades 2 - 5 Children  
and their Parents**

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**(Updated Curriculum Expectations September 2008)**



## Esso Family Math

### What is the Esso Family Math Project?

The Esso Family Math Project is a community-based program for families who would like their children to experience success in math. Some families may find it difficult to obtain assistance for improvement. Parents may have little math education. It may be impossible for them to obtain resources for home reinforcement of math concepts. Their children fall behind quickly. Low income families, minority families or single parent families often have difficulty overcoming these challenges. The Esso Family Math Project supports these parents.

Research shows that students do better at school when their parents are involved in their education. Many parents, however, are not comfortable being involved in their child's mathematics education because mathematics doesn't make sense to them or because they dislike mathematics. Sometimes, the negative attitudes and fears of the parents are transferred to the children. Involvement in Family Math provides parents with the confidence to better help their children enjoy and understand math in a positive environment.

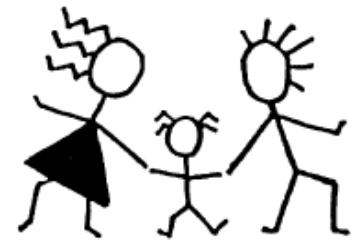
Family Math sessions educate parents to work and play with their children so as to develop positive attitudes towards mathematics. Parents and their children attend the Family Math sessions together, and all are actively involved in *doing* mathematics. Trained facilitators lead the sessions, introducing games and activities that reinforce skills and develop math concepts, as well as fostering an enjoyment for mathematics. Given early support at home and in their community, children have an opportunity to maintain a positive attitude toward math through their school years. Doors remain open and options increase.

### The Importance of Community Building

Family Math Fun Nights take place in selected sites in a community such as libraries, community centres or church halls. It is important for the parents and their children to feel they are in a safe and relaxed environment where they can make errors, learn from these errors, make sense of the mathematics they are learning, and grow. Building a community is a crucial part of the Esso Family Math Project. We want parents and their children to feel comfortable, and ask questions when they do not understand. Having dinner and talking together helps build such a community. Parents, children, and Family Math facilitators eat together and get to know one another in an informal setting prior to starting the math activities.

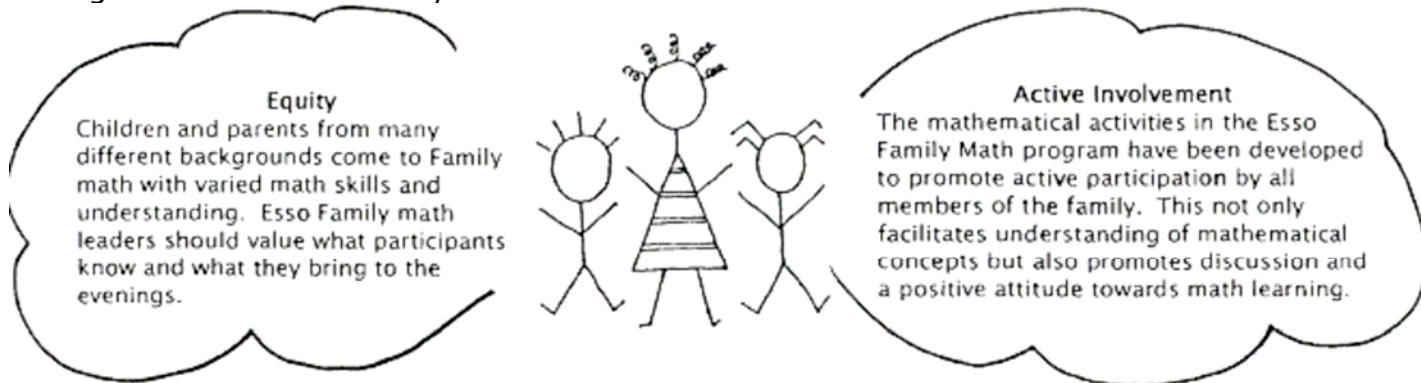
### The Importance of Developing Good Parenting Skills

Helping parents expand their parenting skills is an important component of the Esso Family Math Project. Parents may lack the knowledge to assist their children's development, and understand their mathematical thinking. It is important for Family Math facilitators to model positive parenting skills, demonstrating worthwhile strategies to help parents relate with their children. Facilitators must model these skills without acting in a prescriptive manner, or appearing to be judgmental of a parent's behaviour. Parents must learn how to invite their children to share their thinking, encouraging them to communicate their understanding (or lack of it) in a safe and relaxed atmosphere. Becoming a good listener is hard, and takes effort and patience. Parents and facilitators should not be critical of an incorrect answer nor be excessive in their praise of a correct one. Incorrect answers, however, should be corrected. When a family has fun learning a challenging topic together, and



respects each other's thought processes, everyone benefits.

Children develop a love for reading when parents read to them on a regular basis. A love for mathematics develops in the same way. Parents can help their children see the patterns and relationships in mathematics by playing card games to practice basic skills, finding and discussing mathematics in numbers around the home, posing simple math challenges and talking about math in the daily world in which the child lives.



### The Coding Used Throughout the Outline

The Esso Family Math Project was originally designed for families in Ontario, Canada. The previous editions were based on the Ontario Ministry of Education and Training 1997 Grades 1 – 8 Mathematics Curriculum. **The 2008 Update makes reference to the 2005 Ontario Mathematics Curriculum for Grades 1 – 8 and the 2006 Kindergarten Program.** The mathematical expectations written next to the codes match learning outcomes or expectations common to many other provinces, states, or countries. Therefore, if you are using this program outside Ontario simply match the expectation with those of your own jurisdiction. The following are the five mathematics strands in Ontario:

N	Number Sense and Numeration
M	Measurement
G	Geometry
P&A	Patterning and Algebra
DM&P	Data Management and Probability
(o)	overall expectations
(s)	specific expectations

Mathematical process expectations are also given in the Ontario Curriculum as follows:

PS	Problem Solving	CONN	Connecting
R&P	Reasoning and Proving	REP	Representing
REF	Reflecting	COMM	Communicating
ST&CS	Selecting Tools and Computational Strategies		

In most circumstances we have provided an expectation from the grade two and grade five curriculum (as indicated by coding **G2** or **G5**) – the approximate grade range for these resources. Grade two students in Ontario are about eight years of age, and grade five children are approximately eleven years old.

### The TI – 10/15 Calculator

Texas Instruments is a partner of the Esso Family Math Project. If these calculators are unavailable to you, either use alternative calculator activities with calculators accessible to your families, or omit these activities and spend extra time on other mathematical activities.

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*Esso Family Math Project*  
 Grades 2 – 5  
 Session 1  
Number Sense and Numeration  
Games

Entry Estimation	Materials	Activities	Home Challenges
<p><u>How many cookies?</u></p> <ul style="list-style-type: none"> <li>• Families write their name on a post-it note and place it on the number line to indicate the range of their estimate.</li> </ul>	<ul style="list-style-type: none"> <li>➤ name tags</li> <li>➤ estimating jar</li> <li>➤ post-it notes</li> <li>➤ transparent overlay</li> <li>➤ <i>Counting on Frank</i> (Clement)</li> <li>➤ 10 decks of cards</li> <li>➤ deck of large playing cards</li> <li>➤ copies of home challenges and materials</li> <li>◇ pencils</li> <li>◇ cookies</li> <li>◇ doubles chart</li> <li>△ number line (0 – 60)</li> <li>△ 32 stones in a container for each pair of participants</li> </ul>	<ol style="list-style-type: none"> <li>1. Discussion of estimation activity</li> <li>2. Story: Counting on Frank – first 7 pages</li> <li>3. Double the Fun</li> <li>4. Go Fish</li> <li>5. Cover Up</li> <li>6. Parent Time/Home Challenges with children</li> </ol>	<ul style="list-style-type: none"> <li>➤ Math Game Questionnaire</li> </ul> <p><u>Materials to take home</u></p> <ul style="list-style-type: none"> <li>➤ Deck of cards</li> <li>➤ “Math at Home” book</li> <li>➤ Family Math bag</li> </ul>

➤ Materials provided by Esso Family Math Centre    ◇ Materials to be purchased using Esso Family Math Funds    △ Materials to be collected/made by the community

Location: \_\_\_\_\_

Time: \_\_\_\_\_ Date: \_\_\_\_\_

Possible Schedule for Session One:

Activity	Duration	Start Time	Team members
❖ Set-Up	15 minutes		
❖ Meal	30 minutes	5:30 p.m.	
❖ Registration and Name Tags	Before and During meal		
❖ Entry Activity: Cookie estimation	Before and During meal		
❖ Introduction, Entry Activity and Home Challenge Review	15 minutes	6:00 p.m.	
❖ Story: Counting on Frank	10 minutes	6:15 p.m.	
❖ Double The Fun	15 minutes	6:25 p.m.	
❖ Go Fish	20 minutes	6:40 p.m.	
❖ Cover Up	20 minutes	7:00 p.m.	
❖ Parent Time (questions from parents)	10 minutes	7:20 p.m.	
❖ Home Challenges (each facilitator works with 1 or 2 children)			
❖ Clean Up <i>Please leave the room as you found it.</i>	15 minutes	7:30 p.m.	All
❖ Planning for next week	30 minutes	7:45 p.m.	All

## Entry Estimation How Many Cookies?

### Materials

- Litre sized Jar (plastic or glass so people can see what is inside)
- Cookies to fill the jar (about the size of Oreos) – No more than 50 cookies!
- Post-it notes (12.5 cm by 7.5 cm)
- Number line (106 cm long – 3 legal sized pieces of paper joined horizontally)  
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60
- Transparent overlay (15 cm)

### Instructions

As participants arrive–

1. Families are given a post-it note and asked to estimate how many cookies are in the jar. They place the blank post-it note above their range or zone of the estimated answer. Blank post-it notes without name or identification decrease the anxiety of making an estimation. The post-it will cover a range of numbers.  
Stress that we are trying to be ‘in the zone’, not find an exact answer.
2. Encourage parents and children to talk about their estimating strategies.
3. Leaders should be close by to discuss and extend thinking about estimating.

At the beginning of the session–

1. Ask if anyone would like to share their strategy for estimating the number of cookies in the jar. As this is the first night, not too many (if any) will volunteer, so it is useful to have one or two of the other leaders volunteer their strategies.
  2. Discuss how there is not a right or wrong way to estimate, but some strategies can be more effective than others.
  3. Be sure to cover strategies for making an estimation of volume such as:
    - counting the number up the side and across in one row and multiplying
    - comparing this situation to a similar one
    - “chunking” using an “anchor”
  4. After discussion, leader puts transparent overlay on the number line where most post-it notes are placed. Blank post-it notes decrease an individual’s anxiety during discussion.
  5. Leader takes about half of the cookies out of the jar and places them on the number line (counting by 2’s). Ensure clean hands or plastic gloves are used.
  6. Leader then asks families if they wish to move the transparent overlay and **why**. Leader responds to the general consensus of the group by moving the overlay as directed. This strategy will reinforce the idea of refining estimations based on further information.
  7. Leader takes the rest of the cookies out of the jar and places them on the number line.
  8. Leader discusses the refining of the zone with questions such as:
    - Why did we keep the zone the same? or Why did we change it?
  9. Select a family that contributed to the discussion to distribute the cookies to the group.
- Note: Discuss allergies. Parents should know if their children are allergic to Oreo cookies.

# *Counting on Frank*

## Estimation and Literature

### Materials

- Book by Rod Clement ISBN 0-8368-0358-2

### Instructions

1. Read the first seven pages of “Counting on Frank” up to and including the picture of Frank’s dad inside the television set.
2. Ask the children if anyone has a pet dog, and how many of their dogs might fit inside their bedroom.
3. Ask how they worked out their answer.
4. Suggest variations such as:
  - What about a larger animal like a whale?Discuss how you could work out an answer to questions such as this one.
5. Encourage parents to go to the library and read the rest of “Counting on Frank” to their child.

### Home Challenge –

What might be some other interesting things to estimate? For next week ask each family to write down the most interesting things they have estimated and bring them in to share with the group.

Note: Make sure you have contacted the local library to be sure they have copies of “Counting on Frank” available.

# Double the Fun

Knowing "doubles" facts helps children learn their addition facts and the related subtraction facts. Think of:

$$16 - \square = 8$$

$$8 + \square = 16$$

Once children know their doubles, they can learn to add numbers like  $6 + 7$  by thinking of  $6 + 6 + 1$  or  $7 + 7 - 1$

The books "Box Cars and One-Eyed Jacks" by Joanne Currah, Jane Felling and Cheryl MacDonald has lots of excellent card and dice games. They have given nicknames to some of the more difficult doubles.

$$6 + 6 = 12$$

Farmer's double

(12 eggs)

$$7 + 7 = 14$$

Valentine's double

(14<sup>th</sup> of February)

$$8 + 8 = 16$$

Sweet sixteen  $9 + 9 = 18$

Grownup double

Other names could be:

$$5 + 5 = 10$$

Handy double

(10 fingers)

$$4 + 4 = 8$$

$$3 + 3 = 6$$

$$2 + 2 = 4$$

$$1 + 1 = 2$$

## Materials

- Deck of cards from Ace to 10 (remove J, Q, K)
- Doubles Chart

## Rules of the Game:

Two or three players can play.

Remember Ace = 1.

Turn over one card from the pile of cards.

Players must double the number.

The first player to say the answer out loud gets the card.

In the case of a tie, the card goes in the middle.

Play continues until someone is first to say the double. That person gets the cards in the middle plus the card for that turn.

The winner is the one with the most cards.

Challenge 1: Play double plus one (e.g.,  $8 + 8 + 1$ )

Challenge 2: Play double minus one (e.g., if the card is 8, the answer is  $8 + 8 - 1 = 15$ )

Adapted from "Box Cars And One-Eyed Jacks" materials  
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# Doubles Chart

$$9 + 9 = 18$$

$$8 + 8 = 16$$

$$7 + 7 = 14$$

$$6 + 6 = 12$$

$$5 + 5 = 10$$

$$4 + 4 = 8$$

$$3 + 3 = 6$$

$$2 + 2 = 4$$

$$1 + 1 = 2$$

# Go Fish

## Materials

- Deck of cards with the Jack, Queen and King removed

## Rules of the Game:

1. Any number of players can play.  
Remember Ace = 1.
2. The cards are shuffled and each player gets five cards.
3. The remaining cards are placed face down in the center of the group.  
The top card is turned over and that number becomes the "key" number for that round.
4. Players look for two cards that add up to the key number, or two cards that can be subtracted to give a difference of the "key" number.

Example:

The key number is 8.

Players could add six  plus two  to make 8.

OR

Players could take one  from nine  to make 8.

5. Each player draws a card and the one with the highest number goes first.
6. The first player tries to make a sum or difference of 8.
7. If (s)he can, the cards are placed on the table and the player explains how (s)he made 8.
8. If the other players agree, the player who made 8 puts these two cards in her pile, and picks two cards from the top of the deck. Play then proceeds to the next player.
9. If a person has an 8, they can play it as a single card and then pick up one card.
10. Whenever a player makes an incorrect claim, they pick up the two cards they had incorrectly played and miss a turn.

11. If a player cannot make a sum or difference of 8, they can “Go Fish”.

Example:

If Player A needs 2, (s)he can ask a specific player (Player B) if (s)he has a 2.

If player B has a 2, (s)he must give it to Player A, and take another card from the center deck.

If Player B does not have a 2, (s)he can tell Player A to “Go Fish”.

Then Player A places that card in a discard pile, trades it for the top card on the deck, and misses that turn.

The next player now has a turn.

12. Play continues until all the cards from the deck in the middle have been played.


13. Everyone then counts the number of cards they have paired up to make 8.

14. The winner is the one with the most cards.

Variations 1: Players can put down more than one pair at a time. They pick up as many cards as they put down.

Variation 2: Players can use more than two cards to make the “key” number.

Example:

If the “key” number is 8, a player could say 9  plus

5  minus 2  minus 4  equals 8.

The player would then put the four cards in his pile, and pick up 4 new cards.

Variation 3: Use the Jack = 11, Queen = 12, and King = 13.

Using the extra cards presents a challenge for older or more capable players.

Adapted from “Box Cars And One-Eyed Jacks” materials

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# Cover Up

## Materials

- about 32 small stones, pebbles or counters for each pair of participants
- container to hold them

## Background

Cover Up is a game based on one invented by the Mbuti people. The Mbuti live in the tropical rainforests throughout Central Africa. To play version 2 you have to be able to count by fours.

## Instructions

### Version 1

1. Start with about 10 stones on the ground.
2. One player takes some stones away so that the other player cannot see how many are hidden in his/her hand.
3. The second player must estimate (as quickly as possible) how many have been removed. They must tell how they came up with their answer.
4. The first player shows the second player how many stones are in his/her hand.
5. Count to see how close the second player is.
6. Switch roles and continue playing.

### Variations

- Use a larger number of stones to make the game more challenging.
- Use a smaller number of stones to make the game easier.

### Version 2

1. One person drops all the stones on the ground, then removes a handful.
2. The second person must estimate (as quickly as possible) whether zero, one, two, or three stones must be returned to the ones on the ground so that the total number of stones on the ground is a multiple of four. Multiples of four are 4, 8, 12, 16, 20, 24, 28, 32 ...
3. The first player returns the number of stones requested by the second player. If the total number of stones on the ground is now a multiple of four, the second player is the winner. If not, then the first person wins.
4. Partners switch roles and continue to play.

### Variations

- Use a different number of stones.
- Use different multiples, e.g., 6

### How did you like the games?

<u>Double the Fun</u>						
<i>Easy</i>	1	2	3	4	5	<i>Very hard</i>
<i>No fun</i>	1	2	3	4	5	<i>Lots of fun</i>
<i>Didn't play it this week</i>	1	2	3	4	5	<i>Played it lots</i>
<i>Rules were hard to understand</i>	1	2	3	4	5	<i>Rules were easy to understand</i>
<i>Comments:</i>						

<u>Go Fish</u>						
<i>Easy</i>	1	2	3	4	5	<i>Very hard</i>
<i>No fun</i>	1	2	3	4	5	<i>Lots of fun</i>
<i>Didn't play it this week</i>	1	2	3	4	5	<i>Played it lots</i>
<i>Rules were hard to understand</i>	1	2	3	4	5	<i>Rules were easy to understand</i>
<i>Comments:</i>						

<u>Cover Up</u>						
<i>Easy</i>	1	2	3	4	5	<i>Very hard</i>
<i>No fun</i>	1	2	3	4	5	<i>Lots of fun</i>
<i>Didn't play it this week</i>	1	2	3	4	5	<i>Played it lots</i>
<i>Rules were hard to understand</i>	1	2	3	4	5	<i>Rules were easy to understand</i>
<i>Comments:</i>						

Name (if you want) \_\_\_\_\_

*Wrap Up with Parents*  
*Session 1*  
**Where's the Math?**

**1. Estimation Activity**

Estimating develops a sense of number. This skill is developed through practice and reflection. The more we do it and the more we think about why we do it, the better we become. This activity also develops risk taking, problem solving and the idea that there is a range of possible answers when estimating. Finding a reasonable answer helps build an awareness of number. Reinforce with parents that estimation is a life skill related to mathematics. To be successful children must have many opportunities to practice estimation and to learn from their previous experiences e.g., refining the zone. Parents should be encouraged to remind children of strategies that they have used in the past or that they heard about tonight.

An activity such as this one is also useful when it comes to more formal mathematics such as finding volume. Finding how many units cover the base, and multiplying by the number of layers (area of base x height) is an excellent formula for the volume of many solids.

- G2 R&P – apply developing reasoning skills to make and investigate conjectures;
- G2 M(o) – estimate, measure, and record length, perimeter area, mass, capacity, time, and temperature, using non-standard units and standard units;
- G5 CONN – make connection among mathematical concepts and procedures and relate mathematical ideas to situations drawn from everyday contexts

**2. Counting on Frank**

There are many excellent books that have a mathematical focus. (See the page in Night 3 for a listing of good “math” storybooks.) Linking math with literature often places math in a real world context, and also provides children and their parents with opportunities to see the fun, beauty, and importance of mathematics in our world. Many parents often read to their children. Why not encourage them to include some math in their children’s bedtime stories.

- G2 M(s) – estimate and measure length, height, and distance using standard units and non-standard units;
- G2 COMM – communicate mathematical thinking orally, visually and in writing, using everyday language, a developing mathematical vocabulary and a variety of representations
- G5 R&P – develop and apply reasoning skills to make and investigate conjectures and construct and defend arguments;
- G5 COMM – communicate mathematical thinking orally, visually and in writing, using everyday language, a basic mathematical vocabulary and a variety of representations and observing basic mathematical conventions;

**3. Double the Fun**

Discuss the importance of doubles for helping with other facts.

e.g.,  $6 + 7$        $\longrightarrow$  Think  $6 + 6 + 1$

This strategy enables children to learn about one third of the addition facts they should be able to recall immediately. This strategy also promotes learning of subtraction facts, and helps students learn the more difficult addition facts.

G2 N(s) – solve problems involving the addition and subtraction of whole numbers to 18, using a variety of mental strategies

G2 – identify, describe and create, through investigation, growing patterns and shrinking patterns, involving addition and subtraction

G5 N(s) – solve problems involving the addition, subtraction, and multiplication of whole numbers, using a variety of mental strategies

#### 4. Go Fish

This game provides practice of addition and subtraction facts.

It allows children to explore the relationship between addition and subtraction. (This is difficult for young children.)

G2 N(s) – solve problems involving the addition and subtraction of whole numbers to 18, using a variety of mental strategies

G5 N(s) – solve problems involving the addition, subtraction, and multiplication of whole numbers, using a variety of mental strategies

#### 5. Cover Up

The game not only helps children estimate, but also assists the development of basic skills in addition, subtraction, multiplication and division.

The children's exploration of their strategies will reveal their strengths and weaknesses in numeracy.

Listen to their explanation and change the level of difficulty to challenge but not frustrate the children. It takes time to become comfortable, and being frightened of being wrong does not help to build confidence.

Reward good thinking strategies not just correct answers.

G2 P&A – determine the missing number in equations involving addition and subtraction to 18, using a variety of tools and strategies

G2 R&P – apply developing reasoning skills to make and investigate conjectures;

G5 N(s) – use estimation when solving problems involving the addition, subtraction, multiplication, and division of whole numbers, to help judge the reasonableness of a solution

You may want to speak with parents about when (and if) it is appropriate to let children win in order to maintain motivation and benefit from the repeated practice.

When you give out the *Math at Home* book, invite families to explore the book. Explain that no specific pages will be suggested this week, but there will be pages that link to activities in following weeks.

Remind parents that the practice at home during the week is extremely important for improving skills and developing a positive attitude towards math through the fun of playing games. Explain that the children are being asked to return a questionnaire about their participation during the week.

Esso Family Math Project

Grades 2 – 5

Session 2

Measurement

Entry Estimation	Materials	Activities	Home Challenges
<p><u>What is the length of string?</u></p> <ul style="list-style-type: none"> <li>• Families write their name on a post-it note and place it on the number line to indicate the range of their estimate.</li> </ul>	<ul style="list-style-type: none"> <li>➤ nametags</li> <li>➤ math stickers</li> <li>➤ post-it notes</li> <li>➤ transparent overlay</li> <li>➤ 2 rolls of string</li> <li>➤ 2 rolls of masking tape</li> <li>➤ 10 measuring tapes</li> <li>➤ <i>Length</i> (Pluckrose)</li> <li>➤ copies of value of letters page</li> <li>➤ calculators ( one TI-10 calculator per family)</li> <li>➤ copy of Calculator Guide, page 1</li> <li>◆ pencils</li> <li>◆ 15 pairs of scissors</li> <li>◆ chart for “How Square Are You?”</li> <li>▲ number line (0 – 300)</li> <li>▲ paper to work out “How Expensive Are You?”</li> </ul>	<ol style="list-style-type: none"> <li>1. Discussion of estimation activity and Home Challenge</li> <li>2. Story: Length</li> <li>3. How Square Are You?</li> <li>4. How Expensive Are You?</li> <li>5. Calculators</li> <li>6. Parent Time/Home Challenges with children</li> </ol>	<ul style="list-style-type: none"> <li>➤ Home Challenge from “How Expensive Are You?”</li> <li>➤ Calculators</li> </ul> <p>Optional Challenges</p> <ul style="list-style-type: none"> <li>➤ “Telephone Math” from “Math at Home”</li> <li>➤ “Getting Personal” from “Math at Home”</li> </ul> <p><u>Materials to take home</u></p> <ul style="list-style-type: none"> <li>➤ Calculators</li> <li>➤ Copy of value of letters page</li> <li>➤ Copy of Calculator Guide, page 1</li> </ul>

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Location: \_\_\_\_\_

Time: \_\_\_\_\_ Date: \_\_\_\_\_

**Possible Schedule for Session Two:**

Activity	Duration	Start Time	Team members
❖ Set-Up	15 minutes		
❖ Meal	30 minutes	5:30 p.m.	
❖ Registration and Name Tags	During meal		
❖ Entry Activity: Length of String	Before and During meal		
❖ Introduction Entry Activity and Home Challenge Review	15 minutes	6:00 p.m.	
❖ Story: Length	10 minutes	6:15 p.m.	
❖ How Square Are You?	20 minutes	6:25 p.m.	
❖ How Expensive Are You?	20 minutes	6:45 p.m.	
❖ Calculators	15 minutes	7:05 p.m.	
❖ Parent Time (questions from parents)	10 minutes	7:20 p.m.	
❖ Home Challenges (each facilitator works with 1 or 2 children)			
❖ Clean Up <i>Please leave the room as you found it.</i>	15 minutes	7:30 p.m.	All
❖ Planning for next week	30 minutes	7:45 p.m.	All

# Entry Estimation

## What length is the string?

### Materials

- Between 1 and 3 metres of string wrapped loosely around the *Esso Family Math Book*
- Post-it notes (12.5 cm by 7.5 cm)
- Number line (106 cm long – 3 legal sized pieces of paper joined horizontally)  
0 10 20 30 40 50 60 70 ..... 280 290 300
- Transparent overlay (15 cm)

### Instructions

As participants arrive–

1. Families are given a post-it note and asked to estimate the length of string in centimetres. Encourage participants not to touch the string, but to visually estimate only. They place the blank post-it note above their range or zone of the estimated answer. Blank post-it notes without name or identification decrease the anxiety of making an estimation. The post-it will cover a range of numbers.

Stress that we are trying to be ‘in the zone’, not find an exact answer.

2. Have a metre stick and/or a measuring tape nearby to help facilitate estimation, but do not allow participants to unwrap the string.
3. Encourage parents and children to talk about their estimating strategies.
4. Leaders should be close by to discuss and extend thinking about approaches to estimating that they notice the participants using.

At the beginning of the session–

1. Ask if anyone would like to share his or her strategy for estimating the length of string that was wrapped around the book. Discussion will focus on reasons for differences and strategies for estimating length (e.g., compare to known length, establish an anchor – hand span is 20 cm, hand width is 10 cm, fingernail is 1 cm for an adult, thumbnail is 1 cm for a child, door handle is 1 metre from the floor).
2. Find something positive to say about each person’s strategy, whenever possible.
3. After discussion, leader puts transparent overlay on the number line where most post-it notes are placed. Blank post-it notes decrease an individual’s anxiety during discussion.
4. Leader unwraps about a metre of string and places it next to the metre stick or tape measure to give a visual ‘anchor’.
5. Leader then asks families if they wish to move the transparent overlay and why. Leader responds to the general consensus of the group by moving the overlay as

directed. This strategy will reinforce the idea of refining estimations based on further information.

6. Leader unwraps the rest of the string and measures it with the help of a child.
7. Leader discusses the refining of the zone with questions such as:
  - Why did we keep the zone the same? or Why did we change it?
  - How is this estimating activity the same or different to what we did last week? (cookies in the jar)

### Home Challenges–

#### 1. Estimation from “Counting on Frank”

During dinner discuss a family’s favourite estimate for the week. Find out who would be willing to share their favourite estimate, and ask them to do so at the beginning of the session.

#### 2. Math Game Questionnaire

During dinner collect questionnaires. Provide math stickers for those completing the page during the week. Explain this feedback will help presenters change future sessions if indicated.

# *Math Counts – Length*

## Measurement and Literature

### Materials

- Book by Henry Pluckrose ISBN 0-516-45453-6

### Instructions

This book discusses both non-standard and standard units\* of linear measurement, and emphasizes why standard units are important (“...people’s hands are not all the same size”, page 11; “... people’s paces are not all the same size”, page 13).

1. Read the first fourteen pages of “Length”.
2. Discuss what units might be used to measure different lengths, and why we might use those units.
3. This discussion leads nicely into measuring the length of the small ball of string from the entry activity and the activity “How Square are You?”
4. Encourage parents to go to the library and read the rest of “Length”.

\*Because the book was written in the United States it uses both metric and Imperial measurements. You might want to discuss how different countries use different units and some people in Canada still use the old British measuring units rather than metric.

The book also uses the American spelling of meter and centimeter, rather than metre and centimetre.

Note: Make sure you have contacted the local library to be sure they have copies of “Length” available.

## How Square Are You?

### Materials

- String
- Scissors
- Laminated recording chart
- Copies of personal data sheet

### Activity 1

1. Participants help each other to cut a string to exactly the height of each person. Each person should use that string to complete the rest of the activity.
2. Using the string, participants will find out if they are a “tall rectangle”, a “short rectangle”, or a “perfect square”.
3. To do this, participants have someone help them hold their string along their outstretched arms.
  - If the string is longer than their reach, they are a tall rectangle.
  - If the string is shorter than their reach, they are a short rectangle
  - If the string is about the same as their reach, they are a perfect square.
  - Record the finding on a group chart.

Example:

Short Rectangle	Perfect Square	Tall Rectangle
Matthew Jane	George	Linda Fred

### Activity 2

1. Participants use the string to compare their height to the distance around (circumference of) their head, wrist and fist.
2. Complete the data sheet.

Example:

Name <u>Nancy</u>
My height is <u>3</u> times the distance around my head.
The length of my arm is <u>3</u> times the distance around my wrist.
My foot is <u>1</u> times the distance around my fist.

Notes: The length of one's foot is about the same as the distance around one's fist. (This is a good way to know the size of socks you have to buy.)

Also, artists need a good knowledge of body part comparisons for their sketches.

Adapted from “Family Math” materials

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Name \_\_\_\_\_

My height is \_\_\_ times the distance around my head.

The length of my arm is \_\_\_ times the distance around my wrist.

My foot is \_\_\_ times the distance around my fist.

Name \_\_\_\_\_

My height is \_\_\_ times the distance around my head.

The length of my arm is \_\_\_ times the distance around my wrist.

My foot is \_\_\_ times the distance around my fist.

# How Expensive Are You?

## *Leader's Notes*

### Materials

- List of letters and their value:

A = \$ 1.00

B = \$ 2.00

C = \$ 3.00

D = \$ 4.00

E = \$ 5.00

F = \$ 6.00

G = \$ 7.00

H = \$ 8.00

I = \$ 9.00

J = \$ 10.00

K = \$11.00

L = \$ 12.00

M = \$13.00

N = \$14.00

O = \$15.00

P = \$ 16.00

Q = \$17.00

R = \$ 18.00

S = \$ 19.00

T = \$ 20.00

U = \$ 21.00

V = \$ 22.00

W = \$ 23.00

X = \$ 24.00

Y = \$ 25.00

Z = \$ 26.00

### Activity:

Add the value of the letters together to find how expensive a name or a word is.

Variation 1: Use first names to find – **How Expensive Are You?**

Who is the most expensive person in the room?

Is anyone worth exactly \$50.00, \$100.00?

Variation 2: Use last names to find – **How Expensive Are You?**

Who is the most expensive person in the room?

Is anyone worth exactly \$50.00, \$100.00?

### Home Challenge

Try *one* of the following challenges.

Can you find a word worth exactly \$50.00 or \$100.00?

What is the most expensive word you can find?

Bring your answer to Family Math next week to share with the group

Adapted from "Family Math" materials

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## Value of Letters

A =	\$ 1.00	N =	\$14.00
B =	\$ 2.00	O =	\$15.00
C =	\$ 3.00	P =	\$16.00
D =	\$ 4.00	Q =	\$17.00
E =	\$ 5.00	R =	\$18.00
F =	\$ 6.00	S =	\$19.00
G =	\$ 7.00	T =	\$20.00
H =	\$ 8.00	U =	\$21.00
I =	\$ 9.00	V =	\$22.00
J =	\$10.00	W =	\$23.00
K =	\$11.00	X =	\$24.00
L =	\$12.00	Y =	\$25.00
M =	\$13.00	Z =	\$26.00

### Home Challenge

Try *one* of the following challenges.



Can you find a word worth exactly \$50.00 or \$100.00?


What is the most expensive word you can find?

Bring your answer to Family Math next week to share with the group.

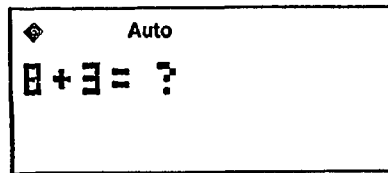
# Calculator Guide

Page 1

Press  and  at the same time to erase old messages.

Press 

You will see a screen that looks similar to



Press the answer on the white keys that you think is correct. Then press enter.


If you are correct the calculator will say **YES** and give you a new problem.

If you are wrong the calculator will say **NO**.

You will also see a **<** which means your answer is smaller than the correct answer, or you will see **>** which means your answer is bigger than the correct answer.

The calculator gives you three tries to get the correct answer.

After every 5 problems you will see how many questions you have correct and how many you have wrong.

You can press  at any time to check our score. Then press

 again to continue.

*Wrap Up with Parents*  
*Session 2*

## Where's the Math?

### 1. Estimation Activity

This estimating activity helps children visualize length in different ways (the wrapping of the string around the book). Measuring something wrapped on a book or on a circular object, is far more difficult than estimating the length of a straight object. Estimating is developed through practice and reflection. The more we do it and the more we think about why we do it, the better we become. This activity also develops risk taking, problem solving and the idea that there is a range of possible answers when estimating. Discuss how measurements are never exact, even when we use a ruler. (You will always be part of a millimetre off in your measurement.) Being able to estimate fairly accurately is very useful in the real world. Discuss how people who sell fabric are generally very good estimators of length. Who else might be good estimators of length? Why?

Measurement probably has more practical uses and links to the real world than other aspects of mathematics. Remind parents of the value of establishing and reinforcing anchors or comparison points that exist in the real world (e.g., hand span is 20 cm, hand width is 10 cm, fingernail is 1 cm, door handle is 1 metre from the floor).

G3 M(s) – estimate and measure length, height, and distance, using standard units and non-standard units;

G4 M(o) – estimate measure and record length, perimeter, area, mass capacity, volume, and elapsed time, using a variety of strategies;

### 2. Story: Length

In grade 2, the students' concepts of length are developing from the use of non-standard units (such as, my desk is 15 erasers long) to standard units (such as, my desk is 43 centimetres long). They need lots of practice comparing objects with non-standard units before they understand why standard units are necessary to communicate effectively. They also need to understand that a measurement must include both a number and a unit. Older students must recognize that some units are more appropriate than others when measuring, and also that there is an inverse relationship between the number of units and the size of the unit, i.e., when we use large units fewer of them are required.

G2 M(s) – estimate and measure length, height, and distance, using standard units and non-standard units;

G5 M(s) – solve problems requiring the estimation and calculation of perimeters and areas of rectangles;

### 3. How Square Are You?

Children need to develop their own “anchors” or comparison points for estimating distance (e.g., width of a finger is 1 cm). They also need to establish relationships

between different lengths. Many will be surprised that “round” (circular) distances are often longer than anticipated.

- G3 M(s) – choose benchmarks – in this case, personal referents – for a centimetre and a metre to help them perform measurement tasks;
  - estimate and measure length, height, and distance, using standard units (i.e., centimetre, metre) and non-standard units;
  - record and represent measurements of length, height, and distance in a variety of ways (e.g., written, pictorial, concrete)
- G5 M(s) – estimate and measure the perimeter and area of regular and irregular polygons, using a variety of tools and strategies.
- G5 COMM – communicate mathematical thinking orally, visually and in writing, using everyday language, a basic mathematical vocabulary and a variety of representations and observing basic mathematical conventions;

#### 4. How Expensive Are You?

In the home challenge children are adding and estimating when it comes to finding words worth \$100.00. Strategies for finding the most expensive word include not only finding long words, but also finding words containing expensive letters like Z, Y, W.

- G2 N(s) – solve problems involving the addition and subtraction of two-digit numbers, with and without regrouping, using concrete materials, student-generated algorithms, and standard algorithms;
- G5 P&A(o) – demonstrate, through investigation, an understanding of the use of variables in equations.

#### 5. Calculators

Parents might be against calculator use, so they need to see the benefits of using them. They have to realize that for many math problems the calculator can do the computation, but not the thinking about the mathematics involved. Having children practice basic skills using the calculator (as was demonstrated in this session) will probably not be resisted by parents.

Possibly discuss with parents that there are many functions (or buttons) on this calculator that won't be explained on these nights, but their children will often figure them out for themselves through trial and error. They may also work with these calculators in school (although most other children will not have this new calculator yet). Remind parents that pressing **On/Off** and **Clear** gets rid of anything in the memory. Also remind parents that it takes time to learn new technology like this calculator or a computer.

##### The Mathematical Process – Selecting Tools and Computational Strategies

Students can use calculators or computers to perform operations, make graphs, and organize and display data that are lengthier and more complex than those that might be addressed using only pencil-and-paper. Students can also use calculators and computers in various ways to investigate number and graphing patterns, geometric relationships, and different representations; to simulate situations; and to extend problem solving. When students use calculators and computers in mathematics, they need to know when it is appropriate to apply their mental computation, reasoning, and estimation skills to predict and check answers.

The computer and the calculator should be seen as important problem-solving tools to be used for many purposes.

(Ontario Mathematics Curriculum 2005, pages 14, 15)

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Esso Family Math Project

Grades 2 – 5

Session 3 Geometry

Entry and Sign In	Materials	Activities	Home Challenge
<p><u>How many candies?</u></p> <ul style="list-style-type: none"> <li>Families write their name on a post-it note and place it on the number line to indicate the range of their estimate.</li> </ul>	<ul style="list-style-type: none"> <li>➤ nametags</li> <li>➤ math stickers</li> <li>➤ post-it notes</li> <li>➤ transparent overlay</li> <li>➤ estimating jar</li> <li>➤ measuring tape</li> <li>➤ <i>The Village of Round and Square Houses</i> (Grifalconi)</li> <li>➤ popsicle sticks</li> <li>➤ list of math literature</li> <li>➤ counters in 2 colours; pennies</li> <li>➤ Awithlaknannai game board</li> <li>➤ scoring sheet for Onesteh</li> <li>➤ calculators (to loan if families forget their own)</li> <li>➤ copies of on-site and home math walks</li> <li>◆ pencils            ◆ candies</li> <li>▲ number line (0 – 300)</li> <li>▲ set of real world 3D geometric solids – ball (sphere), ice cream cone (cone), Toblerone box (triangular prism), etc.</li> <li>▲ bag of small stones</li> </ul>	<ol style="list-style-type: none"> <li>1. Discussion of estimation activity and Home Challenge</li> <li>2. Geometry Walk</li> <li>3. Story: The Village of Round and Square Houses – first 8 pages</li> <li>4. Games: Onesteh and Awithlaknannai</li> <li>5. Calculators</li> <li>6. Parent Time/Home Challenges with children</li> </ol>	<ul style="list-style-type: none"> <li>➤ “Geometry Math Walk in My House” and “Math Walks”.</li> </ul> <p><u>Materials to take home</u></p> <ul style="list-style-type: none"> <li>➤ Copies of Geometry Walk</li> <li>➤ Copy of Calculator Guide, page 2</li> <li>➤ Copy of “Read Some Fun Math Books”</li> </ul>

Location: \_\_\_\_\_

Time: \_\_\_\_\_ Date: \_\_\_\_\_

Possible Schedule for Session Three:

Activity	Duration	Start Time	Team members
❖ Set-Up	15 minutes		
❖ Meal	30 minutes	5:30 p.m.	
❖ Registration and Name Tags	During meal		
❖ Entry Activities: How many candies?	Before and During meal		
❖ Introduction Entry Activity and Home Challenge Review	20 minutes	6:00 p.m.	
❖ Geometry Walk	20 minutes	6:20 p.m.	
❖ Story: The Village of Round and Square Houses	5 minutes	6:40 p.m.	
❖ Games: Onesteh and Awithlakkannai	20 minutes	6:45 p.m.	
❖ Calculator	15 minutes	7:05 p.m.	
❖ Parent Time (questions from parents)	10 minutes	7:20 p.m.	
❖ Home Challenges (each facilitator works with 1 or 2 children)			
❖ Clean Up <i>Please leave the room as you found it.</i>	15 minutes	7:30 p.m.	All
❖ Planning for next week	30 minutes	7:45 p.m.	All

# Entry Estimation

## How Many Candies?

### Materials

- Litre sized Jar (plastic or glass so people can see what is inside)
- Between 100 and 200 candies to fill the jar (about the size of jujubes)
- Post-it notes (12.5 cm by 7.5 cm)
- Number line (106 cm long – 3 legal sized pieces of paper joined horizontally)  
0 10 20 30 40 50 60 70 ..... 280 290 300
- Transparent overlay (15 cm)

### Instructions

As participants arrive–

1. Families are given a post-it note and asked to estimate how many candies are in the jar. They place the blank post-it note above their range or zone of the estimated answer. Blank post-it notes without name or identification decrease the anxiety of making an estimation. The post-it will cover a range of numbers.  
Stress that we are trying to be 'in the zone', not find an exact answer.
2. Facilitators should recall strategies from week one (e.g., comparing this situation to a similar one – especially what they remember from session 1, counting the number up the side and across in one row and multiplying, “chunking” using an “anchor”)
3. Encourage both parents and children to talk about their estimating strategies.

At the beginning of the session–

1. Ask if anyone would like to share his or her estimation strategy.
2. Discuss why it is more difficult to estimate the number of smaller objects.
  - The mental math is more complicated because the numbers are larger.
  - It is more difficult to count the number for each layer and the number of layers.
3. After discussion, leader puts transparent overlay on the number line where most post-it notes are placed. Blank post-it notes decrease an individual's anxiety during discussion.
4. Leader takes about half of the candies out of the jar and gives about 10 to a number of volunteers who count to be sure they have 10 (adding or subtracting from the candies remaining in the jar). Leader places each group of 10 on the number line (counting by 10's). Ensure clean hands or plastic gloves are used.
5. Leader then asks families if they wish to move the transparent overlay and why. Leader responds to the general consensus of the group by moving the overlay as directed. This strategy will reinforce the idea of refining estimations based on further information.

6. Leader takes most of the remaining candies out of the jar and gives about 10 to a number of volunteers who count to be sure they have 10 (adding or subtracting from the candies remaining in the jar). Leader places each group of 10 on the number line and includes those few remaining in the jar.
7. Leader discusses the refining of the zone with questions such as:
  - Why did we keep the zone the same? or Why did we change it?
8. Select a family that contributed to the discussion to distribute the candies to the group.

Note: Discuss allergies. Parents should know if their children are allergic to jujubes.

### Home Challenge -

1. How Expensive Are You?

During dinner discuss last week's Home Challenge:

Can you find a word worth exactly \$50.00 or \$100.00?

What is the most expensive word you can find?

Ask participants to complete a chart with their names and the words they found.

Share your words.		
Name	Word worth \$50 or \$100	Most Expensive Word

Give out stickers to anyone who attempted the Home Challenge.

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# Geometry Walk

## Materials

- Copies of handout
- Collection of “real world” three dimensional geometric solids – ball (sphere), ice cream cone (cone), Toblerone box (triangular prism), sugar cube (cube), toothpaste box (rectangular prism) etc

## Activity

1. Go over the handout “Geometry Walk” with participants and compare the collection of solids, such as those listed above, to the pictures. (3D shapes are sometimes hard to visualize from a 2D picture.)
2. Use the handout to find real life examples of the geometric solids. (They don’t have to be exact replicas of the geometric solids, just close.)
3. Send the families on a walk for 5 or 10 minutes. They should try to find as many objects resembling the 3D solids as they can and record the names of the objects on the handout.
4. After the walk, discuss what people found, and see if there were some objects found by everyone, and some found by only one family.

## Home Challenge

Introduce the pages “Geometry Math Walk in My House” and “Math Walks”.

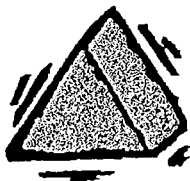
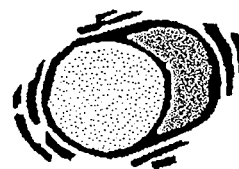
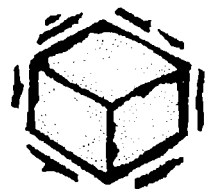
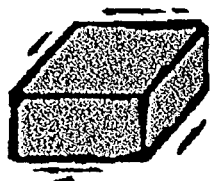
Tell participants completed pages will be posted and discussed next week.

Family: \_\_\_\_\_

# Family Math - Math Walk

## Geometry

List the objects that look like these geometric figures.

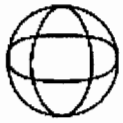


Family: \_\_\_\_\_

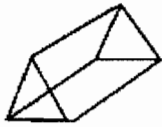
## Geometry "Math Walk" in my House

### Geometry

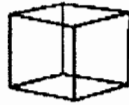
Fill in the table with things you find at home that look like these 3D figures



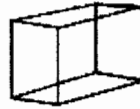
**sphere**



**triangular  
prism**



**cube**



**rectangular  
prism**



**cone**



**cylinder**

**Living Room**

**Bedroom**

**Kitchen**

Family: \_\_\_\_\_

## Math Walks

### Geometry

On the math walk at my house I noticed...

There were more \_\_\_\_\_ in my house than \_\_\_\_\_.

There were not many \_\_\_\_\_ because...

There were a lot of \_\_\_\_\_ because...

My favourite 3D shape is the \_\_\_\_\_ because...

On the math walks at home and in the classroom I was good at.....

On the math walks what I found hard to do was...

# *The Village of Round and Square Houses*

## Geometry and Literature

### Materials

- Book by Ann Grifalconi ISBN 0-316-32862-6

### Instructions

1. Begin to read at the sixteenth page of the story “The Village of Round and Square Houses – “All through the night Old Naka spoke to them...” Explain that Old Naka is the name the people have given the volcano near their village. Continue for the next eight pages up to the point where the chief tells the children to pick up the stones so crops can be planted.
2. Discuss how this part of the book focuses on the shapes of people covered in volcano ash and the shapes of the surviving village huts. Ask how the people were sorted into the 2 huts. Was this a good way to determine who should live in which house?
3. Discuss the shape of our houses. What other shapes of houses do they know? (e.g., First Nation’s teepee – cone; Inuit igloo – hemisphere)
4. Encourage parents to go to the library and read the rest of “The Village of Round and Square Houses” to their child.
5. Ask children to go home and draw a picture of a house. Then colour anything round green, and anything square yellow. What other shapes are in their drawing?

Note: Make sure you have contacted the local library to be sure they have copies of “The Village of Round and Square Houses” available.

# Onesteh

*(Note: The games Awithlaknannai and Onesteh should both be briefly demonstrated to the entire group. Then allow families to choose the one they would most like to play. Facilitators should be directly involved during the playing of the games to ensure that no one becomes frustrated. Onesteh may be easier for younger children while Awithlaknannai may be more appropriate for older participants.)*

## Materials

- Popsicle sticks (3 per person)
- Container with about 50 small stones, pebbles or counters per family
- Washable markers

## Background

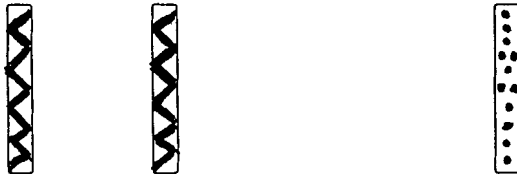
Onesteh was a very popular game played among the tribes of the Blackfoot nation. It is also called STICKS, STAVE GAME, or TRAVOIS GAME.

Originally, the sticks used in the game were made from buffalo ribs, and marked only on one side. We will use popsicle sticks, and make designs on one side of each stick.

Players took great pride decorating their sticks. Before playing the game, you will need to decorate your sticks. Be proud of your design.

## Instructions

1. Participants take three popsicle sticks and decorate TWO of them with a zigzag pattern like the ones below. The third stick should have a collection of dots.



**IMPORTANT:** Remember, the reverse of the sticks must be left blank.

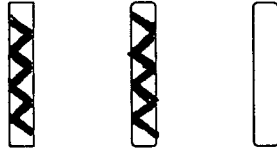
2. Players sit in a circle and throw the sticks onto the ground.
3. The “sticks” have names. The one with a collection of dots is called the “man”. The other two are “the snakes”.
4. The score is determined by the way in which your sticks fall on the ground. A pile of about 50 stones is placed in the middle of the circle. Players take stones according to the table below.
5. The possible combinations are:

Two snakes and one unmarked	6 stones
Two unmarked and one snake	6 stones
Two snakes and one man	4 stones
All unmarked	4 stones
One man, two unmarked	2 stones
One unmarked, one snake, one man	0 stones

## Scoring for Onesteh

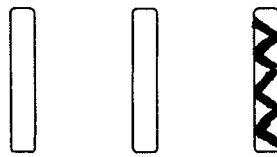
Two snakes, one unmarked

6



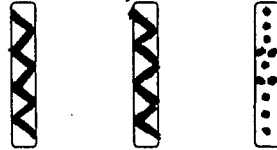
Two unmarked, one snake

6



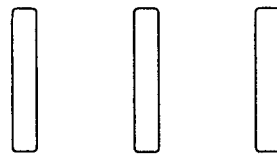
Two snakes, one man

4



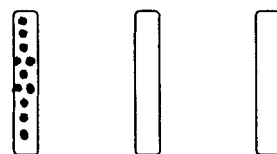
All unmarked

4



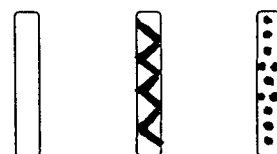
One man, two unmarked

2



One unmarked, one snake, one man

0



# Awithlalnannai

## Materials

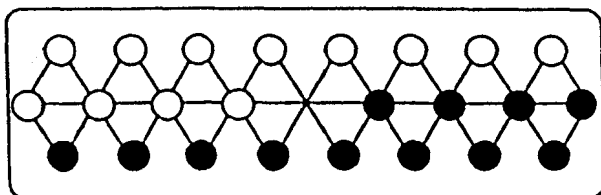
- 12 counters for each player (players needs a different colour from their opponent)
- Pennies
- Game board

## Background

Awithlalnannai originates from the Zuni Indians of New Mexico, and is a favourite game of the Zuni children. The game is played with flat playing pieces on a board, like the one below. However, when boards are not available, the diamond-shaped diagram can be drawn on the ground and different coloured stones or wood can be used as playing pieces

## Instructions

1. Arrange your pieces on the board as shown by the black and white dots.



2. One player arranges his or her pieces on the black dots. The other player's pieces are placed on the white dots.
3. Toss a coin to decide who goes first.
4. Players take turns moving their counters to an empty spot. You can jump over and capture an opponent's piece that is blocking the way to an empty space. You can also make double and triple jumps (as in checkers).
5. The first player to capture all of an opponent's pieces is the winner.

## Variations

- You can jump around corners.

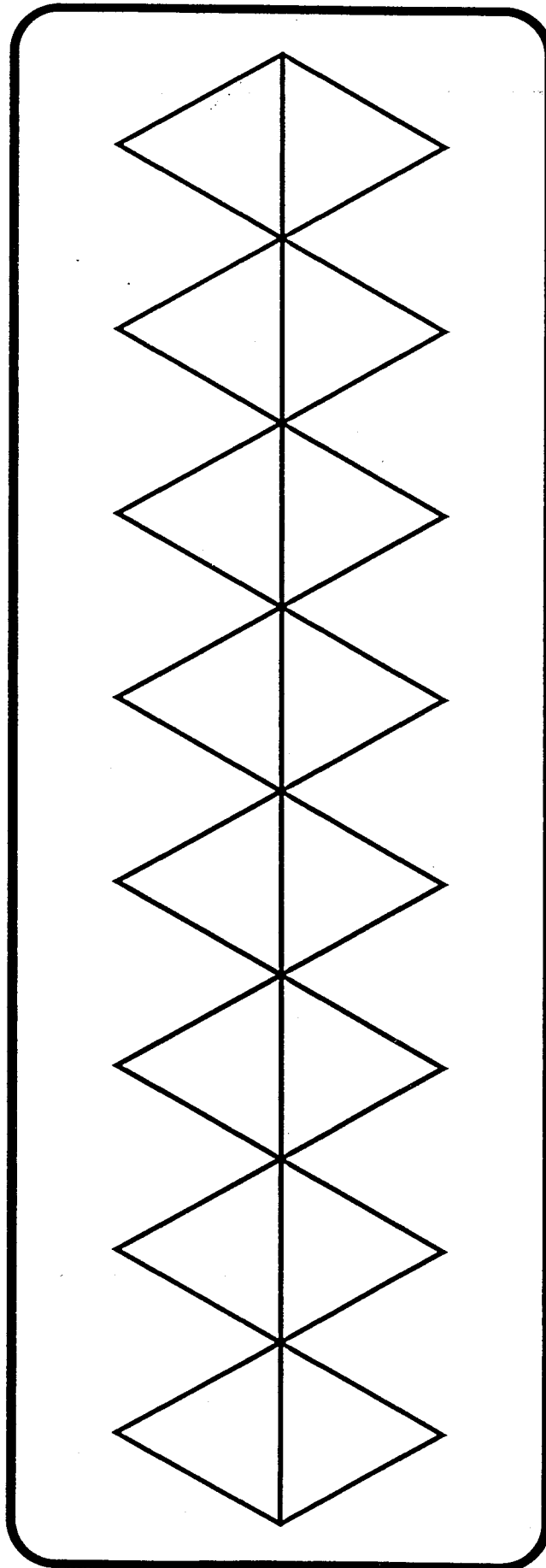
Note: The games Awithlalnannai and Onesteh should both be briefly demonstrated to the entire group. Then allow families to choose the one they would most like to play.

Facilitators should be directly involved during the playing of the games to ensure that no one becomes frustrated.

Onesteh may be easier for younger children while Awithlalnannai may be more appropriate for older participants.

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Awithlaknannai  
Game Board





# Calculator Guide

Page 2

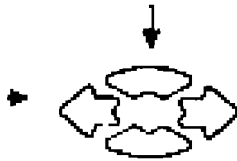
## Leader's Notes

If you want to do harder questions or different questions (e.g.,  $\div$ ,  $\times$ , or  $\div$ ) follow these directions.


Press  and  at the same time to erase old messages.

 moves back to screen before this one

 moves underline to the left



 moves underline to the right

 moves forward to next screen

Press  Display

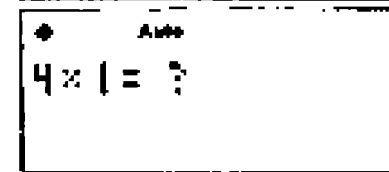
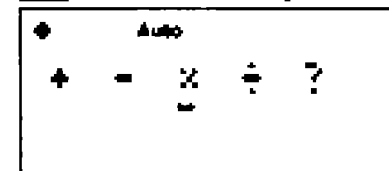
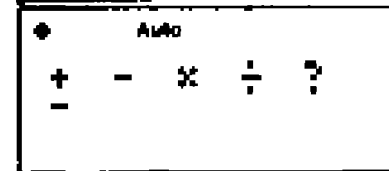
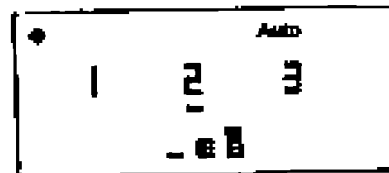


Mode

Enter

Enter

Display



1. Press  then 

After 2 seconds the screen on the left appears.

2. Press  to go to next screen and see levels.

3. Press   to move underline to level 2.

Press    If you want to go from level 1 to level 3.

4. Press  to go to next screen and see operations.

5. Press    to move underline to 3.



6. Press  to begin.

Calculator now works the same as last week.

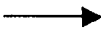
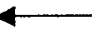
# Calculator Guide


Page 2

If you want to do harder questions or different questions (e.g., -, x, or ÷) follow these directions.

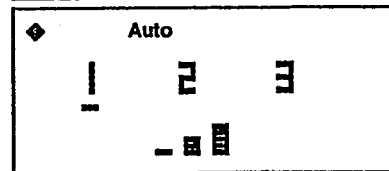
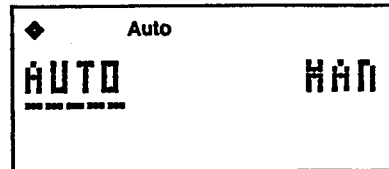
Press  and  at the same time to erase old messages.

 moves back to screen before this one

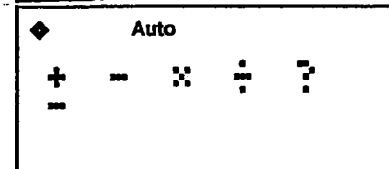
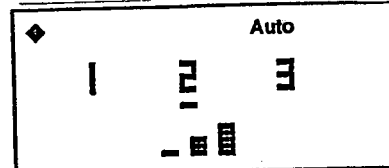
moves underline to the left   moves underline to the right

 moves forward to next screen

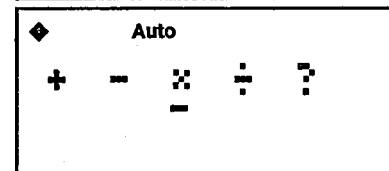
Press Display



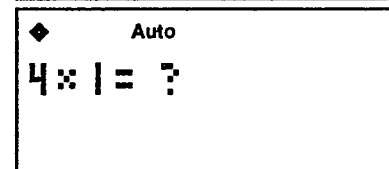
**Enter**



**Enter**



**Mode**



Calculator now works the same as last week.

## Read Some Fun Math Books

<b>Counting on Frank</b>	by Rod Clement
<b>Math Curse</b>	by Jon Scieszka and Lane Smith
<b>G is for Googol: a math alphabet book</b>	by David Schwartz (illus. Marissa Moss)
<b>How Much Is A Million</b>	by David Schwartz (illus. Steven Kellogg)
<b>Grandfather Tang's Story</b>	by Ann Tompert (illus. Andrew Parker)
<b>One Hundred Hungry Ants</b>	by Eleanor J. Pincze
<b>A Remainder of One</b>	by Eleanor J. Pincze
<b>Anno's Counting House</b>	by Mitsumasa Anno
<b>Alexander Who Used To Be Rich Last Sunday</b>	by Judith Viorst
<b>The King's Chessboard</b>	by David Birch (illus. Devis Grebu)
<b>Selena and the Bear Paw Quilt</b>	by Barbara Smucker (illus. Janet Wilson)
<b>Length</b>	by Henry Pluckrose
<b>Capacity</b>	by Henry Pluckrose
<b>The Village of Round and Square Houses</b>	by Ann Grifalconi
<b>100<sup>th</sup> Day Worries</b>	by Margery Cuyler

*These books are available at your local Public Library.*

*Wrap Up with Parents*  
*Session 3*  
**Where's the Math?**

**1. Estimation Activities**

Estimating develops a sense of number. This skill is developed through practice and reflection. The more we do it and the more we think about why we do it, the better we become. This activity also develops risk taking, problem solving and the idea that there is a range of possible answers when estimating. Finding a reasonable answer helps build an awareness of number. Reinforce with parents that estimation is a life skill related to mathematics. To be successful children must have many opportunities to practice estimation and to learn from their previous experiences e.g., refining the zone. Parents should be encouraged to remind children of strategies that they have used in the past or that they heard about tonight.

Estimation and mental math are crucial skills in today's technological society. We often use calculators to find an answer, but knowing if that answer is reasonable or not is very important, since it is easy to press the wrong buttons. It is also important to know which buttons to push.

It is important for parents to do a lot of estimating with their children using many different referents (or "anchors"). There are many opportunities in the home, especially the kitchen, for estimating.

**The Mathematical Process – Selecting Tools and Computational Strategies**

*Computational Strategies.* Problem solving often requires students to select an appropriate computational strategy. They may need to apply the written procedures (or algorithms) for addition, subtraction, multiplication, or division or use technology for computation. They may also need to select strategies related to mental computation and estimation. (Ontario Mathematics Curriculum 2005, pages 15)

Note: Refer to Week 1, page 11 for the expectations noted for the cookie estimating activity. Those same expectation apply to this activity.

**2. Geometry Walks**

This activity promotes seeing math in the real world, which is crucial if it is to make sense and be more than abstract symbolism. Concrete examples such a sugar **cube**, ice cream **cone**, help children learn the language of geometry.

Review the Home Challenges that the family can do in their own home. Stress that these challenges will be posted and discussed.

G2 G(s) – identify and describe various three dimensional figures (i.e., cubes, prisms, pyramids) and sort and classify them by their geometric properties (i.e., number and shape of faces), using concrete materials

Grade 5 G(s) –distinguish among prisms, right prisms, pyramids, and other three-dimensional figures;

**3. The Village of Round and Square Houses**

Having just gone on a geometry walk and with Home Challenges related to geometry in the family's world, this story provides an opportunity for families to consider how geometric shapes are found in many places.

#### **Literacy and Inquiry/Research Skills**

The language of mathematics includes special terminology. The study of mathematics consequently encourages students to use language with greater care and precision and enhances their ability to communicate effectively. (Ontario Mathematics Curriculum 2005, pages 29)

G2 G(o) – identify two-dimensional shapes and three-dimensional figures and sort and classify them by their geometric properties

G5 G(o) – identify and classify two-dimensional shapes by side and angle properties, and compare and sort three-dimensional figures

#### **4. Onesteh and Awithlakkannai**

Onesteh and Awithlakkannai are two First Nations games. Many games are mathematical, and nearly all involve logic and the making of conjectures – two skills for successful mathematicians.

Onesteh introduces children to some early ideas of probability, and the fact that some events are more likely to occur than others.

Awithlakkannai is similar to the game of checkers. At first it seems like a simple game, but after several hours the players realize how much logic, probability, persistence and strategy are needed if they are to win on a consistent basis.

Onesteh

G2 DM & P(o) – describe probability in everyday situations and simple games.

G5 DM & P(s) – determine and represent all the possible outcomes in a simple probability experiment (e.g., when tossing a coin, the possible outcomes are heads and tails; when rolling a number cube, the possible outcomes are 1, 2, 3, 4, 5, and 6)

Awithlakkannai

G2 PS – apply developing problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen the mathematical understanding:

G5 PS – develop, select, and apply problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding;

#### **5. Calculator**

This week's use introduces different operations and more difficult levels. Inform parents that children have to become comfortable and confident before moving on to a higher level. They should not push too hard.

#### **The Mathematical Process – Selecting Tools and Computational Strategies**

Students can use calculators or computers to perform operations, make graphs, and organize and display data that are lengthier and more complex than those that might be addressed using only pencil-and-paper. Students can also use calculators and computers in various ways to investigate number and graphing patterns, geometric relationships, and different representations; to simulate situations; and to extend problem solving. When students use calculators and computers in mathematics, they need to know when it is appropriate to apply their mental computation, reasoning, and estimation skills to predict and check answers.

The computer and the calculator should be seen as important problem-solving tools to be used for many purposes. (Ontario Mathematics Curriculum 2005, pages 14, 15)

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### 3. The Village of Round and Square Houses

Having just gone on a geometry walk and with Home Challenges related to geometry in the family's world, this story provides an opportunity for families to consider how geometric shapes are found in many places.

G2 G(o) – use language effectively to describe geometric concepts, reasoning, and investigations

G5 G(o) – use mathematical language effectively to describe geometric concepts, reasoning and investigations

### 4. Onesteh and Awithlaknannai

Onesteh and Awithlaknannai are two First Nations games. Many games are mathematical, and nearly all involve logic and the making of conjectures – two skills for successful mathematicians.

Onesteh introduces children to some early ideas of probability, and the fact that some events are more likely to occur than others.

Awithlaknannai is similar to the game of checkers. At first it seems like a simple game, but after several hours the players realize how much logic, probability, persistence and strategy are needed if they are to win on a consistent basis.

G2 DM & P(o) – demonstrate an understanding of probability and demonstrate the ability to apply probability in familiar day-to-day situations

G5 DM & P(o) – demonstrate an understanding of probability concepts

G5 P & A (o) – apply patterning strategies to problem-solving situations

### 5. Calculator

This week's use introduces different operations and more difficult levels.

Inform parents that children have to become comfortable and confident before moving on to a higher level. They should not push too hard.

G2 N(s) – mentally add and subtract one-digit numbers

G2 N(o) – use a calculator to explore number patterns

G5 N(s) – use mental computation strategies to solve number problems

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Esso Family Math Project

Grades 2 – 5

Session 4

Measurement and Probability

Entry Estimation	Materials	Activities	Home Challenges
<p><u>How many centimetre cubes would fit into the stone?</u></p> <ul style="list-style-type: none"> <li>Families write their name on a post-it note and place it on the number line to indicate the range of their estimate.</li> </ul>	<ul style="list-style-type: none"> <li>➤ nametags</li> <li>➤ math stickers</li> <li>➤ post-it notes</li> <li>➤ transparent overlay</li> <li>➤ 5 to 10 centimetre cubes</li> <li>➤ litre measuring cup</li> <li>➤ 15 pair of dice</li> <li>➤ small counters</li> <li>➤ <i>Capacity</i> (Pluckrose)</li> <li>➤ 5 basins to hold rice</li> <li>➤ 5 funnels</li> <li>➤ copies of How Much Does it Hold?, Crossing the River game board and Calculator Guide, p3</li> <li>◆ pencils ◆ rice</li> <li>▲ number line (0 – 150)</li> <li>▲ large stone or small rock (approx. 4 cm x 5 cm x 5 cm)</li> <li>▲ variety of containers</li> <li>▲ 20 containers to hold counters</li> <li>▲ 5 two litre milk/juice containers cut off at 10 cm mark to give litre measure</li> </ul>	<ol style="list-style-type: none"> <li>Discussion of estimation activity and Home Challenges</li> <li>Story: Capacity</li> <li>How Much Does It Hold?</li> <li>Crossing the River</li> <li>Calculator</li> <li>Parent Time/Home Challenges with children</li> </ol>	<ul style="list-style-type: none"> <li>➤ “Calendar Predictions” from “Math at Home”</li> <li>➤ “Fun in the Tub” from “Math at Home”</li> <li>➤ “What Never Happens?” from “Math at Home”</li> </ul> <p><u>Materials to take home</u></p> <ul style="list-style-type: none"> <li>➤ Pair of dice</li> <li>➤ Copy of Calculator Guide, page 3</li> </ul>

➤ Materials provided by Esso Family Math Centre ◆ Materials to be purchased using Esso Family Math Funds ▲ Materials to be collected/made by the community

Location: \_\_\_\_\_

Time: \_\_\_\_\_ Date: \_\_\_\_\_

**Possible Schedule for Session Four:**

Activity	Duration	Start Time	Team members
❖ Set-Up	15 minutes		
❖ Meal	30 minutes	5:30 p.m.	
❖ Registration and Name Tags	During meal		
❖ Entry Activity: Stone estimation	Before and During meal		
❖ Introduction Entry Activity and Home Challenge Review	20 minutes	6:00 p.m.	
❖ Story: Capacity	10 minutes	6:20 p.m.	
❖ How Much Does It Hold	20 minutes	6:30 p.m.	
❖ Crossing the River	20 minutes	6:50 p.m.	
❖ Calculator	10 minutes	7:10 p.m.	
❖ Parent Time (questions from parents)	10 minutes	7:20 p.m.	
❖ Home Challenges (each facilitator works with 1 or 2 children)			
❖ Clean Up <i>Please leave the room as you found it.</i>	15 minutes	7:30 p.m.	All
❖ Planning for next week	30 minutes	7:45 p.m.	All

# Entry Estimation

## How many centimetre cubes would fit into the stone?

### Materials

- A large stone or small rock (approx. 4 cm x 5 cm x 5 cm) – Must not be more than 150 centimetre cubes!
- Litre measuring cup
- 5 to 10 centimetre cubes
- Post-it notes (12.5 cm by 7.5 cm)
- Number line (106 cm long – 3 legal sized pieces of paper joined horizontally)  
0 5 10 15 20 25 30 .... 130 135 140 145 150
- Transparent overlay (15 cm)

### Instructions

As participants arrive–

1. Families are given a post-it note and asked to estimate the volume of the small rock in centimetre cubes. They place the blank post-it note above their range or zone of the estimated answer. Blank post-it notes without name or identification decrease the anxiety of making an estimation. The post-it will cover a range of numbers.

Stress that we are trying to be ‘in the zone’, not find an exact answer.

2. Encourage parents and children to talk about their estimating strategies.
3. Have a collection of centimetre cubes next to the rock for families to use as a referent (if they want to).
4. Leaders should be close by to discuss and extend thinking about estimating.

At the beginning of the session–

1. Ask if anyone would like to share their strategy for estimating the number of centimetre cubes in the stone.
2. After discussion, leader puts transparent overlay on the number line where most post-it notes are placed. Blank post-it notes decrease an individual’s anxiety during discussion.
3. Put 250 ml of water (or enough to cover the rock) in a litre measuring cup.
4. Carefully place the stone into the cup and record the new level of water.
5. Subtract the 250 ml that was in the cup at the beginning to find how many millilitres the stone took up.
6. Tell participants that one millilitre of water fills one centimetre cube, so the number of millilitres is equal to the number of centimetre cubes.
7. You may want to tell the following story about displacement.

Many years ago a Greek king had a new gold crown made for himself. He was extremely pleased with the craftsmanship, but thought the man making the crown had cheated him and not used pure gold to make the crown. The king knew that if he could find the volume of his gold crown, he would be able to place an equal volume of gold on a balance, and ensure that the two sides were even. However, he didn't know how to find the volume of his crown without melting the gold, and that would destroy the crown.

Not knowing what to do the king sent for one of the greatest thinkers in his kingdom, Archimedes (AR-kim-ee-dis). He told Archimedes his dilemma, but Archimedes was also stumped and didn't know how he could find the volume of such an irregular shaped object. He thought about the problem every day, but couldn't find a solution.

One day Archimedes came home very tired and told his slave to run his bath for him. The slave put so much water in the bath that when Archimedes got in, the water overflowed. Instead of being upset, Archimedes eyes lit up with excitement when the water went all over the floor. He leapt out of the bath and, without putting on any clothes, went running through the streets to the king's palace shouting "Eureka!" (which is Greek for "I've found it").

When he got to the palace, he told the king that he now knew how to find the volume of the crown. He told the king, "Fill a container up to the top with water, put the crown in the container, and collect all the water that flows out. The displaced water will have the same volume as the crown."

Unfortunately, for the maker of the crown, this story does not have a happy ending. He did cheat the king and so received a terrible punishment.

On the other hand Archimedes was rewarded by the king, and people today still use Archimedes' method to find the volume of irregular shaped objects.

### Home Challenges-

1. "Geometry Math Walk in My House" and "Math Walks"
2. Pictures of a house

As participants arrive or during the meal, display work from people who would like to share.

Ask for participants to share the most unusual or favourite 3D object found in their house.

Give out math stickers to those attempting the Home Challenges.

# *Math Counts – Capacity*

## Measurement and Literature

### Materials

- Book by Henry Pluckrose ISBN 0-516-45451-X

### Instructions

1. Read the first nine pages of “Capacity” up to the sentence, “We must measure to find out.”
2. Discuss how we can measure to find the capacity of different sized containers shown in the book.  
Ask the children for their suggestions. For example a child might say, “We could use a measuring cup.” or, “That container would fill about half of the milk carton, so it is half a litre.”  
Facilitators can model appropriate language (half, third, litre, etc.)
3. This discussion leads nicely to the next activity “How Much Does It Hold?”
4. Encourage parents to go to the library and read the rest of “Capacity”.

Note: Make sure you have contacted the local library to be sure they have copies of “Capacity” available.

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# How much does it hold?

## Materials

- Bottom half of a 2 litre milk or juice carton (with measurements 10 cm x 10 cm x 10 cm)
- Several other containers (some more than one litre, some less; some close to one litre, some not)
- Basins of birdseed
- Variety of sizes and shapes of containers for measurement activities
- Funnels

## Activity:

1. Discuss how the bottom “half” of a 2 litre milk container is about 1 litre.
2. Participants are to estimate which of the other containers holds about one litre and write their estimate on their data sheet.
3. Then they check how close their estimate was by using the birdseed to measure the capacity of their chosen container.
4. They record their measurement on their sheet and find how close they were.
5. Next participants estimate the capacity of another container, record their estimate, and measure to confirm, completing their data sheet as they go.
6. Families proceed through the other containers in a similar fashion, one by one.

## Notes:

This is an estimation activity, so being close is good enough.

When completing the data sheet, participants should estimate and check each container one by one. This way their estimates should improve. If they do all the estimates first, they have no opportunity to improve and refine their skills.

Name \_\_\_\_\_

## How much does it hold?

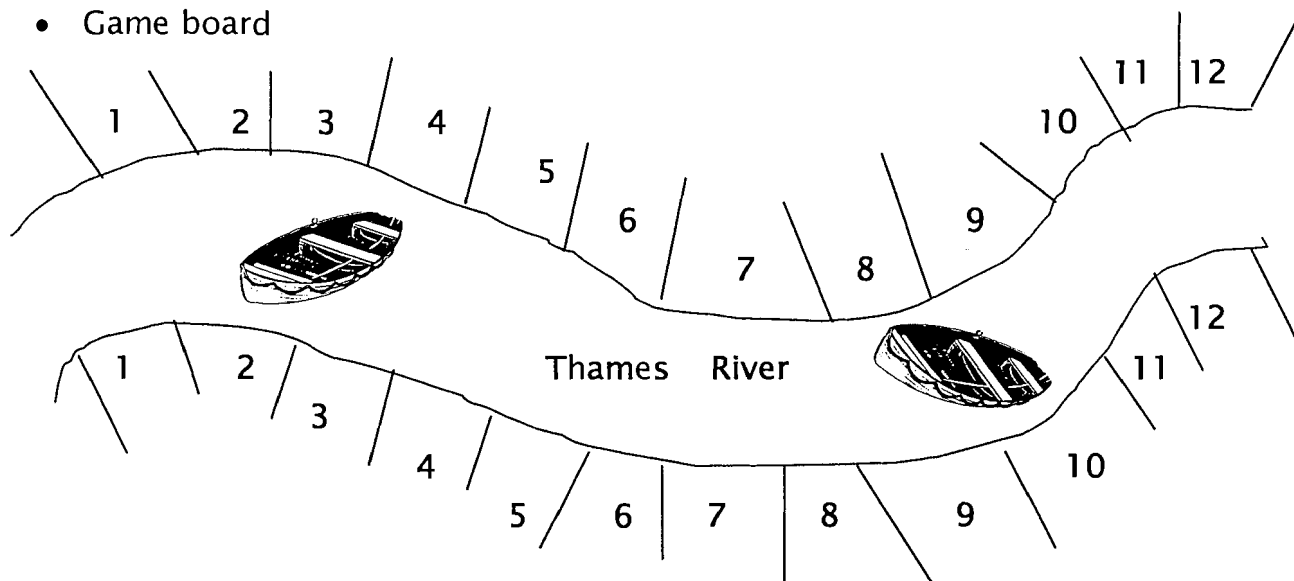
### Data Sheet

Name of Container	Estimated Number of Litres It Will Hold	Actual Number of Litres Measured	How Close? (Too Much/Too Little)

# Crossing the River

## Materials

- Between 8 and 12 small counters per person to place in the docks as boats
- Container to hold counters
- Game board

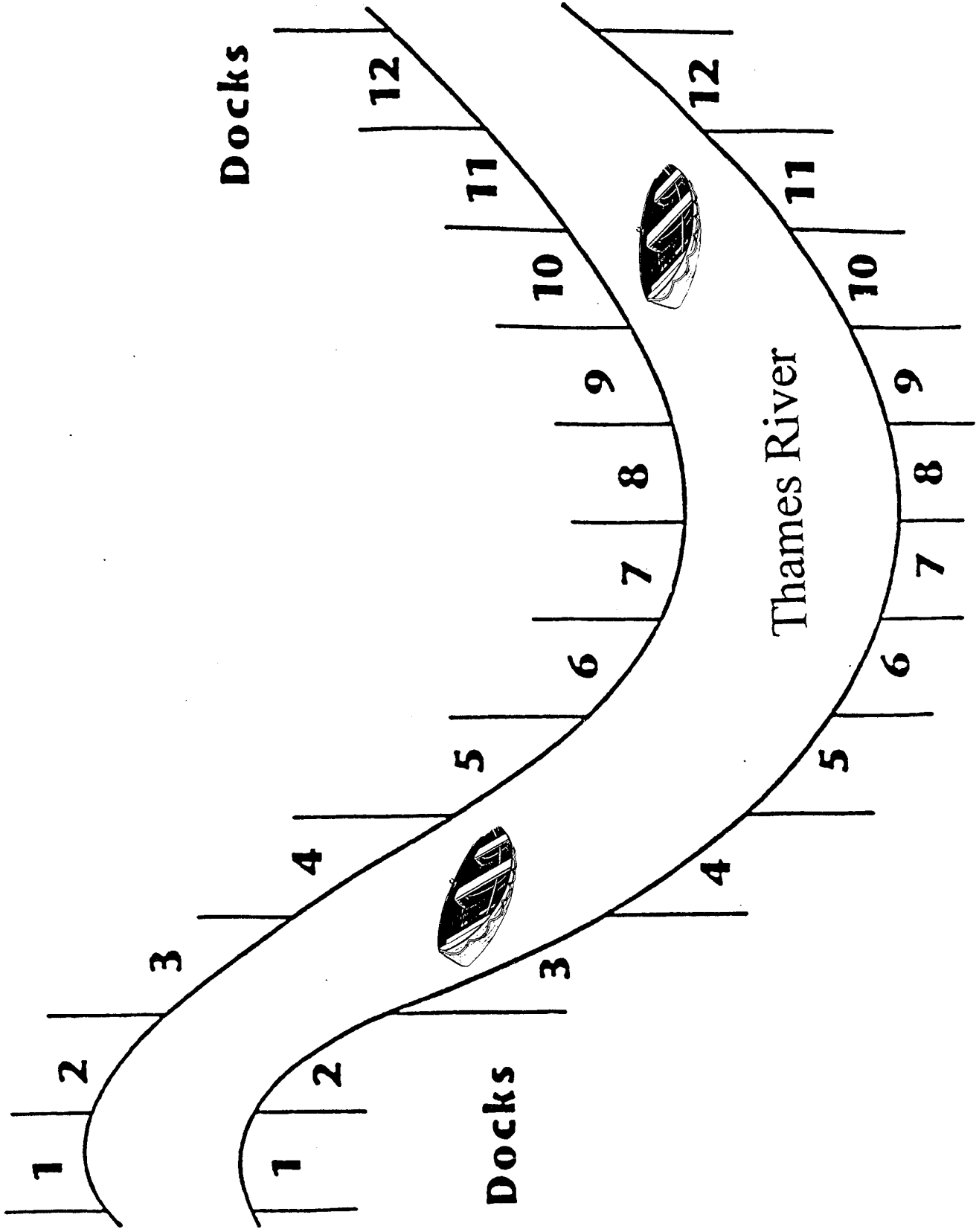


## Rules of the Game:

1. Each player is given a number of “boats” to place on their side of the river.  
Between 8 and 12 counters works best.
2. The boats can be placed on any “dock”.  
Players can put as many boats as they wish in each dock.
3. Players take turns rolling two dice.  
The numbers on the dice are added together.
4. If the player who rolled the dice has a boat in the dock with that number (s)he can remove it - “Cross the River”.  
If they have several boats in that dock, they can only remove one each time they roll that sum.
5. The boats that cross go into the container.
6. The first person to remove all boats is the winner.

## Notes:

This game helps children understand some basic ideas of probability. Certain numbers are more likely (e.g., 6, 7, or 8). Other numbers are rolled very infrequently (e.g., 2 and 12). Therefore it is best to keep your boats around the centre.

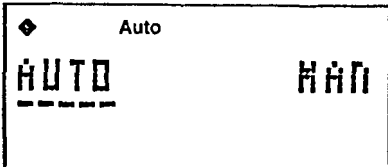
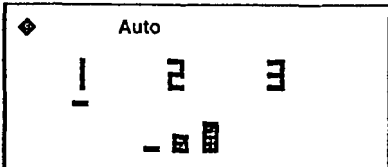
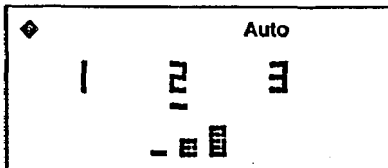
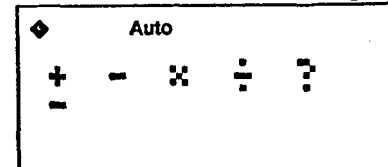
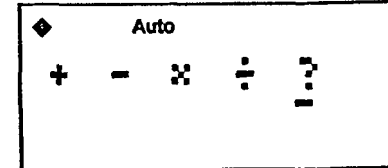
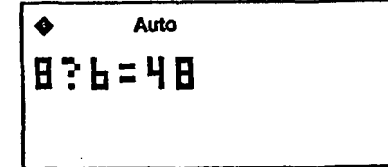
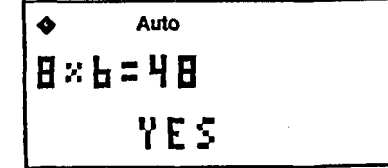



# Calculator Guide

## Page 3 Using the ?

If you want to solve problems that give you the answer but do not tell you the "operation" follow these directions.

Press On  
Off and Clear at the same time to erase old messages.

Press	Display
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">Mode</span>	
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">1</span>	
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">Enter</span>	
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">2</span>	
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">+</span>	
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">+</span> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">-</span> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">x</span> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">÷</span> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">?</span>	
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">Mode</span>	
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">x</span> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">Enter</span>	

After about 2 seconds the screen on the left appears.

Press → to change levels.  
3 is the hardest

Press → to change the operation.

If you press → 4 times you will get to ?

In this example decide if it is a +, -, x or ÷  
Press the answer on the yellow keys.

You are correct.

Calculator now works the same as last week.

## What was your favourite activity in “Math at Home”?

Write in the name of the activity you liked best this week from the “*Math at Home*” book.

- Calendar Predictions
- Fun in the Tub
- What Never Happens

Fill in the chart to tell what you liked about it.

In the Comments section tell why you liked it.

Name of Favourite Activity	_____			
1	2	3	4	5
Easy				Very hard
1	2	3	4	5
No fun				Lots of fun
1	2	3	4	5
Tried it once				Tried it lots
1	2	3	4	5
Instructions were hard to understand				Instructions were easy to understand
Comments:				

Name of Second Favourite (If you have one)	_____			
1	2	3	4	5
Easy				Very hard
1	2	3	4	5
No fun				Lots of fun
1	2	3	4	5
Tried it once				Tried it lots
1	2	3	4	5
Instructions were hard to understand				Instructions were easy to understand
Comments:				

Name (if you want) \_\_\_\_\_

*Wrap Up with Parents*  
*Session 4*  
**Where's the Math?**

**1. How many centimetre cubes would fit into the stone?**

This estimating activity helps children visualize capacity in different ways. Estimating the capacity of irregular objects, is far more difficult than estimating the capacity of a regular object (e.g., a box).

Estimating is developed through practice and reflection. The more we do it and the more we think about why we do it, the better we become. This activity also develops risk taking, problem solving and the idea that there is a range of possible answers when estimating.

In Grade 3 it is important for students to estimate and record capacity in standard units. However, this activity is designed for older students who need to understand the relationship between capacity and volume, as well as an understanding of displacement theory.

Archimedes is the most famous person when discussing displacement. You might want to tell the famous “Eureka” story to families.

G3 M(s) – estimate, measure, and record the capacity and/or mass of an object, using a variety of non-standard units

G5 M(s) – determine, through investigation, the relationship between capacity (i.e., the amount a container can hold) and volume, by comparing the volume of an object with the amount of liquid it can contain or displace

**2. Capacity**

This story provides a good introduction to the activity “How Much Does It Hold?”, and is also a good link with the home activity “Fun in the Tub”.

Gr 2 COMM – communicate mathematical thinking orally, visually, and in writing, using everyday language, a developing mathematical vocabulary, and a variety of representations

G4 M(s) – communicate mathematical thinking orally, visually, and in writing, a basic mathematical vocabulary, and a variety of representations, and observing basic mathematical conventions

**3. How Much Does it Hold?**

This activity promotes the understanding that different shaped containers can often look like they hold far less than they really do. Capacity and volume concepts are best understood by “doing”, then talking about the “doing”.

Children have to make sense of concepts for themselves from direct experiences.

- G2 M (s) – estimate, measure, and record the capacity and/or mass of an object, using a variety of non-standard units
- G5 M (s) – determine, through investigation, the relationship between capacity and volume
- G5 M (s) – select and justify the most appropriate standard unit to measure mass (i.e., milligram, gram, kilogram, tonne).

#### 4. Crossing the River

Some primary addition facts are needed to add the numbers on the two dice, but the main purpose of this activity is to introduce children to early ideas about probability.

They should recognize which numbers are most likely (6, 7 and 8 because there are more combinations of numbers on the dice that add to these numbers).

They should also understand which number could never come up. (That number would be one.)

- G2 DM&P (s): – describe the probability that an event will occur, through investigation with simple games and probability experiments and using mathematical language
  - R&P – apply developing reasoning skills (e.g., pattern recognition, classification) to make and investigate conjectures (e.g., through discussion with others);
- G5 DM&P (s): – determine and represent all the possible outcomes in a simple probability experiment
  - R&P – develop and apply reasoning skills (e.g., classification, recognition of relationships, use of counter-examples) to make and investigate conjectures and construct and defend arguments;

#### 5. Calculator

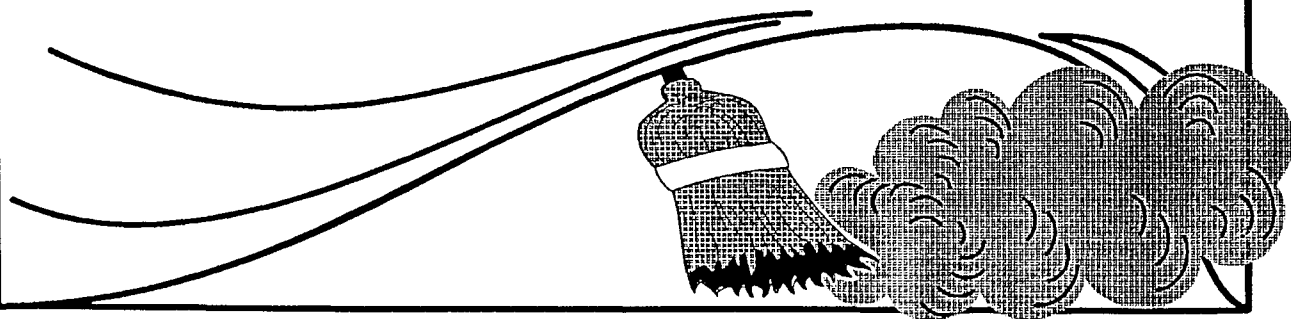
This week children will try and find the operation that is needed (e.g.,  $6 \times 8 = 48$  – No multiplication sign is shown). When solving word problems you have to decide what to do with the numbers even when you have a calculator – Think, “Is this addition or subtraction?” This activity helps children explore operations.

##### **The Mathematical Process – Selecting Tools and Computational Strategies**

Students can use calculators or computers to perform operations, make graphs, and organize and display data that are lengthier and more complex than those that might be addressed using only pencil-and-paper. Students can also use calculators and computers in various ways to investigate number and graphing patterns, geometric relationships, and different representations; to simulate situations; and to extend problem solving. When students use calculators and computers in mathematics, they need to know when it is appropriate to apply their mental computation, reasoning, and estimation skills to predict and check answers.

The computer and the calculator should be seen as important problem-solving tools to be used for many purposes. (Ontario Mathematics Curriculum 2005, pages 14, 15)

# NOTES



Esso Family Math Project

Grades 2 - 5

Session 5

Measurement and Geometry

Entry Estimation	Materials	Activities	Home Challenges
<p><u>How long will the birthday candle burn?</u></p> <ul style="list-style-type: none"> <li>• Families write their name on a post-it note and place it on the number line to indicate the range of their estimate.</li> </ul>	<ul style="list-style-type: none"> <li>➤ nametags</li> <li>➤ math stickers</li> <li>➤ post-it notes</li> <li>➤ transparent overlay</li> <li>➤ birthday candle</li> <li>➤ 15 trays for Mancala</li> <li>➤ 15 x 50 beads</li> <li>➤ 20 square pieces of cardstock</li> <li>➤ 20 sets of tangrams for families to use and take home</li> <li>➤ <i>Grandfather Tang's Story</i> (Trompert)</li> <li>➤ copies of tangram activities, scoring guide for Deer Buttons, Calculator Quiz</li> <li>◊ pencils</li> <li>◊ 15 pairs of scissors (see night 2)</li> <li>▲ 20 small containers (to hold counters - See Night 4)</li> <li>▲ 6 pennies per family</li> <li>▲ matches</li> <li>▲ clock or watch (to time candle)</li> <li>▲ container with sand (to burn it in)</li> </ul>	<ol style="list-style-type: none"> <li>1. Discussion of estimation activity and Home Challenges</li> <li>2. Games: Deer Buttons (younger children) and Mancala (older children)</li> <li>3. Cut a card</li> <li>4. Tangrams</li> <li>5. Story: Grandfather Tang's Story</li> <li>6. Calculator Quiz</li> <li>7. Parent Time/Home Challenges with children</li> </ol>	<ul style="list-style-type: none"> <li>➤ Calculator Quiz</li> <li>➤ Tangram Challenge</li> </ul> <p><u>Materials to take home</u></p> <ul style="list-style-type: none"> <li>➤ Tray for mancala</li> <li>➤ 50 beads</li> <li>➤ Set of tangram pieces</li> </ul>

Location: \_\_\_\_\_

Time: \_\_\_\_\_ Date: \_\_\_\_\_

Possible Schedule for Session Five:

Activity	Duration	Start Time	Team members
❖ Set-Up	15 minutes		
❖ Meal	30 minutes	5:30 p.m.	
❖ Registration and Name Tags	During meal		
❖ Entry Activities: How long will the candle burn?	Before and During meal		
❖ Introduction Entry Activity and Home Challenge Review	20 minutes	6:00 p.m.	
❖ Games: Deer Buttons (younger children) Mancala (older children)	20 minutes	6:20 p.m.	
❖ Cut-A-Card ❖ Tangrams	20 minutes	6:40 p.m.	
❖ Story: Grandfather Tang's Story	10 minutes	7:00 p.m.	
❖ Calculator Quiz	10 minutes	7:10 p.m.	
❖ Parent Time (questions from parents)	10 minutes	7:20 p.m.	
❖ Home Challenges (each facilitator works with 1 or 2 children)			
❖ Clean Up <i>Please leave the room as you found it.</i>	15 minutes	7:30 p.m.	All
❖ Planning for next week	30 minutes	7:45 p.m.	All

# Entry Estimations

## How long will the birthday candle burn?

### Materials

- Birthday candle
- Container with sand (for candle)
- Matches
- Clock or watch with second hand (to time candle)
- Post-it notes (12.5 cm by 7.5 cm)
- Number line (106 cm long – 3 legal sized pieces of paper joined horizontally)  
0 ½ 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ ..... 13 13½ 14 14½ 15
- Transparent overlay

### Instructions

As participants arrive–

1. Families are given a post-it note and asked to estimate how long they think the candle will burn. Encourage participants to think in half-minute intervals. Blank post-it notes without name or identification decrease the anxiety of making an estimation. The post-it will cover a range of numbers.

Stress that we are trying to be ‘in the zone’, not find an exact answer.

2. Encourage parents and children to talk about their estimating strategies.
3. Leaders should be close by to discuss and extend thinking about approaches to estimating that they notice the participants using.

At the beginning of the session–

1. Ask if anyone would like to share his or her strategy for estimating how long the candle will burn. Discussion will focus on reasons for differences and strategies for estimating time (e.g., previous experiences with candles burning).
2. Find something positive to say about each person’s strategy, whenever possible.
3. After discussion, leader puts transparent overlay on the number line where most post-it notes are placed. Blank post-it notes decrease an individual’s anxiety during discussion.
4. Light the candle and have a participant time how long it burns.
5. When the candle has burned half way, ask families if they wish to move the transparent overlay and why. Leader responds to the general consensus of the group by moving the overlay as directed. This strategy will reinforce the idea of refining estimations based on further information.

6. When the candle has burned out completely, note how long it took. Compare to estimates and discuss reasons for differences.

Note: As an alternative to burning a candle you could have participants predict how long it will take for a dripping tap to fill a glass. The drips can be fast or slow, and the size of the glass can vary.

### Home Challenge –

Collect the questionnaires. You might help those who forgot to complete the questionnaire to do so during dinner.

Provide stickers to anyone trying an activity during the week.

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# Deer Buttons

(Game for younger children\*)

## Materials

- About 50 small stones, pebbles or counters for each family
- Container to hold them
- 6 pennies per family

## Background

Many First Nations' People, especially those of the Woodlands area, play a version of this game.

The game can be played with 6 two-sided counters or "buttons". The circular buttons were often made from deer or elk horn, and had a diameter of approximately 2 cm. Designs were burned onto one side of the button. Today, many household materials can be used to play the game. However, the players must be able to distinguish the difference between the two sides. Coins, real buttons or checker pieces, with one side clearly different from the other, make good "buttons".

## Instructions

1. A pile of approximately 50 stones is placed in the middle of the players.
2. To play the game, the "buttons" (in this case pennies) are thrown onto a flat surface.
3. Points are scored according to the table shown.
4. Each time players score points they take that many stones.
5. Play continues until all the stones are gone. The player with the most stones is the winner.

Words	Picture	Scoring
When 6 sides turn up the same.	●●● or ○○○ ●●● ○○○	Take 5 stones from the pile.
When 5 sides turn up the same, and one is different.	●●● or ○○○ ●○● ○○●	Take 2 stones from the pile.
If 3 sides turn up the same, and 3 are different.	●●● ○○○	Take 1 stone from the pile.
When 4 sides turn up the same, and 2 are different.	●●● or ○○○ ○●○ ●○●	Take 0 stones from the pile.

(\*Older children of lower ability might enjoy this game more than mancala.)

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Deer Buttons

Words	Picture	Scoring
When 6 sides turn up the same.	●●● or ○○○ ●●●    ○○○	Take 5 stones from the pile.
When 5 sides turn up the same, and one is different.	●●● or ○○○ ●○○    ○○●	Take 2 stones from the pile.
If 3 sides turn up the same, and 3 are different.	●●● ○○○	Take 1 stone from the pile.
When 4 sides turn up the same, and 2 are different.	●●● or ○○○ ○○○    ●○○	Take 0 stones from the pile.

Deer Buttons

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When 4 sides turn up the same, and 2 are different.	●●● or ○○○ ○○○    ●○○	Take 0 stones from the pile.

# Mancala

(Game for older children\*)

## Materials

- Ice cube trays or 2 muffin trays with 12 compartments (1 per pair of players)
- 48 small beads, pebbles or counters per tray
- Containers (such as margarine tubs or yogurt cups) to act as the mancalas

## Background

Mancala is one of the world's oldest games of strategy and skill. It can be learned in a few minutes but takes years to master. Variations of Mancala are most commonly found in Africa, but it is played throughout the world including India, Sri Lanka, Indonesia, Malaysia, Philippines, South America and the Caribbean. Stone Mancala boards have been found carved into the roofs of temples in Memphis, Thebes and Luxor, and we know the game was popular in Egypt before 1400 B.C.

For more information, go to these Web sites:

<http://www.tradgames.org.uk/games/Mancala.htm>

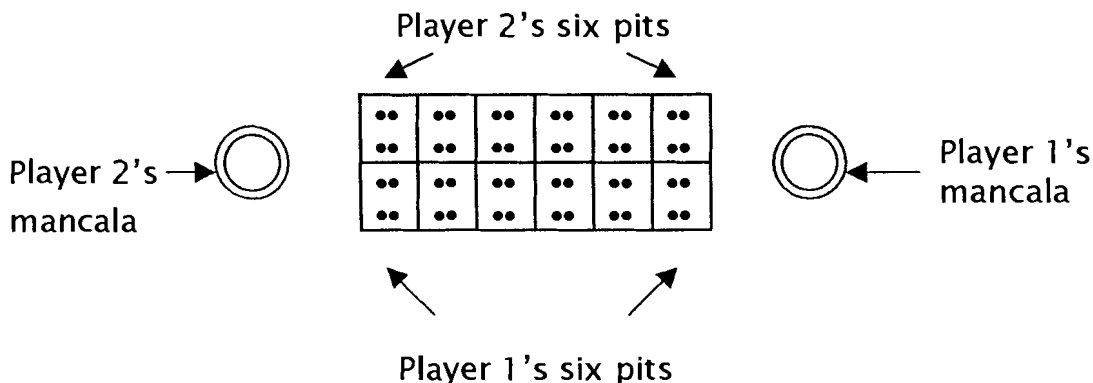
<http://imagiware.com/mancala/mancala.cgi>

<http://www.miniclip.com/mancalabugs.htm>

## Instructions

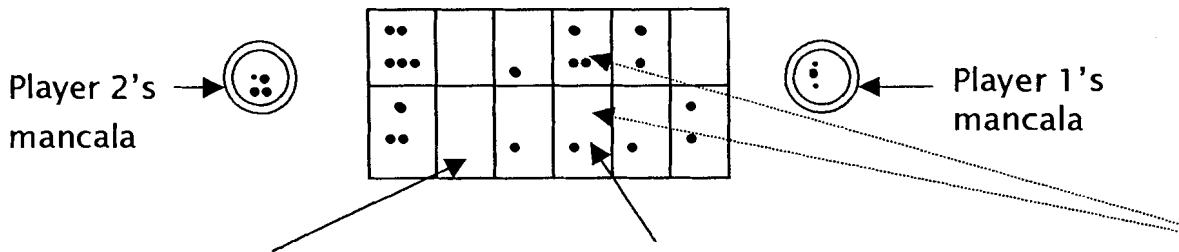
Although there are as many different variations of rules as there are names, we will play according to the following rules:

1. Each small bowl ('pit') on the ice cube tray is filled with four beads. The mancalas are empty.



2. Players take turns picking up all the beads from one of their pits and moving in a counterclockwise ( ↶ ) direction, dropping one bead in each pit, including their own mancala. No bead is dropped in your opponent's mancala.
3. Getting an extra turn – If the last bead to be dropped is dropped into your own mancala, you get an extra turn.

4. Capturing Beads – If the mover drops the last bead in an empty playing pit which belongs to the mover, then any beads in the opponent's playing pit that is directly opposite are moved to the moving player's mancala together with the bead the mover dropped in the empty pit. If a player lands in the opponent's empty pit the game continues as usual.



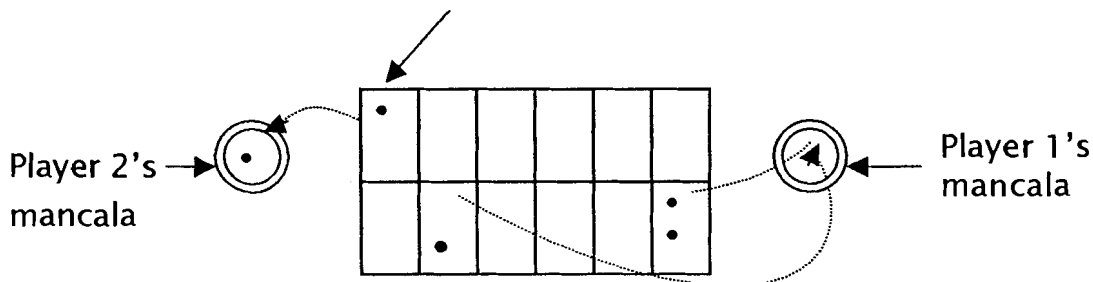
Step 1: The mover, Player 1, takes two beads from this pit

Step 2: If the last bead is dropped into the mover's empty pit, beads in the opponent's pit are captured.

Step 3: All four beads captured from the two pits are placed in the mover's (Player 1's) mancala.

5. Ending the game – when no beads are left in one player's playing pits, the game is over. The other player keeps all the beads in his pits and places them in his own mancala for scoring. Hence, it is not always wise to be the first player to finish (see below).

Player 2 moves the last bead into the mancala.  
The game stops because all of Player 2's pits are empty.



Once the last move has been made, Player 1's beads are moved into Player 1's mancala. The game is now over.

6. At the end of the game the beads in each player's mancala are counted, and the player with the most beads is the winner.

(\*Young children of high ability might enjoy this game.)

# Cut-A-Card

## Materials

- Square piece of cardstock
- Scissors

## Activity:

1. Cut the card into two pieces of any size or shape. (Surprisingly, straight cuts are more difficult than curved lines.)  
Shake the two pieces in your hands; drop them on the table and put the square back together.
2. Take one of the two pieces and cut that piece in two (any size, any shape).  
Shake the three pieces in your hands; drop them on the table and put the square back together.
3. Take the other piece and cut that in two.  
Shake the four pieces in your hands and drop them in front of the person to your left. Have them put it back together.
4. Using the pieces that are now in front of you, cut one of the pieces.  
Shake the five pieces in your hands and give them back to the owner so that the owner can put them back together to make a square.

Note: This activity is quite difficult if both sides of the cards are blank. You can either use cards that have lines on one side, or have the children draw a picture on one side. They can then put together either the picture side or the blank side.

# Tangrams

## Materials

- Sets of tangram puzzle pieces
- Challenge pages (house and letters of the alphabet)

## Activity:

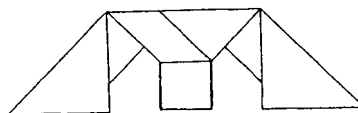
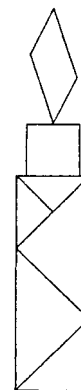
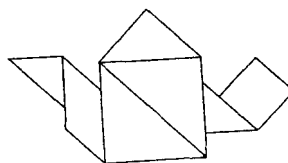
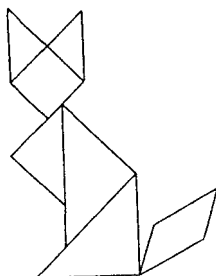
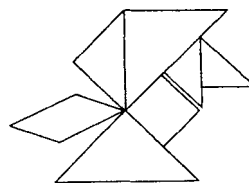
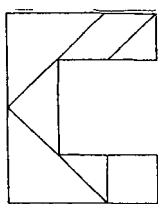
1. Distribute tangram sets and challenges pages.
2. Suggest participants start with the house puzzle.
3. As participants create letters of the alphabet, have them trace the tangram pieces to create puzzles for others to try.

## Home Challenge:

Give participants tangram sets and silhouette challenge page to take home.

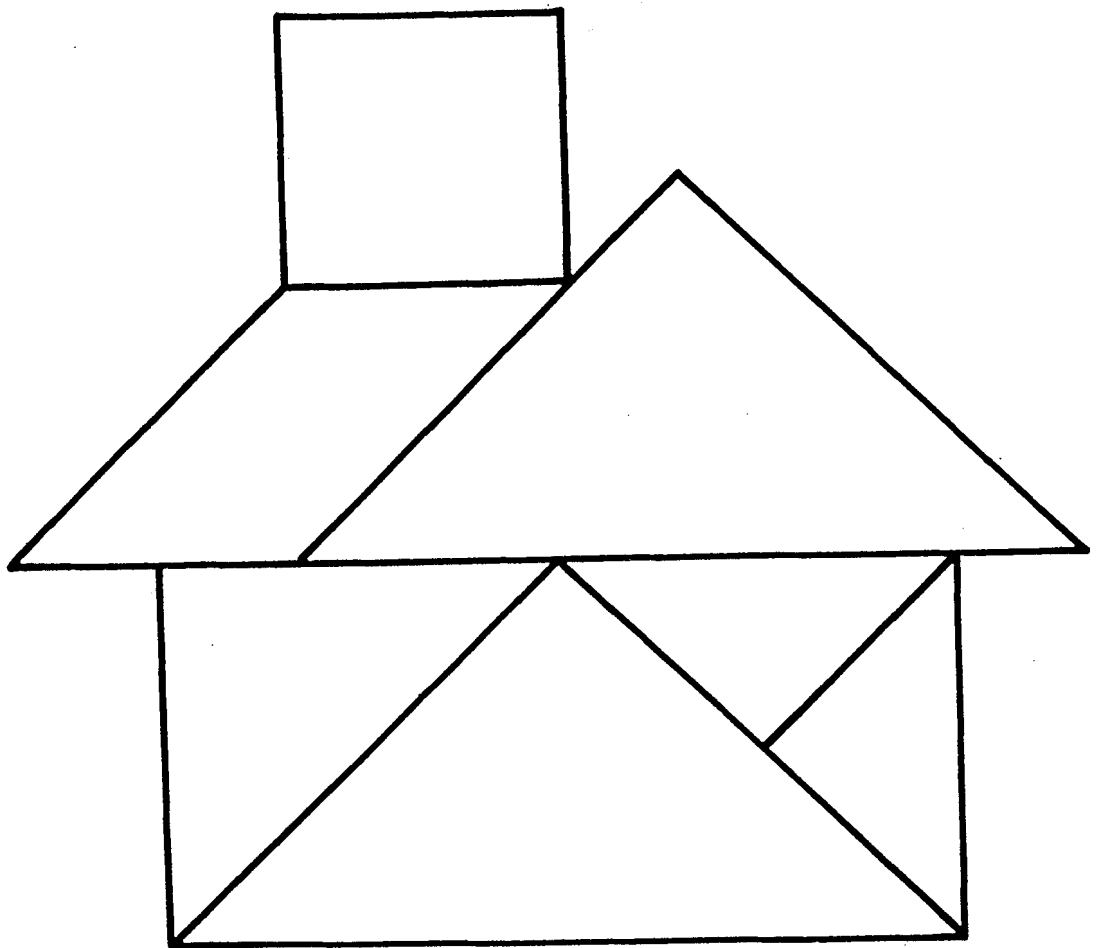
Encourage them to create their own tangram shapes, trace them and bring them back to display next week.

## Solutions:

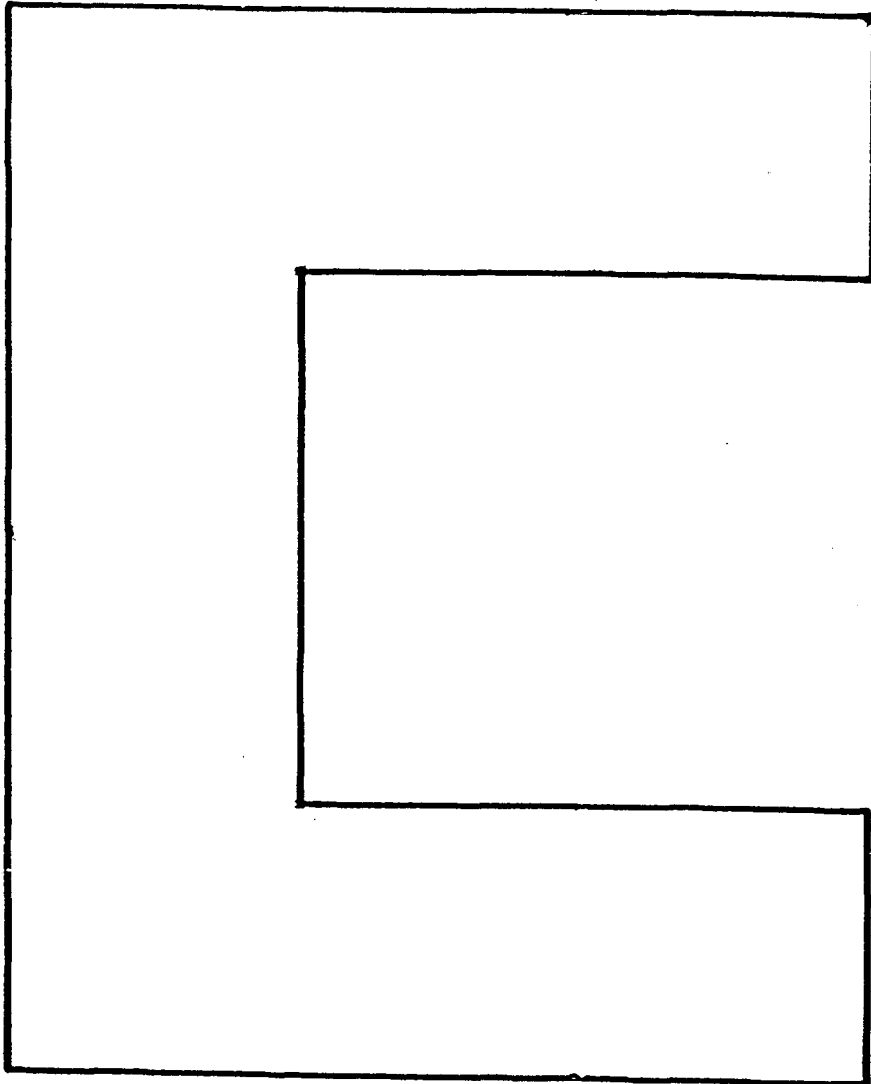


Adapted from "Tangramath" materials  
Esso Family Math Centre

Use the tangram pieces to make the shape of a house like this one.



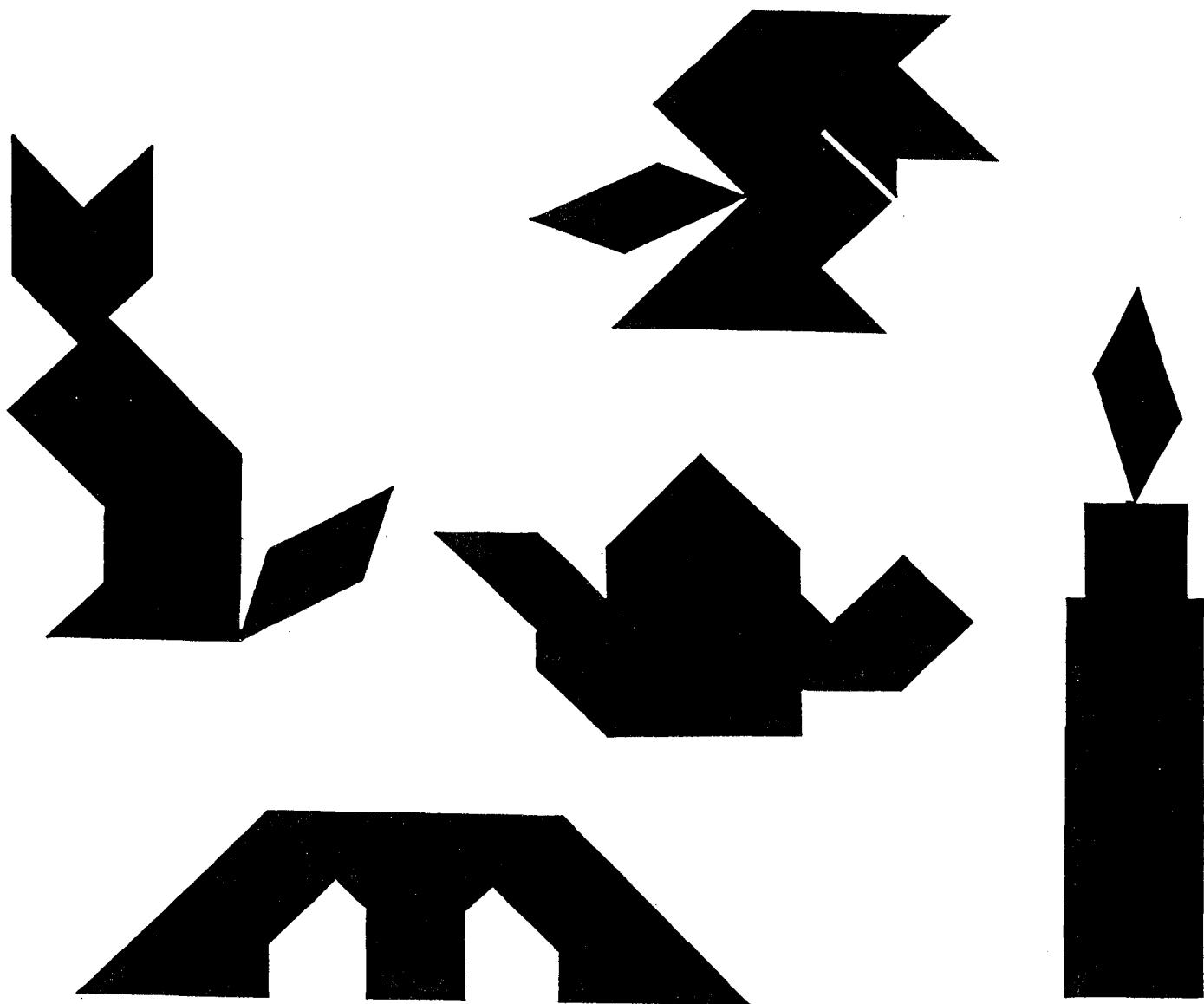
**Use the tangram pieces to make the letter  
"C" like this:**



**Using any number of tangram pieces, can  
you make another alphabet letter?**

Trace its shape to make a puzzle for someone  
else to try.

At home,  
try to make these pictures with your  
tangram pieces.



Make up your own pictures, trace them and  
bring them next week to show.

# *Grandfather Tang's Story*

## Geometry and Literature

### Materials

- Book by Ann Tompert ISBN 0-517-88558-1

### Instructions

1. In this story Grandfather Tang arranges the tangram pieces to represent various animals. It is a beautiful story to illustrate the power of literature in helping develop representations in children's minds.
2. Read the first five pages of "Grandfather Tang's Story" up to and including changing into a squirrel.
3. It is useful to have large pictures of the foxes, rabbit, dog and squirrel formed from tangram shapes to show the children as you read.
4. Ask the children what other animals Grandfather Tang might create?
5. One of the Home Challenges is to "Create your own tangram shapes and bring them back next week for display." Encourage the children to make an animal of their choice, and name it. Fantasy animals could be created too.

Note: Make sure you have contacted the local library to be sure they have copies of "Grandfather Tang's Story" available.

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# Calculator Quiz

## *Leader's notes*

*Demonstrate the process for solving the riddles by doing a few examples as a group. Facilitators should be working closely with the families during this demonstration so that everyone understands the process involved. Family frustrations can easily rise if they feel confused and left behind the group.*

Find the answer to the riddle by using the calculators to solve the number sentences. Then turn the calculator upside down to see the word answer to riddle.

- |                                 |                                  |
|---------------------------------|----------------------------------|
| 1. The outside of an egg        | $50\ 045 + 25\ 309 - 9 + 2\ 000$ |
| 2. Mountains usually are        | $4\ 300 + 400 - 100 + 14$        |
| 3. A hot spot!                  | $28\ 432 \div 4$                 |
| 4. What a salesperson does      | $3\ 849 \times 16 - 3\ 849$      |
| 5. Good for a car               | $1\ 600 \div 2 - 90$             |
| 6. A person in charge           | $4 \times 9 \times 9 \times 17$  |
| 7. Crying a lot                 | $13 \times 13 \times 5 - 40$     |
| 8. Every garden should have one | $0.002\ 415 \div 0.007$          |
| 9. A _____ of flowers           | $3.1 \times 5.2 \div 8 - 1.635$  |
| 10. You might play on this      | $30\ 000 + 275 - 100$            |

## How to Make Your Own Quiz

*Facilitators should create a riddle or two with the children during the "Home Challenges" portion of the session so that they understand the directions.*

Which numbers make letters?

(0 = O or D, 1 = I, 3 = E, 4 = h, 5 = S, 6 = g, 7 = L, 8 = B)

1. Make up a word from the letters - O, D, I, E, h, S, g, L, B.
2. Now make up a riddle.
3. Last, make a number sentence that gives the answer you want. Be sure it works when you **turn the calculator upside down**.
4. Bring your questions to class next week.

# Calculator Quiz

Find the answer to the riddle by using the calculators to solve the number sentences. Then turn the calculator upside down to see the word answer to riddle.

1. The outside of an egg  $50\,045 + 25\,309 - 9 + 2\,000$
2. Mountains usually are  $4\,300 + 400 - 100 + 14$
3. A hot spot!  $28\,432 \div 4$
4. What a salesperson does  $3\,849 \times 16 - 3\,849$
5. Good for a car  $1\,600 \div 2 - 90$
6. A person in charge  $4 \times 9 \times 9 \times 17$
7. Crying a lot  $13 \times 13 \times 5 - 40$
8. Every garden should have one  $0.002\,415 \div 0.007$
9. A \_\_\_\_\_ of flowers  $3.1 \times 5.2 \div 8 - 1.635$
10. You might play on this  $30\,000 + 275 - 100$

## How to Make Your Own Quiz

Which numbers make letters?

(0 = O or D, 1 = I, 3 = E, 4 = h, 5 = S, 6 = g, 7 = L, 8 = B)

1. Make up a word from the letters – O, D, I, E, h, S, g, L, B.
2. Now make up a riddle.
3. Last, make a number sentence that gives the answer you want. Be sure it works when you turn the calculator upside down.
4. Bring your questions to class next week.

## Wrap Up with Parents

### Session 5

## Where's the Math?

### 1. Burning the Candle

Estimating time is an important skill in the real world, but it is a difficult concept because although the passage of time is constant, it is relative to what we are doing — it flies by or takes forever. When having fun (in math!) time flies, but when bored, or perhaps in pain (in math!) time appears to pass very slowly. Experience helps people become better estimators, so we are often very good estimating what we do “lots of”, but quite poor estimating new ideas. Most people tend to underestimate the time for a birthday candle to burn. Parents can have their children close their eyes for a minute and open them after they think a minute has past. Children are surprised when they open their eyes after only 15 seconds.

Suggest that birthday candles might be burnt in different places at home to see that they will burn faster near an open window and slower in a sheltered room.

*Talk about fire safety and never letting children play with matches.*

- G2 M(o) – estimate, measure, and record length, perimeter, area, mass, capacity, time, and temperature, using non–standard units and standard units;
- CONN – make connections among simple mathematical concepts and procedures and relate mathematical ideas to situations drawn from everyday life;
- G5 M (s) – estimate and determine elapsed time, with and without using a time line, given the durations of events expressed in minutes, estimate and measure the passage of time using **minutes** and hours
- CONN – make connections among mathematical concepts and procedures, and relate mathematical ideas to situations or phenomena drawn from other contexts (e.g., other curriculum areas, daily life, sports);

### 2. Mancala

Mancala is an African game played in many different countries under many different names. It is a game of strategy in which you have to think ahead, counting how many beads are in your pits at the present time, how many will be in each pit after your opponent has had a turn, and where you can place your last bead in order to have an advantage in winning the game. This style of thinking is necessary if one is to be a good mathematical problem solver. The game also illustrates the multicultural aspect of mathematics and the enjoyment associated with mathematical games.

- G2 N (s) – solve problems involving the addition and subtraction of whole numbers to 18, using a variety of mental strategies.
- DM&P(s) – describe the probability that an event will occur, through investigation with simple games;
- G5 N (s) – solve problems involving the addition, subtraction, and multiplication of whole numbers, using a variety of mental strategies

### 3. Deer Buttons

Deer Buttons is a First Nations game introducing young children to some early ideas of probability. It is important for the children to understand that when they toss six two–

sided counters onto the ground that ●●●○○○ and ●●○○○○ or ○○●●●●, are more likely than ●●●●●○ and ●●●●●●. Talking about these ideas helps children understand the notion of chance.

G2 DM&P (s) – describe the probability that an event will occur through investigation with simple games and probability experiments and using mathematical language

G5 DM&P (s) – pose and solve simple probability problems, and solve them by conducting probability experiments and selecting appropriate methods of recording the results

#### 4. Cut-A-Card and Tangrams

An important aspect of elementary geometry is “Motion Geometry” or “Transformational Geometry”. In this activity children slide, turn and flip (if both sides are blank) the pieces. They also learn which pieces fit together and thereby develop spatial skills.

The Tangram puzzle is an old Chinese puzzle that helps children develop spatial ability and creativity.

G2 G(s) – compose and describe pictures, designs, and patterns by combining two-dimensional shapes

G2 G(s) – cover an outline puzzle with two dimensional shapes in more than one way

G5 G(s) – create and analyse designs by translating and/or reflecting a shape, or shapes, using a variety of tools

#### 5. Grandfather Tang’s Story

The Story “Grandfather Tang” by Ann Tompert is a beautiful book about using tangram pieces in many different ways. Developing spatial sense, and recognizing how 2D shapes can be taken apart and put back together to form other 2D shapes is an important skill for many occupations. It is also important to encourage divergent thinking and creativity in mathematics.

G2 G(s) – compose and describe pictures, designs, and patterns by combining two-dimensional shapes

G5 G(s) – create and analyse designs by translating and/or reflecting a shape, or shapes using a variety of tools

#### 6. Calculator Quiz

The math comes out of deciding on the numbers and operations that must be used to get the answers that will produce the words. Children can make these as simple or as complex as they like, so all children can be successful at their own level of ability.

##### The Mathematical Process – Selecting Tools and Computational Strategies

Students can use calculators or computers to perform operations, make graphs, and organize and display data that are lengthier and more complex than those that might be addressed using only pencil-and-paper. Students can also use calculators and computers in various ways to investigate number and graphing patterns, geometric relationships, and different representations; to simulate situations; and to extend problem solving. When students use calculators and computers in mathematics, they need to know when it is appropriate to apply their mental computation, reasoning, and estimation skills to predict and check answers.

The computer and the calculator should be seen as important problem-solving tools to be used for many purposes. (Ontario Mathematics Curriculum 2005, pages 14, 15)

Esso Family Math Project

Grades 2 – 5

Session 6

Place Value and Patterns

Entry Sign In	Materials	Activities	Home Challenge
<p><u>Pattern Chart</u></p> <ul style="list-style-type: none"> <li>• Participants continue the patterns on the charts provided.</li> </ul>	<ul style="list-style-type: none"> <li>➤ nametags</li> <li>➤ math stickers</li> <li>➤ copies of hundred chart</li> <li>➤ 20 packages of crayons</li> <li>➤ “100th Day Worries” (Cuyler)</li> <li>➤ copies of small hundred chart, Race for a Loonie game board, Patterns on a Hundred Chart</li> <li>➤ copies of Family math certificates</li> <li>➤ extra dice to loan (in case families forgot their own)</li> <li>◆ pattern chart</li> <li>◆ 20 baggies of loonies, dimes and pennies</li> <li>◆ 20 “L” and “T” shapes</li> <li>◆ large 100 chart</li> </ul>	<ol style="list-style-type: none"> <li>1. Discussion of entry activity and Home Challenges</li> <li>2. Race for a Loonie</li> <li>3. Spend a Loonie</li> <li>4. Patterns on the Hundred Chart</li> <li>5. Story: 100<sup>th</sup> Day Worries</li> <li>6. Presentation of Certificates</li> </ol>	<p><u>Materials to take home</u></p> <ul style="list-style-type: none"> <li>➤ Family Math certificates</li> <li>➤ Race for a Loonie game board</li> <li>➤ 100 chart</li> <li>➤ Patterns on a Hundred Chart</li> </ul>

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➤ Materials provided by Esso Family Math Centre    ◆ Materials to be purchased using Esso Family Math Funds    ▲ Materials to be collected/made by the community

Location: \_\_\_\_\_

Time: \_\_\_\_\_ Date: \_\_\_\_\_

Possible Schedule for Session Six:

Activity	Duration	Start Time	Team members
❖ Set-Up	15 minutes		
❖ Meal	30 minutes	5:30 p.m.	
❖ Registration and Name Tags	During meal		
❖ Entry Activity: Pattern charts	Before and During meal		
❖ Introduction Entry Activity and Home Challenge Review	20 minutes	6:00 p.m.	
❖ Race for A Loonie	15 minutes	6:20 p.m.	
❖ Spend a Loonie	15 minutes	6:35 p.m.	
❖ Patterns on the Hundreds Chart	20 minutes	6:50 p.m.	
❖ Story: 100 <sup>th</sup> Day Worries	10 minutes	7:10 p.m.	
❖ Presentation of Certificates	10 minutes	7:20 p.m.	
❖ Clean Up <i>Please leave the room as you found it.</i>	15 minutes	7:30 p.m.	All

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# Entry Activity Pattern Chart

## Materials

- 5 or 6 laminated charts (on which family members can write a continuation of the pattern that has been started)
- Washable markers

Continue the Pattern
S, M, T, W, _ , _

Continue the Pattern
1, 2, 3, 5, 8, _ , _ ,

Other pattern ideas might include:

1, 2, 4, 8 , \_\_, \_\_, \_\_,

I, I, I, \_\_, \_\_, \_\_,

2, 4, 6, \_\_, \_\_, \_\_, \_\_,

→ , ← , →, \_\_, \_\_, \_\_

30, 25, 20, \_\_, \_\_, \_\_

o, t, t, f, f \_\_, \_\_, \_\_,

/ , \, \/\_ \_\_, \_\_, \_\_

etc.

## Instructions

As participants arrive for the last night-

1. Encourage them to be as creative as possible when continuing the patterns on the chart
2. Encourage both parents and children to participate.
3. Ask for those who created a calculator quiz to post it and encourage other families to attempt some of those quizzes, which have been posted.

At the beginning of the session-

1. Have participants explain their reasoning for their continuation of the patterns.
2. Praise divergent thinking, and explain how there is often more than one correct answer to a math problem.

## Home Challenge -

Ask for participants to show the tangram puzzles they created.

Have any families who solved someone else's calculator quiz share the answer they found.

Provide stickers to anyone who brought in a tangram puzzle and/or calculator quiz, which they completed during the week.

**PENNIES**



**DIMES**



**LOONIE**



## Race for a \*Loonie

### Materials

- Game boards
- Two dice
- Pennies
- Dimes
- Loonies
- Container for the “bank”

### Instructions:

1. Use a game board for each player.  
Give each player 19 pennies, 10 dimes and 1 loonie to act as “the bank” during the game.
2. The first player rolls the dice and adds the numbers together.  
That sum is the number of cents the player receives from the bank.  
The player places them in the “Cents” column of their game board.  
Whenever there are 10 pennies in the “Cents” column, the player should exchange them for a dime from the bank.  
Likewise 10 dimes are exchanged for a loonie.
3. The first player to get a loonie is the winner.

### **Spend the Loonie**

(A more difficult game of subtraction)

### Instructions:

*This game is the reverse of “Race for a Loonie”.*

1. Players start with a loonie and try to get rid of it.
2. Players roll two dice, add the numbers together and put that many cents into the “bank”.
3. The first player to “spend” all their money is the winner
4. The most difficult roll is the first one. The player will need to exchange the loonie for 10 dimes. Then they will exchange one of the dimes for 10 pennies.

N.B. Consider the difficulty of  $100 - 6$ . It is the regrouping which causes problems for so many children. Once they know how to regroup (and why) subtraction is mastered quite quickly.

*\*“Loonie” is the term applied to the Canadian one dollar coin.*

# Patterns on the Hundred Chart

## Materials

- Copies of hundreds chart
- Coloured counters
- “L” and “T” shaped covering pieces

## Activity 1:

Colour numbers on the 100 chart with the crayons to fit the following rules. If you use blue for multiples of 2 and yellow for multiples of 5, then the 10’s will show as green.

Try these rules:

- Start with 2. Colour every second number blue.
- Start with 5. Colour every fifth number yellow.
- What do you notice about numbers that end with zero?
- Colour numbers with both digits the same red.
- Colour numbers whose digits add to 9 any colour you choose.

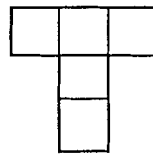
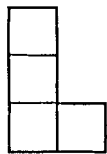
For example, in the number 45, the digits 4 and 5 add to 9; or in the number 81, the digits 8 and 1 add to 9.

- Colour numbers with the number four in them. Now colour numbers whose digits add to four. What do you notice? (A “4” is formed.)

Have participants make up a rule for someone else to solve. (e.g., one person starts colouring a pattern and others try to guess the rule.)

## Activity 2:

Have participants cover different sections of the chart with the “L shape” or the “T shape”.



Have the children name the numbers that are hidden under the letter.

## Patterns on the Hundred Chart

Colour the numbers following the directions below:

- Start with 2. Colour every second number **blue**.
- Start with 5. Colour every fifth number **yellow**.
- What do you notice about numbers that end with zero?
- Colour numbers with both digits the same **red**.
- Colour numbers whose digits add to 9 any colour you choose.  
For example, in the number 45, the digits 4 and 5 add to 9; or in the number 81, the digits 8 and 1 add to 9.
- Colour numbers with the number four in them. Now colour numbers whose digits add to four. What do you notice?

Make up your own rule for someone else to solve.

One person colours a pattern and others try to guess the rule.

# HUNDRED CHART

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

## *100<sup>th</sup> Day Worries*

### Number Sense, Patterning and Literature

#### Materials

- Book by Margery Cuyler ISBN 0-439-18807-5

#### Instructions

1. In this story Jessica worries about what she can take to school for 100<sup>th</sup> Day. Read the story to page 8 where it says, “That Sunday night at dinner, Jessica asked her family for ideas”.
2. Ask the children if they have any suggestions for items you could easily find 100 of, and if so what are they?
3. Read the remainder of the story.

This is an excellent story for the last night of Family Math, illustrating that trust, love and working together is what family life and Family Math is all about.

Note: Make sure you have contacted the local library to be sure they have copies of “100<sup>th</sup> Day Worries” available.

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## **Where's the Math?**

### **1. Entry Activity**

Patterns and relationships are the foundation of mathematics at all levels. It is crucial for children and their parents to understand that higher level mathematics is frequently finding and explaining symbolic relationships and patterns (e.g., generating a mathematical model – formula – for a real-world phenomenon).

G2 P&A(s) – identify repeating, growing, and shrinking patterns found in real-life contexts

G5 P&A(s) – create, identify, and extend numeric and geometric patterns, using a variety of tools

### **2. Race for a Loonie and Spend a Loonie**

Our number system is based on groups of ten. This activity has the children trading every time they get, or need, a group of ten. It also links math to real world money. The first game, “Race for a Loonie”, is linked to the idea of “carrying”, whereas the second game, “Spend a Loonie” will assist children with the notion of “borrowing” in subtraction.

G2 N(s) – solve problems involving the addition and subtraction of two-digit numbers, with and without regrouping, using concrete materials (e.g., base ten materials, counters)

G4 N(s) – demonstrate an understanding of place value in whole numbers

### **3. Patterns on the Hundreds Chart**

It is important for children to see how our number system is made up of tens and for them to see the patterns that are so prevalent. By colouring the numbers these patterns should become more transparent and less abstract.

Adults might be surprised that young children will not know the numbers that are covered by the T and L, but until children understand how the number system works and the patterns involved, they will not know what is under the shapes.

Parents should be patient with children and let them experiment.

G2 N(s) – represent, compare, and order whole numbers to 100, including money amounts to 100¢, using a variety of tools (e.g., ten frames, base ten materials, coin manipulatives, number lines, hundreds charts and hundreds carpets)

G5 P&A(s) – create, identify, and extend numeric and geometric patterns, using a variety of tools

### **4. 100<sup>th</sup> Day Worries**

Our counting system is based on groups of 10, as the story so nicely illustrates. It also models how a family can support children's schoolwork at home without “doing it for them”. The story fits with the activity “Patterns on a Hundred Chart”. If children understand our place value system they are more likely to have a good sense of number and numeration.

\* 100 Day is becoming a very popular activity in many elementary schools in all grades.

If your school hasn't tried the idea yet, you might want to consider getting it started.

G2 R&P) – apply developing reason skills (e.g., pattern recognition, classification) to make and investigate conjectures (e.g., through discussion with others);

G5 N(o) – develop and apply reasoning skills to make and investigate conjectures and construct and defend arguments;

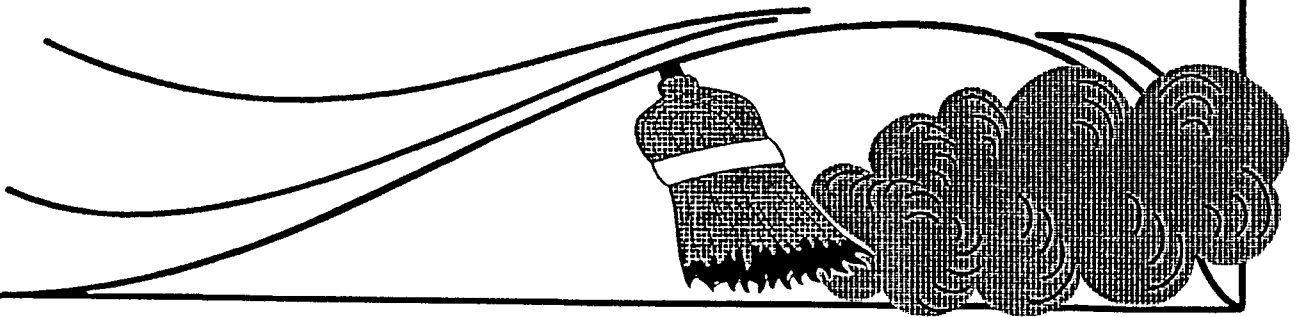
# Where's the Math?

(Alternative Format)

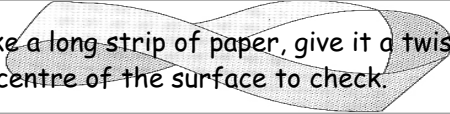
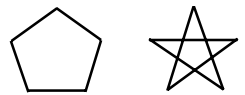

	Number Sense & Numeration	Measurement	Geometry and Spatial Sense	Patterning and Algebra	Data Management & Probability
WEEK 1					
WEEK 2					
WEEK 3					
WEEK 4					
WEEK 5					

Use this format as an alternative to remind families of activities of past weeks. As a group, discuss the activities for each week in terms of the math strands that were present. Indicate activities containing each of the major math strands. Week 6 is not included as there is no time scheduled for a "Wrap Up with Parents".

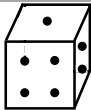
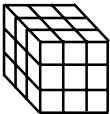
# NOTES



**GO AHEAD! MAKE MY DAY!**  
**YOUR FAMILY MATH CALENDAR**

	<b>INSTRUCTIONS</b>	<b>NUMBER SENTENCES</b>
	<ul style="list-style-type: none"> <li>Each day provides you with an interesting fact about a number.</li> <li>What other interesting facts can you find? Also, try to make number sentences for each day in as many different ways as possible.</li> </ul>	Some examples are done for you.
<b>1</b>	A mobius strip has just <b>one</b> surface. Take a long strip of paper, give it a twist, and join the ends. Draw a line along the centre of the surface to check. 	$1 = 1 + 0$ $1 = 1 \times 1$
<b>2</b>	Bi - means <b>two</b> . A bicycle has <b>two</b> wheels. A bivalve is an animal with two shells, like a mussel. What other bi words do you know?	$2 = 2 + 0$ $2 = \frac{1}{3} \times 6$
<b>3</b>	Most colours can be mixed from just <b>three</b> primary colours. e.g., all the colours you see on TV are mixtures of red, green, and blue light.	
<b>4</b>	On maps, countries next to each other are usually shown in different colours. No one has ever found a map that needs more than <b>four</b> colours. Create a map of your own and try it.	$4 = 9 - 5$ $4 = 4\frac{1}{2} - \frac{1}{2}$
<b>5</b>	Penta - means <b>five</b> . The pentagon has <b>five</b> sides. The pentagram has <b>five</b> points. 	$5 = 2\frac{1}{2} + 2\frac{1}{2}$ $5 = 2\frac{1}{2} \times 2$
<b>6</b>	A cube has <b>six</b> faces. <b>Six</b> -legged animals include insects like flies, moths, ants and wasps.	$6 = 1 + 2 + 3$
<b>7</b>	Mr. C.L. Griggs of Missouri invented <b>7-Up</b> . He called it Bib-label Lithiate Lemon-Lime Soda. Few people bought it! Legend says that after six tries he came up with the name <b>7-Up</b> .	
<b>8</b>	<b>Eight</b> is the third number that looks the same when reflected upside down. What are the first two? What are the next two?	$8 = 2^3$ or $2 \times 2 \times 2$
<b>9</b>	There is an easy way to check if a number can be divided by <b>nine</b> . You add up the digits. If your answer is more than one digit, you add up the digits again, and again, until there is only one digit. If it is <b>9</b> , the number divides by <b>9</b> .	So, 6804 can be divided by 9
<b>10</b>	Deci -- Roman, and Deca -- Greek, both mean <b>ten</b> . A decimetre is one tenth of a metre, and a decametre is ten metres. Our counting system is called the decimal system because it has <b>ten</b> digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.	
<b>11</b>	<b>Eleven</b> is the first two digit number where both digits are the same. What are the next four numbers where both digits are the same? How are they connected to <b>11</b> ?	
<b>12</b>	Another name for <b>twelve</b> is a dozen. The twelfth month is the last month in the year, and <b>12</b> pm is the last hour of the day. Who wrote Twelfth Night?	
<b>13</b>	<b>Thirteen</b> is often called a "Baker's Dozen". Many people think <b>13</b> is an unlucky number. Triskaidekaphobia is the fear of the number <b>13</b> .	
<b>14</b>	In Britain <b>fourteen</b> days is called a fortnight (fourteen nights). February 14 is St. Valentines Day.	$14 = 2 + 3 + 4 + 5$
<b>15</b>	Can you arrange the numbers 1 to 9 so that the sum for each line is <b>fifteen</b> ?	

**GO AHEAD! MAKE MY DAY!**  
**YOUR FAMILY MATH CALENDAR**

<b>INSTRUCTIONS</b>	<b>NUMBER SENTENCES</b>
<b>16</b> In chess each player has <b>sixteen</b> pieces. Caterpillars usually have <b>sixteen</b> legs. Try counting them. (Be gentle).	$16 = 4 \times 4$ $16 = 4^2$
<b>17</b> If you look carefully at wallpaper patterns you will find that they repeat. There are <b>seventeen</b> different types of repeating patterns (not counting colour or shape). How many can you find?	
<b>18</b> The two <b>eighteen</b> letterwords <i>conservationists</i> and <i>conversationalists</i> use the same letters and are called anagrams. They are the longest pair of anagrams in the English language. Do you know two 4 letter anagrams?	
<b>19</b> <b>Nineteen</b> is a prime number. A prime number has exactly two factors, one and itself. How many prime numbers, less than twenty, do you know?	$19 = 1 \times 19$
<b>20</b> Young children normally have <b>twenty</b> teeth. They are usually replaced by thirty-two adult teeth.	$20 = 32 - 12$
<b>21</b> The sum of the dots on a die is <b>twenty-one</b> . 	$21 = 1 + 2 + 3 + 4 + 5 + 6$
<b>22</b> <i>Superextraordinarissimo</i> is the longest word in the Spanish language, and means extraordinary. It contains <b>twenty-two</b> letters.	$22 = 22 - 0$
<b>23</b> When there are <b>twenty-three</b> or more people in a group, there is better than a 50% chance that two people share the same birthday. Check if two people in your class have the same birthday.	
<b>24</b> <b>Twenty-four</b> is the number of ways in which the letters of the word MEAT can be arranged. Only some of these arrangements are real words. Can you find four real words?	$24 = 1 \times 2 \times 3 \times 4$
<b>25</b> Television is transmitted at the rate of <b>twenty-five</b> pictures each second or 90 000 pictures for a one hour program. <b>Twenty-five</b> is the sum of the first five odd numbers.	$25 = 1 + 3 + 5 + 7 + 9$
<b>26</b> There are <b>twenty-six</b> letters in the English language. <i>Precipitevolissimevolmente</i> with 26 letters is the longest word in the Italian language. Its means <i>as fast as possible</i> .	
<b>27</b> This wooden cube was painted red on the outside, then cut into <b>twenty-seven</b> smaller cubes. If you take it apart, how many smaller cubes have: one face painted red? two faces painted red? three faces painted red? 	
<b>28</b> <b>Twenty-eight</b> is a <i>Perfect Number</i> . A perfect number is a number that equals the sum of its factors, apart from itself. Can you find the perfect number between 1 and 10?	$28 = 1 + 2 + 4 + 7 + 14$
<b>29</b> There are <b>twenty-nine</b> days in February every leap year. Seven straight cuts through a pizza can divide it into a maximum of <b>29</b> pieces. Use a ruler and circle to attempt this problem. The lines do not have to go through the centre.	
<b>30</b> There are <b>thirty</b> days in April, June, September and November. <b>Thirty</b> is the sum of the first four square numbers.	$30 = 1^2 + 2^2 + 3^2 + 4^2$ or $30 = 1 + 4 + 9 + 16$
<b>31</b> Most months have <b>thirty-one</b> days. Can you name them all? Now try making up your own calendar of interesting facts and numbers.	



**Esso**  
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**MATH**  
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