Learning Mathematics Through Hands-on Learning Experiences

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PGPS MATHEMATICS WORKSHOP FOR P1 & P2 PARENTS
PARENT LEARNING FEST 3 FEBRUARY 2018
Objectives of workshop

✓ Introduction to the role of games in teaching and learning of Maths
✓ Using games to help students master basic concepts
✓ Tips in the creating simple Maths related games using everyday materials
✓ A glimpse of the different types of commercial produced Math games and activities students are engaged in
In the recent news...

**Primary school mathematics syllabus gets refreshed**

TODAY reports: The changes are in line with the revised mathematics syllabus that kicked in for the Primary One cohort that enrolled into schools in 2013, who are now in Primary Four.

By Ng Jing Ying TODAY

Revised syllabus focuses on making mathematics a relevant and engaging subject for young learners.

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The MOE typically reviews subjects' syllabus once every six years and in the latest syllabus published on the ministry’s website, the ministry wrote that among its considerations during the review is "seeking a better balance between content and skills".

Adding that the amount to be taught has since stabilised over the years, the ministry also wrote: "One key feature of this set of syllabuses is the explication of learning experiences, besides the learning outcomes". "More focus has now been given to skills and competencies that will make a better 21st century learner – the process of learning becomes more important than just what is to be taught and remembered," the ministry said.
Singapore Mathematics Framework

Beliefs
- Interest
- Appreciation
- Confidence
- Perseverance

Monitoring of one’s own thinking
Self-regulation of learning

Numerical calculation
Algebraic manipulation
Spatial visualisation
Data analysis
Measurement
Use of mathematical tools
Estimation

Reasoning, communication and connections
Thinking skills and heuristics
Applications and modelling


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Singapore Mathematics Framework

To develop a deep understanding of mathematical concepts, and to make sense of various mathematical ideas as well as their connections and applications, students should be exposed to a variety of learning experiences including hands-on activities and use of technological aids to help them relate abstract mathematical concepts with concrete experiences.

To develop metacognitive awareness and strategies, and know when and how to use the strategies, students should have opportunities to solve non-routine and open-ended problems, to discuss their solutions, to think aloud and reflect on what they are doing, and to keep track of how things are going and make changes when necessary.

Attitudes refer to the affective aspects of mathematics learning such as:
• beliefs about mathematics and its usefulness;
• interest and enjoyment in learning mathematics;
• appreciation of the beauty and power of mathematics;
• confidence in using mathematics; and
• perseverance in solving a problem.
Student readiness to learn is vital to learning success. In the readiness phase of learning, teachers prepare students so that they are ready to learn. For example, younger students may like contexts such as stories and songs, and play-based activities such as games, whereas older students may appreciate contexts related to everyday life so that they can see the relevance and meaningfulness of mathematics.
Students engage in activities to explore and learn mathematical concepts and skills, individually or in groups. They could use manipulatives or other resources to construct meanings and understanding. Students further explore different strategies and explain why the strategies work or do not work and finally, derive a conclusion as a team. During the discussion, students are also encouraged to communicate their ideas using appropriate mathematical language.
Students need practice to achieve mastery. Practice can be motivating and fun. Practice must include repetition and variation to achieve proficiency and flexibility. Structuring practice in the form of games is one good strategy to make practice motivating and fun, while allowing for repetition and variation. There should be a range of activities, from simple recall of facts to application of concepts.
Tuning in

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Teaching Mathematics Through Games

PGPS Mathematics Workshop for P1 & P2 Parents
Parent Learning Fest 3 February 2018
Why games?

✓ Motivation – Freedom of choice to play the games they like
✓ Positive attitude – Reduces anxiety issues
✓ Increased learning through interaction – Opportunities to collaborate and problem solve with peers
✓ Development of critical and creative thinking skills – Thinking is made visible through the actions and decisions made
✓ Meaningful bonding experience – Opportunities for parent to have fun with child
✓ Develops perseverance – Addictive to move from one level to the next
✓ Promotes independent learning
  – especially games with ‘self-check’ functions
Teaching Mathematics Through Games

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Number card games

✓ Materials needed:
  • ‘Off the shelf’ number cards
  • DIY Print-outs on hard paper
  • DIY by writing numbers on blank name card sized cards
Mystery Number

- **Players**: Minimum 2
- **Materials**: Numeral cards (0 to 100)
- **Learning Objectives**: Comparison of numbers, Identification of number properties

- **How to play**:
  - One player to randomly draw a card from the pile and hide it from the other players.
  - Players take turns to guess the ‘mystery number’ by asking questions such as “Is it more/less than a particular number? Is it an odd/even number?”
  - The player who guesses the number correctly gets to keep the card.

Is it more than 50?
Is it an odd number?
Is it less than 20?
Number Battle

✓ Players: Minimum 2
✓ Materials: Numeral cards (0 to 9)
✓ Learning Objectives:
  Recognition of place values of different digits in a 2 or 3 digit number
✓ How to play:
  • Players to draw 2 to 3 cards from the pile and vie to form either the largest or the smallest number that can be formed using the cards drawn.
  • Player with the greatest/smallest number gets to keep the cards of all other players.

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Addition/Subtraction Number Battle

- **Players:** Minimum 2
- **Materials:** Numeral cards (0 to 9)
- **Learning Objectives:**
  Development of mental calculation skills
- **How to play:**
  - Players simultaneously flip over 3 cards, using 2 to form a 2-digit number and subtracting the third from the number
  - Player with the greatest/smallest difference wins all cards
  - Difficulty of game can be varied by changing the number of cards used (Operation may even be changed to multiplication for older students)
Materials needed:
- Cootie catcher template
Materials needed:
- Bingo game card template
- Any plain piece of paper divided into a square grid
Teaching Mathematics Using Everyday Materials

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List of everyday Math-related simple games

Counting is Fun!
Use objects around your house like coins, toys, spoons and forks etc, to practise counting. If the quantity is big, get your child to talk about the counting strategies he/she uses in counting.

I Spy Numbers Around Me
While out on a family trip, encourage your child to be aware of the numbers within the surrounding area by playing this simple activity. Parent says out, “I spy the number 367. Can you find it?” Get your child to point the number and say it out loud, “Three hundred and sixty-seven. The number is there on that car!” You can invite your child to ‘spy’ numbers on buses, on road signs, on advertisement boards and everywhere possible.
List of everyday Math-related simple games

Calendar Pattern
Show a month from a calendar. Get your child to name a pattern he/she can see from the dates of the calendar month. Alternatively, get him/her to circle all the even numbers using one colour and all the odd numbers using another colour to observe a pattern.

Cluedo Numerals!
Tell your child you are thinking of a 2-digit number, example 54. Tell your child he/she can only ask questions which you can only give a ‘Yes/No’ reply. For example, he/she can ask, “Is the number less than 40?”, “Is the number between 50 and 60?”, “Does the number have a digit 4?”. You and your child may reverse the role to play the game.
List of everyday Math-related simple games

Shopping is Fun!
Get your child to help you in grocery shopping the next time you visit a supermarket. Pass him/her your grocery list. Get him/her to estimate the bill before paying for the groceries. Get him/her every opportunity to sharpen his/her estimation skills!

Money, Money, Money
Take some coins from your coin box. Get your child to form the least/most amount he/she can make with 5 coins. Alternatively, get him/her to show the different ways to form $1 with the coins given.
MATH PUZZLERS

• Pick a stick and answer it. Grab another stick. Repeat.
• Pull a stick, look at the “answer” end and brainstorm different ways you can create that number through addition or subtraction.
• Sort the answer “ends” in ascending or descending order.
Going for a walk

What is so mathematical about going for a walk and finding a rope swing? This is what parents told us....

Swimming

Parents shared ideas of how they could use mathematical thinking when swimming.

It is possible to estimate and measure the depth and length of the pool (in both feet and metres), the amount of water in the pool, how much energy is needed to heat the pool up, and how hard a swimmer has to work to keep warm.

Swimmers can find out how tall they are in relation to the depth of the pool and find the point where they can no longer touch the bottom. The size and shape of floats can be explored (how much water each float absorbs, how heavy they become, how fast they shoot out of the water when they are emerged etc.) and conversations can be had about why things float (e.g. relating shape to density). Swimmers can explore how long lengths they can swim in a certain time frame, or until they run out of energy. They may count the number of laps and estimate the number to swim to swimmer ratio. Some may play games involving numbers, such as the amount of times a width can be swum without the swimmer needing to hold onto the rail, or how far somebody can travel whilst holding their breath. Swimmers in lanes need to take account of who is in front and behind them, and not swim too fast or too slow otherwise swimmers may get kicked. Swimmers may explore the patterns they make in the water when they swim different strokes.

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http://www.everydaymaths.org/for-teachers
Teaching Mathematics Through Commercial Produced Maths Games

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Selection of commercially produced Math games

Suggested criteria for selection

✓ Have specific Mathematics learning objectives
✓ Involves students making a choice of move at any time in the game
✓ Involves more than 1 player
✓ Should not be purely based on elements of chances
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Thank you for your active participation!