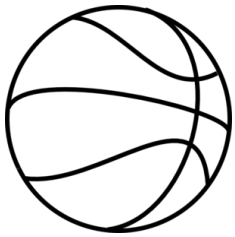

MENTAL NUMERACY GAMES FOR THE CLASSROOM / CLUB

A South African Numeracy Chair Project initiative

SA NUMERACY CHAIR PROJECT

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This booklet is freely available to anyone who wishes to use it and must not be sold on (via a website or other channel) or used for profit making of any kind.

GAMES IN THE CLASSROOM / CLUB AND AT HOME

Benefits

There are numerous benefits to learning through games. These include:

- Creating **meaningful situations** for the application of mathematical skills
- **Motivation** – most children enjoy playing games
- **Positive attitude** - Games provide opportunities for developing positive attitudes towards mathematics by reducing the fear of failure and error
- **Increased learning** - in comparison to more formal activities, greater learning can occur through games as a result of the increased interaction between children and provide opportunities to test intuitive ideas and problem solving strategies
- **Different levels** - Games can allow children to operate at different levels of thinking and to learn from each other. In a group of children playing a game, one child might be encountering a concept for the first time, another may be developing his/her understanding of the concept, a third consolidating previously learned concepts
- **On-going assessment** - children's thinking often becomes apparent through the actions and decisions they make during a game, so the teacher has the opportunity to carry out diagnosis and assessment of learning in a non-threatening situation
- **Home and school** - Games provide 'hands-on' interactive tasks for both school and home
- **Independence** - Children can work independently of the teacher. The rules of the game and the children's motivation usually keep them on task.

Hints for successful mental classroom / club games

- Make sure the game matches your mathematical objective(s)
- Most of the games in this booklet can be adapted to practice aspects of mathematics from grade 1 up to grade 7 including but not limited to:
    - Number / pattern recognition and sequences
    - Bonds to 10, 20
    - How many more to 50, 100 etc.
    - Doubling and halving
    - Place value and equivalence
    - Add / subtract 10, 100, 1000
    - Multiplication tables
    - Fractions, percentages, ratios
- When planning your questions, keep in mind that the children should be able to work out and answer the questions mentally without paper and pencil
- Question cards and score sheets do not need to be created on the computer: scorecards can be drawn by learners and question cards can be handwritten
- Use games for specific purposes, not just time-fillers
- Keep the game completion time short

MENTAL STARTER GAMES

FIZZ POP

Skills: Depends on the questions you pose but good for number sense and mental work	Mental starter No resources required	Grade: any	Whole class / group

- Decide what aspect of maths you want to practice e.g. bonds to 10, 20, 100, doubling, halving etc.
- The game starts with leader saying "FIZZ", class responds with "POP"
- Say the number and class responds
- Next one: "FIZZ", class responds with "POP" and so on

For example

Let's do bonds to 10 as an example. The leader explains that they will say a number and the group must give how many more to make ten

Say 5, answer 5 more to make 10, say 7, 3 more to make ten

FIZZ BUZZ

The rules are so simple but encourage players to analyse a number in several different ways

Skills: Multiplication tables	Mental starter No resources required	Grade: 3 to 7	Whole class
Source: adapted from http://www.dr-mikes-math-games-for-kids.com/fizz-buzz.html			

- Everyone stands, or sits, in a circle
- One person starts counting from 1
- Each person counts on in 1s... but... with a few rules …

If the number is divisible by 5, the person says "Fizz!" instead of 5 Also, if the number contains a 5, the player must say "Fizz!"	If the number contains a 3 or is divisible by 3, they must say "Buzz!"	Put the fizzes and buzzes together - for example: 30 would be: "Buzz, Buzz, Fizz!" because the number contains a 3, is divisible by 3 and divisible by 5

- If a **fizz** or a **buzz** is said, reverse the **direction** of play (from anticlockwise to clockwise, or vice-versa)
- A player who makes a mistake gets three chances before they must leave the game

VARIATIONS

- Use different numbers. Whatever times table your class needs practice with
- For a tough challenge, have three different numbers - for example, 5 for "Fizz!", 7 for "Buzz!", and 9 for "Zap!".
- Challenge the class to come up with the most "Fizzy" or "Buzzy" number they can think of

STOMP-TAP-CLAP-SNAP

Skills: Conceptual place value especially expanded notation, active listening	Mental starter No resources required	Grade: 2 to 6	Whole class or in pairs / groups
Source: adapted from Dr Subramaniam's version (the Homi Bhabha Centre for Science Education in Mumbai, India)			

A **SNAP** (of the fingers) means 1 So **SNAP, SNAP, SNAP** is 3	A **CLAP** means 10 So **CLAP, CLAP** is 20
A **TAP** (on a table or desk for example) means 100 So **TAP, TAP** is 200.	A **STOMP** (with one foot) means 1000 So **STOMP**, **STOMP** is 2000

Example Activities

Note that the numbers in the brackets indicate the number represented by the sequence and are for the teachers' reference only.

Beginning activities

Identifying numbers and 'counting on' skills

Early learners can benefit from the game as a way of encouraging '*counting on*' skills

For example, if you do **CLAP, SNAP, SNAP, SNAP**

They can count on from "10" (**CLAP**) in ones: "11" (**SNAP**), "12" (**SNAP**), "13" (**SNAP**)

CLAP, SNAP, SNAP, SNAP, SNAP (14)
CLAP, CLAP, CLAP, SNAP, SNAP, SNAP, SNAP, SNAP, SNAP (36)
TAP, TAP, CLAP, CLAP, CLAP, SNAP, SNAP (232)
STOMP, TAP, TAP, TAP, TAP, CLAP, CLAP, CLAP, SNAP (1421)

Adding / subtracting 10 and adding / subtracting 100 to a sequence

Rule is:

add 10 to the number sequence	**CLAP, CLAP, CLAP, SNAP** (31 + 10) = (41)
subtract 10 from the number sequence	**TAP, TAP, CLAP, CLAP, SNAP, SNAP** (222 - 10) = (212)
add 100 to the number sequence	**TAP, TAP, TAP, CLAP, CLAP, SNAP** (321 + 100) = (421)
subtract 100 from the number sequence	**TAP, CLAP, CLAP, SNAP** (121 - 100) = (21)

Working with operations

For this series of activities, start by writing the suggested number (or something similar) on the board

35	Learners add:	**SNAP, SNAP, SNAP** (3) = (38)
57	Learners add:	**TAP, TAP** (20) = (77)
29	Learners subtract:	**CLAP, SNAP, SNAP** (12) = (17)
15	Learners multiply by:	**SNAP, SNAP, SNAP, SNAP** (4) = (60)
100	Learners divide by:	**TAP** (10) = (10)

More challenging activities

These activities promote careful listening skills and take the game beyond place value into working mentally with place value and operations. To add another level of interest, when someone has an answer, get him or her to make the sequence for the answer.

Add a sequence

STOMP, STOMP, TAP, CLAP, CLAP, CLAP, SNAP, SNAP (2132)

Now add:
TAP, TAP (200) = (2332)

Subtract a sequence

STOMP, TAP, TAP, TAP, CLAP, CLAP, CLAP, SNAP, SNAP (1331)

Now subtract:
TAP, TAP (200) = (1131)

Multiply a sequence

CLAP, CLAP, SNAP, SNAP, SNAP, SNAP, SNAP (25)

Now multiply by:
SNAP, SNAP, SNAP, SNAP (4) = (100)

Divide a sequence

TAP, TAP, TAP, SNAP, SNAP (32)

Now divide by:
SNAP, SNAP (2) = (16)

NOTES

AROUND THE WORLD

Skills: Depends on the questions you pose but good for number sense and mental work	Mental starter No resources required	Grade: 2 to 5	Whole class / group

Playing the game

- All the children sit in a circle
- One child stands behind one of the children. This child is going to try to get 'around the world'
- Pose a mental mathematics question (see examples below)
- Start with the two children (the one standing and the one sitting)
- If the standing child correctly answers first, he or she moves on to stand behind the next person
- If the sitting child answers first, the two swap places and the child now standing up moves on to stand behind the next person
- Continue asking questions until a child is back to the starting point
- Who moved most places?
- Can anyone get 'around the world' i.e. back to his or her original chair?

Example questions

Bonds to 10, 20, 30, 100

I have	How many more to	How many more to	How many more to
6	10	20	30
60	100		
66	70	80	100

Doubling and halving

Double	Half
2, 3, 4, 5, 6, 7, 8, 9	2, 4, 6, 8, 10
10, 11, 12, 13, 14, 15, 16, 17, 18, 19	12, 14, 16, 18, 20, 22, 24, 26, 28
20, 30, 40, 50, 100	30, 40, 50, 60, 70, 80, 90, 100, 200
200, 300, 400, 500, 600, 700, 800, 900	1, 3, 5, 7, 9
1000, 2000, 10000	1000, 2000, 10000

Developing counting by 10s and 100s

Add 10 to 34	to 98	to 294	To 932
Add 100 to 8	to 56	to 345	to 932
Take 10 from 40	from 54	from 99	from 300
Take 100 from 400	from 432	From 567	From 1000

LONGER GAMES

SCOOT!

SCOOT is a fun game that can be used to review or reinforce any concept in maths and other subjects. There are many variations but all work on the same idea. Question cards are placed on desks or around the room. Learners move from one card to another answering the questions on the cards after a certain amount of time and they all move in the same direction. Using 10 cards is good for smaller groups and when you are short of time. If your group is large, you may need to set up games at groups of desks so that each child has a station at a card and you can repeat cards around the room.

Skill:	You need:	Grade:	Learners work
Depends on the questions you pose but good for number sense and mental work	A cell phone or stop watch for timing, Prestick, 1 recording sheets per child / pair with either 10 questions or 20 questions, question cards: 1 set of 10 or 20 questions, pencils	1 to 9	individually or as a pair

Preparation

- Look in the separate '*Games masters*' booklet for cards and recording sheets. Print these (and laminate if you wish to re-use them)
- Pin or Prestick 10 or 20 cards around the room at equal distances apart in **order** from 1 to 10 or 1 to 20.
- Prepare recording sheets for 10 or 20 questions
- Depending on how much time you think your learners will need, decide how long to time them on each question. You can use anything from 30 seconds to 2 minutes.
- Before playing a game of SCOOT it is useful to practice the moving around aspect of it and the words (or methods) you will use for getting them to stop, start and move stations.
- Learners / pairs each choose a card and stand in front of it. If Sipho is standing in front of card number 4, he will move to card number 5 next, then on to 6 and so on.

Playing the game

- The learners / pairs must solve the problem on the card in front of them and **wait** until the time is up and the whistle blows. (You can use a different signal to tell them to move to their next card: a whistle, a bell etc.)
- The timer shouts "**SCOOT**" and the learners / pairs all move onto the next card in numerical order
- Continue like this. Answers are written against the correct card number on a recording sheet
- The game ends when the learners / pairs have rotated and are back where they started
- If you have time (or later in the day or in another lesson / session), go over the answers with your learners

TREASURE HUNT!

This is a mathematical treasure hunt, which is similar to Scoot, except that it is not timed and the learners do not rotate around the cards in numerical order. It can be a little chaotic, but fun. Have something for early finishers to do, as learners will finish at different times. Question cards do not need to be created on the computer and can be handwritten for a more flexible game.

Skill: Number sense, operations and patterns up to 200 but can be adapted to work in any way	You need: 1 set of questions, Prestick, 1 recording sheet per learner /pair, pencils	Grade: 1 to 7	Learners work individually or as a pair

Preparation

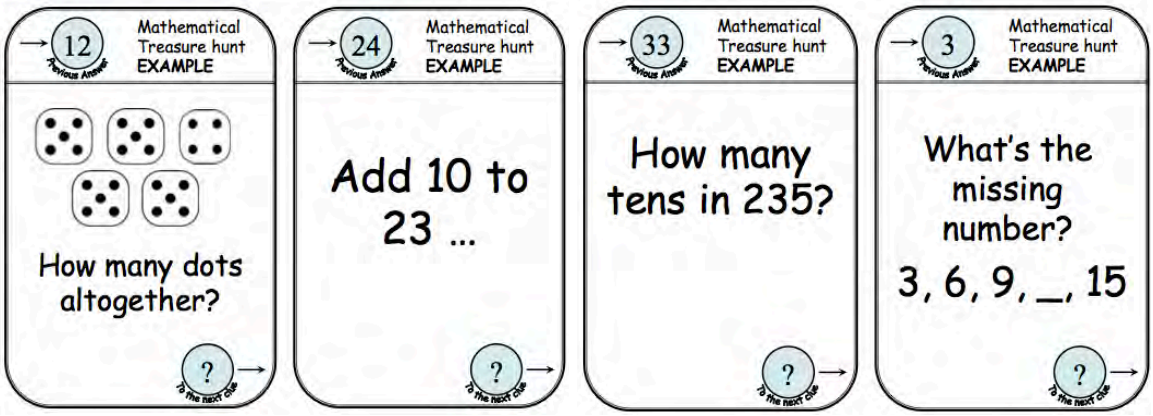
- Look in the separate '*Games masters*' booklet for question cards and recording sheets. Print these (and laminate if you wish to re-use them)
- Cut out each of the question slides and place them around the room **out of sequence** e.g. Prestick them onto walls, chairs, tables etc.
- Print out and distribute the recording sheet, one per learner (or pair)

Playing the game

- Learners / pairs find a card to start at
- If the question is answered correctly, the learner / pair looks for the next card with that number on it and continues.
- If the learner / pair does not answer the question correctly, they will not be able to find their next card and will have to go back and work it out again
- Once they return to their starting card, they are done
- If you have time (or later in the day or in another lesson / session), go over the answers with your learners

Example

Thandi is standing in front of the card with '12' in the top left corner.



She will work out the problem on that card, which is 'how many dots altogether?' If she gets the correct answer of 24, she must then move on to find the card with '24' in the top left corner. That is the next question. In the example it is, 'add 10 to 23…' The next card will be 33 and so on…

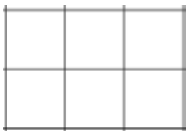
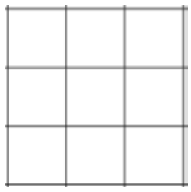
BINGO

Bingo is a popular game around the world and one that can easily be adapted to the classroom without too much preparation.

Skill: Depends on the questions you pose but good for number sense and mental work	You need: scrap paper, pencils, prepared questions	Grade: any	Whole class as individuals or in pairs

Preparation

Learners draw a 2 x 3 or 3 x 3 grid on scrap paper and it doesn't need to be neat. A smaller grid means the game can be finished more quickly.

 or 

Depending on what you want to consolidate / practice with your learners, you will give them a list of possible answers to choose from the blackboard. If the grid needs 6 answers, have ten questions, if the grid needs 9 answers, have 12 questions.

Prepare your questions (see examples below). See ideas for questions on page 3.

Playing the game

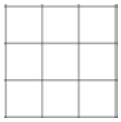
- Ask your questions one by one, giving the learners time to work out the answer and to see if they have the answer on their grid
- If they have the answer, they must cross if off
- The winner shouts "**BINGO**!" and can be determined in a number of ways depending on how much time you have
  - First to cross off all the numbers in their grid
  - First to get a line of 3 in a row, column or diagonal (works best with the 3 x 3 grid)

Example questions (3 x 3 grid) and blackboard instructions

Here we will work with a 3 x 3 grid, so we need at least 12 questions. Here are my questions, with a focus on addition and doubles up to 20.

Answer	Question	Answer	Question
13	5 + 8	2	1 + 1
1	0 + 1	12	double 6
10	7 + 3	3	2 + 1
15	10 + 5	7	4 + 3
4	3 + 1	14	double 7
11	9 + 2	5	3 + 2

My blackboard would show:

Draw a 3 x 3 grid like this 

Choose 9 of these numbers and write one in each cell of your grid in any order

13 1 10 15 4 11 5 12 3 7 14 2

A learner grid might look like this

2	14	11
5	7	3
13	10	15

PAPER BASKETBALL

This game is useful for consolidating aspects of maths that you have been doing in class / club or just use it as a way to practice *number sense*. The only preparation needed is a list of questions for each team related to the topic you want to consolidate / practise (see examples below). It can be fun to do this outdoors too.

Skills: Depends on the questions you pose	Mental starter List of questions for each team, scrap paper, rubbish bin	Grade: 1 to 7	Whole class in teams

Playing the game

- Divide group into 2 or more teams
- Use scrap paper to make a 'balls'
- Put the rubbish bin in the front of the room (or outside) and decide on a line behind which the children must stand
- Alternate asking each team a question, anyone in the team can answer but they must all agree. You can write longer questions on the board, but the children must answer mentally
- If the team gets it right, they get one point
- If they answer the question correctly, learners take turns to take a shot at the basket. If the paper ball lands in the basket, they get an extra point for their team

Example questions (Grades 2,3)

TEAM A	TEAM B
2 + 98	3 + 87
27 + 10 + 10	36 + 10 + 10
I have 16. How many more to 20?	I have 17. How many more to 20?
Double 16	Double 14
Double 16 + 60	Double 14 + 50
I have 8. How many more to 20?	I have 6. How many more to 20?
I have 20. How many more to 100?	I have 10. How many more to 100?
Half of 50	Half of 30
I have 200. I take away 90. How many left?	I have 200. I take away 70. How many left?

Example questions (Grades 5,6)

TEAM A	TEAM B
What is $\frac{3}{4} + \frac{1}{4} + \frac{2}{4}$ equal to?	What is $\frac{2}{5} + \frac{3}{5} + \frac{1}{5}$ equal to?
3 x 4 = 2 x ?	3 x 6 = 2 x ?
2 + 999	3 + 798
3 x 15 = 5 x ?	2 x 25 = 5 x ?
99 + 99 + 99	198 + 99
Half 50, then take away 10, then add 100	Half 60, then take away 20, then add 210
Add 500 to 1056	Add 400 to 2045
8255 (-2) ____ (-3) ____	7347 (-3) _____ (-4) _____

NOTES

SOURCES OF GAMES

This booklet has been compiled using ideas from games devised and used in SANC Project Maths Clubs since 2011, some have been adapted from other sources and these have been acknowledged in the game itself.

For more resources visit

- our website at: www.ru.ac.za/sanc or
- our Facebook page: https://www.facebook.com/RUSANC

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