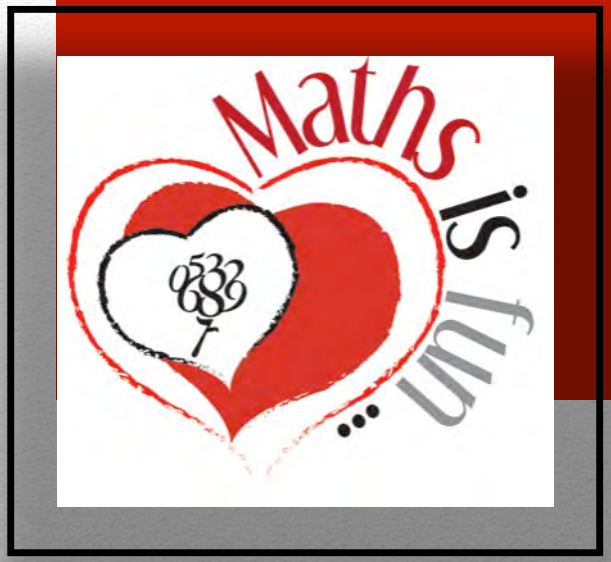


SA NUMERACY CHAIR PROJECT

NICLE SESSION 1

MARCH 2015

- Subtraction strategies
  - With Number Talks
  - With number lines especially Empty Number Lines
  - 100 charts

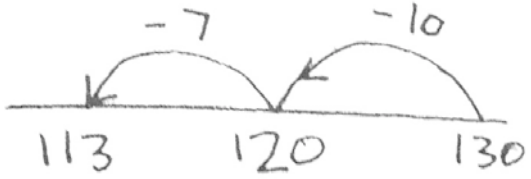
Working with subtraction

- 10 – 7
  - 10 take away 7
  - 10 minus 7
  - 10 subtract 7
  - What is the difference between 10 and 7?
  - How much greater than 7 is 10?
  - How much less than 10 is 7?
- The Empty Number Line is a powerful image for:
  - helping children develop mental methods for subtraction
  - exploring the different meanings of subtraction

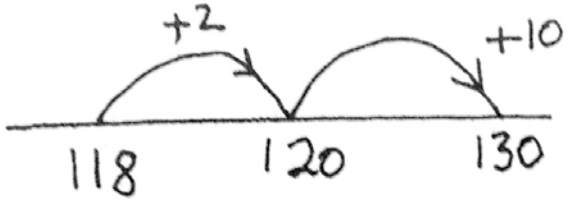
Different kinds of subtraction problems

- Think about these three different calculations:
  - 130 – 17
  - 130 – 118
  - 130 – 49
- How would you do them?

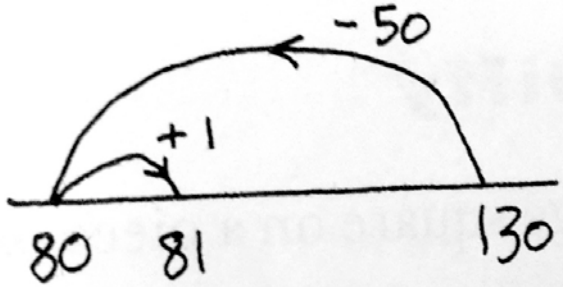
130 − 17 = 113



130 − 118 = 12

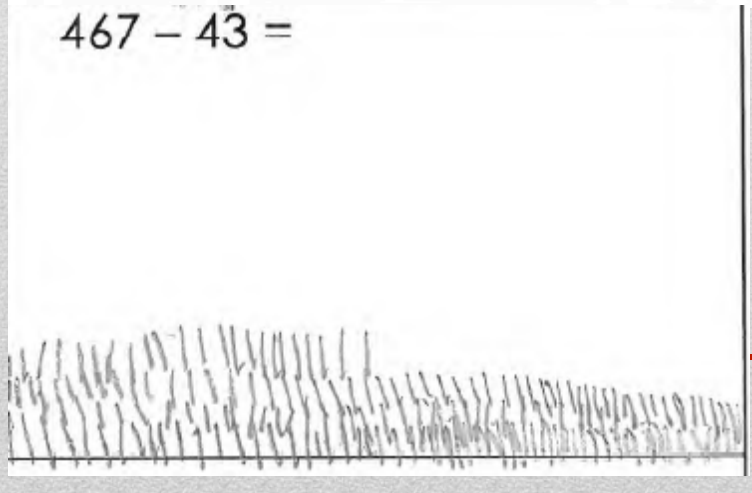


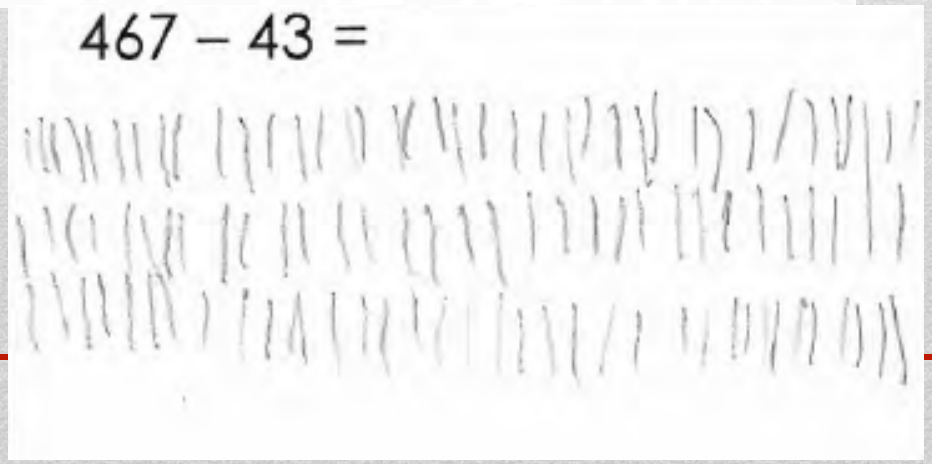
130 − 49 = 81



Early Arithmetic Strategies

Stage Number	Stage Descriptor	Characteristics (representing increasing levels of sophistication)
0	Emergent counting	**Cannot count visible items**. The child might not know the number words or might not coordinate the number words with the items
1	Perceptual counting	Can count only **visible** items starting from 1. Including seeing, hearing and feeling
2	Figurative counting	Can count **concealed items** but the learner will 'count all' rather than 'count on'.
3	Initial number sequence	Initial number sequence. The child can **count on** rather than counting from one, to solve + or missing addends. May use the **counting down** to solve removed items. (count-back-from)
4	Intermediate number sequence	**Count-down-to** to solve missing subtrahend (e.g. 17-3 as 16, 15 and 14 as an answer. The child is able to use a more **efficient** way to count down-from and count down-to strategies (count-back-to)
5	Facile number sequence	Uses of range of **non-count-by one strategies**. These strategies such as compensation, using a known result, adding to 10. Commutativity, subtraction as the inverse of addition, awareness of the 10 in a teen.





Perceptual counting

- This involves counting objects that are perceptually available – typically seen but perhaps heard or touched. Perceptual counting usually occurs in situations where the child's task is to figure out how many objects are in one or perhaps two collections where the objects are available in the child's visual field.

Figurative counting

- when presented with an additive task such as 5 + 3 involving two screened collections, some children would invariably count from one – "one, two, three, four, five – six, seven, eight!". This is referred to as Figurative Counting

Advanced counting-by-ones

- In the context of additive and subtractive tasks as referred to above, children advance from figurative counting to the four advanced counting-by-ones strategies:

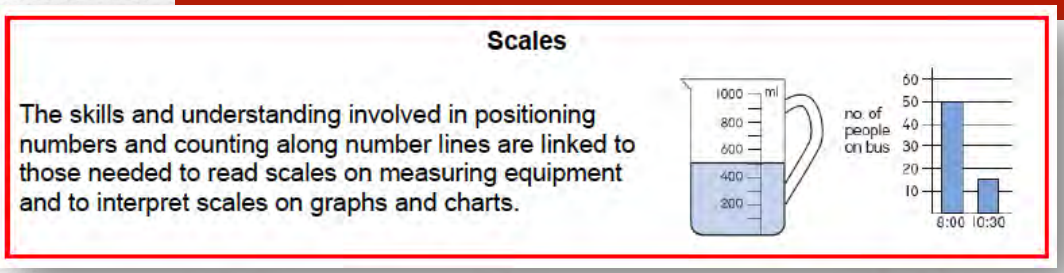
(a) Counting-up-from is used to solve additive tasks;

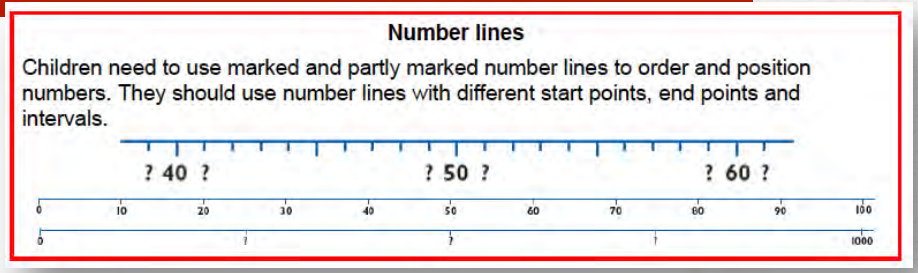
(b) Counting-up-to is used to solve missing addend tasks;

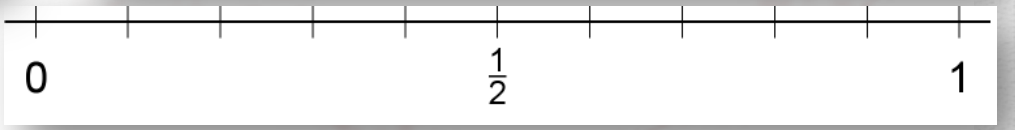
(c) Counting-down-from is used to solve what we call removed items tasks or take away tasks; and

(d) Count-down-to is used to solve what we call missing subtrahend tasks. In the period before children learn to add and subtract in the range 1 to 20 without counting, they frequently use the four advanced counting-by-ones strategies (see Wright, Stanger, Stafford & Martland, 2006).

Samples of learners work…

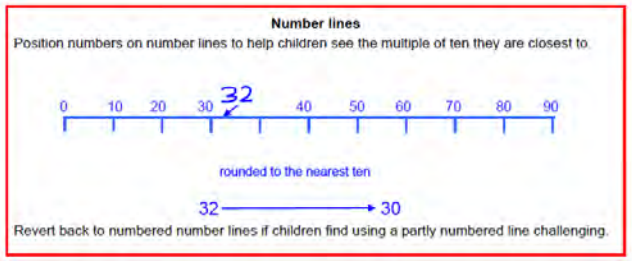


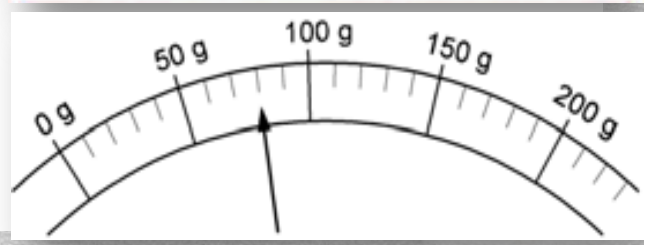




Number lines can be used:

- for understanding ordering and positioning of numbers
- for understanding rounding numbers
- for addition, subtraction, multiplication and division
- to support solving of problems and understanding of strategies used to solve problems
- to develop understanding of how to read different scales

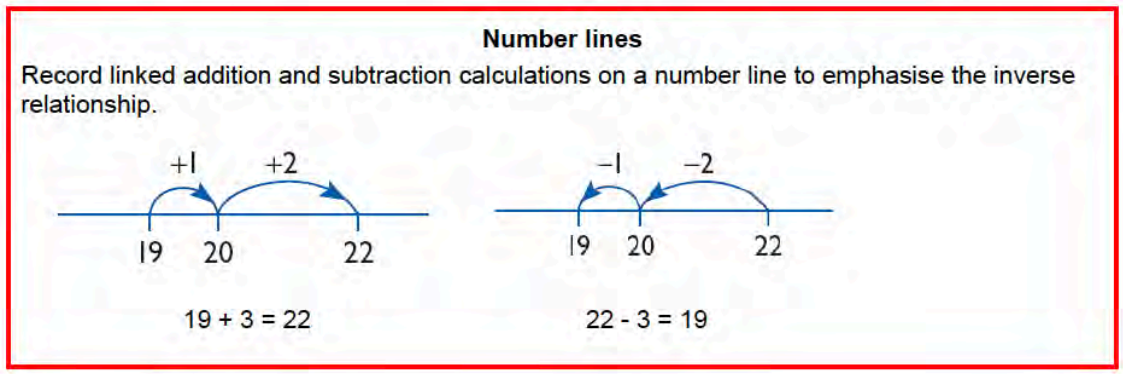


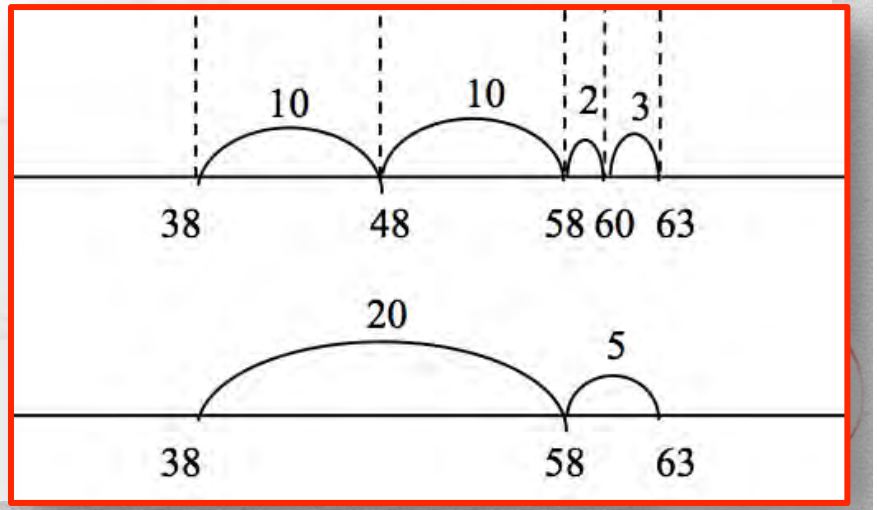


Number Lines

Empty Number Lines (ENL):

- Are a schematic aid to mental calculation or to illustrating calculations - provides a visual model that's a useful tool
- On an empty number line, learners mark only the numbers they need for their calculation
  - In contrast to the standard number line there are neither a scale nor any other pre-given objective landmark on the empty number line
- There is no rule which requires the same spatial distance between the marks which correspond to two pairs of numbers having an equal arithmetical distance
- The empty number line therefore is a reproduction of the normal number line that is not faithful to the scale but which respects the order of numbers
- It engages students in decomposing numbers and reasoning.
- For subtraction:
  - reinforces the idea that the answer to a subtraction problem is the difference between two numbers





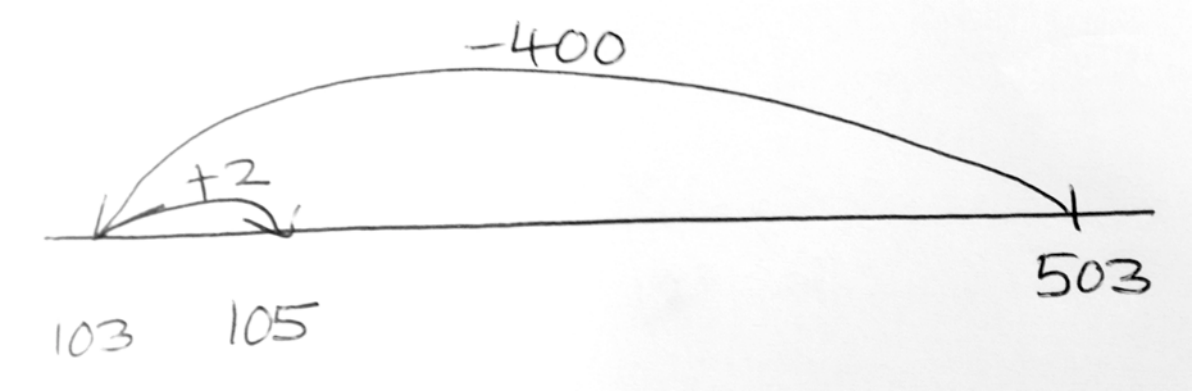
503 − 398 = ?

The numbers in this problem aren't particularly friendly

How could we estimate an answer?

How close is the answer to 100? And do you think the answer is greater than 100 or less than 100?

How can we resolve this using an empty number line



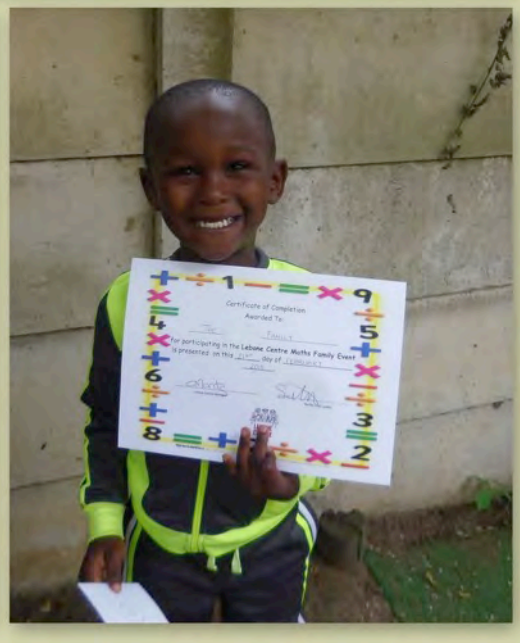
- Using Empty Number Lines
  - 23 – 18
  - 305 – 97
  - 467 – 43
  - 122 – 119
  - 2014 – 1997
- How do number line strategies connect to efficient strategies on the 100 chart?
- Compare the strategies used:
  - Advantages and disadvantages of each

Try these …

Family Maths Events


February 2014


Lebone Centre Family Maths Event


Certificate of Completion
Awarded To
for participating in the Lebone Centre Maths Family Event
is presented on this

"parental and community support benefits children's learning, including their numeracy development"

Family events

From Page 6

We hope the experiences, ideas and photos shared here inspire others to run events which include families in whatever form they see as most appropriate to their communities.

For our first event we invited a guest speaker, Steve Sherman of Living Maths to host a family maths event open to the Grahamstown community.

Approximately 120 parents and children from across the spectrum of schools attended the event. Families were given a range of challenging problems involving 'out of the box' thinking to solve in the form of a worksheet.

Further information and activities of this event can be found on our website.

At the second event Professor Mellony Graven spoke at a parents evening at a SANCP school on "How can parents help learners to develop key foundations for numeracy learning".

Approximately 110 parents attended the event and Prof Graven shared ideas for developing learner resilience and independence and also some oral and dice games.

The parents' willingness and determination to support their children's education was overwhelming and sparked the need for SANCP to host more events across schools in our area. Graven's speech from this event can be found at the address below.

Our third event involved a family games challenge at a local development and care centre catering for children from three schools of our project schools. The centre cares for children considered 'in need' of support.

Approximately 120 children and caregivers attended this event held on a Saturday and competed in 'family' groups moving through mathematical problem solving stations. Thereafter caregivers were provided with ideas for home support such as using dice and other games to learn maths.

Scorecard

Family/Team Name:

Good progress on task, but not complete = 1point
Task completed = 3 points

Station 1	Station 2	Station 3	Station 4	Station 5
Station 6	Station 7	Station 8	Station 9	Station 10
Station 11	Station 12	Station 13	Station 14	Station 15
Station 16	Station 17	Station 18	Station 19	Station 20
Family Score				

Mellony Graven is the South African Numeracy Chair Project at Rhodes University. Debbie Stott is a PhD Intern and Maths Club Co-ordinator of the South African Numeracy Chair Project also at Rhodes University

Why Family Events?

We love Maths

All family fun with maths

By NTOMBOVUYO NGAPHU and DANI KREUSCH

The morning of family maths fun held at the Lebone Centre on 21 February began with a countdown from ten.

Children scrambled obediently from the corners of the centre's playground to stand before the event's facilitator, Sarah Williams, their parents forming a strong wall behind them.

For half an hour the families, armed with a score card, were to travel between the different stations set up at the centre.

Each station had something different that the families had to accomplish, and each one promised to be tricky yet fun. And, if a morning of competing enthusiastically against other families wasn't a draw enough, the prizes promised to the top achievers spurred the teams on.

The families were divided into three broad age groups – each with its own set of level-appropriate tables to navigate.

The tables were facilitated by volunteers from the Lebone Centre and other child development centres around Grahamstown.

The parents were advised to let the children to solve as many of the problems as they could by themselves.

A true parent does not really have to be biological.

Tarry Anne came to support her friend's six-year-old daughter, Remania Davis.

Remania's broad smile showed her pride in having two mothers by her side who taught her the tricks she needed to master to win the competition.

"I am very excited to win!" said an enthusiastic mother, Ella Davis.

"My daughter is very good with her studies and she can be anything she wants to be when she grows up. I can't choose for her."

Among the pupils keen to steal the prize were 12-year-old 6th grader, Zellen Roberts. Her favourite subject at school is Afrikaans but she was still determined to win the maths competition to prove herself multi-skilled.

"You see, maths is very important for all ages," laughed Child Welfare volunteer Mandi Matsamko as Ukufunda journalist Dani failed to get the correct answer to his table's problem for the third time.

"This is a day for parents to learn how to help their kids and not just to give in to the temptation to grab the pencil and say, 'here, I'll do it'," Williams said. "If you, parents, can just be hands off but very encouraging, and you can all learn something today then we would have done our jobs. And you can take this with you after today's over," she said.

As the scores for each team were tallied all the participants gathered together to learn fun ways to learn many facets of maths using the pair of dice and the pack of cards they were given for participating.

Williams also detailed some maths games that can be played without the need for any materials.

One of these, entitled Fizz Pop, requires the parent to call out "Fizz" and the child to respond "pop".

That's the cue for a simple addition, subtraction or multiplication sum for the child to answer.

The morning ended with each participant receiving a hotdog and a juice, but not before the winners were announced.

There were six prizes in total: one for each of the families that scored the highest in every age group, two for the two families that let the children do most of the activity with no help but only encouragement and one lucky draw prize. Each prize winner received a R100 voucher to Wimpy, and every participating family also got a participation certificate.

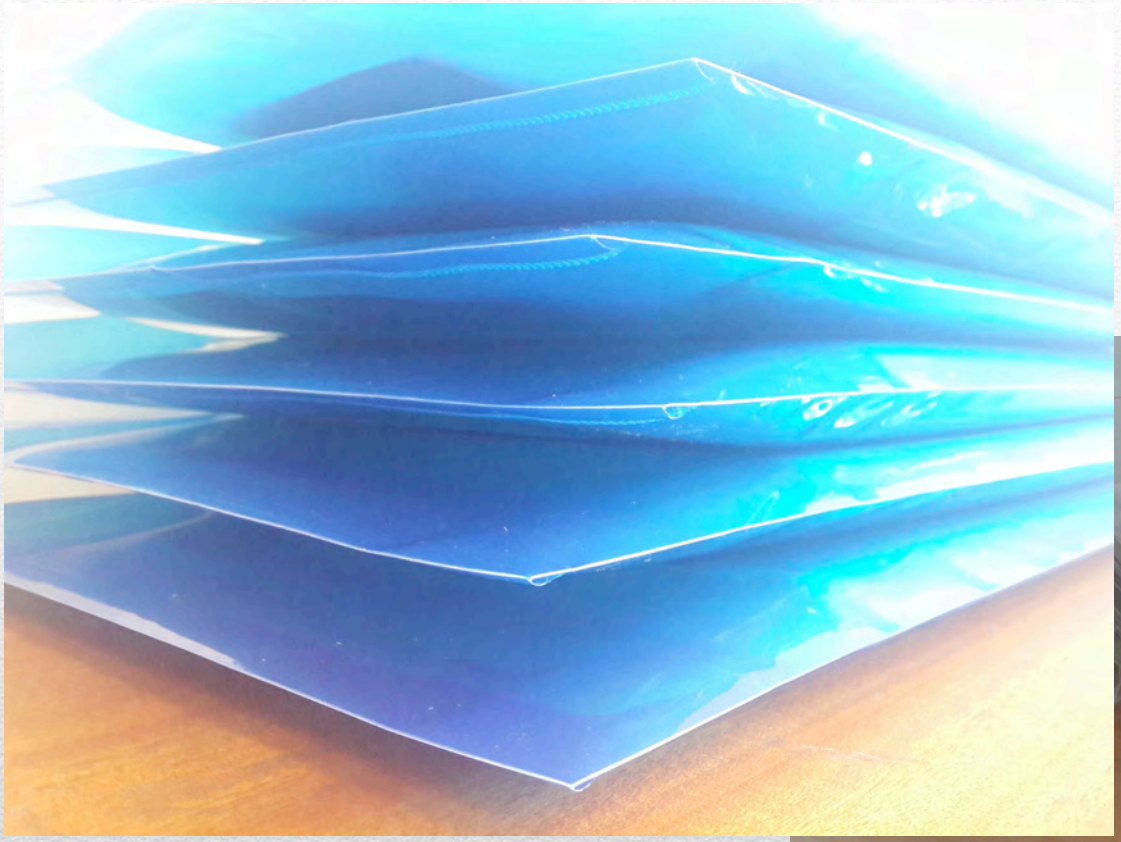
Remania Davis gets some help from her mom at one of the stations for pre-school children.
Photo: Ntombovuyo Ngaphu

In the preschool age group, team Tiger won the prize, with the Racing Team taking the prize for the grade one to threes and the JNB team taking the prize for the grade four to sevens.

The S Team and the Roberts team won the Participation prize and the Iron Man Team got chosen in the raffle.

More such events are scheduled to happen throughout the year at different learning centres in Grahamstown.

For more information about this event and other upcoming education fixtures, visit the Ukufunda blog at *www.ukufunda.wordpress.com*



One kit per school

What's in your kit?

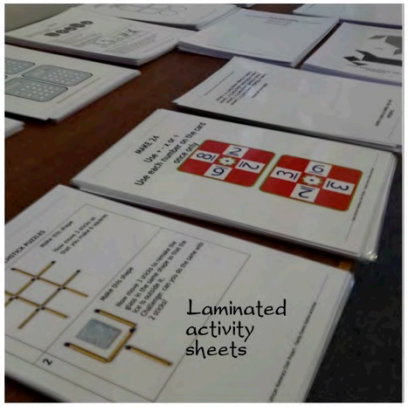
What's in your kit?

- List of activities and related resources for each station
- Solutions for each activity
- Activities
  - 20+ for younger groups
  - 21+ for older groups
  - 5+ much harder activities
  - Toothpicks
  - GeoGenius shapes and elastics
- Whistle
- 15 boards and clip
- Cloths
- Kokis
- Spray bottle
- Scorecard master
- Family register master

What do you need to add?

- Stations:
  - People (draw on local resources eg Soul Buddiez)
  - 3D wooden blocks
  - pack of cards
  - Unifix blocks
- Additional ideas
  - Prizes: WIMPY, SPUR vouchers, other prizes such as games etc
  - Activities for the families to take home (cards, dice etc)
  - Certificates for each family

- Replacement and new activities are available on the SANC project website:
- http://www.ru.ac.za/sanc/numeracybuzz/familymathsevents/



What does a Family Event Kit need?