



American International School of Lusaka

Every student thrives

Parent session



Mathematics at AIS

The Common Core State Standards (CCSS) define what students should understand and be able to do by the end of each grade and the CCSS for mathematics place an emphasis on applying mathematics to the real world. Mathematical instruction includes both the proficiency in, and processes of, mathematics. The CCSS are a shift in the direction of mathematics education. Students are no longer learning content as isolated facts, but rather as tools to solve a wide range of problems. Mathematical understanding and procedural skill are equally important, and both are assessable using mathematical tasks that are developmentally appropriate.

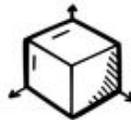
To reflect the unique learning journey of each of our students, we support each child through a developmental approach. In 2018, we modified our Math standards to better meet the varied developmental needs of our students. A progression of knowledge and skills can be viewed in the Early Years Phase 0A to Upper Primary Phase 5 domains.



Number & place value



Measurement & data



Geometry



Operations and algebraic
thinking

What is number sense?

(McIntosh et al, 1997)

Number sense refers to a person's general understanding of number and operations along with the ability and inclination to use this understanding in **flexible** ways to make mathematical judgments and to develop useful and **efficient** strategies for managing numerical situations.

How do we develop it?

Ask students regularly to calculate mentally:

Mental math encourages students to build on their knowledge about numbers and numerical relationships. When they cannot rely on memorized procedures or hold large quantities in their heads, students are forced to think more flexibly and efficiently, and to consider alternate problem solving strategies. (Parrish, 2010)

Make estimation an integral part of computing

How are mathematics practices changing?	
Increased emphasis on:	Decreased emphasis on:
connecting mathematical concepts and applications to learning	treating mathematics as isolated concepts and facts
manipulatives, to make mathematics understandable to students	rote learning, memorization and symbol manipulation
real-life problem solving using mathematics	word problems as problem solving
instruction built on what students know, what they want to know, and how they best might find out	instruction focused on what students do not know
a variety of strategies for possible multiple solutions—emphasis on process	one answer, one method, emphasis on answer
students being encouraged to speculate and pursue hunches	the teacher as the sole authority for right answers
a broad range of topics regardless of computational skills	computational mastery before moving on to other topics
mathematics as a means to an end	teaching mathematics disconnected from other learning
the use of calculators and computers for appropriate purposes	a primary emphasis on pencil and paper computations
programme of inquiry as the context for learning	the textbook as the context for learning
students investigating, questioning, discussing, justifying and journaling their mathematics	the use of worksheets
students and teachers engaged in mathematical discourse.	teacher telling about mathematics.

Estimation Task



Estimation Task



1. The temperature outside
2. The distance from the centre of Lusaka to Lochinvar National Park
3. The price of an avocado
4. The weight of a medium sized apple

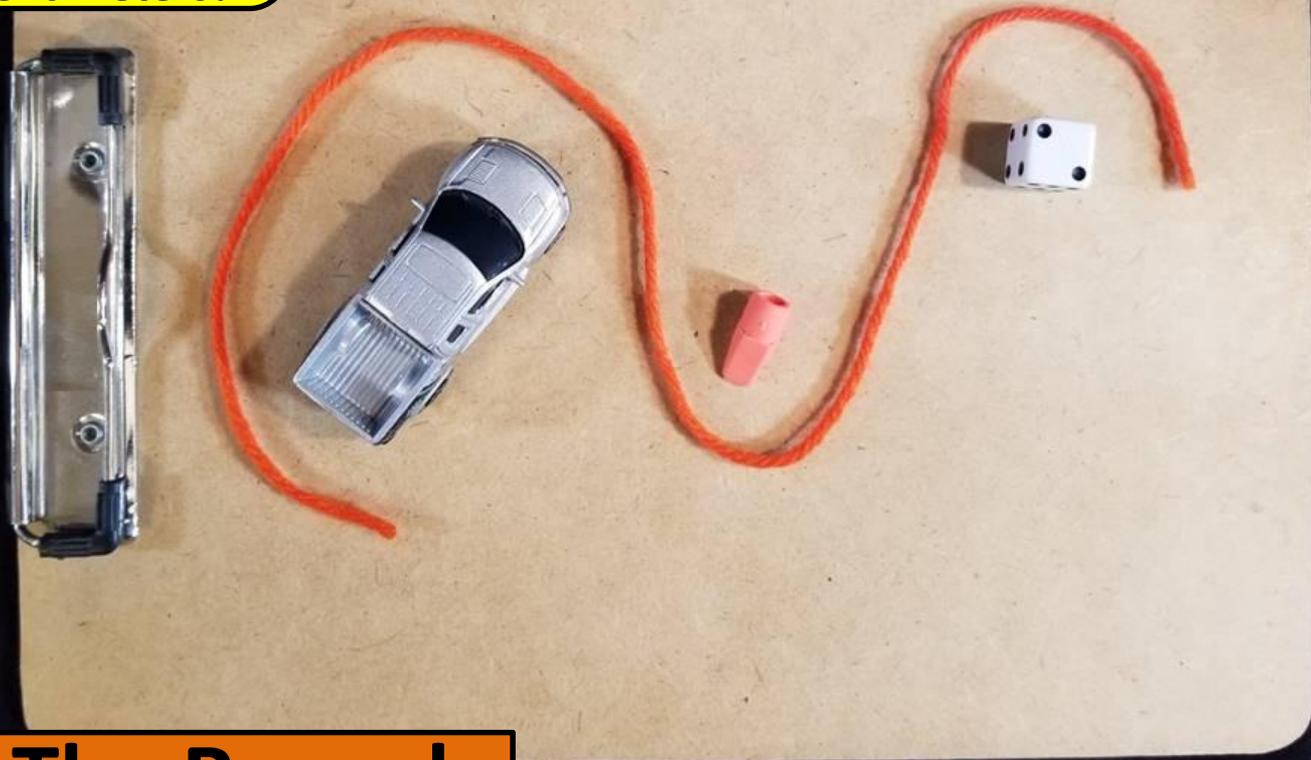
How tall is the bus?



What is the height of the lamppost?



What is the length of the yarn in centimeters?



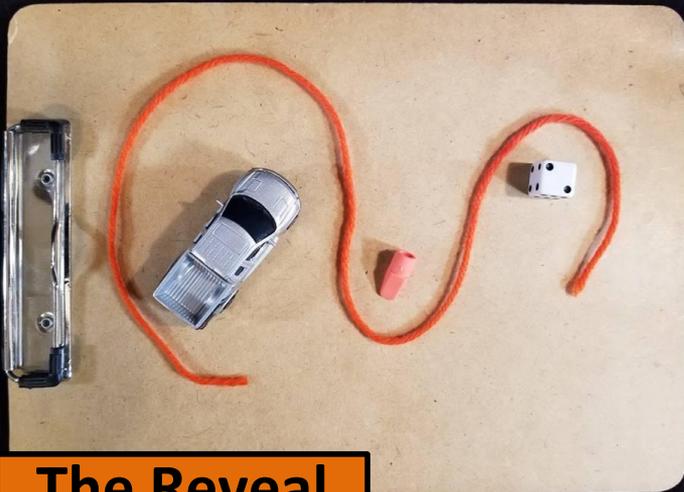
The Reveal



52 cm



The Reveal



The Reveal



The Reveal

‘Knowing mathematics, really knowing it, means understanding it. When we memorise rules for moving symbols around on paper, we may be learning something, but we are not learning mathematics. When we memorise names and dates we are not learning history; when we memorise titles of books and authors we are not learning literature. Knowing a subject means getting inside it and seeing how things work, how things are related to each other, and why they work like they do’

(Hiebert et al. 1997, *Making Sense: Teaching and Learning Mathematics with Understanding.*)

The learner should never be told directly how to perform any operation in arithmetic... Nothing gives scholars so much confidence in their own powers and stimulates them so much to use their own efforts as to allow them to pursue their own methods and to encourage them in them.



- Each numeracy stage highlights key knowledge and strategy that a child should know.
- Strong knowledge is essential for students to broaden their strategies across a full range of numbers.

Creates new knowledge through use



Provides the foundation for strategies

$$6 \times 4$$

$$6 \times 24$$



How can we record the strategies?

Now try 18×5

How might students solve $9 + 8$?

$$82 - 69$$

$$56 + 28$$



How does your child solve problems?

Counter



Adder



Multiplier



There are five people in the family and their average age is 20. What might their ages be?



Show me what $\frac{1}{4}$ looks like?

What do you do at home?

- **Measuring things** - lengths, cooking ingredients...
- **Games** - Monopoly, Bingo, board games, cards...
- **Time**- read timetables, time until bed, reading the clock...
- **Reading numbers**- number plates, speed signs...
- **Estimating**- number of :- people at a game, biscuits ...

1

Encourage children to play maths puzzles and games. Award winning mathematician, Sarah Flannery reported that her maths achievement and enthusiasm came not from school but from the puzzles she was given to solve at home. Puzzles and games – anything with a dice really – will help kids enjoy maths, and develop number sense, which is critically important.

2

Always be encouraging and never tell kids they are wrong when they are working on maths problems. Instead find the logic in their thinking – there is always some logic to what they say. For example if your child multiplies 3 by 4 and gets 7, say – Oh I see what you are thinking, you are using what you know about addition to add 3 and 4, when we multiply we have 4 groups of 3...

3

Never associate maths with speed. It is not important to work quickly, and we now know that forcing kids to work quickly on maths is the best way to start maths anxiety for children, especially girls. Don't use flashcards or other speed drills. Instead use visual activities such as <https://bhi61nm2cr3mkdkg1dtaov18-wpengine.netdna-ssl.com/wp-content/uploads/2015/03/FluencyWithoutFear-2015.pdf>

4

Never share with your children the idea that you were bad at maths at school or you dislike it – especially if you are a mother. Researchers found that as soon as mothers shared that idea with their daughters, their daughter's achievement went down.

5

Encourage number sense. What separates high and low achievers is number sense – having an idea of the size of numbers and being able to separate and combine numbers flexibly. For example, when working out $29 + 56$, if you take one from the 56 and make it $30 + 55$, it is much easier to work out. The flexibility to work with numbers in this way is what is called number sense and it is very important.

6

Perhaps most important of all – encourage a “growth mindset” let students know that they have unlimited maths potential and that being good at maths is all about working hard. When children have a growth mindset, they do well with challenges and do better in school overall. When children have a fixed mindset and they encounter difficult work, they often conclude that they are not “a math person”. One way in which parents encourage a fixed mindset is by telling their children they are “smart” when they do something well. That seems like a nice thing to do, but it sets children up for difficulties later, as when kids fail at something they will inevitably conclude that they aren't smart after all. Instead use growth praise such as “it is great that you have learned that”, “I really like your thinking about that”. When they tell you something is hard for them, or they have made a mistake, tell them: “That's wonderful, your brain is growing!”

Any questions?

