Parent Workshop

Mathematics is beautiful and creative:

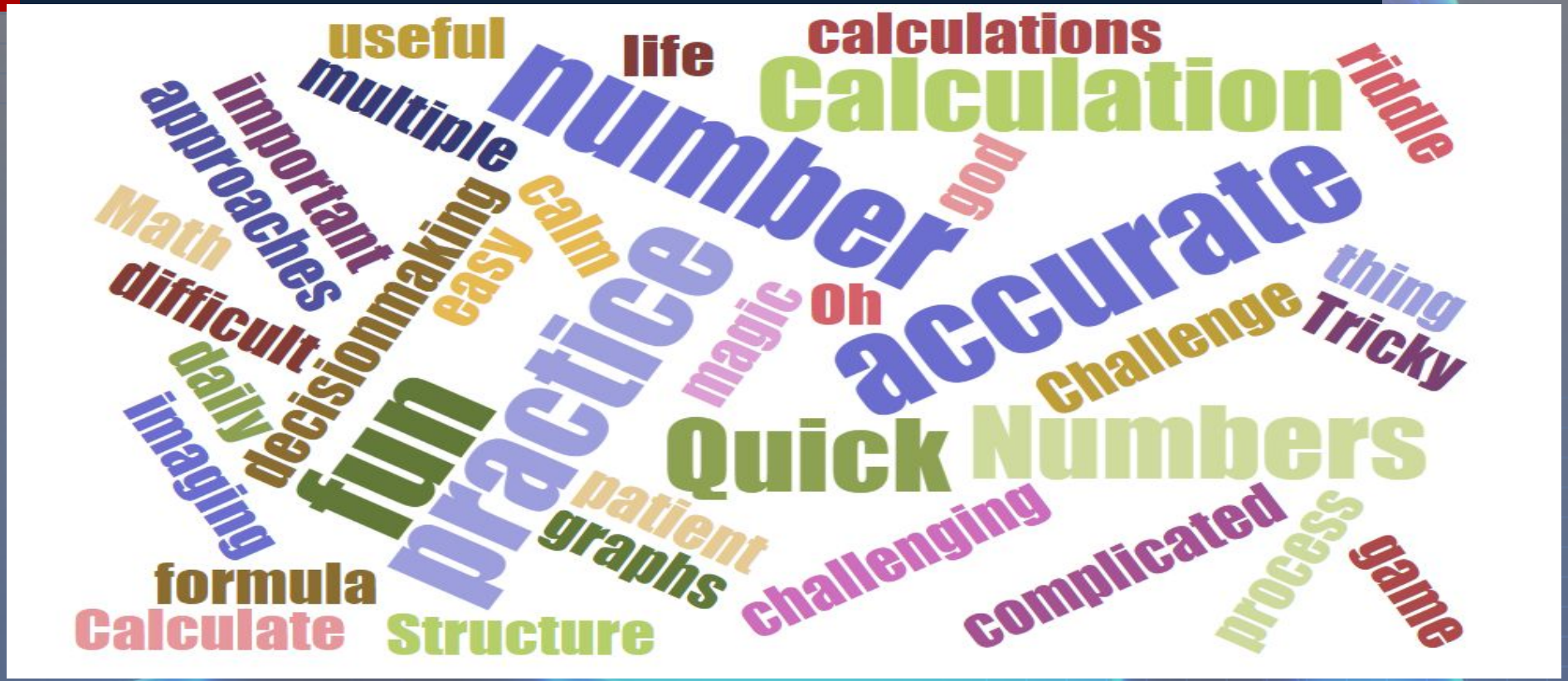
An introduction to the neuro-science of learning and the wonder of inquiry Maths.

Before we begin…..

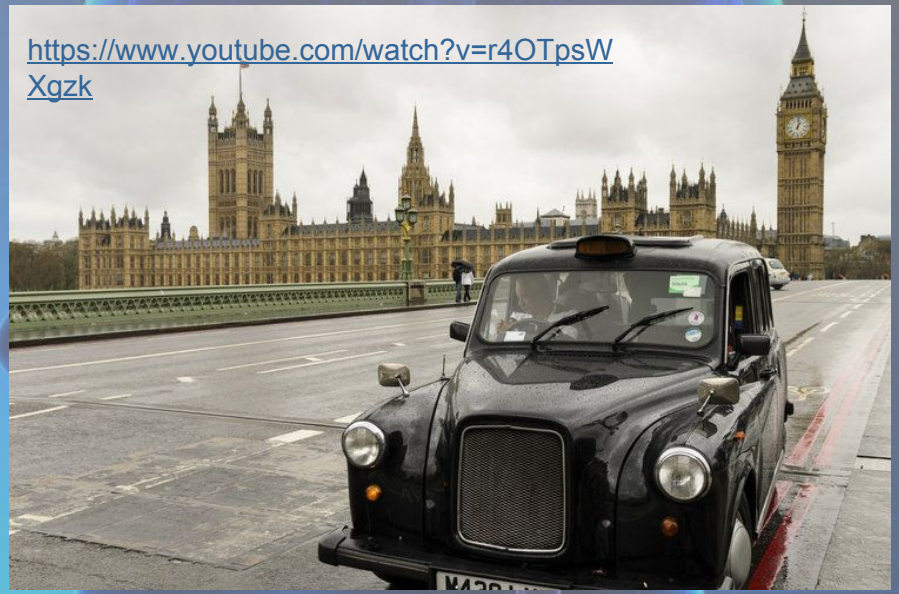
https://goo.gl/forms/hXSmi8Sz30iHTDRe2

Please complete the one question online survey.

The larger the word, the more it appeared in the survey. These are your responses: Maths is mainly about number, practice, calculation, accuracy and fun!



Our journey starts with a London taxi



What do you think the connection is?

What is your growth mind-set?

On your tables is a mindset survey!

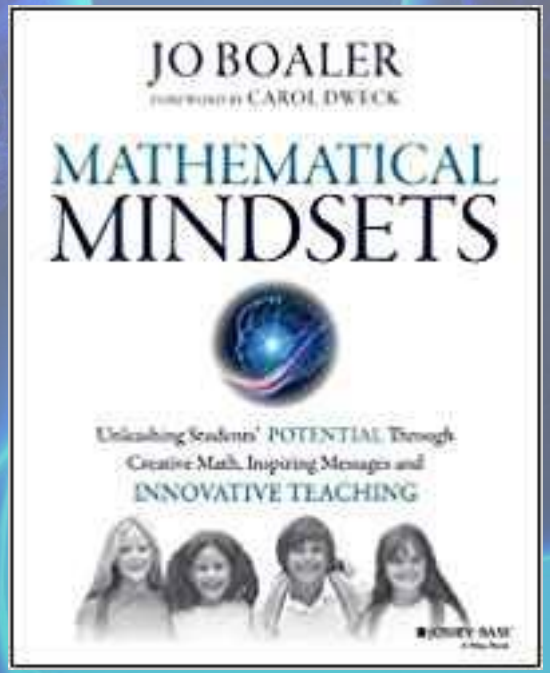
Circle the statements that fit your mindset.

What is your dominant mindset right now?

	Fixed	Mixed	Growth
Taking on challenges	You don't really take on challenges on your own. You feel that challenges are to be avoided.	You might take on challenges when you have some previous experience with success in a related challenge.	You look forward to the next challenge and have long-range plans for new challenges.
Learning from mistakes	You see mistakes as failures, as proof that the task is beyond your reach. You may hide mistakes or lie about them.	You may accept mistakes as temporary setbacks, but lack strategies to apply what you learned from the mistakes in order to succeed.	You see mistakes as temporary setbacks, something to be overcome. You reflect about what you learned and apply that learning when revisiting the task.
Accepting feedback and criticism	You feel threatened by feedback and may avoid it altogether. Criticism and constructive feedback are seen as a reason to quit.	You may be motivated by feedback if it is not overly critical or threatening. Who is giving the feedback, the level of difficulty of the task, or their personal feelings might all be factors in your motivation.	You invite and are motivated by feedback and criticism. You apply new strategies as a result of feedback. You think of feedback as being a supportive element in the learning process.
Practise and applying strategies	You do not practise and avoid practising when you can. You do not have any strategies for accomplishing the learning goals or tasks, or you apply ineffective strategies.	You practise, but a big setback can make you want to quit. You are more willing to practise things you are already considered good at. You are open to being given a strategy to meet a challenge, but you rarely apply your own strategies unless it is something you are already good at.	You enjoy the process of practising and see it as part of the process of getting good at something. You may create your own practice or study plans. You fluidly use many strategies, think of some of your own strategies and ask others about their strategies.
Perseverance and focus	You have little persistence on learning goals and tasks. You give up at the first sign of a struggle.	You may persevere with prompting and support. Unless you are provided with strategies for overcoming obstacles, you will stop or give up.	You 'stick to it' and have stamina for the task(s). You keep working confidently until the task is complete.
Asking questions	You do not ask questions or do not know which questions to ask, but you can usually say you 'don't get it' if asked.	You might ask questions about a portion of the task that you feel you can do. If you perceive it to be out of your ability, you probably won't ask questions.	You ask specific questions, ask questions about your own thinking and challenge the text, the task and the teacher.
Taking risks	You do not take risks, and if something is too hard you give in blank or copied work, if anything at all. You are not engaged in the process/task.	You will take risks if the task is already fairly familiar to you. If not, you will resort to copying or giving in partially completed work.	You begin tasks confidently, risk making errors and openly share the work you produce.

Table 2.1 *The mindsets continuum (copyright © Mindsetworks Inc.* www.mindsetworks.com*: used with permission)*

Jo Boaler - Stanford University



Jo Boaler at Stanford University

Inspiring Math Success for all Students through Growth Mindsets and Innovative Teaching

Our main goal is to inspire, educate and empower teachers of mathematics, transforming the latest research on math learning into accessible and practical forms.

Dr Jo Boaler is a Professor of Mathematics Education at Stanford University, and the faculty director of youcubed. She is the author of the first MOOC on mathematics teaching and learning. Former roles have included being the Marie Curie Professor of Mathematics Education in England, a mathematics teacher in London comprehensive schools and a lecturer and researcher at King's College, London. Her PhD won the national award for educational research in the UK and her book: Experiencing School Mathematics won the 'Outstanding Book of the Year' award for education in Britain. She is an elected fellow of the Royal Society of Arts (Great Britain), and a former president of the International Organization for Women and Mathematics Education (IOWME). She is the recipient of a National Science Foundation 'Early Career Award', the NCSM Kay Gilliland Equity Award (2014) and the CMC Walter Denham Mathematics Leadership award (2015). She is the author of nine books and numerous research articles.

youcubed Maths Class Norms

Everyone can learn maths to high levels!

Believe in yourself, it changes what you can do!

Maths is about creativity and making sense!

Mistakes and challenge are the best times for your brain!

Maths is about learning not performing!

Questions & discussions deepen your mathematical understanding!

Visualize and make connections to strengthen your brain!

Depth is more important than speed!

Parents can help by...

Read your table comment and discuss how it can impact the way Maths is experienced at home. (3 minutes)

Find other parents with different number slips to make a new group of 6 so that you can discuss and share the 6 ideas. (5 minutes)

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://bhi61nm2cr3mkdgk1dtaov18-wpengine.netdna-ssl.com/wp-content/uploads/2015/03/FluencyWithoutFear-2015.pdf

4

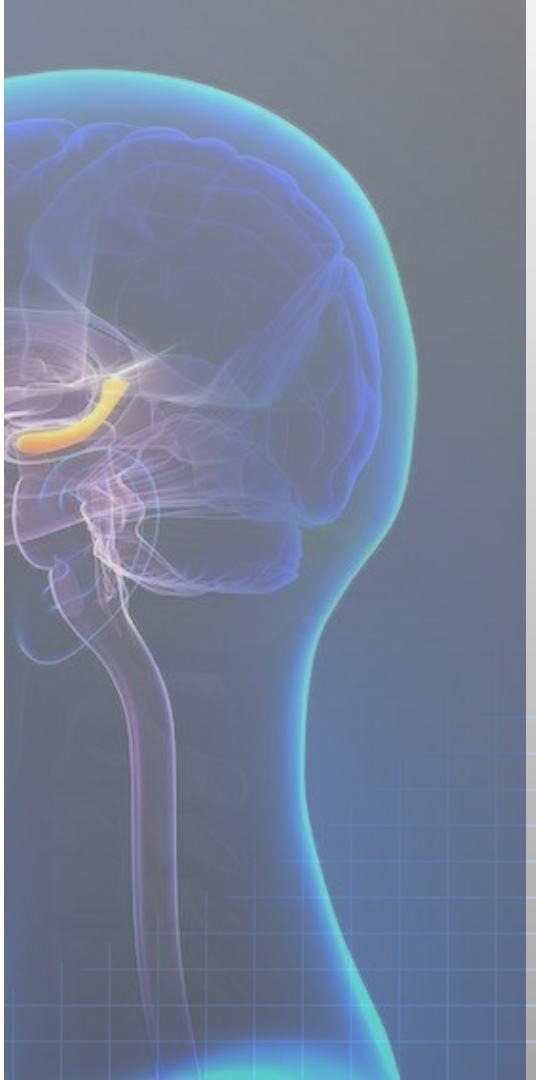
Never share with your children the idea that you were bad at maths at school or you dislike it – especially if you are a mother. Researchers found that as soon as mothers shared that idea with their daughters, their daughter's achievement went down.

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!"



The Evidence

We are going to watch a short video in 4 parts. These cover the 4 key ideas of Dr Jo Boaler. Click to watch Jo Boaler's 4 key messages

We will use a visible thinking routine called Connect, Extend, Challenge to help us discuss her ideas.

CONNECT / EXTEND / CHALLENGE

A routine for connecting new ideas to prior knowledge

CONNECT:	How are the ideas and information presented CONNECTED to what you already knew?
EXTEND:	What new ideas did you get that EXTENDED or pushed your thinking in new directions?
CHALLENGE:	What is still CHALLENGING or confusing for you to get your mind around? What questions, wonderings or puzzles do you now have?

A Mathematical experience

20 10 5 16 8 4 2 1

Here is a sequence of integers.

What is the rule for the sequence?

A Mathematical experience

20 10 5 16 8 4 2 1

Here is a sequence of integers.

What is the rule for the sequence?

The rule:

If the number is even, divide it by 2

If the number is odd, multiply by 3 and add 1

A Mathematical experience

20 10 5 16 8 4 2 1

Here is a sequence of integers.

What is the rule for the sequence?

What happens to the sequence if you start with another number?

A Mathematical experience

20 10 5 16 8 4 2 1

In 1937 a mathematician called Lothar Collatz proposed that for any number you pick, if you follow the procedure enough times you will eventually get to the number 1. This then became known as The Collatz Conjecture. Since then lots of mathematicians have been trying to prove or disprove it. So far every number that has been tried has reached 1, and powerful computers have checked enormous numbers of numbers, but no one knows if there is a big number out there that might break the rule. So this is classifed as an unsolved problem in mathematics.

In summary:

- Everyone can do well in Maths.
- Maths problems can be solved with many different insights and methods.
- Mistakes are valuable, they encourage brain growth and learning.
- Maths will help our students in their daily lives because they are learning to think quantitatively and abstractly.
- Students should develop an inquiry relationship with Maths.

Finally, if you want to know more...

There are readings in the google folder link below and you can visit Jo Boaler's website youcubed!

https://drive.google.com/drive/folders/0B3tm2oJxZ5kVcDFPbk5kWFNQVGc?usp=sharing

https://www.youcubed.org/