1. Jo Boaler - short video on 'How To Learn Math'

According to Dweck (2006), students with a **fixed mindset** believe that their ability is fixed or unchangeable no matter how hard they work. Therefore when confronted with challenges, they give up or they avoid them for fear of making mistakes. Mistakes mean you aren't smart. Students are threatened by feedback because they consider it to be criticism, something they have done wrong.

Students with a **growth mindset** believe that their ability is the result of hard work and that they are responsible for their own learning. Challenges and mistakes are viewed as opportunities to learn. Asking questions, they believe, leads to a clearer understanding and feedback is embraced. Students persevere at tasks because they believe that effort creates success.

2. "Optimal frustration" ("mistakes are our friends")

What is the value of failure? (see other side for practical suggestions)

So what's the link between making mistakes/math anxiety and mindset?

People with a fixed mindset view failure or mistakes as confirmation that they aren't very smart. When they get something wrong, they feel anxious or depressed and want to give up. Their negative feelings get in the way of learning.

Growth mindset thinking views failure or mistakes as an opportunity to learn. When we make a mistake, we remain hopeful that eventually we will be able to do something.

This is the power of YET – *"I can't do it, yet."*

In fact research has shown that when we make mistakes the synapses in our brain fire which actually causes brain growth!

3. Bus survey/mental math/estimation skills

4. "Is this on the test?" - assessment/evaluation, what does it look like (G/B/B)

5. Math problems, examples

-open and closed
-POTW #26 (Q's then answers)

6. Math Resources for Parents

a) Jo Boaler and practical research findings:

The Impact of Mindsets on Learning
http://blogs.wrdsb.ca/learningaswego/2014/08/28/the-impact-of-mindsets-on-learning/

Math Anxiety and Mindsets
http://blogs.wrdsb.ca/learningaswego/2014/10/06/math-anxiety-and-mindsets/

b) Math Resources for Parents - April 30 (page/link) to be posted

How can we encourage a growth mindset in students?

The main way is to **help students value MISTAKES**. They — and we — need to see MISTAKES as something very valuable for learning. A growth mindset transforms “failure” into an opportunity to learn.

Here are some ideas:

1. Simply: encourage mistakes at all times. Do not put them down. Show your children/ students that YOU value them. You can even "praise" mistakes in this sense: tell the student, "Great, I'm glad for this mistake, because it helps your brain to grow, its when you really learn!" This often helps students to relax and be more willing to jump into problems and persist longer.

2. Explain to students or your children WHY mistakes are important. Tell them about the brain growth!

(Science shows that brain growth results from struggle
-when we stick at a task the neurons in our brain connect
-when we persevere these connections grow stronger and we become smarter.
-when tasks are easy and when we don’t make mistakes, there is no brain growth.
-Knowing how the brain worked and its plasticity appeared to empower and motivate them.)

3. USE student mistakes in your teaching. If you can get where students are comfortable with sharing them with you and with the whole class, if the mistake is dealt with in the right manner, not putting the person down, but emphasizing how VALUABLE it is, then everybody can learn from it. As Lucy West states, don’t rescue the student, understand the wrong answer (and the thinking behind it), and talk about it.
4. Do NOT use time-pressured tasks and tests. They give the impression that math is about finding quick answers to factual questions, and not about learning.
5. Give students challenging work that encourages mistakes. The math problems need to be difficult enough so that students make mistakes, because if they can easily solve them, there is no brain growth. So try to always keep them at the "edge" of their understanding (“optimal frustration”).

(Carol Dweck, a researcher from Stanford University states that children should feel cheated if they are not challenged with opportunities to make mistakes.
Her research has found that deep learning occurred when students are confronted with mistakes they have made in their work. “If the work is easy - you’re not learning anything.”)

6. Often, you can even change a simple, "closed" math problem into an "open" one that encourages students to think.

Sources include: http://www.mathmammoth.com/lessons/value_of_mistakes.php http://blogs.wrdsb.ca/learningaswego/