What are Your Attitudes about Learning Mathematics?

- Bad math experience: bad math teacher, flunking test, failing Math xyz
- Good math experience: Passing Math xyz, had great math teacher who could explain

<table>
<thead>
<tr>
<th>Hate Math</th>
<th>Dislike Math</th>
<th>Get along with Math</th>
<th>Like Math</th>
<th>Love Math</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I ♥ math</td>
</tr>
</tbody>
</table>

What Type Of Mindset Do You Have?

- Do you think that some people can do math and others can't?
- Do you think you can get better at math with practice?
- Do you think there is a math gene?

Growth Mindset versus Fixed Mindset

- Fixed Mindset vs. Growth Mindset

How To Develop A Growth Mindset?

| INSTEAD OF... | TRY THINKING...
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I can't make this any better</td>
<td>I can always improve</td>
</tr>
<tr>
<td>This is too hard</td>
<td>This can take some time</td>
</tr>
<tr>
<td>I just can't do this</td>
<td>I'm going to learn how to do this</td>
</tr>
<tr>
<td>I'm not that smart</td>
<td>I will learn from them</td>
</tr>
<tr>
<td>I'm not good at this</td>
<td>What am I missing?</td>
</tr>
<tr>
<td>I give up</td>
<td>I'll use a different strategy</td>
</tr>
<tr>
<td>I don't like this</td>
<td>Is this really my best work?</td>
</tr>
</tbody>
</table>

"I failed over and over again... and that is why I succeed!"
Neurons

Unlike other body cells, neurons stop reproducing shortly after birth. Because of this, some parts of the brain have more neurons at birth than later in life because neurons that die are not replaced. However, new connections between neurons form throughout life.

Newer research indicates that even in adults new neurons are created in the hippocampus, but not as many.

Neurons and their Synapses

Timing is Everything!

Brain Plasticity

This is the brain’s capacity to develop and change throughout life, that is, to re-organize neural pathways as a result of experience.
Stimulating and Exercising the Brain

- A stimulated brain grows more connections – so exercise your brain!

Failure and Grit

- Your brain learns when it is engaged
- Struggling with problems, or investigating why something did not work engages the brain

- Trying again when you do not get the solution the first time – that needs stamina or grit

Grit:
- Passion and perseverance for long-term goals
- Sticking with your future

Information Age and Information Overload

- We live in the information age
- Need brain capacity for making sense of data and information

Question: What does it mean to know something?

Information is NOT Knowledge!


From Information to Knowledge via Cognition (Thinking)

Frontal lobe responsible for:
- Planning & organizing
- Problem solving and decision making
- Memory & attention
- Control of behavior, emotions and impulses

Problem Solving involves Metacognition

Some definitions of metacognition
- Thinking about thinking
- Knowledge about when and how to use particular strategies for learning or for problem solving
- Higher-order thinking that enables understanding, analysis, and control of one’s cognitive processes, especially when engaged in learning
Final Thoughts

• Don’t focus primarily on your grade
• Have as your main goal the growth of your brain and making light bulbs come on!