|  |
| --- |
| **Building Mathematical Mindsets: Day 1 for Grade 4** |
| **Lesson Overview:** |
| **Standards for Mathematical Practice:** 1. Make sense of problems and persevere in solving them.2. Reason abstractly and quantitatively. **Mathematical Mindset Goal:**Everyone can learn math to the highest levels. There is no such thing as a math person or math brain.* You can learn anything.
* The more work you do, the better you will get in math.

**Materials:** * chart paper and markers for Mindset anchor chart (one side labeled Fixed Mindset and one side labeled Growth Mindset)
* sets of mindset attributes cards (1 set for each student pair or group of 3)
* math journal per student
* Standards for Mathematical Practice poster or display

**Video**:Growth Mindset: <https://www.youtube.com/watch?v=ElVUqv0v1EE> (2:31) |
| **Before: 15 minutes** |
| **1. Introduction****Say:** I am so excited about all the great ideas that we are going to be thinking about together in math this year! There are so many interesting mathematical things for us to consider together. We are going to begin this year by thinking about what it means to think like a mathematician. One of the most important things for you to understand as a mathematician is ‘Everyone can learn math to the highest levels. There is no such thing as a math person or math brain.’ Sometimes, grown-ups say things like ‘I am not a math person’ or ‘I am bad at math’, but that’s not true. Scientists have studied the human brain, and they have discovered that there is no such thing as a “math” person. And **that** is great news for **ALL** of us. Scientists have discovered these two things about math smartness:* You can learn anything (even things that you think are really hard).
* The more work you do, the smarter you will get.

**2. Fixed vs. Growth Mindset**Some people (like the grown-ups that I mentioned earlier) have a **fixed mindset**. People with a fixed mindset believe people are either born smart or they are not. And they think that there is nothing you can do to change how well you understand math. Actually, no one is born smart in math. We just think that some people are smarter because they have different experiences that allow them to solve some problems that other people may find hard. But the good news is that everyone can learn those things if they work hard and have more experiences and practice with the things they want to learn. (Add the underlined characteristic to the Fixed Mindset side of the anchor chart.)Other people have a **growth mindset**. They believe that if you work hard and try, you can get better at math. This year we may work on some math that is hard for you. What I want you to think when that happens is, “This math is hard, but I know if I work hard that I can figure it out. I just haven’t had enough practice and time with it **yet**.” (Add the underlined characteristic to the Growth Mindset side of the anchor chart.)Tell students that you are giving them a set of cards with characteristics of fixed and growth mindset. They should work with their group to decide which characteristic should be classified as fixed mindset and which would be classified as growth mindset.Have students sort cards and then add the attributes to the fixed and growth mindset anchor chart.  |
| **During: 25 minutes** |
| **1. Introduction of Math Activity**Tell students that they will be working with a partner or group of 3 to complete today’s activity. Remind students that they may struggle to complete this activity. Ask students what someone with a growth mindset would do if they got stuck.**2. Math Activity** **Four 4’s:** Students build expressions that only use the digit four and the four operations or fractions (with only 4 as digits) to create all of the numbers between 1 and 20. Students can try to come up with more than one way to make the number if time allows. (See detailed instruction from You Cubed: <https://www.youcubed.org/>). As students are working, circulate to make sure students are working collaboratively and thinking about which groups may be ideal to have share in the discussion section. |
| **After: 20 minutes** |
| **1. Discussion**Have students share expressions for a number. \*Note that you might show students the ( ) symbols and tell them that mathematicians use these symbols around parts of a problem that they want someone to do first. For example, if a student writes 4 x 4 – 4 + 4 to make 8, then they could use ( ) to show to do the first two 4’s together and the last two 4’s together, then subtract (otherwise, the expression appears to equal 16). They could write: (4 x 4) – (4 + 4) to show that*. It is not an appropriate time for a full Order of Operations lesson*. Simply, telling students that mathematician’s use parenthesis (…) to mean do this part first is enough. **Ask:** If there are different expressions for the same numbers, can they all be correct? **Ask:** Does anyone have an example for how they could use their expression for one number to figure out another one?**2. Connecting to the Mathematical Practices**After the discussion, briefly point out the Standards for Mathematical Practice. (Posters and other resources: <http://www.debbiewaggoner.com/math-practice-standards.html>.) Tell students that these practices are ones that are habits of mathematicians. Point out one or two that you may have seen at play today [i.e. Students may have persevered (MP#1) when trying to find an expression for a number that was hard using only 4’s or perhaps students showed quantitative reasoning (MP#2) when using one number to figure out another number.] **3. Growth Mindset Video**Show the following video about Growth Mindset. Remind students that there is no such thing as a “math person” and everyone can learn. Growth Mindset Video: <https://www.youtube.com/watch?v=ElVUqv0v1EE>**4. Math Journals**Introduce math journals. Share how you plan to use the journal this year and any guidelines that you would like for students to use writing a new entry (i.e. recording date, title or question, etc.). Ask students to complete their first entry reflecting on something that our talk about fixed and growth mindset made them think about and/or about something interesting they noticed while working on the today’s math activity. |

\*Ideas, tasks, and some videos for this series of lessons were developed from the following the Week of Inspiration and Tasks tabs at <https://www.youcubed.org/> and Jo Boaler’s book Mathematical Mindsets: Unleashing Students’ Potential Through Creative Math, Inspiring Messages, and Innovative Teaching. However, these lessons and videos are in a different order, contain additional detail, have an explicit connection to Standards for Mathematical Practice, and contain a few outside resources. YouCubed (<https://www.youcubed.org/>) is a free site, but you will have to register to access some of the materials. Additional information regarding information for the task in this lesson can be found here: <https://www.youcubed.org/wp-content/uploads/2015/08/WIM-Day-1-gr-3-4-vF.pdf>.

**Fixed vs. Growth Mindset Card Sort**

|  |  |
| --- | --- |
| Does not want to try hard things. Wants easy work or shortcuts. | Enjoys practicing and working hard at new things. |
| Wants hard work. Thinks easy work is boring. | Does not like practice or hard work. Thinks it means that he or she is not smart. |
| Wants to forget mistakes. Tries to hide or makes excuses for mistakes. | If something is hard, it makes him or her try harder. |
| Sees mistakes as a chance to learn. Tries to think about what to do differently next time. | Gives up if something is hard. |
| Wants to give up when someone else gives feedback or criticism. | Asks lots of questions to self and others to make sure that he or she understands. |
| Does not get upset when someone gives feedback or criticism, because he or she knows they can do better next time. | Does not ask questions or ask for help if something is hard because he or she thinks you cannot be smart if you need help. |