Four 4's
Grades 5-CC

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Introduction

This is one of my favorite inquiry tasks that helps to set norms on the first day of the year. The timing for the lesson is given after my description of the tasks.

Video

Choose a mindset video with important brain and mindset evidence that will encourage students in maths. It will be good if you have time to discuss the video, after the video or at the end of the lesson. Or you could ask the students to reflect on the ideas in writing later.
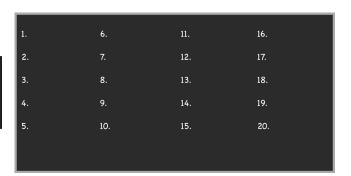
Agenda

Activity	Time	Description/Prompt	Materials
Mindset Video	4 min	Play mindset video.	Mindset video
Four 4's	20 min	Find the numbers 1 - 20 using only four 4's and any operation. Students work in groups and come up to the board to share solutions whenever they find them.	Paper, pencil/pen
Debrief Mindset Message	5 min	Debrief the mindset messages for this activity.	

Activity

I chose four 4's as a first day activity as it is exciting and engaging for students and it also provides a gentle way to encourage reluctant students to come to the board to share their thinking. I always start the activity by putting the numbers 1 to 20 on the board with plenty of space in between them:

Write the numbers 1 - 20 on the board so students can share their solutions.

1.	6.	11.	16.
2.	7.	12.	17.
3.	8.	13.	18.
4.	9.	14.	19.
5.	10.	15.	20.

Ask students to include as many examples as they can think of for each solution.

I then tell students we are going to try and find every number from 1 to 20 using only four 4's – all four of them have to be used each time – and any operation.

I ask them to think of operations and together we make a list. Usually they come up with:

$$+ \quad - \quad \times \quad \div$$

Sometimes I add in the square root of 4, if students don't think of it. You could choose to share one example solution, such as:

$$\sqrt{4} + \frac{4}{4} + 4$$

Organize the students into groups. The finding of individual solutions is not a very "group worthy" task and students often like to work alone in thinking about them, but it is nice if they are sitting in groups so they can bounce ideas off each other and talk.

I tell students to put on the board as many solutions they can think of for each number, and to come and put their solution up on the board whenever they think of one.

If a student puts up an incorrect solution do not correct it, wait as students will often see it for themselves, as more solutions are shared.

When I last taught four 4's with 6th graders they managed to find all of the numbers except 11, 13 and 19. At that point, a nice teach-able moment, I shared with students the meaning of the factorial operation. They were excited to learn this and immediately put it to good use as they saw that it allowed them to find the "missing" numbers.

Factorial
2! = 2 x 1 = 2
3! = 3 x 2 x 1 = 6
4! = 4 x 3 x 2 x 1 = 24

This activity has many extensions. If students have found the 20 numbers and you have more lesson time, ask them if they can think of other questions to try. Or pose other questions, such as, extending beyond 20, extending into negative numbers, or five 5's.

Extensions
- Can you continue using Four 4's to find numbers greater than 20?
- Make a number challenge of your own that is similar to Four 4's
- Can you use Four 4's to make negative numbers?
- How many numbers can you make with Five 5's?