## Lab 7: Four 4s

This lab is called the "4 Fours" lab because that's all you have to work with: 4 fours...



Using these 4's, and some basic mathematical operations, we're going to construct some numbers. Let me show you what I mean.

**Example 1**: Let's suppose I want to make the number "1" by using four 4's. One way to do this would be  $4-4+\frac{4}{4}$ . Using good OOO, I would do the division first, and get 4-4+1. Then, 4-4 is 0, and 0+1 is **1**.

You can also use Google to help!



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Example 1(a): An even easier way would be \frac{44}{44}, I guess.
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**Example 2**: Let's suppose I want to make the number "2". One way to do this would be  $\frac{4}{4} + \frac{4}{4}$ :



I think it's kinda cool how Google inserts parentheses to keep its OOO straight. 💿

**Example 3:** Let's make "3" with four 4's! How about  $\frac{4+4+4}{4}$ ? Yep!



Example 4: Let's see Sean try to make "13" with four 4's!

OK! So, you may have thought that square root was a mean trick. ③ But, it's not a *number*, so I figure go ahead and use them if you want!

For the next example, I decided to let a randomizer pick a number for me! And, Google gave me 15.



**Example 5**: That's not fair, because I got 13 last time. All I have to do is take away the square root to get 15:



I figure you wanna watch me sweat more than that. 🐵 Let's get another random number!



**Example 6:** How fitting! Let's watch Sean try to get "6".

OK, OK...not too bad there, huh? One more randomization!

andom number between 1 and 20		× Q
Q All 🖕 Images 🖽 News 🕨 Videos 🛇 Maps I Mo	ve s	ettings Tools
About 1,270,000,000 results (0.74 seconds)		
	Min	<
10	1	*
18	Max	
	20	

## Example 7: Sean goes for 18. (3)

Hopefully by now, you get the idea! Now, what we're going to do is to create all the whole numbers from 1 through 20, using similar methods. I'll give you a table below with a bunch of them filled in; your job is to get the rest!

Let's remember the rules!

<u>Rule 1</u>: You must use all 4 fours – and *only* 4 fours – in each solution. No other numbers.

<u>Rule 2</u>: You can place two or more 4's next to each other to make 44, 444, or 4444 (although I can't see how 444 and 4444 would be helpful. (3)).

<u>Rule 3</u>: You can use the standard mathematical operations we've discussed so far (+, -, \*, /).

- You can also use the square root, if you want!
- If you wanna use decimals, that's OK, too!
- Parentheses, if you want to, are great!
- Exponents are OK but they have to use 4's.
- Any other non-numerical mathematical symbols are OK, as well. One that comes to mind that you might need is the "factorial" (you might have to Google it to see how it works).

(2.5 points each) OK – go get 'em!

<u>Number</u>	<u>Solution</u>	<u>Number</u>	<u>Solution</u>
1	44 44	11	
2	$\frac{4}{4} + \frac{4}{4}$	12	
3	<u>4+4+4</u> 4	13	$\frac{44}{4} + \sqrt{4}$
4		14	
5		15	$\frac{44}{4} + 4$
6	$\frac{\textbf{4+4+4}}{\sqrt{\textbf{4}}}$	16	
7	$4+4-\frac{4}{4}$	17	
8		18	<b>4*4 + 4</b> - √ <b>4</b>
9	$4 + 4 + \frac{4}{4}$	19	
10		20	$4*\left(4+\frac{4}{4}\right)$