

2021-04-01 digit puzzle

To celebrate 2021-04-01, make the number 20210401 using only the digit 1, together with the following operations (in addition to parentheses):

- Addition: +
- Multiplication: \times

Your goal is to use as few copies of the digit 1 as possible.

For example, you can make the number 40 by using

$$(1 + 1) \times (1 + 1) \times (1 + 1) \times (1 + 1 + 1) + (1 + 1) \times (1 + 1) \times (1 + 1 + 1 + 1)$$

This uses 17 copies of the digit 1. (It turns out the best you can do for 40 is to use 11 copies – I leave this as an exercise.)

BONUS: The break runs from 2021-04-01 to 2021-04-11. What is the least number of copies of 1 you need to make each of the 11 numbers 20210401 through 20210411?