Divisibility Rule For 3 or 9:

- 1. Take any number.
- 2. Sum up the digits of the number you chose in 1.
- 3. See if the sum you got in 2 is divisible by 3 or 9.
- 4. The original number is divisible by 3 or 9 if and only if the sum of its digits is divisible by 3 or 9.

E.g.

1. Take the number 492.

4+9+2 = 15

1+5=6

6 is divisible by 3, so 492 is divisible by 3, but not divisible by 9.

2. Take the number 1098.

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1+0+9+8 = 18
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1+8 = 9
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9 is divisible by 3 and 9, so 1098 is divisible by both 3 and 9.

MATC44 Example:

Can we put the numbers 1,2,3,..., 2019 in a row to form one number which is a perfect square?

Solution:

All the possible numbers we can form have the sum of digits equal to 1 + 2 + 3 + ... + 9 + (1 + 0) + (1 + 1) + (1 + 2) + ... + (2 + 0 + 1 + 9). However, since we know that "The original number is divisible by 3 or 9 if and only if the sum of its digits is divisible by 3 or 9", we can see if the sum of the digits is divisible by 3 or 9 by summing up the numbers 1 to 2019 and then summing the digits of the sum of 1 to 2019.

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I.e.
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1+2+3+...+2019
= (2019)(2020)/2
= (2019)(1010)
= 2039190
2+0+3+9+1+9+0 = 24
2+4 = 6
6 is divisible by 3 but not by 9, so we cannot form a perfect square.
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