



## Nines to Zeros Investigation

***Conjecture: If you continue adding 9 or 19 to a chain of numbers, you eventually get to a multiple of 10.***

***We can predict which multiple of 10 we will end on.***

1. First, choose a number less than 10. Add 9 to this number and write down the answer. For example, if I choose 6, I would do  $6 + 9 = 15$ .
2. Now, add 9 to the answer and write down the new answer.  
For example,  $15 + 9 = 24$ .
3. Carry on adding 9 until you get to a multiple of 10, a number that ends on zero. For example,  $24 + 9 = 33$ ,  $33 + 9 = 42$ ,  $42 + 9 = 51$ ,  $51 + 9 = 60$ . 60 is a multiple of 10, so I stop here.

6 15 24 33 42 51 60

4. Next, start with a new number less than 10 and add 9 until you end up with a multiple of 10. Do you notice anything?
5. Finally, choose other numbers less than 10 and see if the same thing happens. Can you guess which multiple of 10 will be the number you end up on? Can you guess how many additions you will need to do until you end up on a multiple of 10?

### Challenge

Zak chose a number less than 10 and added 19. He added 19 to his answer, and added 19 to his new answer, and so on and ended up at 100!

Work out which number he started on.



## Let's try adding 19

Choose your own numbers less than 10 and keep adding 19 until you get to a number which is a multiple of 10.

Do you notice anything about the number you started on and the number you finish on?

Does this always happen?

Can you guess how many additions you will need to do until you finish on a multiple of 10?

## Let's try adding 21

Katya chose a number less than 10 and kept adding 21. She stopped at 99. Work out what number she started on.

If she wanted to finish at 100, what number could she have started on?

### Challenge

Can you use what you have found out to **subtract** 9? Choose a multiple of 10. Keep subtracting 9 until you reach a number less than 10.

Before you do this, can you guess which number you will finish on? How many times do you think you will need to subtract 9?