



Dastardly Digits

The first trick:

- 1) Choose 3 distinct digits _____.
- 2) Put them in order (largest to smallest) _____
- 3) Reverse the digits _____
- 4) Subtract the smaller number from the larger number _____
- 5) Reverse your answer and add it to your previous answer _____
- 6) Compare your answer to other people's.

Exploration (Questions 1-4 can be done in any order)

- 1) Does it always work?
- 2) Can you explain how it works? Think about how you can represent a general 3 digit number,
- 3) Does it work for any 3 digit number? What if you repeat digit?
- 4) What if the digits aren't in numerical order?

- 5) Try the method for 4 digits. Does it work?
- 6) Can you find an exception for 4 digits that gives a different result (you will need to duplicate some digits)?
- 7) Can you prove why it works/doesn't work for 4 digits?
- 8) Try the method for 5 digits? Can you jump straight to the general case via algebra rather than trying individual numbers?

Different bases

Can you turn these numbers from base 9 to base 10? Use the grid to help

9^3	9^2	9^1	9^0

1) 23

2) 35

3) 126

4) 1081

5) Now try the trick in base 9. Think what the maximum base number is in base 9.

Remember when working in base 9 that $10-1 = 8$ and $8+1 = 10$