

Investigate digital roots by completing the digital roots square from 1 to 9

X	1	2	3	4	5	6	7	8	9
1									
2						3			
3									
4					2				
5									
6									
7									
8									
9									

$$2 \times 6 = 12$$

$$1 + 2 = 3$$

$$4 \times 5 = 20$$

$$2 + 0 = 2$$

This is known as a Vedic Square.

L/O: To **apply** your knowledge of multiples and to **analyse** new information to **investigate** digital roots and make **conjectures** about patterns

What conjectures can you make, test and begin to explain (or even prove) about the digital roots of:

- Multiples of 3
- Multiples of 9
- Numbers that are 3 less than a multiple of 9
- Numbers that are 3 more than a multiple of 9

What patterns do you notice?

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What would happen if we extend the size of the Vedic Square?

Extending this, what do you notice about the digital roots of these types of numbers:

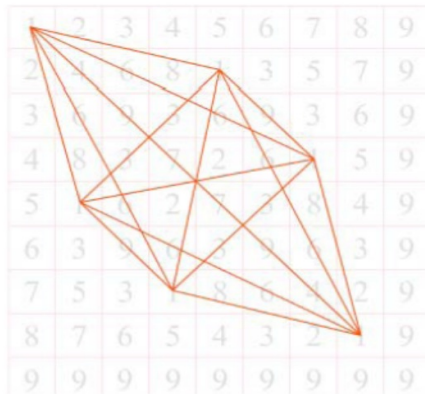
Are there any patterns to when these occur?

Can you explain why they have these digital roots?

- Square numbers
- Cube numbers
- Triangle Numbers
- Prime Numbers
- Powers of 2
- Factorials ! (3! means  $3 \times 2 \times 1$ ; 5! means  $5 \times 4 \times 3 \times 2 \times 1$ )

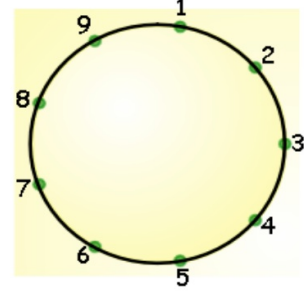
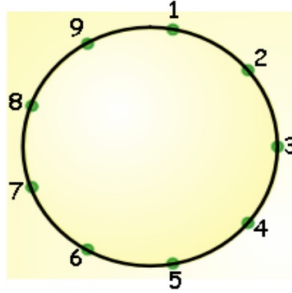
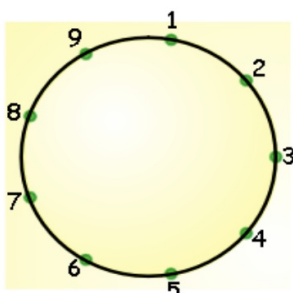
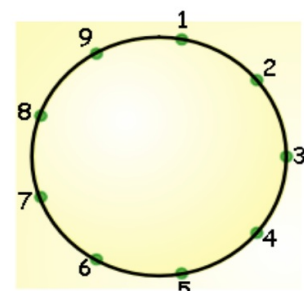
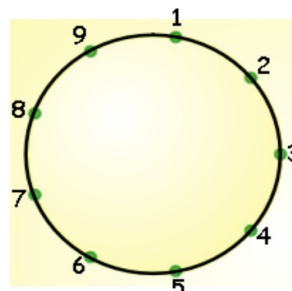
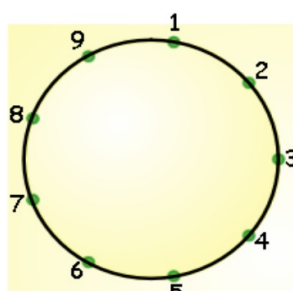
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Explore the patterns you can make by joining up the digits of the same value



Which digit have I joined here?

Choose a row from your digital root table. Join the first number's point to the second in a circle. Continue to the third number, and so on, until you get back to your first point. Can you explain the patterns you get for different rows?



## Hints and Extension Cue Cards

You might like to complete a  $9 \times 9$  multiplication table normally first to help

Need Help  
to get started?

Use colour to help.

How can I spot  
patterns?

Does 3 divide exactly into 87?  
Does 9 divide exactly into 729?

How can you  
test your ideas?

Can you give a number larger than 1000, made up of  
four different digits, that is divisible by 3?

Extend your  
ideas

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