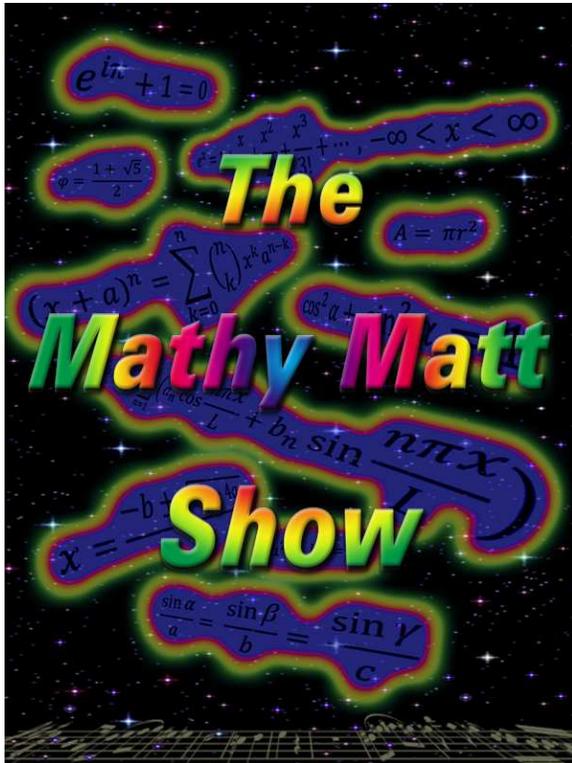


THE MATHY MATT SHOW



The Mathy Matt show, featuring Tekno the computer

Mathy Matt and his digital assistant, Tekno the computer, take you on a musical journey through the fascinating world of numbers! Mathy Matt and Tekno use the power of music to tackle some of the tricky concepts in maths, such as:

- Fractions and decimals
- What is Zero
- Positive and negative numbers
- Place value

The songs are informative and educational, with awesome beats and lyrics about maths that stay stuck in your head. Plus great stories about the origins of some of this maths came to be, and some cool tricks to try on your parents!

A little history, a lot of skills and a heap of music add up to make the Mathy Matt show a whole bunch of fun!

Character descriptions:

Mathy Matt is a cool, confident, energetic lover of all things mathematic. Maths teacher by day, electronic DJ by night, he is in his element when he combines his two passions: maths, and techno-house music.

Mathy is dressed in bright raver-style costume:

- Loose, comfortable jeans or trousers
- Tight T-shirt printed with mathematical equations
- Edgy, modern hairstyle

Tekno the computer is a colourful but unreliable digital assistant. His text-on-screen dialogue is accompanied by a vocoder electronic voice. He is an early experiment into Artificial Intelligence – he loves jokes about maths and can perform over seven million calculations per second but be careful! Tekno does have a habit of going haywire when he gets confused... sometimes the only thing to do is perform a system restore, restart him and find a better way to explain the concept to him.

THE MATHY MATT SHOW

$f(x) = a_0 + \sum_{n=1}^{\infty} (a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L})$ $a^2 + b^2 = c^2$ $e^{i\pi} + 1 = 0$ $-b \pm \sqrt{b^2 - 4ac}$
 $\frac{\sin \alpha \sin \beta \sin \gamma}{a b c}$ $\frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots, -\infty < x < \infty$

Concepts discussed in The Mathy Matt Show
 address the following content descriptions and proficiency streams
 in the Australian Curriculum v8.0 Mathematics Learning Area

Concept	Australian Curriculum v8.0 content	Australian Curriculum v8.0 year level
Intro module (Junior level includes teaching Tekno to count)		
Introduces the characters. Introduces the concept of infinity. Lots of big maths words in the opening song, accompanied by exciting, energetic music.		
What is a number and What are numbers for modules		
Encourages students to consider the purposes of numbers in the real world. Describes the evolution of numerical notation. Recreates the development of the place value system. Counting by groups. Simple ordering, labeling and measuring.		
Introduction to number systems	Understanding, ACMNA124	F, 1, 5
History of numeral notation	Understanding	F & 1

History of numerals chart [shown to senior groups shows only]

India, 100AD

1	2	3	4	5	6	7	8	9
-	=	≡	+	h	φ	?	5	?

	Ghubar undated mss.	Ghubar 10 th century	Ghubar 12 th century	Ghubar 16 th century	Ghubar	Arabic modern	N'ko	Wolof
0		o	o		o	•	0	O
1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9
10					10	10	01	10

African / Arabic numerals development

THE MATHY MATT SHOW

Operators module

Opposite Operators game reordering and substituting numbers to make true equations. Introduces the idea of the commutative law $a + b = b + a$ and additive inverse $a + (-a) = 0$ using a more complicated equation by means of a maths magic trick: $\frac{2x+12}{2} - x = 6$

Operators	ACMNA013, ACMNA031, ACMNA057, ACMNA076	1, 2, 3
Commutative law	ACMNA029, ACMNA036, ACMNA054, ACMNA083, ACMNA121, ACMNA151	1, 2, 4, 5, 7

The algebraic solution describing how the 'Think of a number trick' works

x	Think of any number
2x	Double it
2x + 12	Add 12 to your answer
$(2x + 12) / 2 = x + 6$	Halve your answer
$(x + 6) - x$	Take away your original number
6	

** because you have doubled and halved your number, these cancel out. Because you add 12, then halve it (making six), when you take your original number away you are left with that six. Another way to visualise it is to use 1 as your starting number:

$$1$$

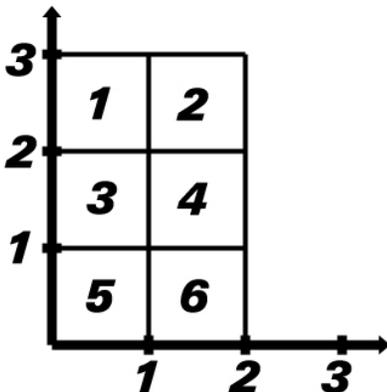
$$1 \times 2 = 2$$

$$2 + 12 = 14$$

$$14 / 2 = 7$$

$$7 - 1 = 6$$

Extension: Visual model for multiplication and division



2×3

- Draw a line horizontally and mark 2 places
- Draw a line vertically and mark 3 places
- Join the places to make boxes
- Count the boxes

$6 \div 2$

- Draw 6 boxes, using 2 columns
- Count the rows

THE MATHY MATT SHOW

$f(x) = a_0 + \sum_{n=1}^{\infty} (a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L})$
 $a^2 + b^2 = c^2$
 $e^{i\pi} + 1 = 0$
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots, -\infty < x < \infty$

Place Value module

Recreates the development of the place value system.
 Musical mnemonic about the direction of powers of ten in the decimal system.
 Demonstrates the home-made adding and subtracting calculator (attached).

Place value system	ACMNA014, ACMNA027, ACMNA053, ACMNA073	1, 2, 3, 4
Extension: Build your own calculator	ACMNA015, ACMNA028, ACMNA029, ACMNA030, ACMNA054	1, 2, 3

Times Tables module

A long interactive joke with the audience, followed by a non-intuitive method for calculating 6, 7, 8, 9 and 10 times tables using one's fingers.

Finger 6 – 10 times tables method	ACMNA057, ACMNA074, ACMNA076, ACMNA081, ACMNA291	3, 4, 5
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Fingers method of times tables

The method is described visually at this website:
<http://www.instructables.com/id/Tables-of-6-7-8-and-9-in-your-hands/>

Fractions as subdivisions module

Introduces $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{8}$. Students apply musical rhythm to the corresponding fraction name, turning the audience into a drum machine.

Cross-curricular application of fractions	ACMNA016, ACMNA033, ACMNA058, ACMNA107	1, 2, 3, 5
<ul style="list-style-type: none"> Extension: box method of adding and multiplying fractions 	ACMNA103, ACMNA126, ACMNA153	5, 6, 7

Extension: online drum sequencer

An extension is for students to program/compose their own drum patterns. There are quite a few online drum sequencers, of which this is just one, close to the format I present:

<http://www.drumbot.com/projects/sequence/>

<http://www.virtualdrumming.com/drums/windows/virtual-drum-machine.html> is a much more basic sequencer that is less interesting musically, but has a real drum kit and moving sticks as the sequence is performed. It also features music notation instead of grid-based notation.

THE MATHY MATT SHOW

$$f(x) = a_0 + \sum_{n=1}^{\infty} \left(a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right)$$

$$a^2 + b^2 = c^2$$

$$e^{i\pi} + 1 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots, -\infty < x < \infty$$

$$\frac{\sin \alpha \sin \beta \sin \gamma}{b} = \frac{\sin \alpha \sin \beta \sin \gamma}{c}$$

$$A = \pi$$

$$k=0$$

Positive and negative numbers and What is Zero module

Introduces the idea of positive and negative as labels for direction.

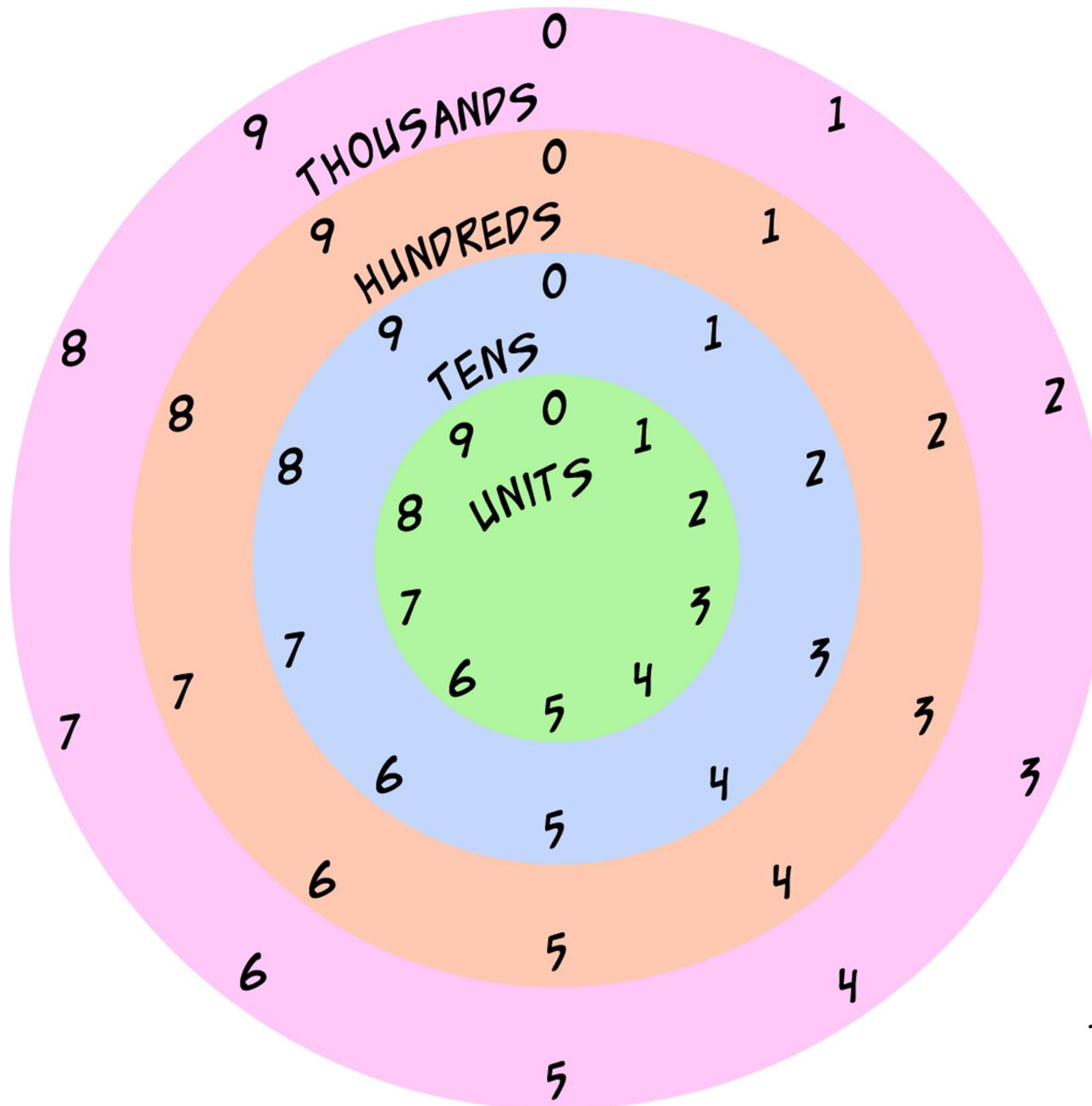
Students apply musical pitch to describe movement along the number line.

Brief discussion about the introduction of zero. Introduces identity law $x + 0 = x$.

Introduces $x \div 0$ as undefined.

Positive and negative as arbitrary labels for direction	ACMNA107, ACMNA124, ACMMG143, ACMNA133,	5, 6
Introduction to the concept of zero		

MATHY MATT PERSONAL CALCULATING MACHINE*



INSTRUCTIONS

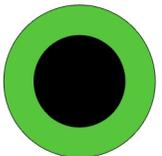
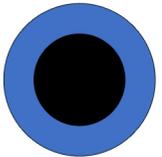
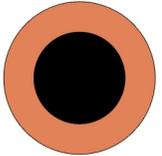
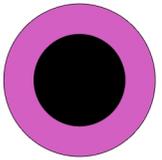
- CAREFULLY CUT OUT THE RINGS TO THE RIGHT, FOLD THE RINGS IN HALF, THEN CUT THE BLACK CENTRES OUT.

- PLACE THE RINGS OVER THE DIGITS OF THE FIRST NUMBER YOU WISH TO ADD OR SUBTRACT FROM

- TO ADD: MOVE EACH RING AROUND THE CIRCLE CLOCKWISE THE SAME NUMBER OF STEPS AS THE DIGIT YOU ARE ADDING. IF YOU TOUCH 0, YOU NEED TO MOVE THE RING IN THE NEXT OUTER WHEEL UP ONE SPOT.

- TO SUBTRACT: MOVE EACH RING AROUND THE CIRCLE ANTI-CLOCKWISE THE SAME NUMBER OF STEPS AS THE DIGIT YOU ARE ADDING. IF YOU TOUCH 9, YOU NEED TO MOVE THE RING IN THE NEXT OUTER WHEEL DOWN ONE SPOT.

- SEE THE EXAMPLES ON THE NEXT TWO PAGES!



*BATTERIES NOT INCLUDED

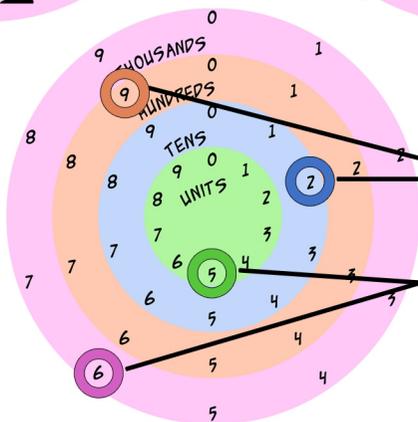
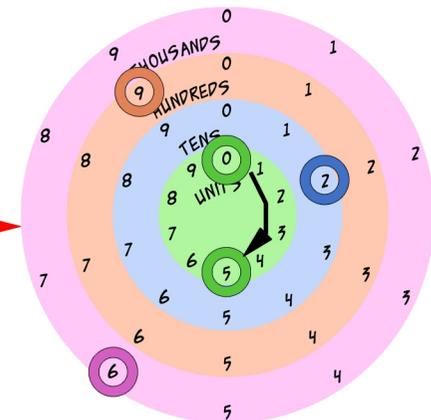
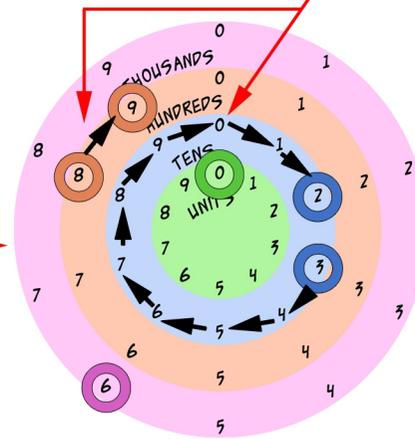
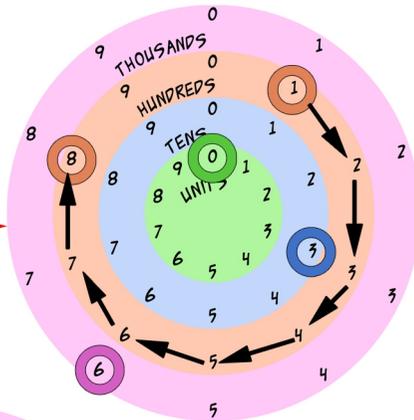
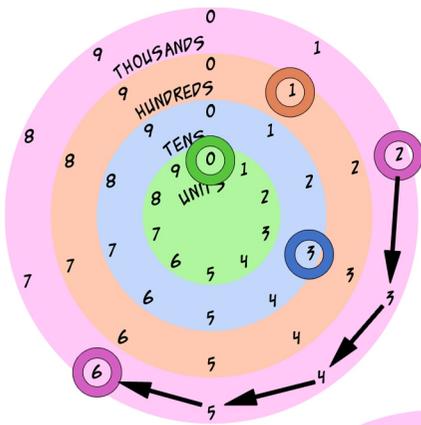
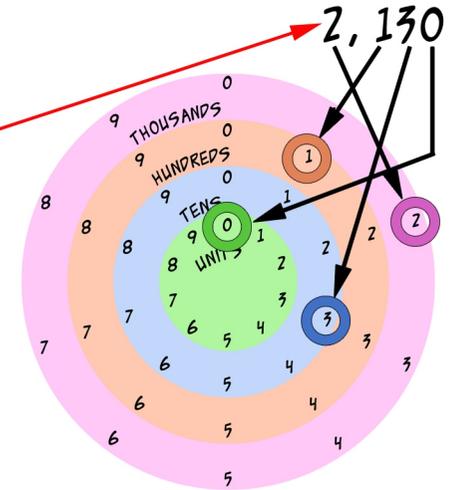
MATHY MATT PERSONAL CALCULATING MACHINE*

EXAMPLE: ADDING 2,130 + 4,795

STEP 1 - PLACE THE RINGS ON FOR THE FIRST NUMBER

STEP 2 - STARTING AT THE HIGHEST PLACE, MOVE THE RING AROUND CLOCKWISE THE NUMBER YOU ARE ADDING. IN THIS CASE WE START AT THOUSANDS AND MOVE THE RING 4 NUMBERS HIGHER. CONTINUE FOR THE NEXT WHEELS.

WE'VE TOUCHED 0!
SO WE NEED TO MOVE THE
NEXT-HIGHEST RING UP ONE DIGIT



STEP 3 -
THE ANSWER!

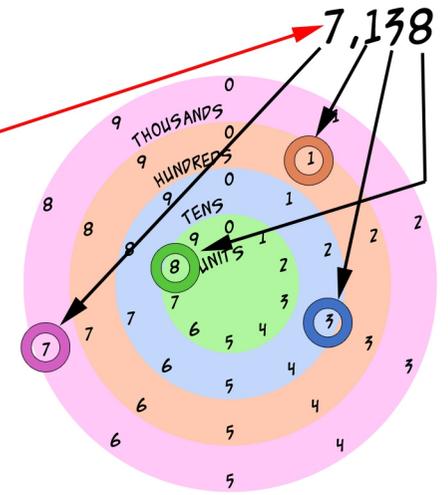
6,925

MATHY MATT PERSONAL CALCULATING MACHINE*

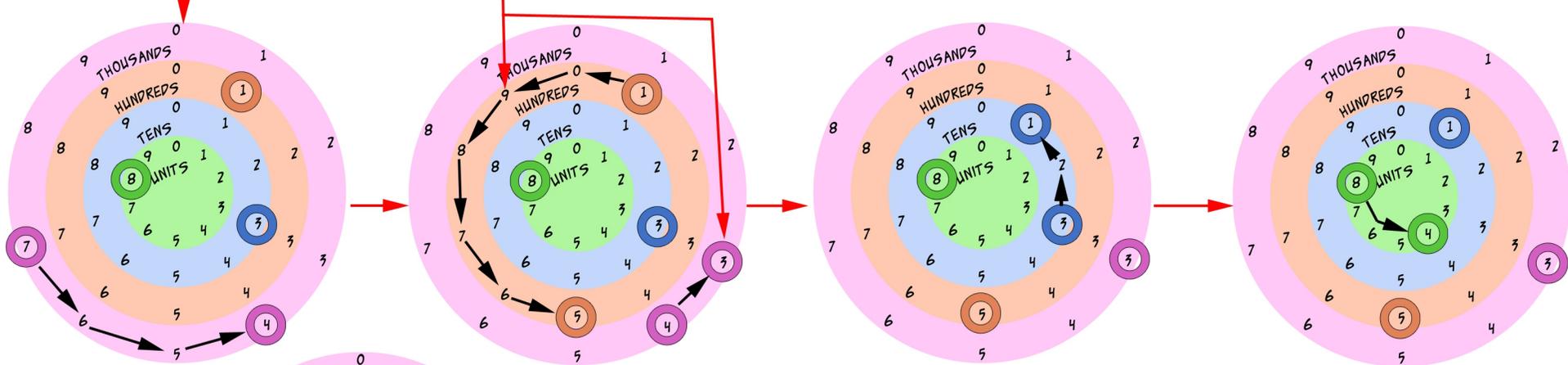
EXAMPLE: SUBTRACTING 7,138 - 3,624

STEP 1 - PLACE THE RINGS ON FOR THE FIRST NUMBER

STEP 2 - STARTING AT THE HIGHEST PLACE, MOVE THE RING AROUND ANTI-CLOCKWISE THE NUMBER YOU ARE SUBTRACTING. IN THIS CASE WE START AT THOUSANDS AND MOVE THE RING 3 NUMBERS LOWER. CONTINUE FOR THE NEXT WHEELS.



WE'VE TOUCHED 9!
SO WE NEED TO MOVE THE
NEXT-HIGHEST RING DOWN ONE DIGIT



STEP 3 -
THE ANSWER!

