EXPLODING DOTS PUZZLE COLLECTION
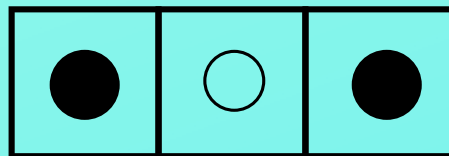
Puzzles Created by
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CoFounder, **Dhimath LLP**
Global Math Project Ambassador

THIS IS NOT MO'R'SE CODE

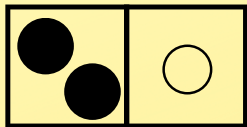if **7 | (a + b)** then is it true that the number "**aba**" is divisible by **7** ?

In a Decimal **Exploding Dots** Machine, what does the below pattern indicate?

QUICK
TIPS

COVID-19 PUZZLE

- **COol VIsual Divisibility by 19 Puzzle**

In a Decimal **Exploding Dots** Machine, what does this pattern on the left indicate?

Given a 2 Digit Number we can add 2 Red Dot-Antidot pairs

to get which becomes on removing patterns of 19

Lets use this concept to check if 36005 is divisible by 19

$36005 \longrightarrow 3600 + 5*2 = 3610$

$3610 \longrightarrow 361 + 0*2 = 361$

$361 \longrightarrow 36 + 1*2 = 38$

Since 19 divides 38,
36005 is divisible by 19. Whoa !!

WITH GREAT POWER COMES GREAT FUN

What is the remainder when the sum

$$10^{10^1} + 10^{10^2} + 10^{10^3} + 10^{10^4} + 10^{10^5} + 10^{10^6} + 10^{10^7}$$

is divided by 7 ?
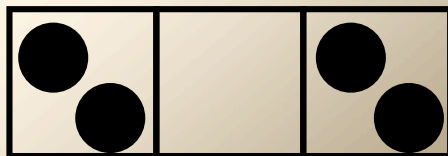
CLUE

| ● | | | | on dividing by 7 → | | | | ○ |

FOUNDATION IS THE KEY TO SUCCESS

Find the the last two digits of 7^{2022}

CLUE

$100 =$

THE "BASE"-ICS OF NUMBER SYSTEM

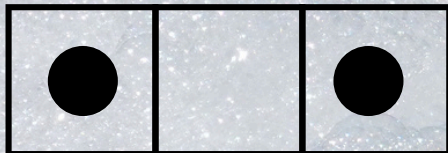In a **Base-2** Number System, the number of digits used are **2**

In a **Base-10** Number System, the number of digits used are **10**

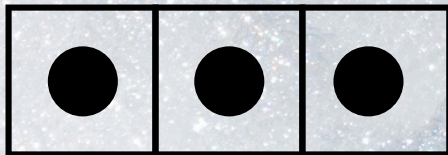What is the number of digits used in

Base 2.2 (two point two) ?

THREE IN A ROW

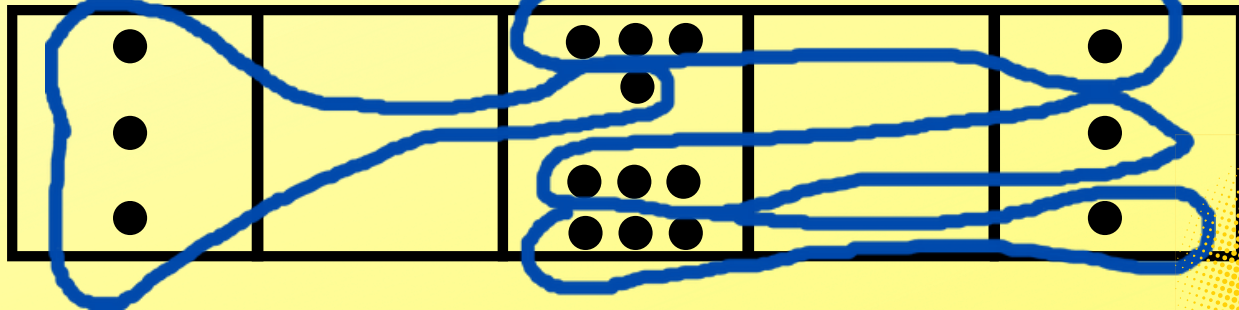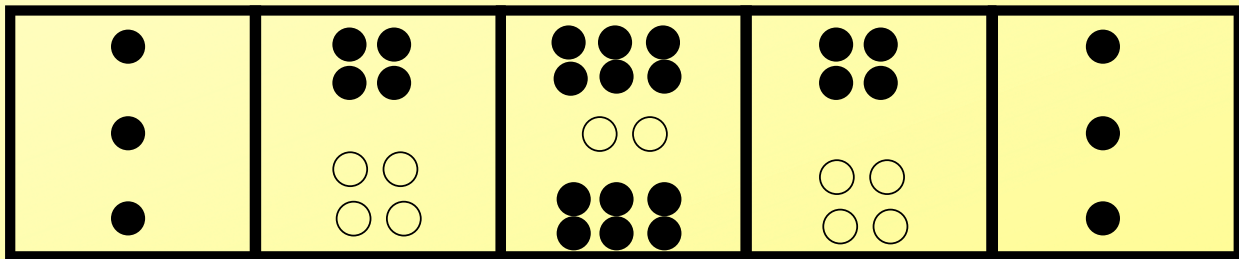If $x + 1/x = -1$, find $x^{99} + 1/x^{99}$

CLUE:

FACTORIZE $(a+1)^4 + (a^2-1)^2 + (a-1)^4$
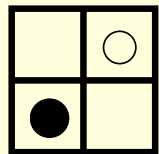

ANS: $(3a^2+1)(a^2+3)$

THINKING^2

$$(x^3 - 3\sqrt{5}x^2 + 13x - 3\sqrt{5}) \div (x - \sqrt{5})$$

A problem from a high school math text book. With Exploding Dots, it becomes fun and easy to solve this problem. Can you try it out?
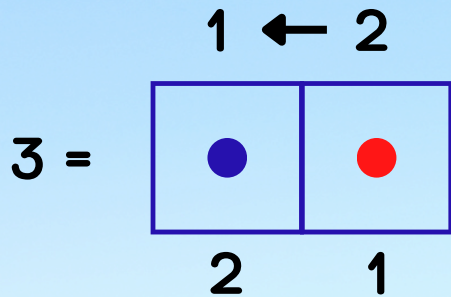
CLUE: 2D EXPLODING DOTS

A Mouth Watering Puzzle

Two people drink water from a 1-liter bottle, alternately. On their turn, each one drinks exactly 50% of the water remaining in the bottle. How much water does the person, who opens the bottle first, drink eventually?

CLUE: BINARY EXPLODING DOTS

1 ← 2

3 =

● Water drunk by first person

● Water drunk by second person

2   1

11 IS A PALINDROME

But are all palindrome numbers with even number of digits divisible by 11 ?

CLUE:

on dividing by 11

THE FAMOUS FIVE

Is every fifth number in the Hemachandra/Fibonacci Sequence

1, 1, 2, 3, **5**, 8, 13, 21, 34, **55**,...

a multiple of 5?

CLUE:

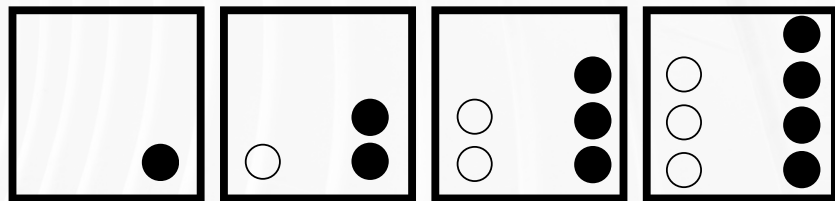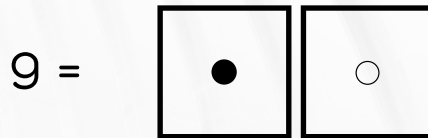unexplosion

VISUALIZE THE PATTERN

$1 \times 9 + 2 = 11$

$12 \times 9 + 3 = 111$

$123 \times 9 + 4 = 1111$

$1234 \times 9 + 5 = 11111$

$12345 \times 9 + 6 = 111111$

$\ldots$

Can you the feel the Magic and Joy of **Exploding Dots**?

LITTLE RED RIDING HOOD 2.0

Little Red Riding Hood starts to her grandmother's house with a bag of cakes. She needs to go through 4 forests, and at every forest, she meets a wolf that grabs away 50% of the cakes in the bag, but gives one cake back. When she reaches her grandmother's house, she is left with 7 cakes in her bag. How many cakes did she start with?
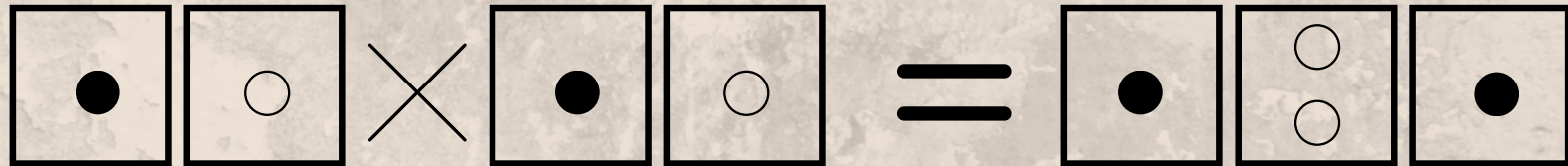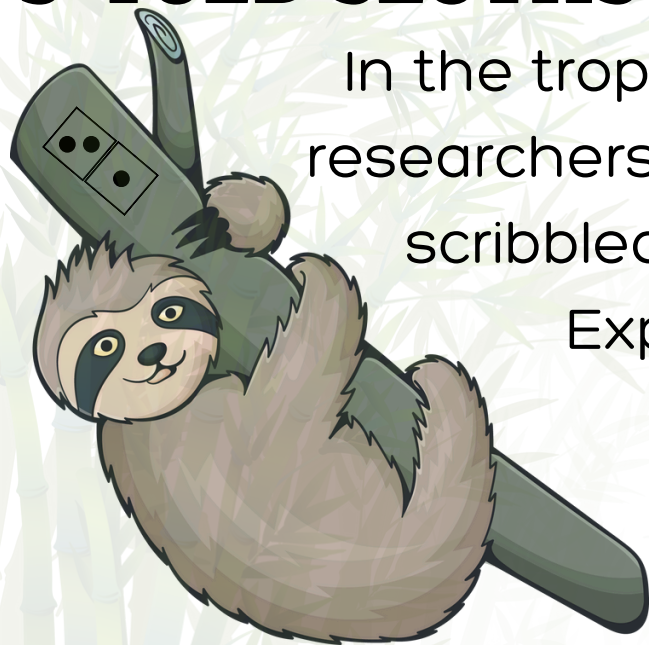
CLUE: Binary Exploding Dots

NINE ALL AROUND

Consider a 999-digit number whose all digits are 9. Can you figure out how many 9's are present in the square of the number?

CLUE:

3-TOED SLOTHS LOVE EXPLODING DOTS

In the tropical forests of South America, researchers found thousands of numbers scribbled on the bark of the trees in Exploding Dots notation.
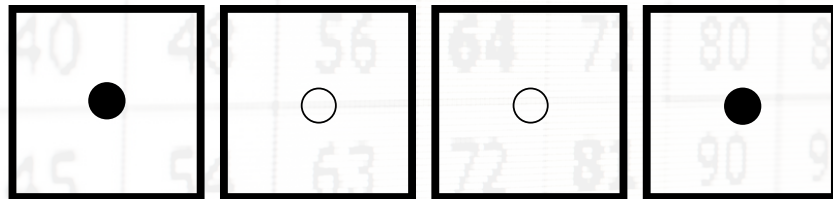
The rightmost box in all these numbers contained either a single dot or a single antidot.

What special numbers did these 3-toed sloths scribble all over the trees ?

EXPLODING DOTS MULTIPLY JOY

A set of numbers when represented in a decimal Exploding Dots machine result in exactly one dot or one antidot in each box.

What special property do these numbers exhibit ?
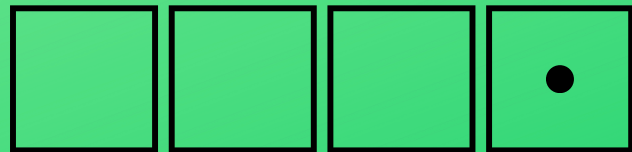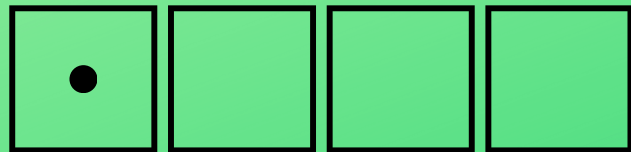
Clue: Observe the poster carefully.

CYCLING YOUR WAY TO GLORY

IF 27 | ABC, THEN 27 | BCA AND 27 | CAB

Ex: 27 | 648 => 27 | 486 and 27 | 864

Which other numbers apart from 27 have this exact property ?

CLUE:

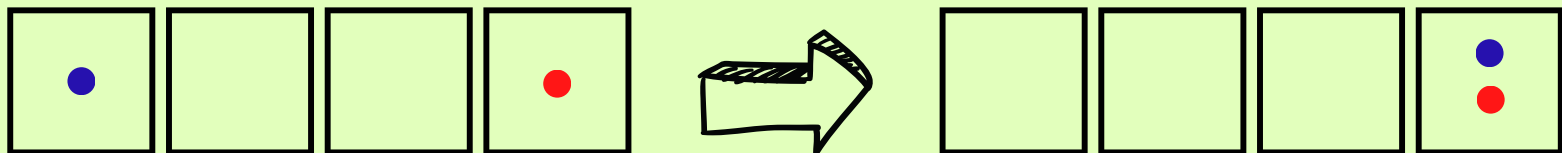How can you make one dot in any box move 3 boxes to the right ?

WHEN PLUS MEANS CONCATENATION

IF 37 | (ABC+DEF), THEN 37 | ABCDEF

Ex: 37 | (100+048) => 37 | 100048

Which other numbers apart from 37 have this exact property ?
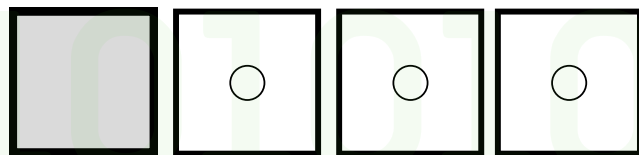
CLUE:

How can you make the blue dot that represents ABC come to rightmost box containing the red dot that represents DEF?

COMPUTERS LOVE EXPLODING DOTS

Computers have a special binary Exploding Dots machine, embedded in the chips. Any antidot that enters the leftmost box gets converted into a dot.

What happens to -7 if we add a dot-antidot pair in the rightmost box ? What is this machine commonly known as in the computer world ?
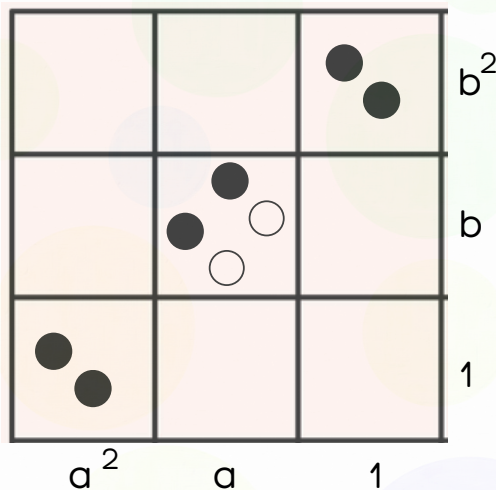
SPRINKLE FEW DOTS IN A SQUARE

If a number N can be expressed as a sum of two squares, can 2N also be expressed as a sum of two other squares ?

CLUE:
What happens if we add two dot-antidot pairs in the box at the center ?

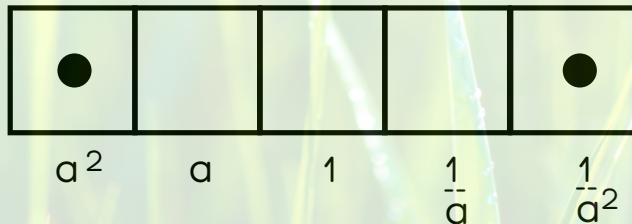$$13 = 2^2 + 3^2$$
$$26 = 5^2 + 1^2$$

WORKING AT GRASSROOT LEVEL

if $(a + 1/a) = \sqrt{2}$

find the value of $(a^5 + 1/a^5)$

CLUE:

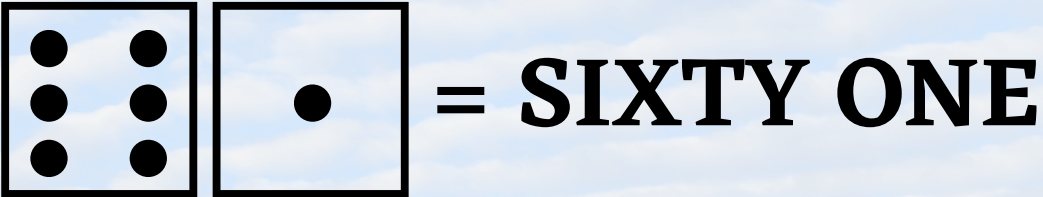| •				•
a^2	a	1	$\dfrac{1}{a}$	$\dfrac{1}{a^2}$

What does this pattern represent ?

MY FRIEND'S BROTHER

I have a friend. His name is **TENTY ONE**. He has a twin brother. Can you guess his name ?
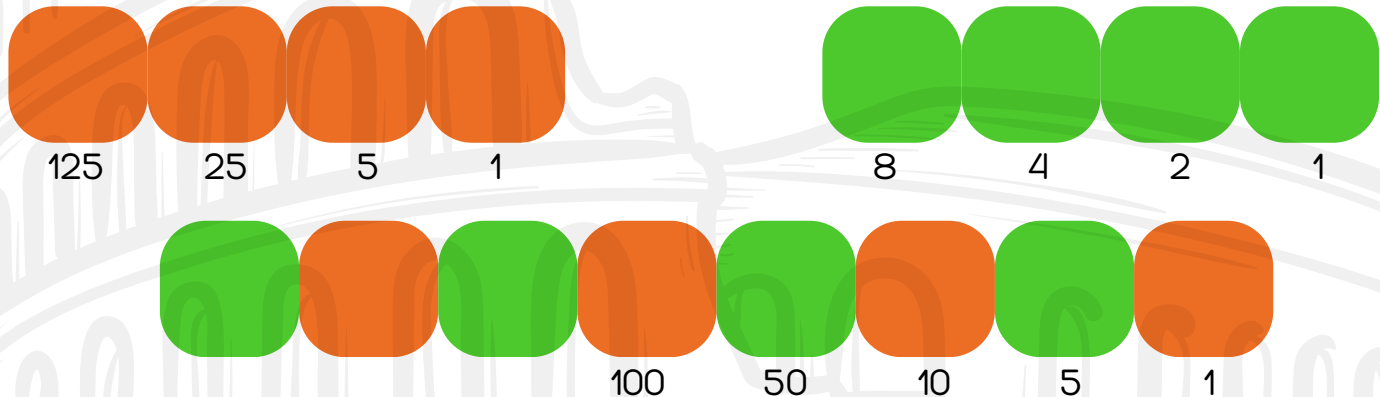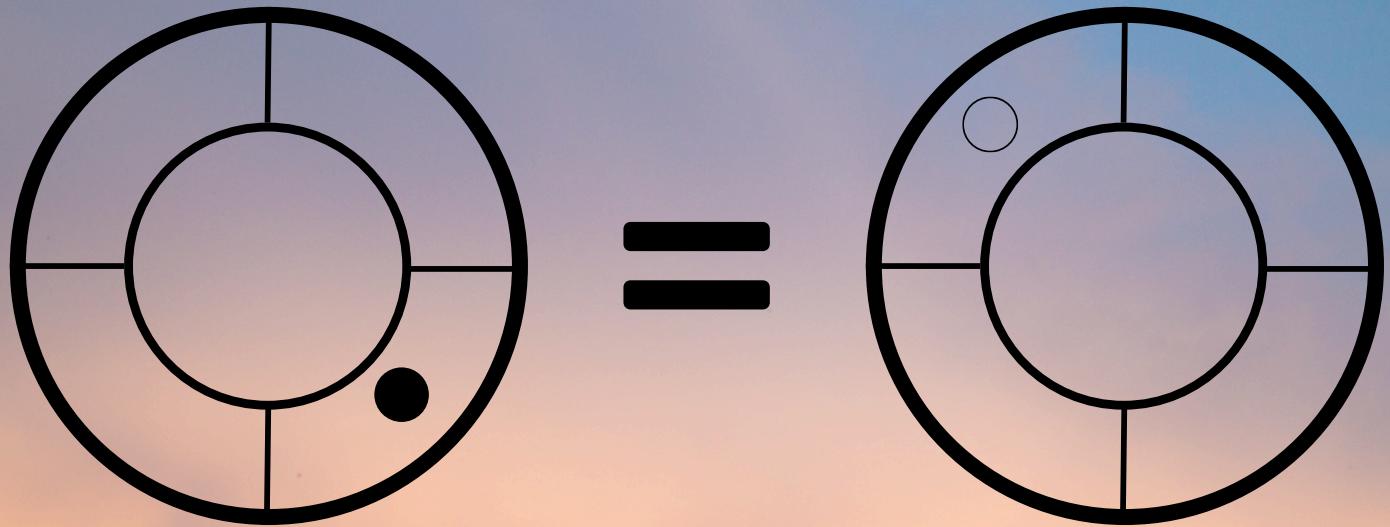
CLUE:

 = **SIXTY ONE**

61 and 59 are twin brothers

EXPLODING DOTS VISITS ROME

Take a 1 ← 5 and a 1 ← 2 Exploding Dots machine and interleave the boxes.

What number system does this interleaved machine represent ?

JUST IMAGINE EXPLODING DOTS

A dot in any box becomes an antidot in the diagonally opposite box. What number system does this machine represent ?

EVERY DATE CAN BE A PALINDROME ?
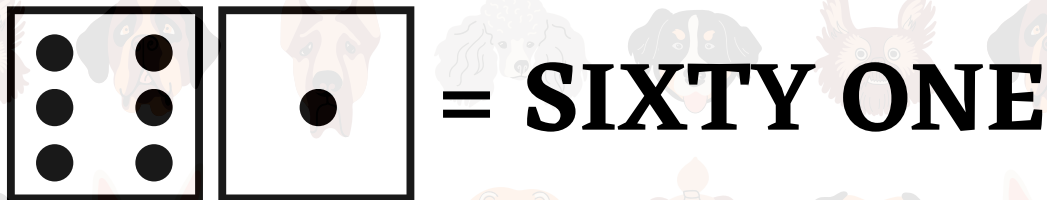
Today's date, 23-10-23, can be written as

Can you figure out the number system of the Exploding Dots machines representing the day, month and the year ?

MY FRIEND'S FAVORITE PET

My friend has **TENTY ONE** (not 21) pet dogs.

Can you guess the breed of the dogs ?

CLUE:

= **SIXTY ONE**

Note: This is a Math + Movie Puzzle