Inspire ALL Students with Open, Creative, Mindset Mathematics

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67,082,089
views and counting!

IMTE 2024

It's a Maths Party!

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@chaoskeeper11

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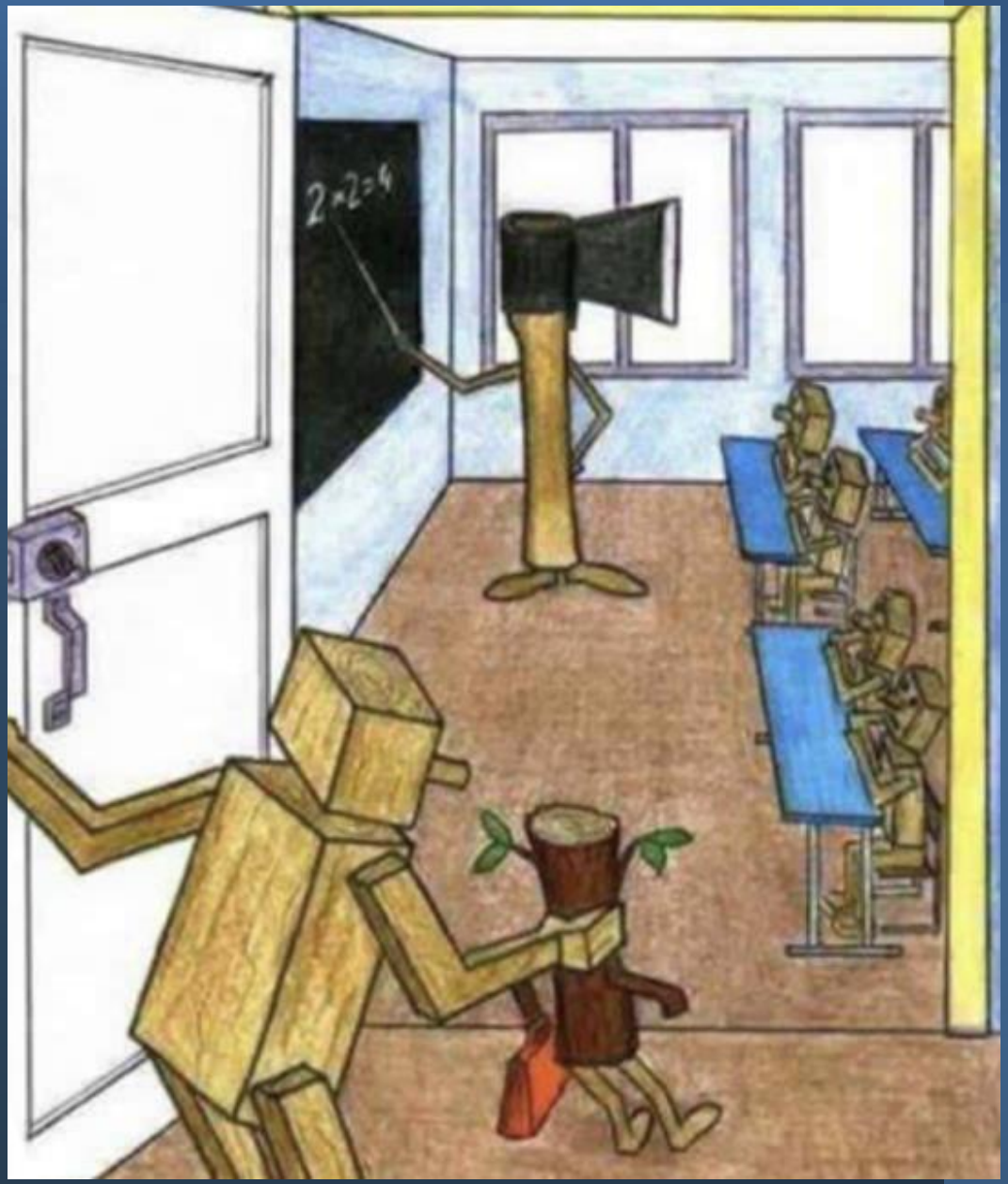
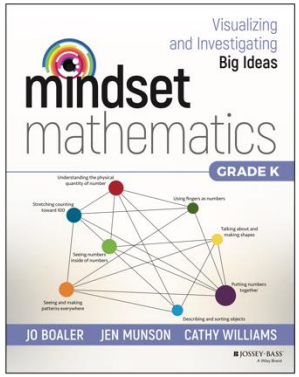
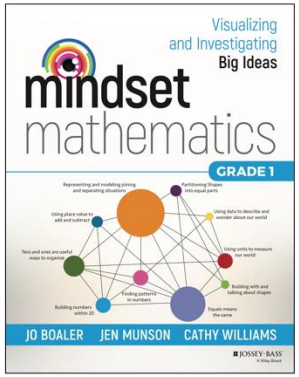
Co-founder, co-director

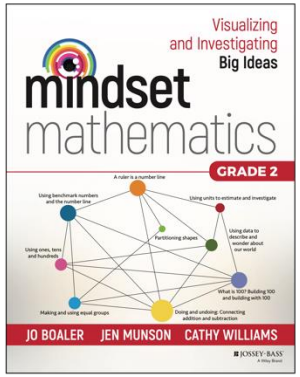
Codi 2π Tangent

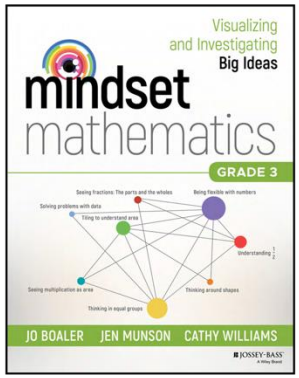

2×2=4

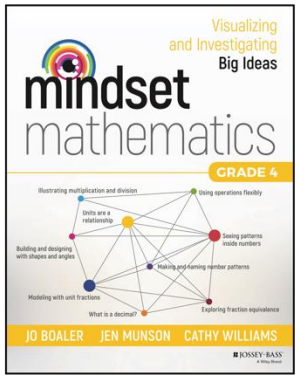
Open, Creative Maths Tasks from Jo Boaler, Jen Munson & Cathy Williams

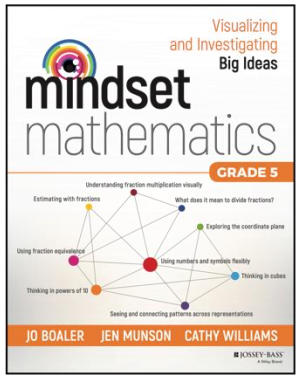


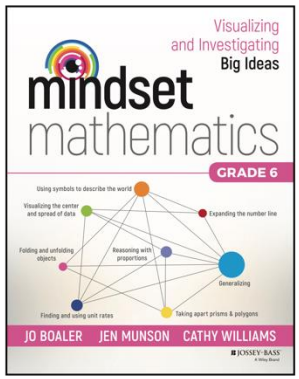


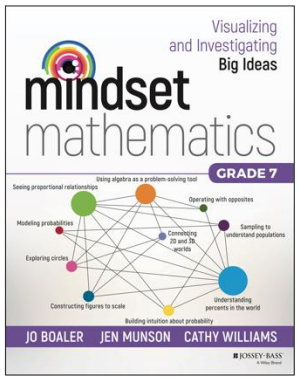


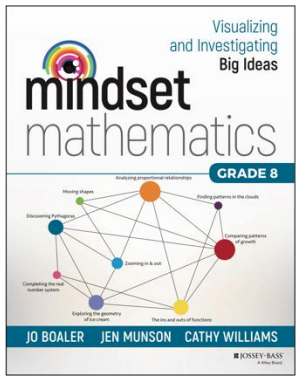




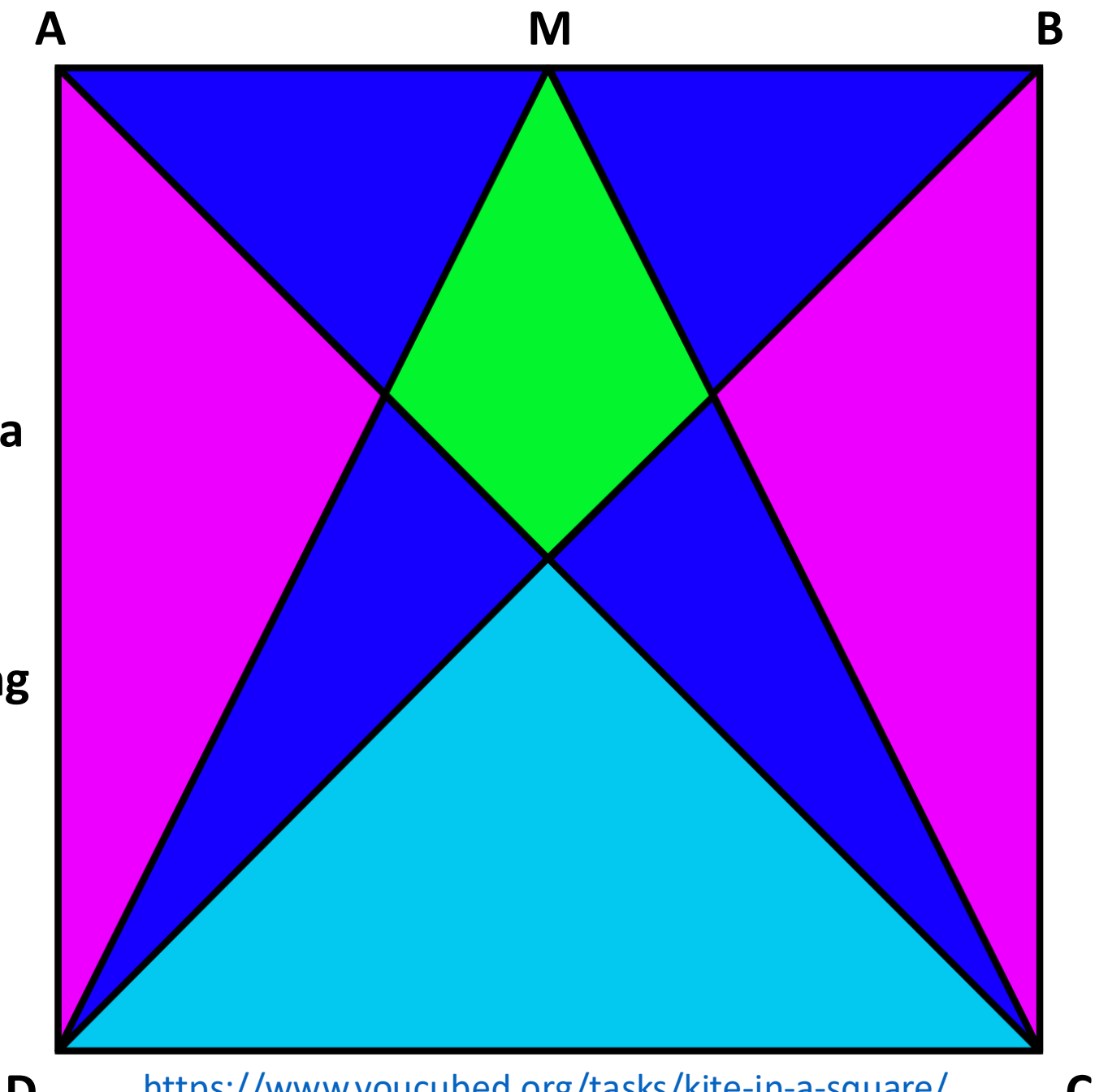








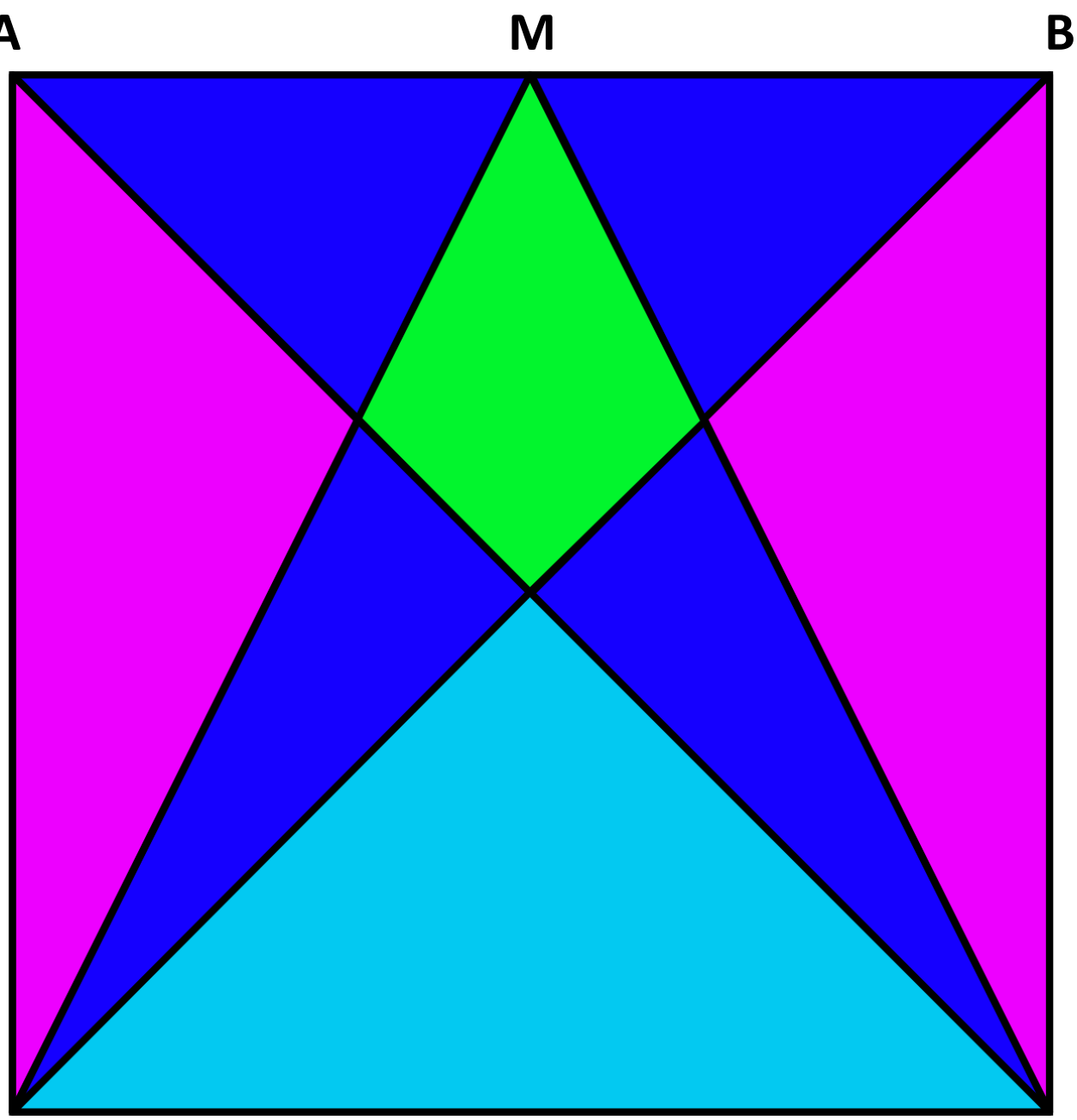
- ABCD is a square
- M is the midpoint of AB
- What fraction or percent of the area of ABCD is green?
- What color is the greatest area? Create a convincing argument



https://www.youcubed.org/tasks/kite-in-a-square/

Adapted from nrich.maths.org https://nrich.maths.org/

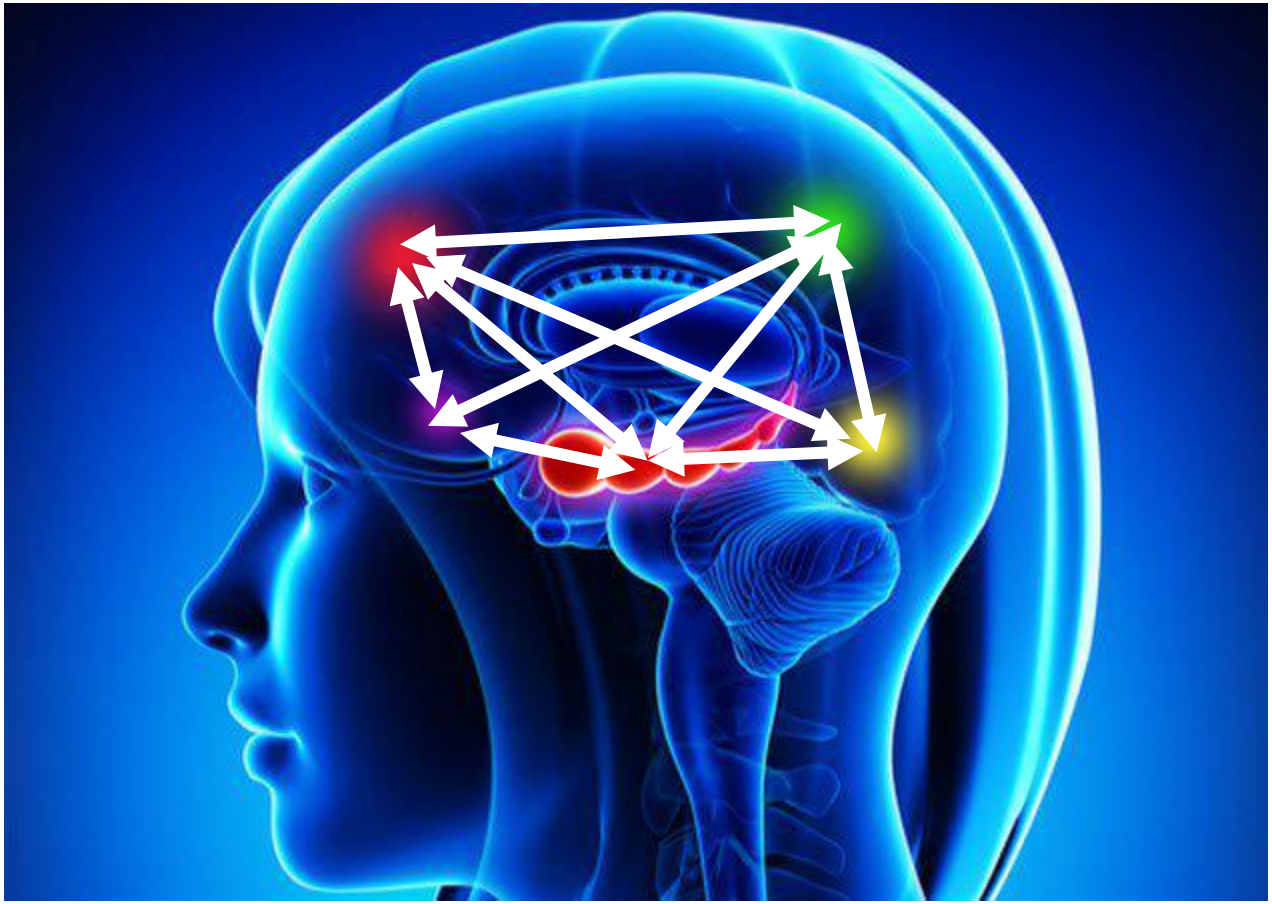
- ABCD is a square
- M is the midpoint of AB
- If AM = x, what fraction or percent of the area of ABCD is green?
- What color is the greatest area?
- Write a function that quantifies the area of the square as a function of x.



https://www.youcubed.org/tasks/kite-in-a-square/

Adapted from nrich.maths.org https://nrich.maths.org/

Brain Connections

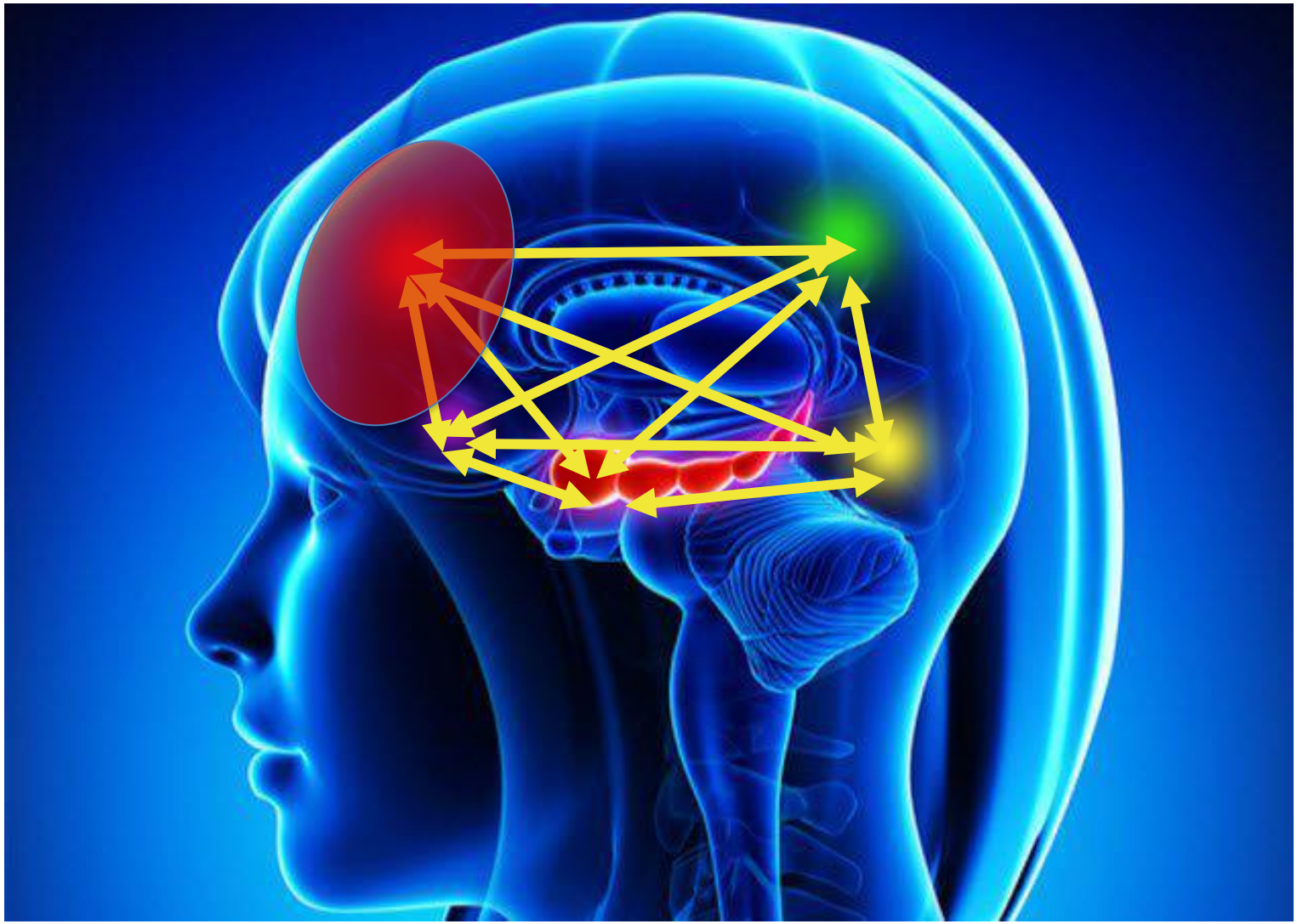


https://www.youcubed.org/resource/visual-mathematics/

Dividing Polynomial Expressions

$$
\begin{array}{r|l}
2x^4 + 7x^3 - 14x^2 - 3x + 15 & x + 5 \\
\underline{-2x^4 - 10x^3} & \\
0 - 3x^3 - 14x^2 & 2x^3 - 3x^2 + x - 8 \\
\underline{3x^3 + 15x^2} & \\
0 + x^2 - 3x & \\
\underline{-x^2 - 5x} & \\
0 - 8x + 15 & \\
\underline{8x + 40} & \\
0 + 55 &
\end{array}
$$

The Importance of Brain Connections



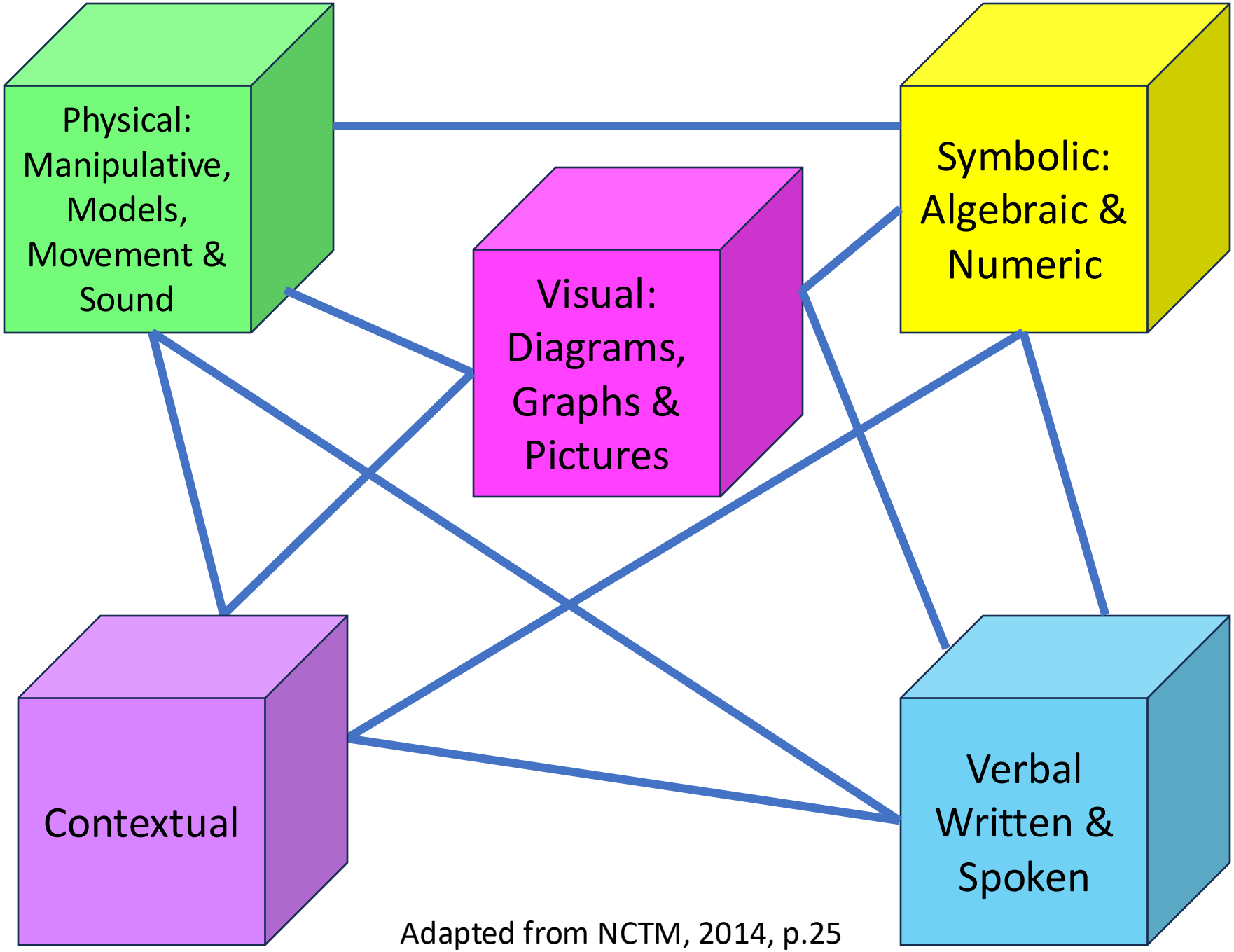
Numbers, words, pictures, graphs, algorithms, tables, models, movement

ME DURING

MATH CLASS


PLAYFUL
MATHS

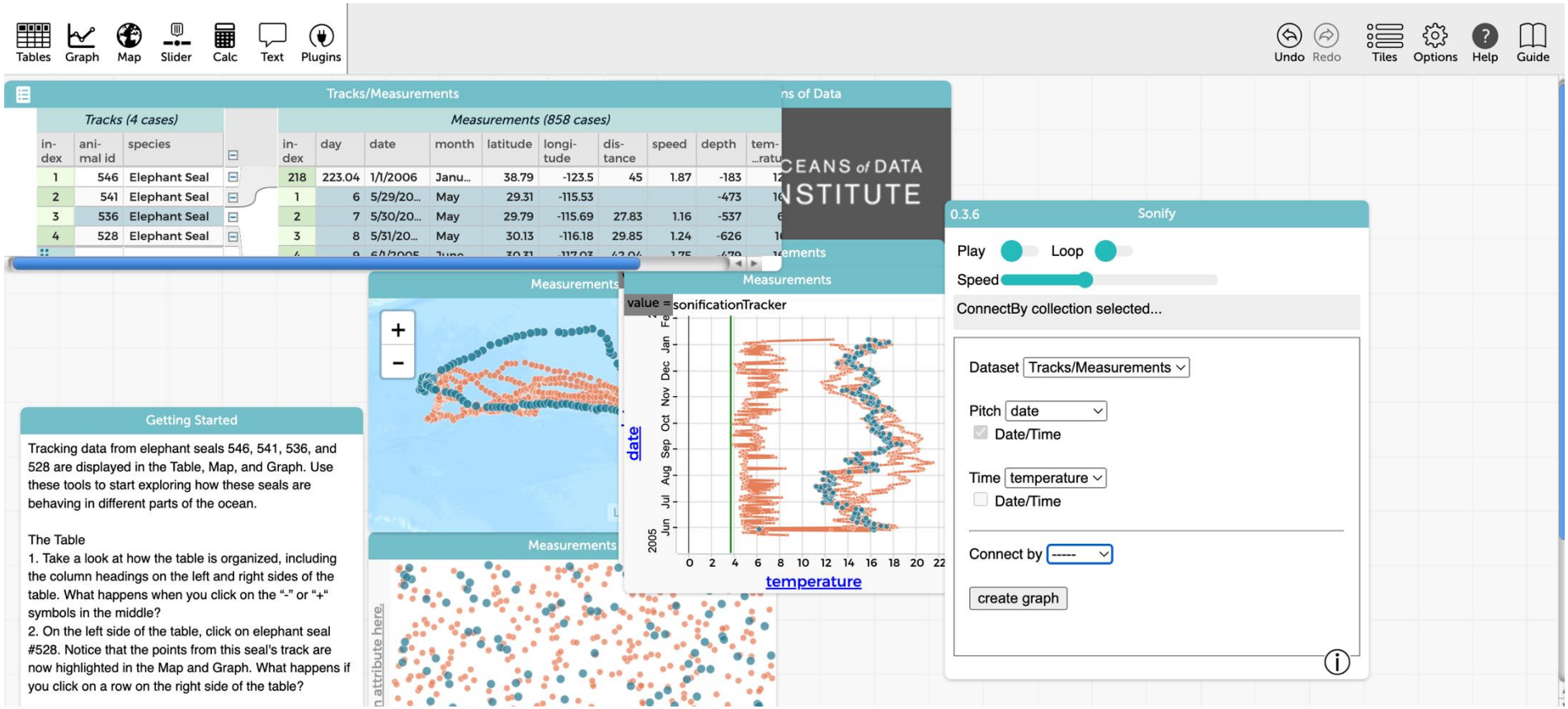

Maths identity



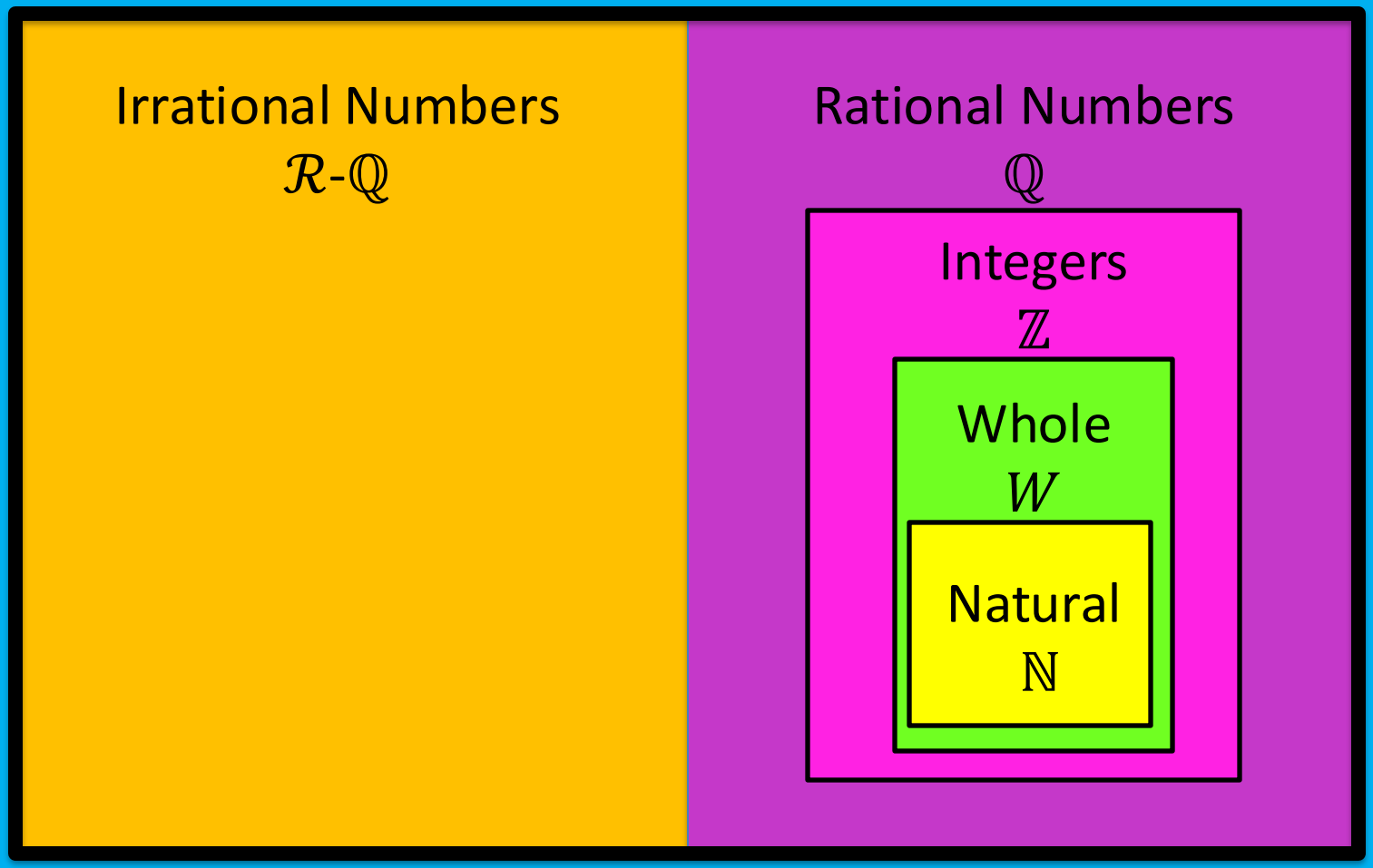
Adapted from NCTM, 2014, p.25

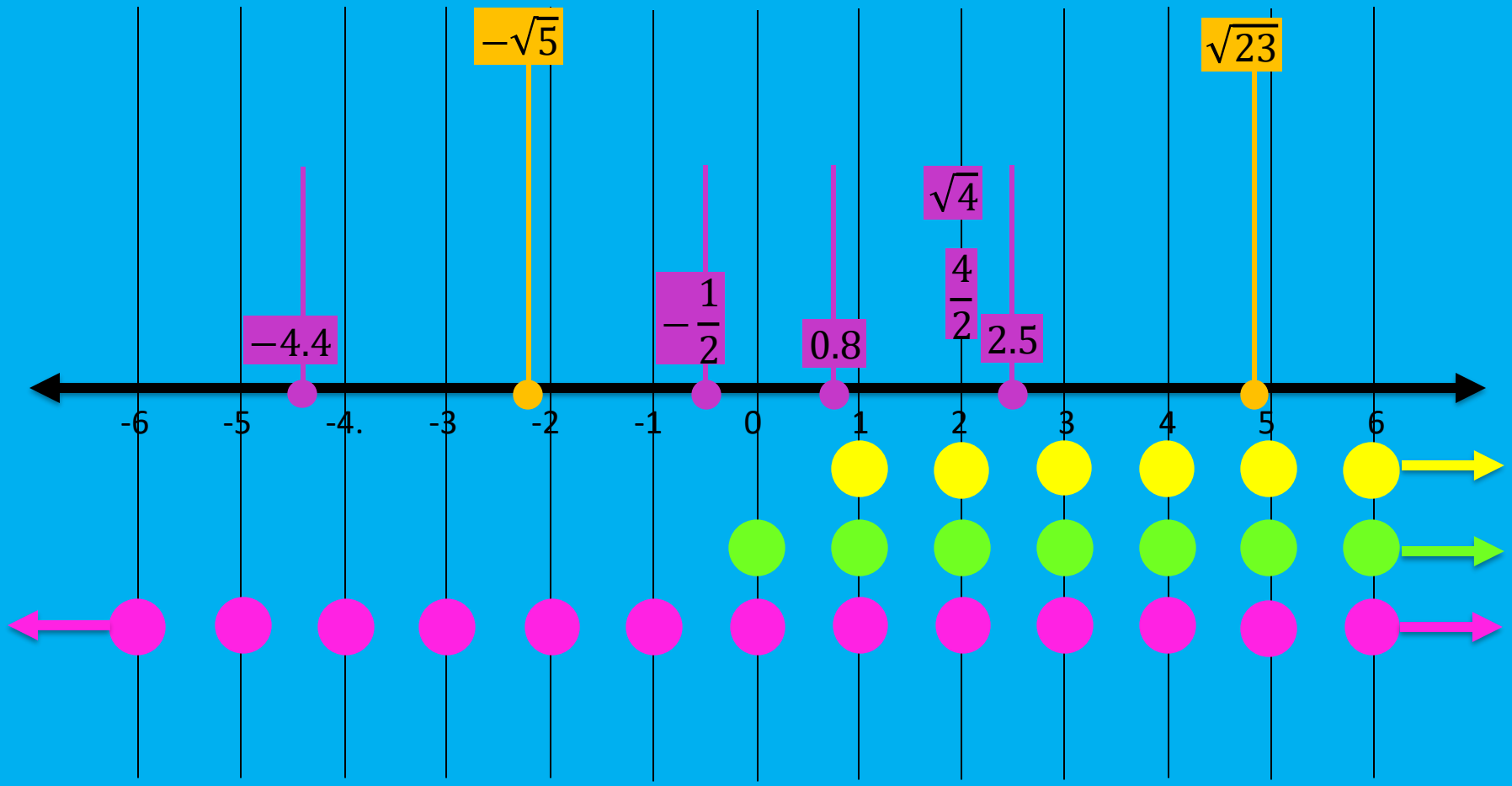
CODAP

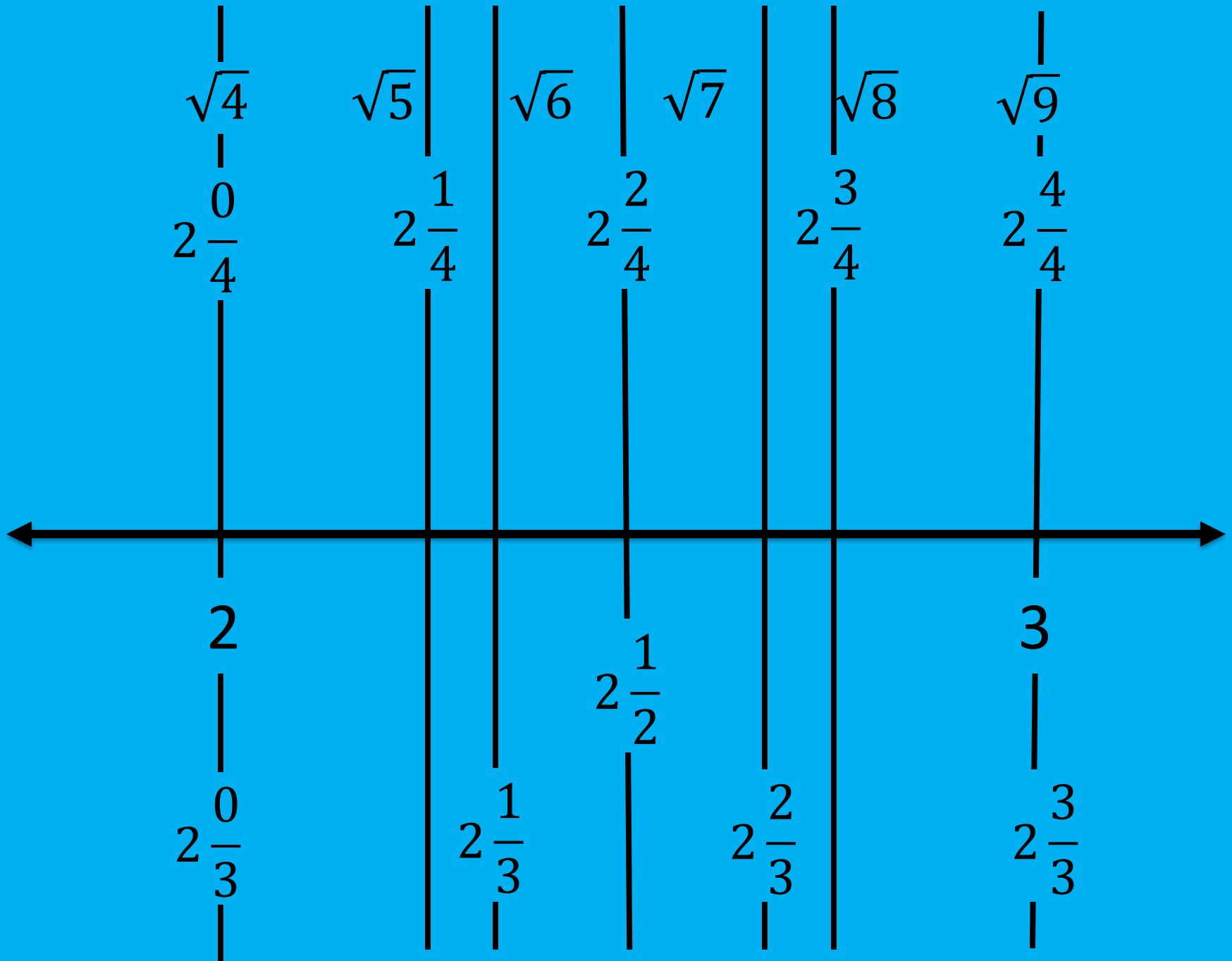
https://codap.concord.org/

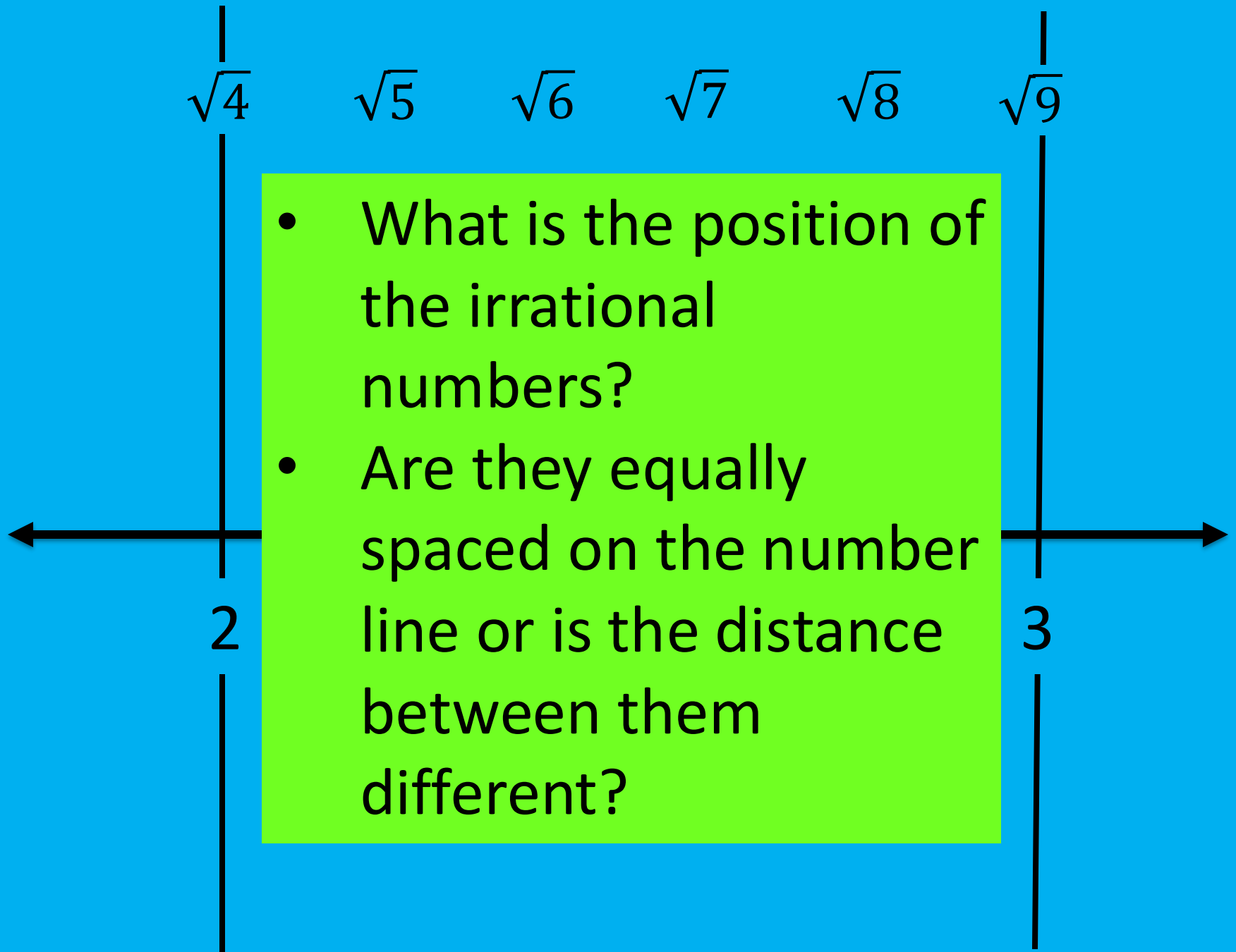


$\mathcal{R}$
Real numbers




$-\sqrt{5}$
$\sqrt{23}$
$\sqrt{4}$
$\frac{4}{2}$
$-\frac{1}{2}$
-4.4
0.8
2.5
-6
-5
-4.
-3
-2
-1
0
1
2
3
4
5
6

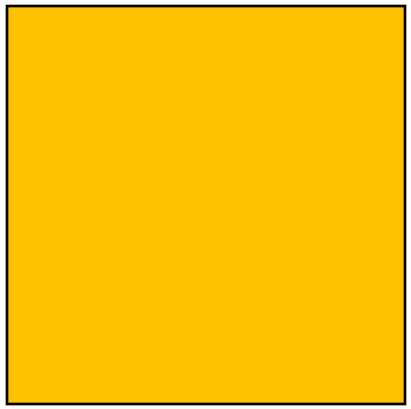

$\sqrt{4}$
$\sqrt{5}$
$\sqrt{6}$
$\sqrt{7}$
$\sqrt{8}$
$\sqrt{9}$
$2\frac{0}{4}$
$2\frac{1}{4}$
$2\frac{2}{4}$
$2\frac{3}{4}$
$2\frac{4}{4}$
2
3
$2\frac{1}{2}$
$2\frac{0}{3}$
$2\frac{1}{3}$
$2\frac{2}{3}$
$2\frac{3}{3}$

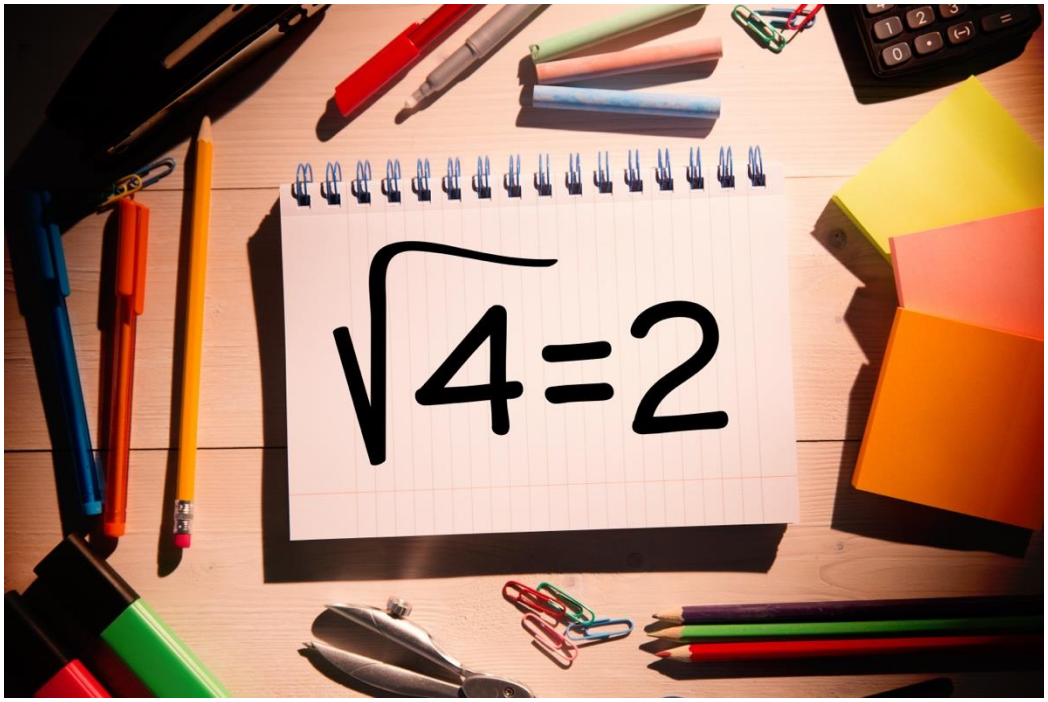


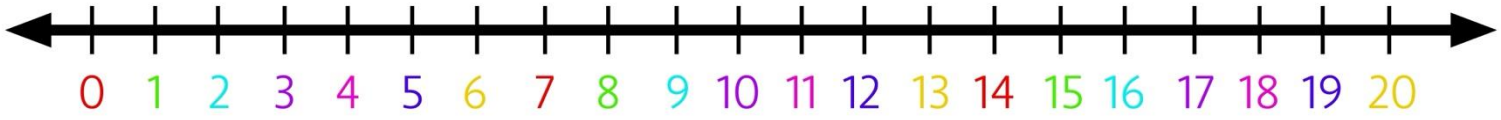
- What is the position of the irrational numbers?
- Are they equally spaced on the number line or is the distance between them different?

A visual proof, numbers on a line

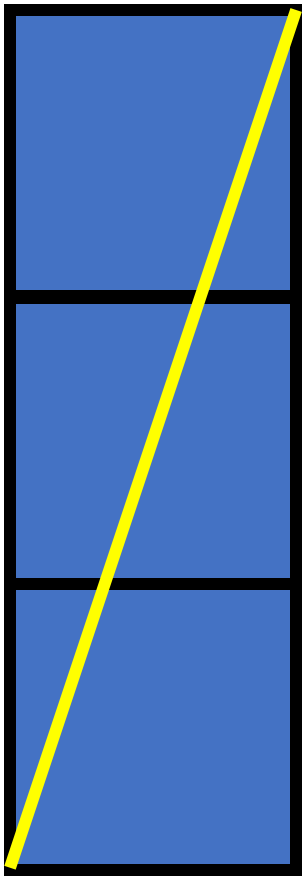
Using a square piece of paper, make a visual proof through folding to show the location of $\sqrt{1}$ through the $\sqrt{10}$ on a number line.



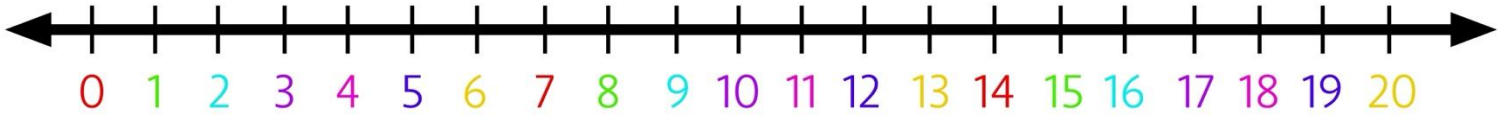


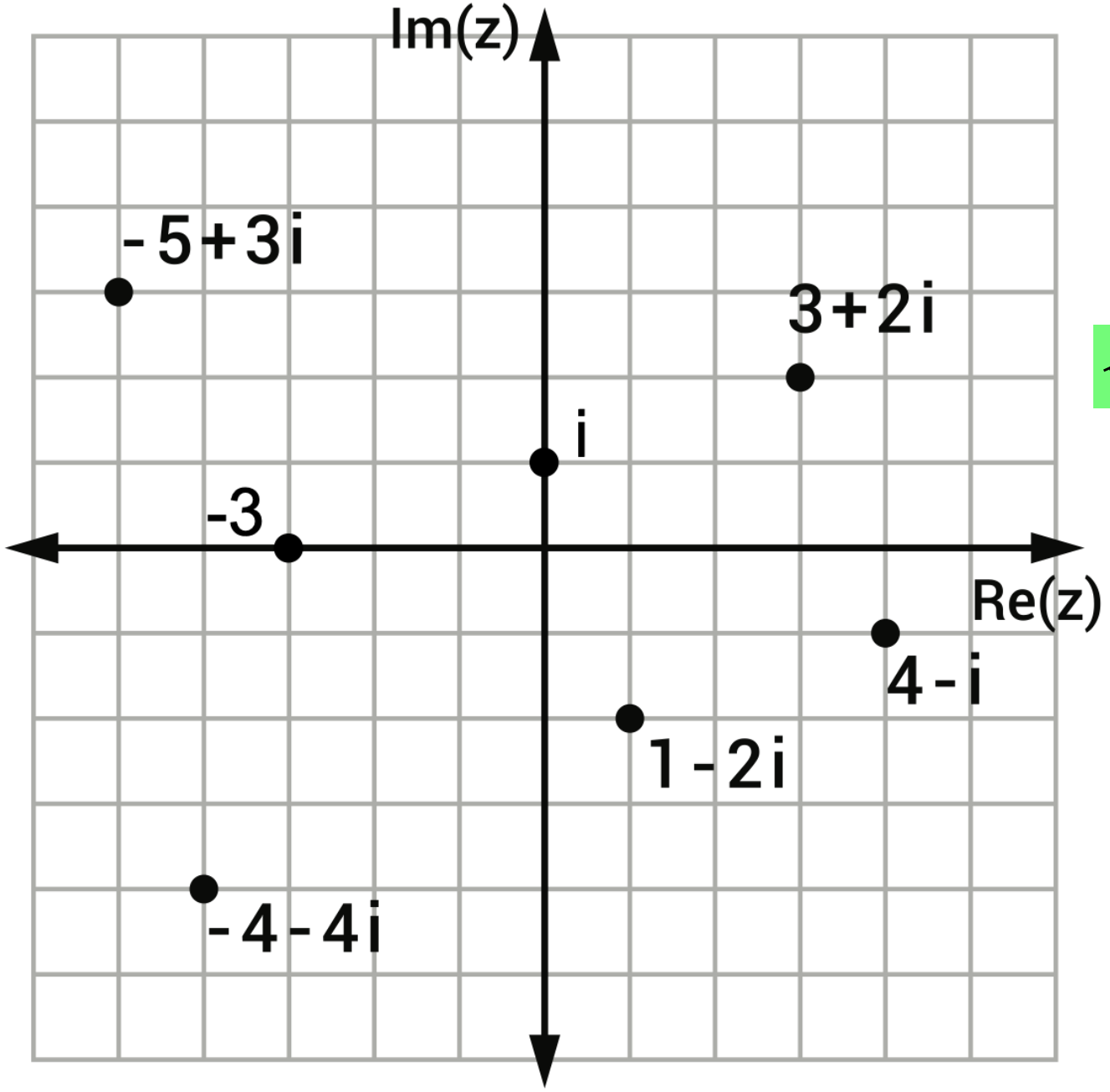


Rectangles



- Draw rectangles where their diagonals represent the lengths of $\sqrt{1}$ through $\sqrt{10}$.
- Using a square piece of paper, fold it to make a visual proof showing the location of $\sqrt{1}$ through the $\sqrt{10}$ on a number line.





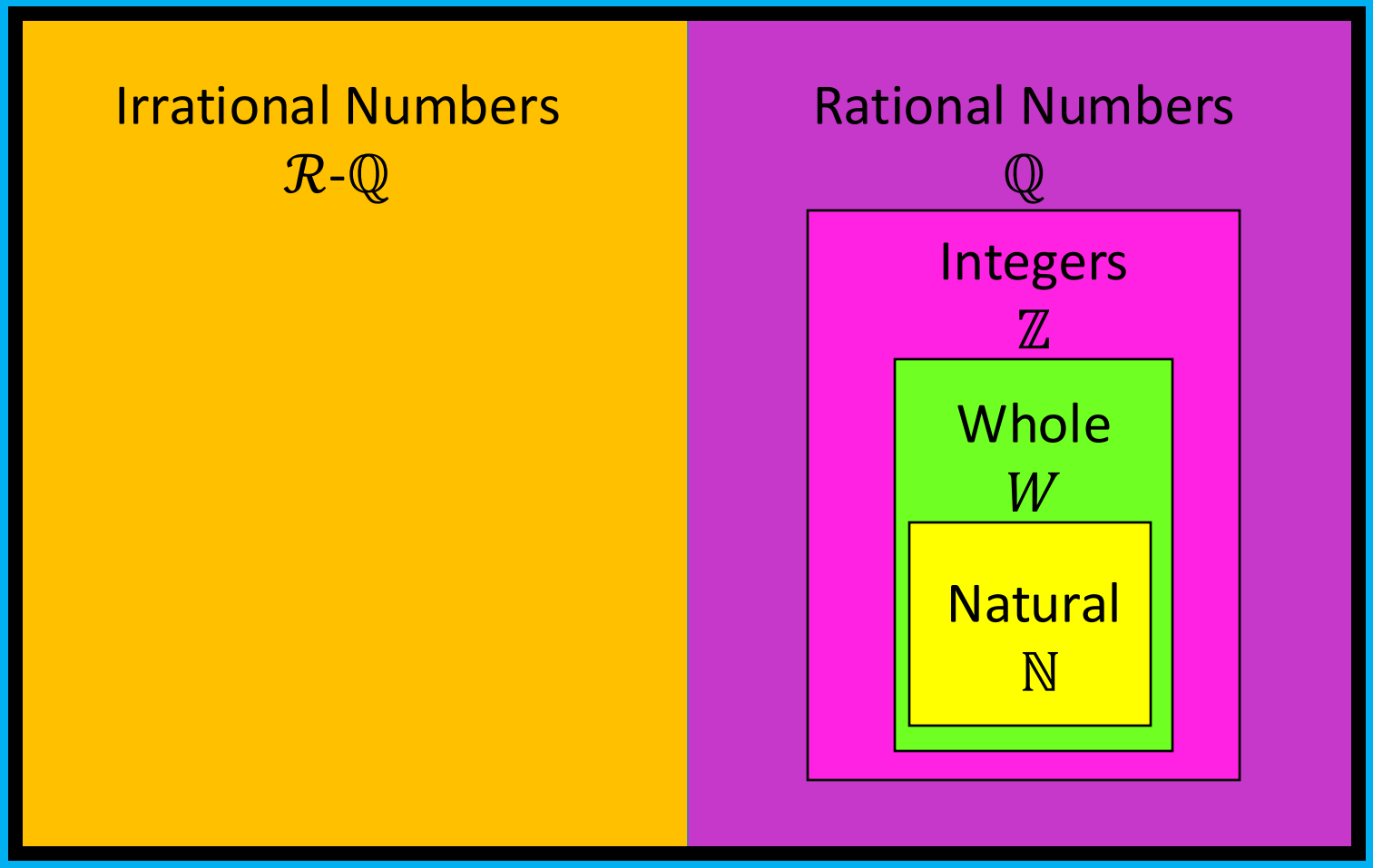
$\sqrt{-1} = i$

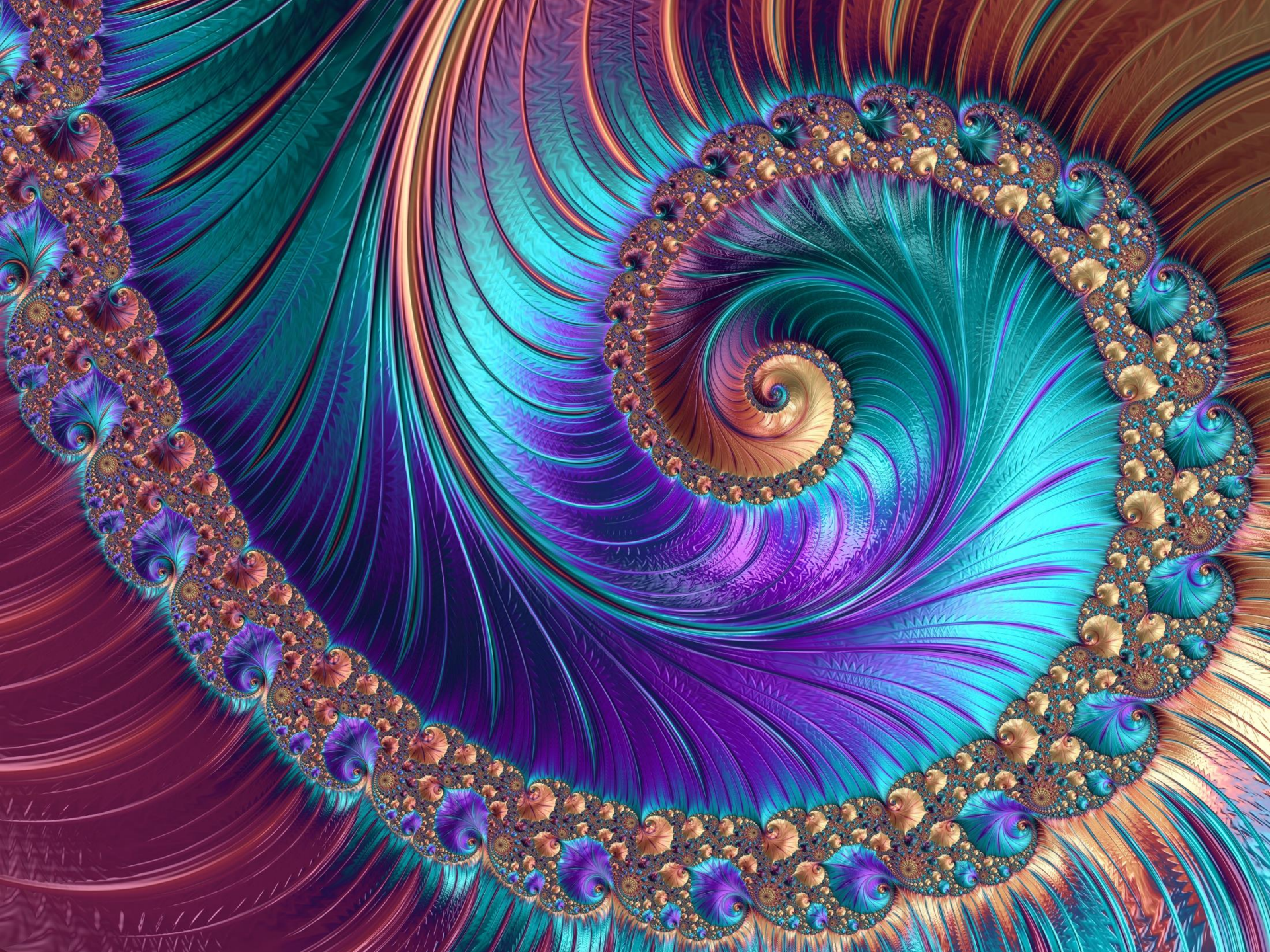
$\sqrt{-1} = i$

$\mathcal{R}$

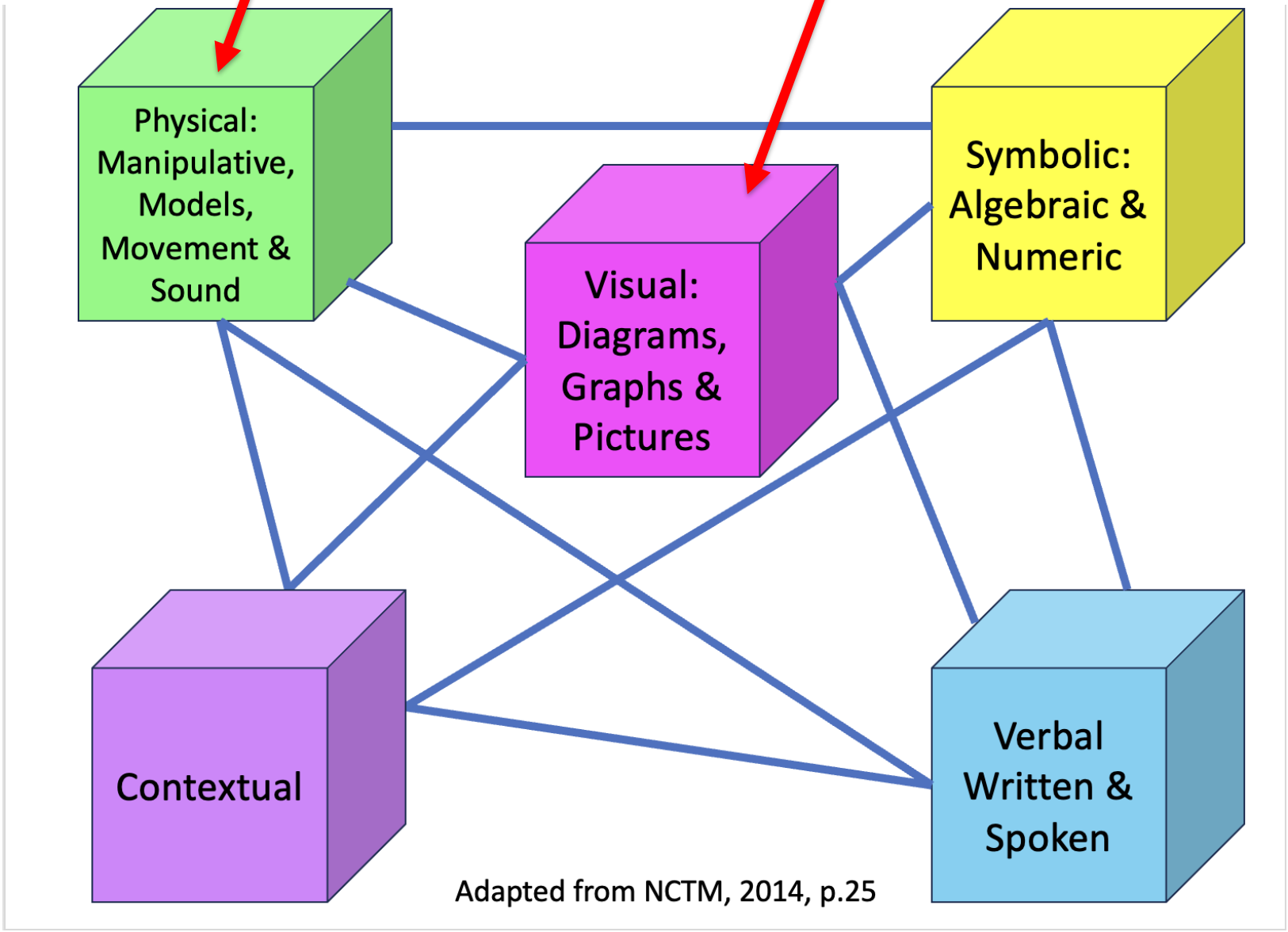
Complex numbers

Real numbers

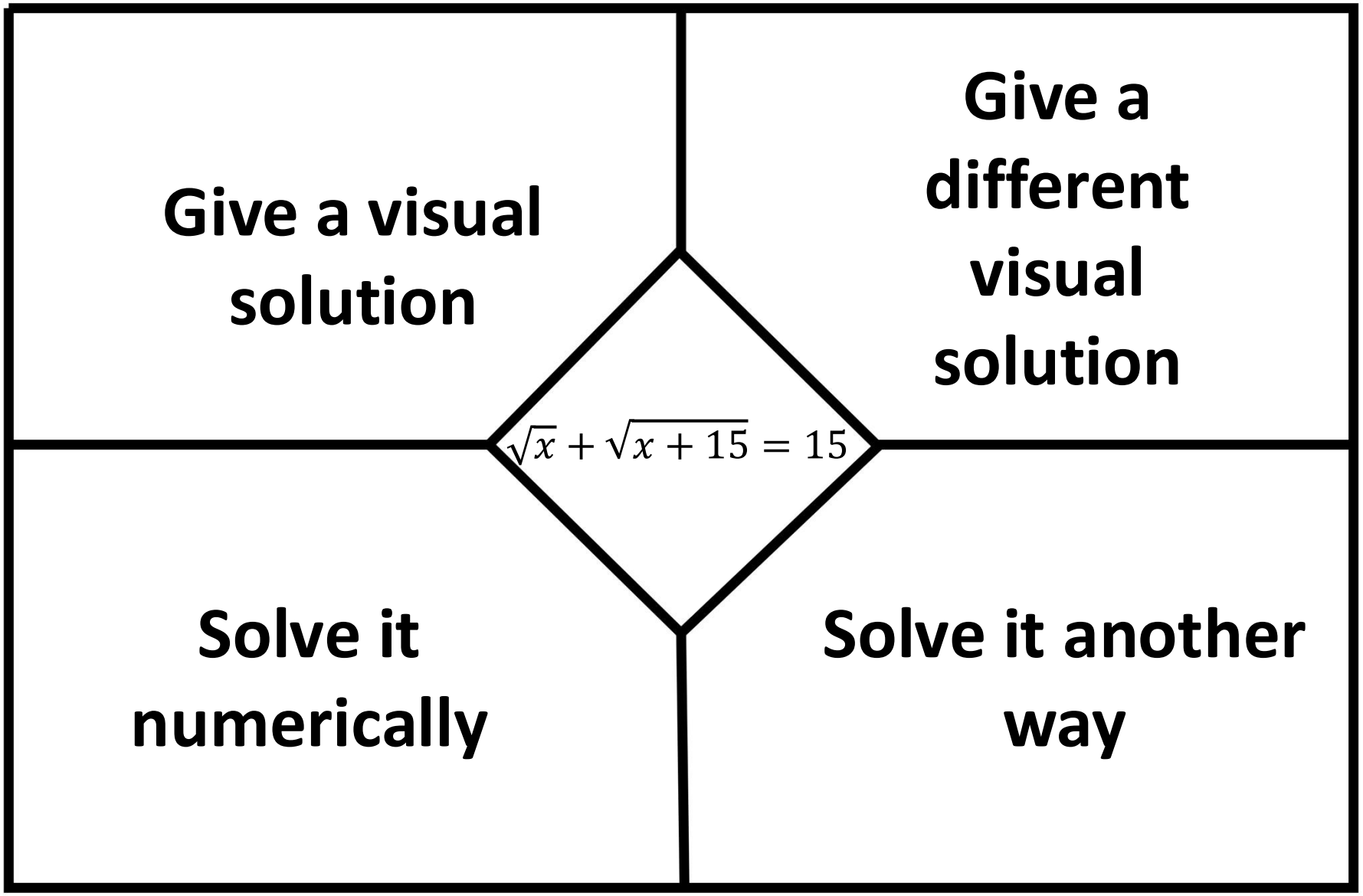




The Real Number System, $\mathcal{R}$

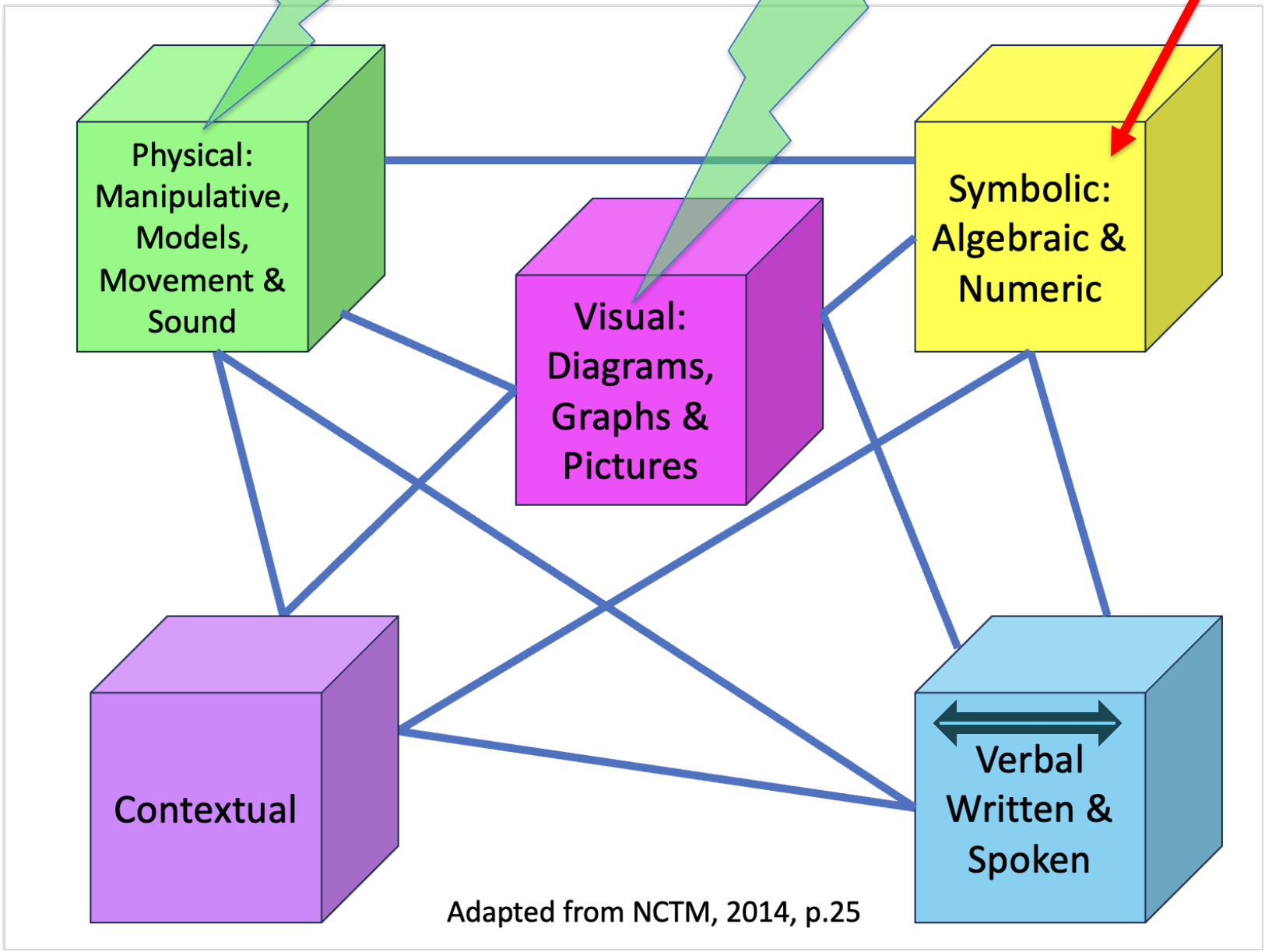


Adapted from NCTM, 2014, p.25



What numbers that add to 15 are possible?

Linear Functions



Mathematical Mindset Algebra

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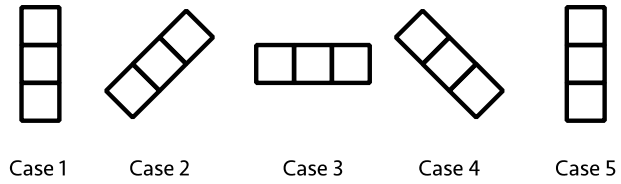
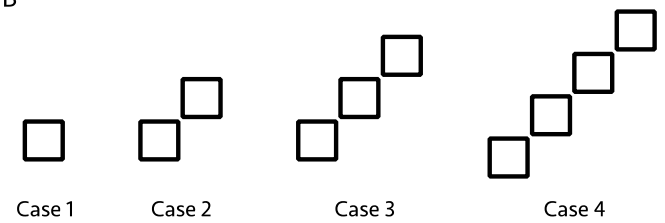
Task Cards

How do you see the shapes change as the case number increases? Where do you see the new squares? How do you see the shapes change as the case number decreases? What would the 15th case look like? What would the -3 case look like?

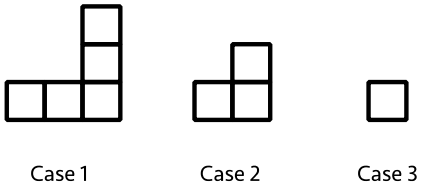
A



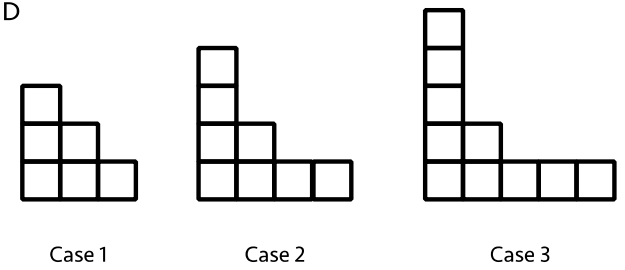
B



C



D



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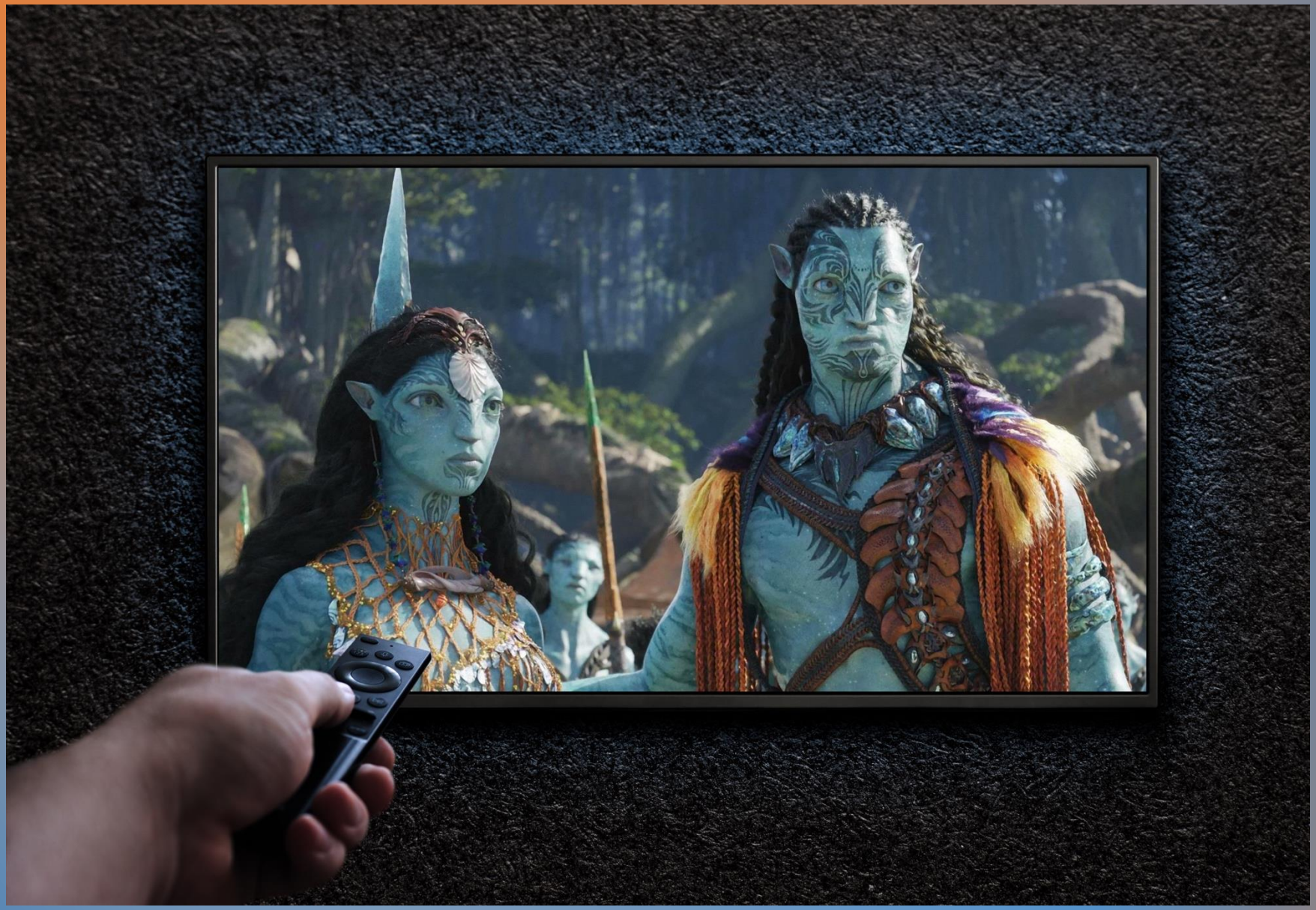
https://www.youcubed.org/algebra/



Wait there's more….

- What would case 2 ½ look like?
- What would case 3.7 look like?
- What would case $\sqrt{5}$ look like?

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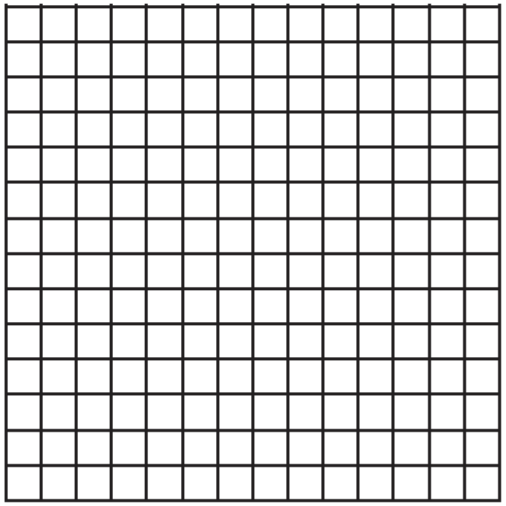
Algebra Representation
B

Make a table using numbers.	Make a coordinate graph to illustrate the pattern. 
Describe the way the pattern is increasing or decreasing.	Describe your function using an algebraic expression that shows the number of blocks in any case number.

https://www.youcubed.org/algebra/

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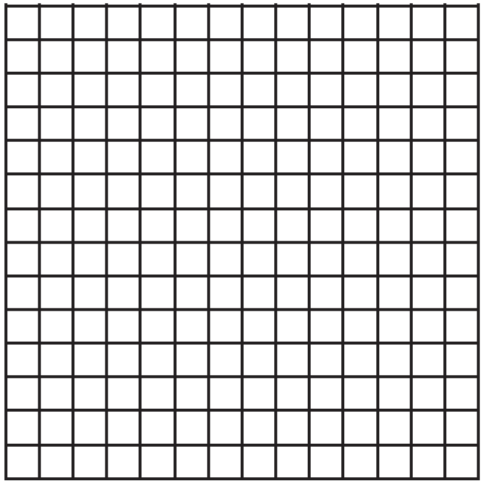
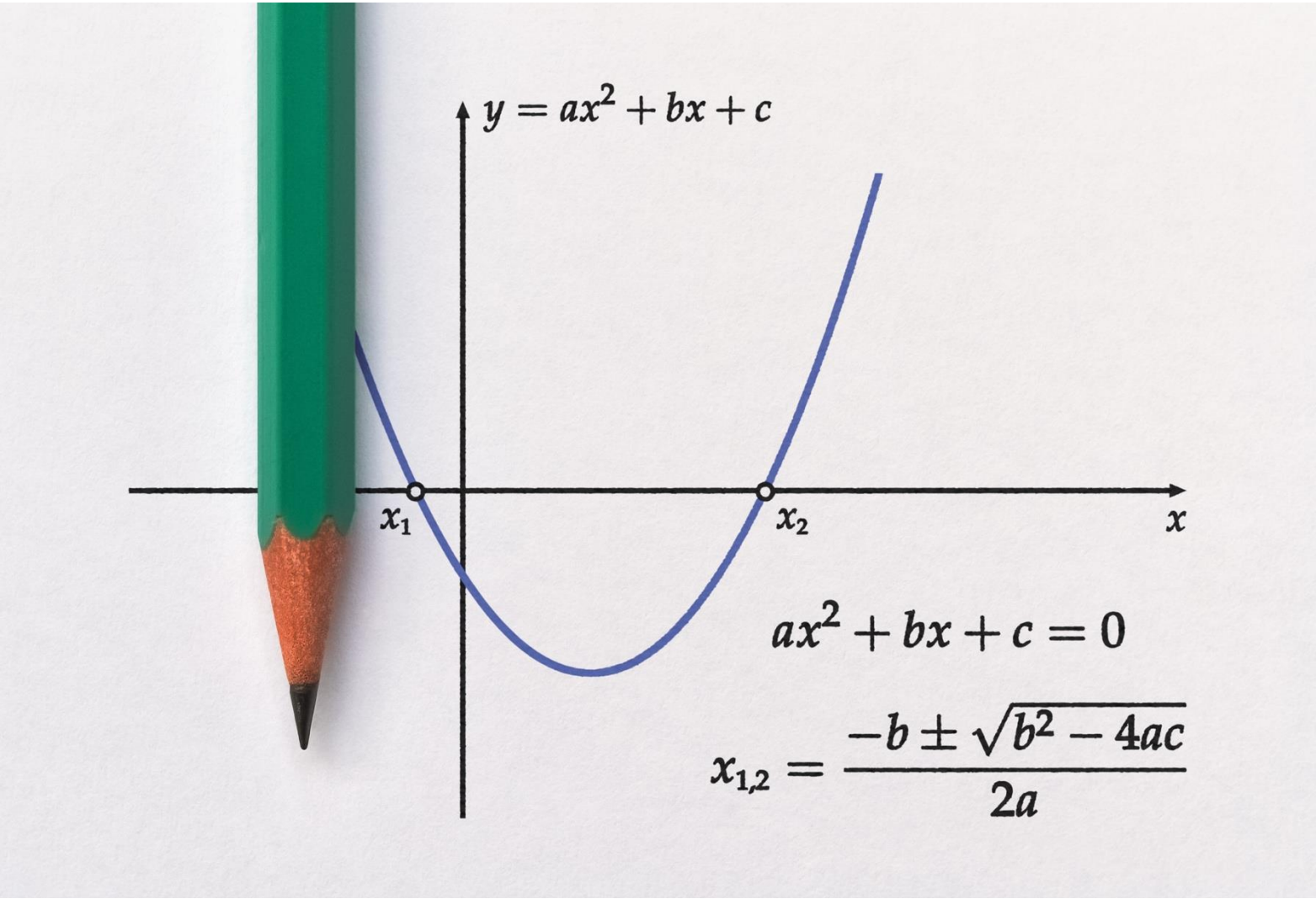
Make your own #2

Make a pattern that gets smaller as the case numbers increase.

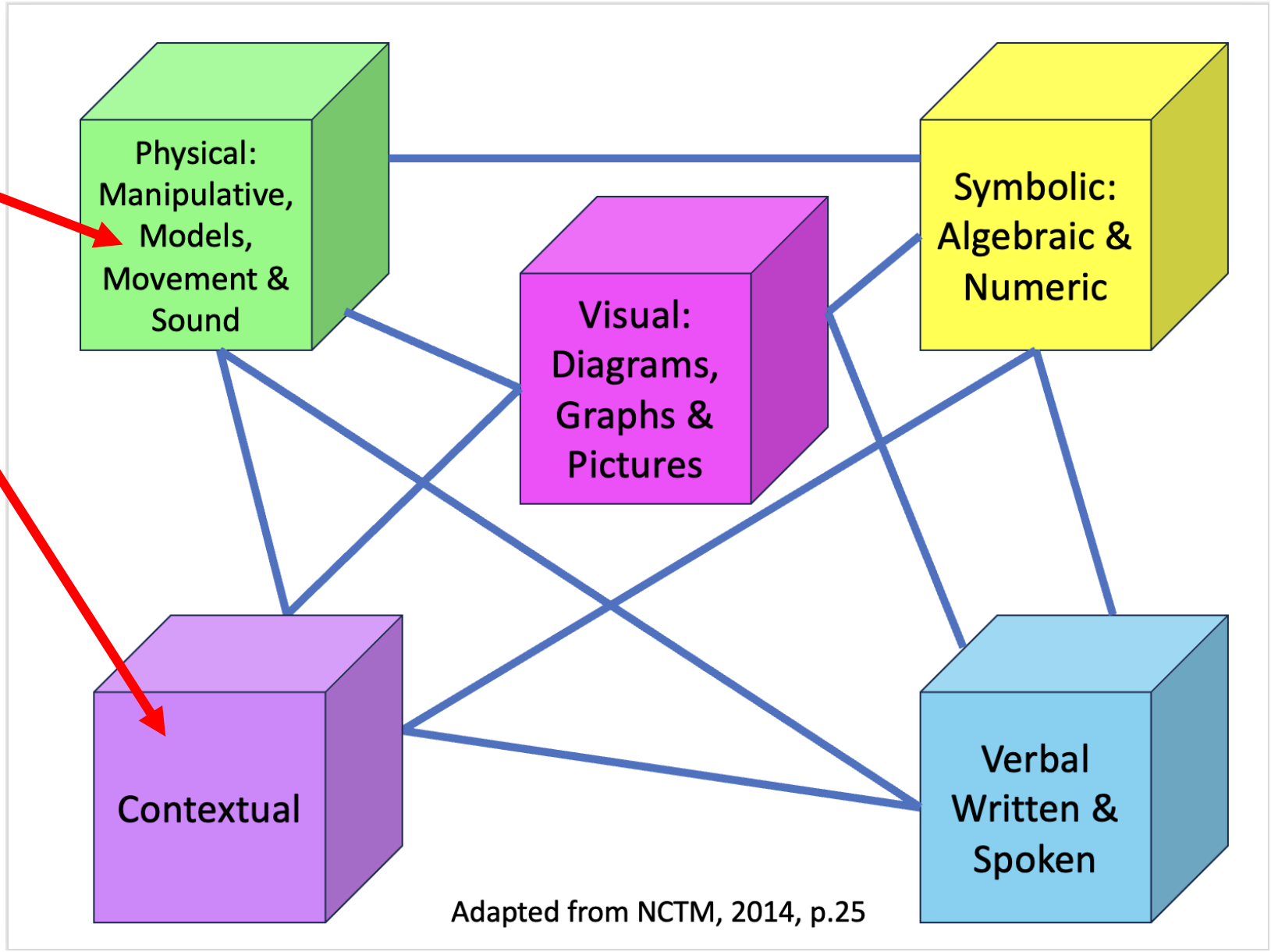
Draw your pattern. Include at least 3 representations and label them by case number.	Make a table using numbers.
Make a coordinate graph to illustrate the pattern. 	Describe your function using an algebraic expression that shows the number of blocks in any case number.

https://www.youcubed.org/algebra/

Let’s investigate quadratic functions



Quadratic Functions

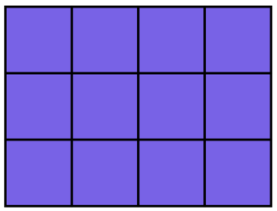


What do you notice?

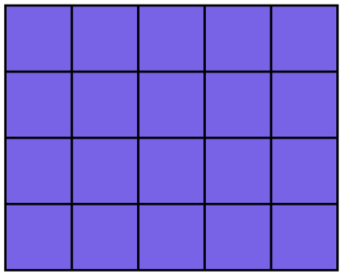
Where do you see the extra squares?

What would Case 7 look like?

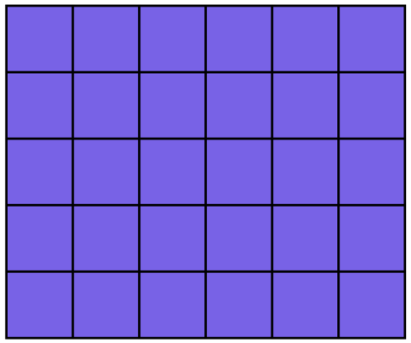
What would Case 0 look like?



Case 1



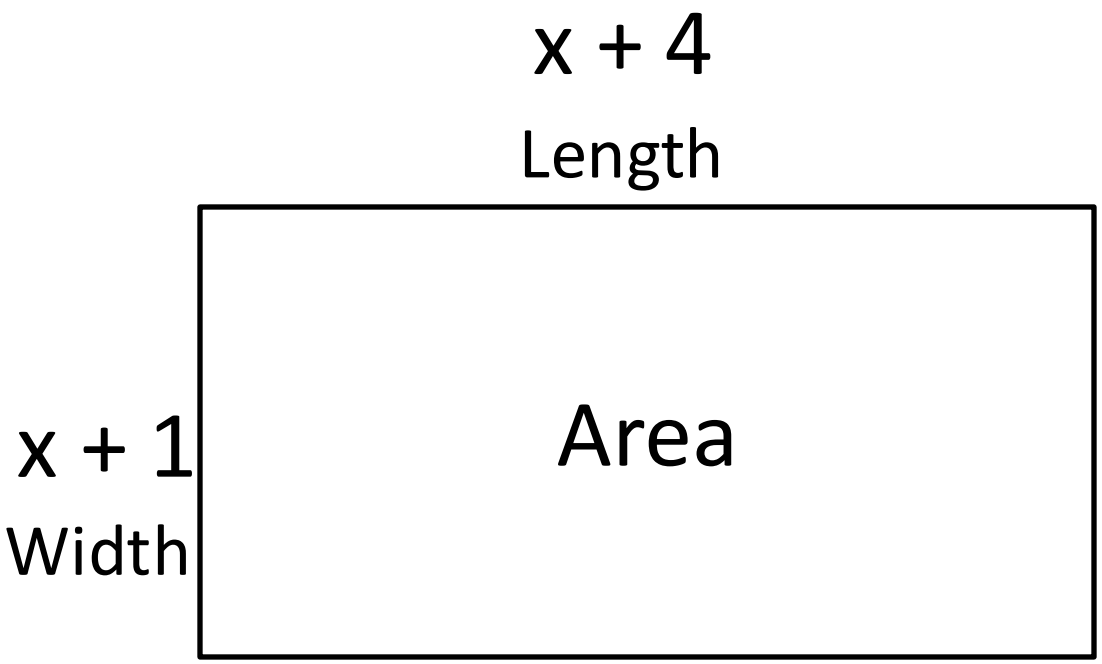
Case 2



Case 3

Case 0

What is the area of the rectangle when….



x	WxL	LxW	A
1	2x5		

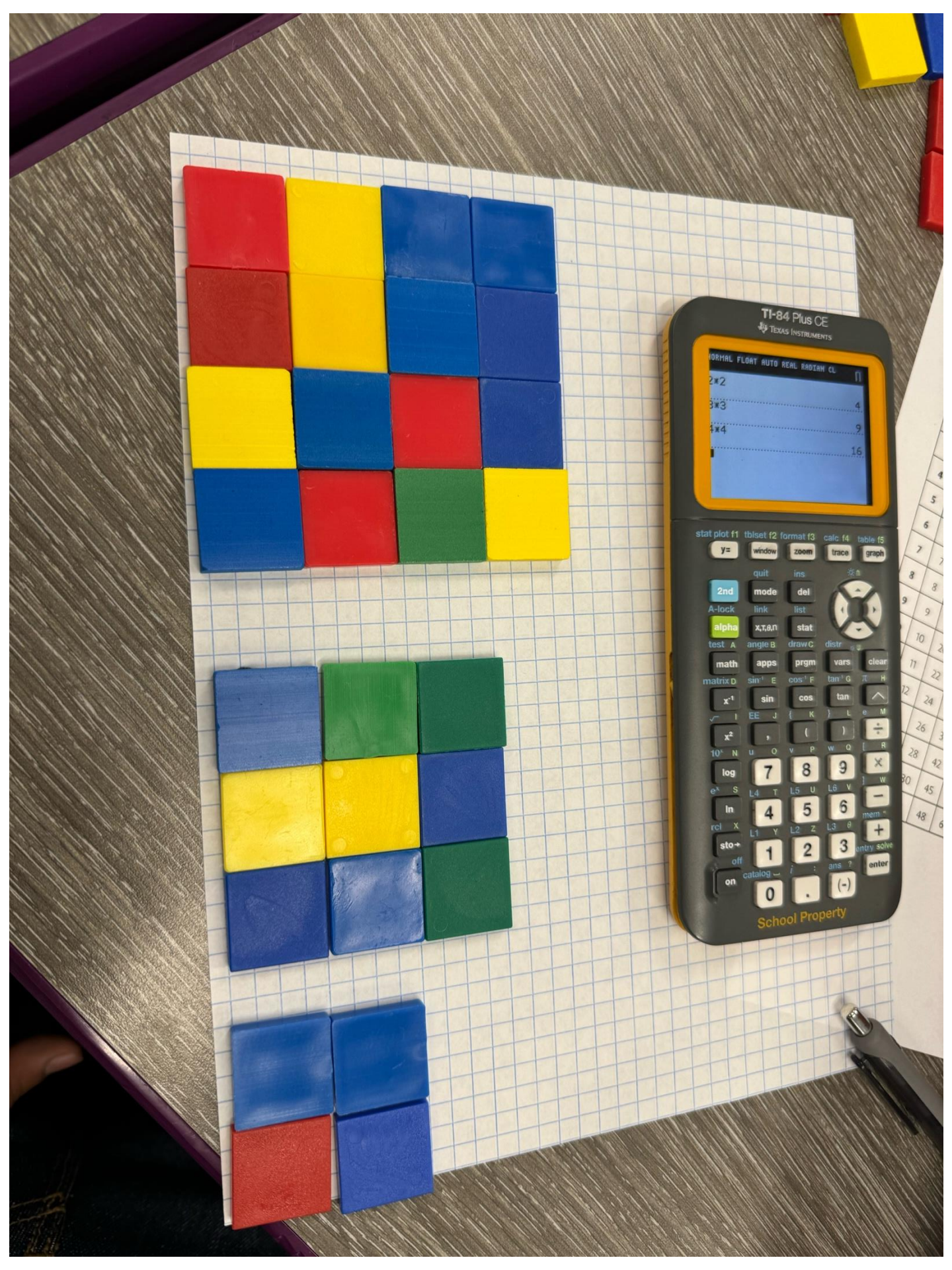
What do these rectangles look like?

What function represents the area?

Your linear functions for the width and length

Width	Length
x	x+1
x+1	x+2
x+2	x+3
x+3	x+4
x+4	x+5

Generate a table and draw the rectangles for a domain of 1,2,3,4,5…


TI-84 Plus CE
Texas Instruments
NORMAL FLOAT AUTO REAL RADIAN CL
2*2
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9
16
stat plot f1 tblset f2 format f3 calc f4 table f5
y=
window
zoom
trace
graph
quit
ins
2nd
mode
del
A-lock
link
list
alpha
X,T,θ,n
stat
test A
angle B
draw C
distr
math
apps
prgm
vars
clear
matrix D
sin⁻¹ E
cos⁻¹ F
tan⁻¹ G
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e M
x²
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enter
School Property

Let's add an old (x) X = friend

x + 4

x + 1

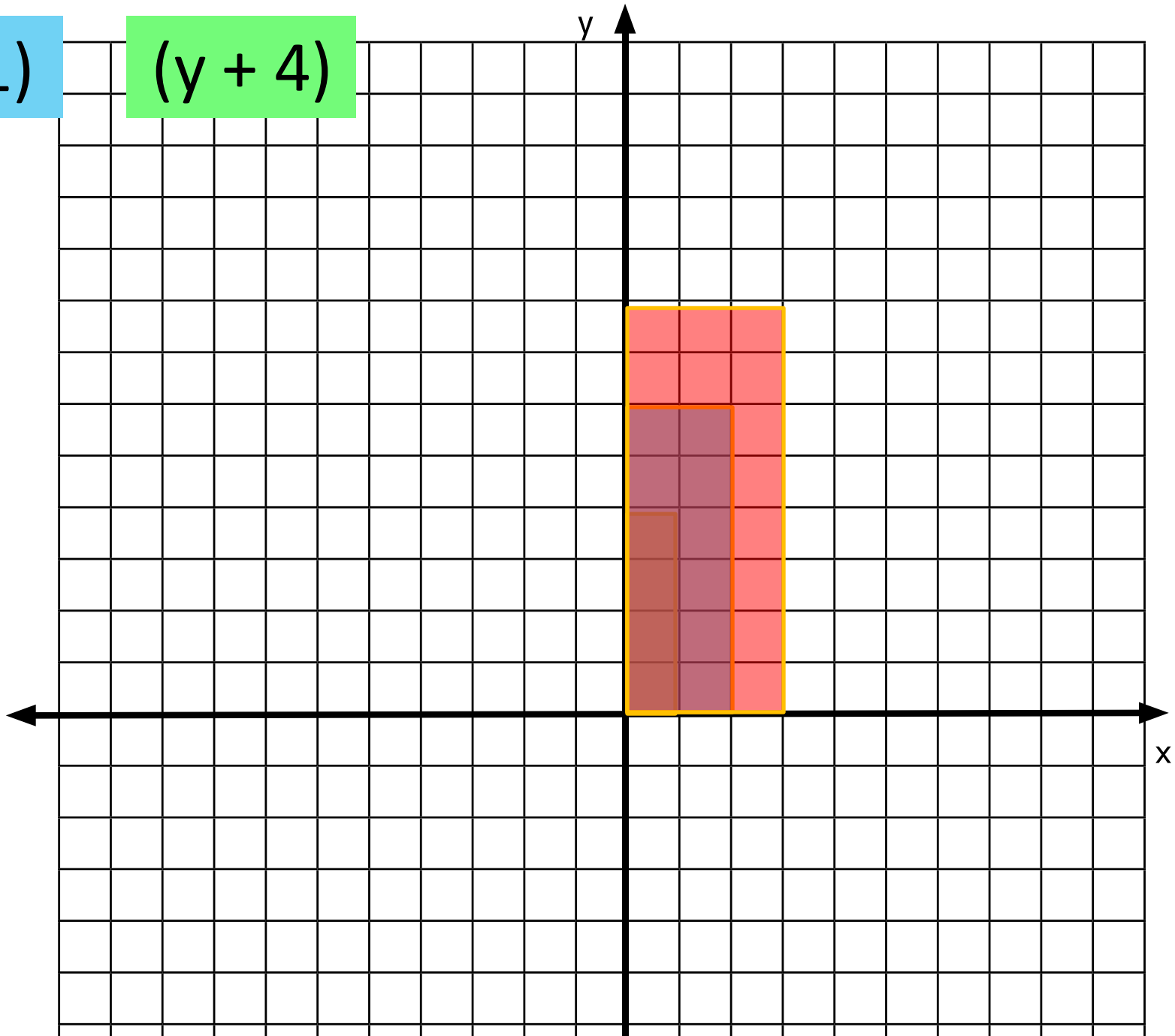
x	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48
4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64
5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
6	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
7	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112
8	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128
9	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144
10	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160
11	11	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176
12	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192
13	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208
14	14	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224
15	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240
16	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256

Length

$(x + 1)$

width

$(y + 4)$



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Keep+Flip+Turn

On our tasks page there are links to google slide decks & handouts

https://www.youcubed.org/tasks/keep-flip-turn-k-12/

WINTER/SPRING 2025 WORKSHOPS

Join us at Stanford or Online

NEW! MATH-ISH WORKSHOP FOR K-16 TEACHERS

- In Person at Stanford: January 28 & 29

TEACHING THE YOUCUBED DATA SCIENCE COURSE

- 10 online sessions, 3:45-5:45 pm Pacific Time
- Select Wednesdays, March 19– June 4

TEACHING THE SUMMER CAMP CURRICULUM

- In Person at Stanford: April 14 & 15
- Live Online: April 28 & 29

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