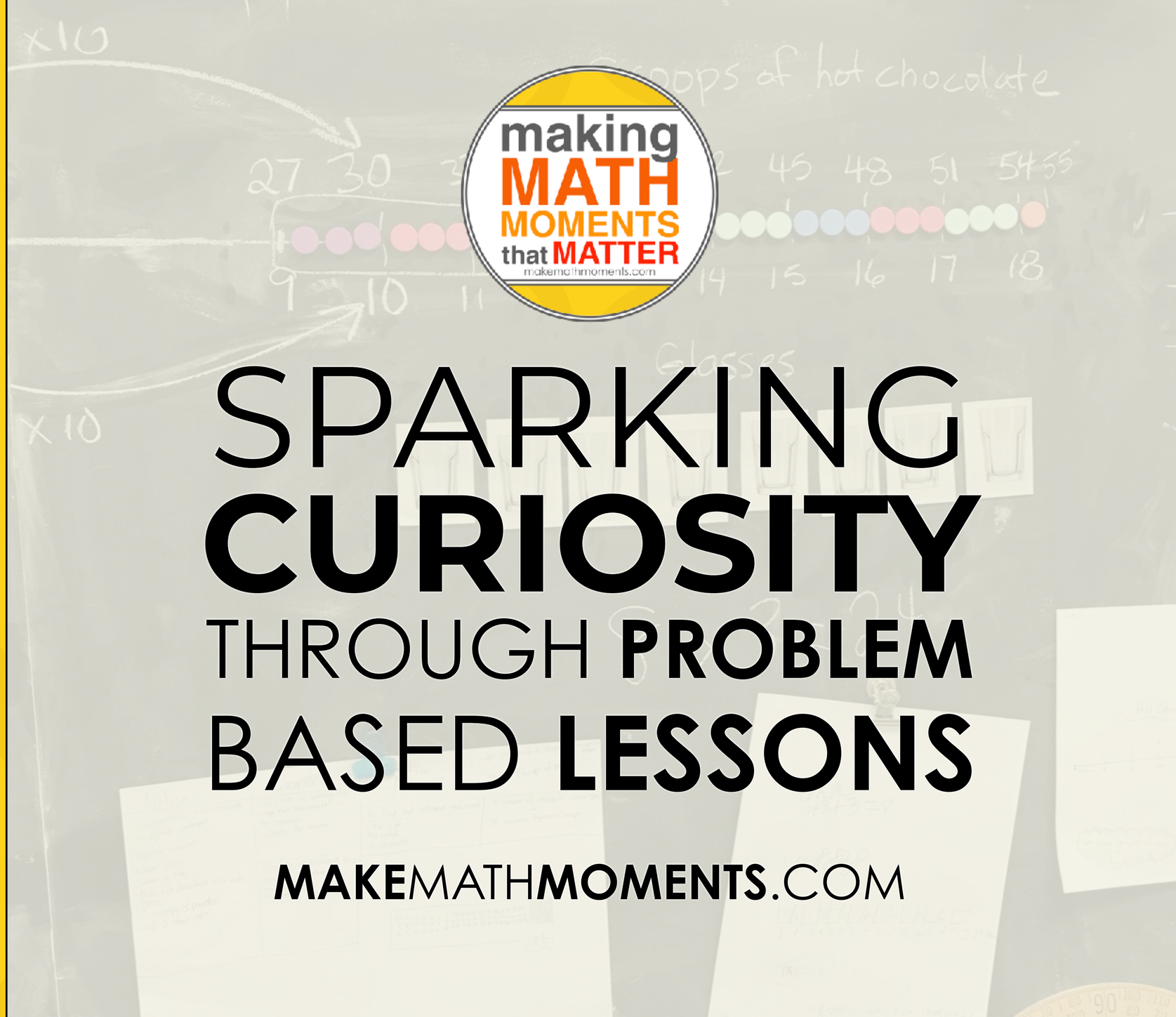

SPARKING **CURIOSITY** THROUGH **PROBLEM** BASED **LESSONS**

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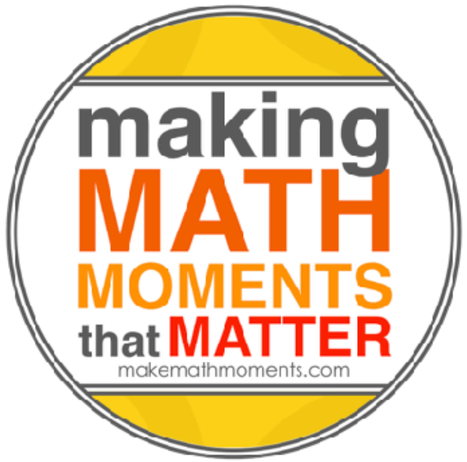
WE'LL START AT 7 PM Eastern

Introduce yourself in the chat!
Who are you?
Where are you from?
What is your role in mathematics education?



4 STRATEGIES TO HELP STUDENTS START PROBLEMS AND STICK WITH THEM

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WELCOME

making MATH MOMENTS that MATTER
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ALL RESOURCES:

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WHAT **YOU'LL** GET

How to structure lessons so that students will dive into the problem solving process without relying on the teacher every step of the way;

WHAT **YOU'LL** GET

How to help your students build confidence and resilience so they develop a productive disposition towards mathematics;

WHAT **YOU'LL** GET

How to ensure students are building a conceptual understanding in order to build procedural fluency over time; and,

WHAT **YOU'LL** GET

Teacher moves that promote student thinking through productive struggle.

HOW **WE** LEARN

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HOW **WE** LEARN

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HOW **WE** LEARN

CURRENT
KNOWLEDGE
and
UNDERSTANDING

NEW
KNOWLEDGE
and
UNDERSTANDING

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HOW **WE** LEARN

CURRENT
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HOW **WE** LEARN

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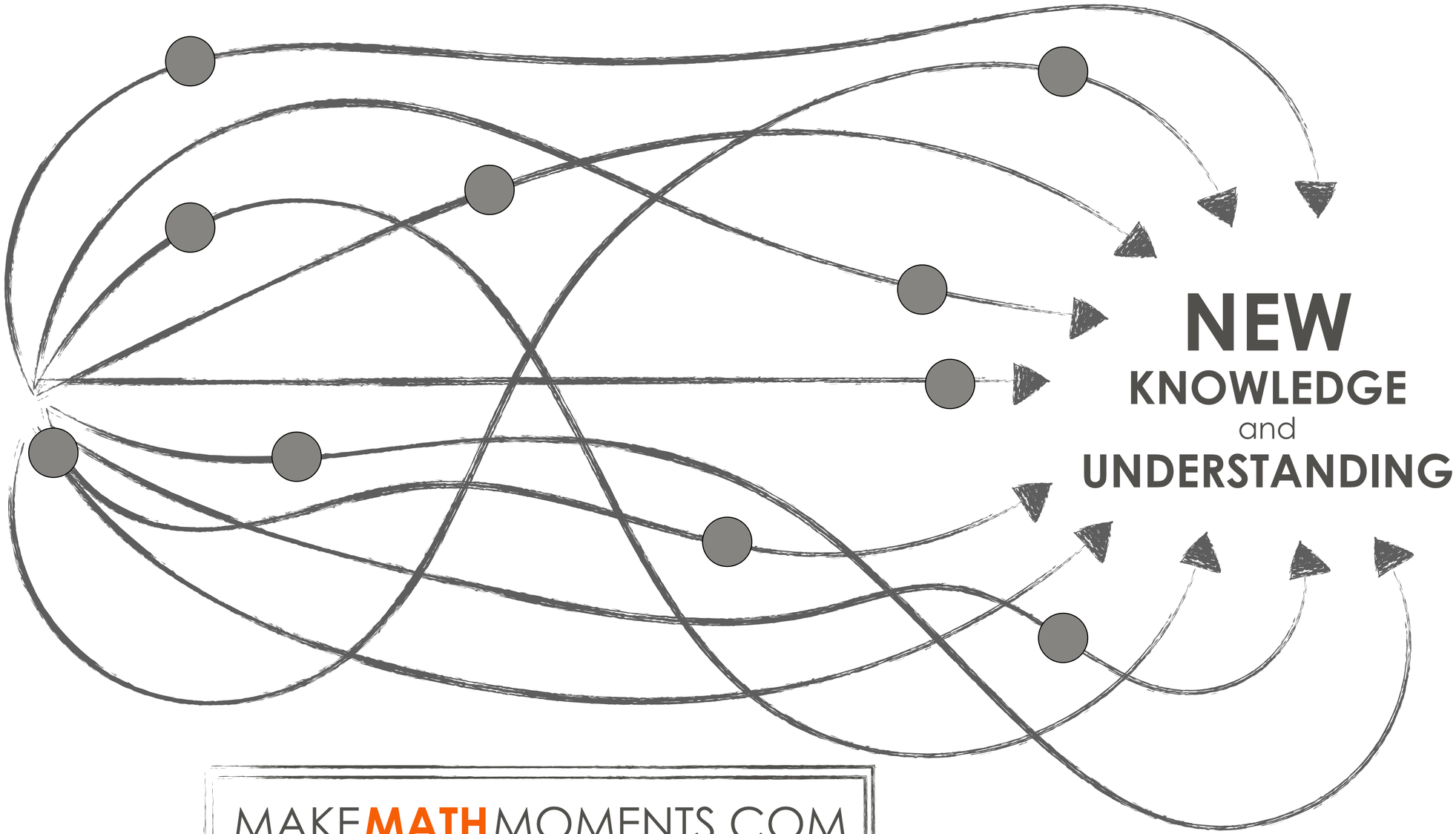
KNOWLEDGE
and
UNDERSTANDING



NEW
KNOWLEDGE
and
UNDERSTANDING

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WHO IS **JON ORR**?

MRORR

ISAGEEK.COM

WHO IS **KYLE PEARCE**?

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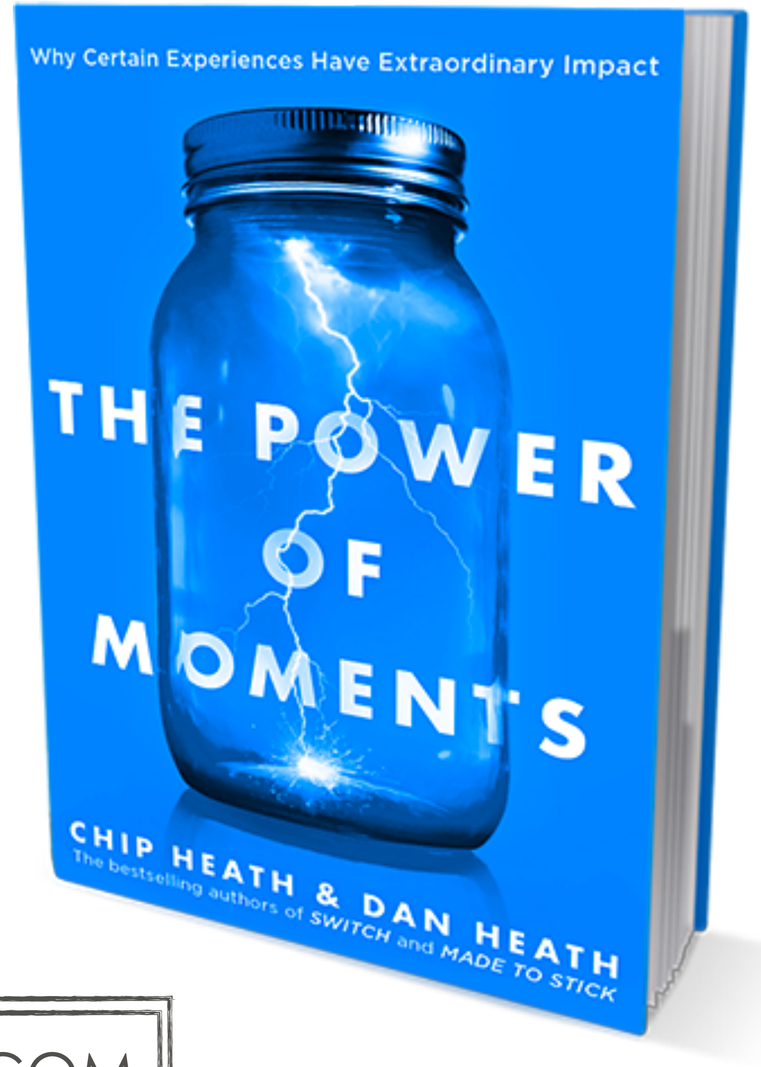
THE **POWER** OF **MOMENTS**

Why Certain Experiences Have Extraordinary Impact



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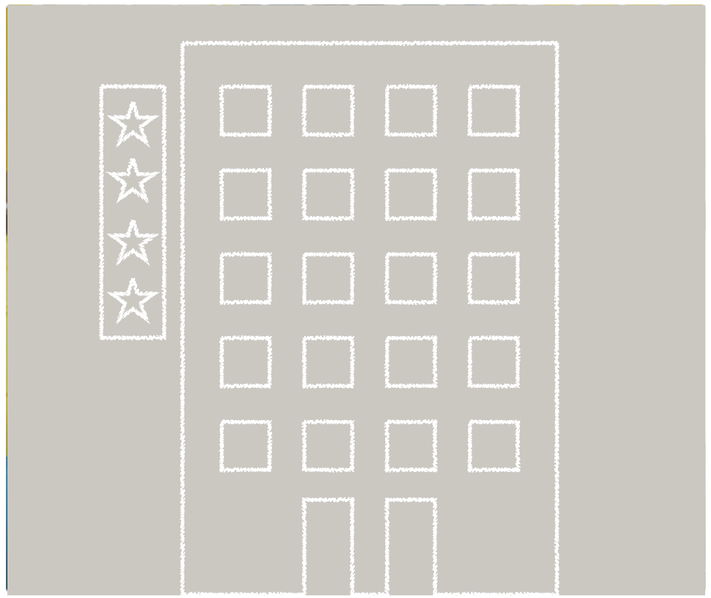
THE **POWER** OF **MOMENTS**

Why Certain Experiences Have Extraordinary Impact

THE **POWER** OF **MOMENTS**



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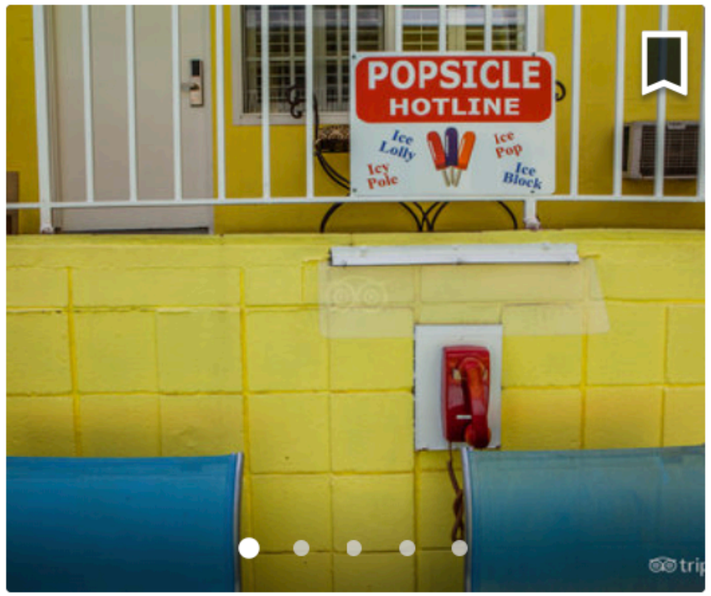
THE **POWER** OF **MOMENTS**



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HOW CAN WE **LEVERAGE** THE **POWER** OF **MOMENTS** IN **MATH CLASS**?

HOW CAN WE **LEVERAGE** THE **POWER** OF **MOMENTS** IN **MATH CLASS**?

IT'S NOT **LUCK**

MEMORABLE MOMENTS CAN BE **CREATED**

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3-PART FRAMEWORK

MAKEMATH**MOMENTS**.COM/**FRAMEWORK**

PART 1 **SPARKING** CURIOSITY

PART 2 **FUELLING** SENSE MAKING

PART 3 **IGNITING** TEACHER MOVES

4 STRATEGIES

These **4 strategies** live **INSIDE** this framework

STRATEGY #1

AVOID RUSHING TO THE ALGORITHM

STRATEGY #1 AVOID RUSHING TO THE ALGORITHM

RUSHING TO
ALGORITHMS
WON'T CREATE
RESILIENT
PROBLEM SOLVERS

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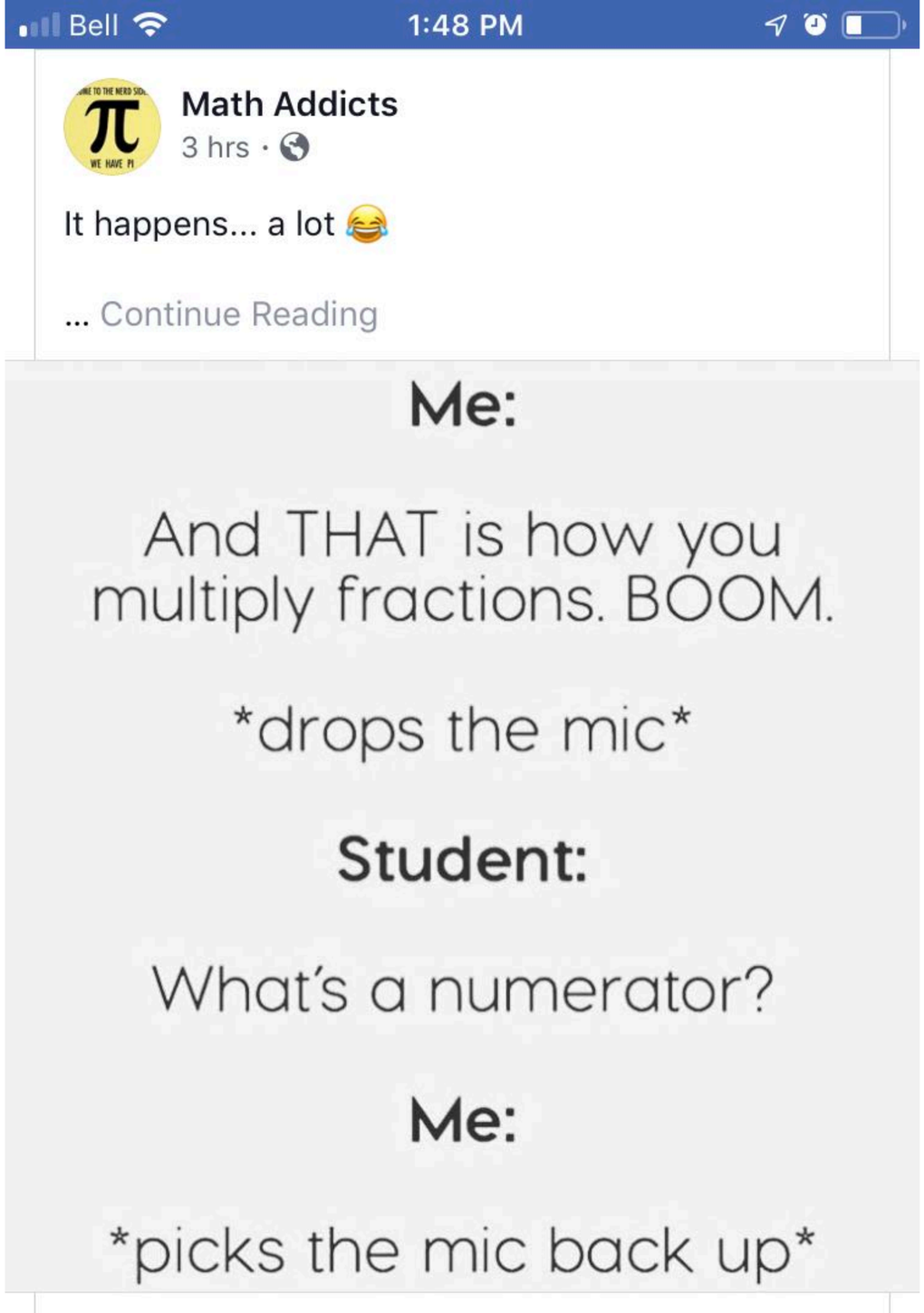
SOLVING PROBLEMS **FOR** STUDENTS

Math Class

1. Take Up Homework
2. Definitions, Formulae, Procedures/Algorithms
3. Examples
4. Homework



Shared By:
Math Addicts
on Facebook

HI-LITERS **DON'T** CREATE RESILIENT PROBLEM **SOLVERS**

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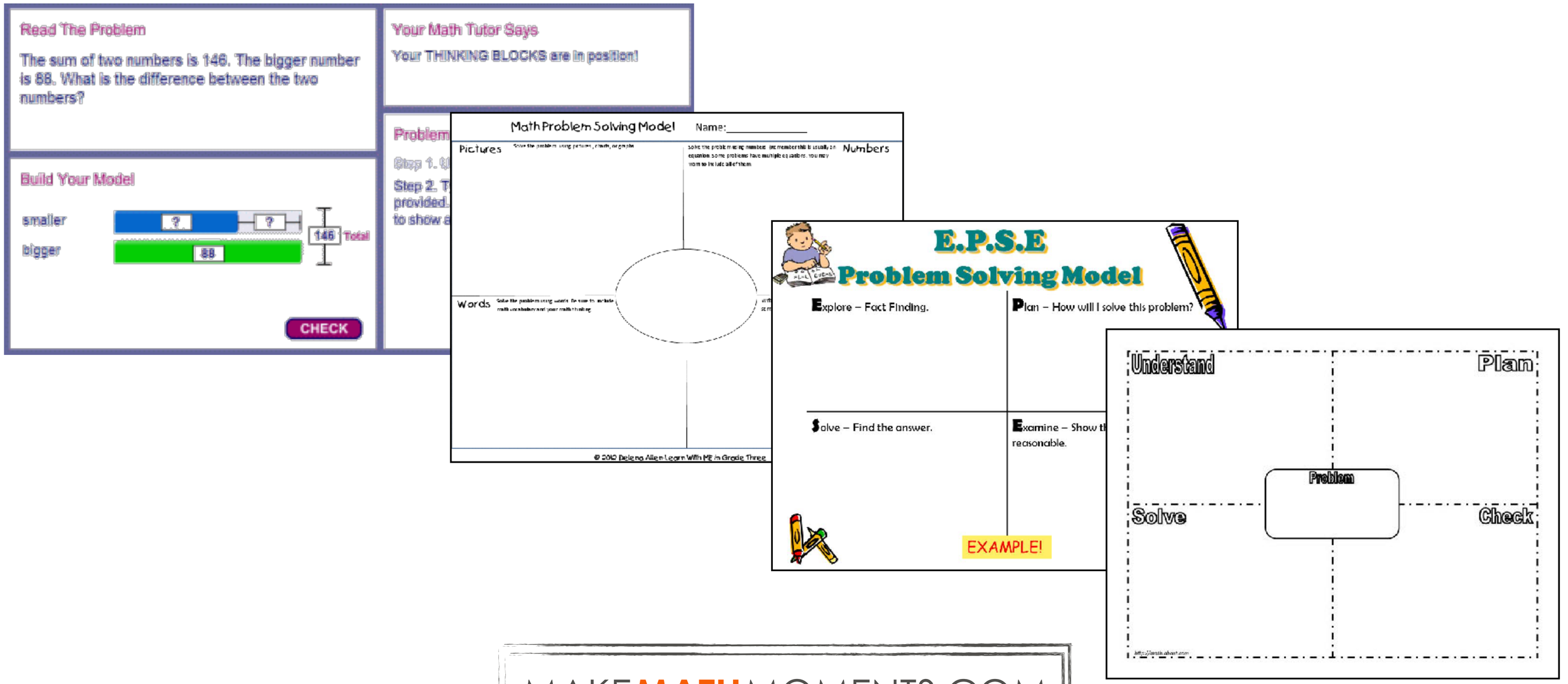
PROBLEM **SOLVING** MODELS



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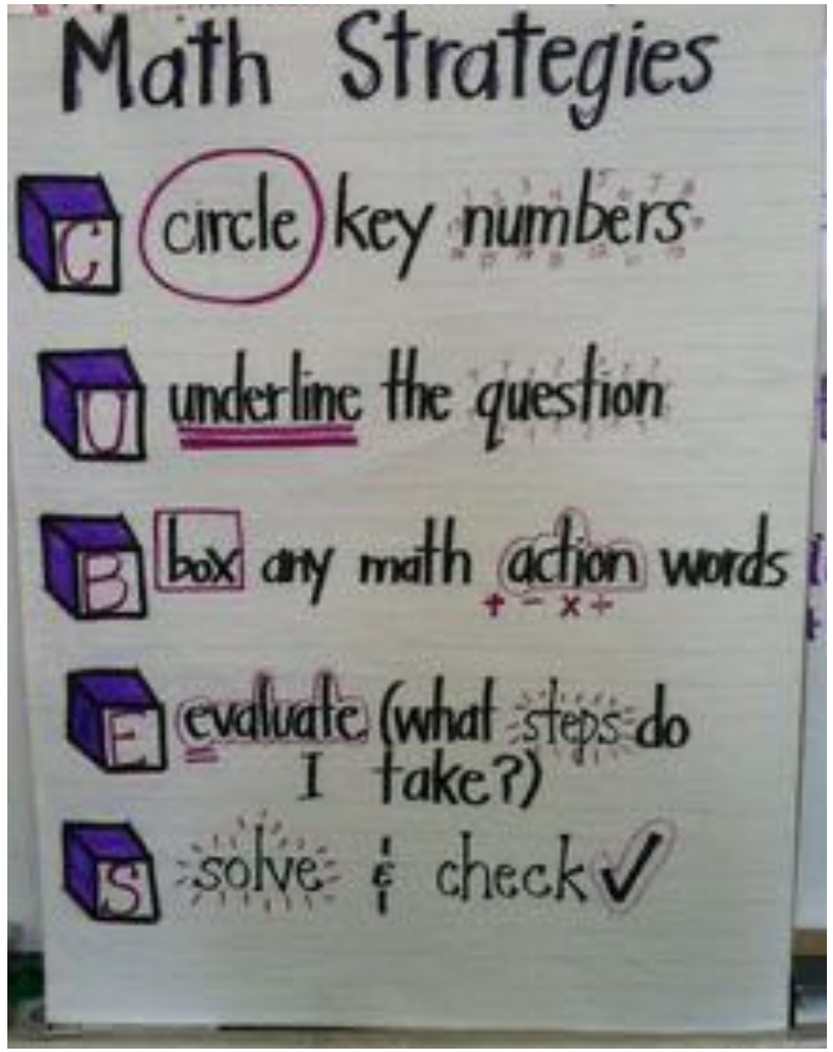
ANCHOR CHARTS



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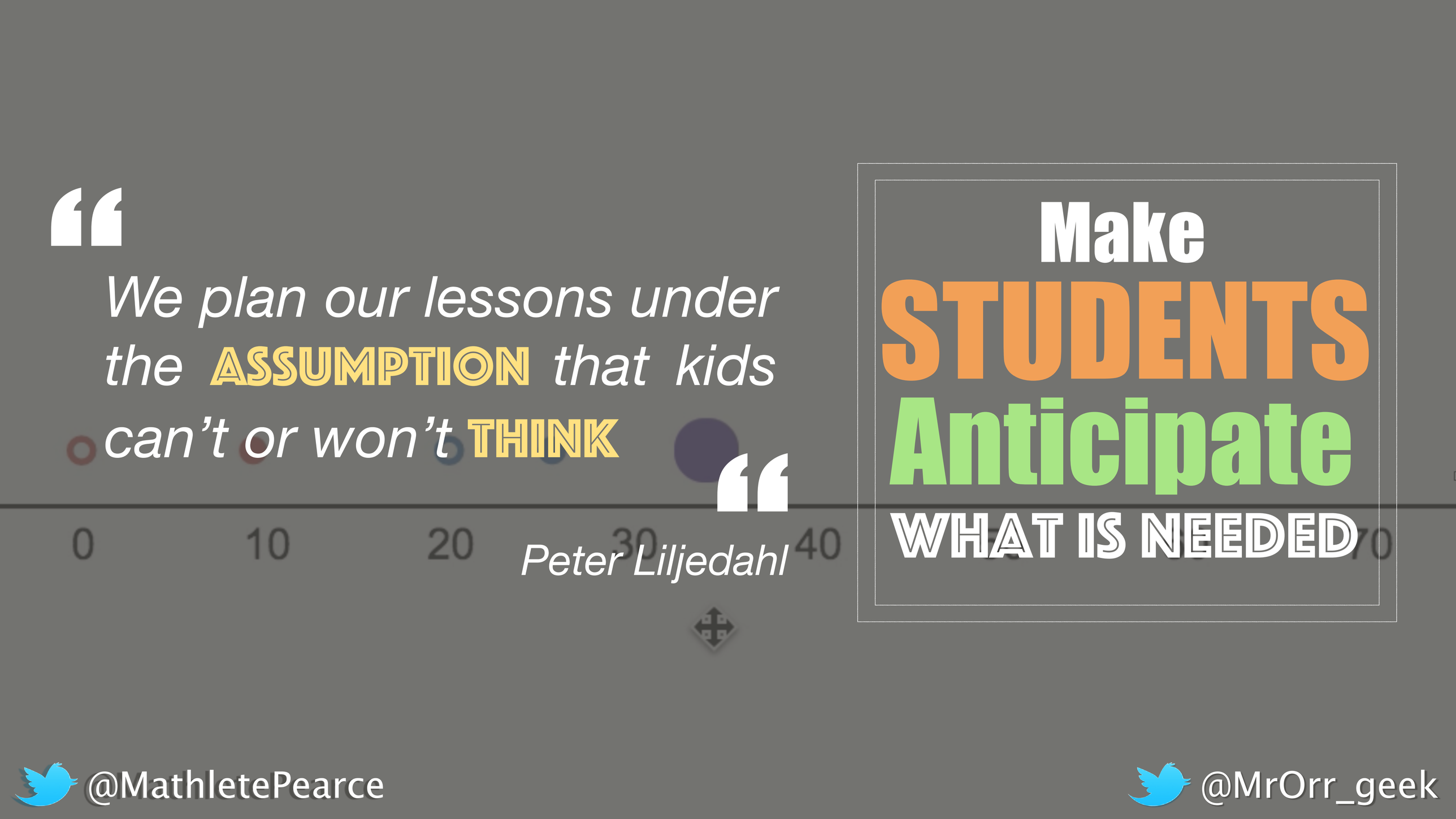
“We plan our lessons under the **ASSUMPTION** that kids can’t or won’t **THINK**”

Peter Liljedahl

Make STUDENTS Anticipate WHAT IS NEEDED



@MathletePearce

@MrOrr_geek

STRATEGY #1 AVOID RUSHING TO THE ALGORITHM

STOP PRE-TEACHING

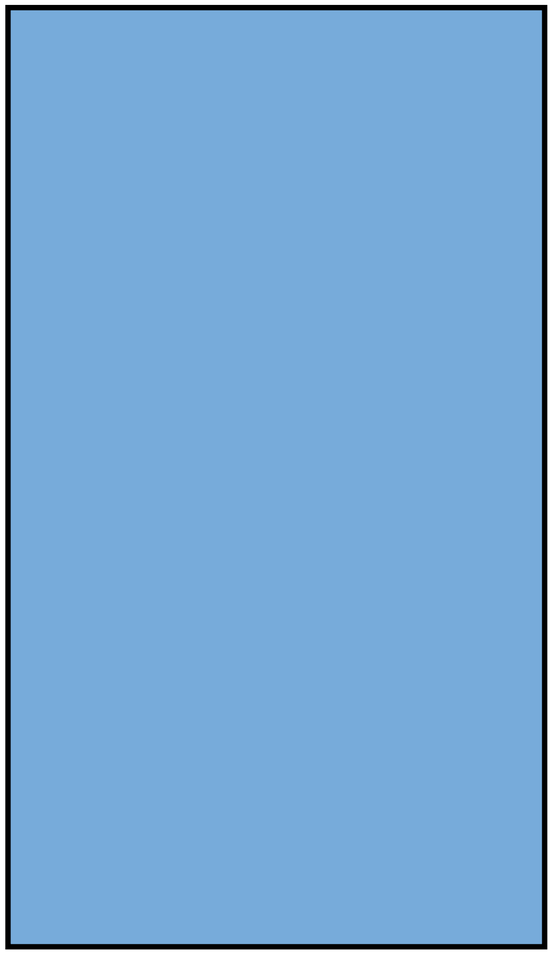
CREATE A **PRODUCTIVE STRUGGLE**

START LISTENING & OBSERVING

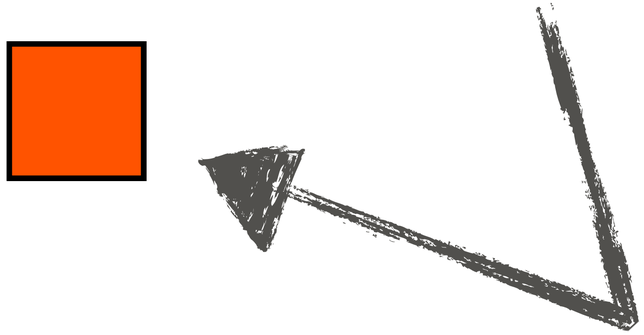
GOING FROM **THIS**...

Finding Area

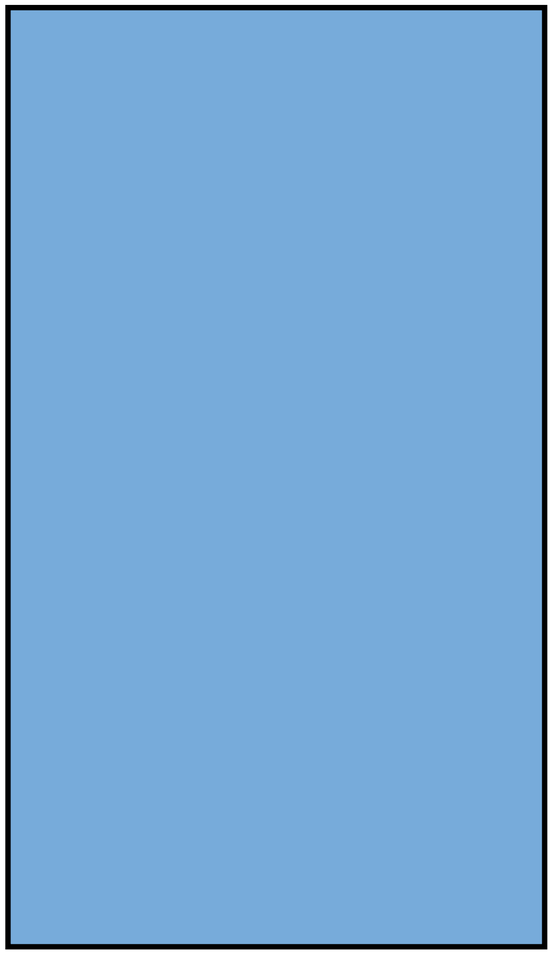
A rectangle has a length of 7 units and a width of 4 units. Find the area of the rectangle.



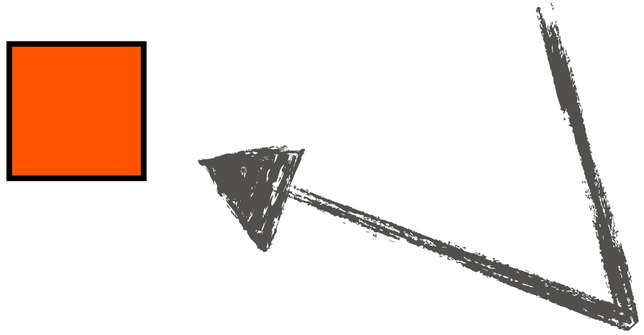
How many of these



will it take to cover that

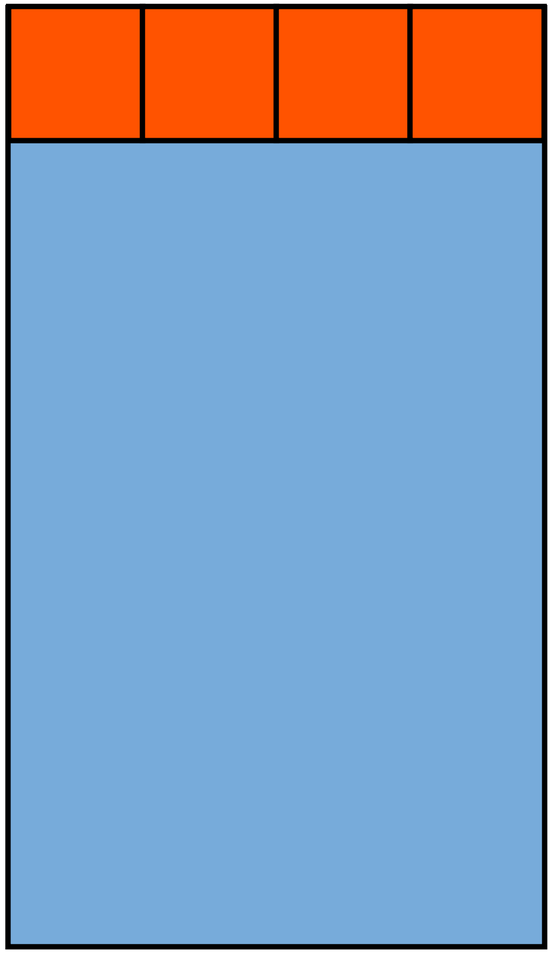


How many of these



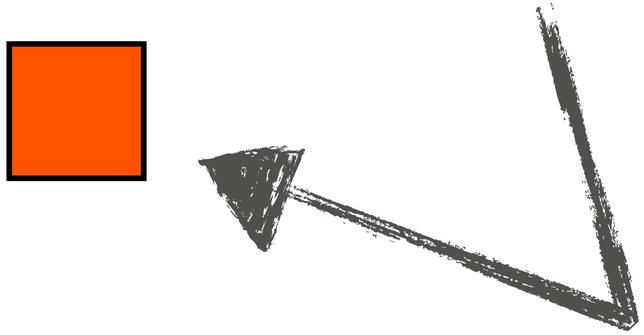
will it take to cover that

MAKE AN ESTIMATE!

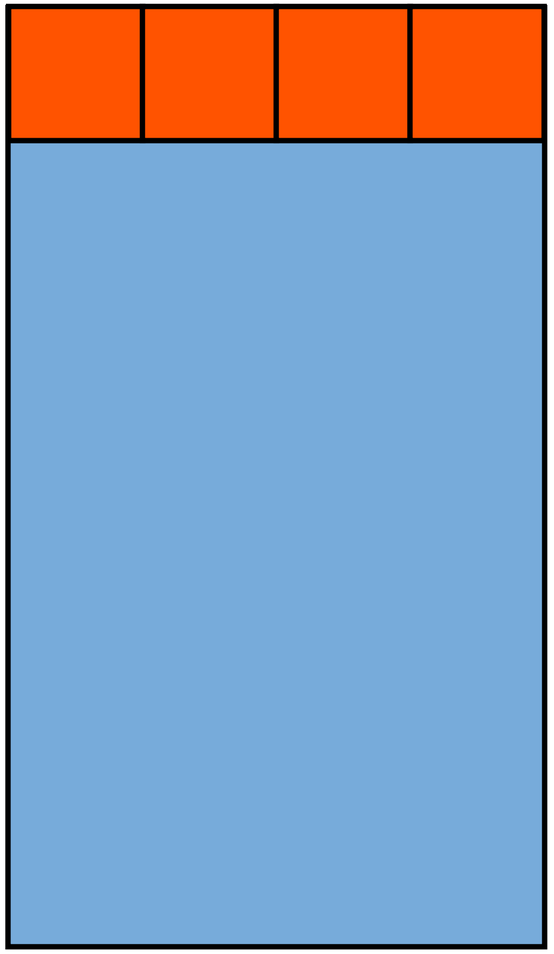


will it take to cover that

How many of these

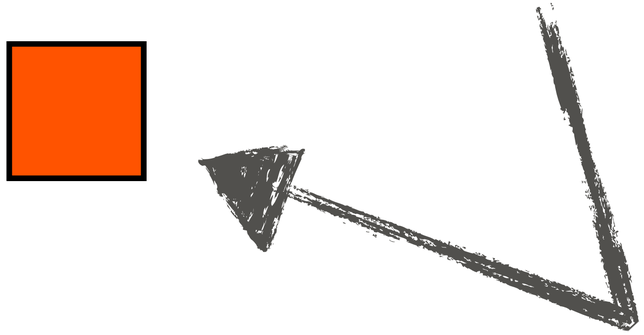


UPDATE YOUR ESTIMATE!



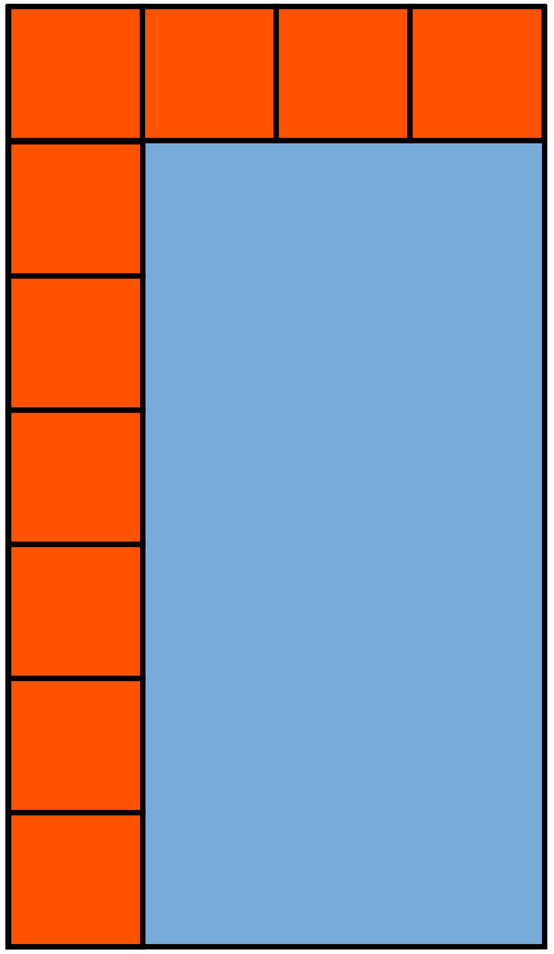
will it take to cover that

How many of these

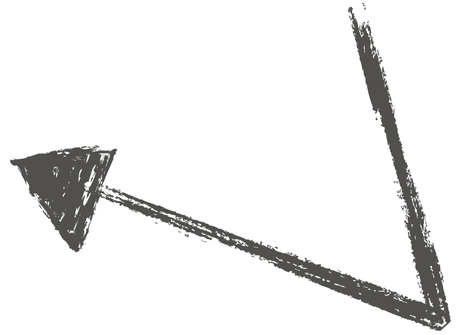


UPDATE YOUR ESTIMATE!

PAUSE VIDEO

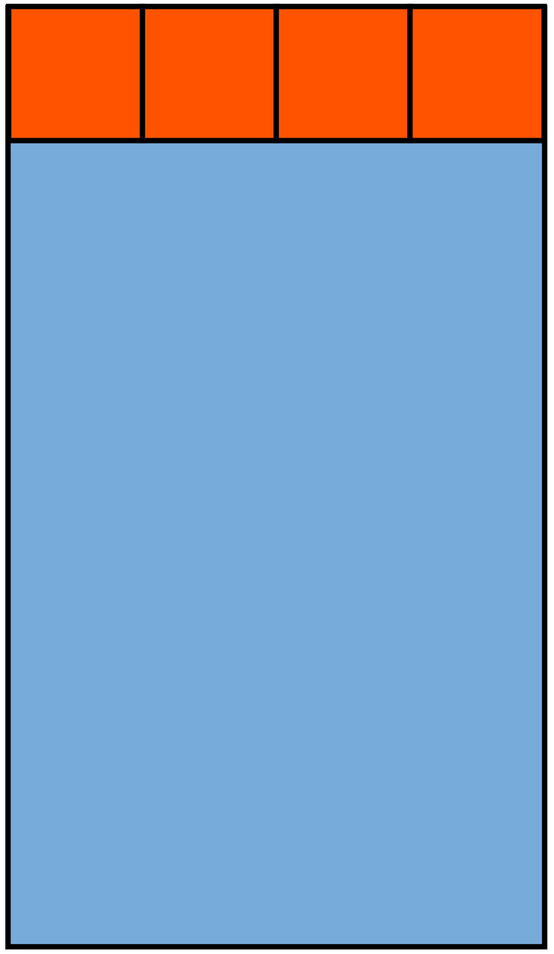


How many of these



will it take to cover that

UPDATE YOUR ESTIMATE AGAIN!



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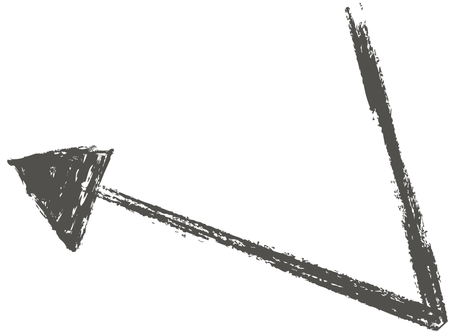
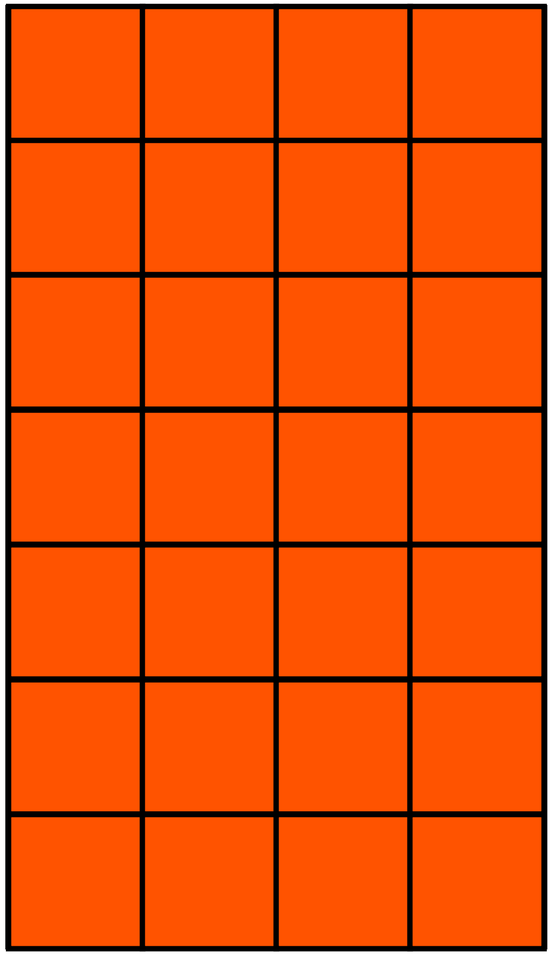
How many of these



will it take to cover that

UPDATE YOUR ESTIMATE AGAIN!



28

How many of these

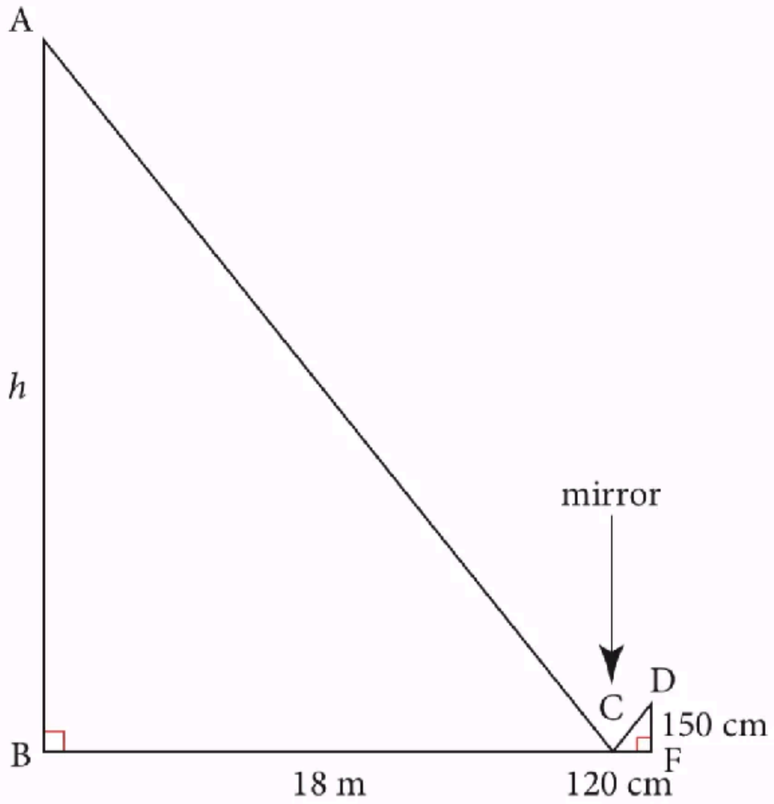
will it take to cover that

UPDATE YOUR ESTIMATE AGAIN!

GOING FROM **THIS**…

Example 3 **Use a Mirror to Find Height**

Elizabeth's eyes are 150 cm from the floor. She places a mirror on the floor 18 m from the base of a climbing wall. She walks backward 120 cm, until she sees the top of the wall in the mirror. What is the height of the climbing wall?




CAN THEY SEE EYE-TO-EYE
IN THE MIRROR?


WHICH MIRROR
CAN THEY SEE EYE-TO-EYE?
1
2
3
4


WHERE SHOULD DYLAN STAND
SO THEY CAN SEE EYE-TO-EYE IN THE MIRROR?
152 cm
150 cm
?
187 cm

2. A big non-math takeaway, but still school related, is that the teacher really makes the class. Although math was my favourite subject before, throughout the years, I have lived math more and more every year and have found passion in everything I do related to math. A big non-math, non school takeaway is to have confidence in your work. Even though I get most of the math ideas, during tests I used to have a loss of confidence and throughout this year I have ~~learned and~~ obtained a confidence gain in not only math but everything I do.

Thank you for a great year Mr Ors, and everything you taught me. :)

Hilroy

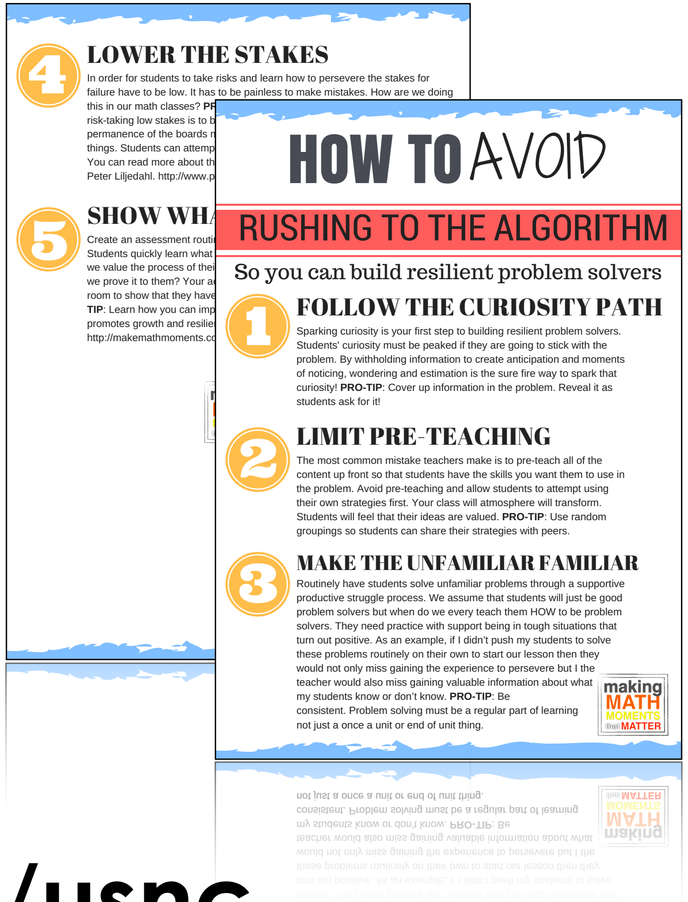
[redacted]

STRATEGY #1 AVOID RUSHING TO THE ALGORITHM

STOP PRE-TEACHING

CREATE A **PRODUCTIVE STRUGGLE**

START LISTENING & OBSERVING



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YOU MIGHT BE **WONDERING**...

HOW?

STRATEGY #2

GIVE YOUR STUDENTS AN
ALL ACCESS PASS

STRATEGY #2 GIVE YOUR STUDENTS AN ALL ACCESS PASS

High-Ceiling

TASKS

Low-Floor

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Supply and Demand

Rachelle is an economist. She evaluates the effect of changing the price on the supply and the demand for a product. The selling price in dollars, y, of a product is related to the number of units sold, x, according to these equations:

Demand: $y + 0.4x = 10$ Supply: $y = 0.6x + 2$

Solve this system algebraically. What does the solution represent?

PART 1

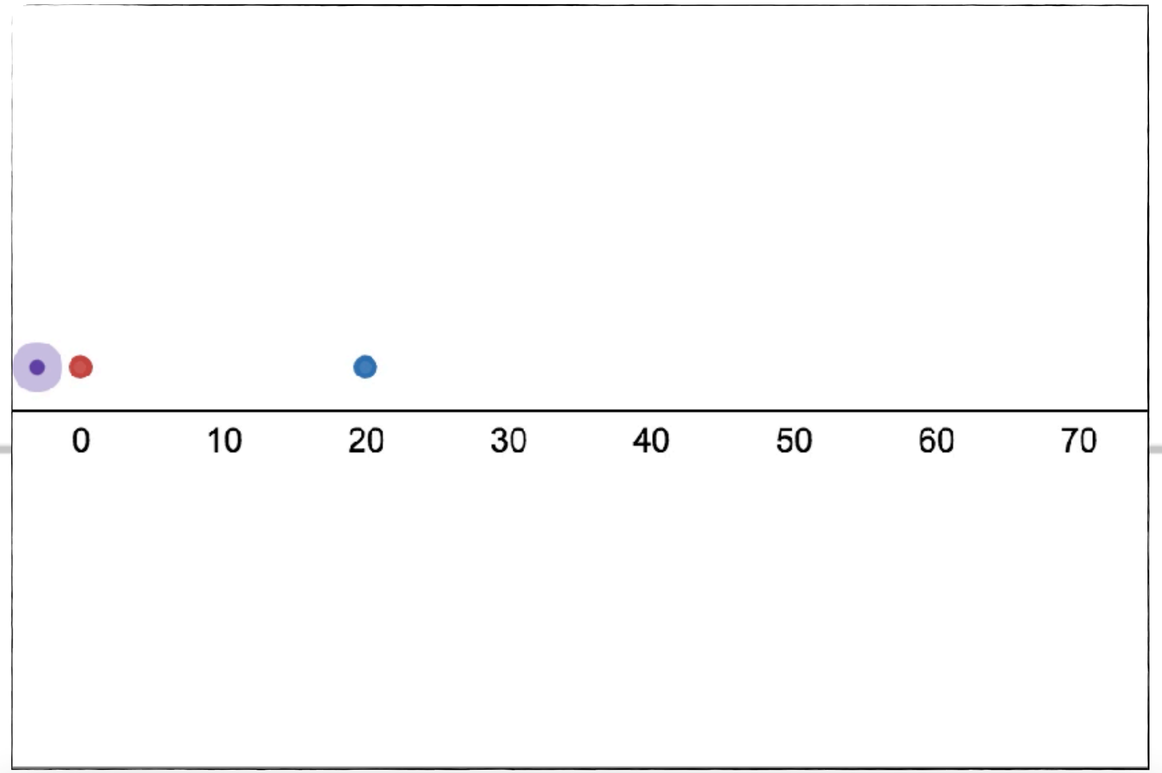
SPARKING CURIOSITY WITH THE CURIOSITYPATH

WITHHOLDING INFORMATION

ANTICIPATION

NOTICE & WONDER

ESTIMATION



The **SUCCESS** *of a Notice and Wonder hinges on how effectively the task creates the feeling of* **ANTICIPATION** *through the* **WITHHOLDING OF INFORMATION.**

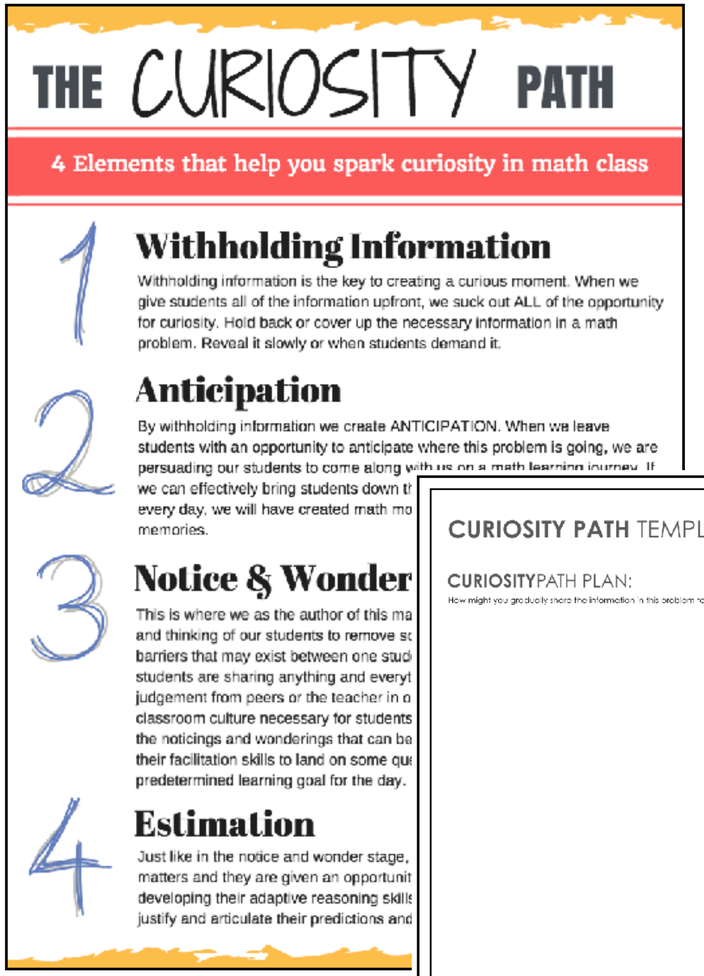
WITHHOLD INFORMATION TO CREATE ANTICIPATION

@MathletePearce

@MrOrr_geek

CURIOSITY PATH

- WITHHOLDING INFORMATION
- ANTICIPATION
- NOTICE & WONDER
- ESTIMATION



THE CURIOSITY PATH

4 Elements that help you spark curiosity in math class

1 **Withholding Information**

Withholding information is the key to creating a curious moment. When we give students all of the information upfront, we suck out ALL of the opportunity for curiosity. Hold back or cover up the necessary information in a math problem. Reveal it slowly or when students demand it.

2 **Anticipation**

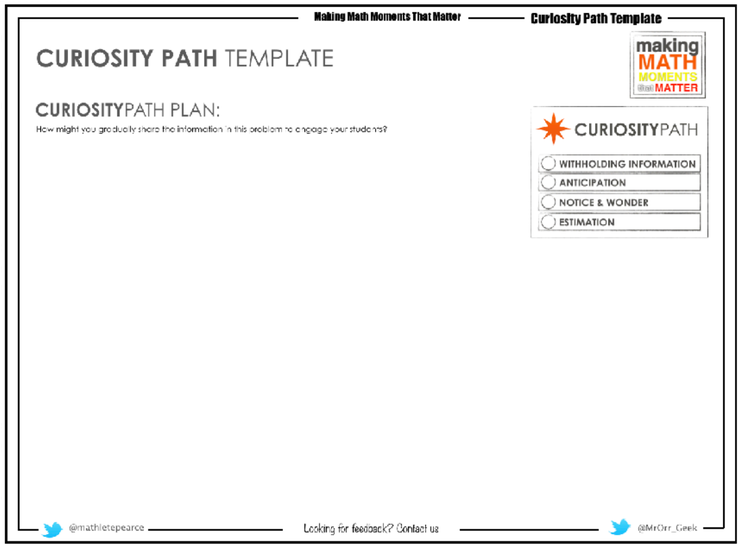
By withholding information we create ANTICIPATION. When we leave students with an opportunity to anticipate where this problem is going, we are persuading our students to come along with us on a math learning journey. If we can effectively bring students down t every day, we will have created math mo memories.

3 **Notice & Wonder**

This is where we as the author of this ma and thinking of our students to remove sc barriers that may exist between one stud students are sharing anything and everyt judgement from peers or the teacher in a classroom culture necessary for students the noticings and wonderings that can be their facilitation skills to land on some qu predetermined learning goal for the day.

4 **Estimation**

Just like in the notice and wonder stage, matters and they are given an opportunit developing their adaptive reasoning skill justify and articulate their predictions and



Making Math Moments That Matter — Curiosity Path Template

CURIOSITY PATH TEMPLATE

making MATH MOMENTS that MATTER

CURIOSITYPATH PLAN:

How might you gradually share the information in this problem to engage your students?

CURIOSITYPATH

- WITHHOLDING INFORMATION
- ANTICIPATION
- NOTICE & WONDER
- ESTIMATION

@mathletepearce — Looking for feedback? Contact us — @MrOrr_Geek

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STRATEGY #3

BE MORE PRINCE

STRATEGY #3 BE MORE PRINCE

From: foreverence.com/legends/

TOOLS
&
REPRESENTATIONS

CURIOSITY PATH

- WITHHOLDING INFORMATION
- ANTICIPATION
- NOTICE & WONDER
- ESTIMATION

RUSHING TO ALGORITHMS

MEMORABLE **MATH** MOMENTS

TOOLS AND REPRESENTATIONS

TOOLS for THINKING & REPRESENTING THINKING

Making intentional use of:

- Mathematical Models with "legs" (Alex Lawson)
- "Power Tools" (Cathy Fosnot)

What do you…

NOTICE?	WONDER?

What Do You...

Notice? Wonder?

What Do You...

Notice?

Wonder?

How many doughnuts are there?

Update Your Prediction

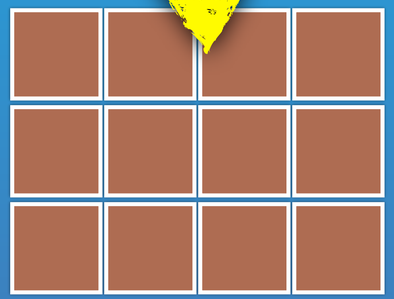
How many doughnuts are there?

Concreteness Fading

How many donuts are in 4 boxes of 12 donuts?

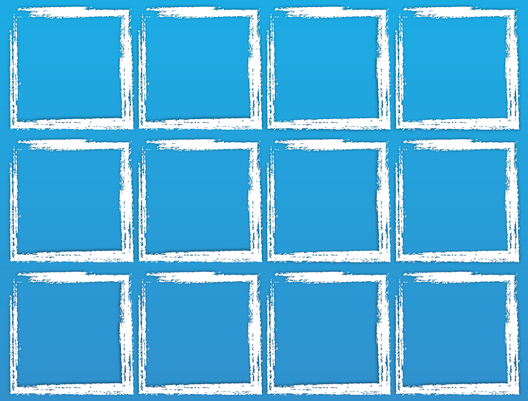
1 Concrete

Actual Doughnuts



Concrete Manipulatives

2 Visual



Drawings and Diagrams

3 Abstract

3 groups of
4 doughnuts
is equal to
12 doughnuts

Symbolic

3 x 4 = 12

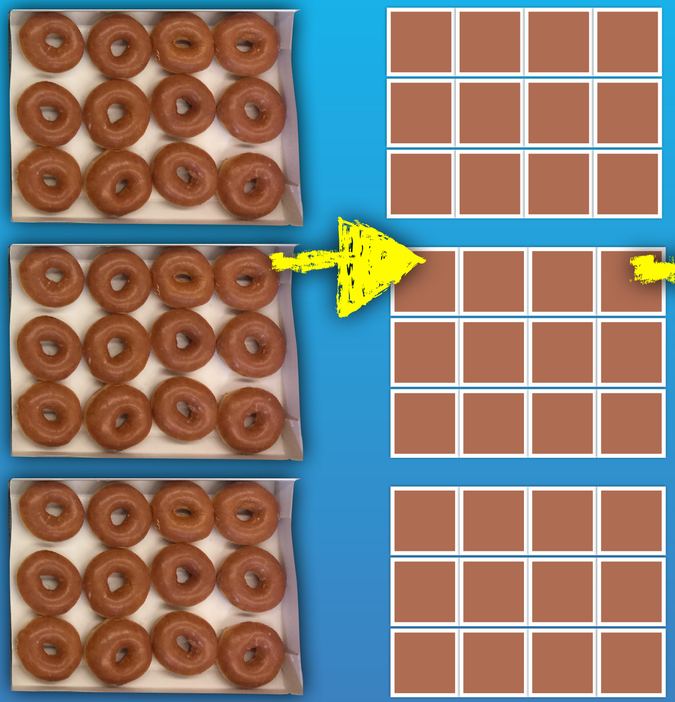
How many doughnuts are in 3 boxes?

How many doughnuts are in 3 boxes?

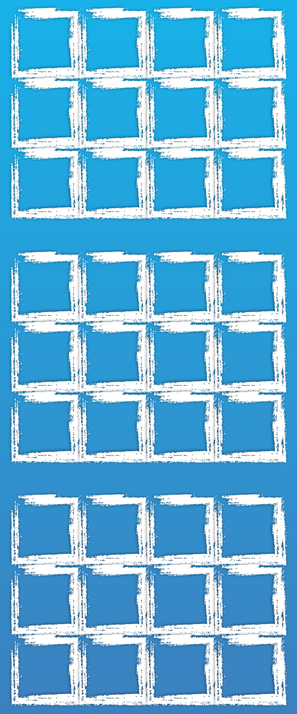
Concreteness Fading

How many doughnuts are in 3 boxes of 12 donuts?

1 Concrete



2 Visual



3 Abstract

3 groups of
12 doughnuts
is equal to
36 doughnuts

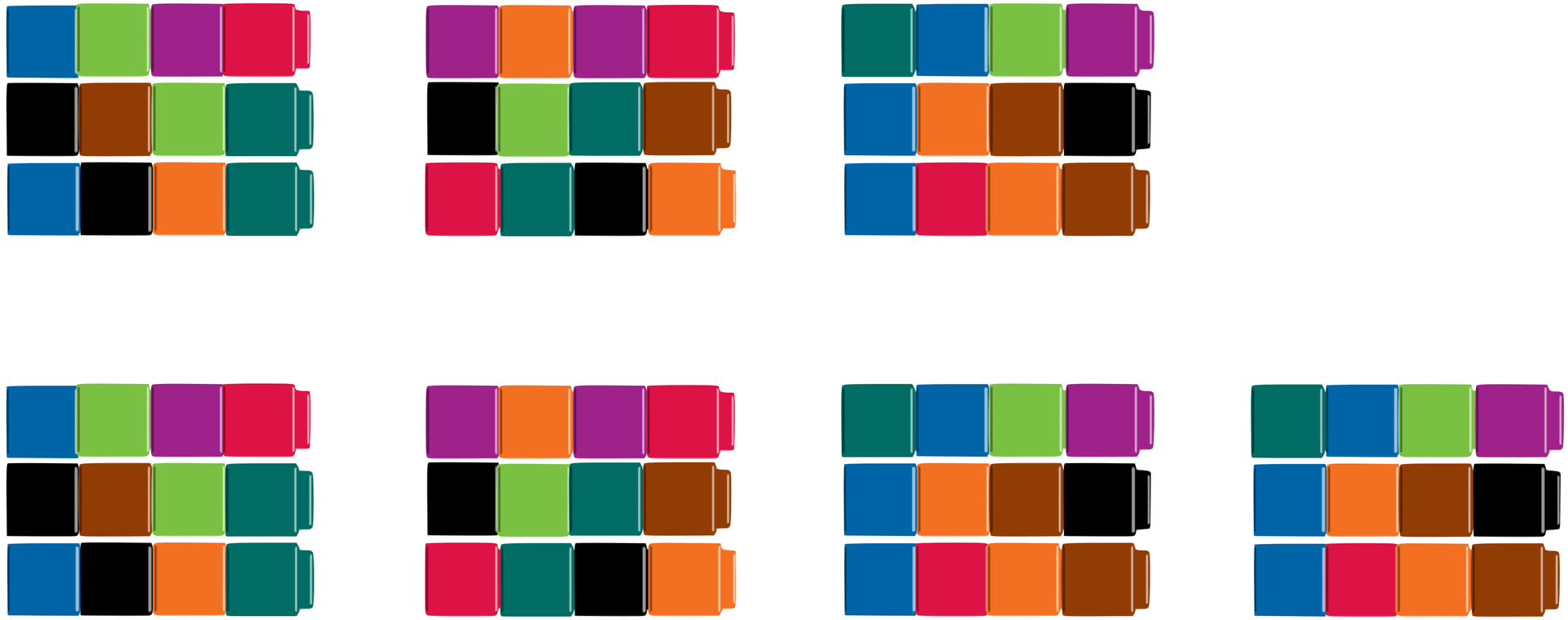
3 x 12 = 36

There are 36 doughnuts in 3 boxes. How many doughnuts are in 7 boxes?

There are 36 doughnuts in 3 boxes. How many doughnuts are in 7 boxes?

There are 36 doughnuts in 3 boxes.
How many doughnuts are in 7 boxes?

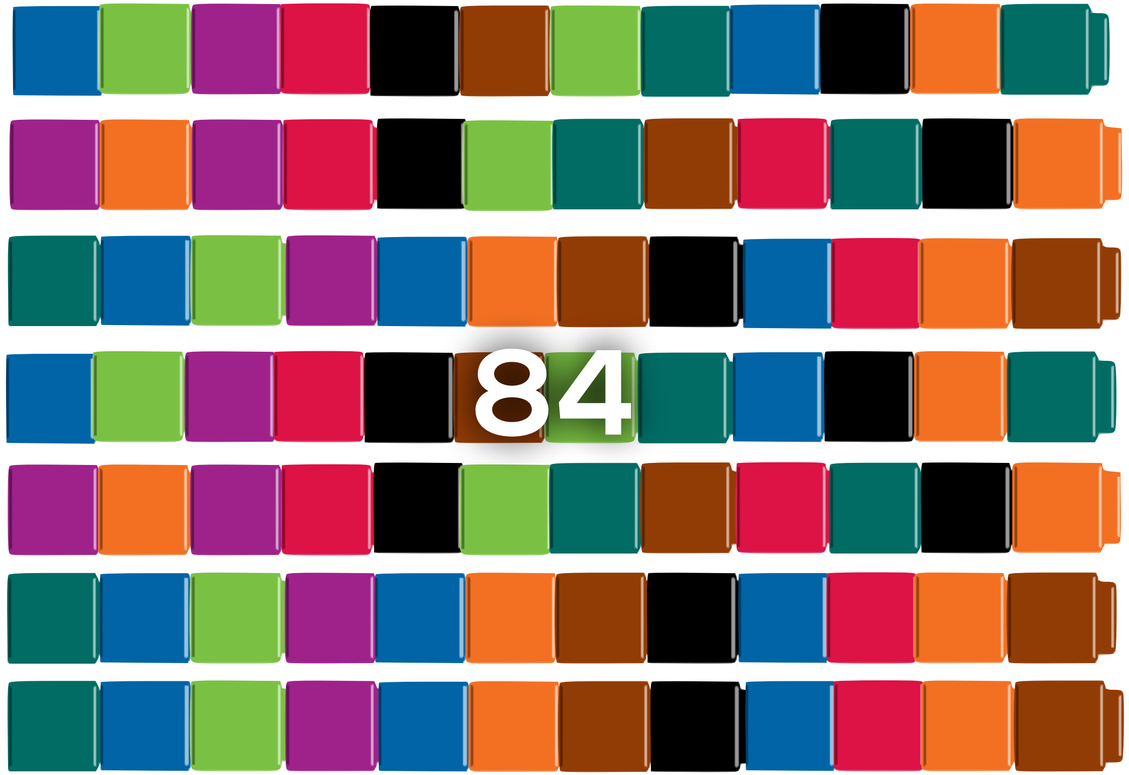
There are 36 doughnuts in 3 boxes. How many doughnuts are in 7 boxes?



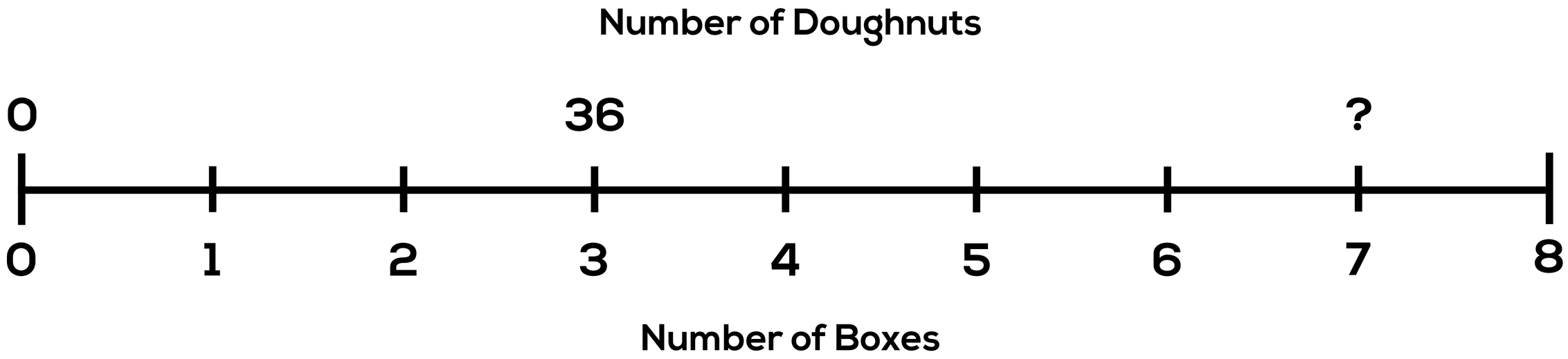
There are 36 doughnuts in 3 boxes. How many doughnuts are in 7 boxes?

12

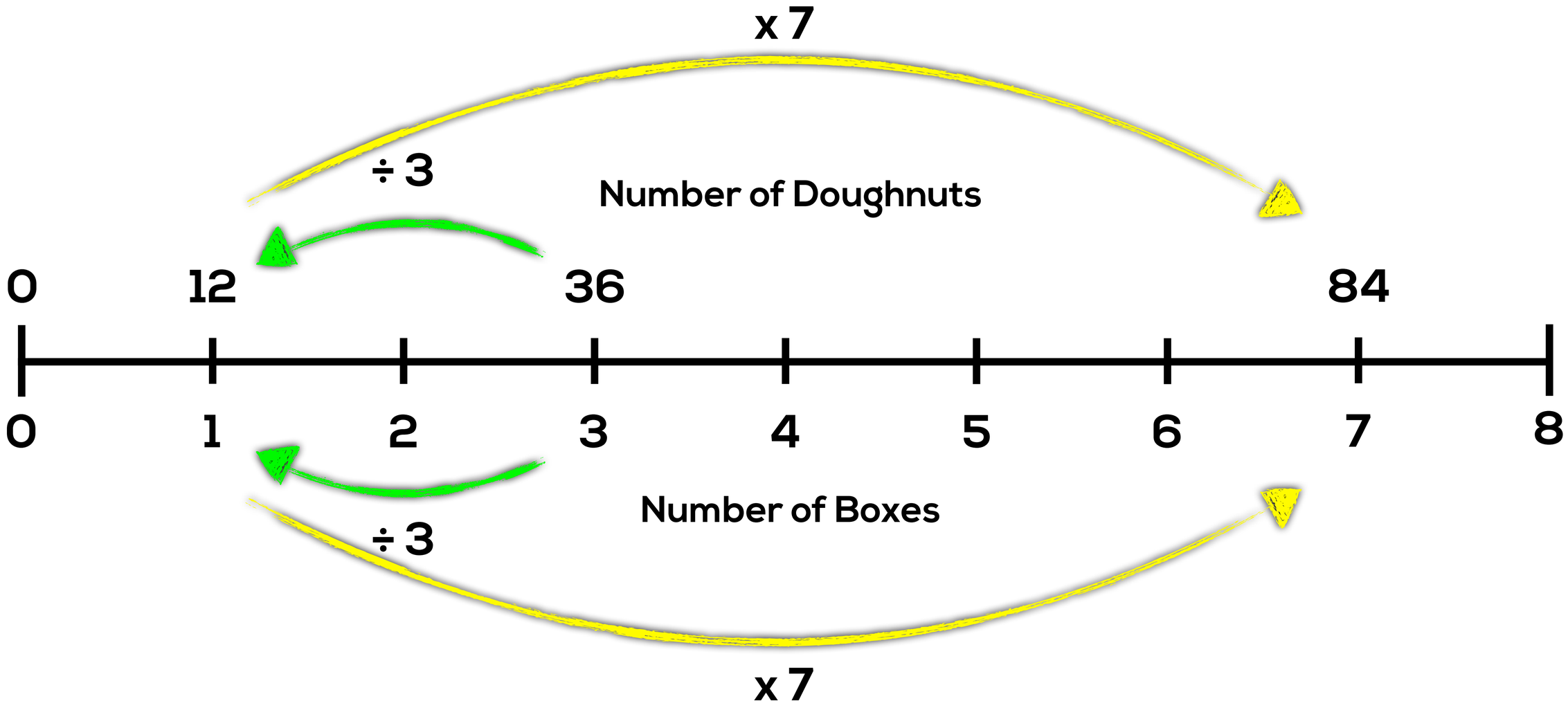
7



There are 36 doughnuts in 3 boxes. How many doughnuts are in 7 boxes?



There are 36 doughnuts in 3 boxes.
How many doughnuts are in 7 boxes?

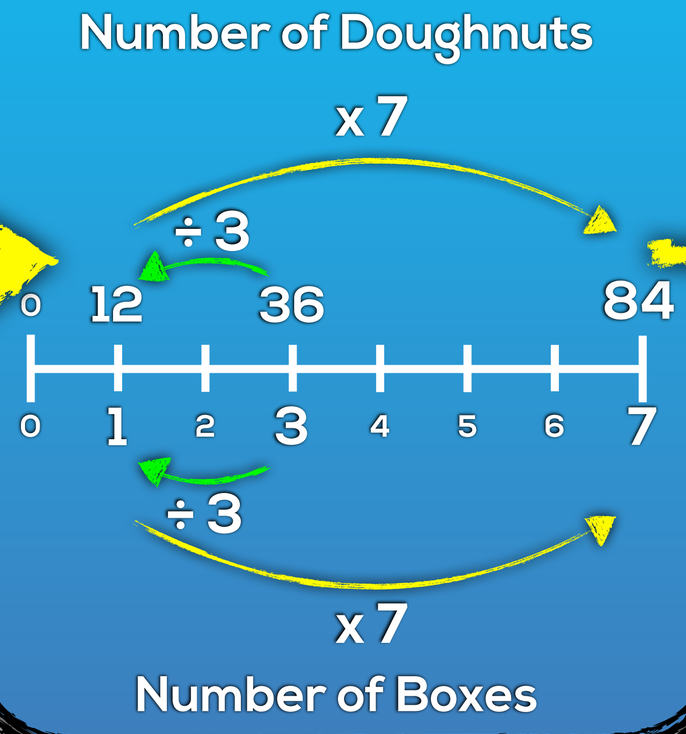


Concreteness Fading

There are 36 doughnuts in 3 boxes. How many doughnuts are in 7 boxes?

1 Concrete

2 Visual



3 Abstract

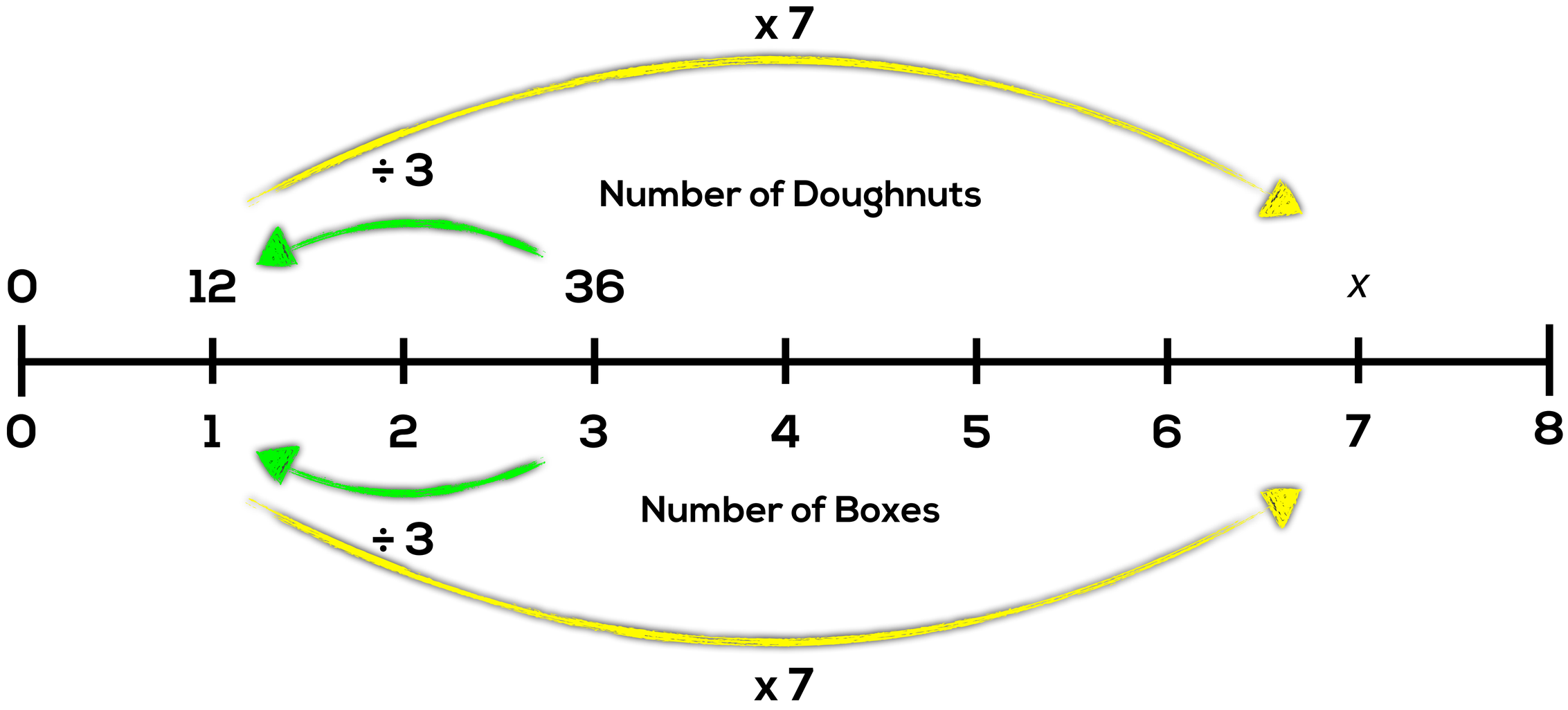
$$\frac{36 \text{ doughnuts}}{3 \text{ boxes}} = \frac{x \text{ doughnuts}}{7 \text{ boxes}}$$

$$\frac{12 \text{ doughnuts}}{1 \text{ boxes}} = \frac{x \text{ doughnuts}}{7 \text{ boxes}}$$

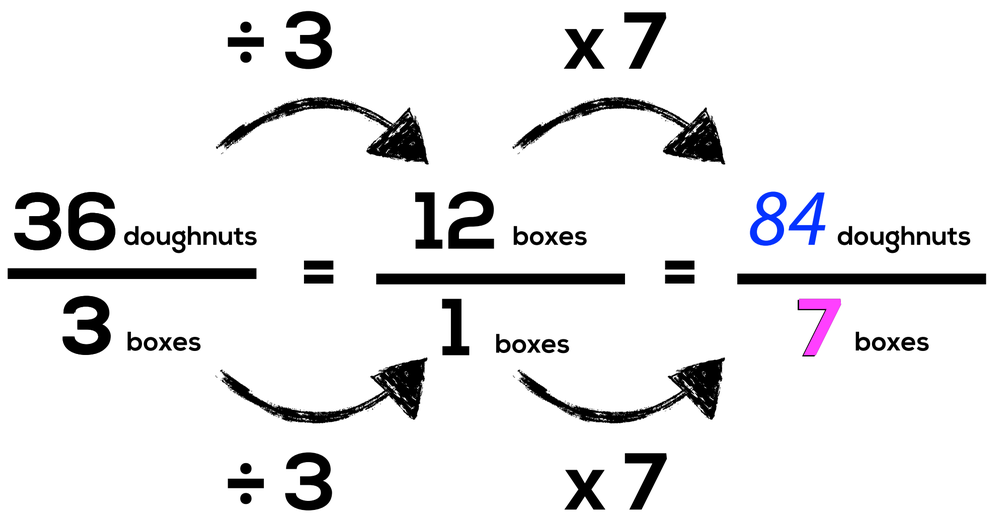
$$7 \text{ boxes} \left(\frac{12 \text{ doughnuts}}{1 \text{ boxes}}\right) = \left(\frac{x \text{ doughnuts}}{7 \text{ boxes}}\right) 7 \text{ boxes}$$

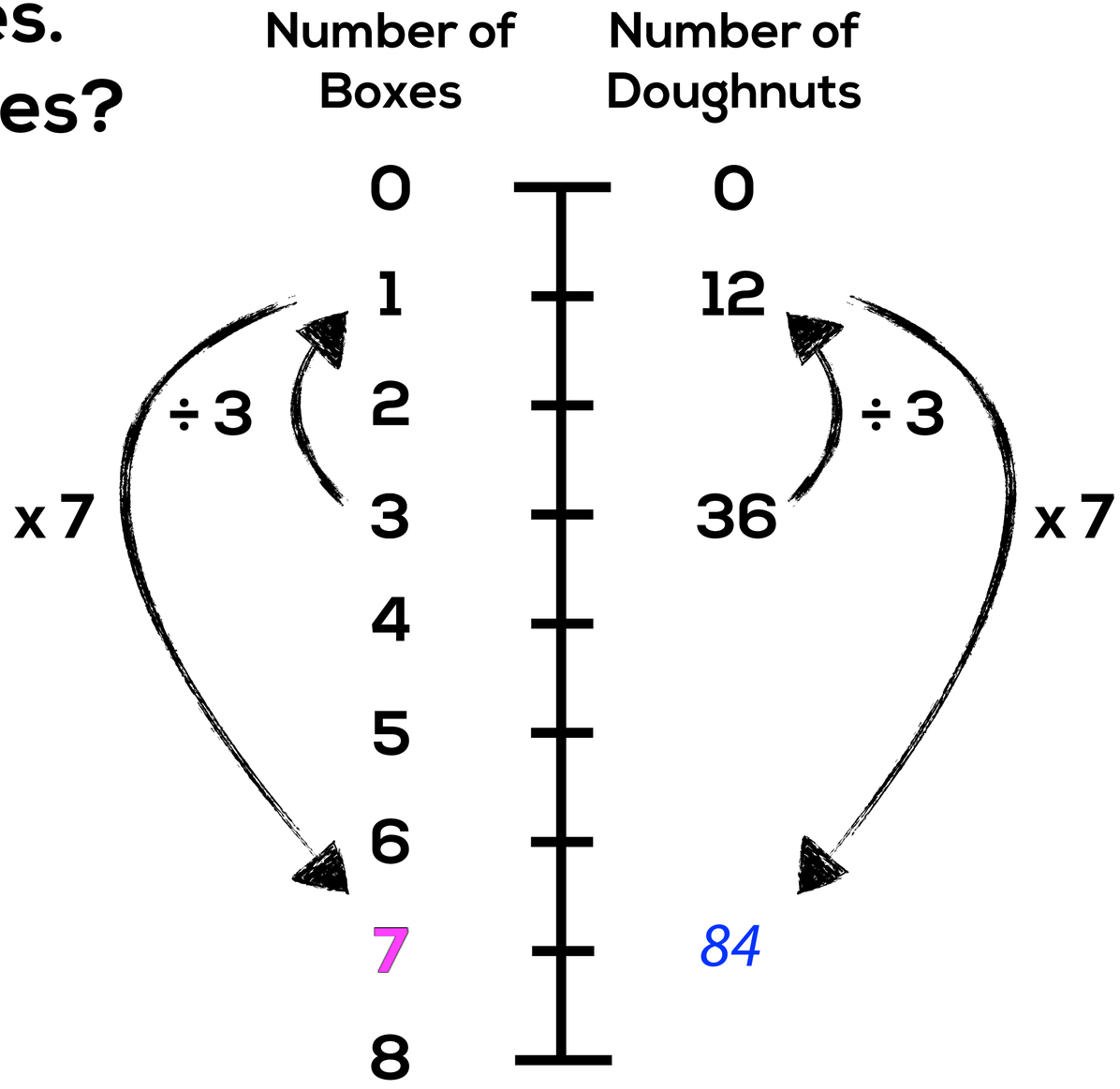
$$84 \text{ doughnuts} = x \text{ doughnuts}$$

There are 36 doughnuts in 3 boxes.
How many doughnuts are in 7 boxes?



There are 36 doughnuts in 3 boxes. How many doughnuts are in 7 boxes?





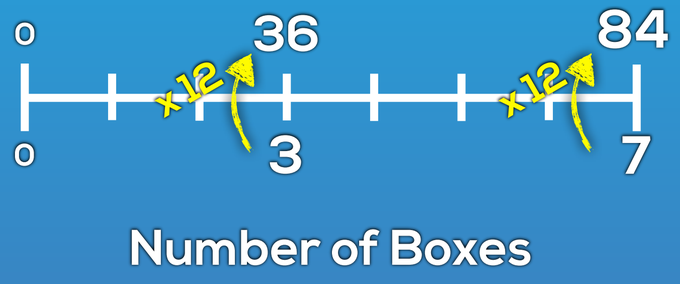
Concreteness Fading

There are 36 doughnuts in 3 boxes. How many doughnuts are in 7 boxes?

1 Concrete

2 Visual

$$\frac{36 \text{ doughnuts}}{3 \text{ boxes}} = 12 \text{ doughnuts per box}$$



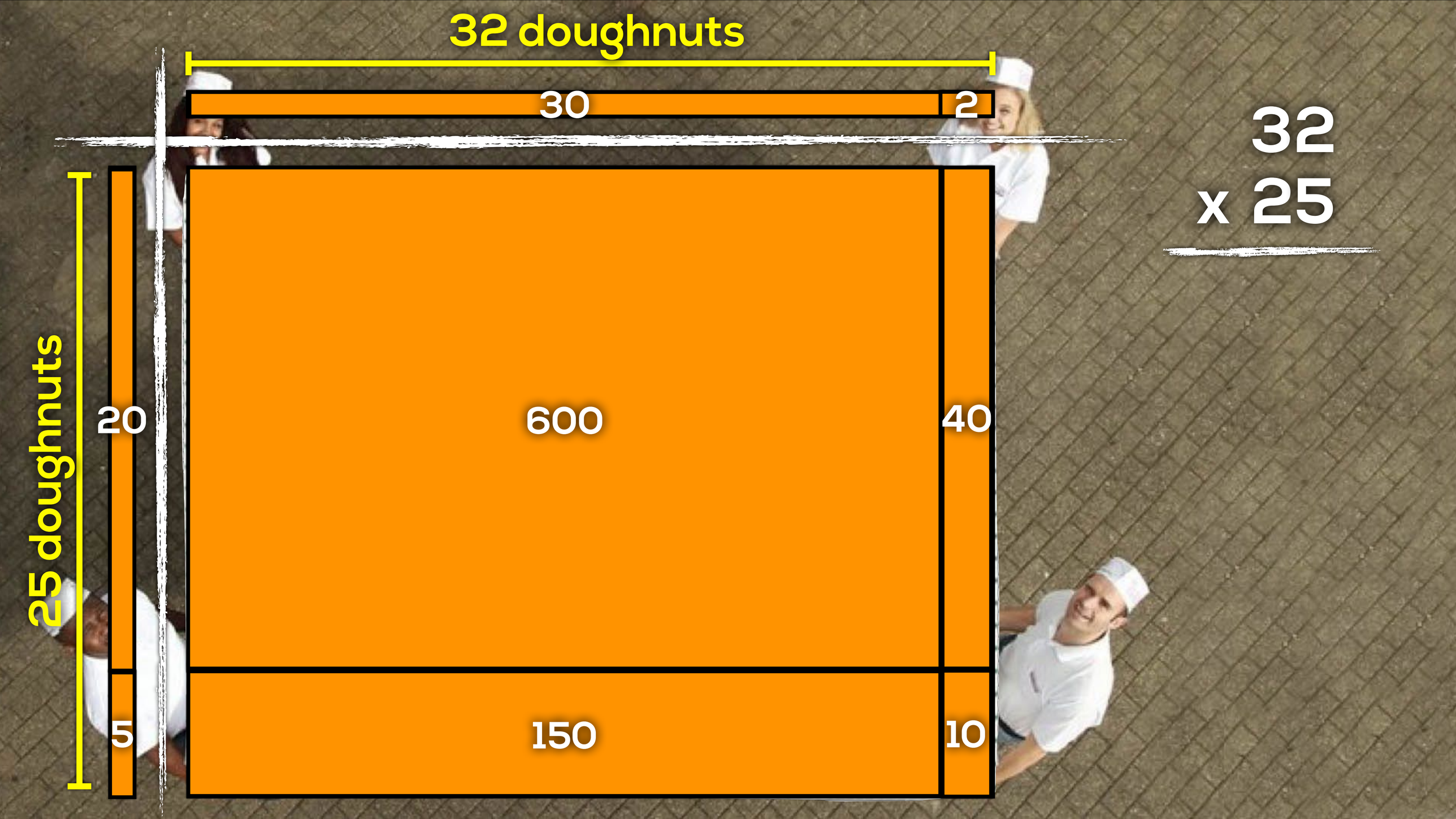
3 Abstract

$y = kx$

$y = 12x$

$y = 12(7)$

$y = 84$


32 doughnuts
30
2
25 doughnuts
20
5
600
40
150
10
32
x 25


32 doughnuts
30
2
25 doughnuts
20
5
600
40
150
10
32
x 25


32 doughnuts
30
2
25 doughnuts
20
5
600
40
150
10
32
x 25
600


32 doughnuts
30
2
25 doughnuts
20
5
600
40
150
10
32
x 25
600

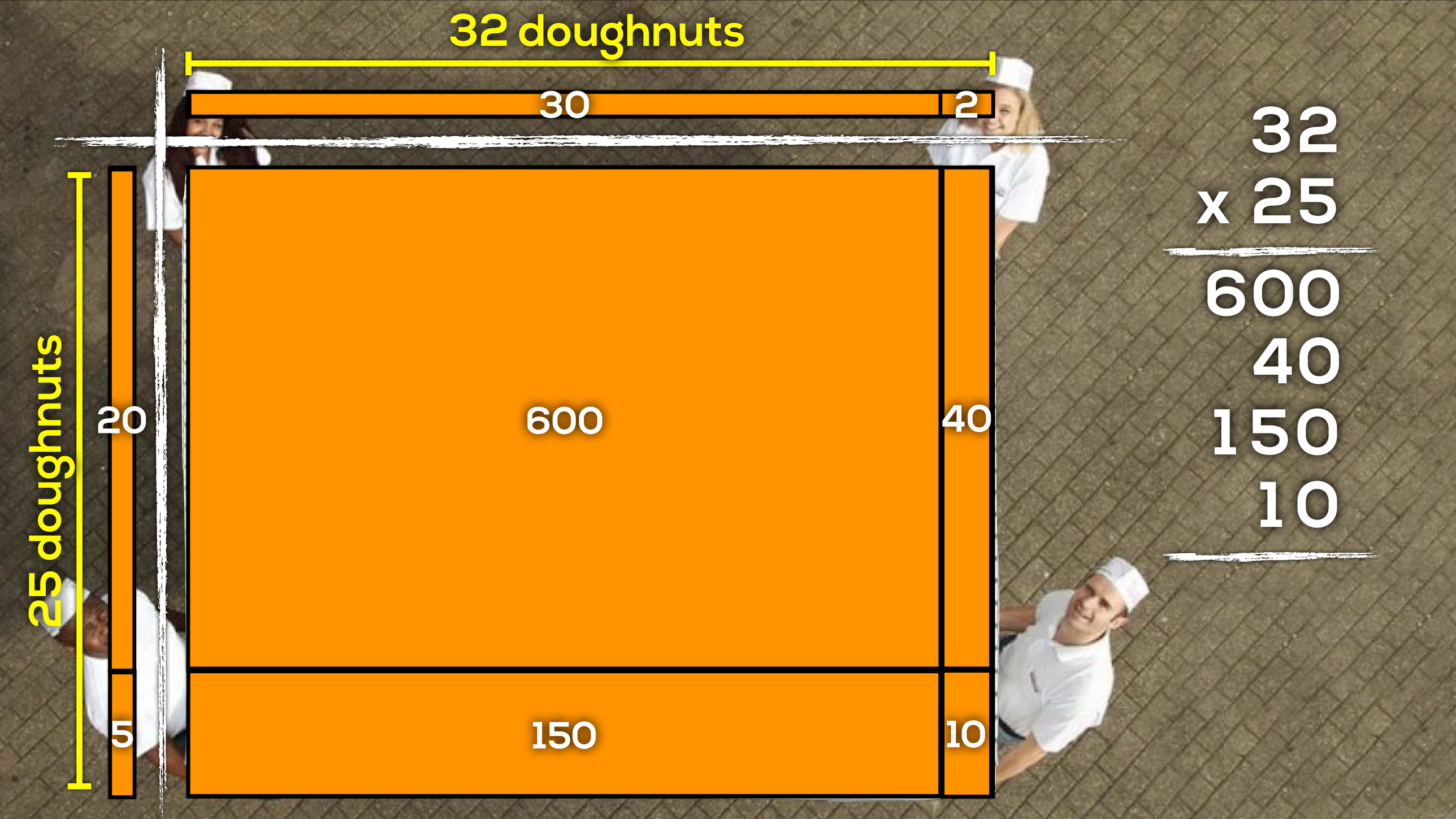

32 doughnuts
30
2
25 doughnuts
20
5
600
40
150
10
32
x 25
600
40


32 doughnuts
30
2
25 doughnuts
20
5
600
40
150
10
32
x 25
600
40

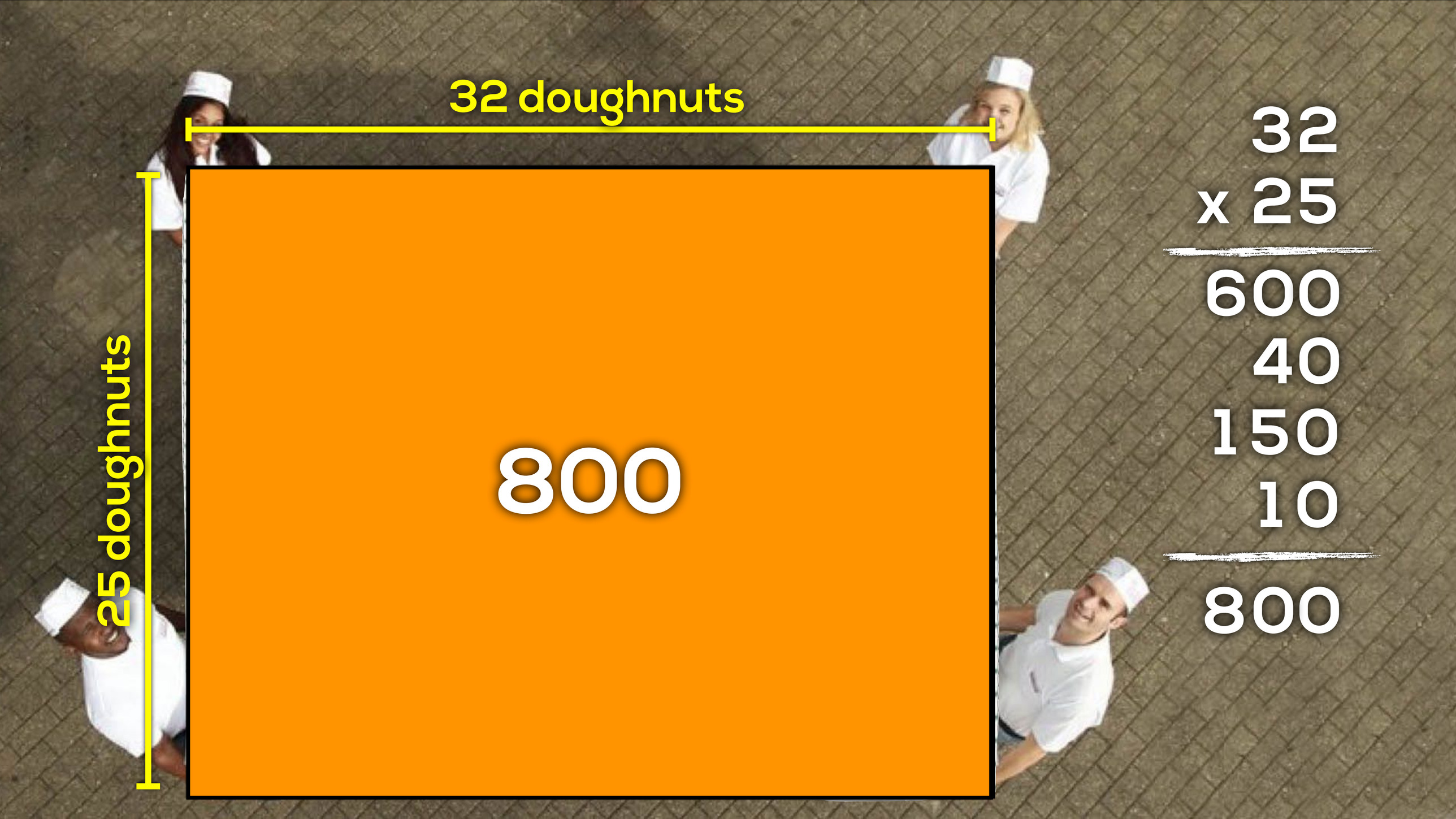
32
x 25
600
40
150


32 doughnuts
30
2
25 doughnuts
20
5
600
40
150
10
32
x 25
600
40
150

32
x 25
600
40
150
10



$$
\begin{array}{r}
32 \\
\times\ 25 \\
\hline
600 \\
40 \\
150 \\
10 \\
\hline
\end{array}
$$

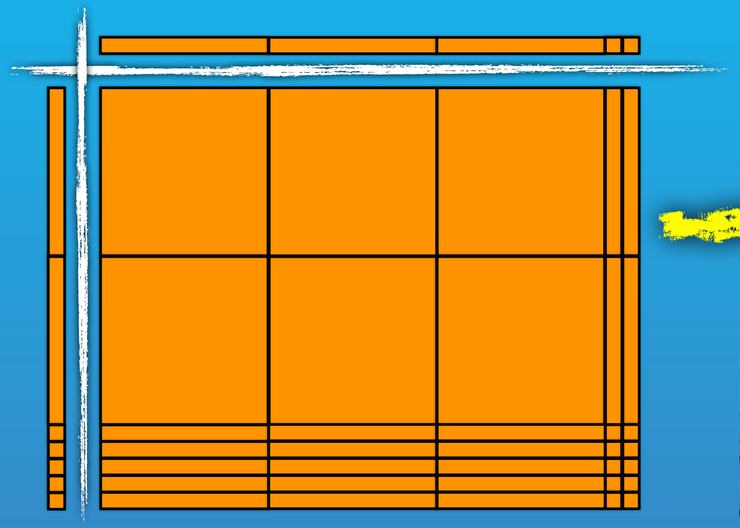

32 doughnuts
25 doughnuts
800
32
x 25
600
40
150
10
800

Update Your Prediction

Concreteness Fading

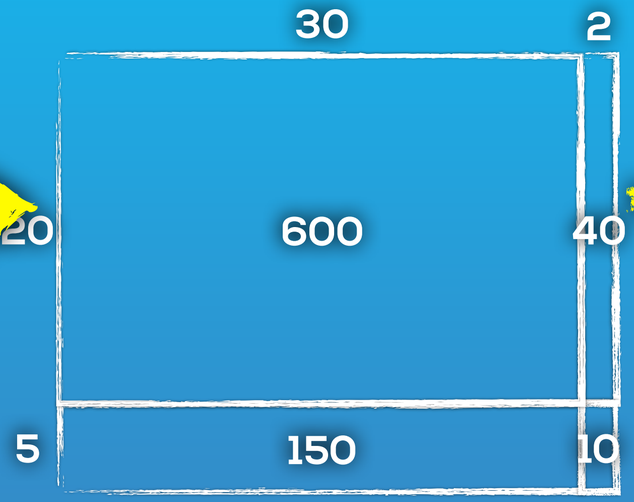
How many doughnuts are in the giant box?

1 Enactive



Concrete

2 Iconic



Visual

3 Symbolic

32
x 25

600	(30 x 20)
40	(2 x 20)
150	(30 x 5)
10	(2 x 5)
800	

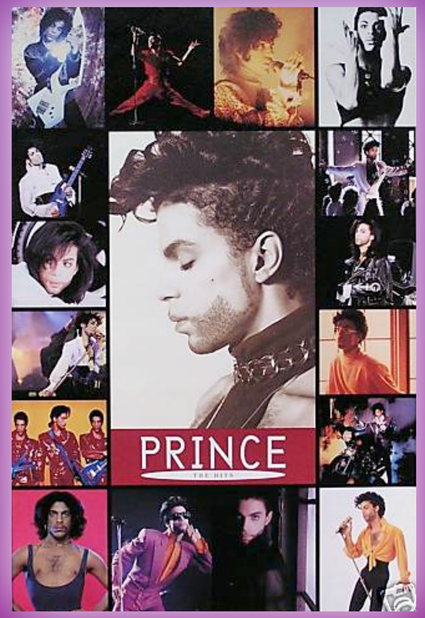
Abstract

STRATEGY #3 BE MORE PRINCE

1 Enactive

Concrete

2 Iconic



Visual

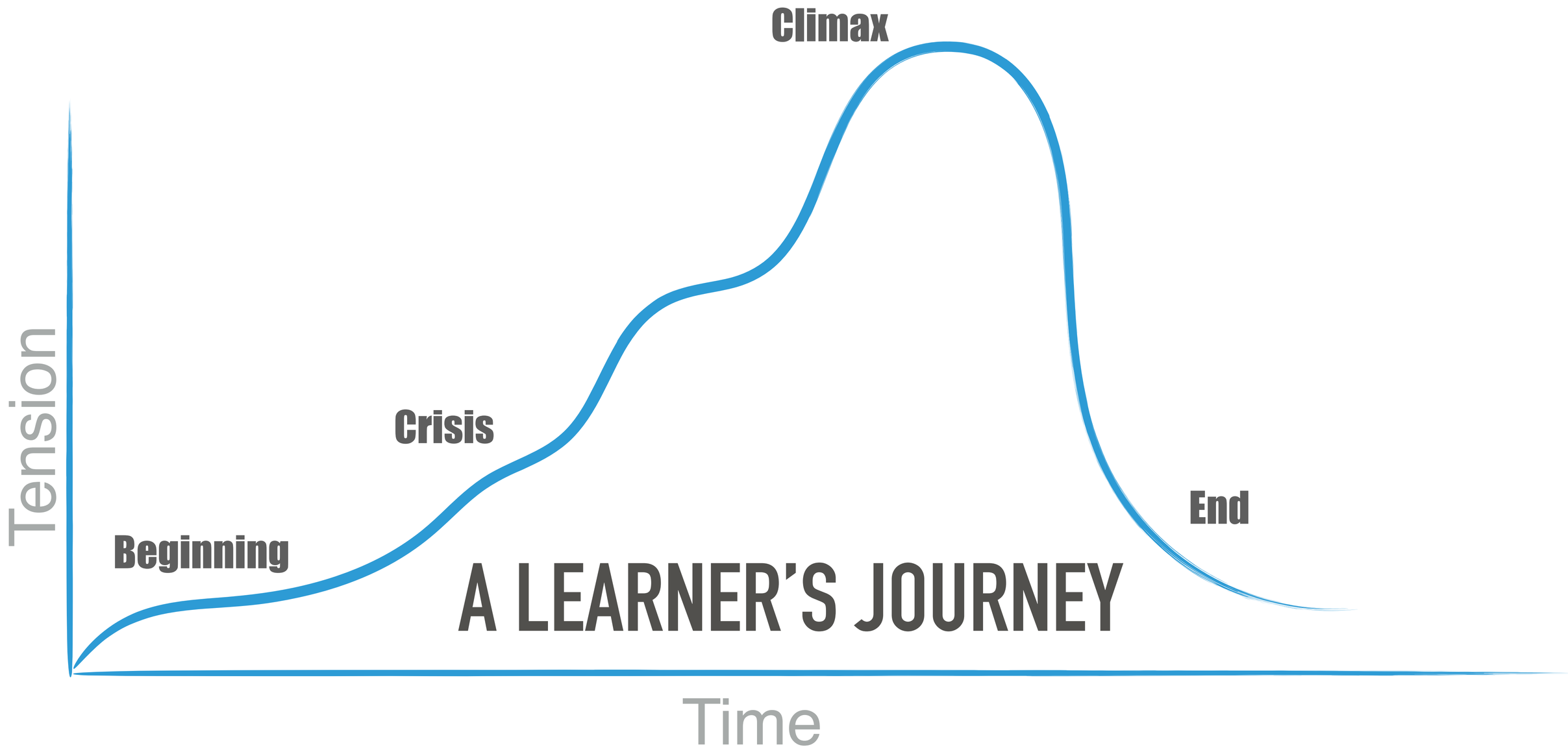
3 Symbolic

Abstract

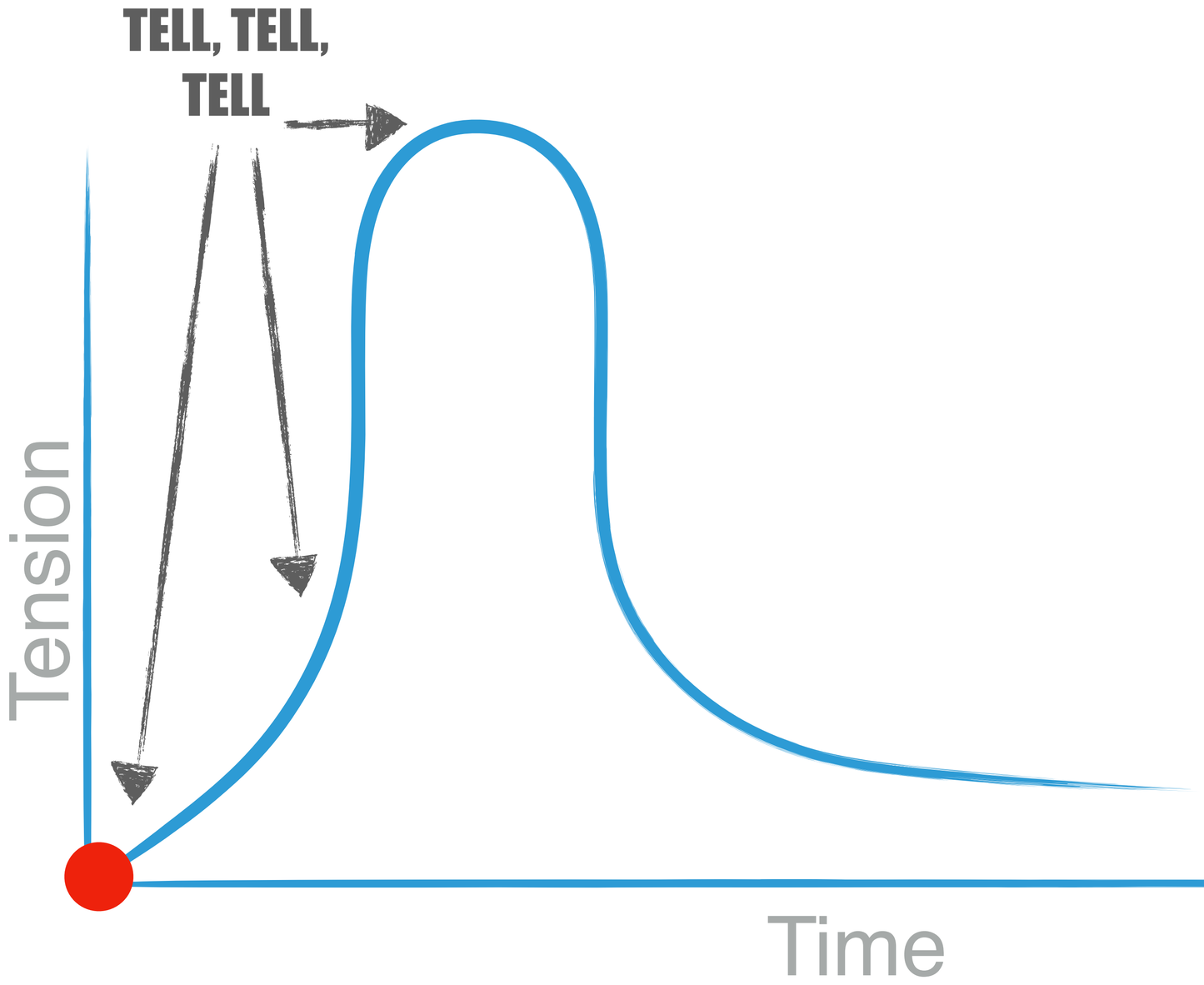
STRATEGY #4

BE THE
GUIDE
NOT THE
HERO

A HERO'S JOURNEY

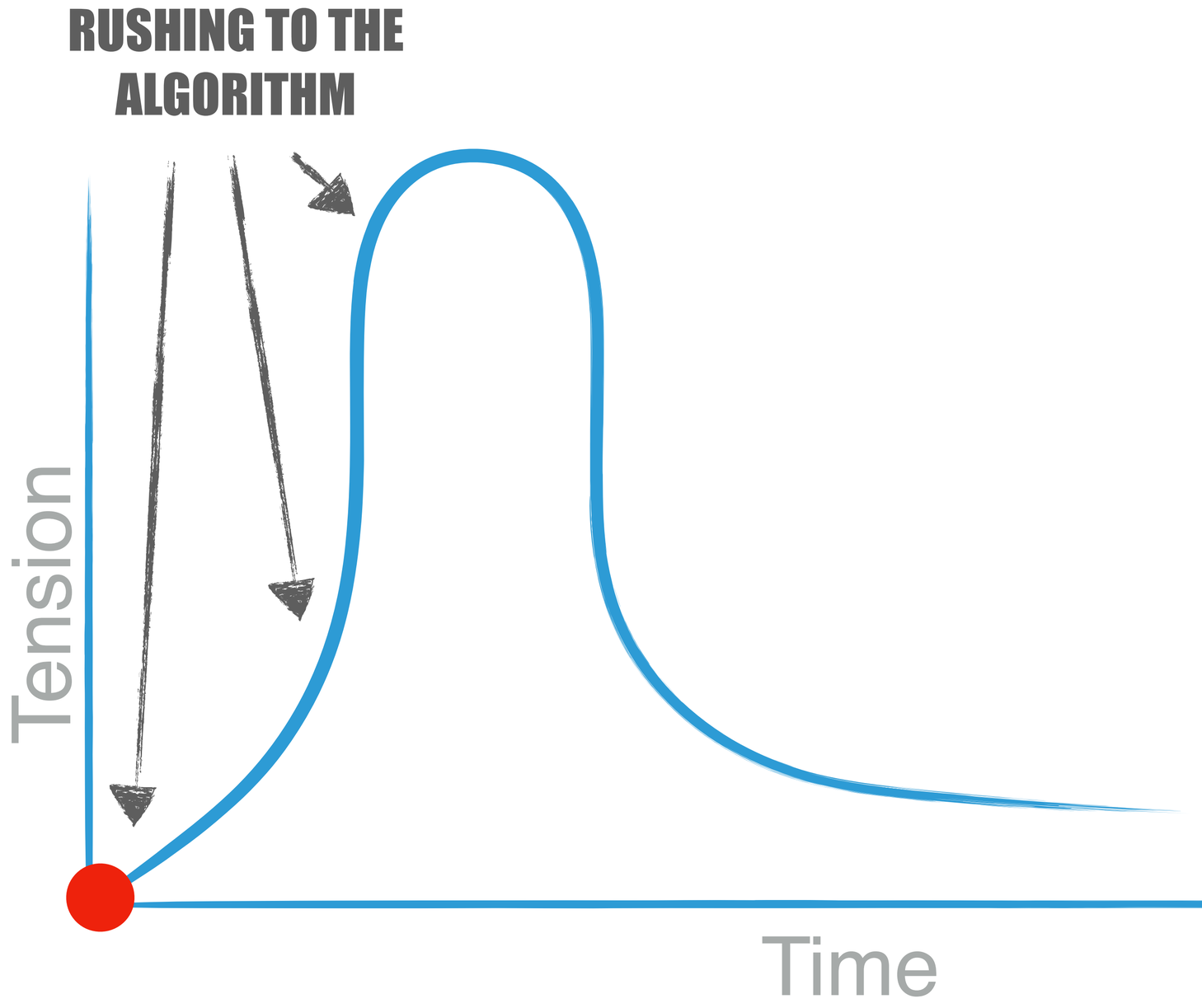


A LEARNER'S JOURNEY



MATH CLASS

1. Take Up Homework
2. Definitions, Formulae, Procedures/Algorithms
3. Examples
4. Homework



MATH CLASS

1. Take Up Homework
2. Definitions, Formulae, Procedures/Algorithms
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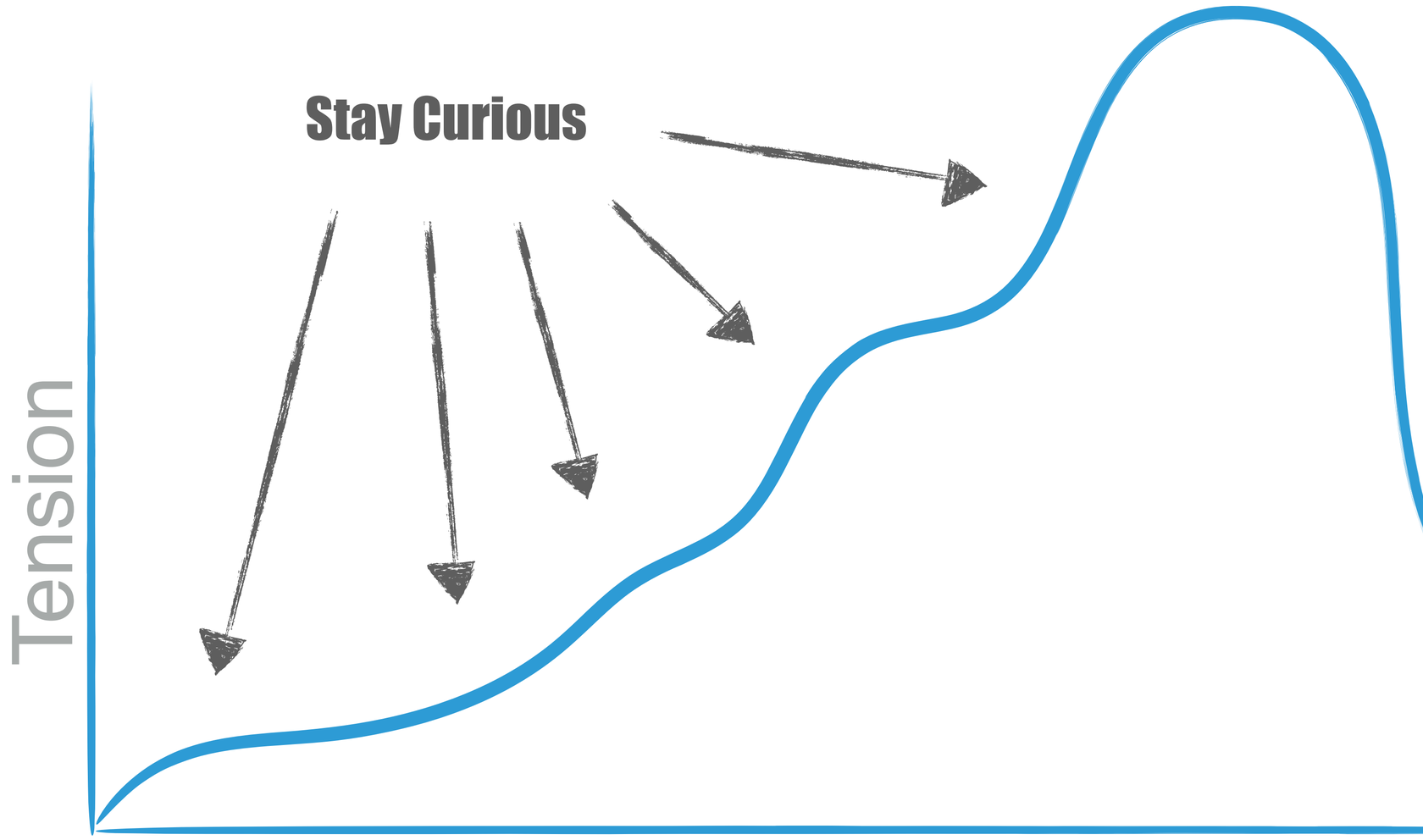
4. Homework

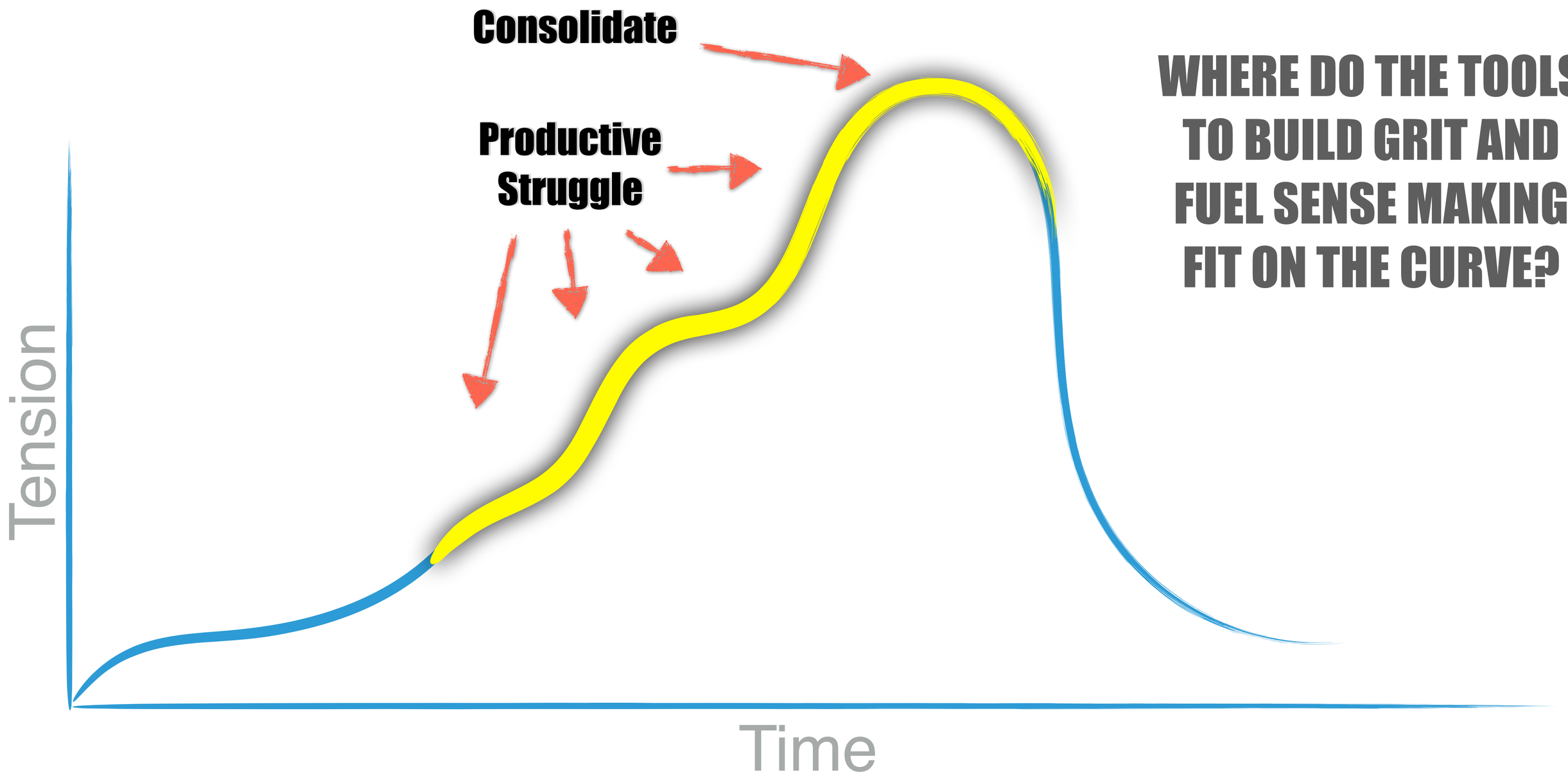
MATH CLASS



SPARK curiosity

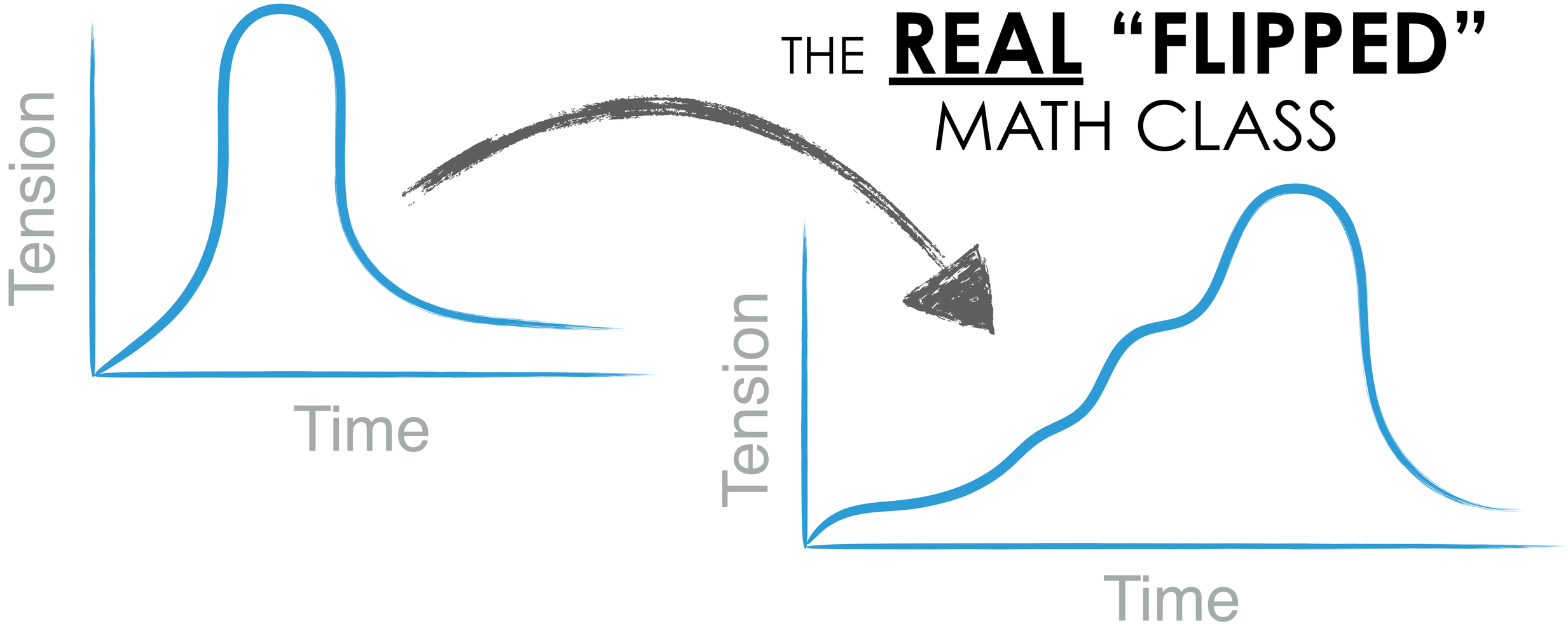
FUEL sense making

IGNITE your next move



WHERE DO THE TOOLS TO BUILD GRIT AND FUEL SENSE MAKING FIT ON THE CURVE?

4 STRATEGIES TO HELP STUDENTS START MATH PROBLEMS & STICK WITH THEM



WHAT **YOU'LL** GET

How to structure lessons so that students will dive into the problem solving process without relying on the teacher every step of the way;

WHAT **YOU'LL** GET

How to help your students build confidence and resilience so they develop a productive disposition towards mathematics;

WHAT **YOU'LL** GET

How to ensure students are building a conceptual understanding in order to build procedural fluency over time; and,

WHAT **YOU'LL** GET

Teacher moves that promote student thinking through productive struggle.

SHARE YOUR **BIGGEST** TAKE AWAY IN THE CHAT

#1 AVOID THE RUSH TO THE ALGORITHM

#2 GIVE YOUR STUDENTS AN ALL ACCESS PASS

#3 BE MORE PRINCE

#4 BE THE GUIDE, NOT THE HERO

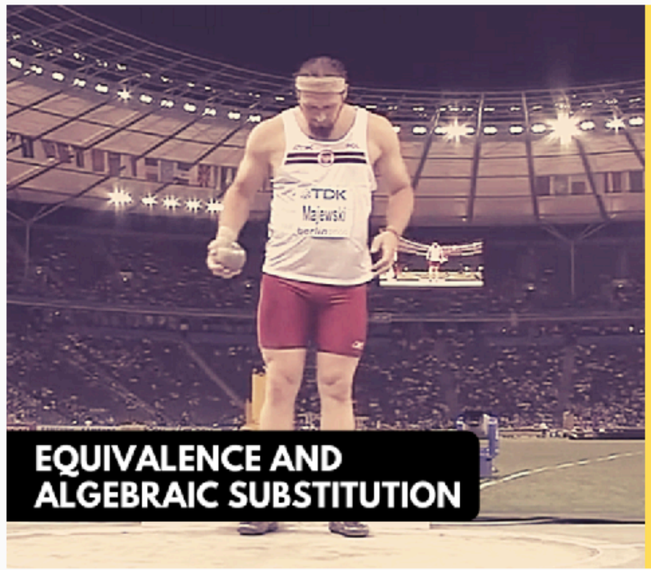
Tasks

All Addition Algebra Circles Circumference Counting Data Management Division Estimation Fractions Geometry Linear Relations Mean Measurement Multiplication Percentages Probability Proportional Reasoning Ratios and Rates Solving Equations Subtraction Volume

Scavenger Hunt

Make Math Moments Unit

Explore the graphical representation of categorical data and the use of mean as a measure of central tendency.



Shot Put

Make Math Moments Unit

Students will explore solving equations using the idea of equivalence and substitution.

Donut Delight

Make Math Moments Unit

Use arrays to develop an understanding of the relationship between multiplication and division.

Hot Chocolate

Make Math Moments Unit

Explore proportional relationships through skip counting, repeated addition, multiplication, and more.

DASHBOARD COURSES & WORKSHOP TASKS COMMUNITY Kyle Pearce 1051

Tasks

All Addition Algebra Circles Circumference Counting Data Management Division Estimation Fractions Geometry Linear Relations
Mean Measurement Multiplication Percentages Probability Proportional Reasoning Ratios and Rates Solving Equations Subtraction

CHECK OUT OUR

PROBLEM BASED LESSONS & UNITS

Make Math Moments Unit

Explore the graphical representation of categorical data and the use of mean as a measure of central tendency.

Make Math Moments Unit

Students will explore solving equations using the idea of equivalence and substitution.

MAKEMATHMOMENTS.COM/TASKS

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CURIOSITY SEARCH ENGINE:

makemathmoments.com/find