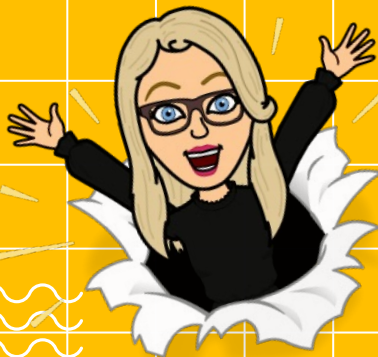


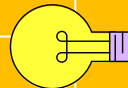
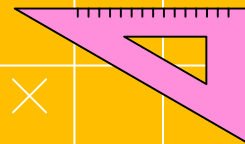
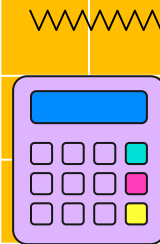
24 Feb 2024

**BRINGING THE CRAIC BACK TO
MATHEMATICS WITH:**

**SIMULATIONS & VIRTUAL
MANIPULATIVES**



@Craic_Matamaitic



ABOUT ME

- 4.5 years teaching in an all-boys school in Cabra
- 8 years teaching in non-formal STEM Ed. (TWC, CTYI)
- 10 years tutoring
- Creator of @craic_matamaitic
- Believer that maths education should be fun teachers and students



WORKSHOP GOALS

- Provide an overview of the variety of online tools available
- Showcase and demonstrate some of my favourite maths simulations and how I facilitate them
- Present practical tips and strategies for facilitating lessons using virtual tools in both low and high-tech mathematics classrooms.



ONLINE MANIPULATIVES

Mathigon



Transum



Desmos



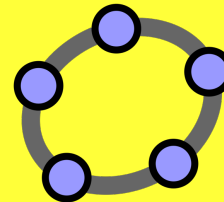
Mathsbot

MathsBot.com
Tools for Maths Teachers

PhET



Geogebra



WHY I USE SIMULATIONS

- *Student centered – promotes meaningful discussions*
- *Discovery/Inquiry based – Empowers the learner*
- *Prioritises student reasoning over rule learning*
- *Supports the needs of all learners*



MATHSBOT.COM

Manipulatives



Home Membership CPD Curriculum Completion Tables Do Now's! GCSE Manipulatives Primary Printables Puzzles Question Generators Starters
Tasks Tools Variation Grids

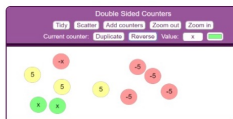
MathsBot Membership!

Become a member for just £3 per month and get all this:

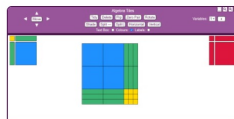
- ✓ No adverts
- ✓ MathsBot curriculum
- ✓ Live CPD Webinars
- ✓ Free CPD downloads
- ✓ MathsBot Tasks
- ✓ Digital manipulatives
- ✓ Question generators
- ✓ 200+ free resources

Join here!

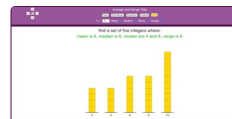
Already a member? Login here:



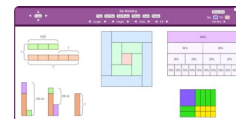
Algebra Discs



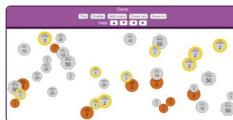
Algebra Tiles



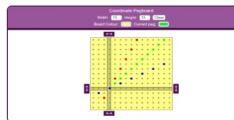
Average and Range Tiles



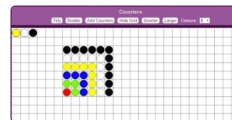
Bar Modelling



Coins



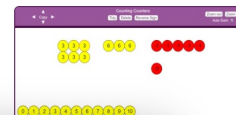
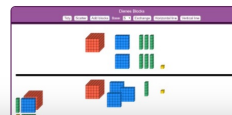
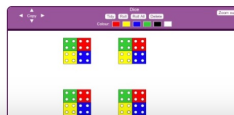
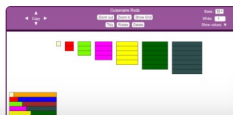
Coordinate Pegboard



Counters



Counting Stick



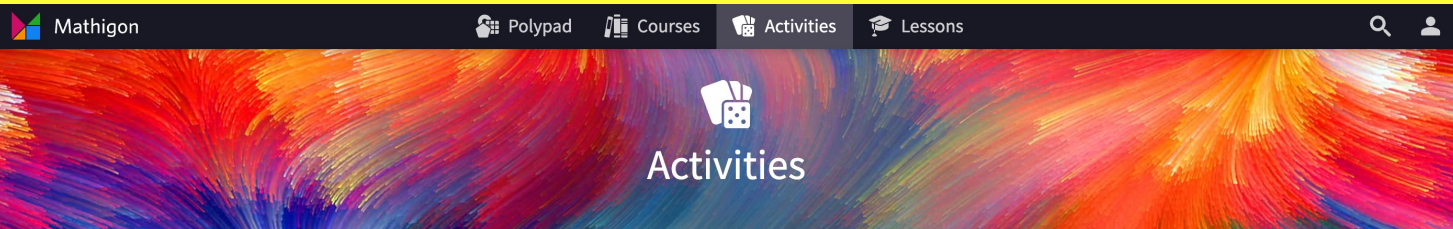
<https://mathsbot.com/manipulativeMenu>

MATHIGON

The screenshot shows the Amplify Polypad web application. The interface includes a top navigation bar with a 'Sign in' button and a help icon. On the left, a sidebar lists categories: Geometry, Numbers, Fractions, and Algebra. Under the Algebra category, 'Algebra Tiles' are displayed in a grid, including tiles for 1 , x , y , x^2 , xy , y^2 , -1 , $-x$, $-x^2$, $-y$, $-xy$, and $-y^2$. The main workspace shows a constructed square representing $(x+1)^2$, composed of one x^2 tile, two x tiles, and one 1 tile. A toolbar at the bottom provides various drawing and editing tools, including a selection tool, eraser, lasso, text tool, and mathematical symbols like x^2 .

<https://polypad.amplify.com/p#geometry>

MATHIGON



Timeline of Mathematics

Travel through time and explore the greatest mathematicians and biggest mathematical discoveries in history.

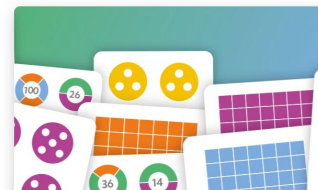
Open



Factris

A classic risk reward high score game, that teaches about factors and basic numeracy while rearranging rectangular blocks to fill a grid.

Play



Multiplication by Heart

These beautiful flash cards use spaced repetition to teach multiplication facts. Achieve fluency with just five minutes of practice per day!

Play

Shuffle Mode

<https://mathigon.org/activities>

TRANSUM.ORG



TRANSUM MATHEMATICS

For Learners

Maths Map

Go Maths

Games

Puzzles

Times Tables

TablesMaster

iPad Maths

Investigations

Exam Questions



For All

Topics

Parents

Tutors

Revision

For Teachers

Starter of the Day

Shine+Write

Fun Maths

Newsletter

Random Names

Maths Videos

Online Teaching

Class Admin

Curriculum

DIGITAL DARTS

PLAYER 1
501

DART 1: 5

DART 2: 10

DART 3: DOUBLE 19

ADD THE SCORES:

CHECK



Player 1's Turn: Add your scores.

PLAYER 2
501

Venn Paint

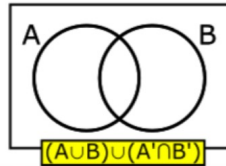
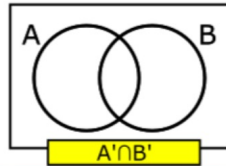
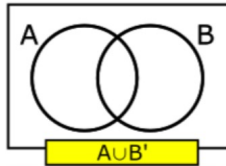
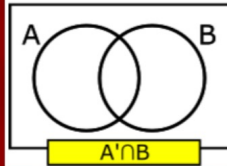
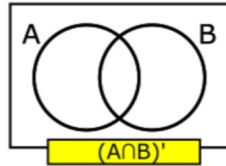
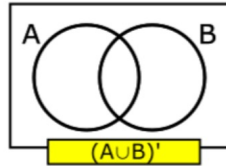
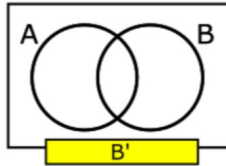
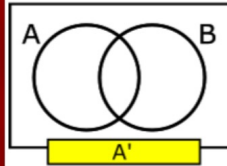
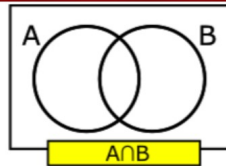
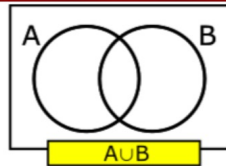
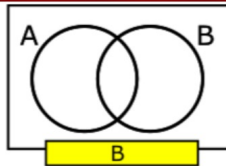
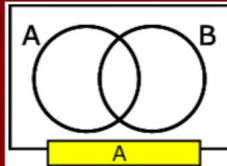
Venn Diagram

Level 1

Level 2

Level 3

Exam Questions



Check

PHET!

Physics Education Technology



University of Colorado
Boulder

<https://phet.colorado.edu/>



CARL WISMANN

"Education is about learning to make better decisions"



DEMO

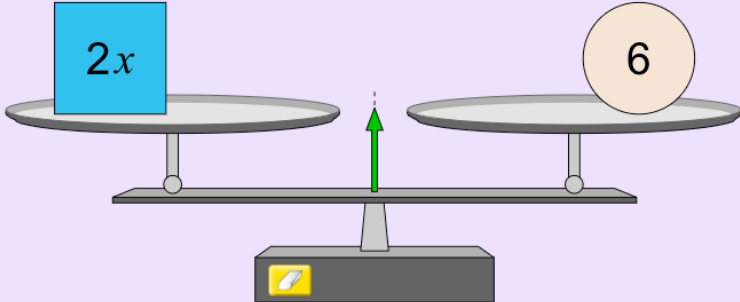
DEMO – EQUALITY EXPLORER

 $2x = 6$

 Variable

 Snapshots





Equality Explorer

Basics Numbers Variables Operations Solve It!

 **PhET**

01

TOP
TIP

Its all in the questions

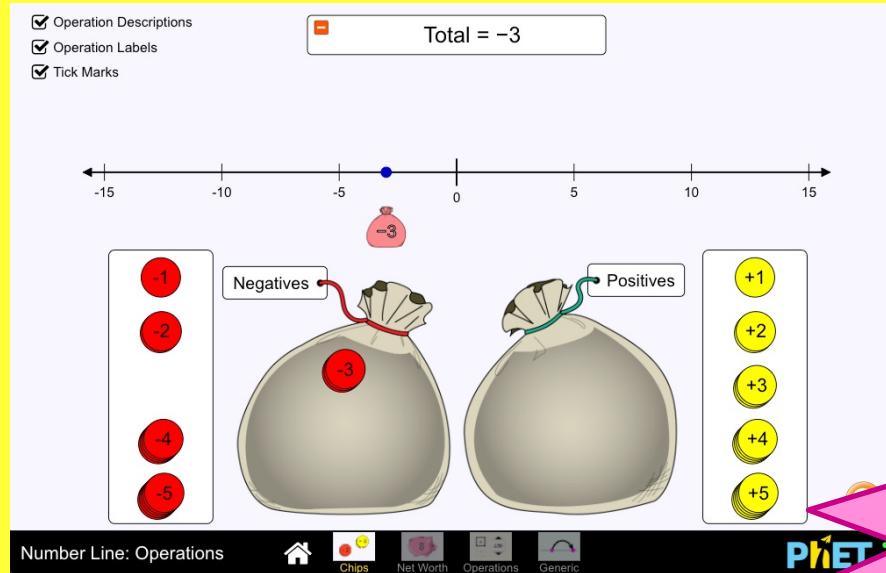
ITS ALL IN THE QUESTIONING

- *Think about common misconceptions and draw them out of students with the questions you set up*
(e.g $2x = 6$, my students always start by saying take away the x..")
- *Use prompts and questioning throughout - be reactive to students' answers*
 - "That's interesting...what makes you say that"
 - "_____ do you agree with _____?"
 - "Did we expect that?"
 - "What would happen if..."



PREDICT. OBSERVE. EXPLAIN.

$$3 - (-5) = ?$$



Allow them to
get things
wrong and go
with it.

02

TOP TIP

*Use Mini Whiteboards / Mentimeter to
gather student input*

COLLECTING STUDENT RESPONSES

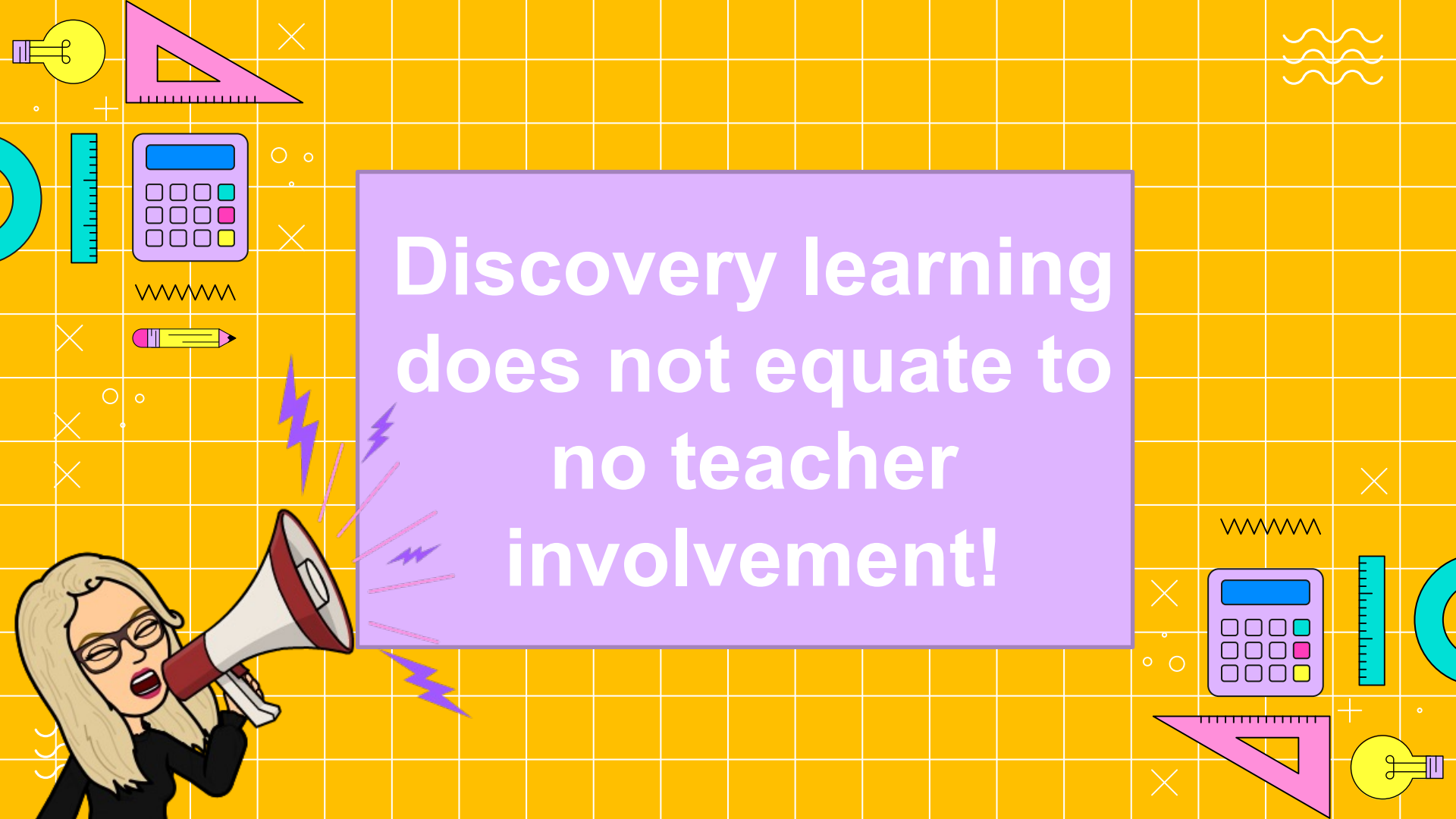
High Tech Classroom

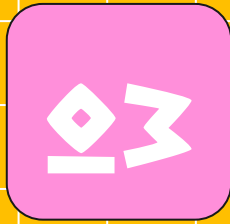
- *Have a way of engaging students throughout the lesson on a whole class level*
- *Use Mentimeter or similar to gather student responses to develop discussions*

Low Tech Classroom

- *Use mini whiteboards during the 'Predict' and 'Explain' intervals to involve all students and gauge understanding*
- *Use student responses as whole class discussion starters*

Discovery learning
does not equate to
no teacher
involvement!





TOP
TIP

Gamify assessment

GAMIFY THE ASSESSMENT

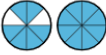
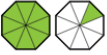
My Matches

Level: 5
Score: 0

←

↺

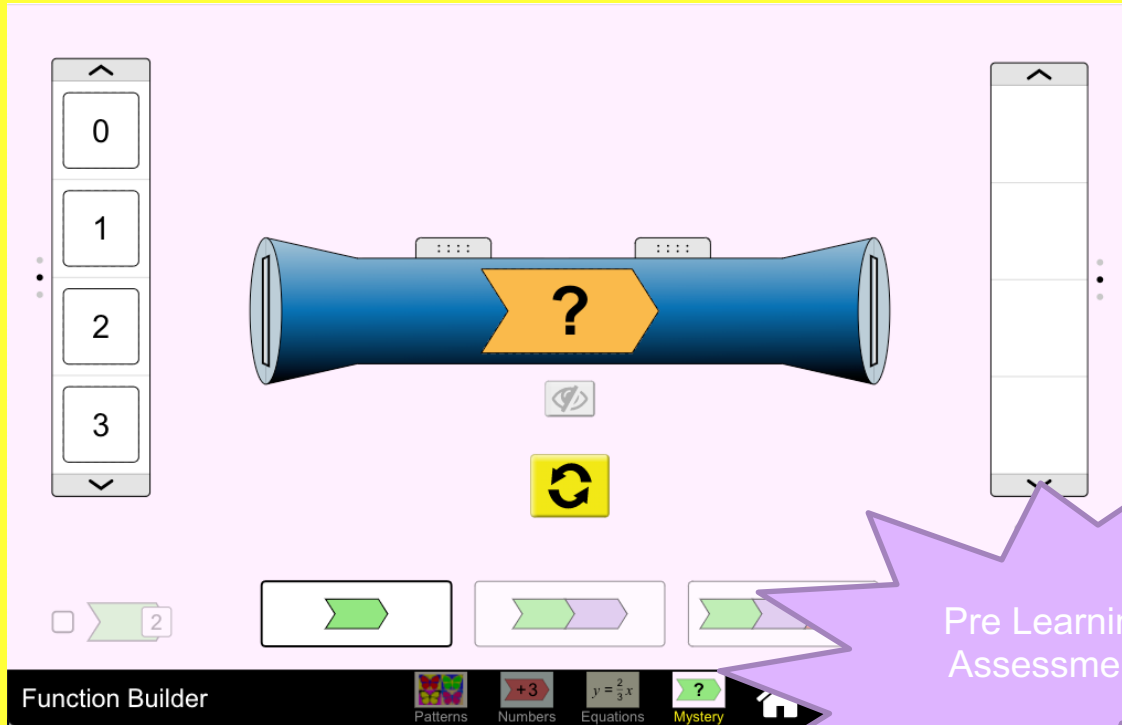
			$\frac{4}{9}$		
			$\frac{42}{24}$	$\frac{24}{27}$	

Fraction Matcher

Post Learning
Assessment

GAMIFY THE ASSESSMENT

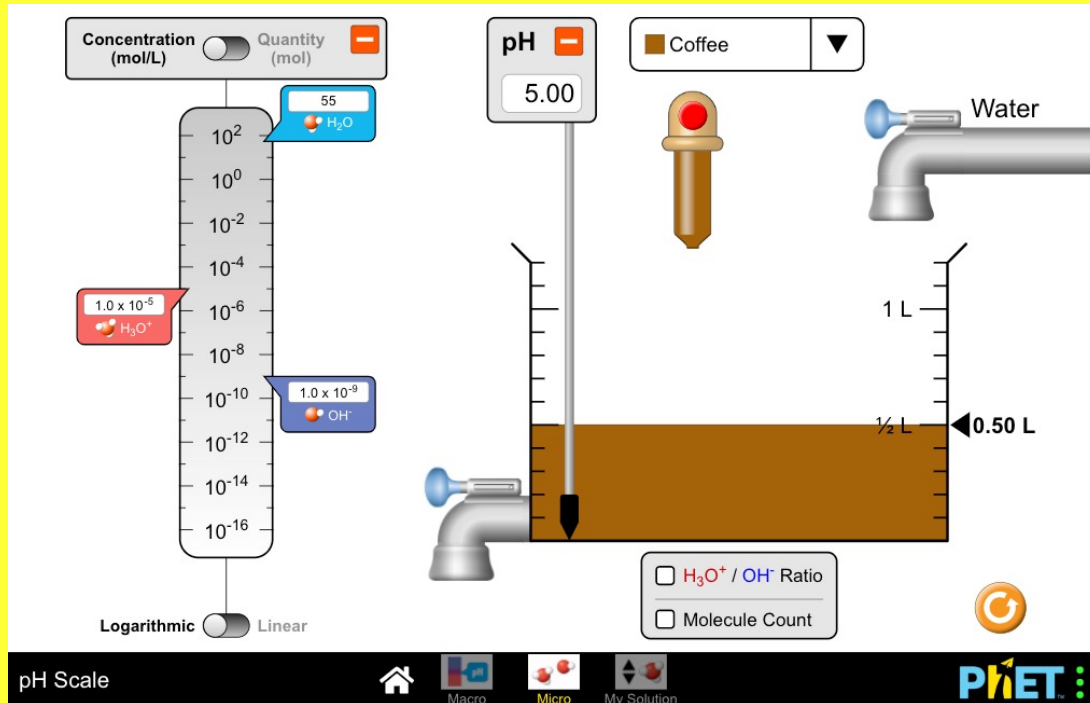




TOP
TIP

Make difficult concepts real & meaningful

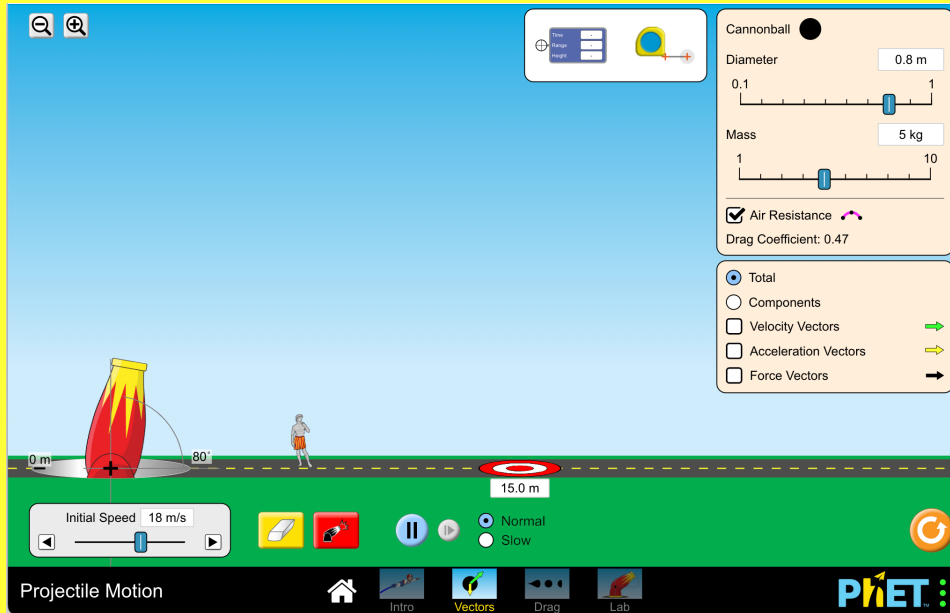
MAKE THE MATHS REAL – INTRODUCTION TO LOGS



Uses:

- Introduction to logs
- Teach students about the necessity of logarithms

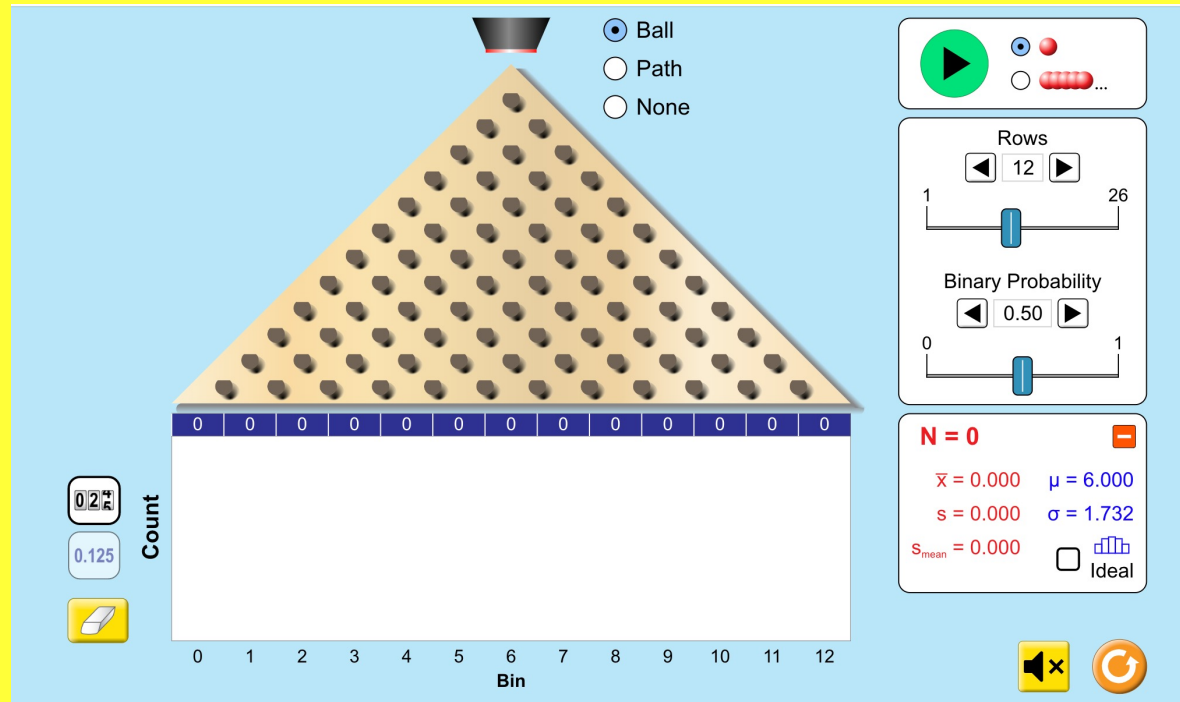
MAKING THE MATHS REAL



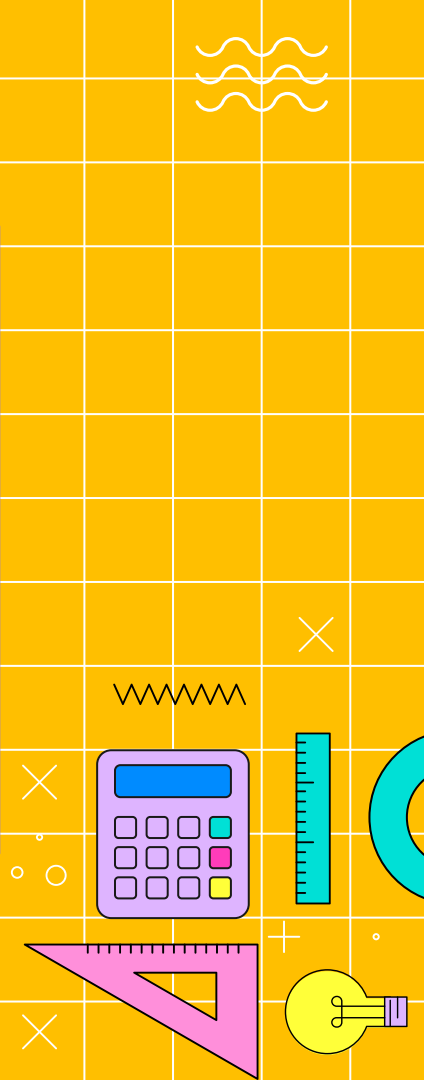
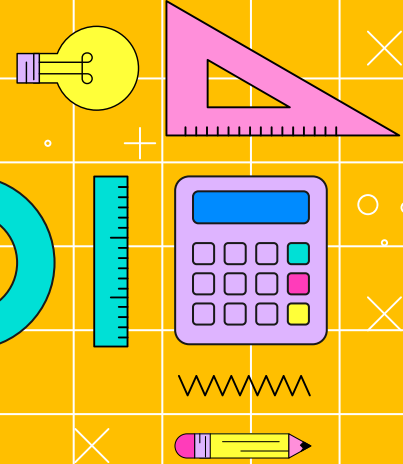
Uses :

- Vectors
- Quadratic equations
- Simultaneous equations
- Completing the square
- Introduction to calculus

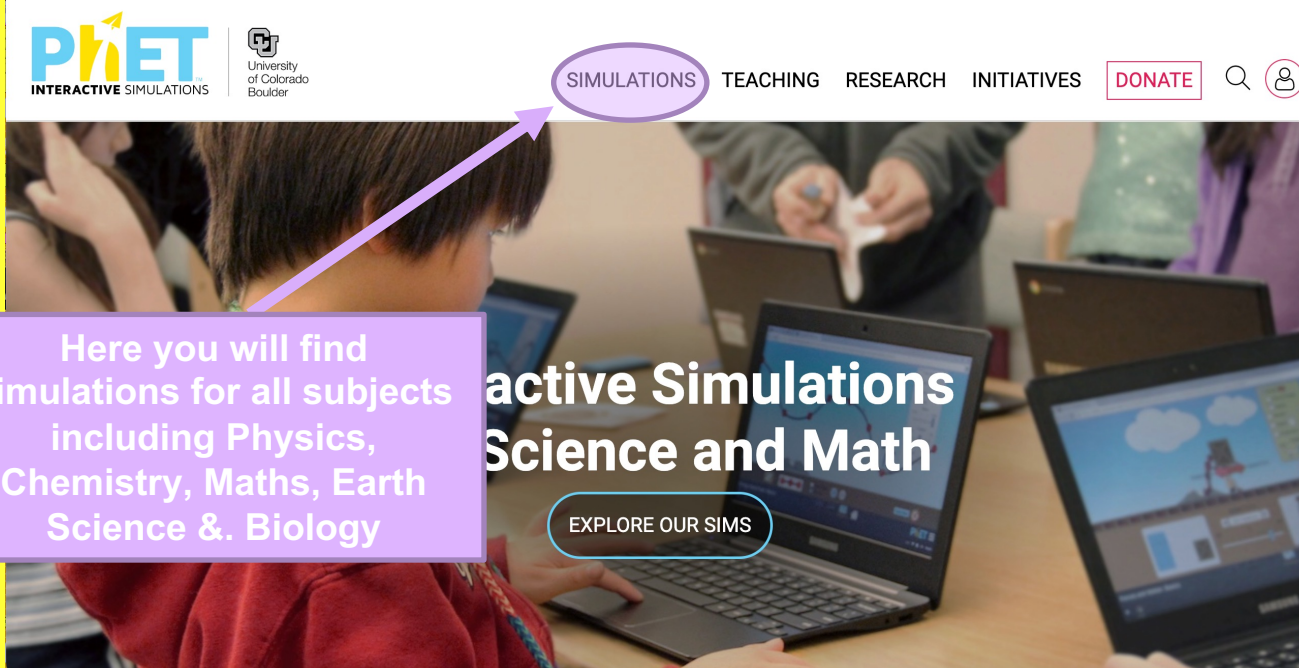
MAKE THE MATHS REAL – BINOMIAL DISTRIBUTION



Free worksheets to
accompany all
simulations are
available on phet!



<https://phet.colorado.edu/>

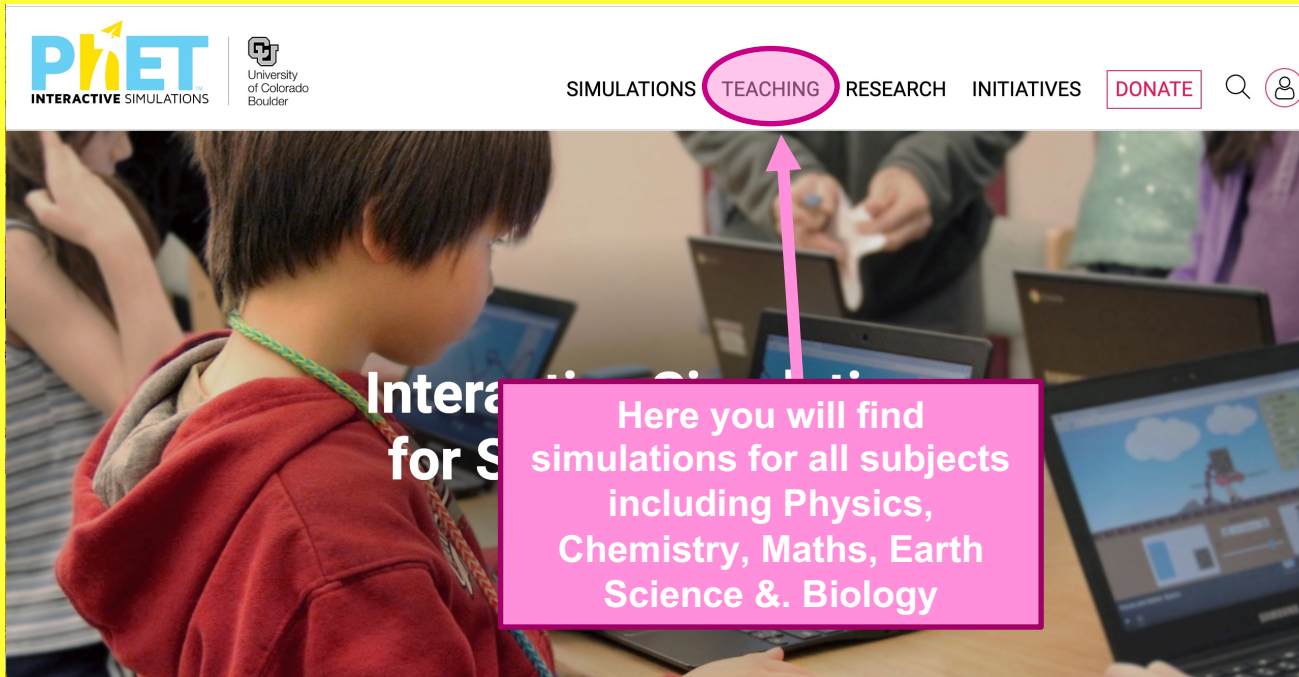


Here you will find simulations for all subjects including Physics, Chemistry, Maths, Earth Science & Biology

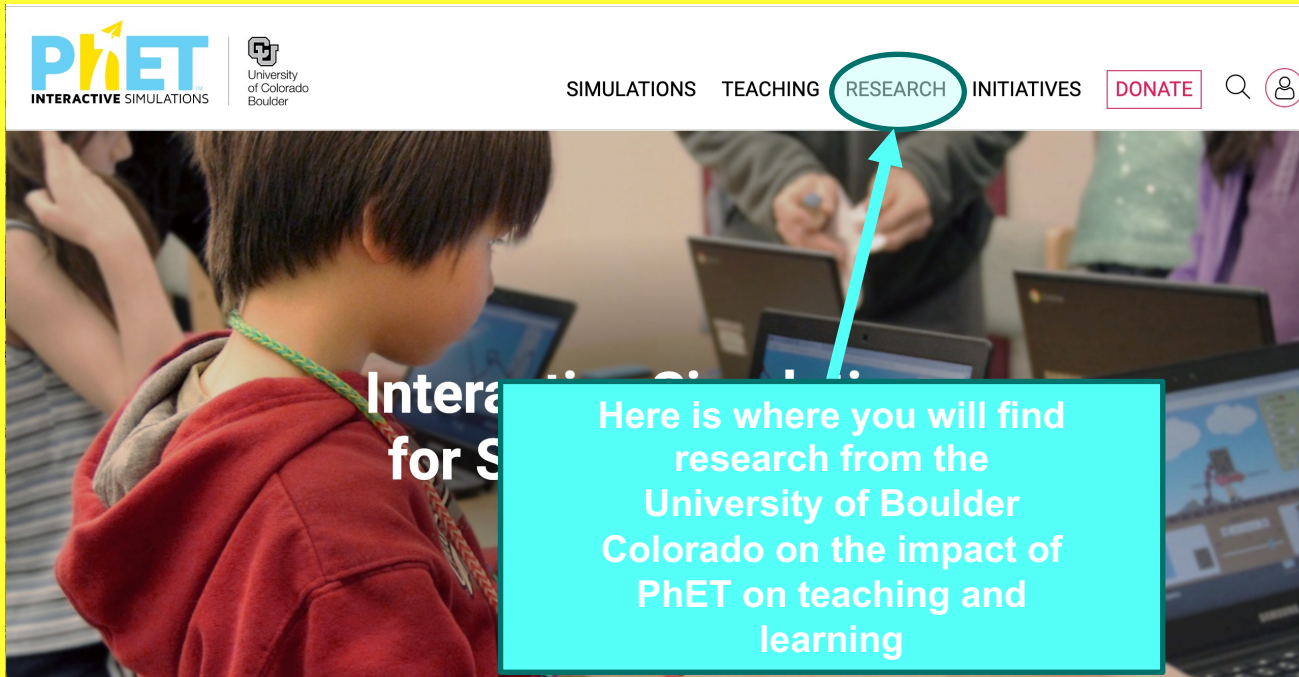
**Interactive Simulations
for Science and Math**

EXPLORE OUR SIMS

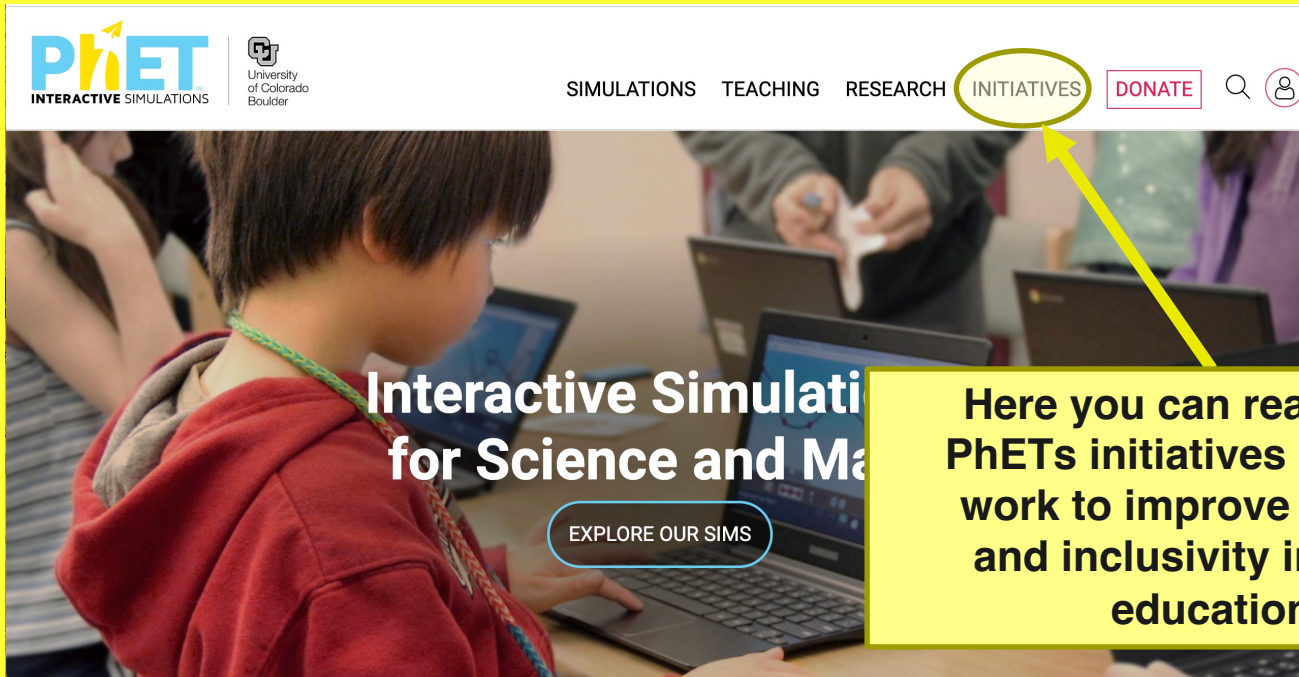
<https://phet.colorado.edu/>



<https://phet.colorado.edu/>



<https://phet.colorado.edu/>



<https://phet.colorado.edu/>

Browse Activities
– Optional text
search

SIMULATIONS TEACHING RESEARCH INITIATIVES [DONATE](#)  

Types **Subjects** **Levels** **Languages**

All Types Remote Lab HW MC Discuss Demo Guided All Subjects Astronomy Biology Chemistry Earth Science Mathematics Physics Other All Levels K-5 MS HS UG-Intro UG-Adv Grad Other All Languages Abkhazian Afar Afrikaans Akan Albanian Amharic Arabic

Optional text search [browse](#)

TITLE	★	PHET	AUTHORS	LEVEL	TYPE	SUBJECT	SIMULATIONS
Investigating Climate Change at the Macroscopic and Microscopic Level	★	PHET	Amy Rouinfar	HS MS	Lab	Earth Science	Glaciers The Greenhouse Effect
Balancing Act Remote Lab	★	PHET	Trish Loeblein	K-5 UG-Intro MS HS	HW Lab Remote	Physics Mathematics	Balancing Act (HTML5)

FACILITATION TIPS

HIGH TECH CLASSROOM

- *Make the goals of the lesson clear*
- *Have a guided worksheet for students to work through*
- *Plan your questioning*
- *Have extension tasks ready*
- ** Turn the sound off the sims or use headphones*

LOW TECH CLASSROOM

- *Have students seated in pairs/pods*
- *Give each student a mini whiteboard to contribute*
- *Use thumbs/down sideways for AFL*

THANK YOU!

Any questions?



@craicmatamaitic



@craic_matamaitic

www.craicmatamaitic.com