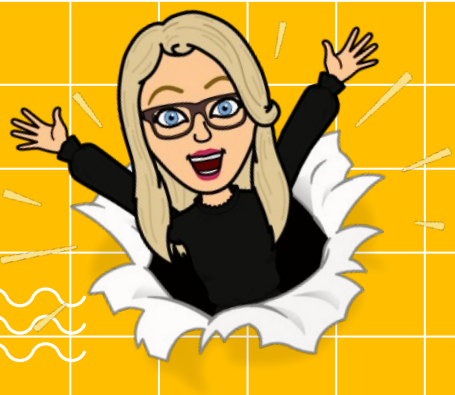
29TH NOV 2024

BRINGING THE CRAIC BACK TO MATHS WITH: TECHNOLOGY



@Craic_Matamaitic

MY LIFE IN NUMBERS

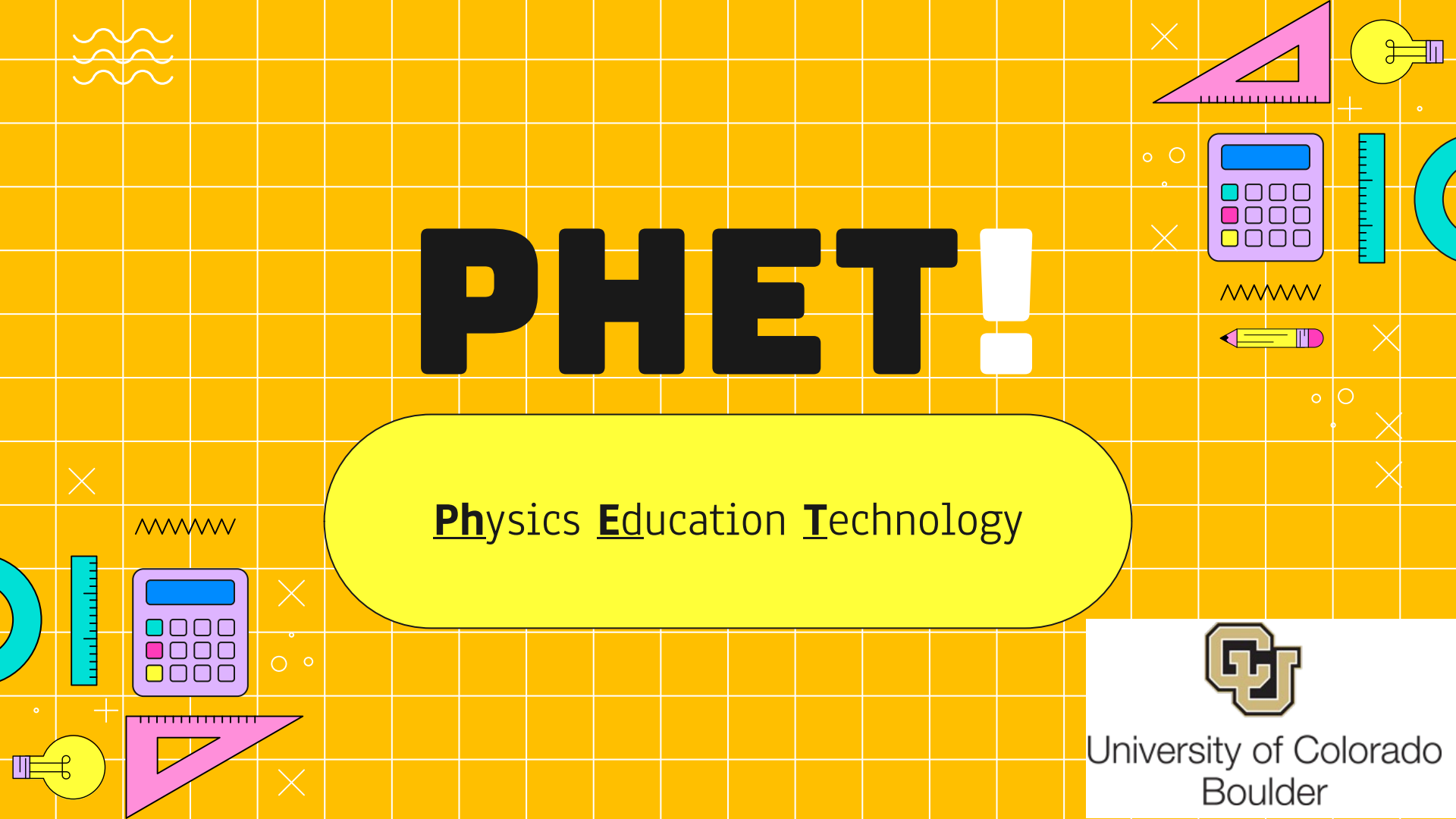
- 5 years teaching in an all-boys school in Cabra
- 9 years teaching in non-formal STEM Ed. (TWC, CTYI)
- 2 Years providing CPD for teachers
- 1 Year on the IMTA National council
- 3 Years as @Craic_Matamaitic

WHAT IS CRAIC?

Maths can and should be an enjoyable suject for all (including the teacher!)

PHET!

Physics **E**ducation **T**echnology

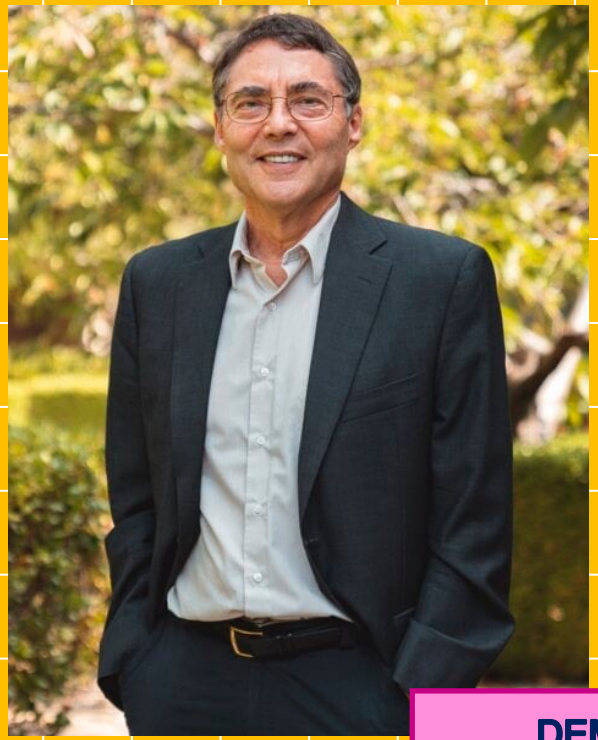


University of Colorado Boulder

HTTPS://PHET.COLORADO.EDU/

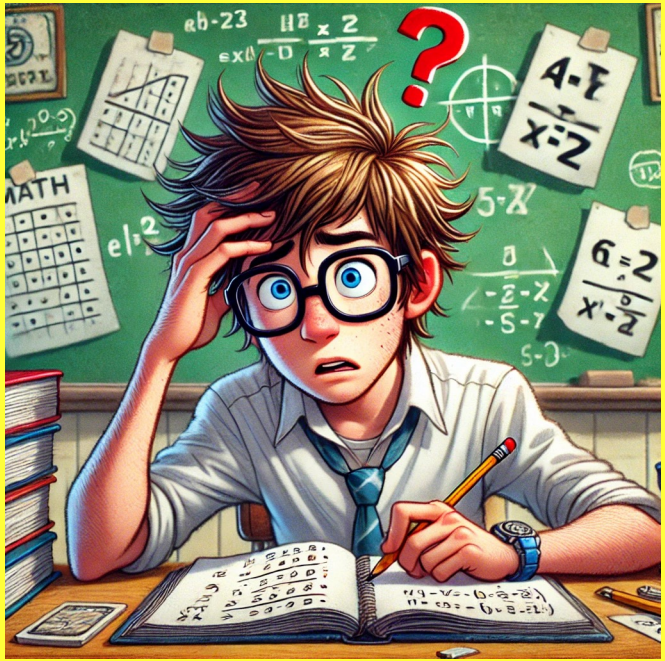
CARL WIEMANN

"Education is about learning to make better decisions"



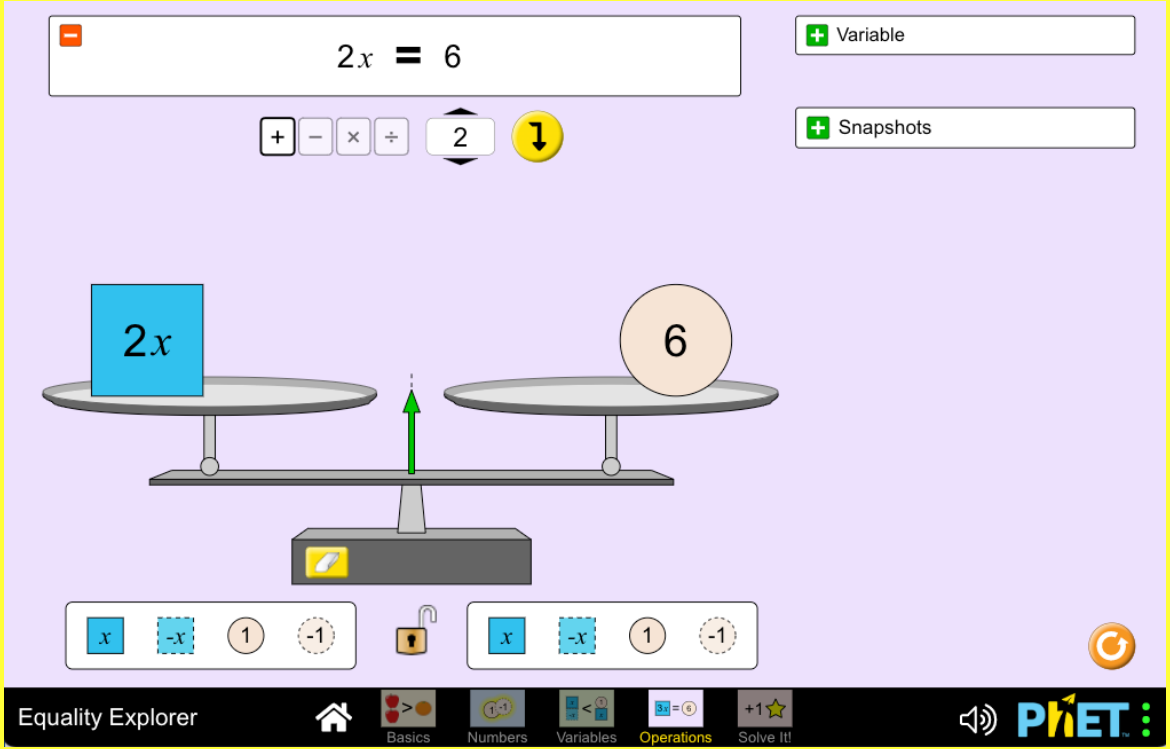
DEMO

MATHS EDUCATION CURRENTLY



MATHS SHOULD BE MORE LIKE COOKING

EQUALITY EXPLORER



01

TEACHER TIP

It's all in the questioning

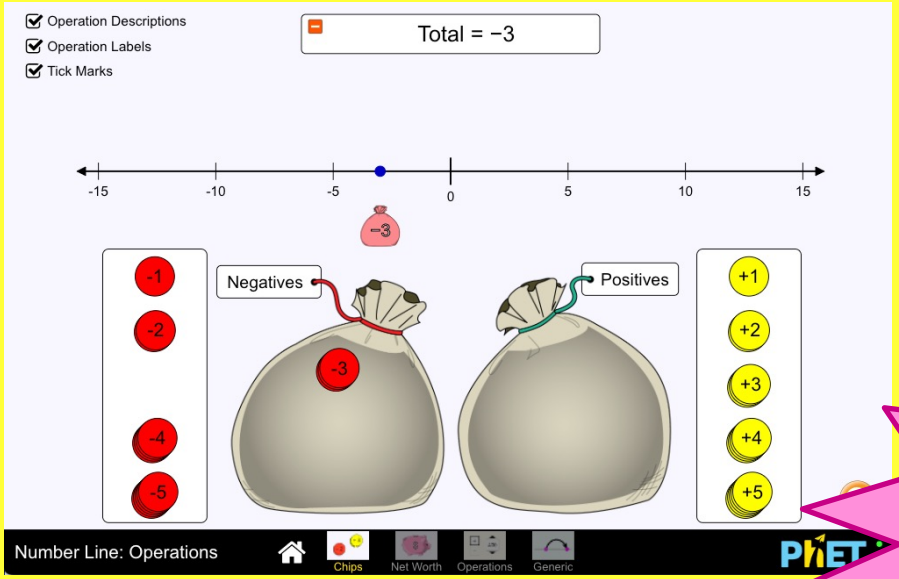
WHAT QUESTIONS WOULD YOU ASK?

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..."

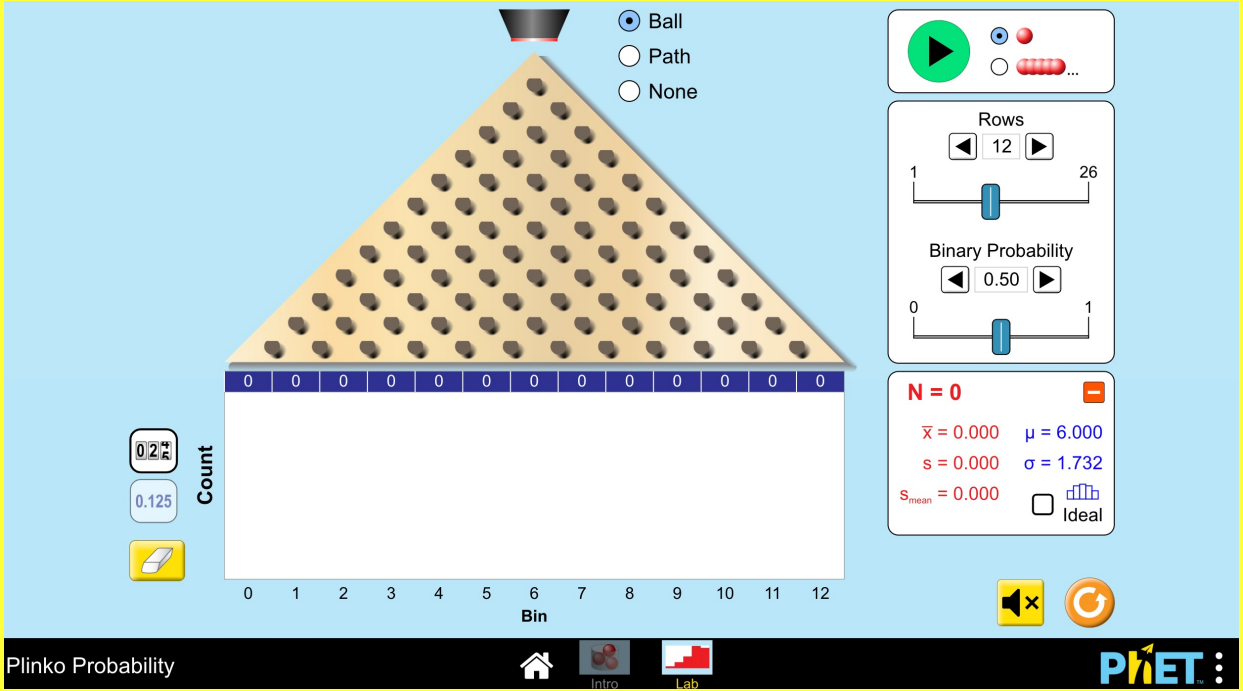
PREDICT. OBSERVE. EXPLAIN

$$-8-(-5)=?$$



Allow them to get things wrong and go with it.

WHAT DO YOU NOTICE? WHAT DO YOU WONDER?



https://phet.colorado.edu/sims/html/plinko-probability/latest/plinko-probability_en.html

02

TEACHER TIP

Use Mini Whiteboards / Mentimeter

COLLECTING STUDENT RESPONSES

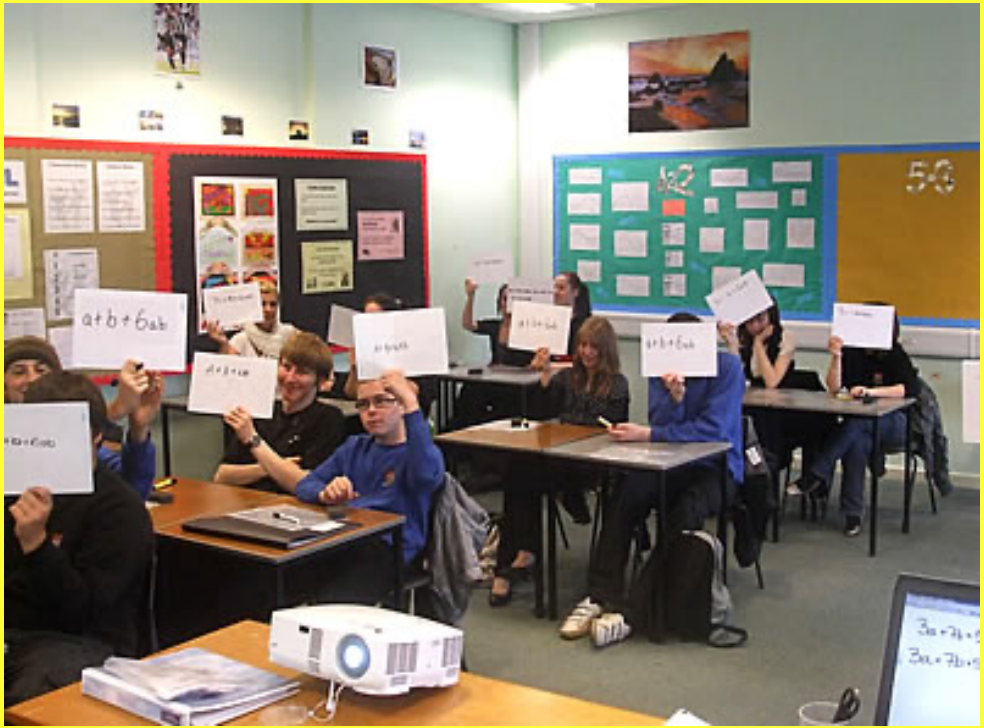
HIGH TECH CLASSROOM

- 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

MINI WHITEBOARDS

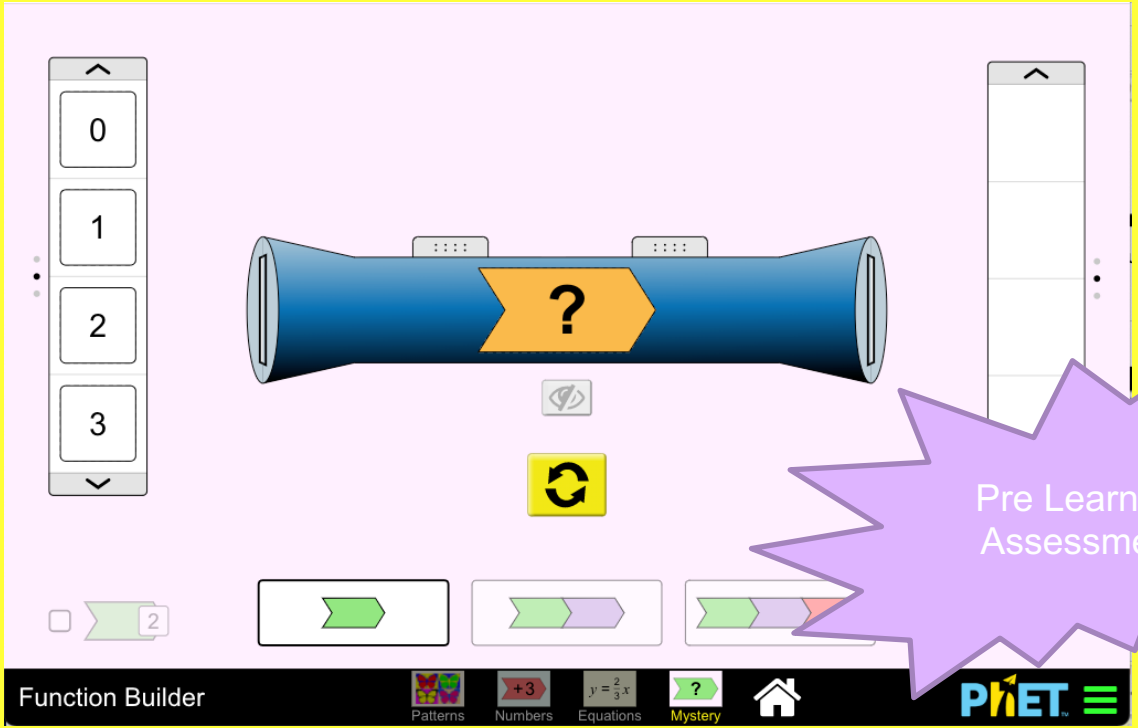


Discovery learning does not equate to no teacher involvement!

TEACHER TIP 03

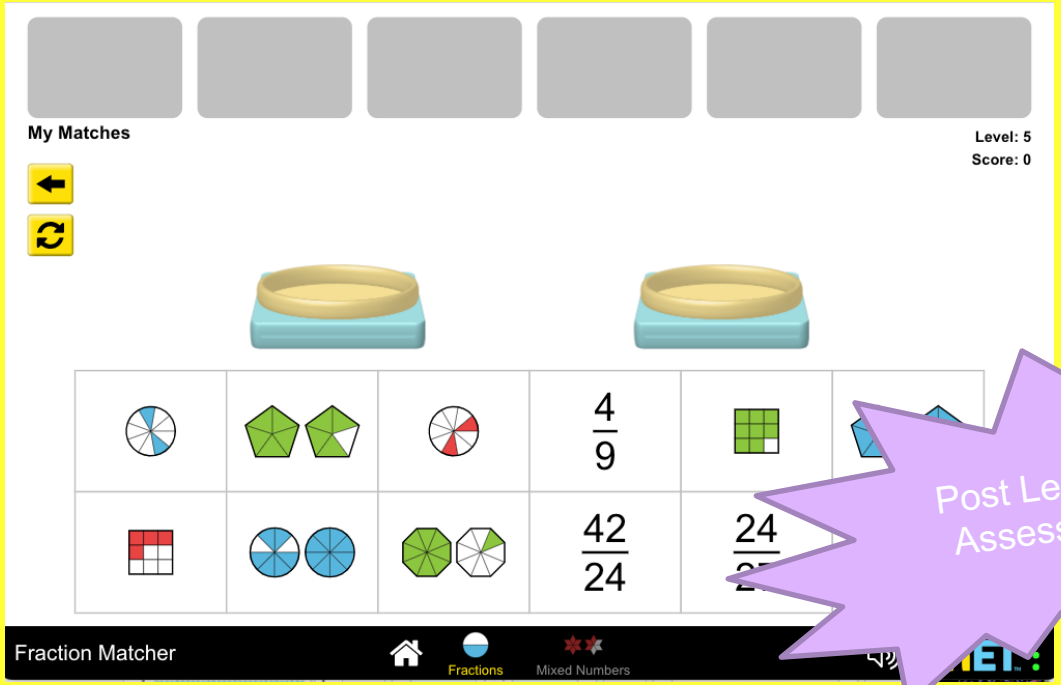
Gamify the assessment

GAMIFY THE ASSESSMENT



https://phet.colorado.edu/en/simulations/function-builder

GAMIFY THE ASSESSMENT



Post Learning Assessment

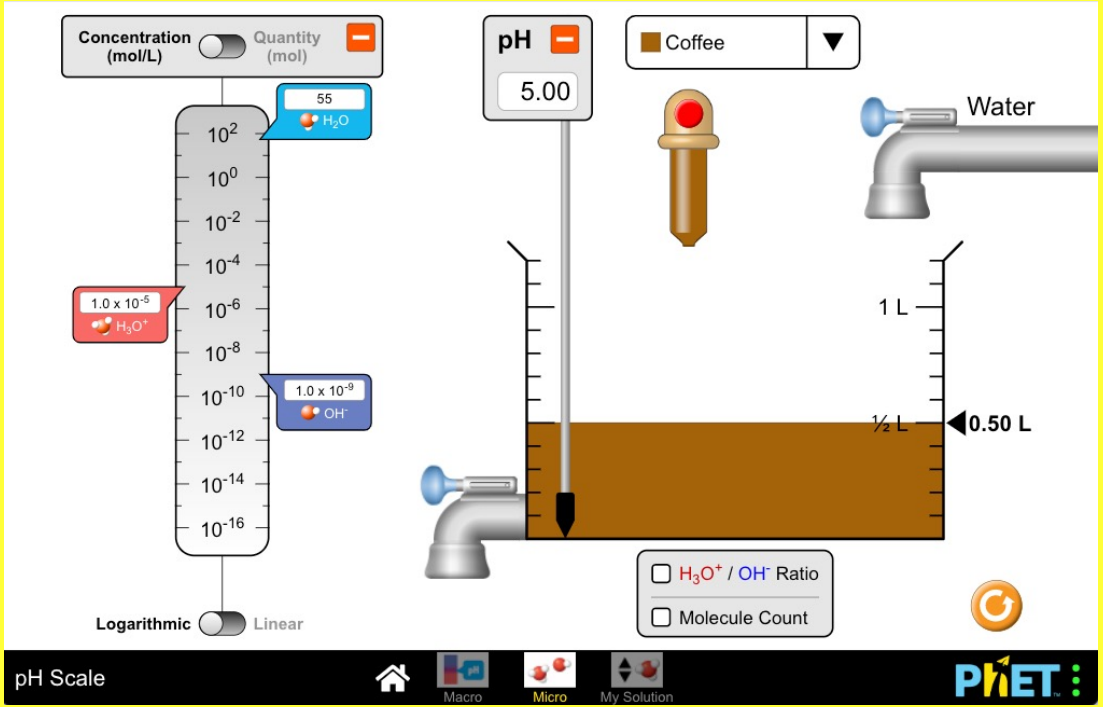
https://phet.colorado.edu/sims/html/fraction-matcher/latest/fraction-matcher_en.html

04

TEACHER TIP

Make difficult concepts real & meaningful

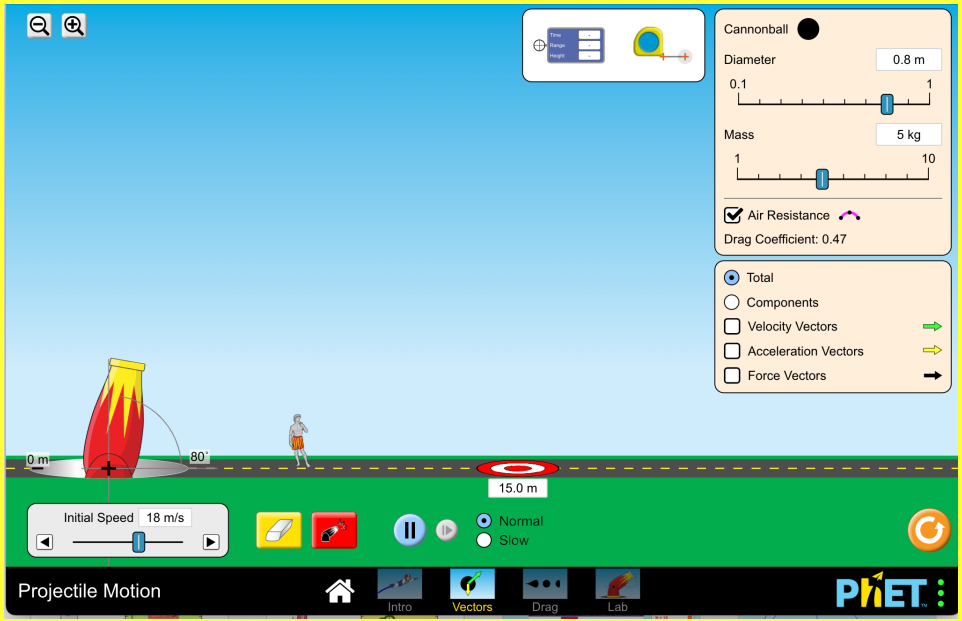
LOGARITHIMS



Uses:

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

PROJECTILES



Uses:

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

CALCULATING THE RANGE

$$R = \frac{u^2 \sin 2\theta}{g}$$

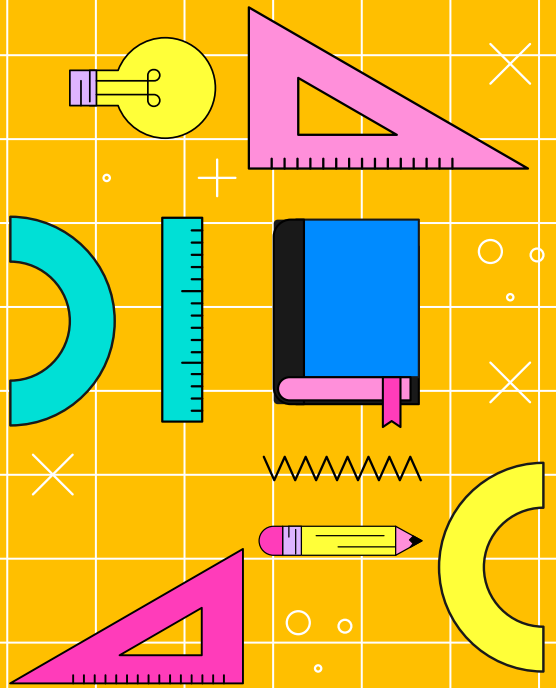
u = initial velocity

θ = final angle

g = 9.8 m/s^2

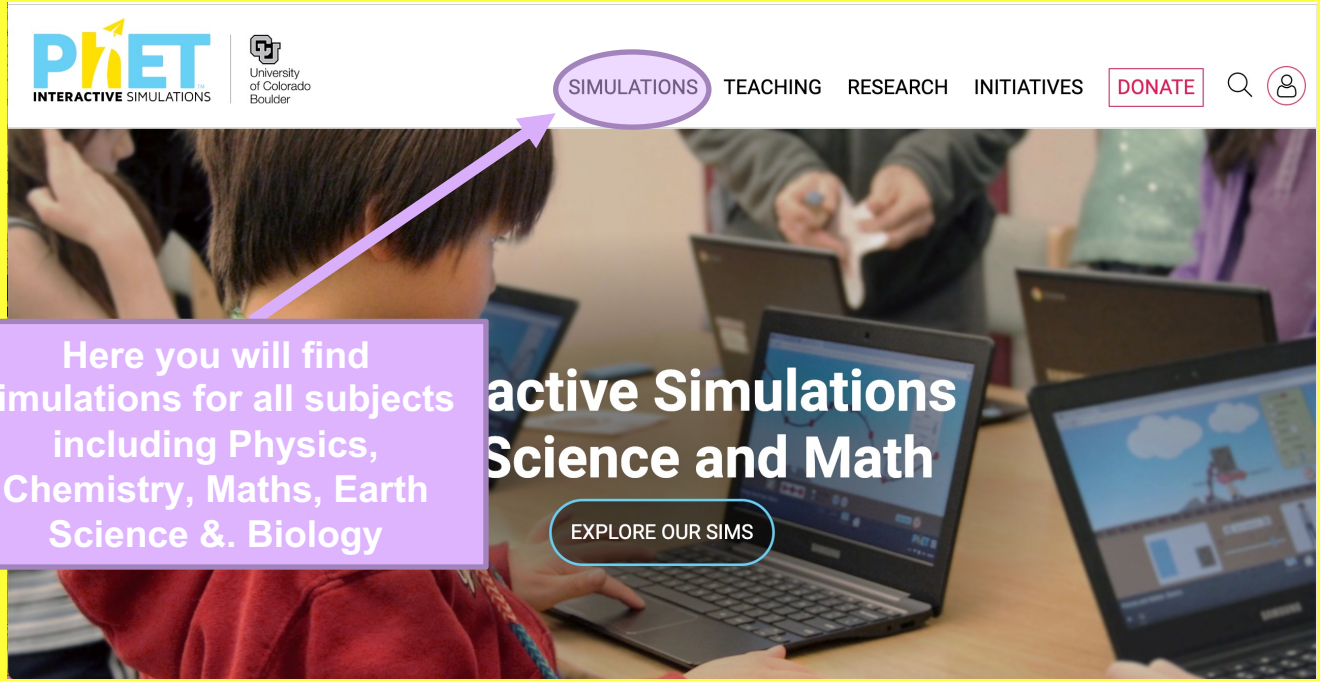
WHY I USE PHET?

1. Student centered
2. Discovery/Inquiry based
3. Prioritises student reasoning over rule learning → Deep learning
4. Supports the needs of **all** learners



Free worksheets to accompany all simulations are available on phet!

HTTPS://PHET.COLORADO.EDU/



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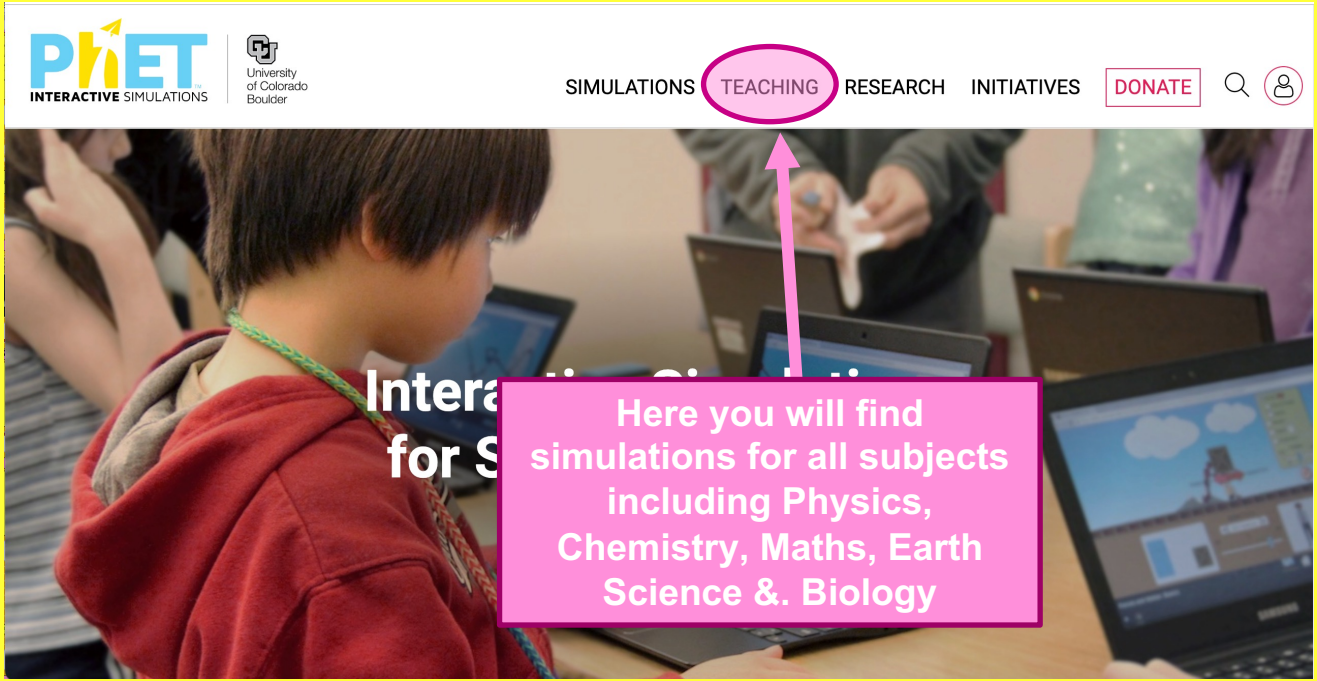

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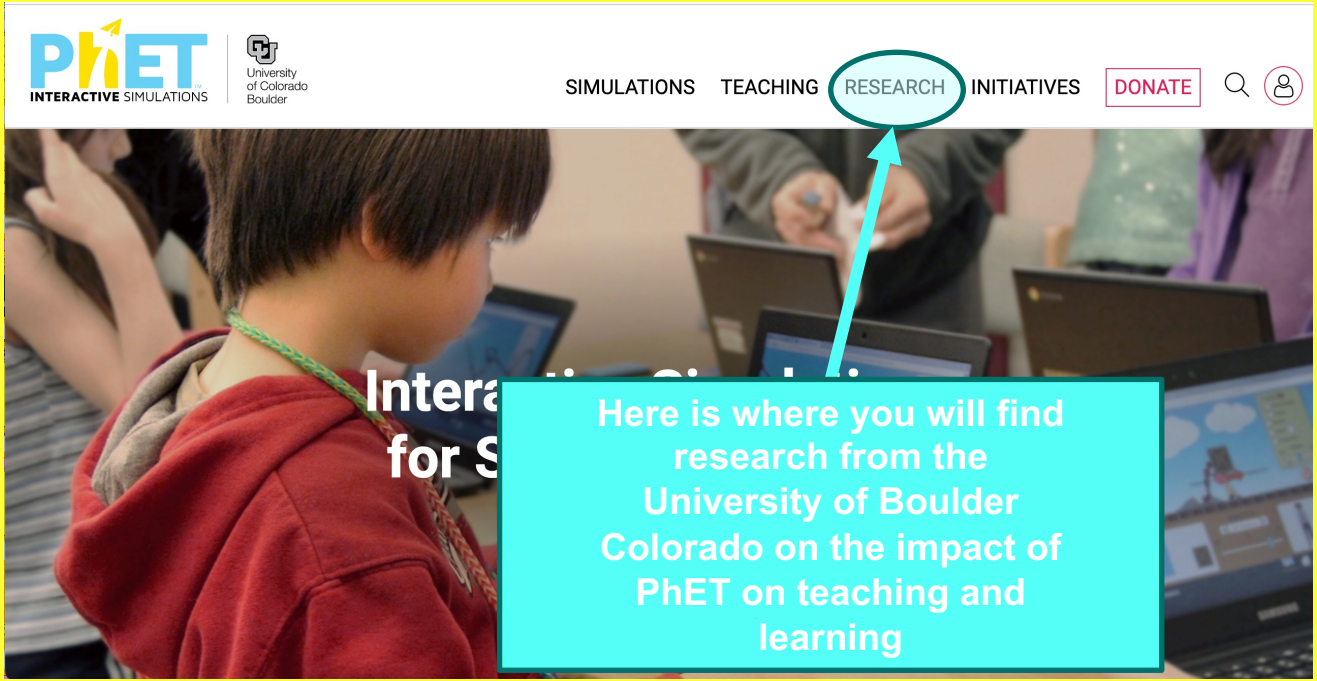
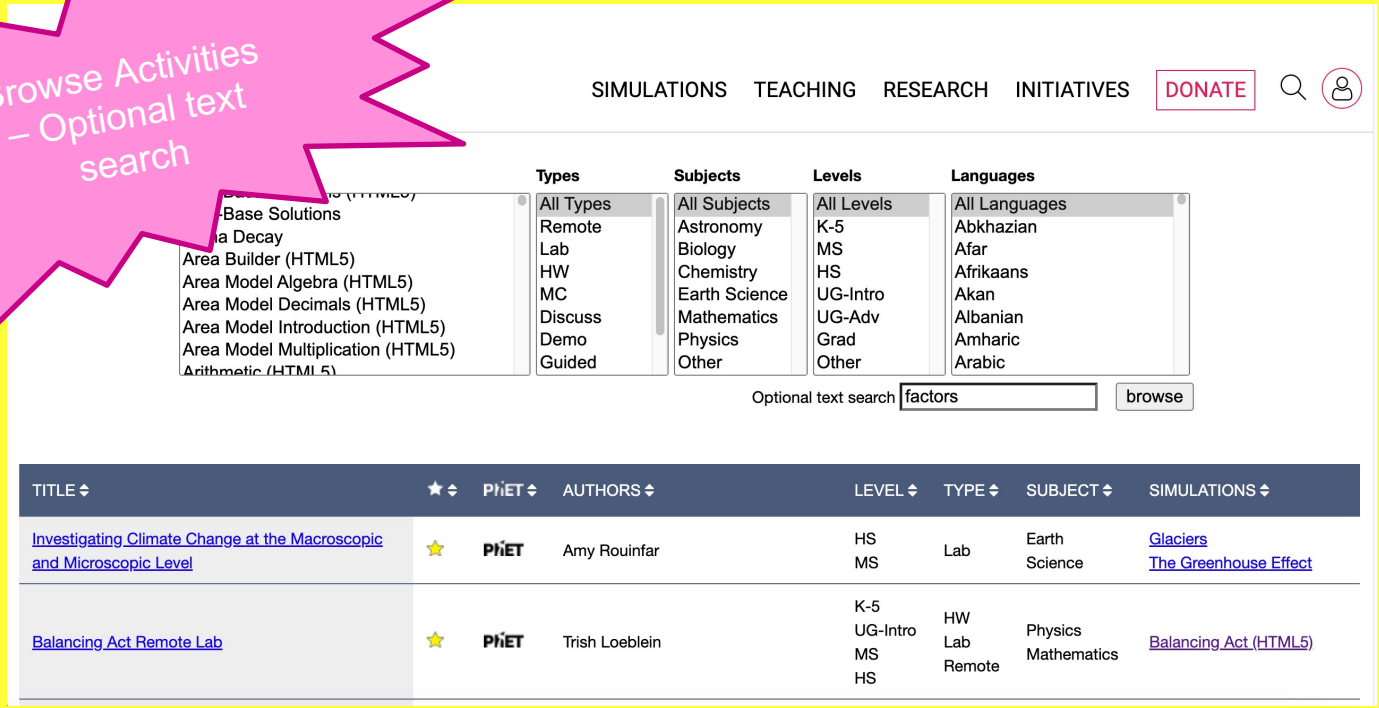


HTTPS://PHET.COLORADO.EDU/

Here you can read about PhETs initiatives and their work to improve equality and inclusivity in STEM education

HTTPS://PHET.COLORADO.EDU/

Browse Activities – Optional text search



FACILITATION TIPS

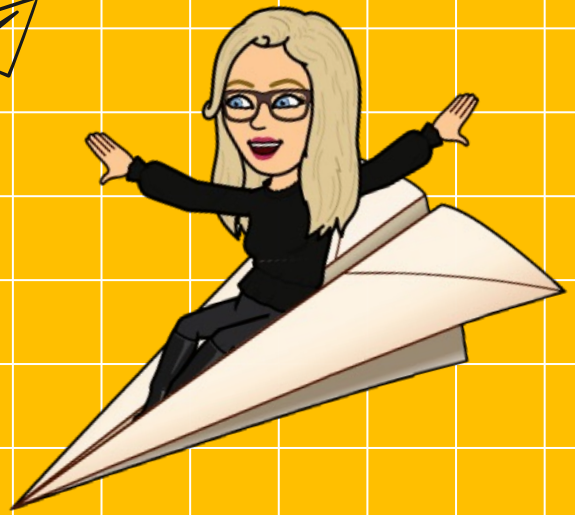
HIGH TECH CLASSROOM

- 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

DESMOS IN LOW TECH CLASSROOMS



01

WHAT?

What is Desmos?

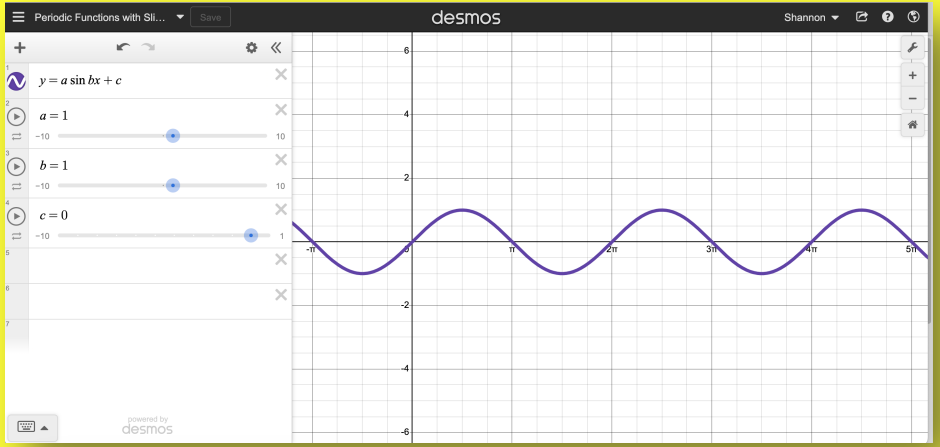
DESMOS

“ Desmos Studio is a Public Benefit Corporation with a goal of helping everyone learn math, love math, and grow with math. We believe that everyone has an inner mathematician and that some people haven’t been given the opportunity, encouragement, or tools to discover theirs.”

DESMOS

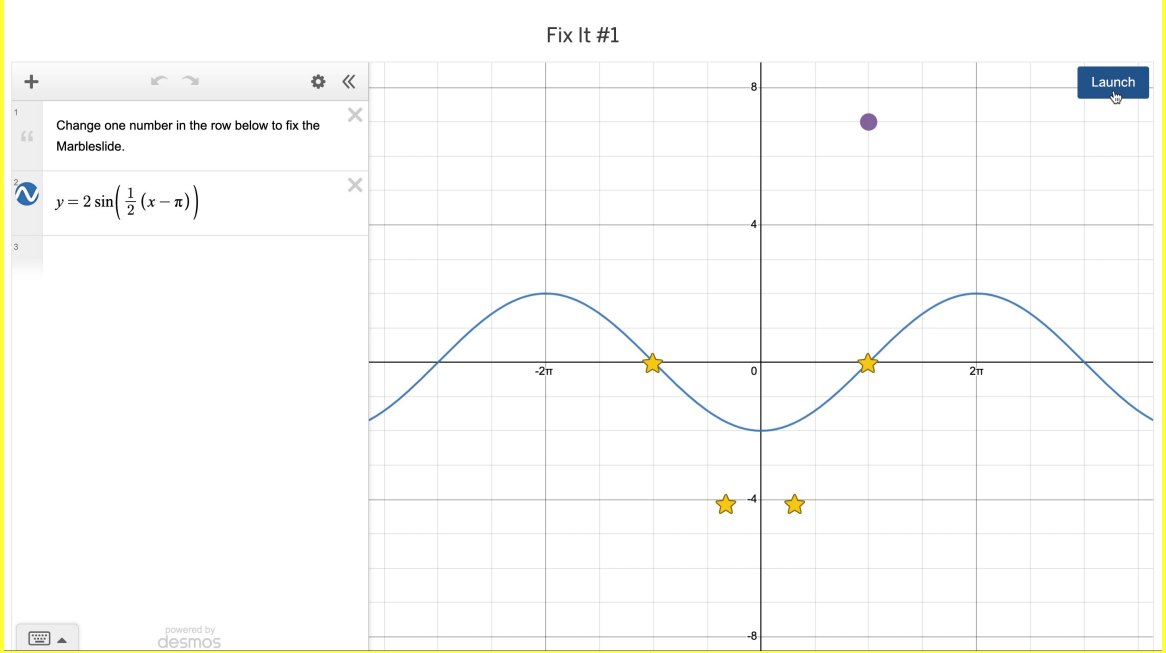
Desmos is an advanced and interactive online graphing calculator.

It is designed to help students and educators explore mathematical concepts, visualise mathematical relationships, and solve a wide range of mathematical problems.



https://www.desmos.com/calculator/yeigoz99sf

MARBLESLIDES



https://student.desmos.com/join/5vf96n

desmos.com

desmos

Math Tools | Classroom | Resources | Shannon

Looking for Desmos Classroom?

Desmos Classroom is a free teaching and learning platform, now part of Amplify.

Teachers

Find interactive and creative lessons for your class, or build your own.

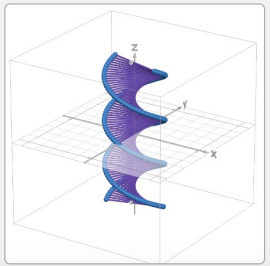
Teacher Home

Students

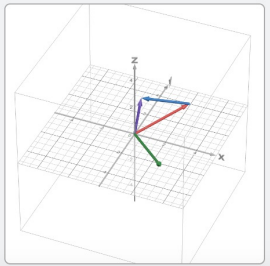
Enter a classcode to join your classmates!

Student Home

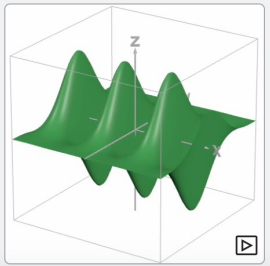
Example 3D Graphs ›



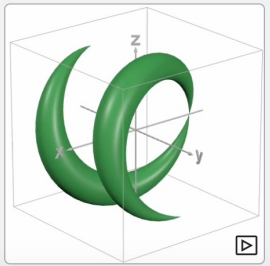
Double Helix



Vectors



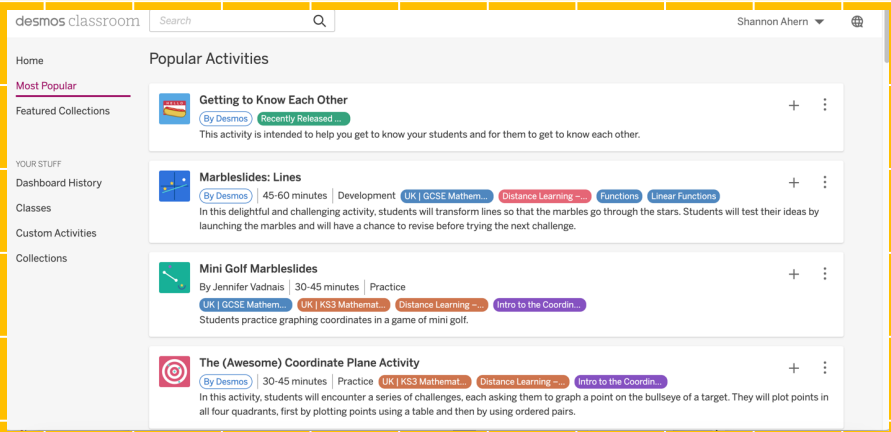
Function of x, y



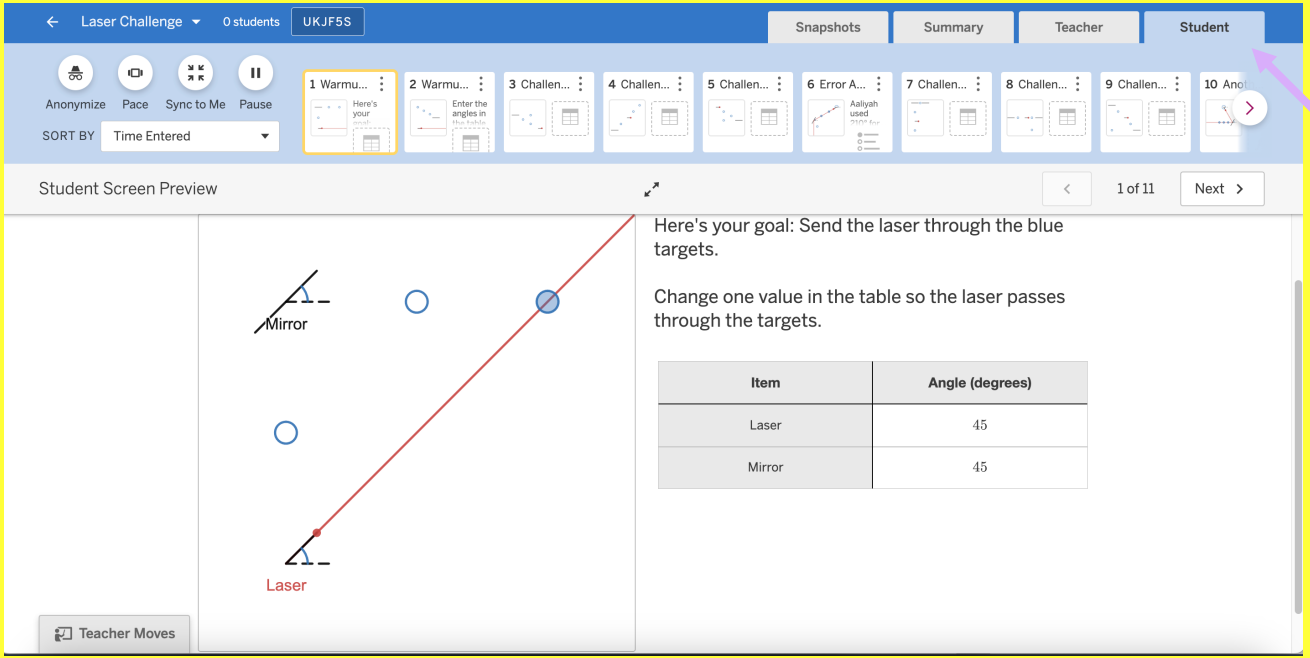
Parametric Surface

DESMOS

Desmos.com hosts dozen's of free activities and manipulatives to effortlessly engage students in the maths classroom.



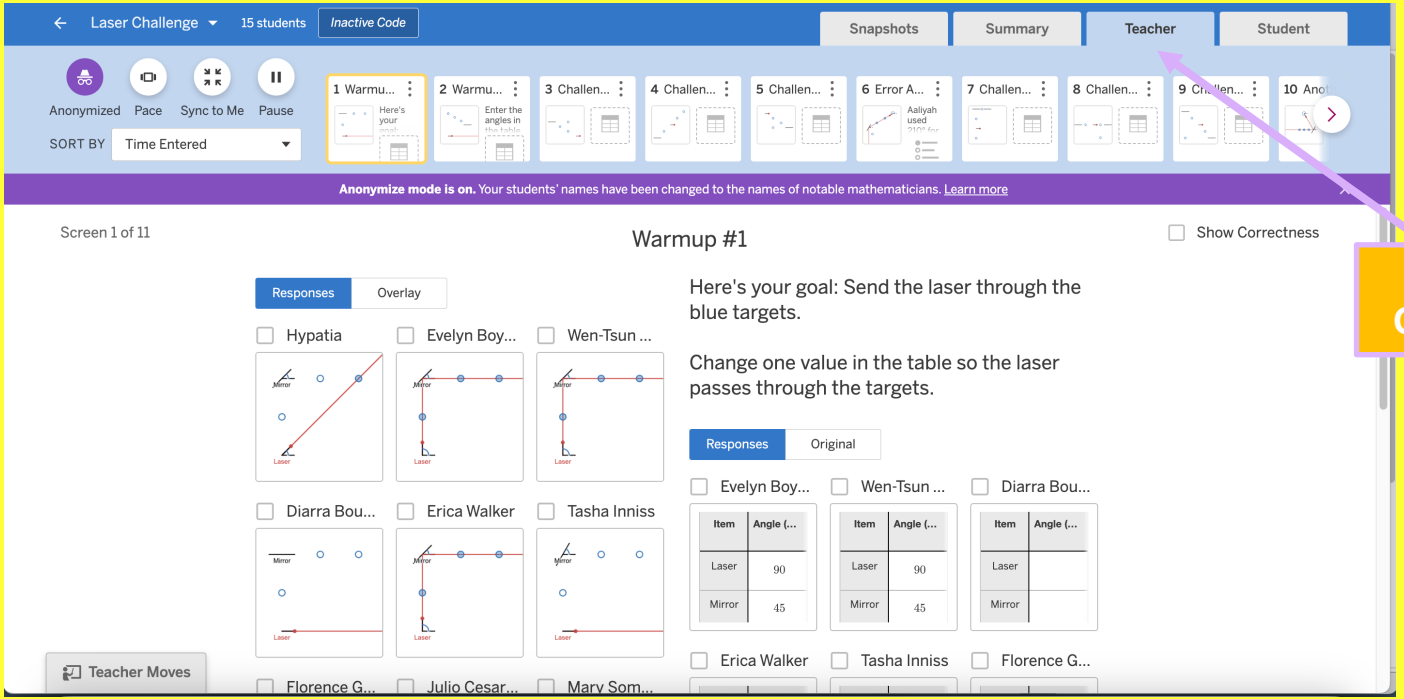
DESMOS WITH DEVICES



What the student sees

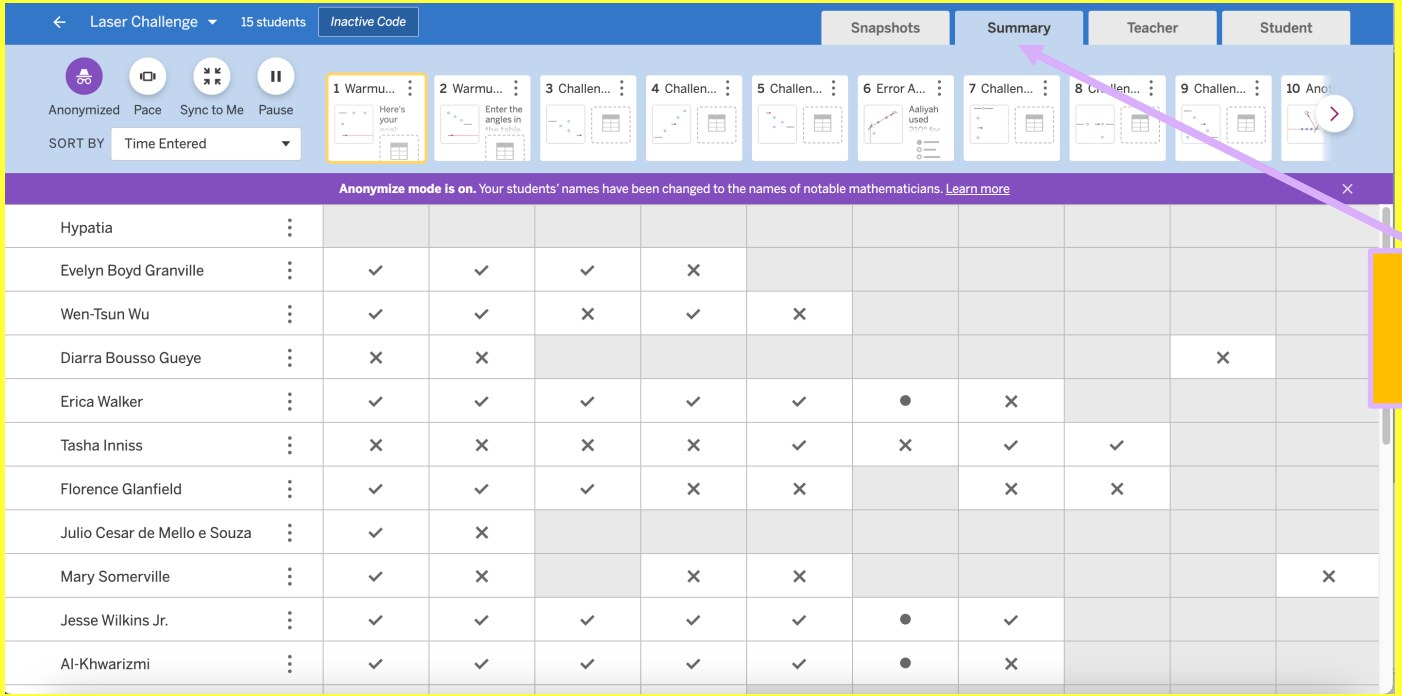
https://student.desmos.com/join/ukjf5s

DESMOS WITH DEVICES



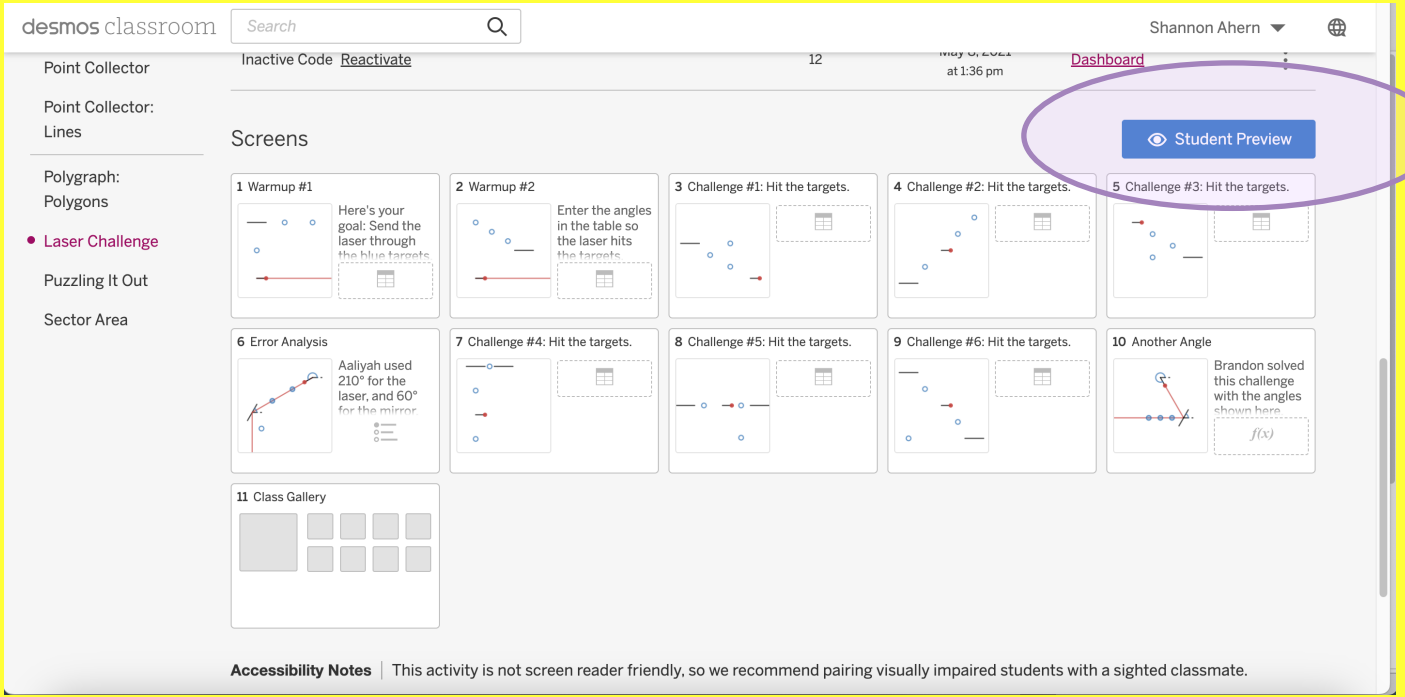
https://student.desmos.com/join/ukjf5s

DESMOS WITH DEVICES



https://student.desmos.com/join/ukjf5s

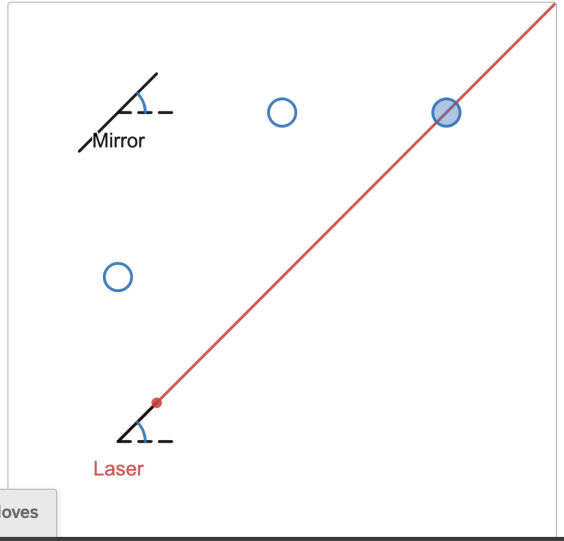
DESMOS WITHOUT DEVICES



desmos classroom | Search | Shannon Ahern

Student Screen Preview | 1 of 11 | Next

Warmup #1



Here's your goal: Send the laser through the blue targets.

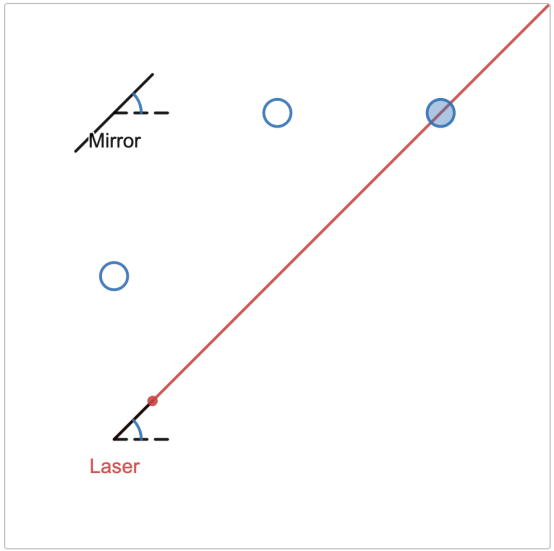
Change one value in the table so the laser passes through the targets.

Item	Angle (degrees)
Laser	45
Mirror	45

Teacher Moves

Accessibility Notes | This activity is not screen reader friendly, so we recommend pairing visually impaired students with a sighted classmate.

Warmup #1



Here's your goal: Send the laser through the blue targets.

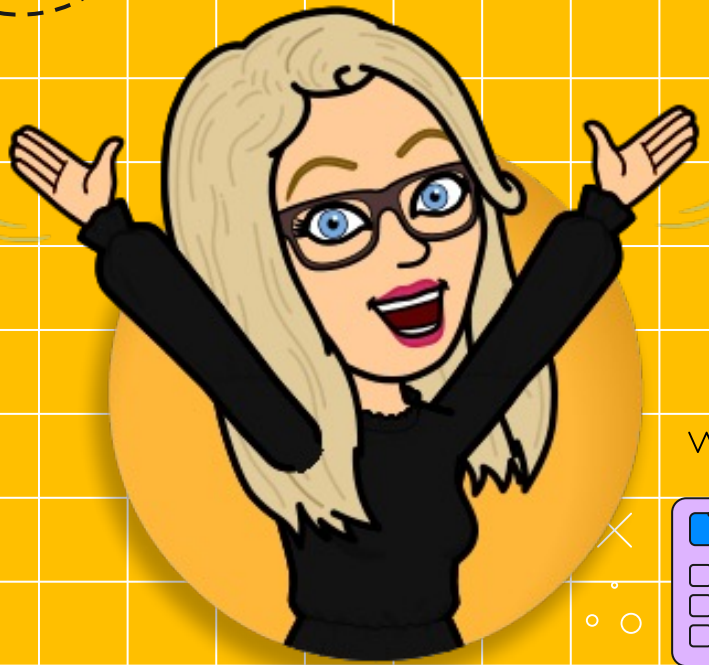
Change one value in the table so the laser passes through the targets.

Item	Angle (degrees)
Laser	45
Mirror	45

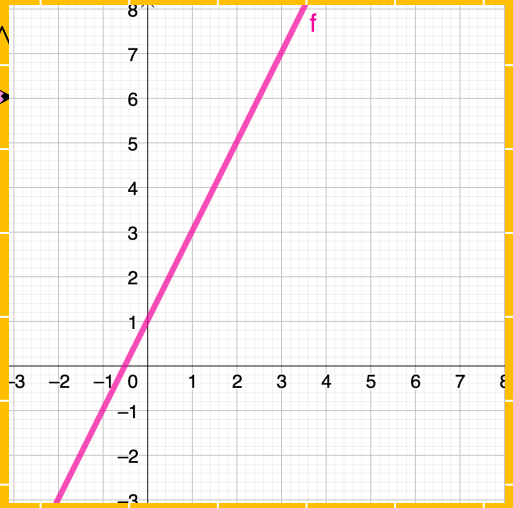
02

WHY?

Why I use Desmos

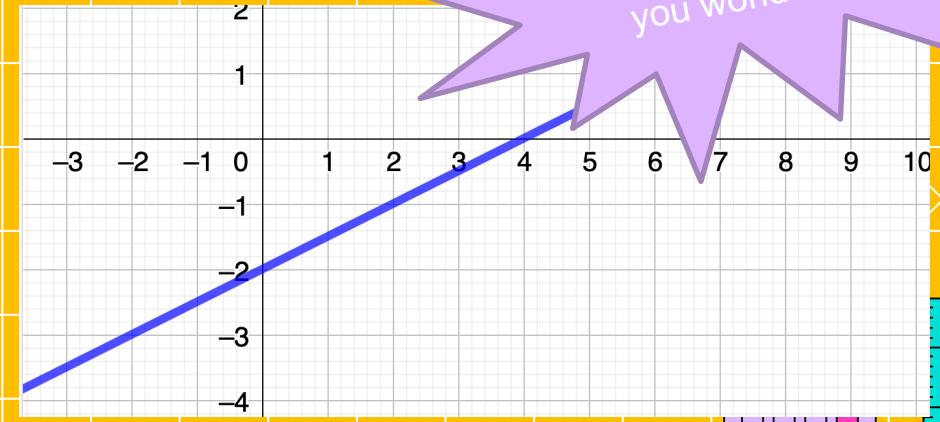


SAMPLE LESSON



$y = 2x + 1$

What do you notice? What do you wonder?



$y = 0.5x - 2$

SAMPLE LESSON

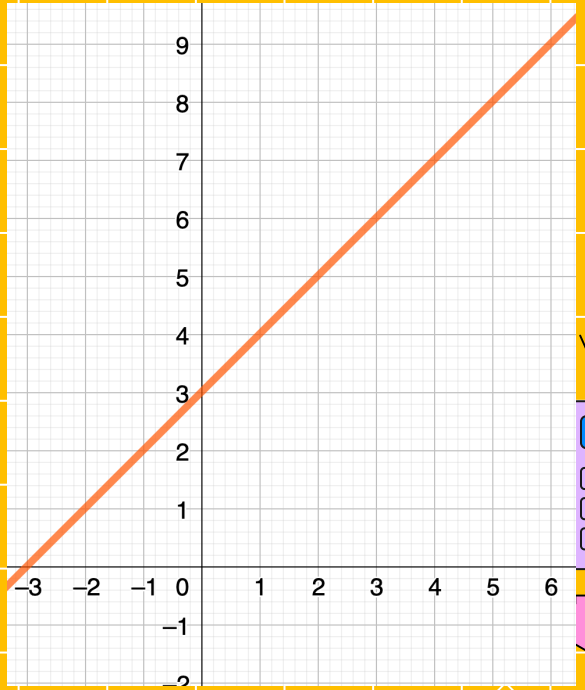
THE EQUATION OF THE LINE IS
$y = mx + c$

m = SLOPE

c = Y - INTERCEPT

SAMPLE LESSON

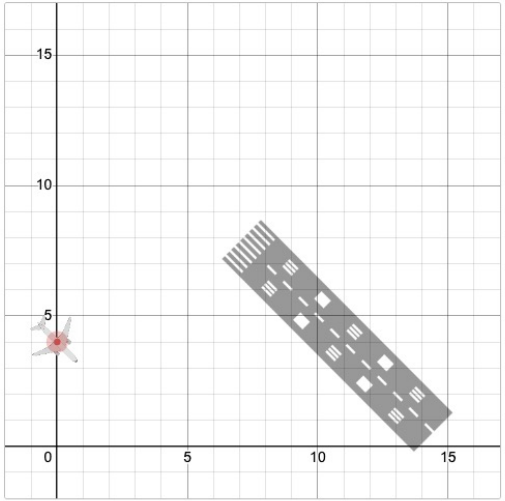
WHAT IS THE EQUATION OF THIS LINE



Student Screen Preview

2 of 7 Next

A line can help.



Lines can help us be more precise.

The path for a safe landing of the airplane follows the line $y = 15 - x$.

Let's try this one more time. Move the plane so it lands safely. Then press "Submit" to check your answer.

Submit

https://student.desmos.com/join/csce39

Why I use Desmos

Gamified learning

GAMIFIED LEARNING

https://www.youtube.com/watch?v=9vJRopau0g0&ab_channel=TEDxTalks

Why I use Desmos

- Gamified learning
- Instantaneous, Visual Feedback
- Discovery-based learning
- Authentic Real-world Problems
- I enjoy the lessons!

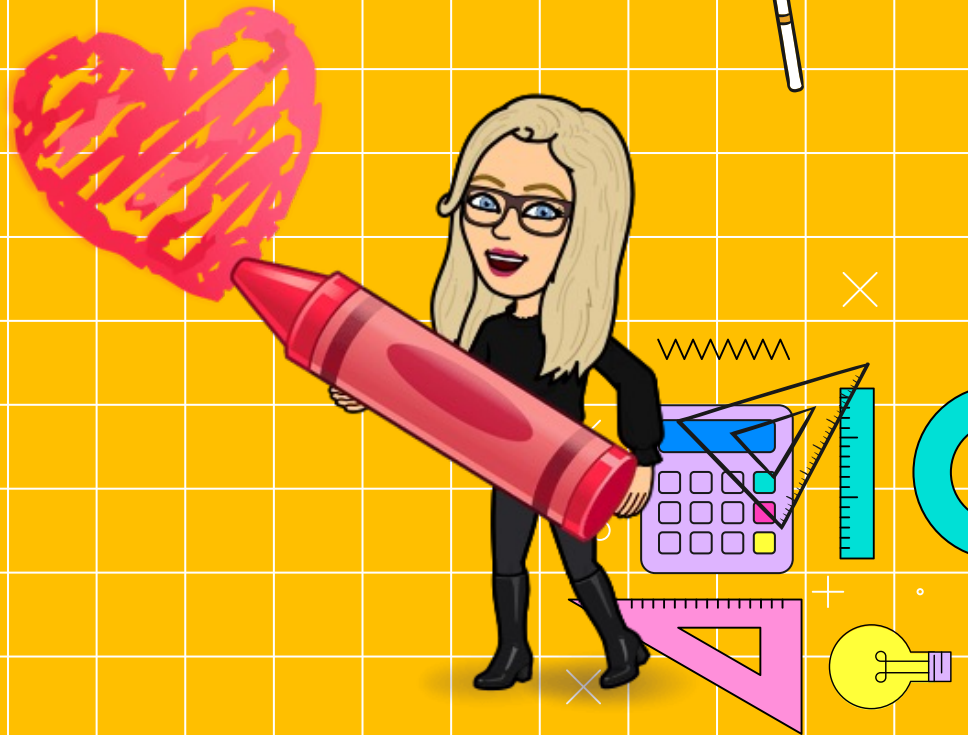
MY FAVOURITE DESMOS ACTIVITIES

- Land the Plane – Equation of the line
- Marbleslides – Transformations (Linear, Quadratic, Periodic)
- The (Awesome) Coordinate Plane Activity - Coordinates
- Laser Challenge – Angles
- The Solar System, Test Tubes and Scientific Notation

03

HOW?

How to use Desmos in a Low Tech Classroom



PLAN YOUR QUESTIONS

1. Before using the Desmos interactive in class play around with it yourself – what are the points of interest? What are the "sticky points"

2. Is there an example that you can provide students to make them think?
    a. E.g using (Sin(x-90) instead of Cosx)? Or using -60 instead of 300 degrees?

3. Is there cross-curricular links that can be built on using questions?
    a. Eg. "Remember when we did patterns...what was the formula then?"

MINI WHITEBOARDS

- Particularly useful for coordinate-geometry based interactives (Coordinates, Land the Plane, Marble Slides)
- Great to get the class discussion going!
- Where different strategies are used make a point of this

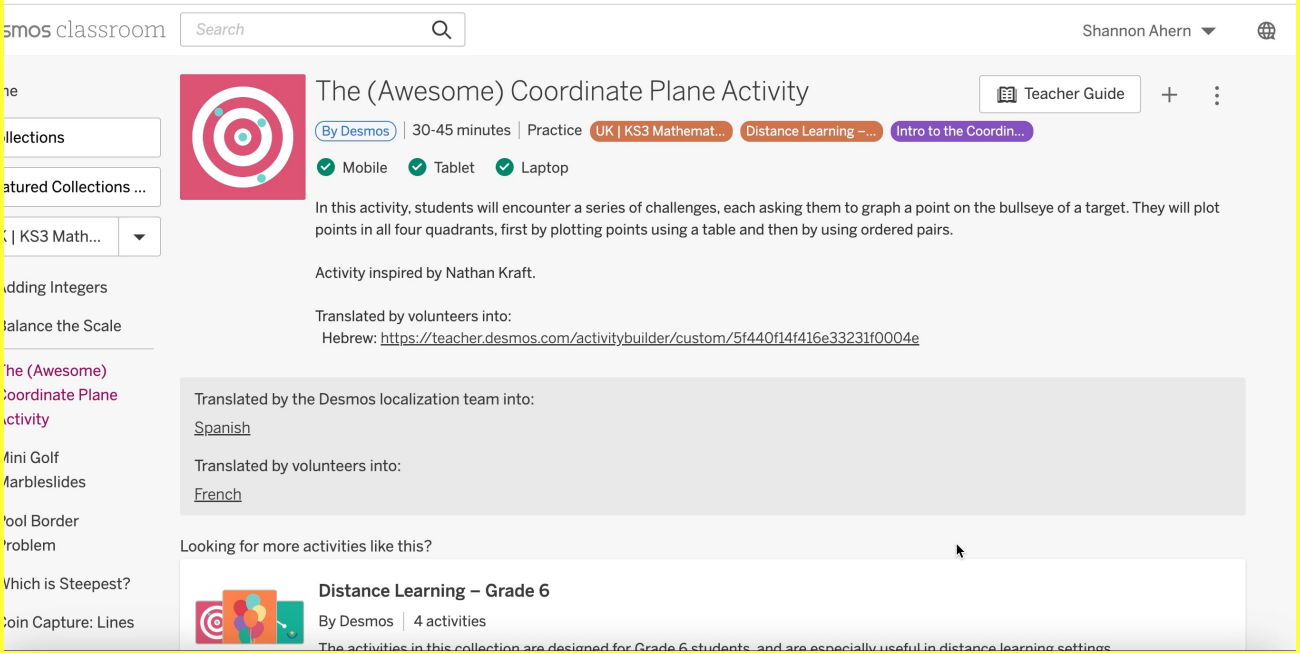
STUDENT VOICE

- "_____ says it increases, do you agree?"
- "John says its 2x+3 but you say 1x+4 where did your strategies thinking differ?"
- "What would happen if..."
- "Could you improve on this idea?"
- "Could we represent this another way?"
- Sometimes students will be too afraid to engage with all class discussions. Teacher Hack: tell them to "Tell the person beside you what you think" and then ask the group what they said!

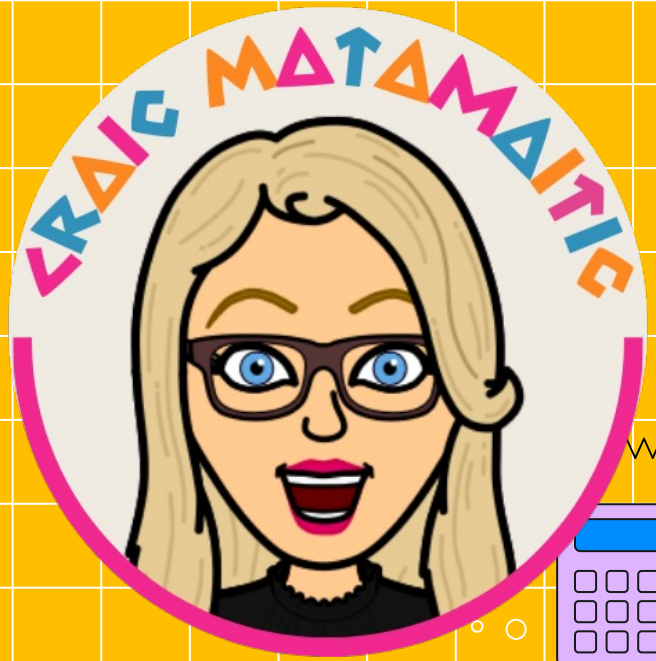
THUMBS UP/DOWN/SIDEWAYS

- To engage all students in the class, do a thumbs up/down/sideways vote
- Thumbs up – agree
- Thumbs down – disagree
- Thumbs sideways – not sure yet
- Where there are students that are not sure yet – ask a student from each side to convince them that they are right!

ASSIGN IT FOR HOMEWORK



Best Solution: Give Students a link


CRAIC MATAMAITIC

THANK YOU!

Any questions?

@craicmatamaitic

@craic_matamaitic

www.craicmatamaitic.com