



PhET Interactive Simulations: Early efforts to support K-3 math

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PhET Background

Goals

To make STEM learning more



ENGAGING

Interact and discover key ideas.

RELEVANT

Connect to everyday life.

ACCESSIBLE

Intuitive and understandable.

EFFECTIVE

Use science and math practices.

Develop conceptual understanding.

PERSONALIZED

Students direct their learning.

PhET Background

PhET Today

Over 140 interactive simulations

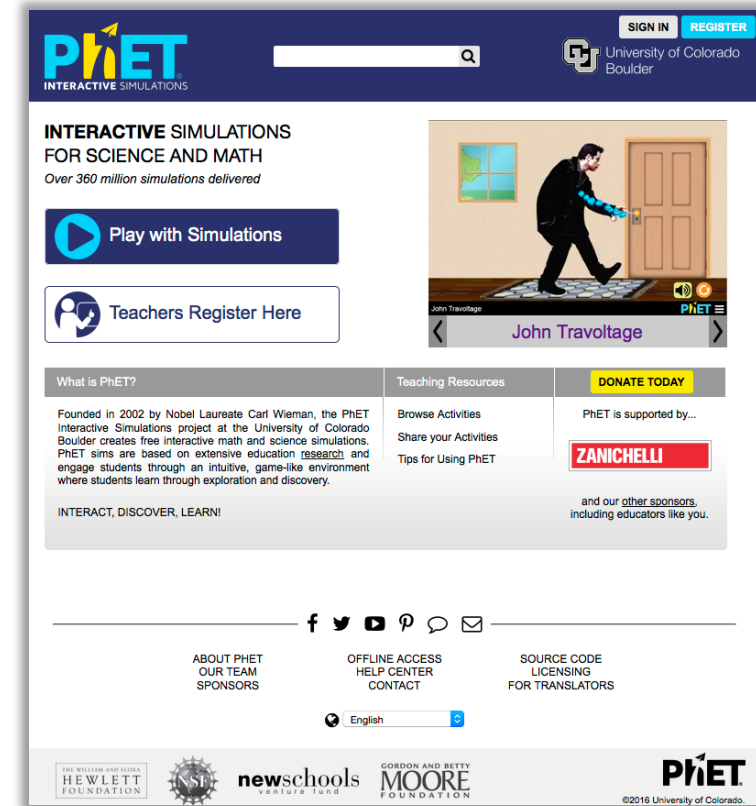
Physics, Chemistry, Math,
Biology, Earth Science

K-12 and College

Open education resources (free)

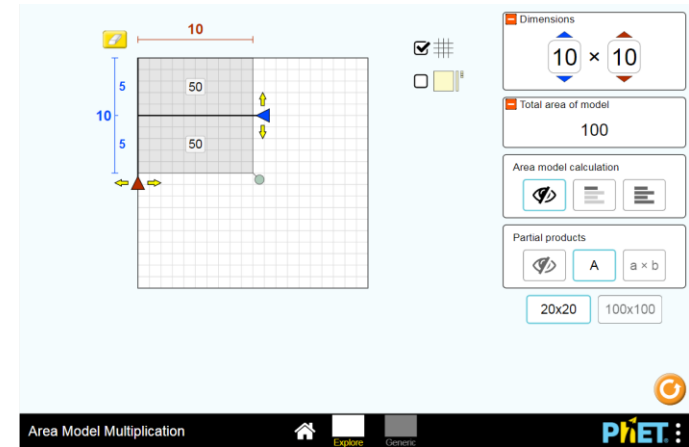
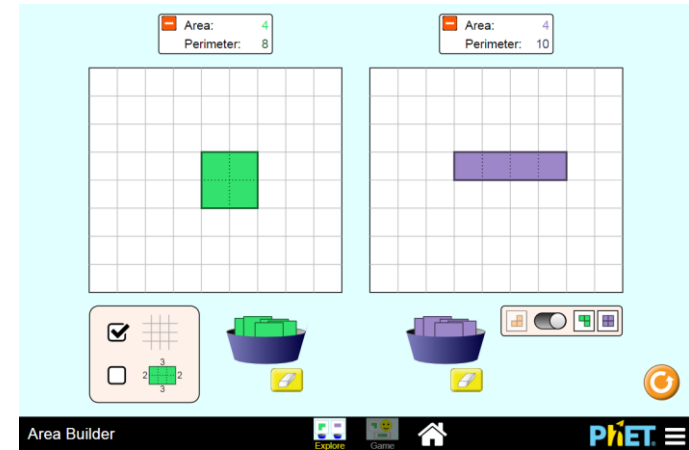
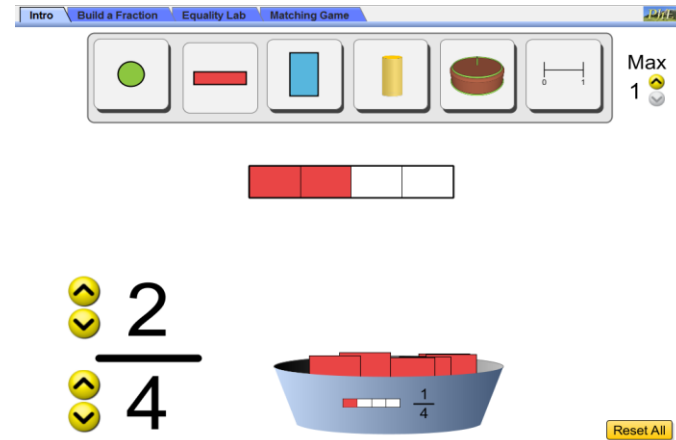
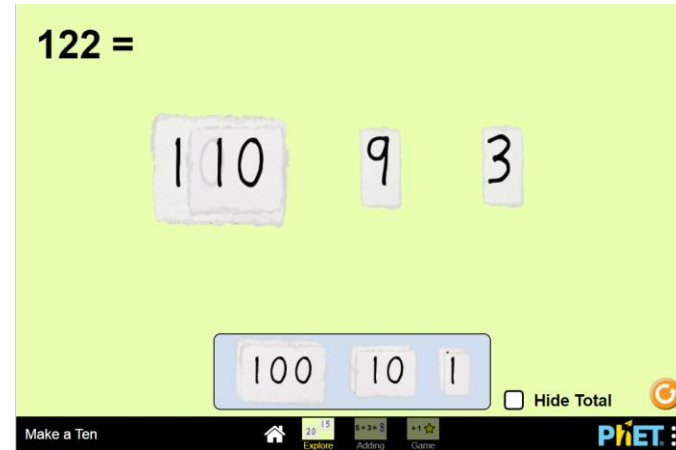
Translated into 90 languages

Run online or offline
(80 million times/yr)



PhET for Early Math

Examples



Sim Design

PhET Design Principles & Implicit Scaffolding

Immediate, Dynamic
Feedback

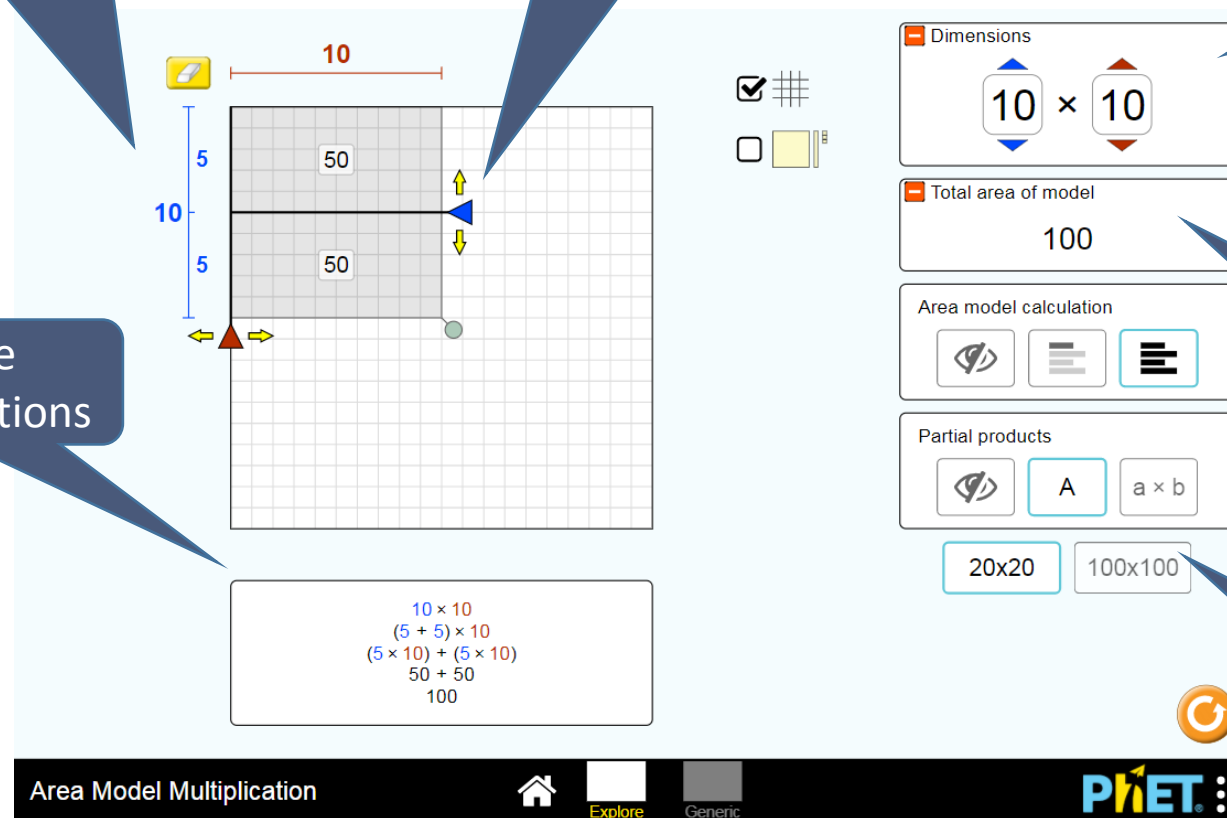
Highly
Interactive

Minimal Text

Multiple
Representations

Intuitive
Interface

Implicit
Scaffolding



PhET for Early Math

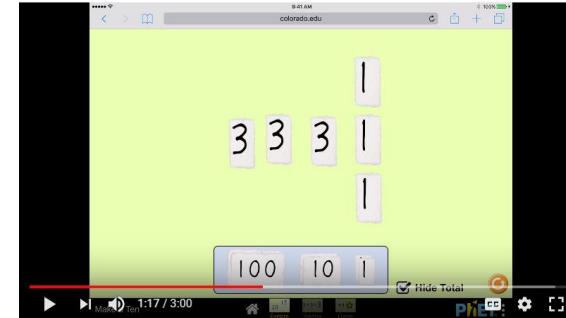
Flexible tool for teaching and learning

Individual
student
work



Teacher
Facilitated
Discussion

Student
group
work



Number
talk videos

PhET for Early Math



Beth Stade

Meet “Juan”



- 1st grade student
- Entered not knowing “3” in English or Spanish
- Prototype sim use – “informal choice time”, whole class activity, and 1-on-1 intervention learning his numbers.

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Meet “Juan” – after 1 month



PhET for
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Meet “Juan” – after 1 month



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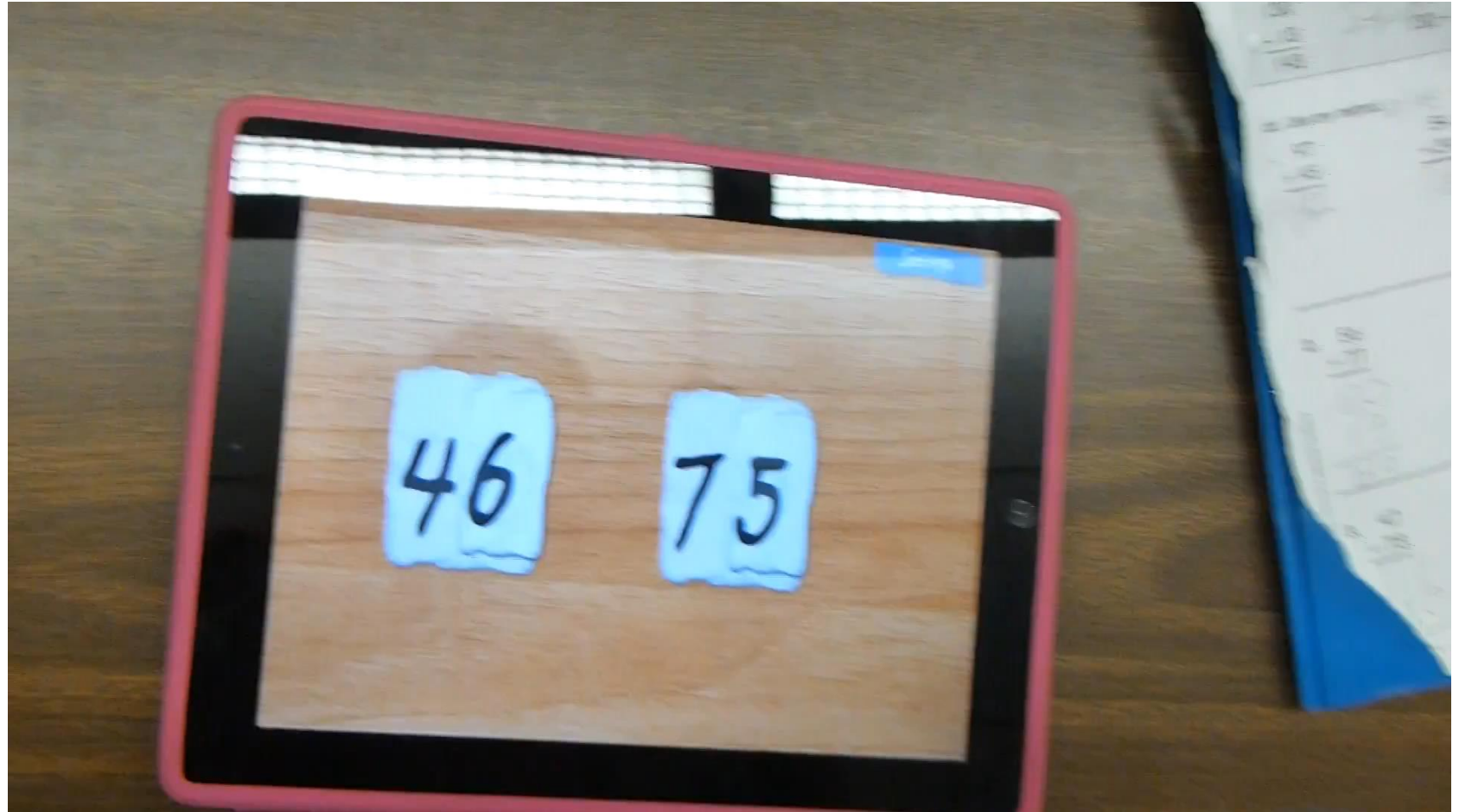
Meet “Marco”



- 2nd grade student
- Week 3 of using prototype sim 10-15 minutes everyday.
- Example of double digit addition

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Meet “Marco”



District Study: 6 weeks of 10-15 minutes/day

2nd grade

6 weeks

Class 1
(treatment)

10-15 min sim time +
Regular math instruction

Class 2&3
(control)

Regular math instruction only

Measures:

Start of school screener, Unit 2 Pre-test, Unit 2 Post-test, Post-Interview

PhET for Early Math



District Study: Post-interview strategies

Solve 2 sums: $46 + 28 =$

$98 + 17 =$

Class 1, 2, 3



PhET for Early Math

Introducing Fractions: Small group discussions

The screenshot shows the PhET 'Introducing Fractions' simulation interface. At the top, there is a navigation bar with tabs: 'Intro', 'Build a Fraction', 'Equality Lab', and 'Matching Game'. The 'Intro' tab is currently selected. Below the navigation bar is a toolbar containing six icons: a green circle, a red rectangle, a blue square, a yellow cylinder, a brown cake, and a number line from 0 to 1. To the right of the toolbar is a 'Max' label with a yellow up arrow and a grey down arrow, and the number '1'. In the center of the screen is a pie chart divided into three equal sections, with one section shaded green. Below the pie chart is a large fraction $\frac{1}{3}$. The numerator '1' has two yellow up and down arrows to its left. The denominator '3' has two yellow up and down arrows to its left. To the right of the fraction is a blue bowl filled with green cards. A small pie chart icon is on the side of the bowl, showing one green section and two white sections, with the fraction $\frac{1}{3}$ next to it. In the bottom right corner, there is a yellow button labeled 'Reset All'.

<https://phet.colorado.edu/en/simulation/fractions-intro>

PhET for Early Math

Introducing Fractions: Small group discussions



Next Steps



Expand K-5 math efforts

Study sim design & use strategies with K-5 ELL/DLL

Seeking feedback, discussion, concerns

Interested in partnering?

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