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In this session, we will

- *Discuss and explore the use of apps to engage students virtually while promoting mathematical reasoning within the context of inequalities.*
- *Use apps to allow students to engage content, express their thinking and creativity, collaborate with one another, and assess their own understanding.*
- *Share resources and ideas*



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Available on



and on the web!

Download and open the Nearpod App on your personal device.

Or

Go to Nearpod.com using your preferred browser.

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Nearpod helps educators make any lesson interactive whether in the classroom or virtual. The concept is simple. A teacher can create interactive presentations that can contain Quiz's, Polls, Videos, Collaborate Boards, and more.

With Nearpod, students do not need accounts to access! When you start a lesson, you'll launch a five-letter code. Share this code with students, or share the lesson through your LMS (like Canvas or Schoology), Google Classroom, or Microsoft Teams

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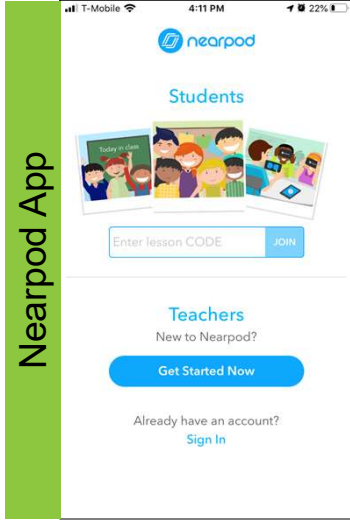


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Internet Browser



Nearpod App

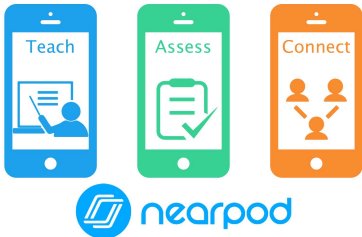


Wait for the CODE to join the lesson demonstration.

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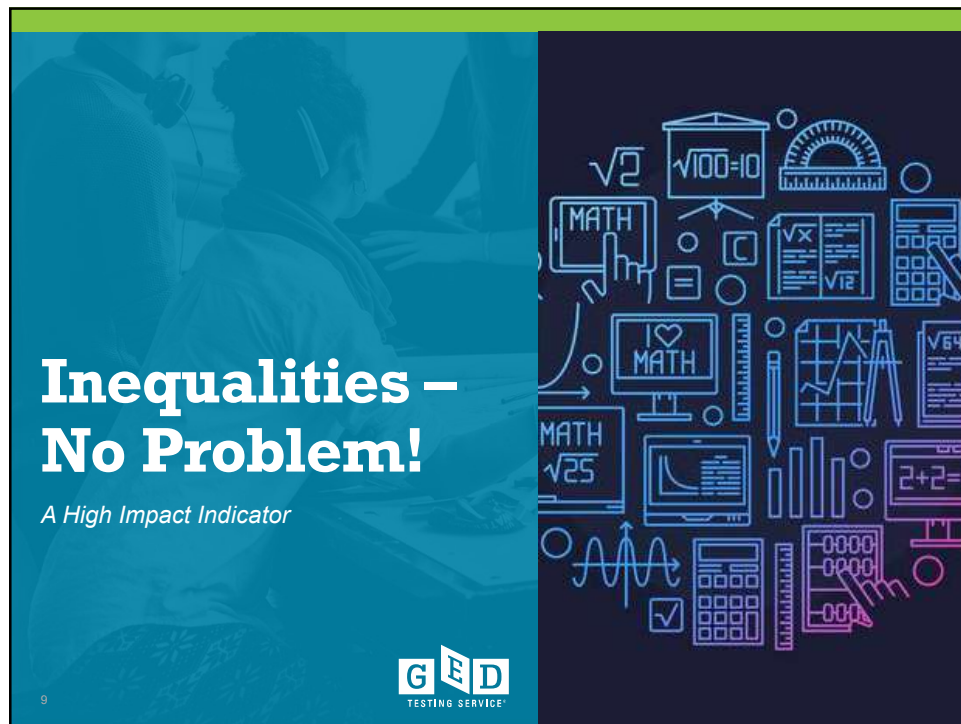
Nearpod Lesson Demonstration

<https://nearpod.com/>

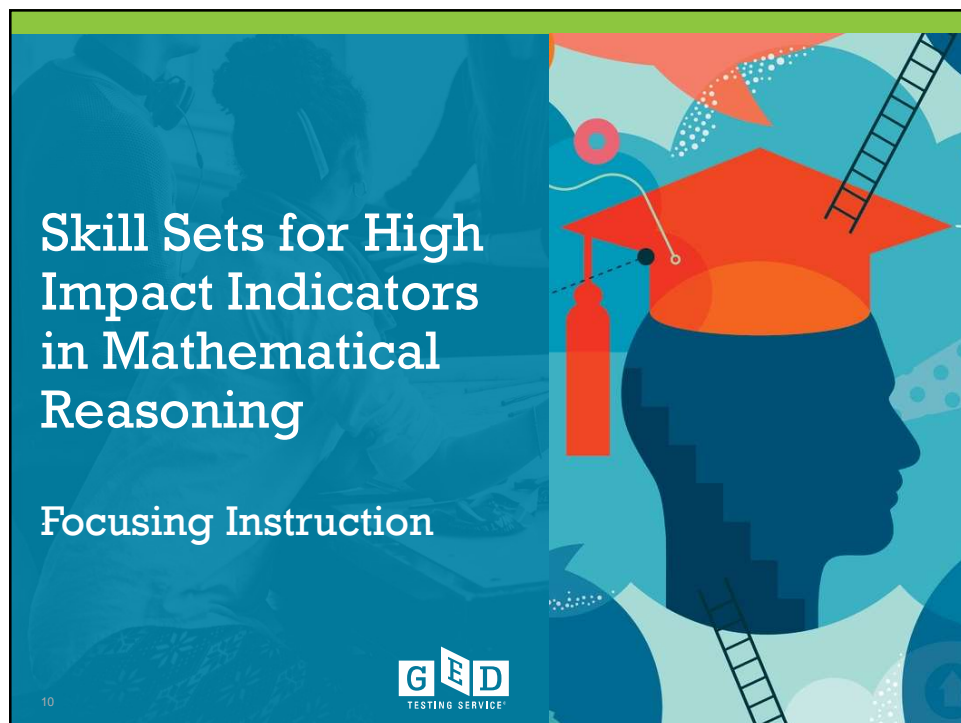
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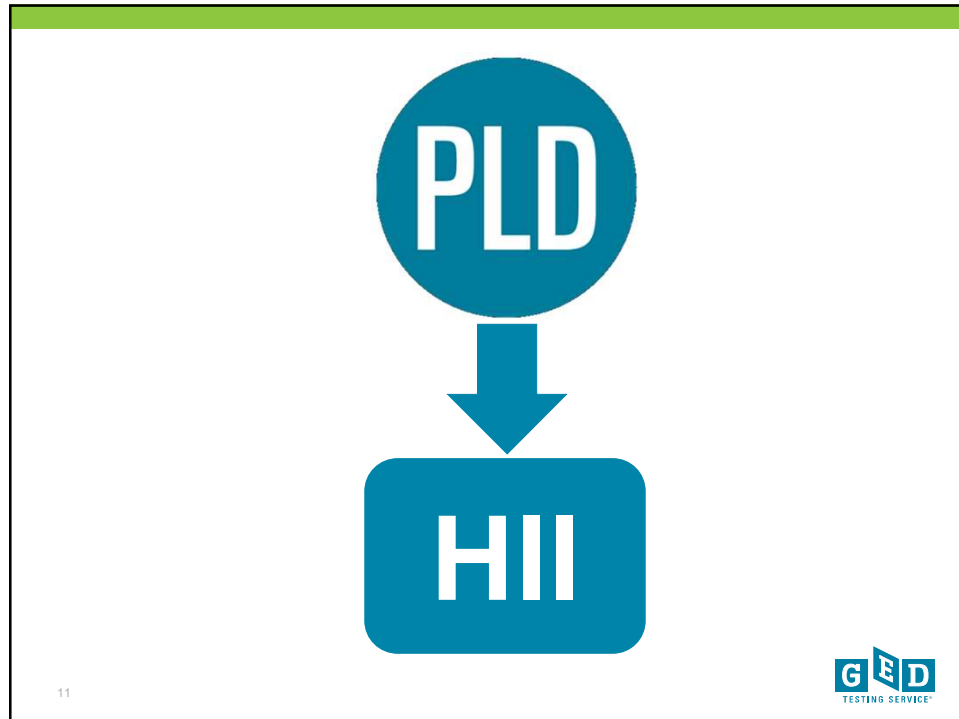
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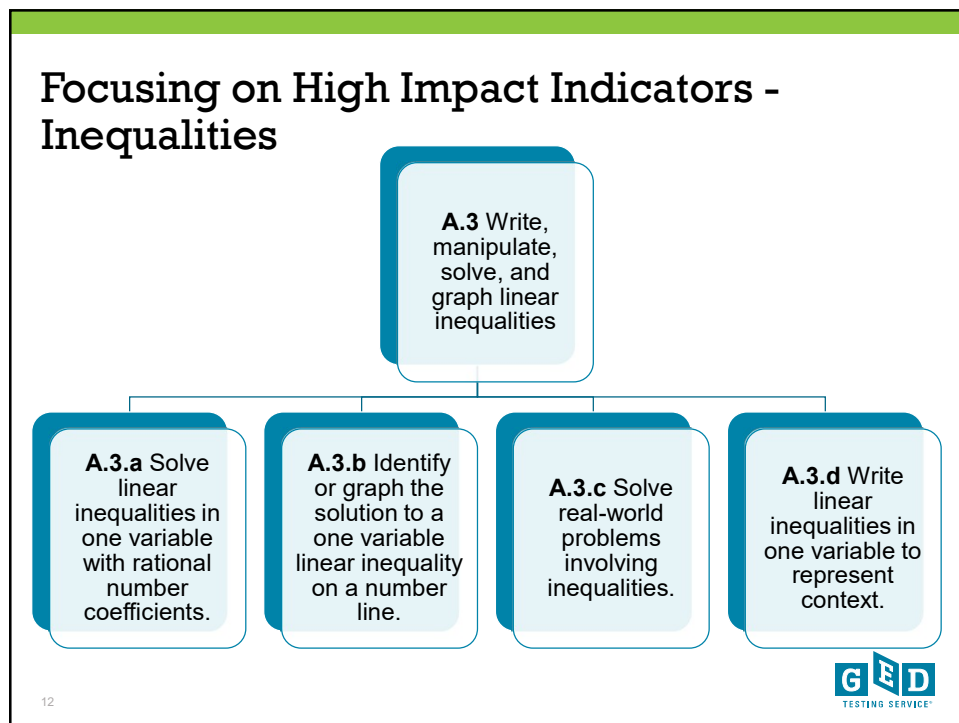
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Can your students ...

Solve inequalities in one variable, using the standard algorithms?

Solve a one-variable inequality and identify or create a graph on the number line of the solution?

Analyze the relationship between quantities in a real-world problem, and then create an inequality to model the problem situation?

Analyze the relationship between quantities in a real-world problem, and then solve the problem through algebraic reasoning?

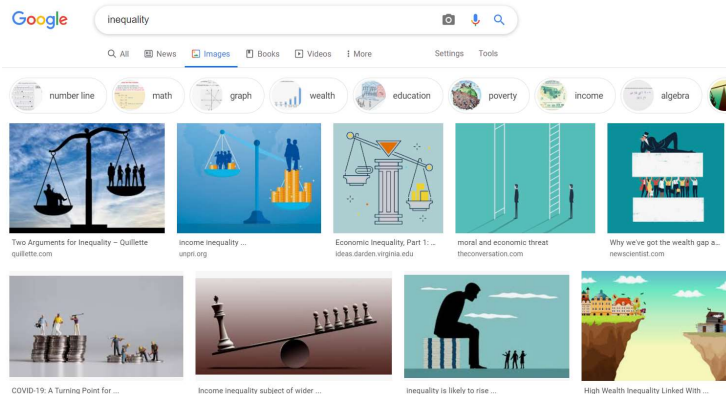
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What is an inequality?

Use your preferred search engine (i.e. Google).
Do an image search for the word "Inequality."



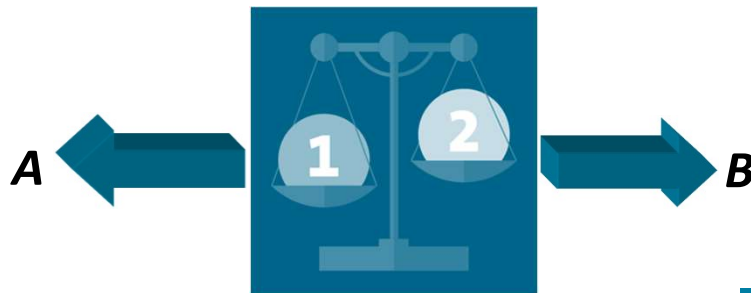
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What is an inequality?

An inequality is a mathematical sentence that uses symbols such as $<$, $\leq$, $>$, or $\geq$ to compare two quantities.



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Inequalities Are Everywhere

Situation	Mathematical Inequality
Speed limit	Legal speed on the highway $\leq$ 65 miles per hour
Credit card	Monthly payment $\geq$ 10% of your balance in that billing cycle
Text messaging	Allowable number of text messages per month $\leq$ 250
Travel time	Time needed to drive from home to school/work $\geq$ 18 minutes

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More Examples of Real-World Inequalities

Situation	Mathematical Inequality
Capacity: Elevator	Number of people in an elevator ≤ 12 people
Election	Electoral votes needed to win U.S. presidency ≥ 270
Nutrition	Amount of calories per meal ≤ 700

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Recognize the Symbols and the Vocabulary

Term	Inequality
Coefficient	$4a > 8$
Boundary Point	A solution that makes the inequality true
Solution Set	The range of values that make the inequality true
Inclusive	$a \leq 6$
Exclusive	$a < 6$

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Recognize the Symbols and the Vocabulary

Phrase	Inequality
"a is more than b"	$a > b$
"a is at least b"	$a \geq b$
"a is less than b"	$a < b$
"a is at most b;" or "a is no more than b"	$a \leq b$

Inequality tells what is "allowable" or "possible." An inequality places conditions on the value of the variable.

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Rules for Solving Inequalities

1. Make the same changes to both sides of the inequality
2. Isolate the variable
3. Combine like terms
4. Use the inverse operation to remove clutter from the variable
5. If your inverse operation is multiplication or division by a negative number, reverse the inequality sign

$<$ becomes $>$
 $>$ becomes $<$
 $\leq$ becomes $\geq$
 $\geq$ becomes $\leq$

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Properties of Inequalities

Addition and Subtraction

If $a > b$, then $a + c > b + c$

If $a > b$, then $a - c > b - c$



Real-life situation

Becky is older than Janet: $b > j$

Add 10 years: $b + 10 > j + 10$

Subtract 10 years: $b - 10 > j - 10$

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Properties of Inequalities

Multiplication and Division

If $a > b$, then $ac > bc$, if $c > 0$

If $a < b$, then $ac < bc$, if $c < 0$



Real-life situation

Becky is older than Janet: $b > j$

When they are twice their current age:

$b(2) > j(2)$

When they were half the age they are now:

$\frac{b}{2} > \frac{j}{2}$

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But...there is one exception

$$-3n > 12$$

If you divide or multiply by a negative number

$$\frac{-3n}{-3} > \frac{12}{-3}$$

reverse the inequality symbol

$$n < -4$$

Solution: all numbers less than -4

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Testing the Property

$$3 > 2$$

Multiply by -1

$$(-1)(3) > 2(-1)$$

$$-3 > -2 \quad \text{FALSE}$$

$$-3 < -2 \quad \text{TRUE}$$

Multiplying by a negative flipped the inequality sign from "greater than" to "less than."

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Solve the Inequality

$$4 + x < 12$$

$$\begin{array}{l} 4 + \boxed{x} < 12 \text{ (draw wall down inequality)} \\ 4 + x < 12 \text{ (box in variable)} \\ 4 + x < 12 \text{ (minus 4 both sides)} \\ -4 \quad -4 \\ \hline x < 8 \end{array}$$

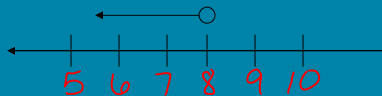
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Graph the Solution

$$x < 8$$

1. Draw a number line. Just need a few numbers on either side of the solution number.



2. Decide if open circle or closed circle. Place it above the solution number.
3. Determine which way your arrow goes by substituting a number in for the variable to make the statement true. Then draw the arrow pointing in that direction.

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Solving Real-World Problems Involving Inequalities

1. List all information required to set-up the inequality.
2. Based on the provided information determine the inequality symbol to be used ($>$, $<$, $\geq$, $\leq$).
3. Set-up the inequality.
4. Isolate the unknown (variable) using the different properties of inequality.
5. Graph the solution, if needed.

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Solving Real-World Problems Involving Inequalities



<https://youtu.be/Cj37irEuFIE>

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Sample Question from GEDTS

Mathematical Reasoning - Candidate Name

Question 13 of 16

☒ Answer Explanation ☐ Calculator ☐ Flag for Review

☐ Formula Sheet ☐ Calculator Reference

Julia wants to spend \$100 or less ordering shirts from an online company. The company charges a \$5 shipping fee for any order. The inequality $5 + 15n \leq 100$ represents the number of shirts, n , Julia can order from the online company. Graph all possible numbers of shirts that Julia can buy.

Click on the number line to plot the point(s).

(NOTE: To remove a point, place the arrow over the point and click the left mouse button.)

← Previous Next →

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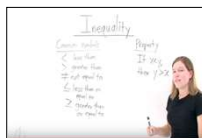
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Resources



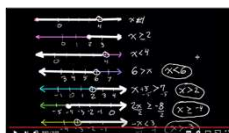
One-Variable Inequalities – Khan Academy

<https://www.khanacademy.org/math/algebra/a/one-variable-linear-inequalities>



Virtual Nerds: What is an Inequality?

<https://www.youtube.com/watch?v=wcBwdz-ZBaM>



Very Basics of Graphing Inequalities (on a number line)

<https://www.youtube.com/watch?v=nif2PKA9bXA>

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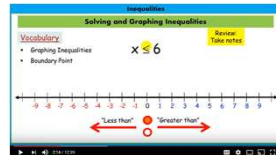
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Resources



Math is Fun – Solving Inequalities

<http://www.mathsisfun.com/algebra/inequality-solving.html>



Solving and Graphing Inequalities (Excellent!)

<https://www.youtube.com/watch?v=EE2qWlyjKD0>



Math Dude Unit 1-4 – Solving Inequalities

https://www.youtube.com/watch?v=8hheWFQ_K0w



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End of Nearpod Lesson Demonstration

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Nearpod for Asynchronous Virtual Instruction

My Lessons Create + Folder



EXPLORE THE NEARPOD LIBRARY

Drag to folder

Live Participation + Zoom

Live Participation

Student-Paced

Edit Preview

Inequalities - SC
Ronald Cruz
Mar 5, 2021 - 20MB



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Monitoring Student Progress in Nearpod

Inequalities - MS
Author: Ronald Cruz - Slides: 33 - Date: Friday, March 5, 2021 02:46:14 PM

SUMMARY Quiz Poll Open Ended Draw It Collaborate Board Time To Climb Interactive Video

Student Participation General

69 Answered
32 Skipped

Correct Answer ratio Quiz

65 Correct Answer
13 Wrong Answer
13 No Answer

Student engagement details Students: # 23

Nick name	Other	Features					Participation
		Quiz	Poll	Open Ended	Draw It	Video Open Ended	
1. Cara Finley IP: 96.122.17.62		100%	100%	100%	100%	100%	100%
2. constance newell IP: 174.131.38.135		100%	100%	100%	100%	100%	50%

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Solve math problems in a snap

Choose between multiple methods

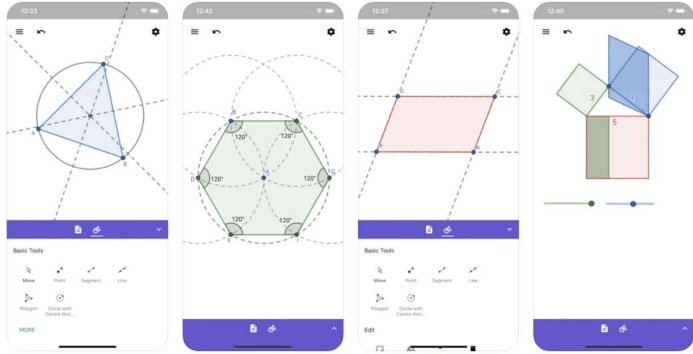
Get step-by-step explanations

Try our smart calculator too!

Photomath allows you to snap a picture of the math problem and get its step-by-step solution! From basic arithmetic to fractions to trigonometry to linear and quadratic equations, it can help you with a lot of Math problems quite easily.

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GeoGebra



Create constructions with points, lines, circles, polygons, and angles, explore interactive geometry by dragging points, measure lengths and areas, transform shapes, investigate construction steps to get deeper understanding, save and share your results with others

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The MATH LEARNING CENTER



SUPPORTS SHARING!
Geoboard

The Geoboard app is a tool for exploring a variety of mathematical topics introduced in the elementary and middle grades. Learners stretch bands around the pegs to form line segments and polygons and make discoveries about perimeter, area, angles, congruence, fractions, and more.

Open Web App
[Apple App Store](#)
[Chrome Store](#)



SUPPORTS SHARING!
Math Clock

Math Clock helps students become fluent working with time. Learners use analog clocks with geared or free-moving hands to learn how to tell time, explore jumps with count by numbers, and visualize story problems involving intervals of time.

Open Web App
[Apple App Store](#)
[Chrome Store](#)



SUPPORTS SHARING!
Number Frames

Number Frames help students structure numbers to 5, 10, 20, and 100. Students use the frames to count, represent, compare, and compute with numbers in a particular range.

Open Web App
[Apple App Store](#)
[Chrome Store](#)



SUPPORTS SHARING!
Number Line

Number Line helps students visualize number sequences and illustrate strategies for counting, comparing, adding, subtracting, multiplying, and dividing. Choose number lines labelled with whole numbers, fractions, decimals.

Open Web App
[Apple App Store](#)
[Chrome Store](#)

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SUPPORTS SHARING!
Number Pieces

Number Pieces helps students develop a deeper understanding of place value while building their computation skills with multi-digit numbers. Students use the pieces to represent multi-digit numbers, regroup, add, subtract, multiply, and divide.

[Open Web App](#)
[Apple App Store](#)
[Chrome Store](#)



SUPPORTS SHARING!
Number Rack

Number Rack facilitates the natural development of children's number sense. Rows of movable, colored beads encourage learners to think in groups of fives and tens, helping them to explore and discover a variety of addition and subtraction strategies. Free activities and free book available.

[Open Web App](#)
[Apple App Store](#)
[Chrome Store](#)



SUPPORTS SHARING!
Pattern Shapes

Students use Pattern Shapes to explore geometry and fractions, create their own designs, or fill in outlines. As they work with shapes, students think about angles, investigate symmetry, and compose and decompose larger shapes.

[Open Web App](#)
[Apple App Store](#)
[Chrome Store](#)



SUPPORTS SHARING!
Whiteboard App

The Whiteboard App is a digital workspace for teachers and students to solve problems and explain their thinking. Math concepts can be explored in a variety of ways using a flexible set of tools to sketch, write, and build equations.

[Open Web App](#)

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Fractions

The Fractions app lets students use a bar or circle to represent, compare, and perform operations with fractions with denominators from 1 to 100. Choose the fraction model and number of equal parts. Use a color to select specific parts to show a fraction of the whole.

[Open Web App](#)
[Apple App Store](#)
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Math Vocabulary Cards

Math Vocabulary Cards help students deepen their conceptual understanding of key terms in mathematics. Each card features three sections: a math term, a representative example or model, and a concise definition.

[Open Web App](#)
[Apple App Store](#)
[Chrome Store](#)



Money Pieces

Money Pieces help students visualize and understand money values and relationships. Two versions of coins and bills are provided: virtual currency pieces that replicate the appearance and relative size of U.S. coins and the dollar bill, and area money pieces.

[Open Web App](#)
[Apple App Store](#)
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Brainly is a crowdsourced Q&A site for students to give and receive homework help, kind of like Yahoo Answers for education. Students post their questions within a subject or grade level, and other students answer them.

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Final Thoughts

1. Pick your app and stick with it.
2. Communicate clearly.
3. Archive your resources for future use.
4. Apply research-based instructional strategies
5. No IP Address left behind! Accountability matters.
6. Simplify
7. Give sufficient brain breaks.
8. Make it fun!
9. Allow for accessibility.
10. Promote collaboration and digital citizenship.

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