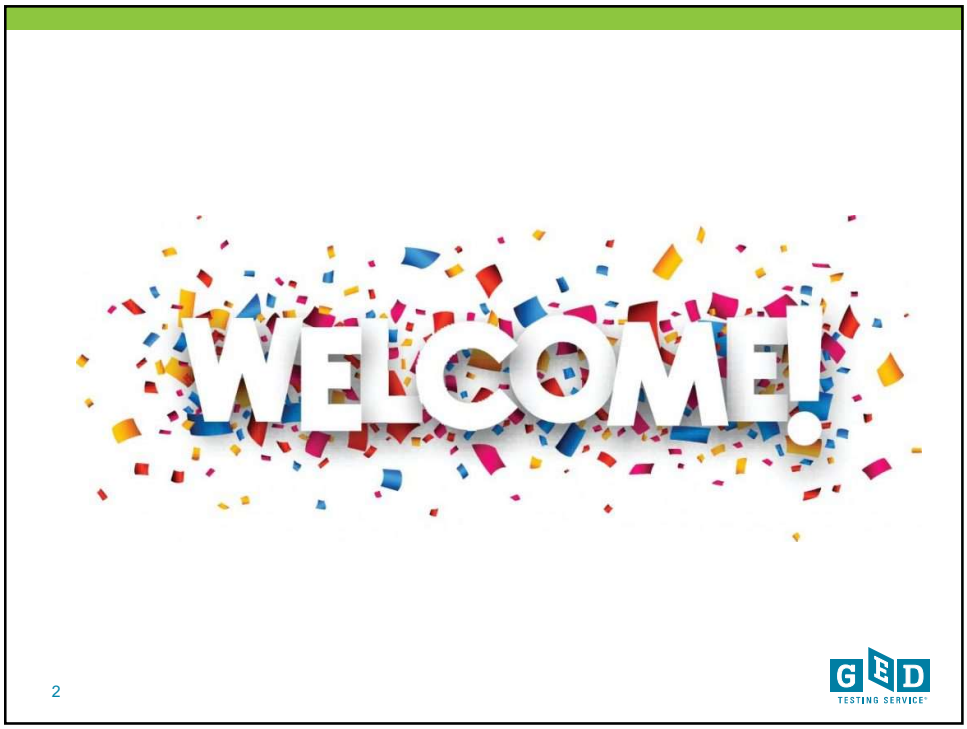

Harnessing Apps to Promote Mathematical Reasoning
Get in TUNE
COABE
TAACE
COABE NATIONAL VIRTUAL • CONFERENCE
PRE-CONFERENCE | MARCH 18-19 2021
EMBRACING COLLABORATION | MARCH 22-24
GED
TESTING SERVICE

1


WELCOME!
2
GED
TESTING SERVICE

2

Facilitator

Ronald Cruz
Coordinator, Hillsborough County Schools, Tampa, FL
Mathematics/Physics Teacher
National Trainer, GED Testing Service
rcruz@bucketpd.com

3

3

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*

4

4

nearpod

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.

5

5

nearpod

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

6

6

Internet Browser

Nearpod App

Wait for the CODE to join the lesson demonstration.

7

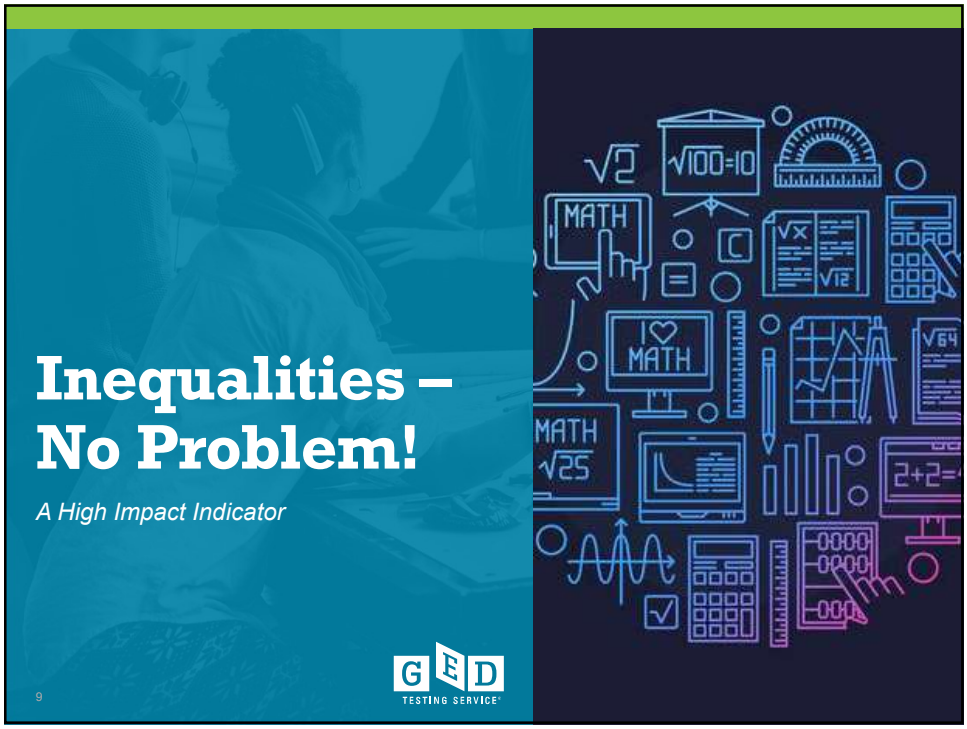
7

Nearpod Lesson Demonstration

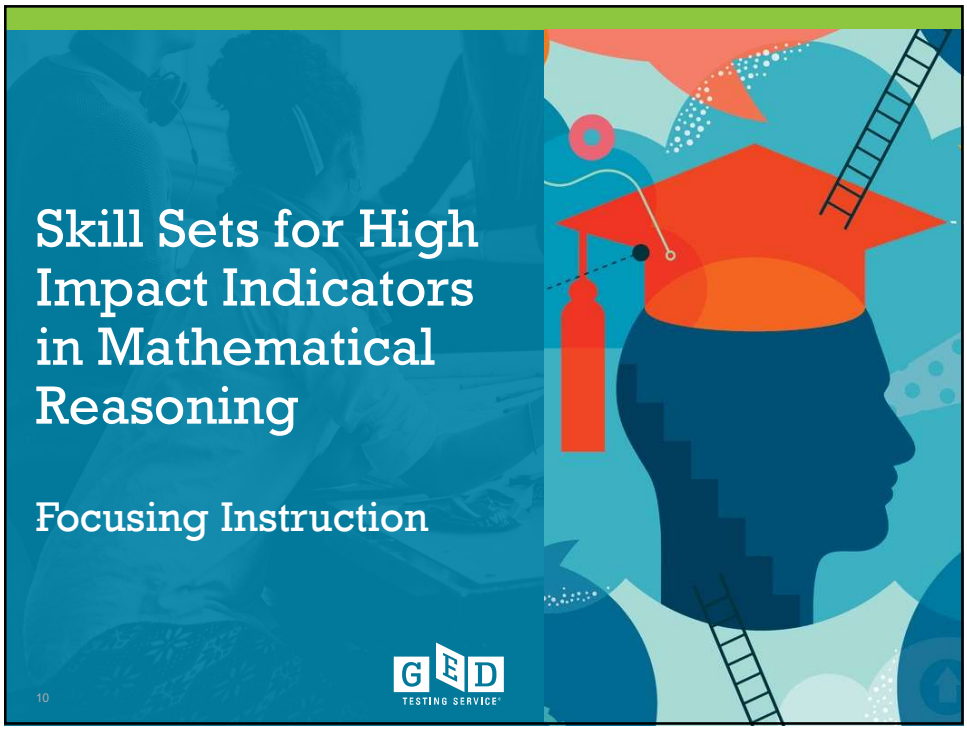
https://nearpod.com/

8

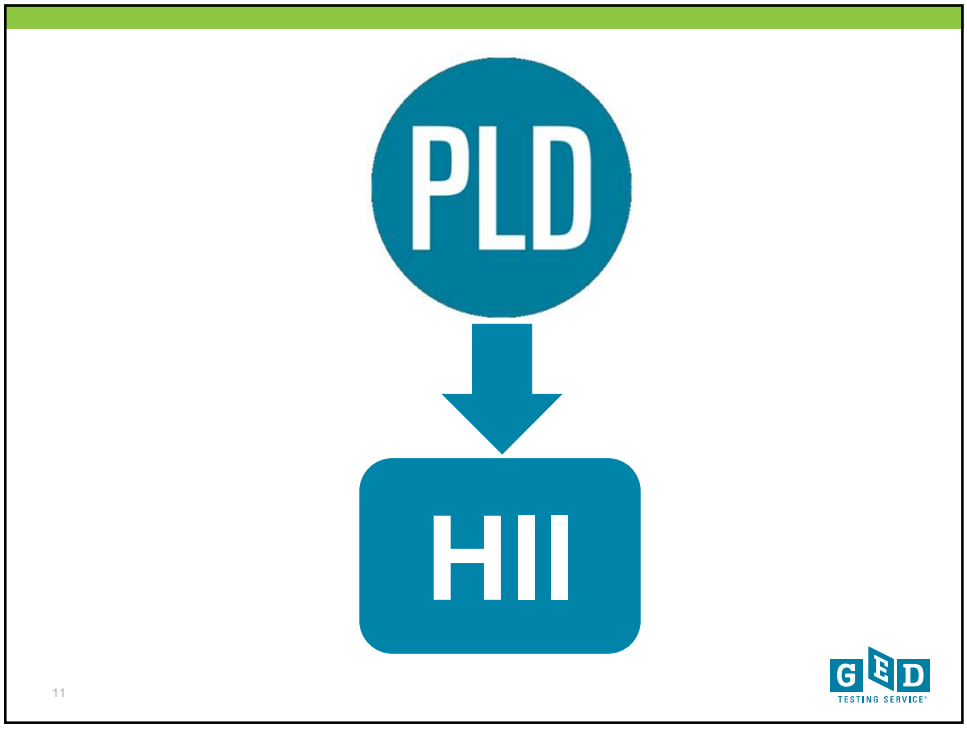
8


Inequalities – No Problem!
A High Impact Indicator
9
GED TESTING SERVICE
√2
√100=10
MATH
MATH
MATH
√25
2+2=

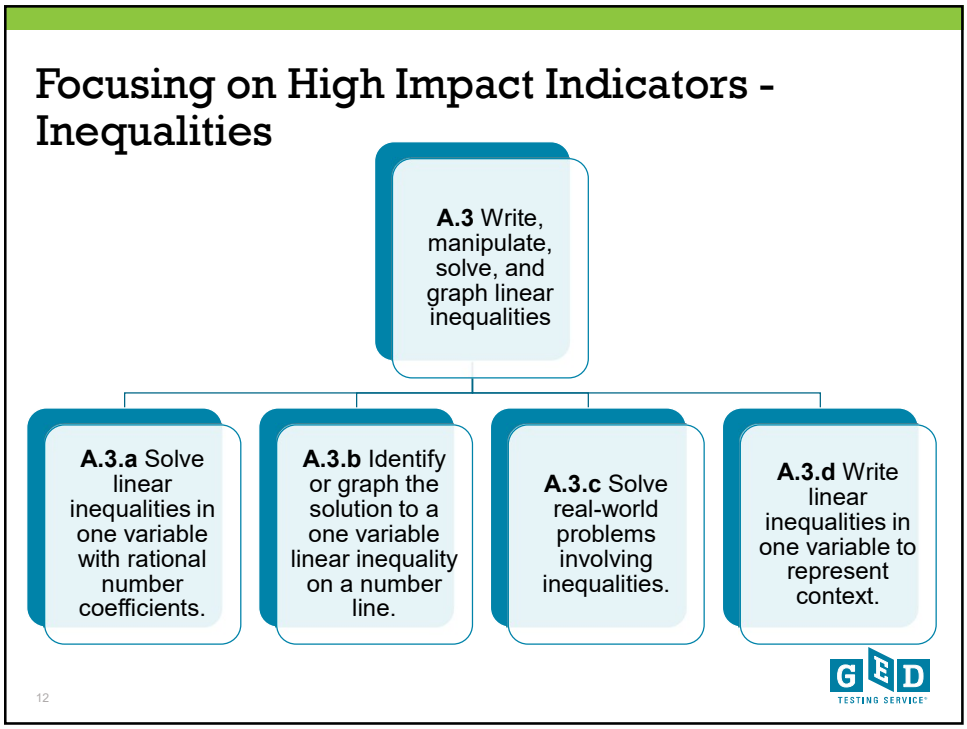
9


Skill Sets for High Impact Indicators in Mathematical Reasoning
Focusing Instruction
10
GED TESTING SERVICE

10


PLD
HII
11

11


Focusing on High Impact Indicators - Inequalities
A.3 Write, manipulate, solve, and graph linear inequalities
A.3.a Solve linear inequalities in one variable with rational number coefficients.
A.3.b Identify or graph the solution to a one variable linear inequality on a number line.
A.3.c Solve real-world problems involving inequalities.
A.3.d Write linear inequalities in one variable to represent context.
12

12

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?

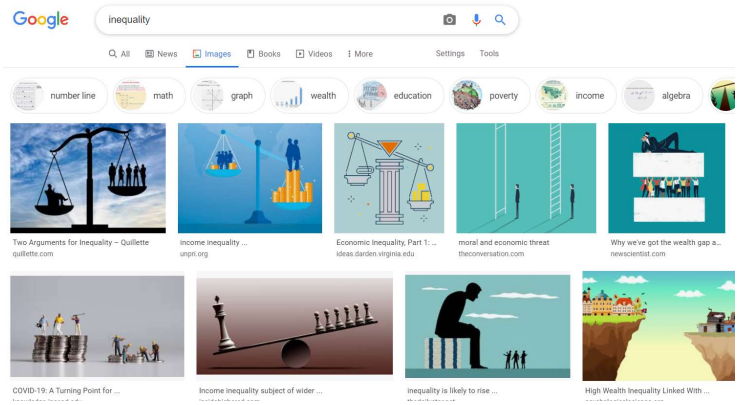
Analyze the relationship between quantities in a real-world problem, and then solve the problem through algebraic reasoning?

13

13

What is an inequality?

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



14

14

What is an inequality?

An inequality is a mathematical sentence that uses symbols such as <, ≤, >, or ≥ to compare two quantities.

15

15

Inequalities Are Everywhere

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

16

16

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

17

17

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 ≤ 6
Exclusive	a < 6

18

18

Recognize the Symbols and the Vocabulary

Phrase	Inequality
"a is more than b"	a > b
"a is at least b"	a ≥ b
"a is less than b"	a < b
"a is at most b;" or "a is no more than b"	a ≤ b

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

19

19

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 <
≤ becomes ≥
≥ becomes ≤

20

20

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

21

21

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

22

22

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

23

23

Testing the Property

3 > 2

Multiply by -1

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

-3 > -2 FALSE

-3 < -2 TRUE

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

24

24

Solve the Inequality

$$4 + x < 12$$

$4 + \boxed{x} < 12$ (draw wall down inequality)

$4 + x < 12$ (box in variable)

$4 + x < 12$ (minus 4 both sides)

$-4 \quad -4$

$x < 8$

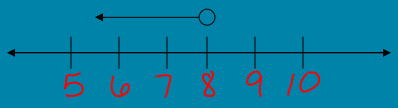
25

25

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.

26

26

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 (>, <, ≥, ≤).
3. Set-up the inequality.
4. Isolate the unknown (variable) using the different properties of inequality.
5. Graph the solution, if needed.

27

27

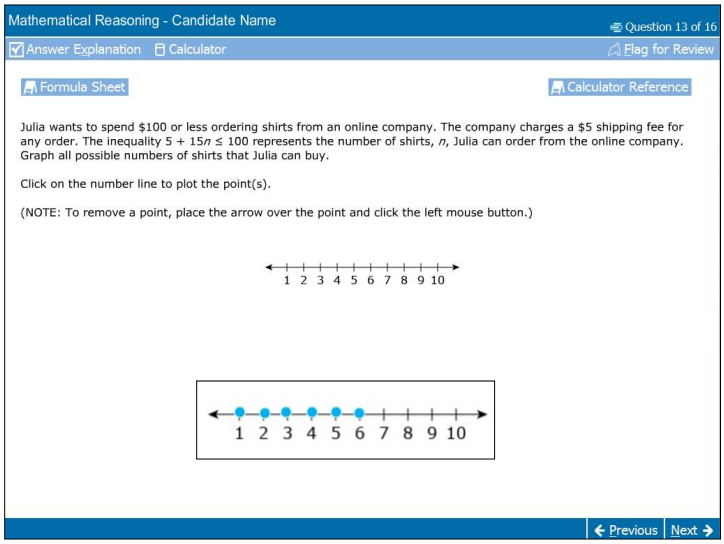
Solving Real-World Problems Involving Inequalities

https://youtu.be/Cj37irEuFlE

28

28

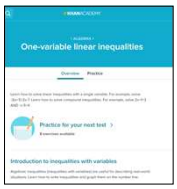
Sample Question from GEDTS



29

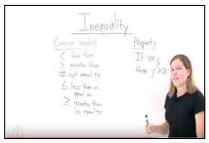
29

Resources

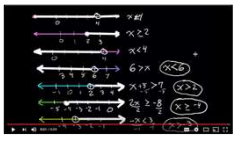


One-Variable Inequalities – Khan Academy

https://www.khanacademy.org/math/algebra/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

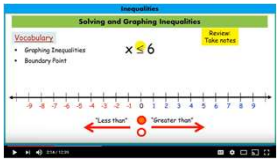
30

30

Resources

Math is Fun – Solving Inequalities

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



Solving and Graphing Inequalities (Excellent!)

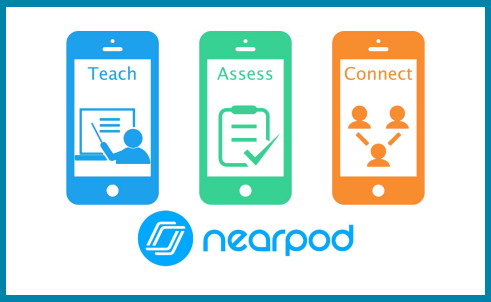
https://www.youtube.com/watch?v=EE2qWIyjKD0

Math Dude Unit 1-4 – Solving Inequalities

https://www.youtube.com/watch?v=8hhewFQ_K0w

31

31

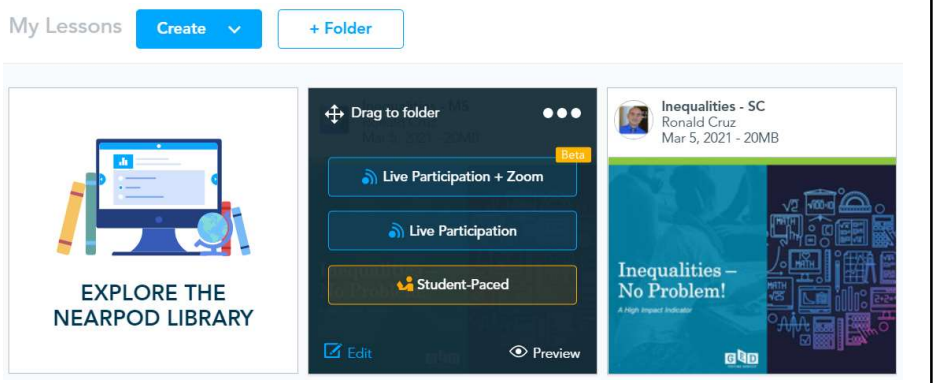


End of Nearpod Lesson Demonstration

32

32

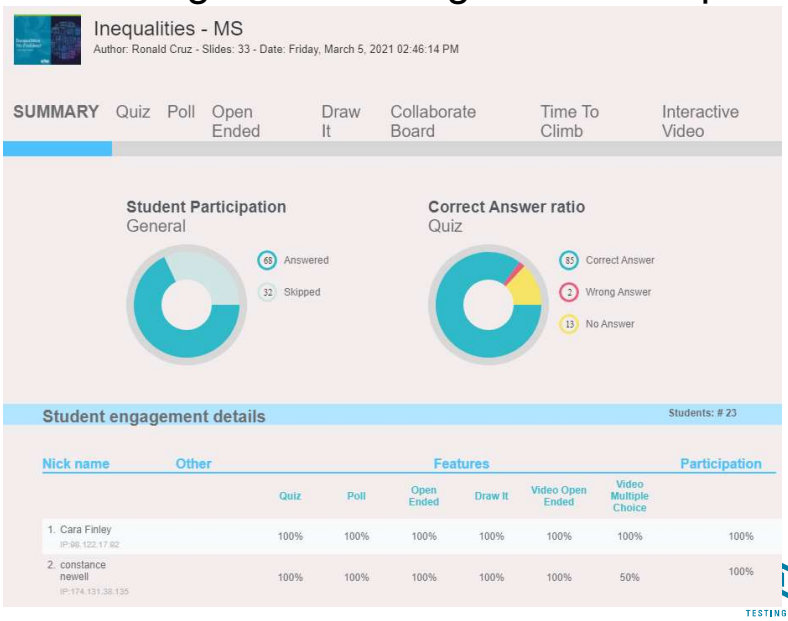
Nearpod for Asynchronous Virtual Instruction



33

33

Monitoring Student Progress in Nearpod

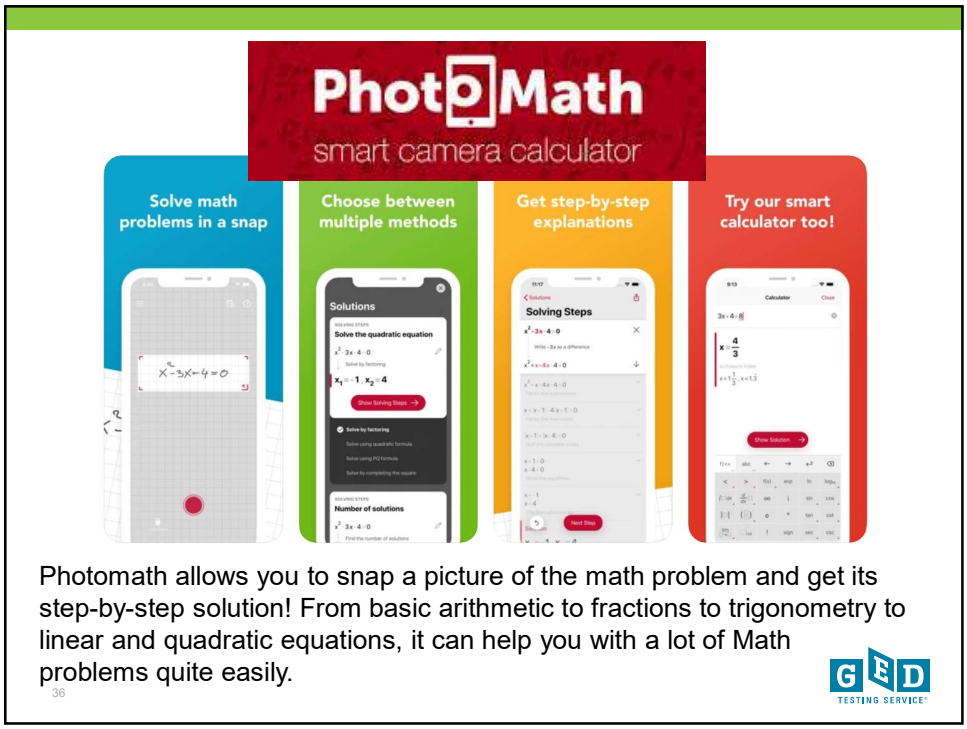


34

34

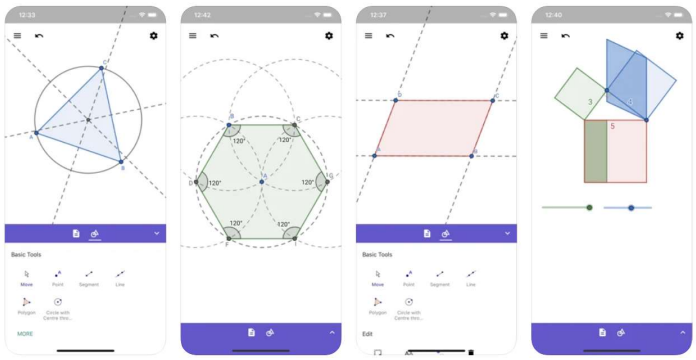

Other Noteworthy Apps
35
GED TESTING SERVICE

35


PhotoMath
smart camera calculator
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.
36
GED TESTING SERVICE

36

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

37

37

The MATH LEARNING CENTER

SUPPORTS SHARING!

Geoboard

Open Web App
Apple App Store
Chrome Store

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.

SUPPORTS SHARING!

Math Clock

Open Web App
Apple App Store
Chrome Store

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.

SUPPORTS SHARING!

Number Frames

Open Web App
Apple App Store
Chrome Store

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.

SUPPORTS SHARING!

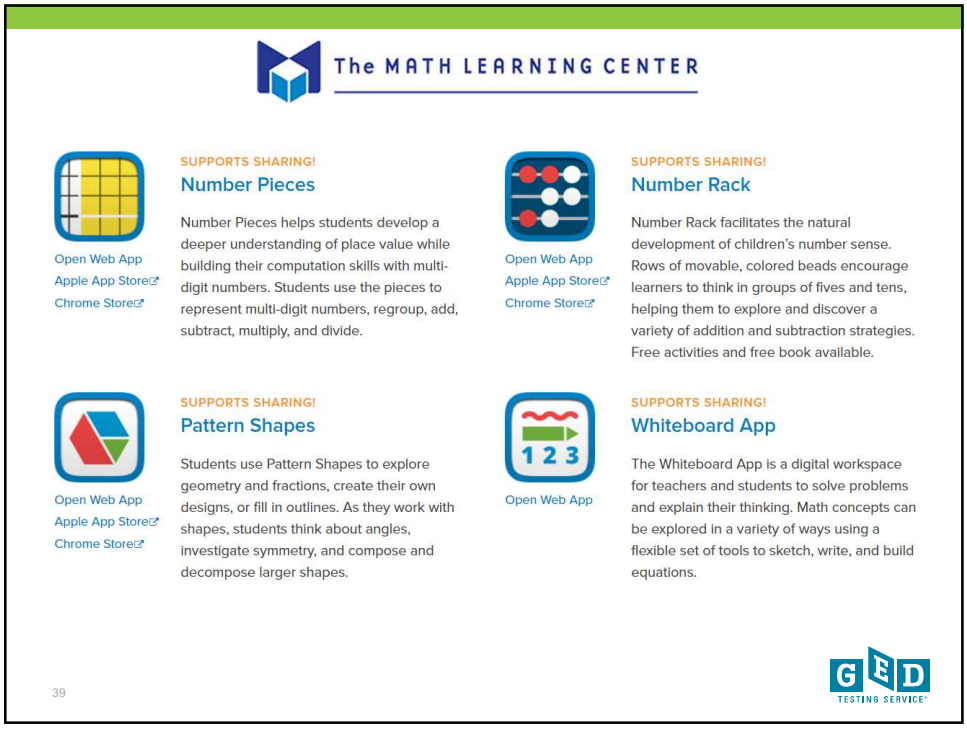
Number Line

Open Web App
Apple App Store
Chrome Store

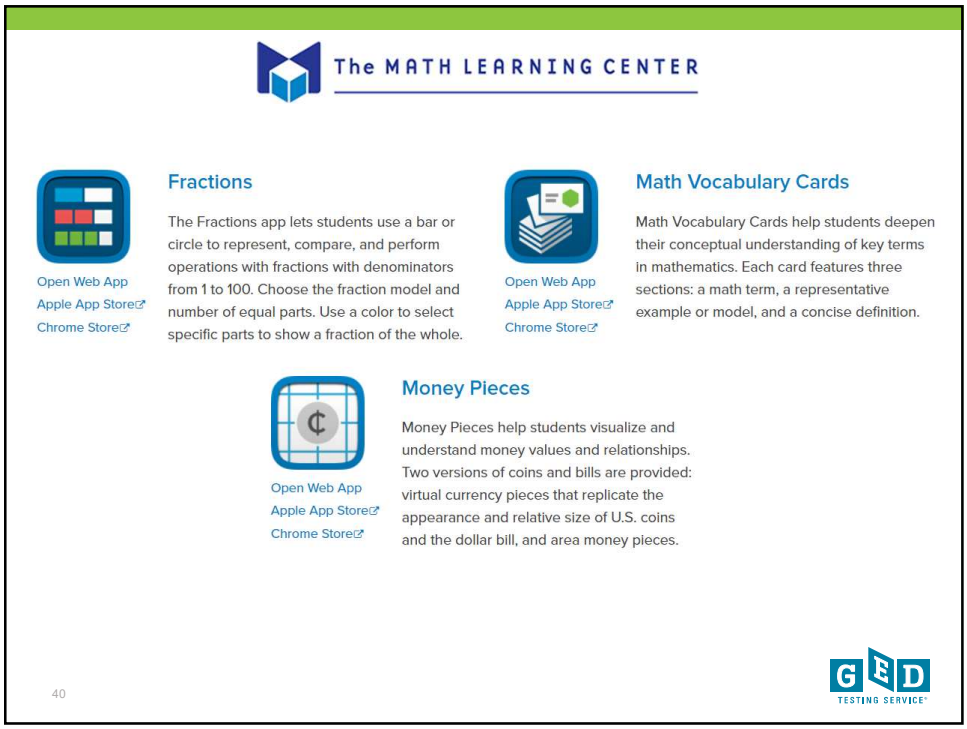
Number Line helps students visualize number sequences and illustrate strategies for counting, comparing, adding, subtracting, multiplying, and dividing. Choose number lines labelled with whole numbers, fractions, decimals.

38

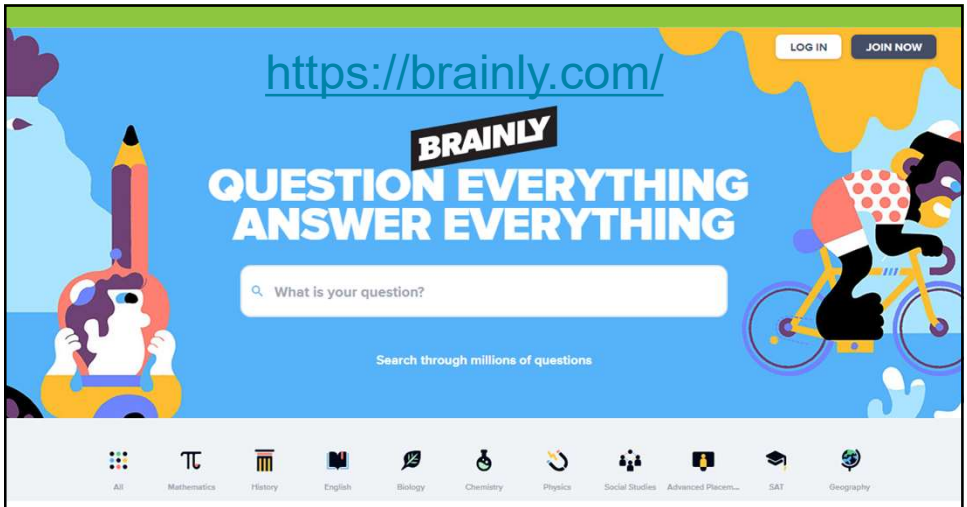
38


The MATH LEARNING CENTER
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
39
GED TESTING SERVICE

39


The MATH LEARNING CENTER
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
Chrome Store
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
Chrome Store
40
GED TESTING SERVICE

40



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.

41

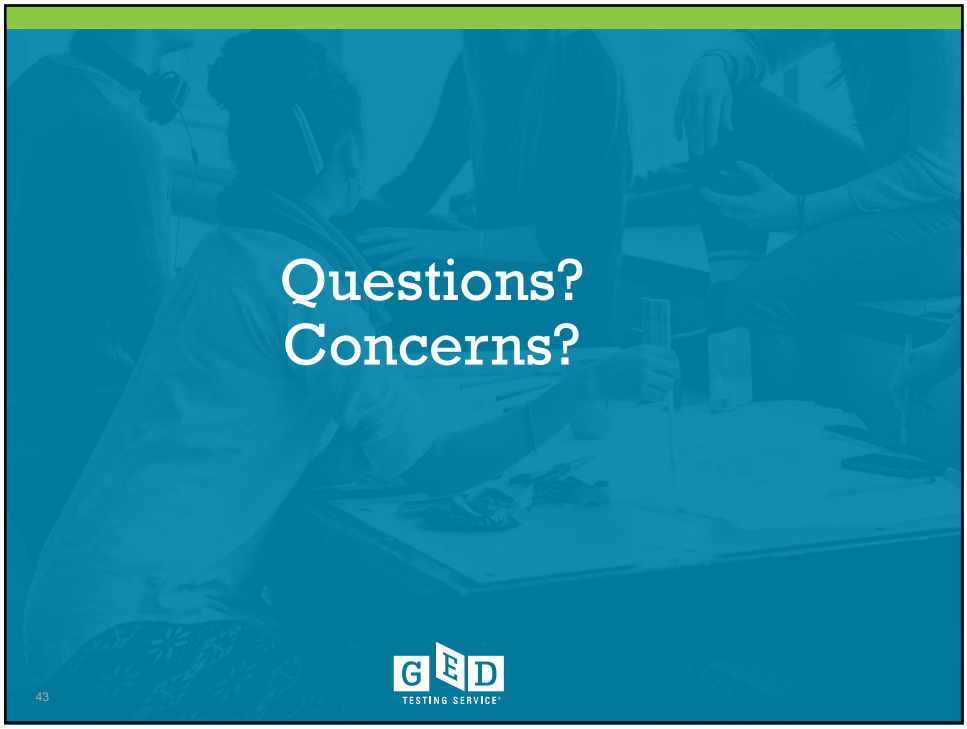
41

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.

42

42


Questions?
Concerns?
43

43


For questions and comments, send an email to rcruz@bucketPD.com.
Ronald Cruz
National Trainer
GED Testing Service
Thank you!
Communicate with GED Testing Service®
communications@ged.com
44

44