


INSTITUTE FOR THE PROFESSIONAL
DEVELOPMENT OF ADULT EDUCATORS

Teaching Mathematical Inequalities Virtually using Nearpod

www.floridaipdae.org

This training event is supported with federal funds as appropriated to the Florida Department of Education, Division of Career and Adult Education for the provision of state leadership professional development activities.

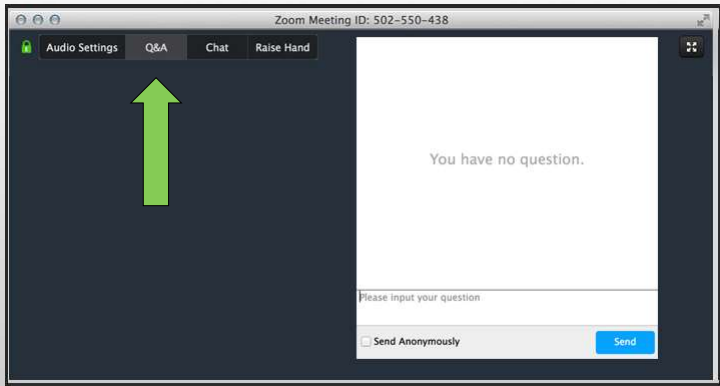
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Webinar Things to Remember

- If you have a question, please type it into the **Q&A** option.



- Attendee microphones will be muted. You will be in **listen only** mode.
- Today's presentation is being **recorded**. It will be archived and available on the IPDAE website within 48 hours.

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The slide features the IPDAE logo in the top left corner, which includes the text 'ipdae' and 'BY EDUCATORS FOR EDUCATORS' with a small graphic of three people. In the top right corner, the text 'Webinar Facilitator' is displayed. On the left side, there is a circular portrait of Ronald Allan Cruz, a man with a shaved head wearing a blue shirt and a striped tie. To the right of the portrait, the following text is listed: 'Ronald Allan Cruz, M.Ed.', 'Coordinator', 'CARIBE Refugee Program', 'Hillsborough County Public Schools', 'IPDAE Statewide Trainer', 'National Trainer, GED® Testing Service', and the email address 'rcruz@floridaipdae.org'. At the bottom right, there is a faint watermark of an apple with a person inside it. At the bottom center, the text '2020-21 The Institute for the Professional Development of Adult Educators' is visible.

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Objectives



- Discuss using High Impact Indicators to drive instruction
- Review the basics of mathematical inequalities.
- Investigate importance of students' understanding of inequalities.
- Share resources and ideas


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Download or Launch



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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Schedule & Agenda




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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Landing Screen



Internet Browser



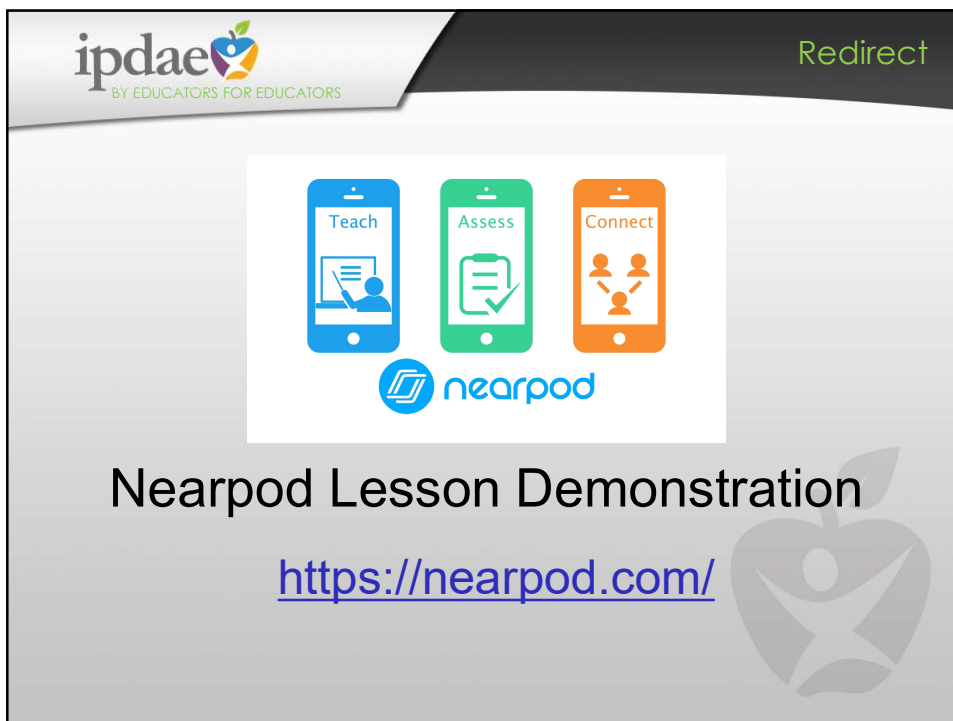
Nearpod App

Wait for the CODE to join the lesson demonstration.

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The slide features the ipdae logo (BY EDUCATORS FOR EDUCATORS) in the top left and a 'Redirect' button in the top right. In the center, three smartphone icons represent 'Teach', 'Assess', and 'Connect' functions, with the Nearpod logo below them. The title 'Nearpod Lesson Demonstration' is prominently displayed, followed by the URL <https://nearpod.com/>. A faint apple logo is visible in the bottom right corner.

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Redirect

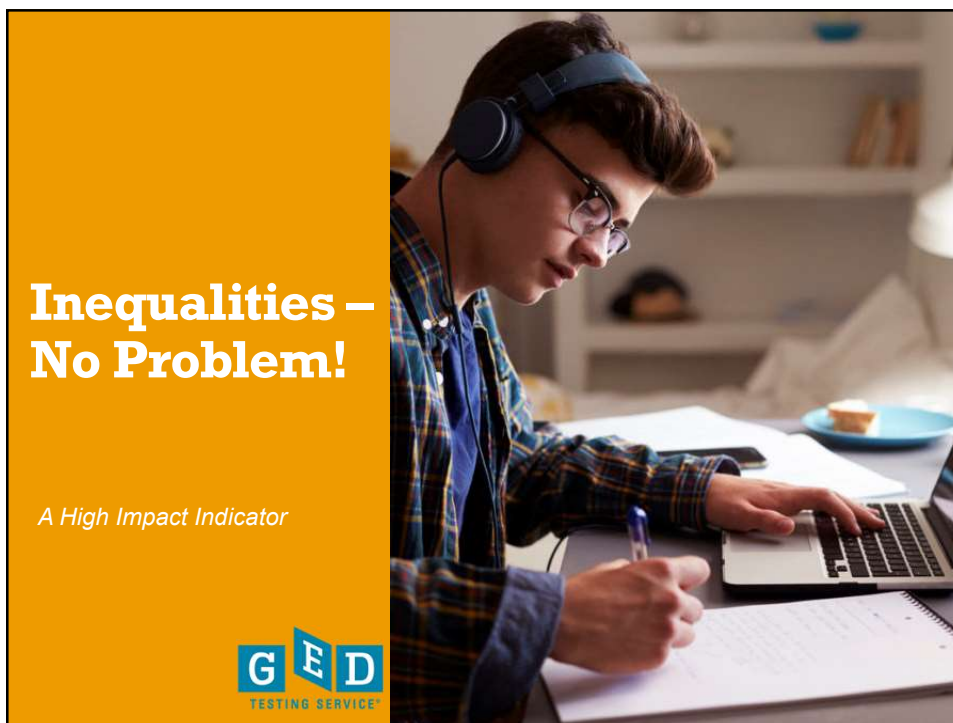
Teach Assess Connect

nearpod

Nearpod Lesson Demonstration

<https://nearpod.com/>

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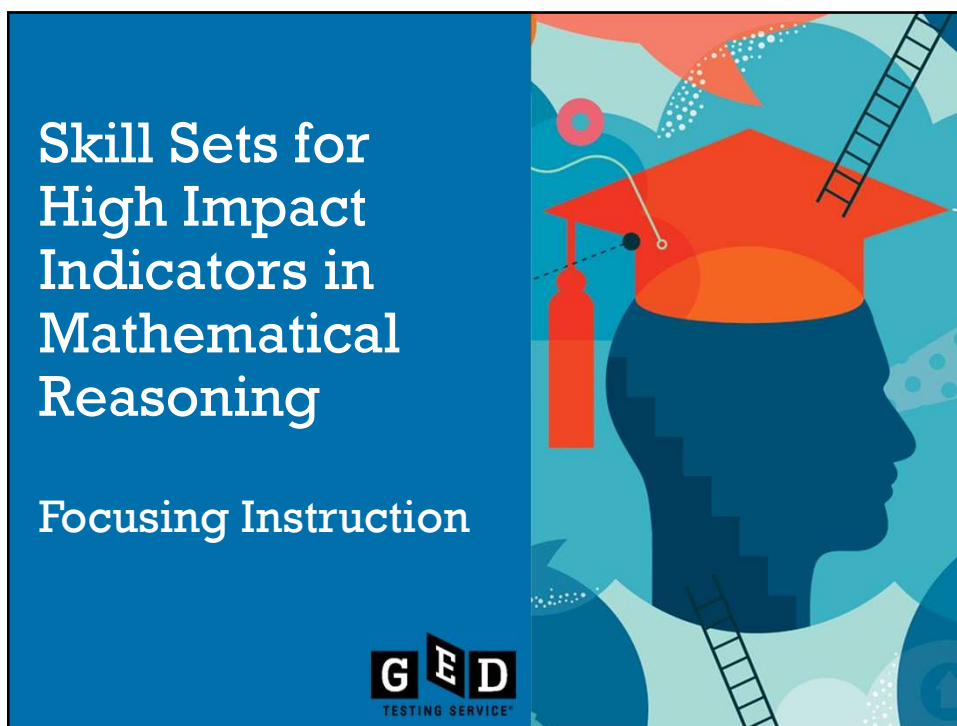
The poster has a yellow background on the left with the title 'Inequalities – No Problem!' and the subtitle 'A High Impact Indicator'. The right side shows a student wearing headphones and working on a laptop. The GED Testing Service logo is at the bottom left.

**Inequalities –
No Problem!**

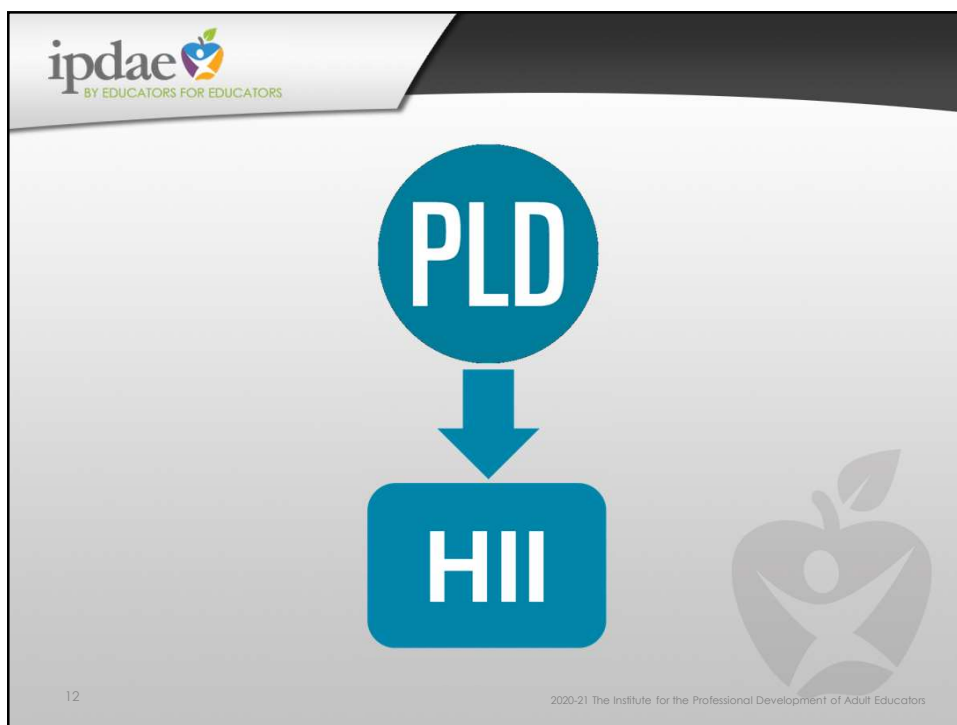
A High Impact Indicator

GED
TESTING SERVICE

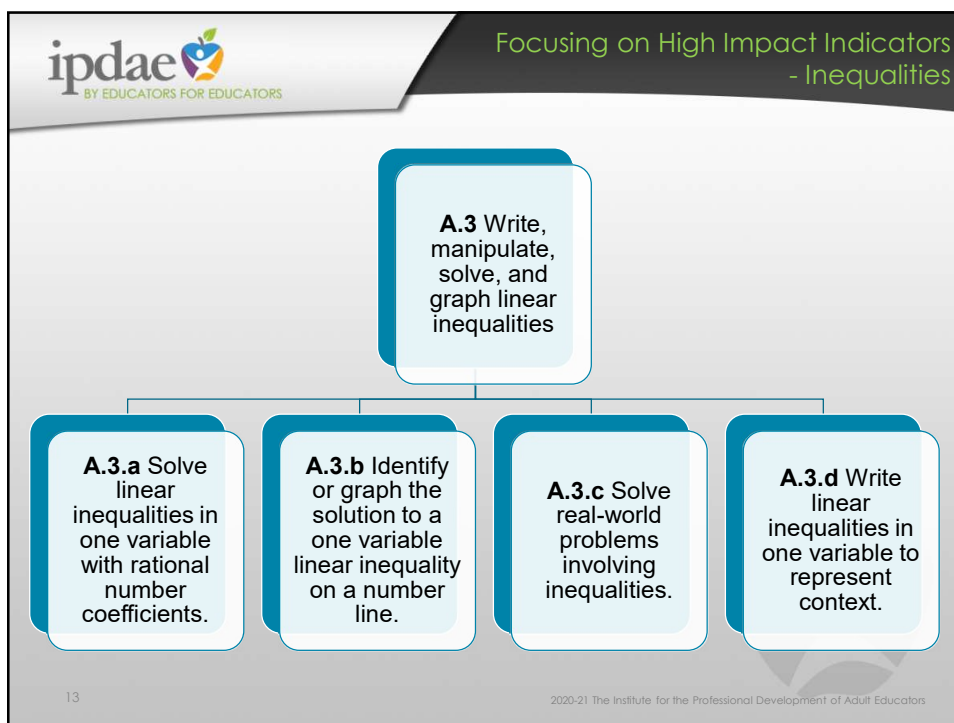
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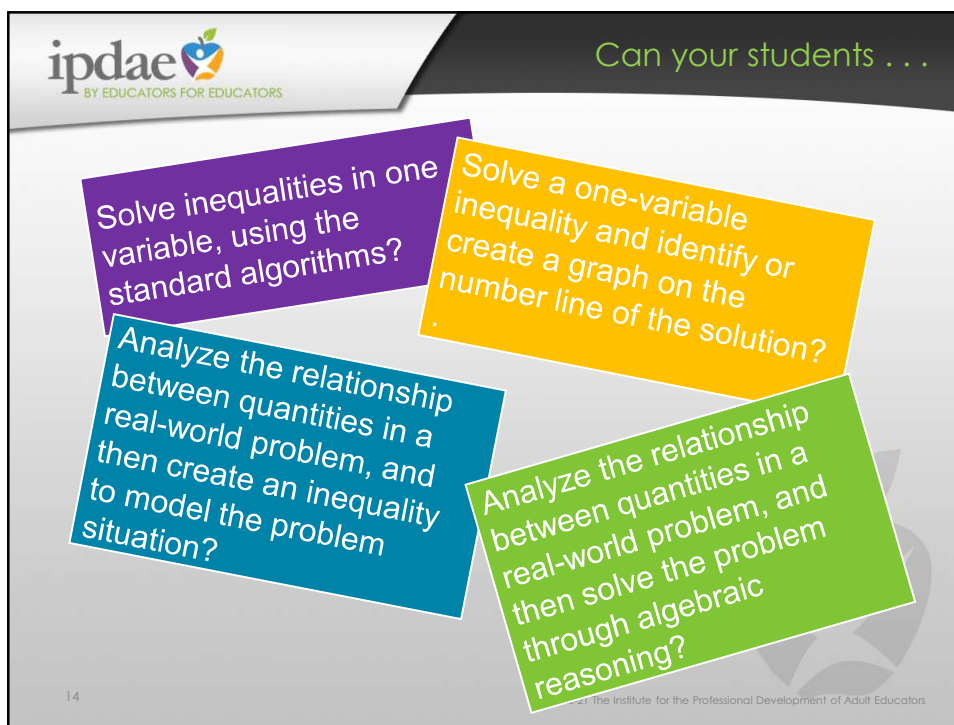
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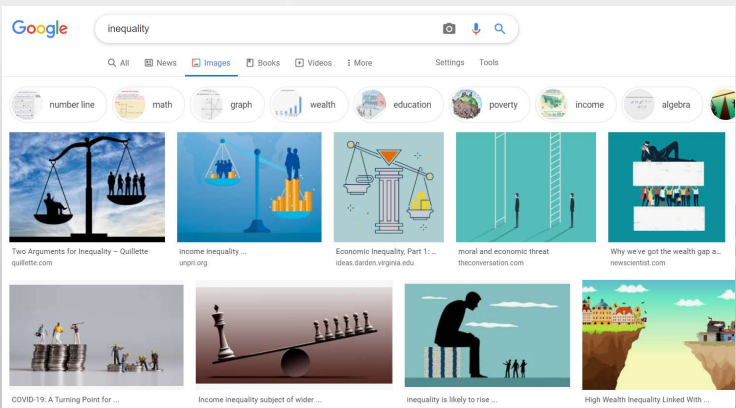
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What is an inequality?


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 ≤ 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 ≤ 250
Travel time	Time needed to drive from home to school/work ≥ 18 minutes

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More Examples

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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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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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


$< \text{ becomes } >$
 $> \text{ becomes } <$
 $\leq \text{ becomes } \geq$
 $\geq \text{ becomes } \leq$



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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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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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Testing the Property

$$4 + x < 12$$

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

$$4 + x < 12 \text{ (box in variable)}$$


$$4 + x < 12 \text{ (minus 4 both sides)}$$

$$\begin{array}{r} -4 \quad -4 \\ \hline x < 8 \end{array}$$

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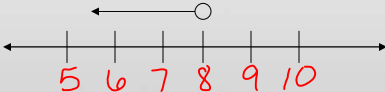
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Graph the Solution

$x < 8$

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

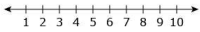
Question 13 of 16

☒ Answer Explanation ☐ Calculator

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.)

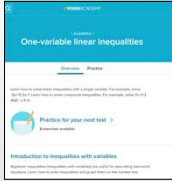
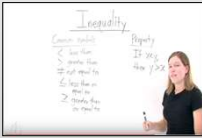
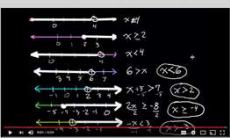


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Resources

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>


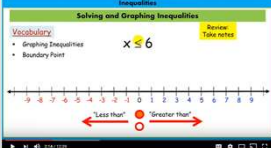
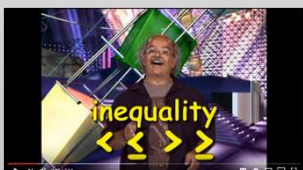
Very Basics of Graphing Inequalities (on a number line)

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

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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

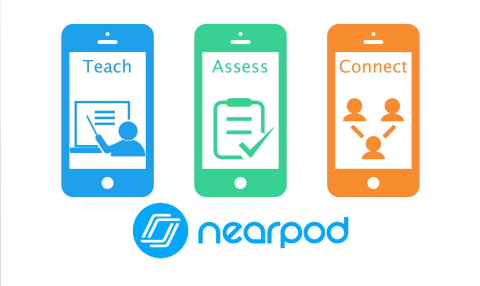
https://www.youtube.com/watch?v=8hhewFQ_K0w

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End of Nearpod Lesson
Demonstration

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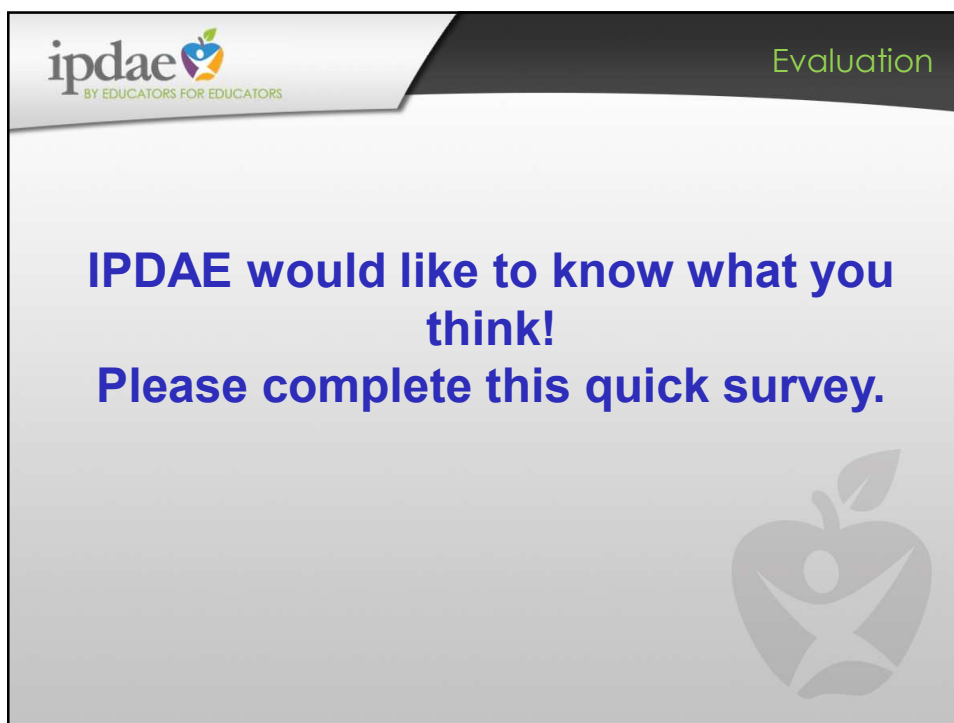
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