

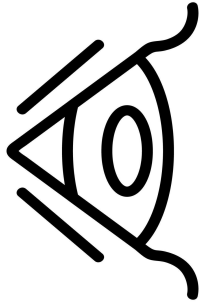


Instructional Nudges to Spark Student Discourse

Zandra de Araujo
University of Florida
www.MathematicallyEducated.com

What is a **high-quality** mathematical discussion?

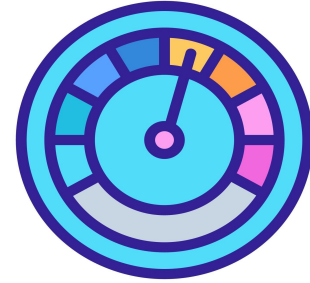
What is a **low-quality** mathematical discussion?



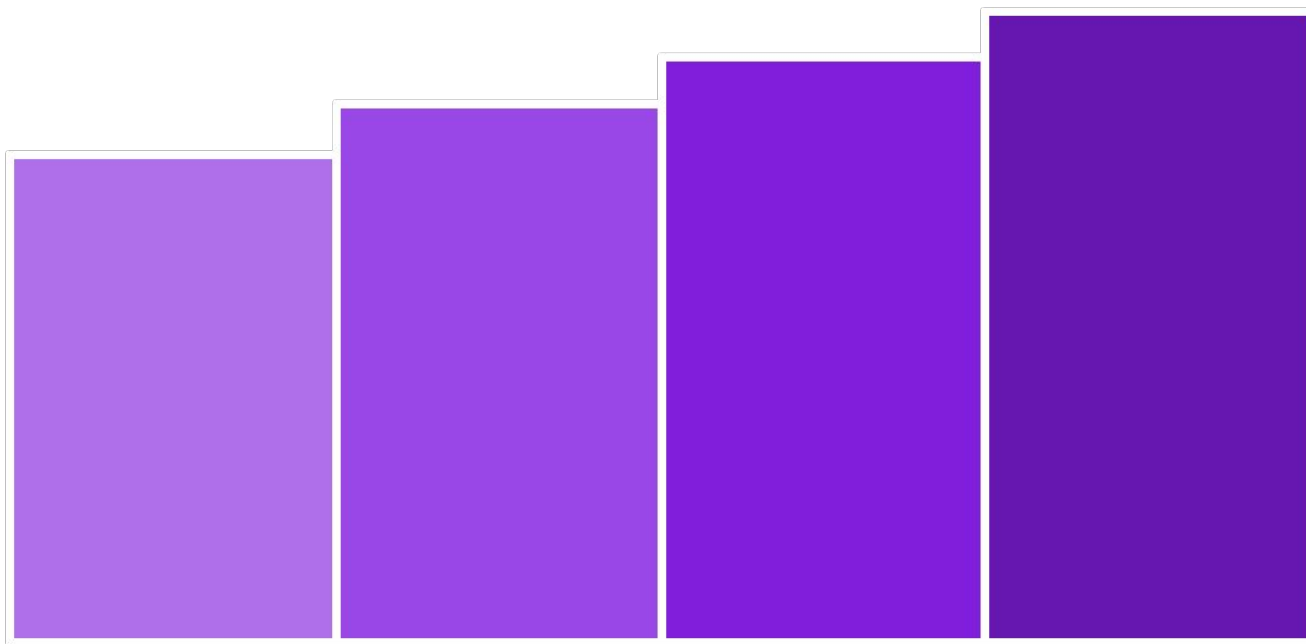
What does it **look** like?



What does it **sound** like?



What are indicators
of the quality?



Practice-Driven PD

PDPD Team



Dr. Zandra de Araujo



Dr. Samuel Otten



Dr. Amber Candela



Dr. Paul Wonsavage



Maria Stewart



Dr. Chris Engledowl



Dr. Wallace Pinto



Dr. LaMicah Lindsey



Olumide Banjo



The views expressed here do not necessarily reflect those of the National Science Foundation.



GOAL

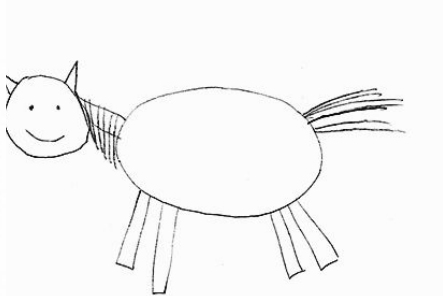


GOAL



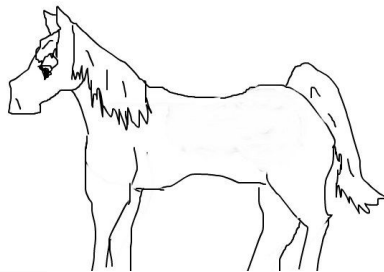
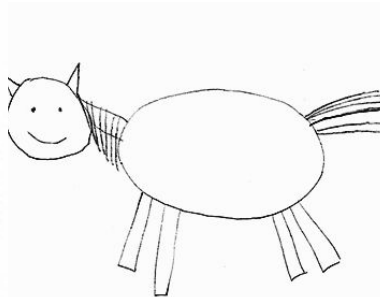


GOAL



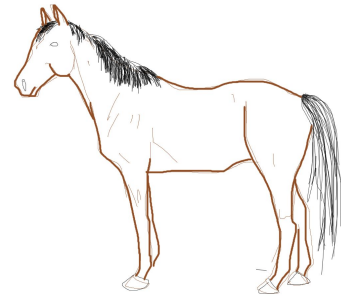
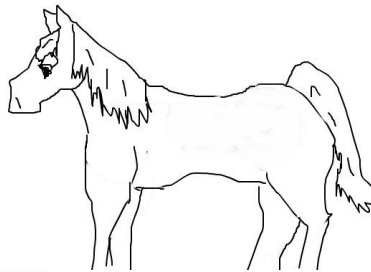
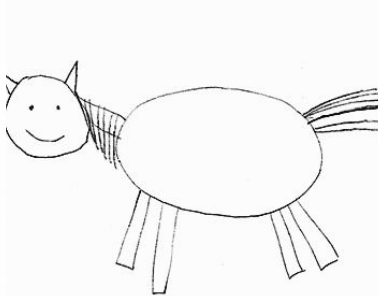


GOAL



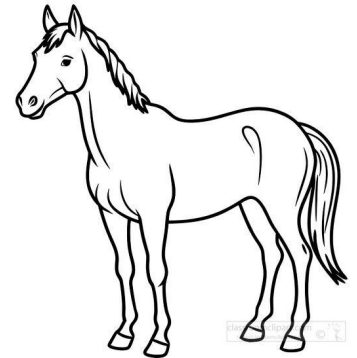
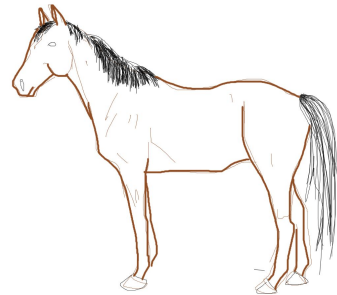
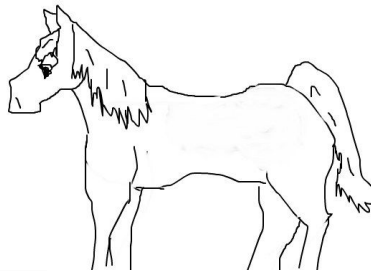
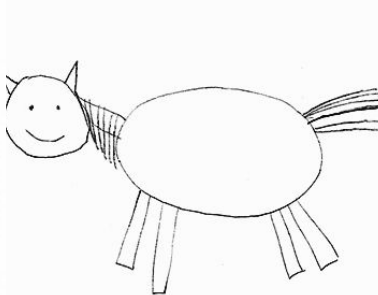


GOAL





GOAL



Instructional Nudges

Modest suggestion intended to be quickly and easily incorporated into teachers' current practice.

Here's Where I'm At



**WHEN STUDENTS
ARE WORKING
INDEPENDENTLY
ON A PROBLEM
SET.**



**HAVE STUDENTS PICK A
PROBLEM THEY WANT TO
DISCUSS AND FIND A
PARTNER.**





**THEN LET THEM DISCUSS
EACH PROBLEM FOR A
COUPLE OF MINUTES
BEFORE GETTING BACK TO
INDIVIDUAL WORK.**

Attending to Meaning

ACTIVITY - Part 1



ACTIVITY - Part 2



ACTIVITY - Part 3



ACTIVITY - Part 4

Absquatulate

Abstemious

Abstruse

Acedia

Absquatulate

To discreetly leave a gathering or party without informing the host.

At the party, I made such a fool of myself that I felt it was best to absquatulate after a half hour.

Word submitted by: Roger Johnson , Whangarei , Nortland , New Zealand

Abstemious

Not self-indulgent, especially when eating and drinking.

He was very abstemious when with a group, limiting himself to one beer and only a handful of chips.

Word submitted by: Chris Williams , Livonia , Michigan , United States

Abstruse

Difficult to understand; obscure.

He looked through the ancient book, trying to make sense of its abstruse wording and concepts.

Word submitted by: Christopher Williams , Livonia , Michigan , United States

Acedia

Spiritual or mental sloth; apathy.

When she broke up with him, he fell into a state of acedia and didn't leave the apartment for two months.

Word submitted by: CW

During the long summer break, Maya struggled with a feeling of _____, finding it difficult to motivate herself to work on projects she once enjoyed. To regain focus, she adopted an _____ lifestyle, limiting unnecessary distractions and excesses. When her professor assigned an _____ philosophical essay that was difficult to understand, she nearly decided to _____ and avoid dealing with it altogether. Instead, she pushed through the challenge and finished the assignment.

ACTIVITY - Part 5

A person is sitting up in bed, stretching their arms upwards. The scene is brightly lit by a window in the background, creating a warm, golden glow. The person is wearing a light-colored, long-sleeved shirt. The bed has white linens. The overall atmosphere is peaceful and serene, suggesting a morning routine.

Talk about the process of waking up.

A person is shown from behind, sitting up in bed and stretching their arms upwards, holding their hands together. The scene is bathed in warm, golden light from a window with sheer curtains, suggesting a sunrise or early morning. The person is wearing a light-colored, long-sleeved shirt.

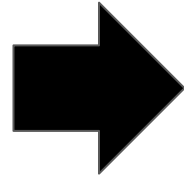
pandiculation noun

pan·dic·u·la·tion (pan·dik·yə·'lā·shən ◀▶)

: a stretching and stiffening especially of the trunk and extremities
(as when fatigued and drowsy or after waking from sleep)

In math class, what do we do?

WORDS



MEANING

10 Inequalities

10–1 *Order of Real Numbers*

Objective: To review the concept of order and to graph inequalities in one variable.

Vocabulary

Inequality A statement formed by placing an inequality symbol between numerical or variable expressions.

Solutions of an inequality The values of the domain of the variable for which the inequality is true.

Solution set of an inequality The set of all solutions of the inequality.

Graph of an inequality The graph of the numbers in the solution set of an inequality.

Active Vocabulary

New Vocabulary Match each term with its definition.

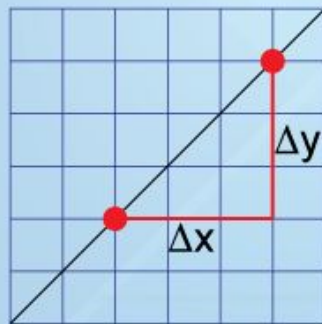
<i>algebraic expression</i>	the quantities being multiplied in an expression involving multiplication
<i>term</i>	consists of one or more numbers and variables along with one or more arithmetic operation
<i>power</i>	the result of a multiplication expression
<i>factors</i>	symbols used to represent unspecified numbers or values in algebra
<i>product</i>	indicates the number of times the base is used as a factor
<i>variables</i>	a part of an expression that may be a number, a variable, or a product or quotient of numbers and variables

Vocabulary Link *Vary* is a word used in everyday English that is used to build the word *variable*. Find the definition of *vary* using a dictionary. Explain how its everyday definition can help you understand the meaning of *variable* in mathematics.

Definition

Slope

The ratio of the rise over the run, or the change in vertical distance over the change in horizontal distance.



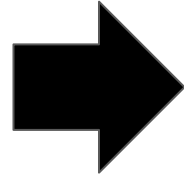
$$\begin{aligned}\text{Slope} &= \frac{\text{Rise}}{\text{Run}} \\ &= \frac{\Delta y}{\Delta x}\end{aligned}$$

Vocabulary

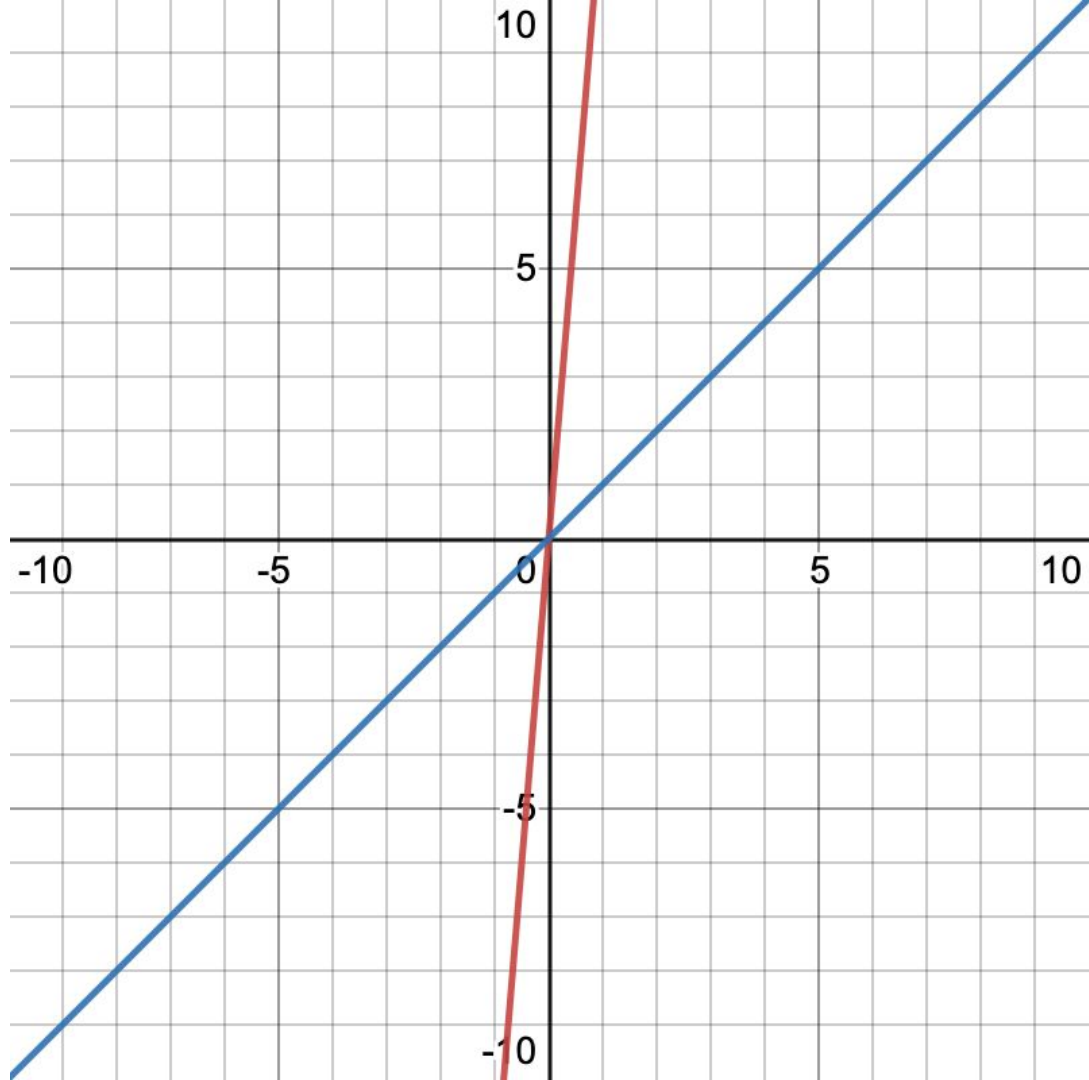
Write the term that best completes each statement.

1. A(n) _____ is a line that divides a segment into two smaller segments of equal length.
2. The _____ of a triangle is the point at which the three medians intersect.
3. Three or more lines that intersect at a common point are called _____.
4. A(n) _____ of a triangle is a line segment that connects a vertex to the midpoint of the side opposite the vertex.
5. The _____ of a triangle is the point at which the three perpendicular bisectors intersect.
6. The point at which three or more lines intersect is called the _____.
7. A(n) _____ is a segment bisector that is also perpendicular to the line segment.

MEANING



WORDS

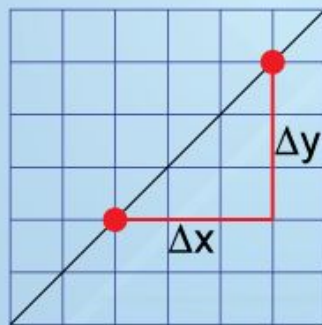




Definition

Slope

The ratio of the rise over the run, or the change in vertical distance over the change in horizontal distance.



$$\begin{aligned}\text{Slope} &= \frac{\text{Rise}}{\text{Run}} \\ &= \frac{\Delta y}{\Delta x}\end{aligned}$$

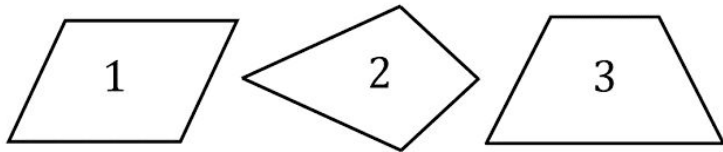
$$y = 2x^2 - y + 0z - 0xy$$

How many terms?

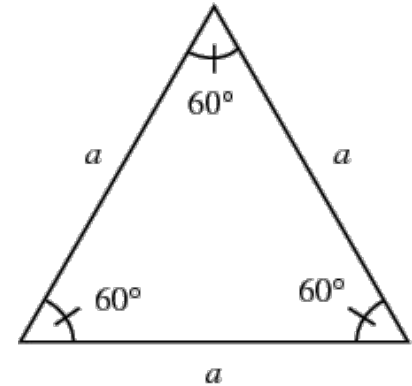
Is it quadratic?

$$y = |x^2|$$

Is it quadratic?



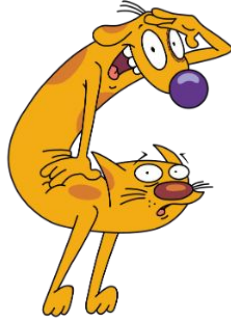
Is it a trapezoid?



Is it isosceles?

Yes, No, IDK

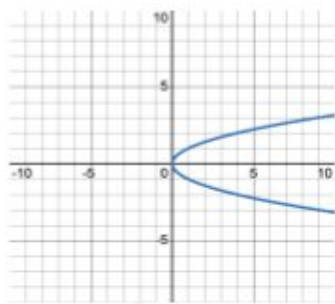
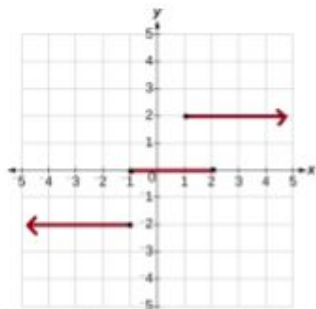
**What is a dog?
Write down a
definition/criteria.**



Is it a **DOG**?
Yes, No, or **IDK**?



**What is a prism?
Write down a
definition/criteria.**



Input: Social Security Number
Output: Name

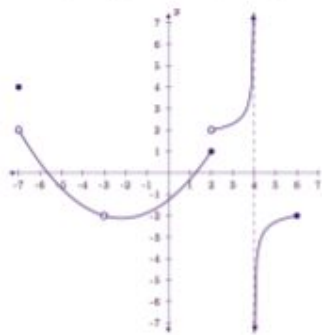
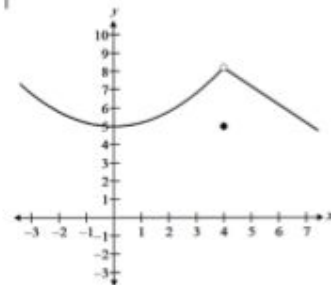
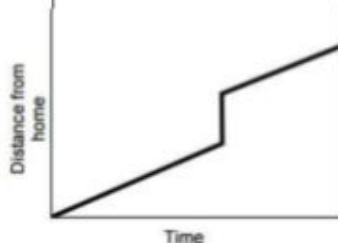
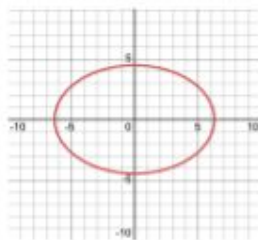
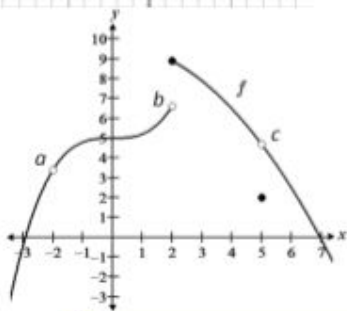
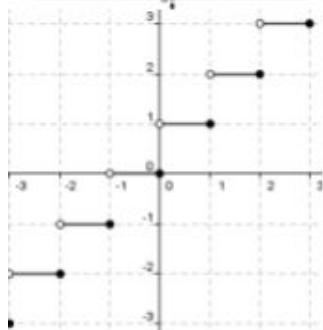
Input: Birthday
Output: Name

Input: Name
Output: Birthday

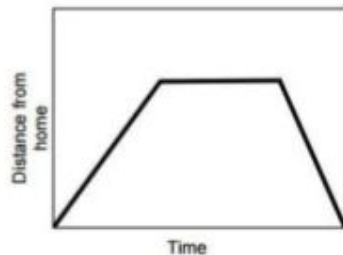
The temperature on a given day.

The average temperature on a given day.

The number of logins by a Lastinger Learner.



**Is it a FUNction?
Yes, No, or IDK?**



Does it represent a fraction multiplication situation?
Yes, No, or IDK

My sister ran 4 miles. I ran $\frac{1}{4}$ of a mile longer than my sister. How far did I run?

I ate $\frac{3}{4}$ more cookies than my sister. My sister ate 8 cookies. How many cookies did I eat?

My recipe calls for $\frac{2}{3}$ cups of flour. I wanted to double the recipe. How much flour should I use?

My recipe calls for $\frac{2}{3}$ cups of flour. I wanted to halve the recipe. How much flour should I use?

I gave away half of my stuffed animals. If I have 6 stuffed animals left, how many stuffed animals did I have to begin with?

Say What?



To Foster Student Engagement...
Students Should have Choices

Choose what to Share

The Circumference of the Earth is about 40,000 kilometers. An evil scientist is going to put a metal (inflexible) band around the earth touching the ground at all locations to make a barrier for animal and people-kind. You, the evil scientist's assistant, want to thwart his plans, so you make a plan to add 10 feet to the band's original length so people and/or animals can cross under the band. It was all you could add without the evil scientist realizing what you had done! Have you ruined the evil scientist's evil plans? Could a flea, or a rabbit, or even a person now fit under the band? Justify your thinking.

QUESTION

GUT REACTION

STRATEGY

QUESTION

**GUT
REACTION**

STRATEGY

**CORRECT
SOLUTION**

**SOLUTION IN
PROGRESS**

**WRONG
ANSWER**

RETELLING

**FIRST
INSTINCT**

STUCK POINT



Thank You



Zandra de Araujo