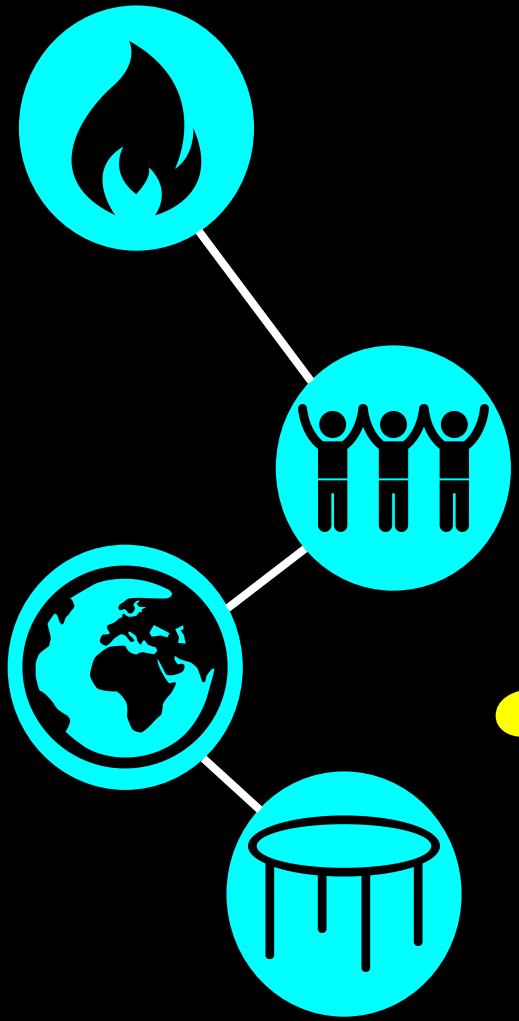
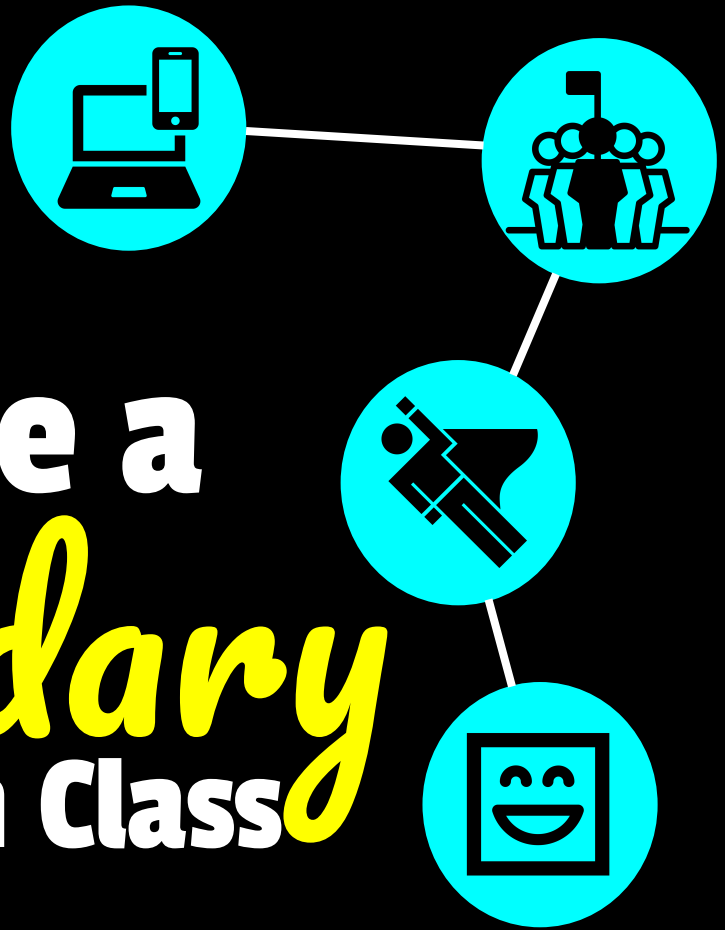
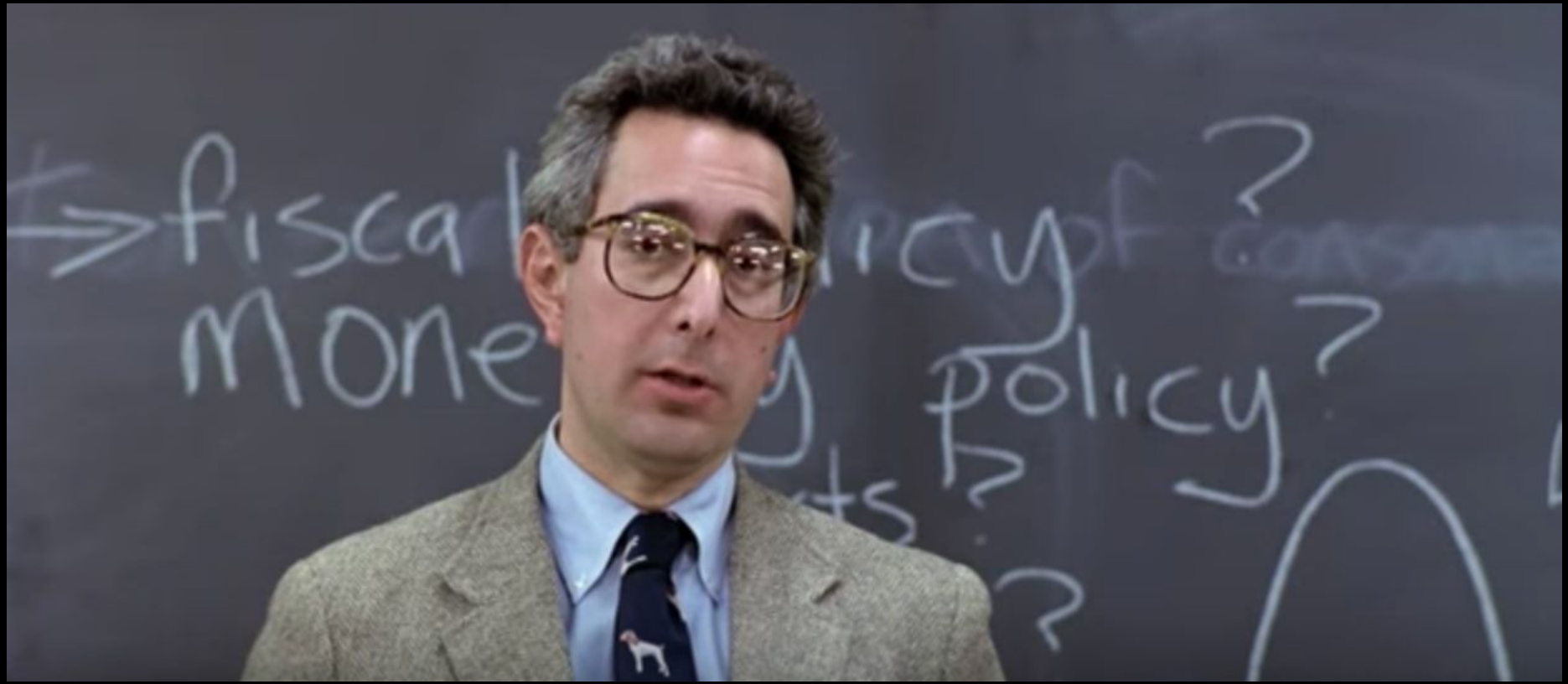


8 Ways to Create a Legendary Math Class

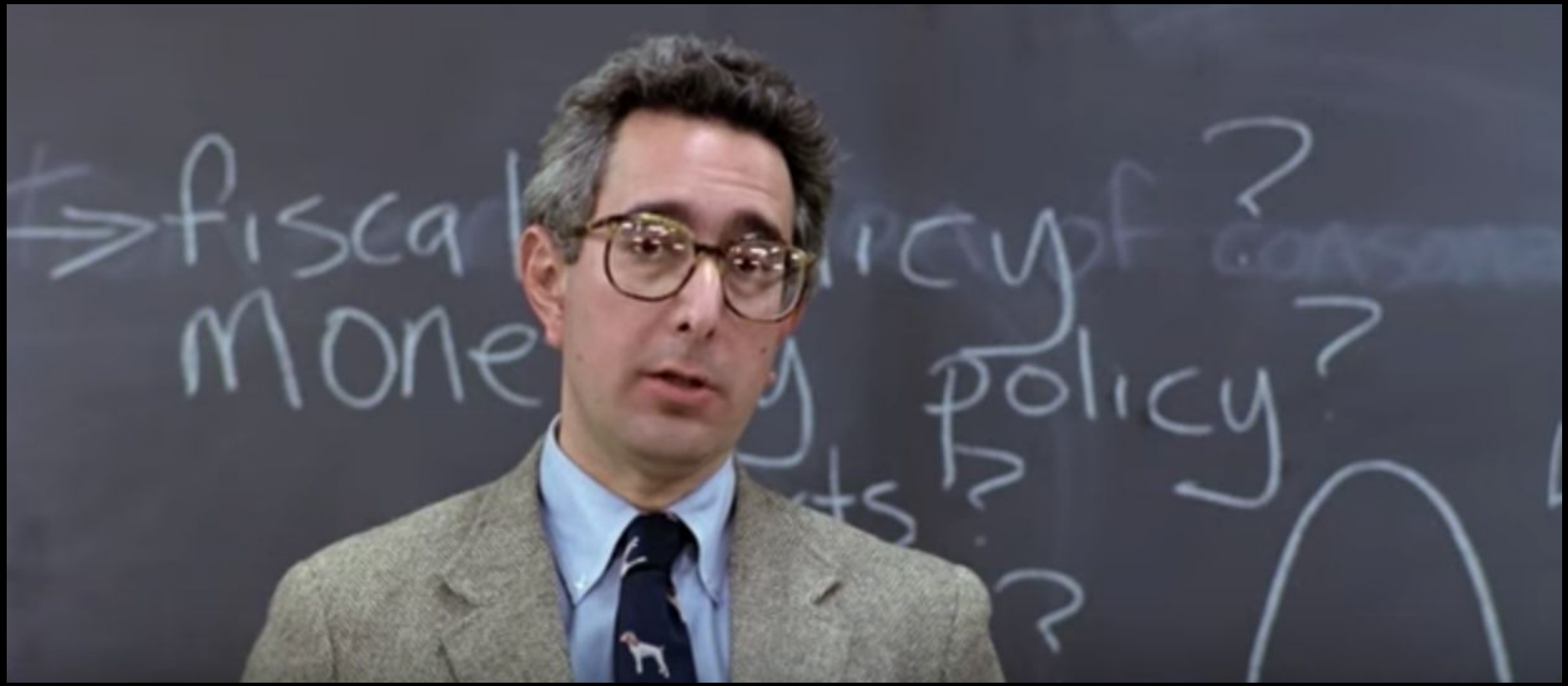


@johnberray


fiscal
Mone
policy?

Have you ever HAD that class or BEEN that teacher?

Who cares?




INSTRUCTIONAL MODEL

How can we *evolve*
a traditional math
classroom
into one that is modern
and ...

leg·end·ar·y

/ˈlejənˌderē/

adjective
adjective: **legendary**

1. of, described in, or based on legends.
   "a legendary British king of the 4th century"
   synonyms: fabled, storied, heroic, traditional, fairy-tale, storybook, mythical, mythological
   "legendary knights"
   antonyms: factual, historical

leg·end·ar·y

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   synonyms: fabled, storied, heroic, traditional, fairy-tale, storybook, mythical, mythological
   "legendary knights"
   antonyms: factual, historical

2. remarkable enough to be famous; very well known.
   "her wisdom in matters of childbirth was legendary"
   synonyms: famous, celebrated, famed, renowned, acclaimed, illustrious, esteemed, honored, exalted, venerable, well known, storied, popular, prominent, distinguished, great, eminent, preeminent, high-profile; *formal* lauded
   "a legendary figure in sports"

Leg • end • ar • y

adjective

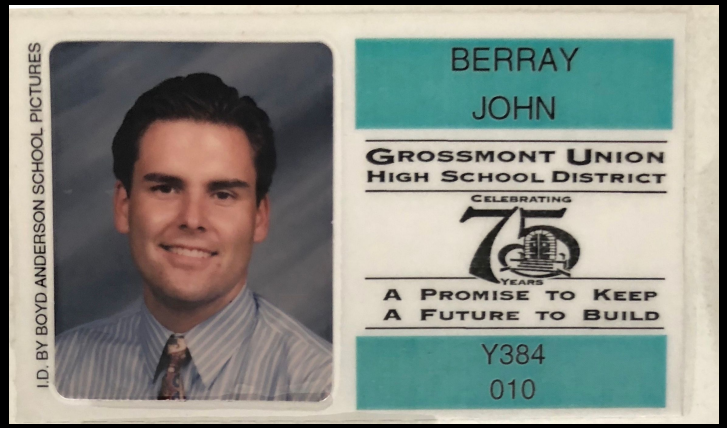
Remarkable enough to be famous; very well known

“Do the best
you can
until you know
better.
Then when you
know better,
do better.”

-Maya Angelou

#knowbetterdobetter

1995


I.D. BY BOYD ANDERSON SCHOOL PICTURES
BERRAY
JOHN
GROSSMONT UNION
HIGH SCHOOL DISTRICT
CELEBRATING
75
YEARS
A PROMISE TO KEEP
A FUTURE TO BUILD
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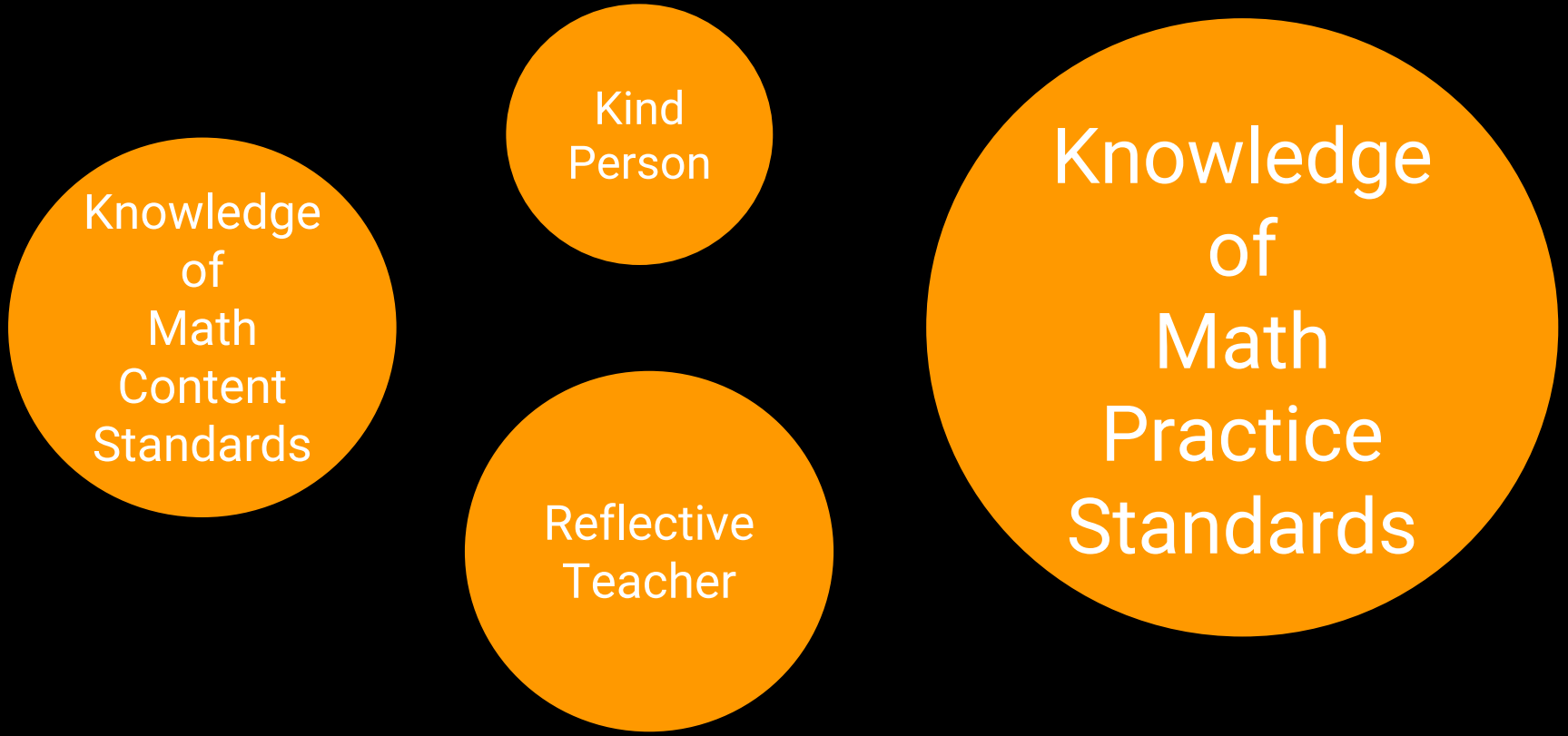
394
3M


Knowledge of Math Content Standards
Kind Person
Reflective Teacher
Knowledge of Math Practice Standards

BUILDING THINKING CLASSROOMS

RESEARCH: @pgliljedahl
SKETCHNOTE: @wheeler_laura

① Begin w/ a Problem

Give a problem-solving task

To start:

Problems should be
- ☐ engaging
- ☐ non-curricular
- ☐ collaborative

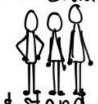
↳ promote talking

Later:

Problems can be curricular
eg textbook problems

② Visibly Random Groups

- ☐ Randomly assigned eg playing cards
- ☐ Daily & in front of students
- ☐ 2 or 3 students / group



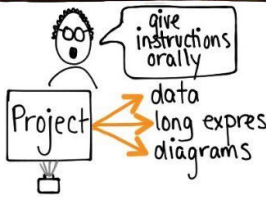
- ☐ Sit & stand together

③ Vertical Non-Permanent Surfaces

- ☐ Vertical
- ☐ Erasable

- ☐ 1 marker or chalk per group
  ↳ promotes discussion

④ Oral Instructions

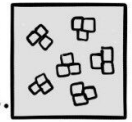


→ groups will discuss (instead of decoding text)

⑤ Defront the room

Desks → orient in various directions
→ pull away from wall (room to stand @ VNPS)

Teacher addresses the class from a variety of locations.

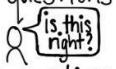


⑥ Answering Questions

Acknowledge, but don't answer:

✗ Proximity questions (b/c teacher is close by)

✗ Stop thinking questions



Answer:

✓ Keep thinking questions
↳ give HINTS not answers

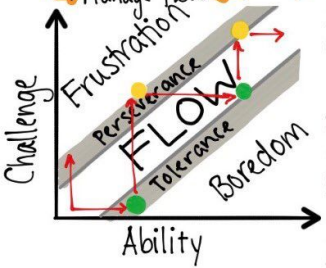
⑦ Build Autonomy

- ☐ Model how groups can visit other groups when they are stuck or done.
- ☐ Hints & extensions come from peers (not just the teacher).

→ Helps manage flow

⑧ Hints & Extensions

↳ Manage flow



FLOW → Mihaly Csikszentmihalyi

⑨ Level to the Bottom

- debrief
- class discussion
- direct teaching
- the "lesson"

Once all groups pass a minimum threshold.

Debrief 1 or more groups' solutions!

Work through a new problem w/ whole group

⑩ Student Notes

Student created:

- select
- synthesize → ideas
- reorganize

Provide time for this after levelling.

⑪ Assessment

Process > Product

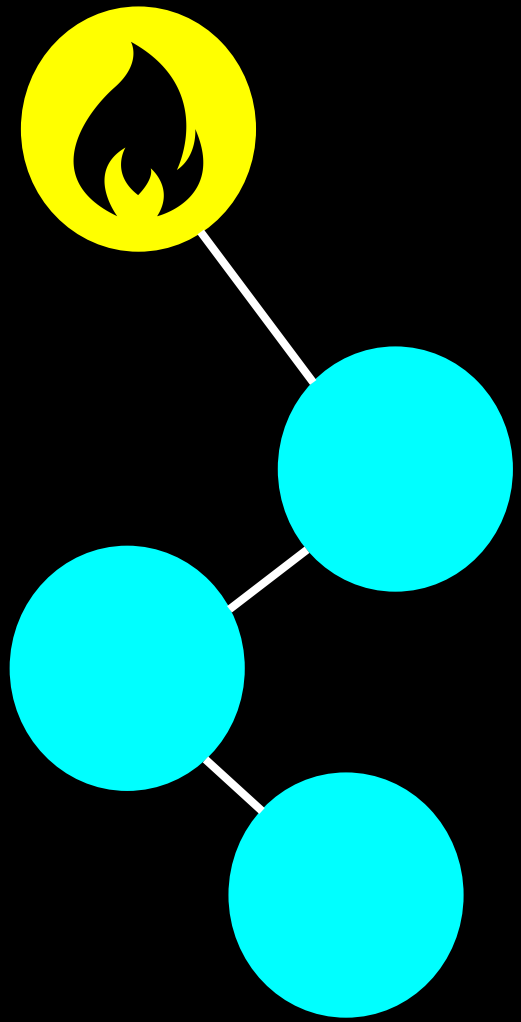
Group work + Individual work

Student learning → Where are they?
→ Where are they going?

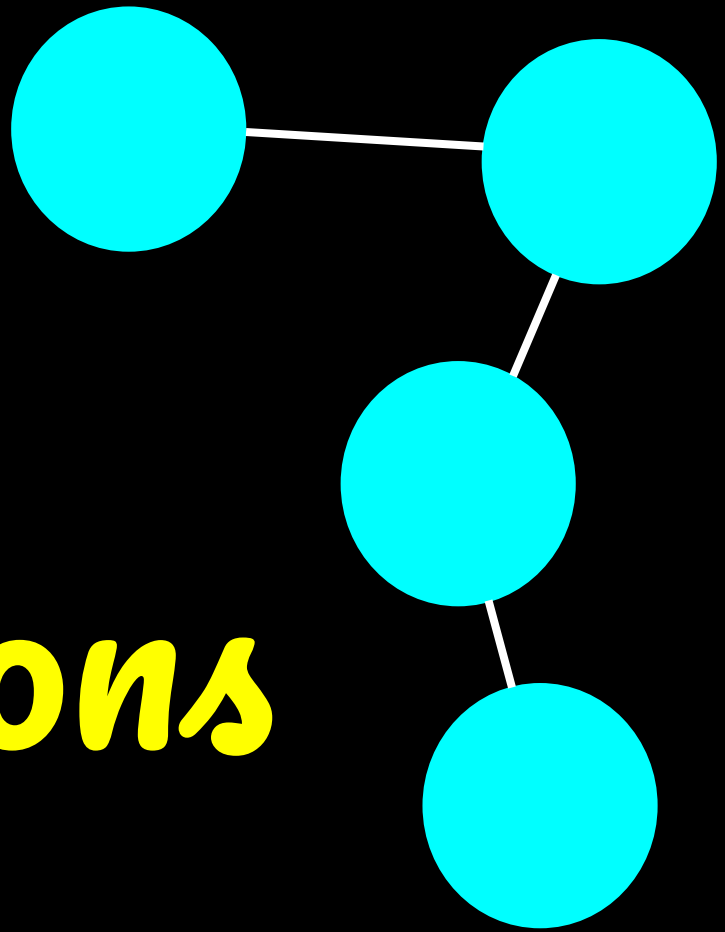
THINKING & LEARNING

Pick a topic you LOVE to teach.

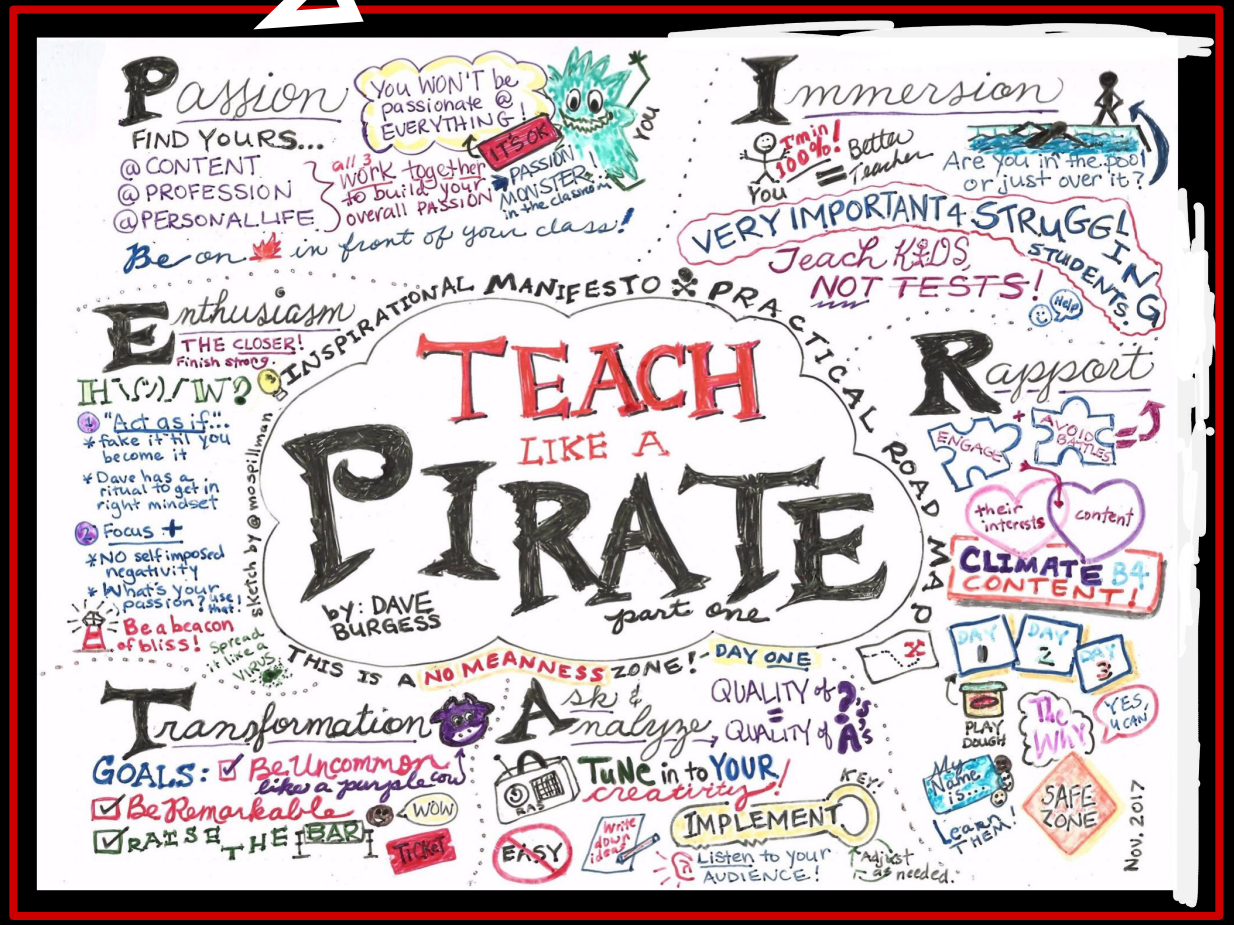
Fractions
Trig identities
Slope
Derivatives
Volumes of solids

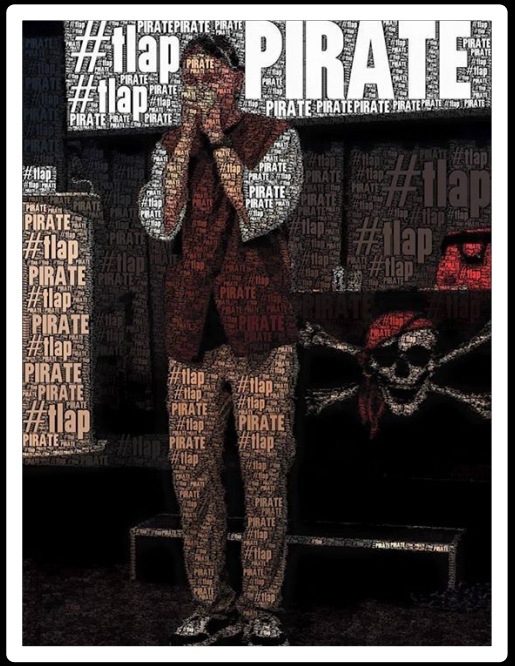


Amplify your *Passions*

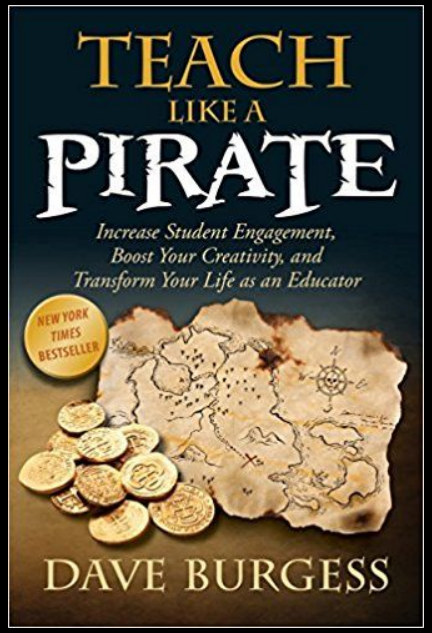


Pick a topic you LOVE outside of teaching.





Dave Burgess

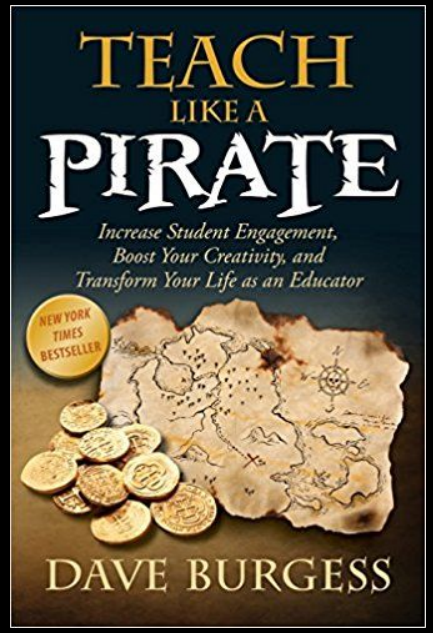


#tlap

#NCTMannual

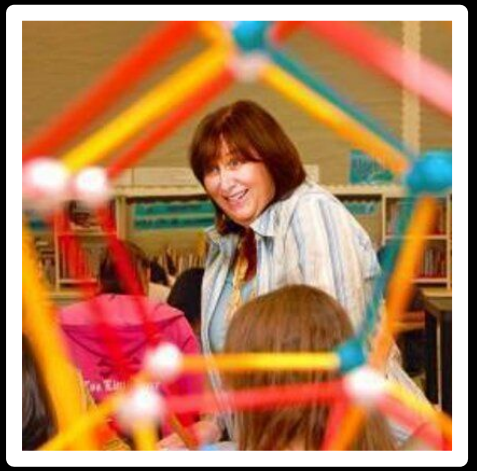
@johnberray

Dos libros



Personal Passion
Professional Passion
Content Passion

“Touchstone Experiences”
-Peg Cagle




JANUARY
FEBRUARY
MARCH
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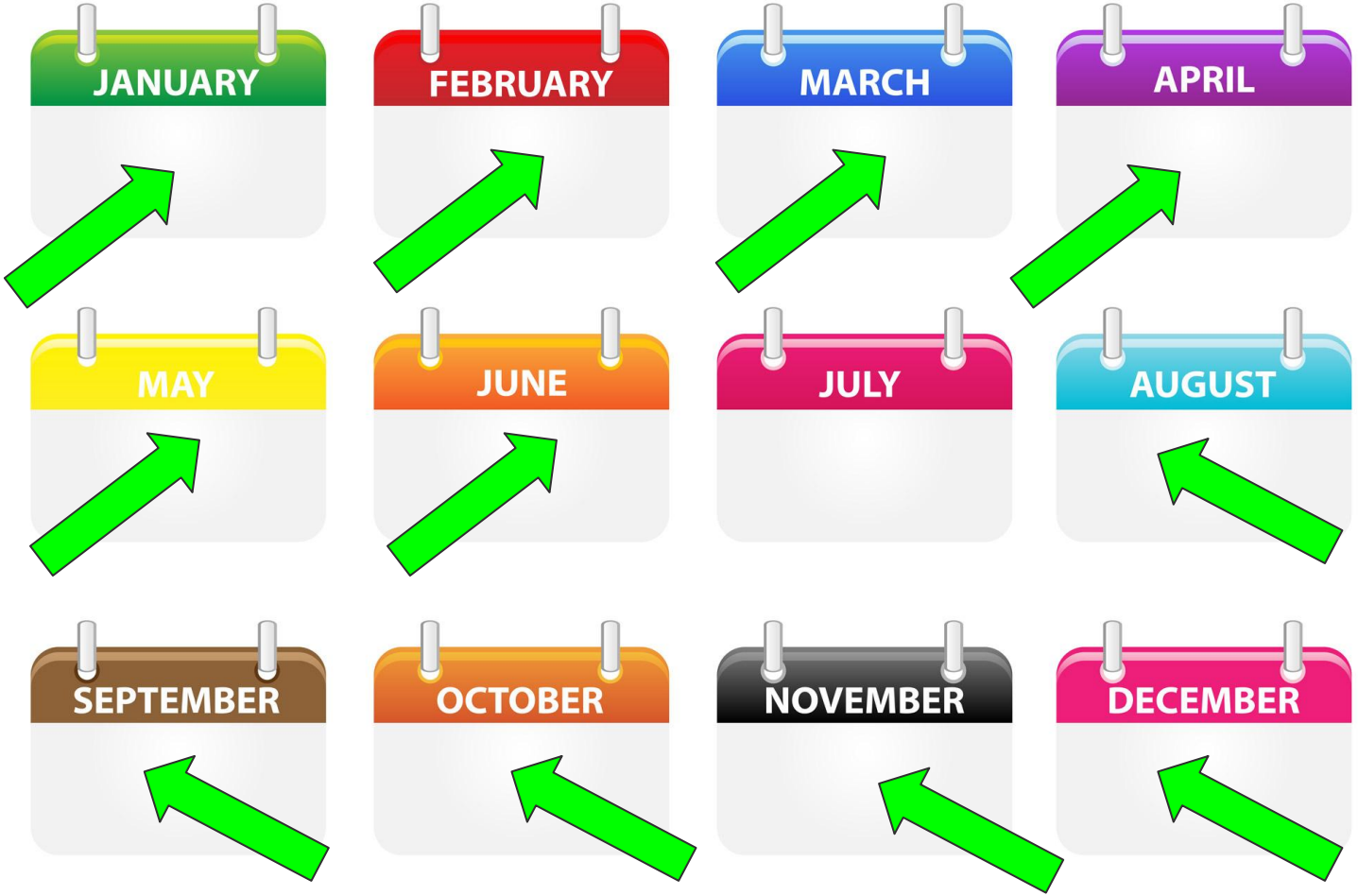
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER


JANUARY
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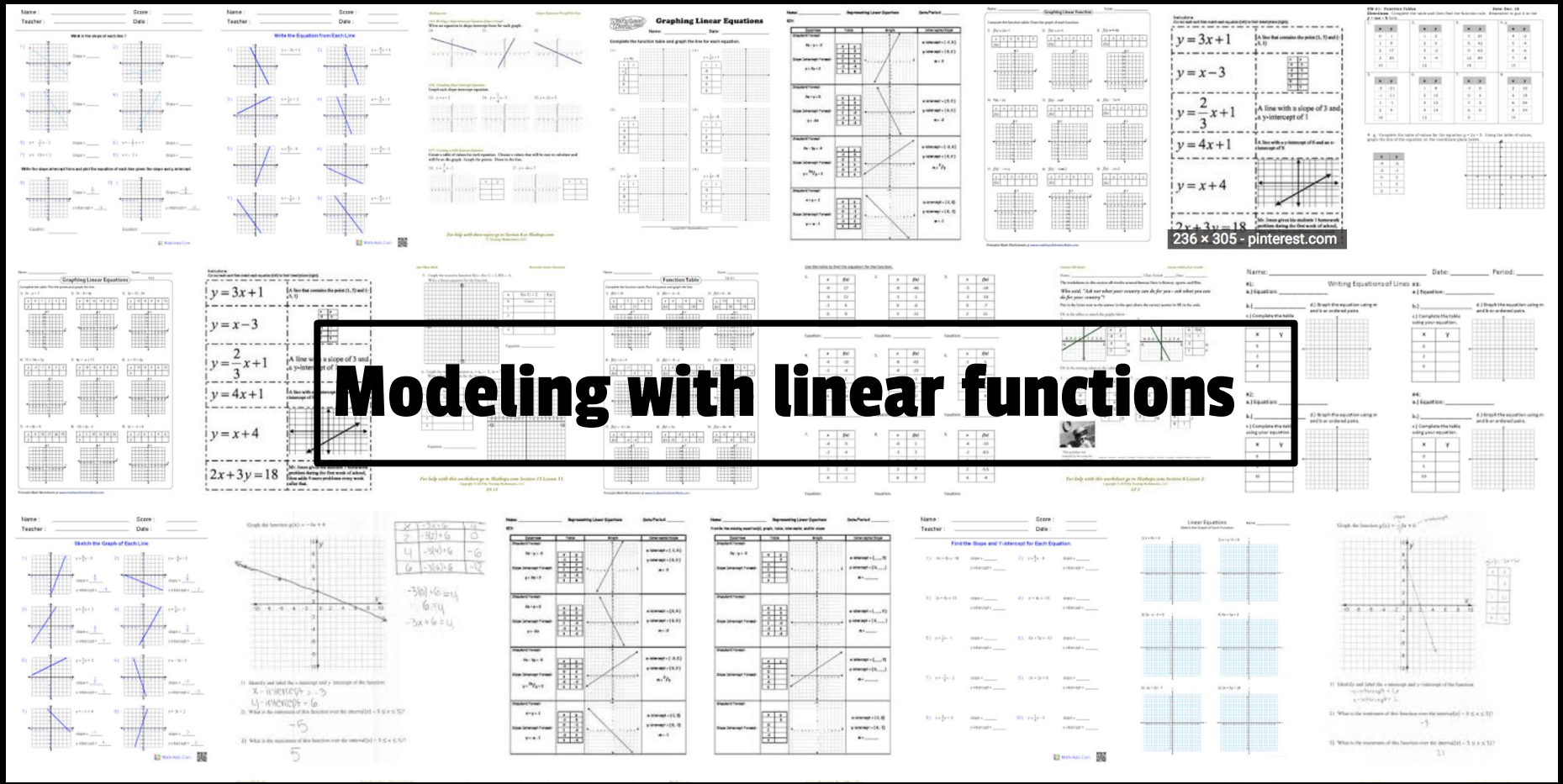

Modeling with linear functions
236 × 305 - pinterest.com

CULT OF PEDAGOGY

26 MAR 2018

FRICKIN' PACKETS

by Jennifer Gonzalez

Are your worksheets contributing to meaningful learning, or just keeping students busy?

IN-N-OUT BURGER

Food meets algebra!

Robert Kaplinsky

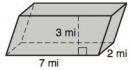
Name _____ Date _____ Class _____

LESSON 10-6

Practice B

Volume of Prisms and Cylinders

Find the volume of each prism. Round to the nearest tenth if necessary.

1. 

the oblique rectangular prism

2. 

the regular octagonal prism

3. a cube with edge length 0.75 m

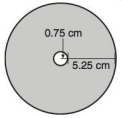
Find the volume of each cylinder. Give your answers both in terms of π and rounded to the nearest tenth.

4. 

5. 

6. a cylinder with base circumference 18π ft and height 10 ft

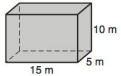
7. CDs have the dimensions shown in the figure. Each CD is 1 mm thick. Find the volume in cubic centimeters of a stack of 25 CDs. Round to the nearest tenth.



Describe the effect of each change on the volume of the given figure.

8. 

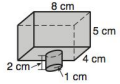
The dimensions are halved.

9. 

The dimensions are divided by 5.

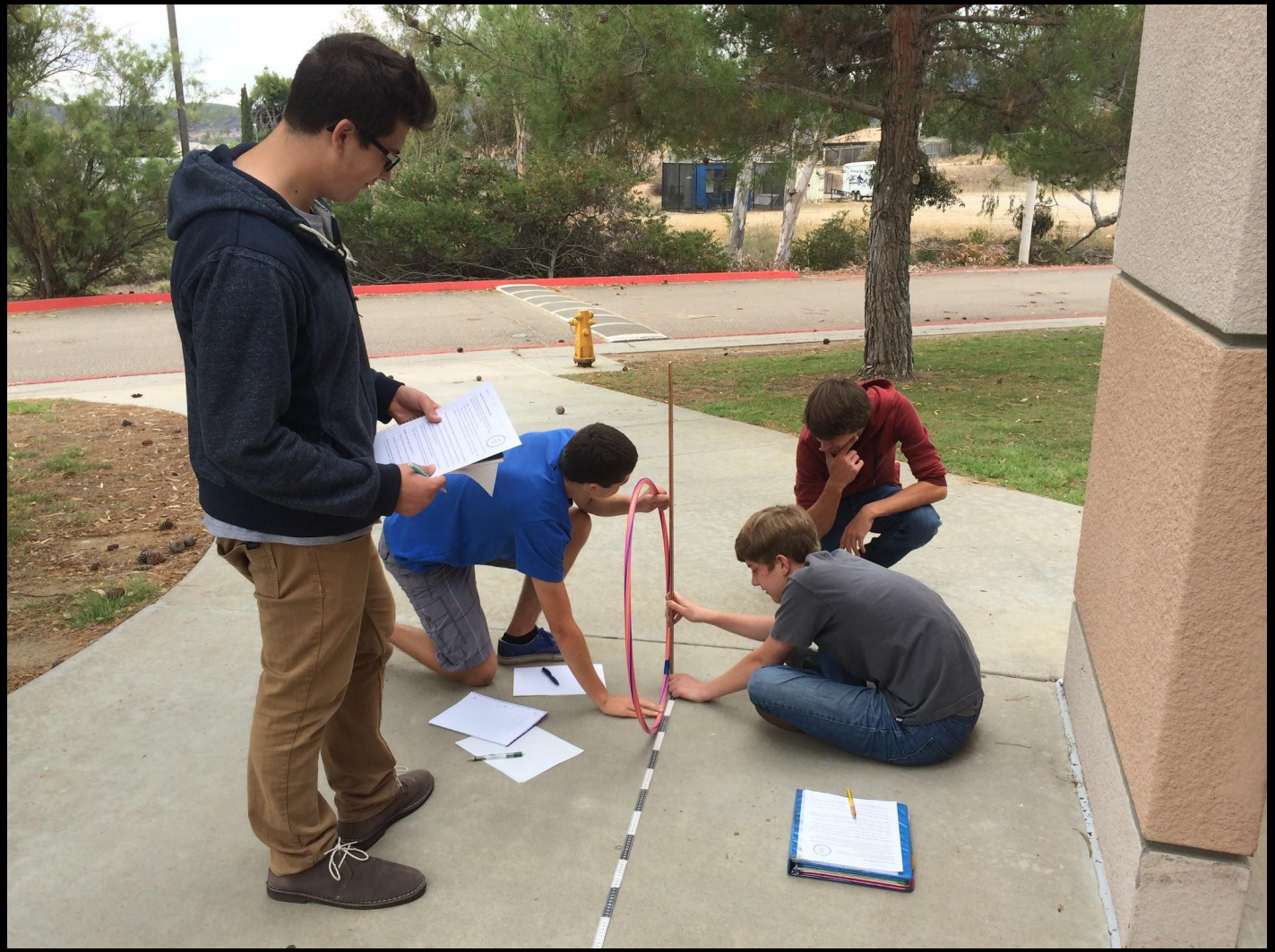
Find the volume of each composite figure. Round to the nearest tenth.

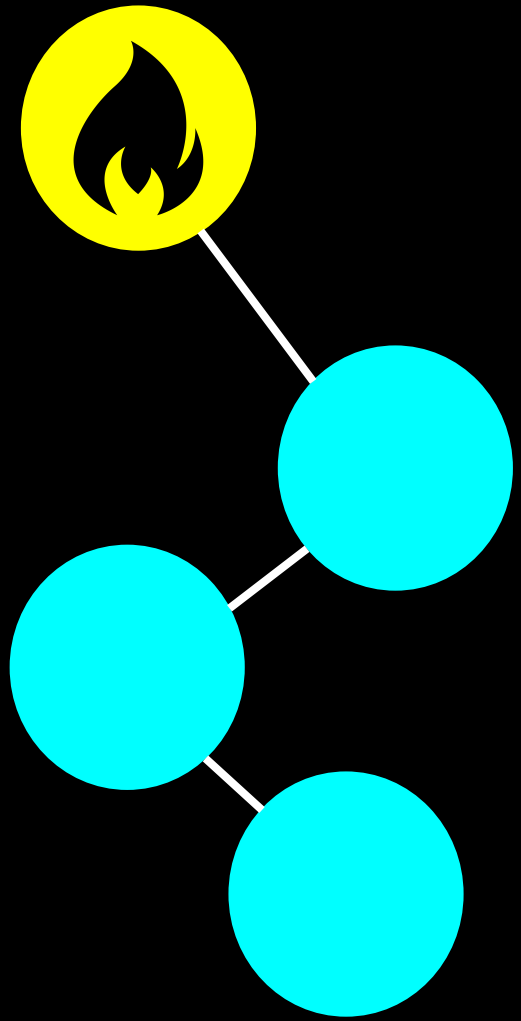
10. 

11. 

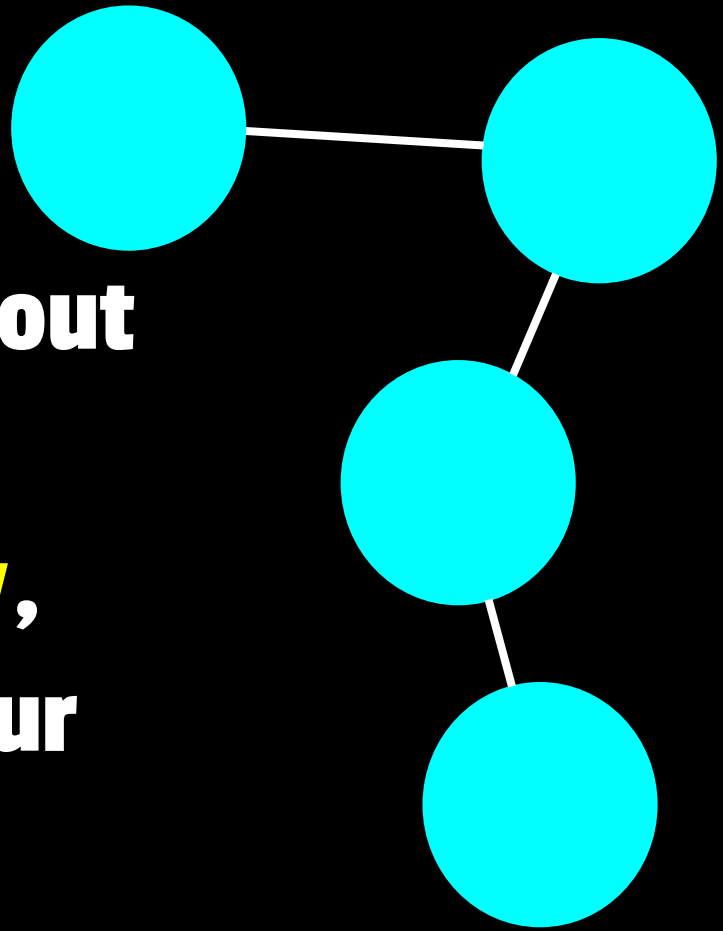
Girl Scout Cookies

Dan Meyer





What are you passionate about **personally**, **professionally**, and within your **content** area?



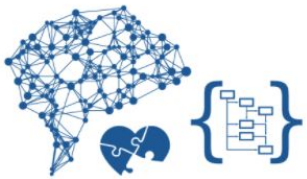
Top 10 skills

in 2020

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgment and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility

in 2015

1. Complex Problem Solving
2. Coordinating with Others
3. People Management
4. Critical Thinking
5. Negotiation
6. Quality Control
7. Service Orientation
8. Judgment and Decision Making
9. Active Listening
10. Creativity



Source: Future of Jobs Report, World Economic Forum

Top 10 skills

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in 2015

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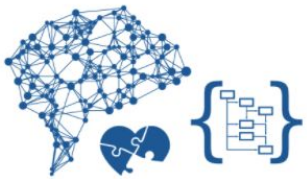


Source: Future of Jobs Report, World Economic Forum

Critical Thinking

Communication

Collaboration

Creativity

Critical Thinking

Communication

Collaboration

Creativity

Critical Thinking

Communication

Collaboration

Creativity

Michael Fenton

Indifference	Curiosity
Consumption	Creativity
Competition	Collaboration
Isolation	Conversation

Choose Collaboration Over Competition!

Collaboration can be...

- informal conversation
- structured talking protocols
- peer feedback
- iterative process of collaborative creation

Screen 14 of 14

Submitted Challenges

Maryan Mirzakhani
TV Shows
✓ 4

Al-Khwarizmi
prescription drugs
✓ 1

Jean d'Alembert
Colors
✓ 3

Karen Uhlenbeck
VEGETABLE
✓ 3

Mina Rees
Cereal
✓ 4

Diophantus
Class subject
✓ 4

Hermann Minkowski
Types of Cake
✓ 3

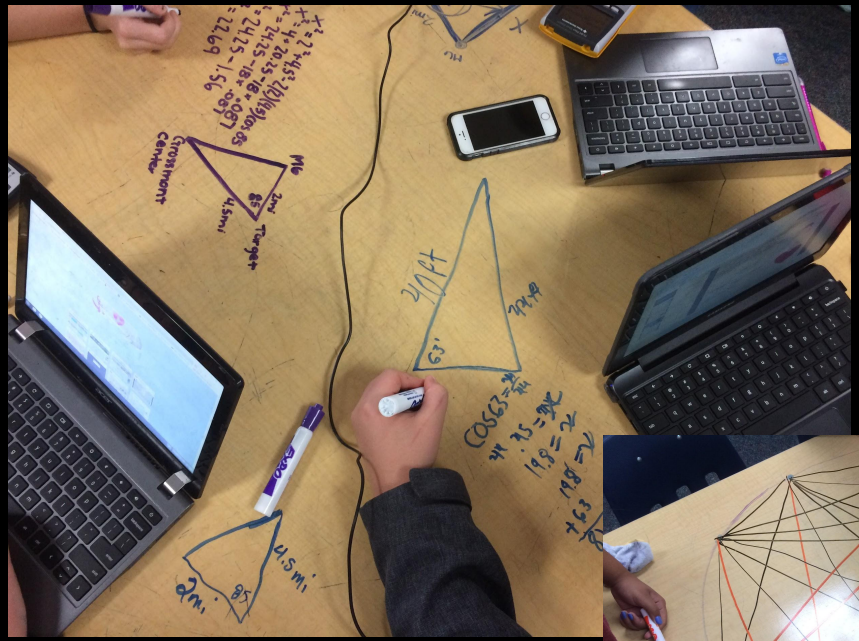
Richard Dedekind
Cars
✓ 4

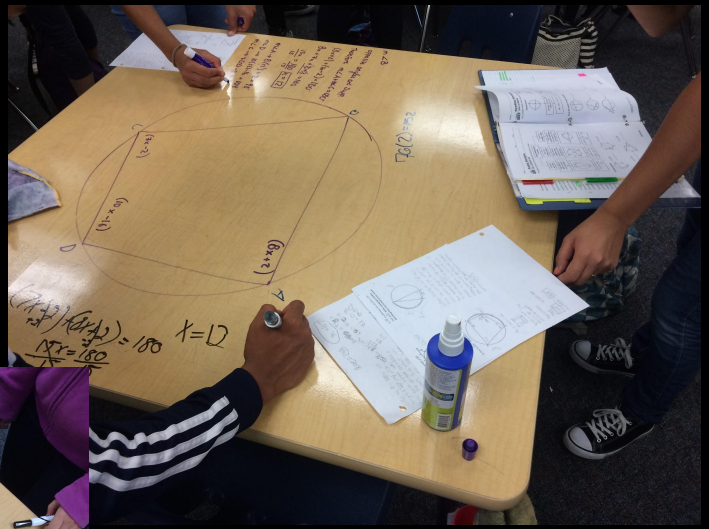
Katherine Johnson
Color
✓ 1

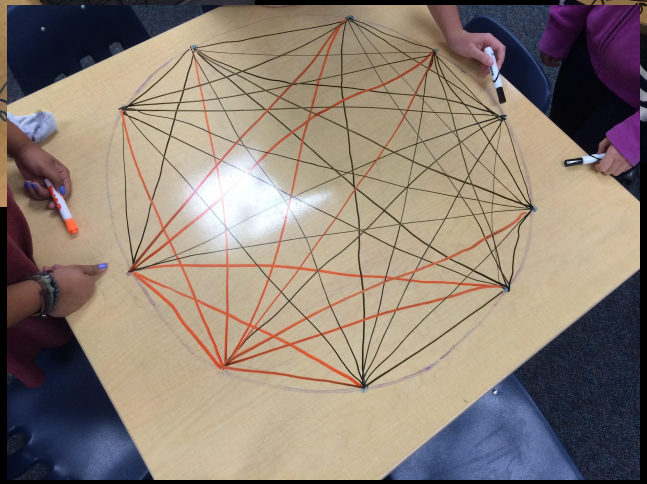
Shiing Shen Chern
Sports
✓ 4

Christine Ladd-Franklin
School Subjects
✓ 2

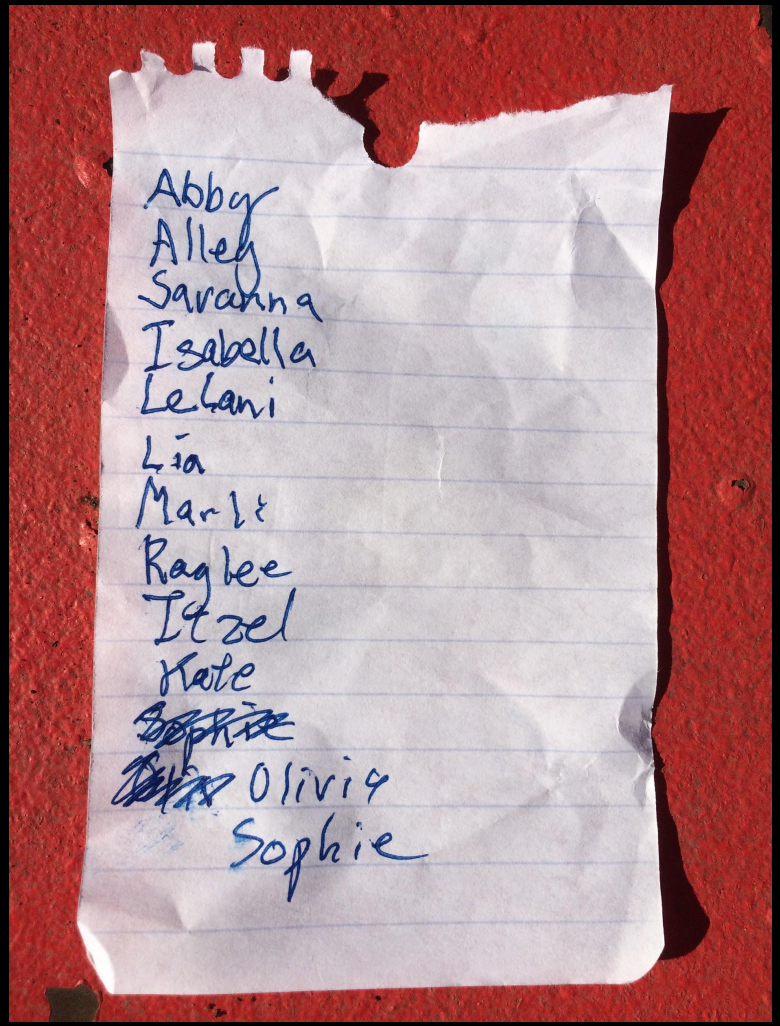
Carl Siegel
Pets
✓ 1







How can I invite and maximize collaboration and minimize a win/lose mentality?


Abby
Alley
Savanna
Isabella
LeLani
Lia
Marli
Raglee
Itzel
Kate
Olivia
Sophie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YOU ORDERED SOMETHING
REALLY AWESOME!
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YOUR FRIENDS WILL BE JEALOUS OF THE CONTENTS OF THIS PACKAGE AND MAY TRY TO STEAL IT! FROM YOU. OPEN AT YOUR OWN RISK AND YOU'VE BEEN WARNED!
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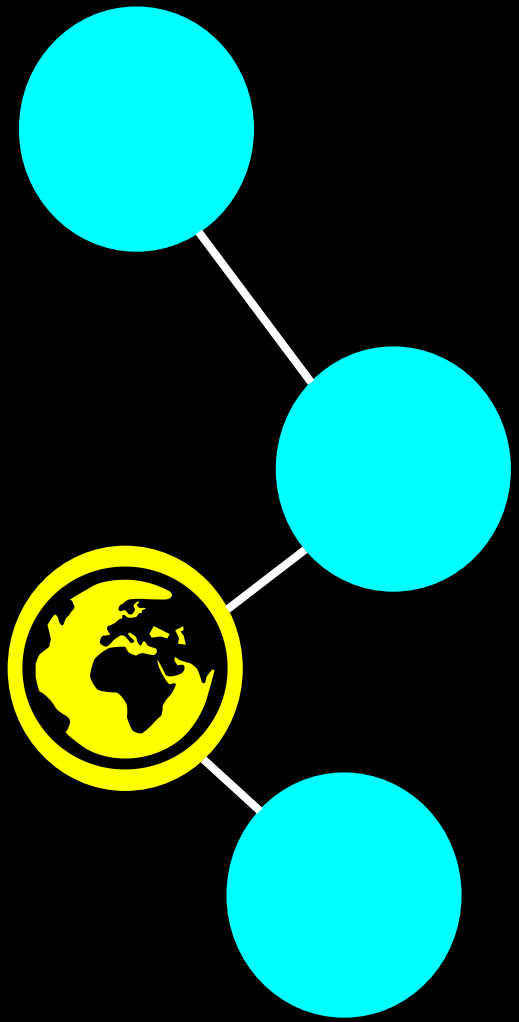
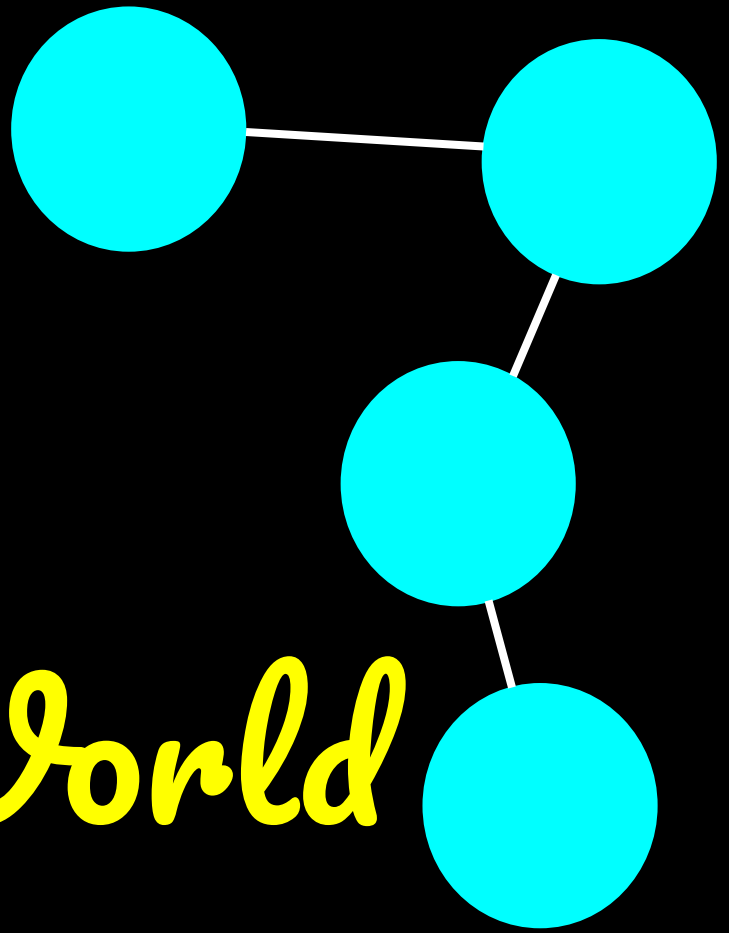
BIG
CANS
Arizona
Green Tea
with GINSENG and HONEY


I
BIG
LANS



Connect to the *Real World*



$ax^2 + bx + c = 0$	General Form of a quadratic equation
$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$	Divide by a
$x^2 + \frac{b}{a}x = -\frac{c}{a}$	Subtract $\frac{c}{a}$ from both sides
$x^2 + \frac{b}{a}x + (\frac{b}{2a})^2 = -\frac{c}{a} + (\frac{b}{2a})^2$	Complete the square
$(x + \frac{b}{2a})^2 = -\frac{c}{a} + (\frac{b}{2a})^2$	Factor on left
$(x + \frac{b}{2a})^2 = -\frac{c}{a} \cdot \frac{4a}{4a} + (\frac{b^2}{4a^2})$	Find LCD on right
$(x + \frac{b}{2a})^2 = (\frac{b^2-4ac}{4a^2})$	Simplify
$\sqrt{(x + \frac{b}{2a})^2} = \sqrt{(\frac{b^2-4ac}{4a^2})}$	Take square root of both sides
$x + \frac{b}{2a} = \frac{\pm\sqrt{b^2-4ac}}{2a}$	Simplify
$x + \frac{b}{2a} - \frac{b}{2a} = \frac{\pm\sqrt{b^2-4ac}}{2a} - \frac{b}{2a}$	Subtract $-\frac{b}{2a}$ from both sides
$x = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$	


0
10
20
30
40
50
60
70
80
90
100
110
MPH
0
20
40
60
80
100
120
140
160
180
km/h
ODO
99343

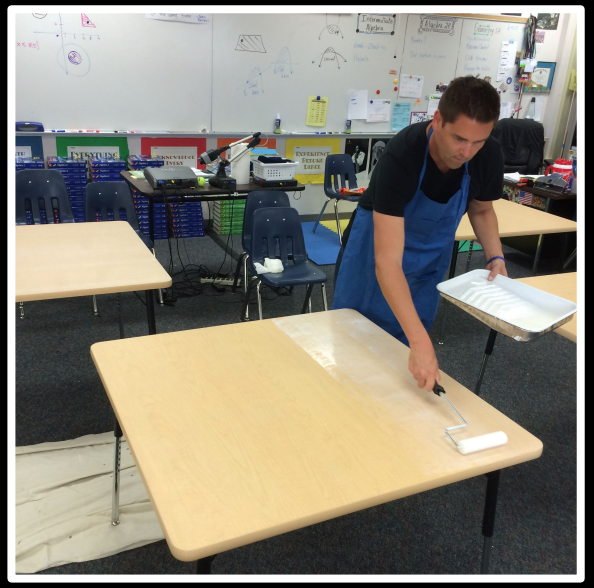
Barbie Bungie! Are you kidding me?!

themathlab.com

How can I bring the OUTSIDE world IN?

Hack the *Physical Space* & Honor *Movement*

Desks/Tables/Chairs
Seating Arrangement
Whiteboards
VNPS
Lighting
Projector
Screens/TVs



Design Spaces for Collaboration

Design Spaces for Inquiry

Design Spaces for Movement

Steelecase


2000
$14,527
2003
$11,159
2004
$17,887
2005
$19,117
2006
$20,845
2007
$22,781

Steelecase


Patricia Bath, age 16.
Alexander Graham Bell, age 16.
Louis Braille, age 16.
Charles Darwin, age 16.
Albert Einstein, age 16.
Thomas Alva Edison, age 16.
Marie Curie, age 16.
SETTING
CHARACTERS
PLOT POINTS

Steelcase®
EDUCATION

About

At Steelcase Education, we have a passion for understanding how teaching and learning best takes place and how smarter, active learning spaces can help. That's why we're offering a grant for an active learning classroom. Each grant includes: furniture, design review, installation, onsite training and a Learning Environment Evaluation measurement tool.

- Choose from 4 classroom styles
- Up to 30 students per classroom
- Up to 16 grants awarded per year
- Grant value: $67,000
- Eligible Classrooms: Grades 6-12, colleges and universities

Key Dates

- Grant Opens Friday, December 1, 2017
- Grant Closes Friday, February 2, 2018
- Grant Recipients announced Friday, March 23, 2018

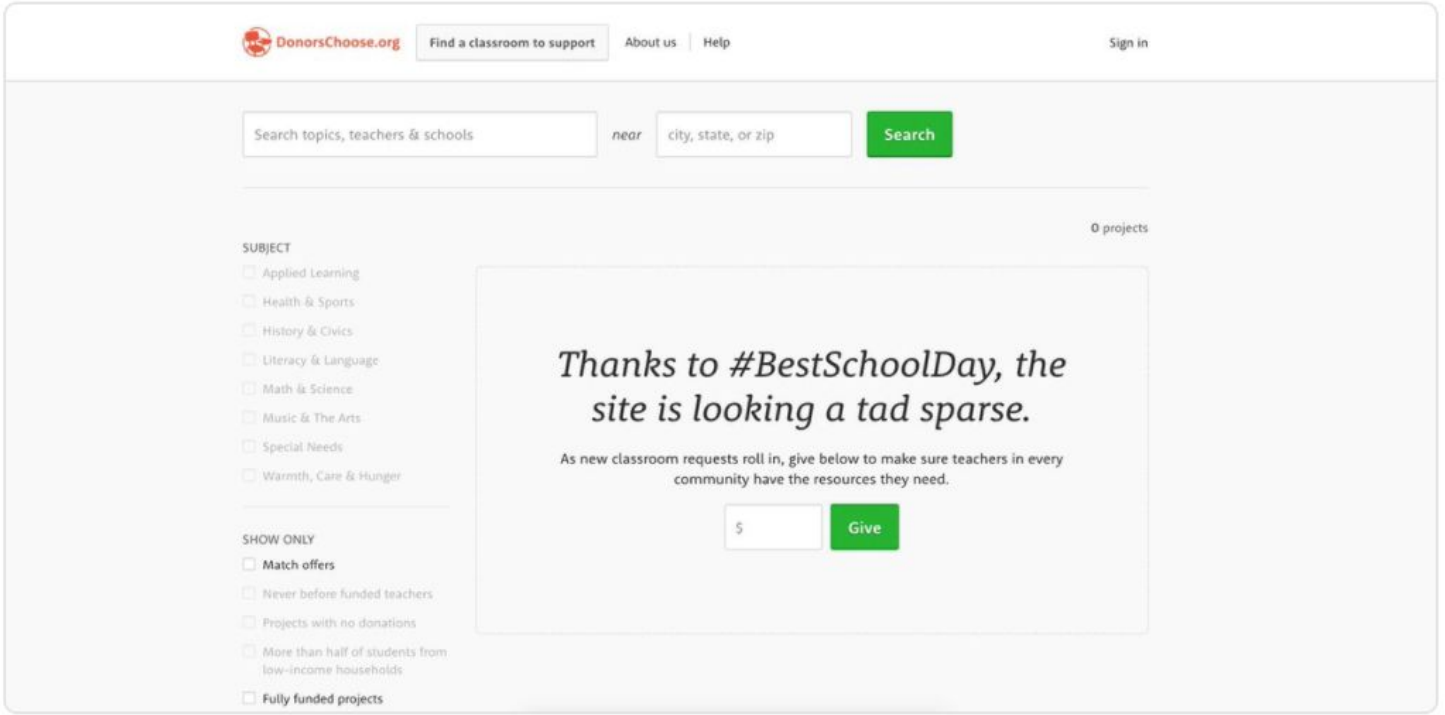
Download Grant Overview


Is your classroom a museum that belongs to you or a learning lab that belongs to your students?

Desks/Tables/Chairs
Seating Arrangement
Whiteboards
VNPS
Lighting
Projector
Screens

DonorsChoose @DonorsChoose · Mar 28

Since DonorsChoose.org was founded in a Bronx classroom 18 years ago, the number of available projects on the site has NEVER read “0.” Until last night! #BestSchoolDay

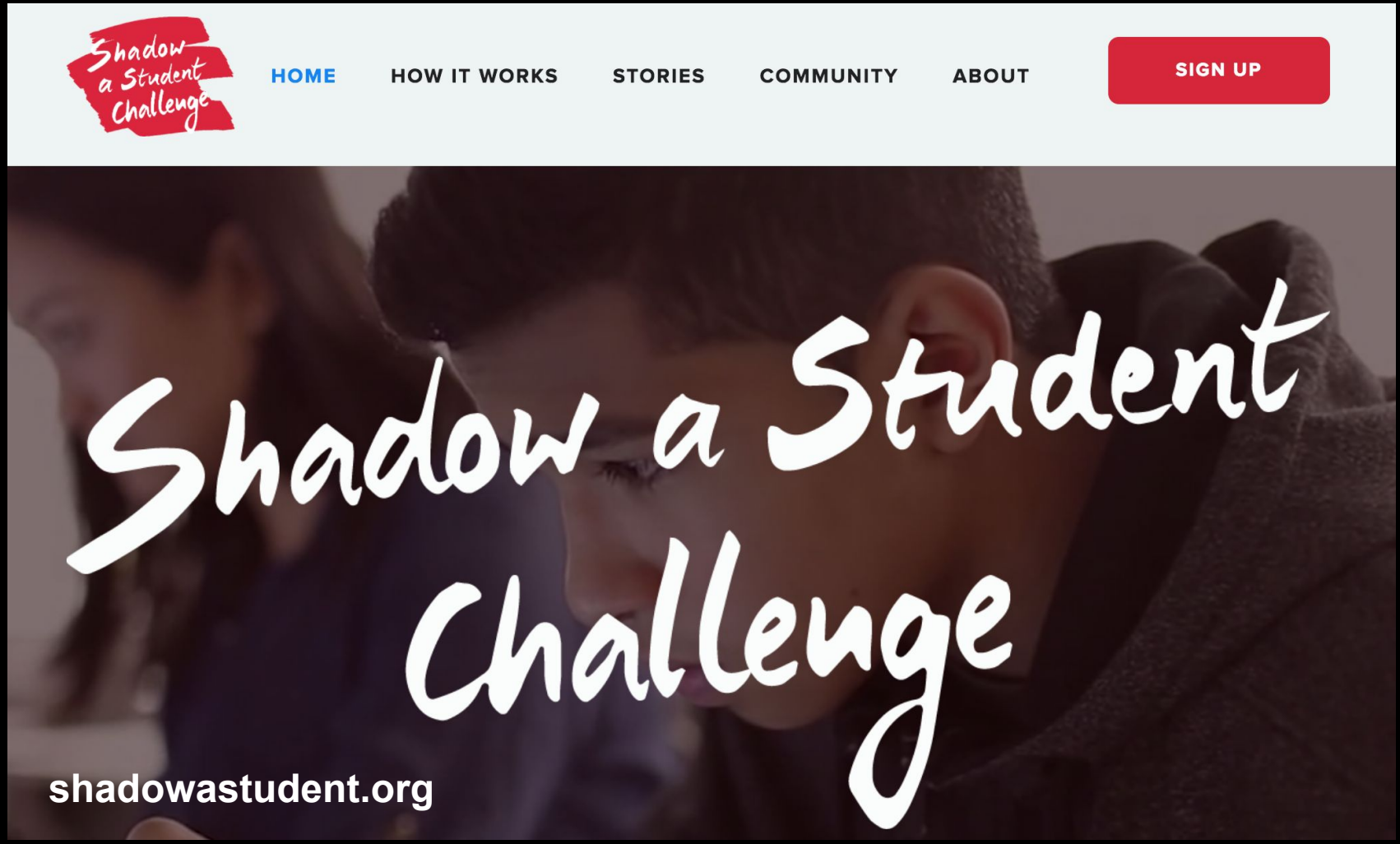


Born This Way @BTWFoundation · Mar 28

Happy #BestSchoolDay! Exciting news from our friends at @DonorsChoose – @Ripple just funded ALL 35,000 classroom project requests on the site. Congratulations to all of the amazing teachers who are part of today's celebration!


INSTRUCTIONAL MODEL

Movement

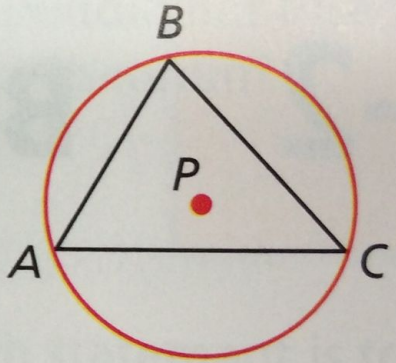

Shadow a Student Challenge
HOME
HOW IT WORKS
STORIES
COMMUNITY
ABOUT
SIGN UP
Shadow a Student Challenge
shadowastudent.org


Verizon LTE
1:18 PM
60%
Tweet
Katie Novak
@KatieNovakUDL
Read these take-aways from a teacher who shadowed her students for a day.
Key takeaway 1: Students sit all day, and sitting is exhausting.
What I Learned By Doing What I Ask Students To Do teachthought.com/pedagogy/teach...
4/6/18, 7:02 AM
17 Retweets 40 Likes

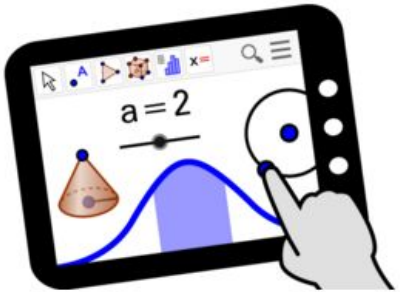
In what ways can I redesign the physical space to enhance the student experience?

Leverage *Technology*

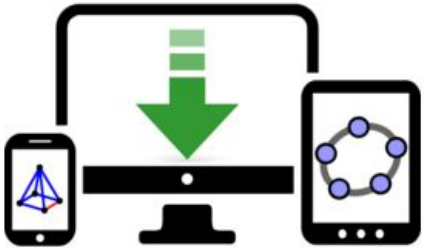
The circumcenter of $\triangle ABC$ is the center of its *circumscribed* circle. A circle that contains all the vertices of a polygon is **circumscribed** about the polygon.



Materials



Start GeoGebra



Downloads

GEOGEBRA

THE GRAPHING CALCULATOR FOR FUNCTIONS, GEOMETRY, ALGEBRA, CALCULUS, STATISTICS AND 3D MATH!

DYNAMIC MATHEMATICS FOR LEARNING AND TEACHING

desmos

Search for an activity

John Berray

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Modeling
Quadratic
Transformations

Activity Pick of the Week

Which is Steepest?

by Desmos | 30-45 minutes | Introduction

In this activity, students explore the idea of "steepness" of line segments. This activity serves as a prelude to formal conversations about vertical change, horizontal change, and slope.

French translation courtesy of Jocelyn Dagenais:
https://teacher.desmos.com/activitybuilder/custom/5aa864739a99a609d5974640

Featured Activities

Land the Plane

by Desmos | 30-45 minutes | Practice

In this activity, students practice finding equations of lines in order to land a plane on a runway. Most of the challenges are well-suited to slope-intercept form, but depending on the goals of an individual class or student they are easily adapted to other forms of linear equations.

Inspired by Hit the Runway by Danny Whittaker:

https://teacher.desmos.com/activitybuilder/custom/56274598fc26d37312cf969b

Dutch translation courtesy Carolijn Tacken:

https://teacher.desmos.com/activitybuilder/custom/58b5f81f59b57ba908439712

Slanty Hills

by Desmos | 45-60 minutes | Development

Students will explore the steepness of hills in this activity, first by comparing angles, then by using the tangent function to convert angles to slope as a percent.

Consider printing out this tangent table for use on screens 5-11, prior to introducing the tangent function on a calculator:

desmos

About Partnerships Classroom Activities We're Hiring!

Explore math with Desmos.

Graph functions, plot data, evaluate equations, explore transformations, and much more – for free!

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Check out the newest additions to the Desmos calculator family.

Four Function | Scientific

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Find the best digital activities for your math class — or build your own.

Classroom Activities

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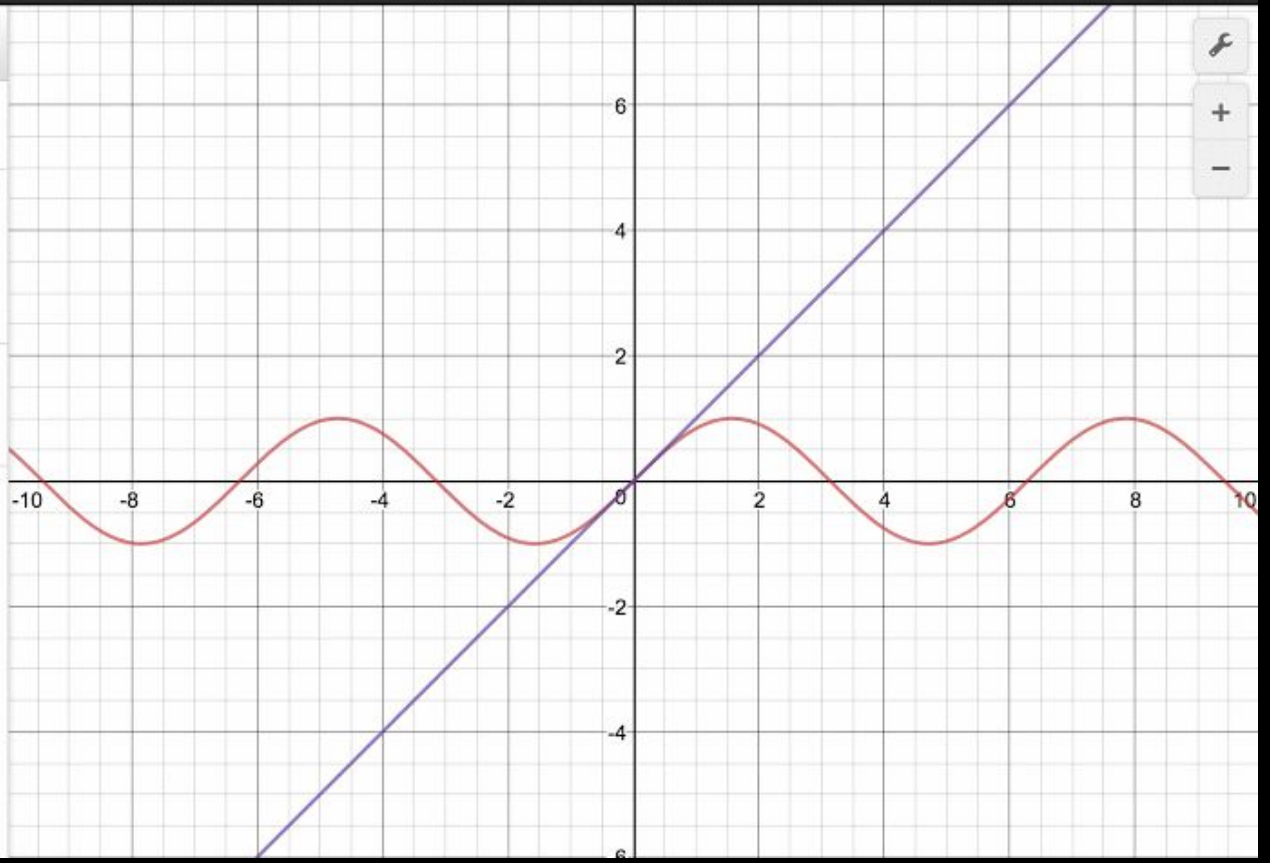
Calculus: Taylor Expansion… Save desmos John

$y = \sin(x)$

$y = \sum_{n=0}^{a} \frac{(-1)^n x^{(2n+1)}}{(2n+1)!}$

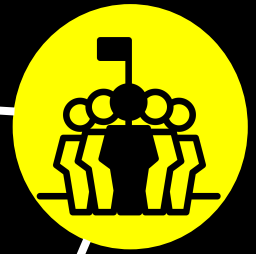
$a = 0$

0 10



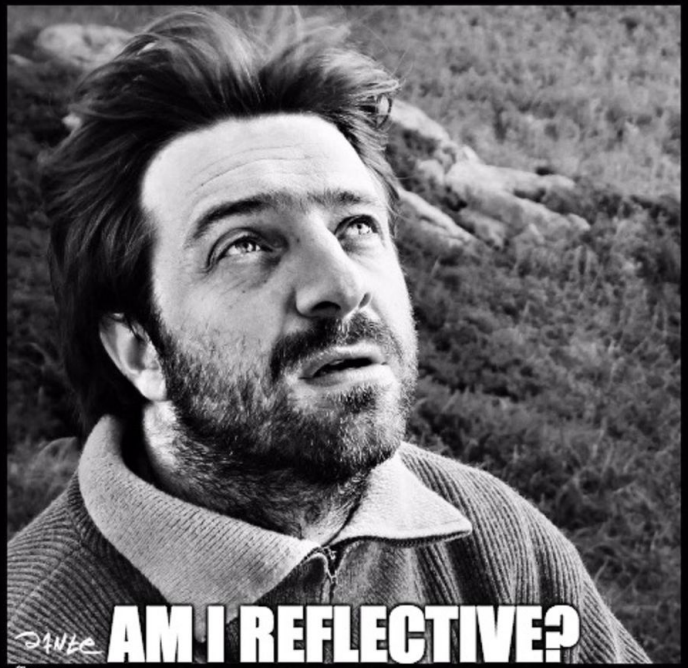
How can I use technology to deepen conceptual understanding?

Lead the Classroom Culture!



Leaders provide protection and direction.

Culture of reflection?



Culture of provoking student curiosity?

Jo Boaler

Dr Jo Boaler is a Professor of Mathematics Education at Stanford University, and the faculty director of youcubed. She is the author of the first MOOC on mathematics teaching and learning. Former roles have included being the Marie Curie Professor of Mathematics Education for Europe, a mathematics teacher in London comprehensive schools and a researcher at King's College, London. She is the author of nine books – including the best seller: Mathematical Mindsets - and she has received numerous awards for mathematics equity and leadership.

Culture of healing students from poor math experiences?

Culture of ridiculously pro wait time?

Culture of ridiculously pro wait time?

How can I step up and be the leader my students need and deserve?

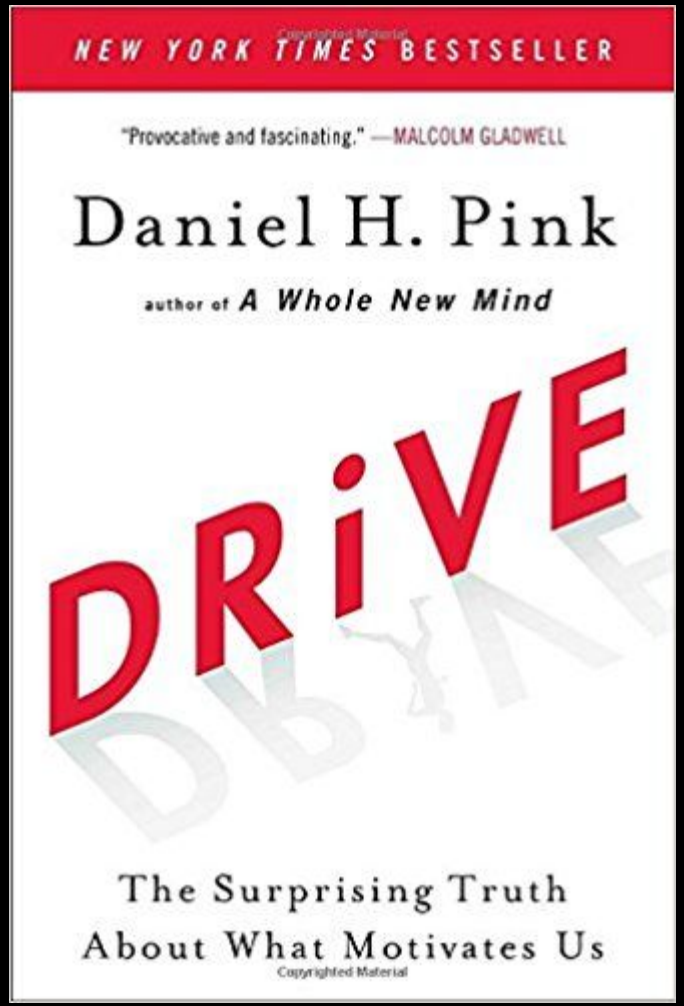
Motivate

Your Students!

Motivation 3.0: Intrinsic

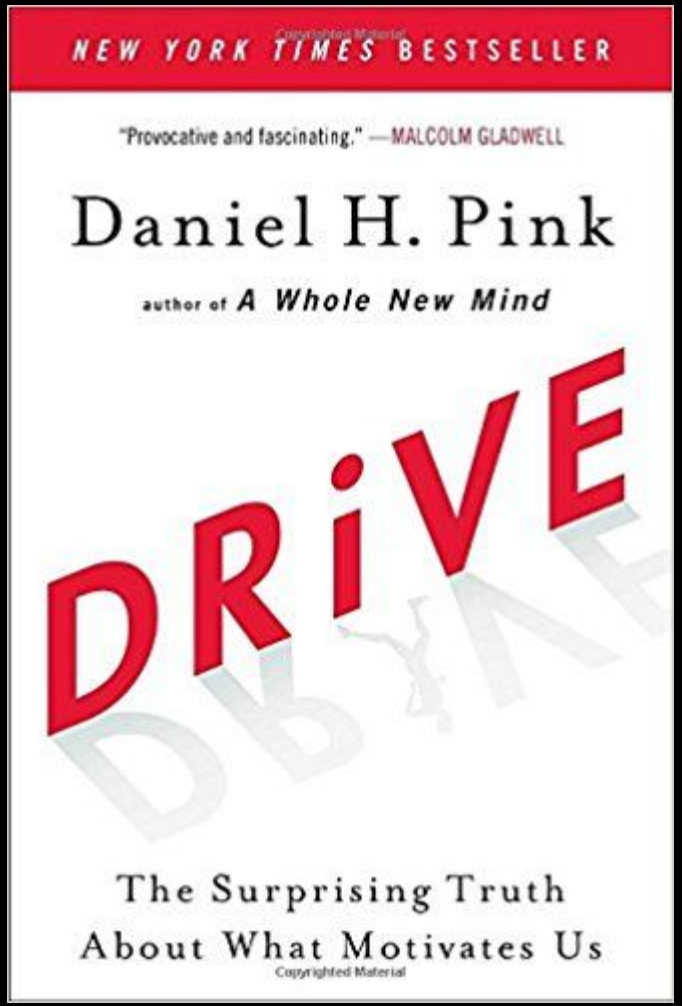
Motivation 2.0: Carrot / Stick

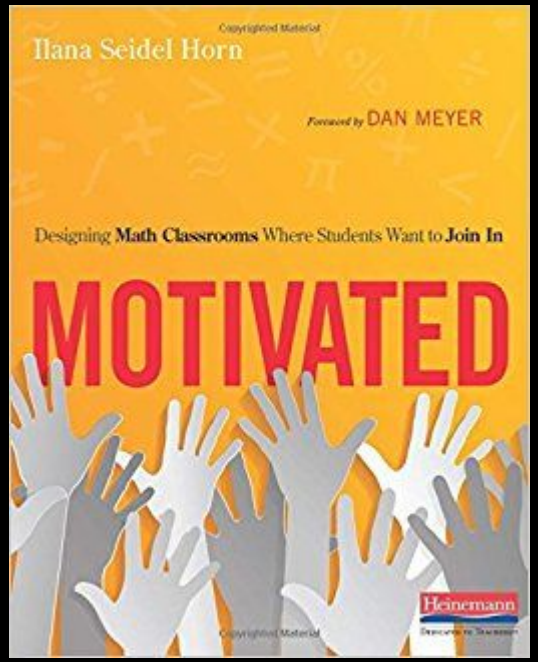
Motivation 1.0: Survival



Motivation 3.0

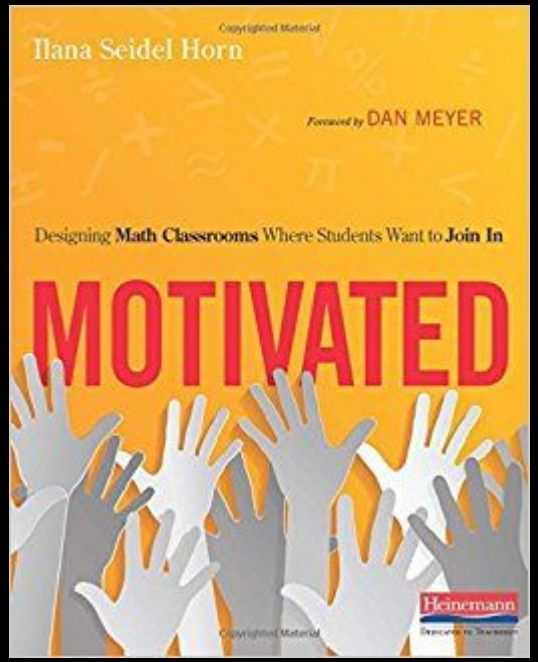
1) ***Autonomy***
   - Time
   - Task
   - Technique
   - Team
2) ***Mastery***
3) ***Purpose***





Llana Horn

Mind. Blown.



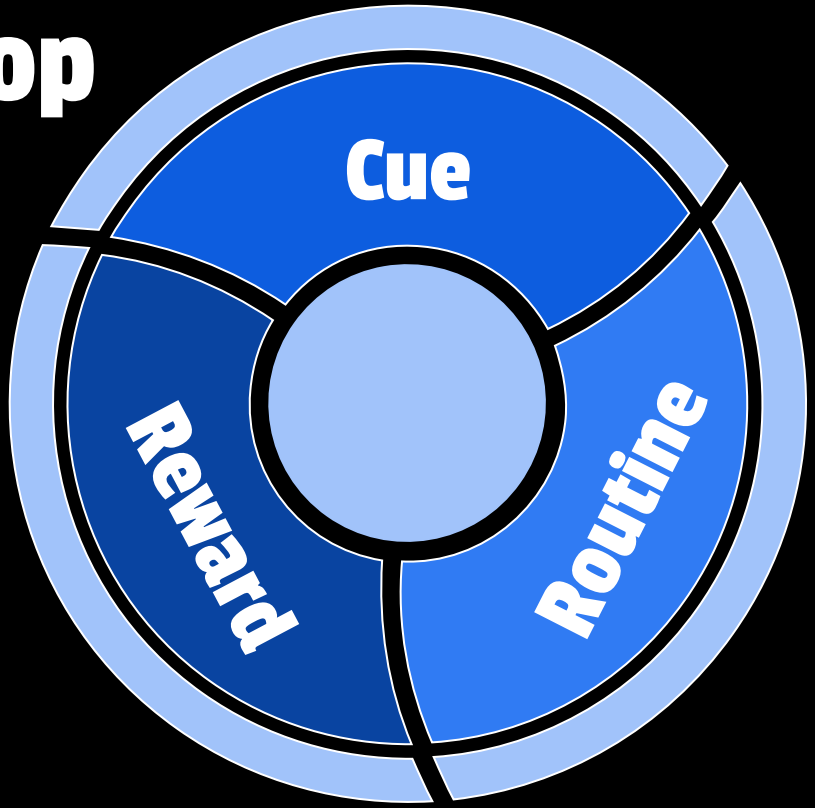
Belonging
Meaningfulness
Competence
Accountability
Autonomy

Would YOU want to be a student in your own class?

Make Class

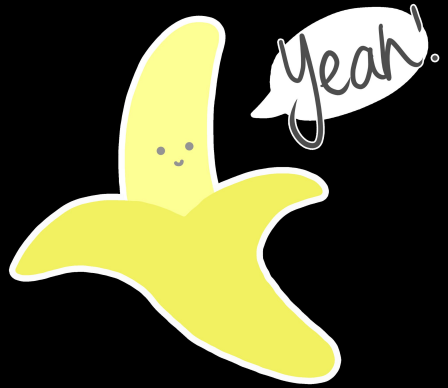
Fun!

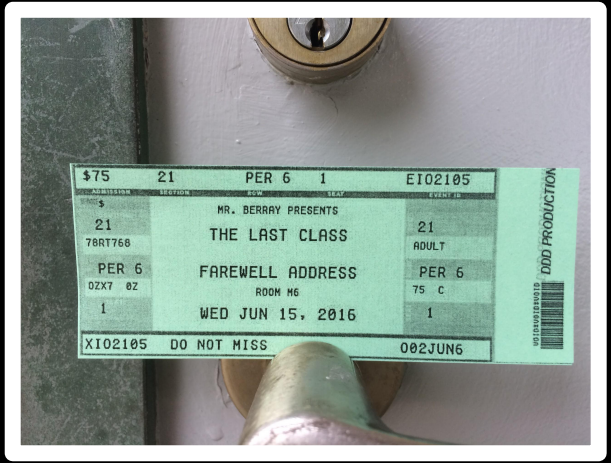
Habit Loop



WHHS

honors algeberray 2

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THE LAST CLASS
FAREWELL ADDRESS
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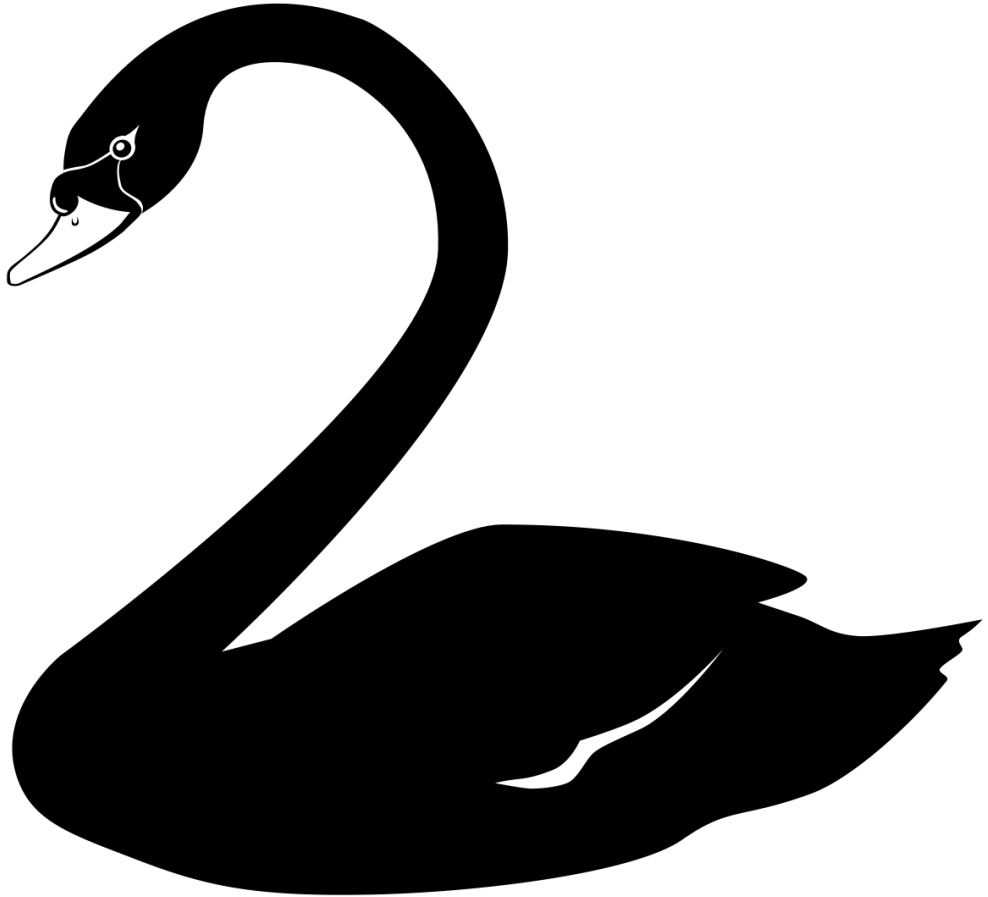
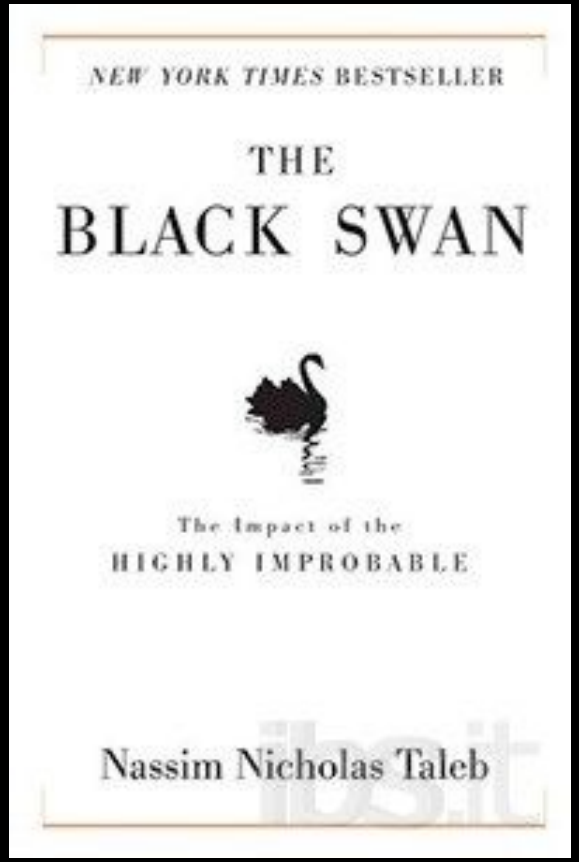
How might you bring more joy into your math class?

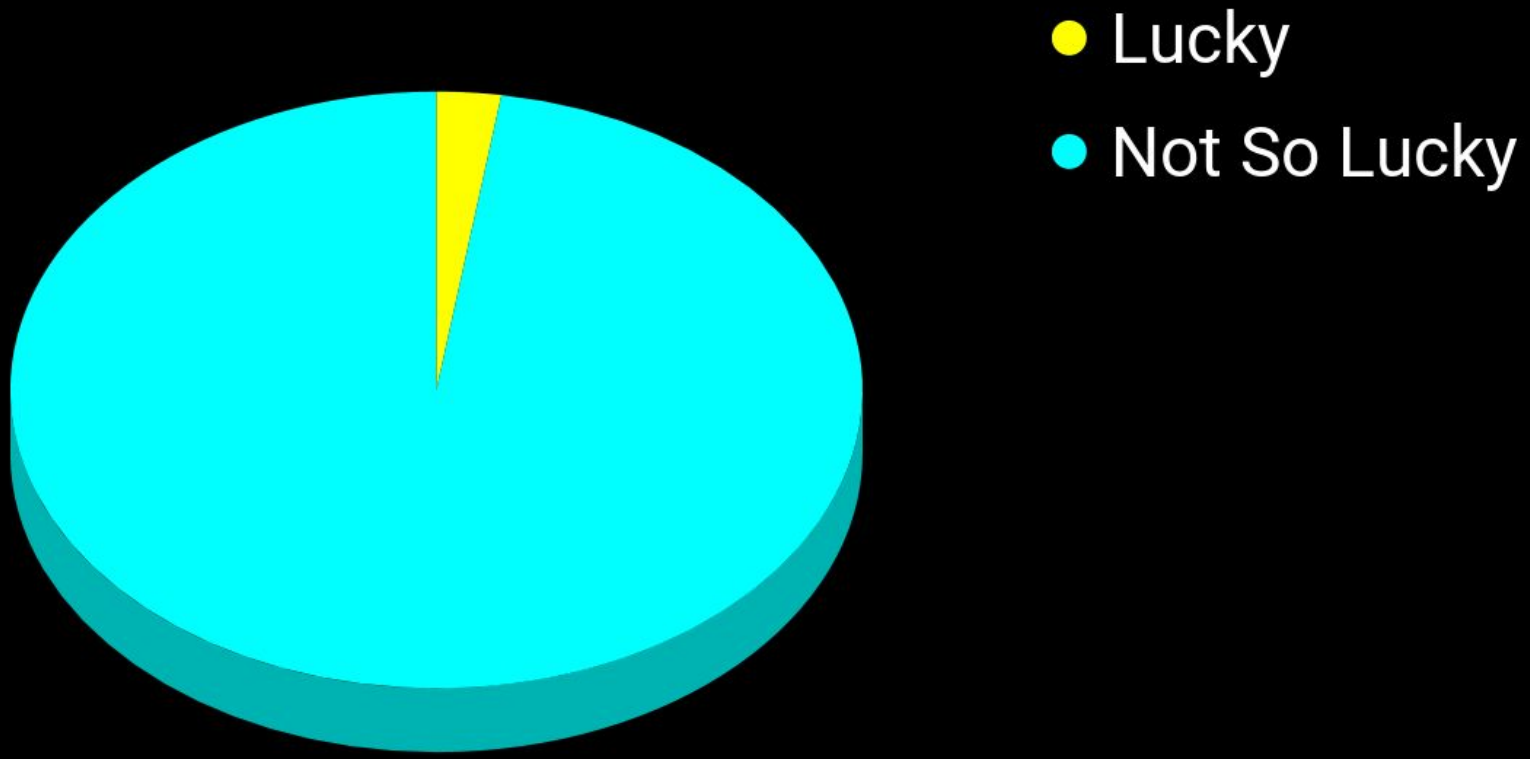




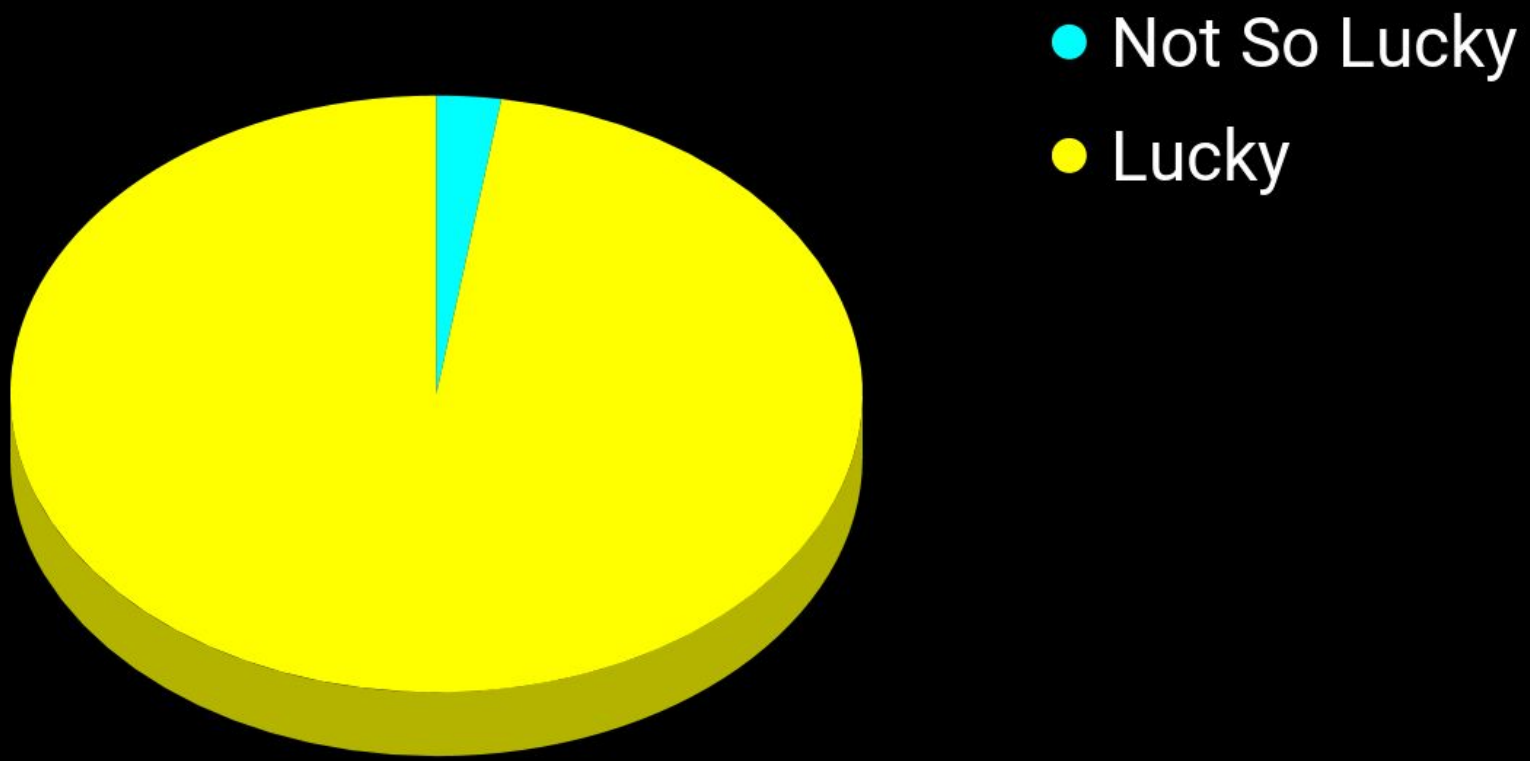
3 Characteristics:

1) **outlier**
2) **extreme impact**
3) **explicable narrative after it occurs**

Chance of Student Landing a Legendary Math Class

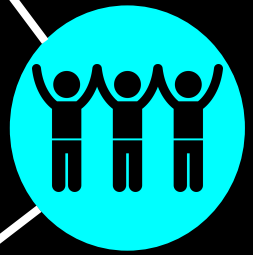


Chance of Student Landing a Legendary Math Class

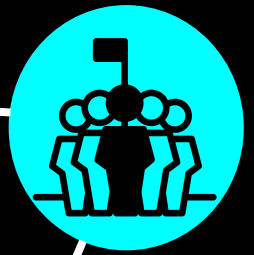
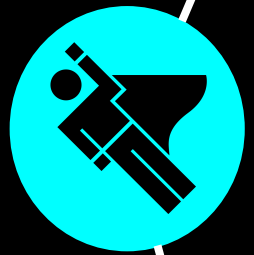


Reflection Cove

Thank you!

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See you at NCTM 2019 in San Diego!