8 Ways to Create a Legendary Math Class
fiscal policy of money
money policy?
Have you ever HAD that class or BEEN that teacher? Who cares?
How can we evolve a traditional math classroom into one that is modern and ...
legendary
/ˈlɛʒər, lər-/ ▶

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
legendary

/ˈlejənˌdæri/ əd

adjective

1. of, described in, or based on legends.
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   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"
Legendary

adj

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
Knowledge of Math Content Standards

Kind Person

Reflective Teacher

Knowledge of Math Practice Standards
BUILDING THINKING CLASSROOMS

1. Begin with a Problem
   - Give a problem-solving task
   - To start: Problems should be
     - Engaging
     - Non-curricular
     - Collaborative
     - Promote talking
   - Later: Problems can be curricular or textbook problems

2. Visibly Random Groups
   - Randomly assigned
   - Playing cards
   - Daily & in front of students
   - 2 or 3 students/group
   - Sit & stand together

3. Vertical Non-Permanent Surface
   - Vertical
   - Erasable
   - Whiteboard
   - Chalkboard
   - Window
   - 1 marker or chalk per group
   - Promotes discussion

4. Oral Instructions
   - Give instructions orally
   - Data long expressions diagrams
   - Groups will discuss (instead of decoding text)

5. Defront the Room
   - Desks: Pull away from wall (room to stand @ VIPS)
   - Teacher addresses the class from a variety of locations

6. Answering Questions
   - Acknowledge, but don't answer:
     - Proximity questions (the teacher is close by)
     - Stop thinking questions
   - Ask: Keep thinking questions
     - Give HINTS not answers

7. Build Autonomy
   - Model how groups can visit other groups when they are stuck
   - Don’t: Proximity questions
   - Hints & extensions come from peers (not just the teacher)
   - Helps manage flow

8. Hints & Extensions
   - Manage flow
   - Frustration
   - Perseverance
   - Self-regulation
   - Flexibility

9. Level to the Bottom
   - Debrief class discussion
   - Direct teaching the "lesson"
   - Once all groups pass a minimum threshold

10. Student Notes
    - Student created:
      - Select
      - Synthesize
      - Reorganize
      - Provide time for this after leveling

11. Assessment
    - Process → Product
      - Group + Individual work
      - Student learning: Where are they?
      - Where are they going?
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.
TEACH LIKE A PIRATE

by: Dave Burgess

Passion
Find Yours...
- CONTENT
- PROFESSION
- PERSONAL LIFE
- Breathe in front of your class!

Immersion
Are you in the sea or just over it?

Teach Kids NOT Tests!

Enthusiasm
The closer!

Rapport
Their interests

Transformation
goals: Be uncommon like a penguin

November 2017

Dave Burgess
Dos libros

#tlap
#NCTManannual
@johnberray
Dos libros
Personal Passion
Professional Passion
Content Passion
“Touchstone Experiences”
-Peg Cagle
Modeling with linear functions
Frickin’ Packets

by Jennifer Gonzalez

Are your worksheets contributing to meaningful learning, or just keeping students busy?
Food meets algebra!

Robert Kaplinsky
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
   - Base: 3 m x 4 m
   - Height: 5 m

2. the regular octagonal prism
   - Side: 2 m
   - Height: 3 m

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

5. a cylinder with radius 6 cm and height 3 km

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

### In 2020

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7. Service Orientation
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Source: Future of Jobs Report, World Economic Forum
Critical Thinking
Communication
Collaboration
Creativity
Critical Thinking

Communication

Collaboration

Creativity
Choose Collaboration Over Competition!
Collaboration can be...
● informal conversation
● structured talking protocols
● peer feedback
● iterative process of collaborative creation
How can I invite and maximize collaboration and minimize a win/lose mentality?
Abby
Alleh
Saradina
Isabella
Letani
Lia
Mari
Raelee
Itzel
Kate
Sophie
Olivija
Sophie
Connect to the Real World
General Form of a quadratic equation

\[ ax^2 + bx + c = 0 \]

\[ x^2 + \frac{b}{a}x + \frac{c}{a} = 0 \]

\[ x^2 + \frac{b}{a}x = -\frac{c}{a} \]

\[ x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 = -\frac{c}{a} + \left(\frac{b}{2a}\right)^2 \]

\( (x + \frac{b}{2a})^2 = -\frac{c}{a} + \left(\frac{b}{2a}\right)^2 \)

\( (x + \frac{b}{2a})^2 = -\frac{c}{a} \cdot \frac{4a}{4a} + \left(\frac{b^2}{4a^2}\right) \)

\( (x + \frac{b}{2a})^2 = \left(\frac{b^2-4ac}{4a^2}\right) \)

\[ \sqrt{(x + \frac{b}{2a})^2} = \sqrt{\left(\frac{b^2-4ac}{4a^2}\right)} \]

\[ x + \frac{b}{2a} = \frac{\pm \sqrt{b^2-4ac}}{2a} \]

\[ x + \frac{b}{2a} - \frac{b}{2a} = \frac{\pm \sqrt{b^2-4ac}}{2a} - \frac{b}{2a} \]

\[ x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} \]
Barbie Bungie! Are you kidding me?!
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
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?
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
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!
Movement
Shadow a Student Challenge

shadowastudent.org
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...
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.
GEOGEBRA
THE GRAPHING CALCULATOR FOR FUNCTIONS, GEOMETRY,
ALGEBRA, CALCULUS, STATISTICS AND 3D MATH!
DYNAMIC MATHEMATICS FOR LEARNING AND TEACHING
Activity Pick of the Week

**Which is Steepest?**

- **by Desmos**  
  - 30-45 minutes  
  - Introduction

In this activity, students explore the idea of "steepest" 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/5aa8647309a99a60d45974640](https://teacher.desmos.com/activitybuilder/custom/5aa8647309a99a60d45974640)

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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/56274598f26d37312cf969b](https://teacher.desmos.com/activitybuilder/custom/56274598f26d37312cf969b)

Dutch translation courtesy Carolijn Tacken:  
[https://teacher.desmos.com/activitybuilder/custom/58b5f81f59b57ba909439712](https://teacher.desmos.com/activitybuilder/custom/58b5f81f59b57ba909439712)

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**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:
Explore math with Desmos.
Graph functions, plot data, evaluate equations, explore transformations, and much more – for free!

Four Function and Scientific
Check out the newest additions to the Desmos calculator family.

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

Learn.desmos.com
Level up your Desmos skills with videos, challenges, and more.
\[ y = \sin(x) \]

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

\[ a = 0 \]
How can I use technology to deepen conceptual understanding?
Lead the Classroom Culture!
Leaders provide protection and direction.
Culture of reflection?

AM I REFLECTIVE?
Culture of provoking student curiosity?
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 1.0: Survival

Motivation 2.0: Carrot / Stick

Motivation 3.0: Intrinsic
Motivation 3.0

1) Autonomy
   Time
   Task
   Technique
   Team

2) Mastery

3) Purpose
Llana Horn

Belonging
Meaningfulness
Competence
Accountability
Autonomy
Would YOU want to be a student in your own class?
Make Class Fun!
Habit Loop

- Cue
- Routine
- Reward
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

- Lucky
- Not So Lucky
Chance of Student Landing a Legendary Math Class

- Not So Lucky
- Lucky
Reflection Cove
Thank you!

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See you at NCTM 2019 in San Diego!