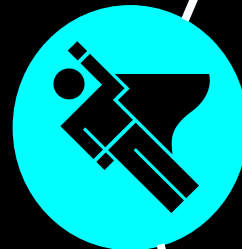
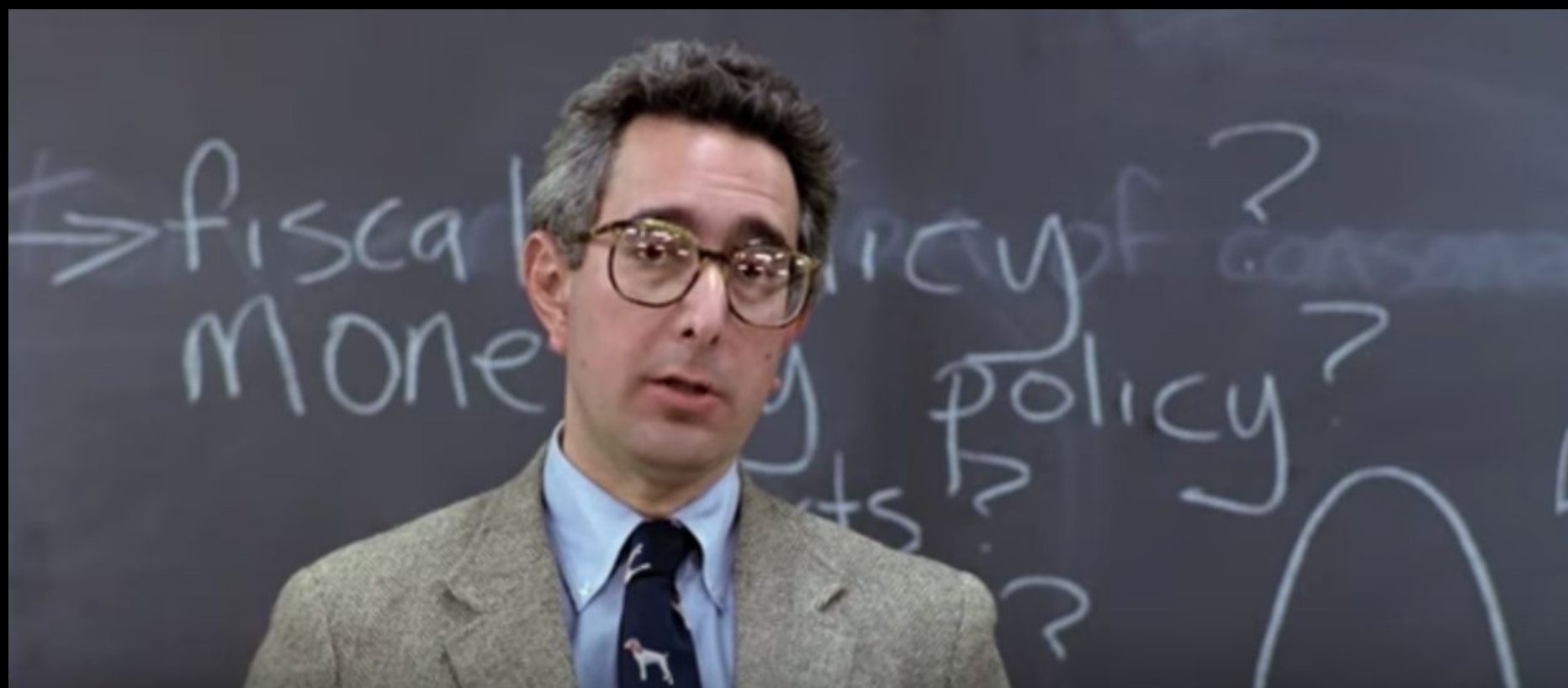


8 Ways to Create a *Legendary* Math Class

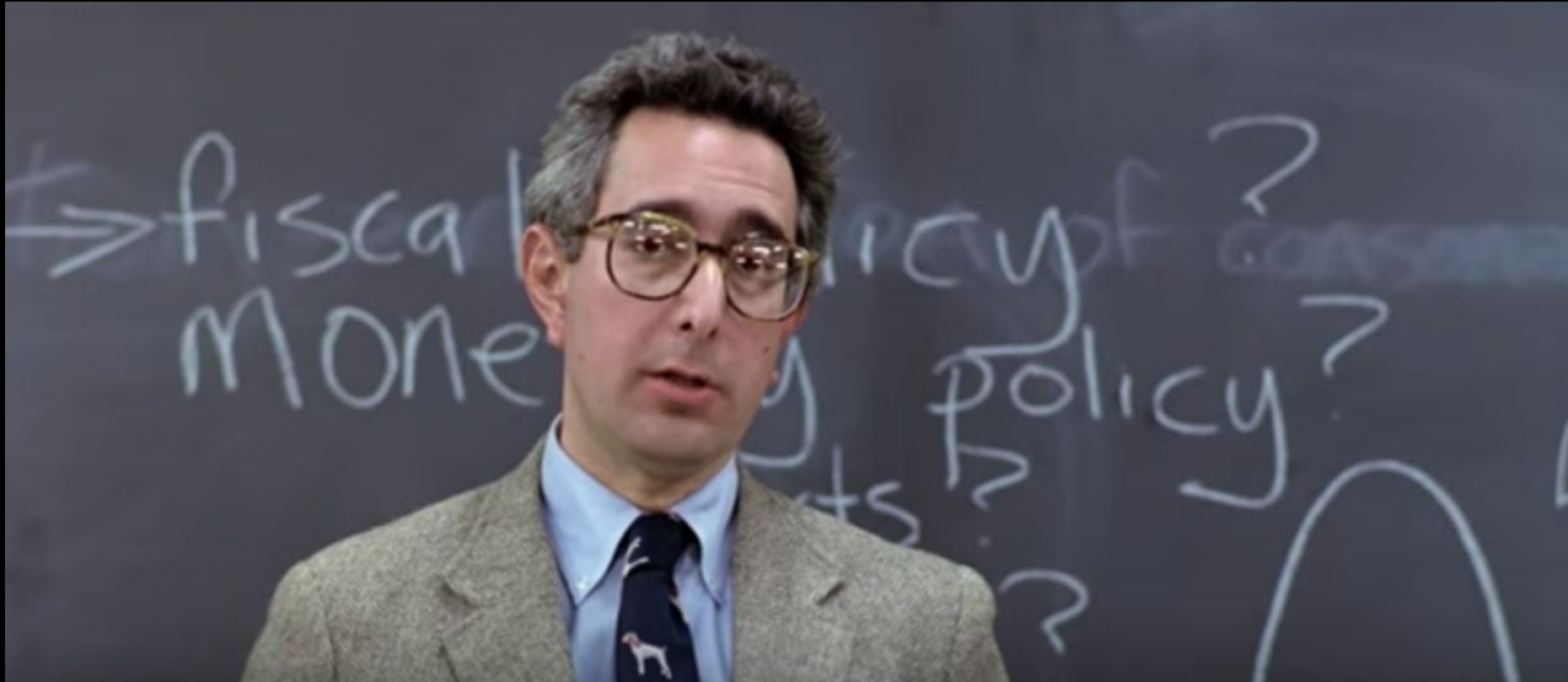


@johnberray





**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 ...



leg·end·ar·y

/ˈleɪən, derē/ 🔊

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

/ˈleɪənˌderē/ 🔊

adjective

adjective: **legendary**

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"a legendary British king of the 4th century"

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



BERRY
JOHN

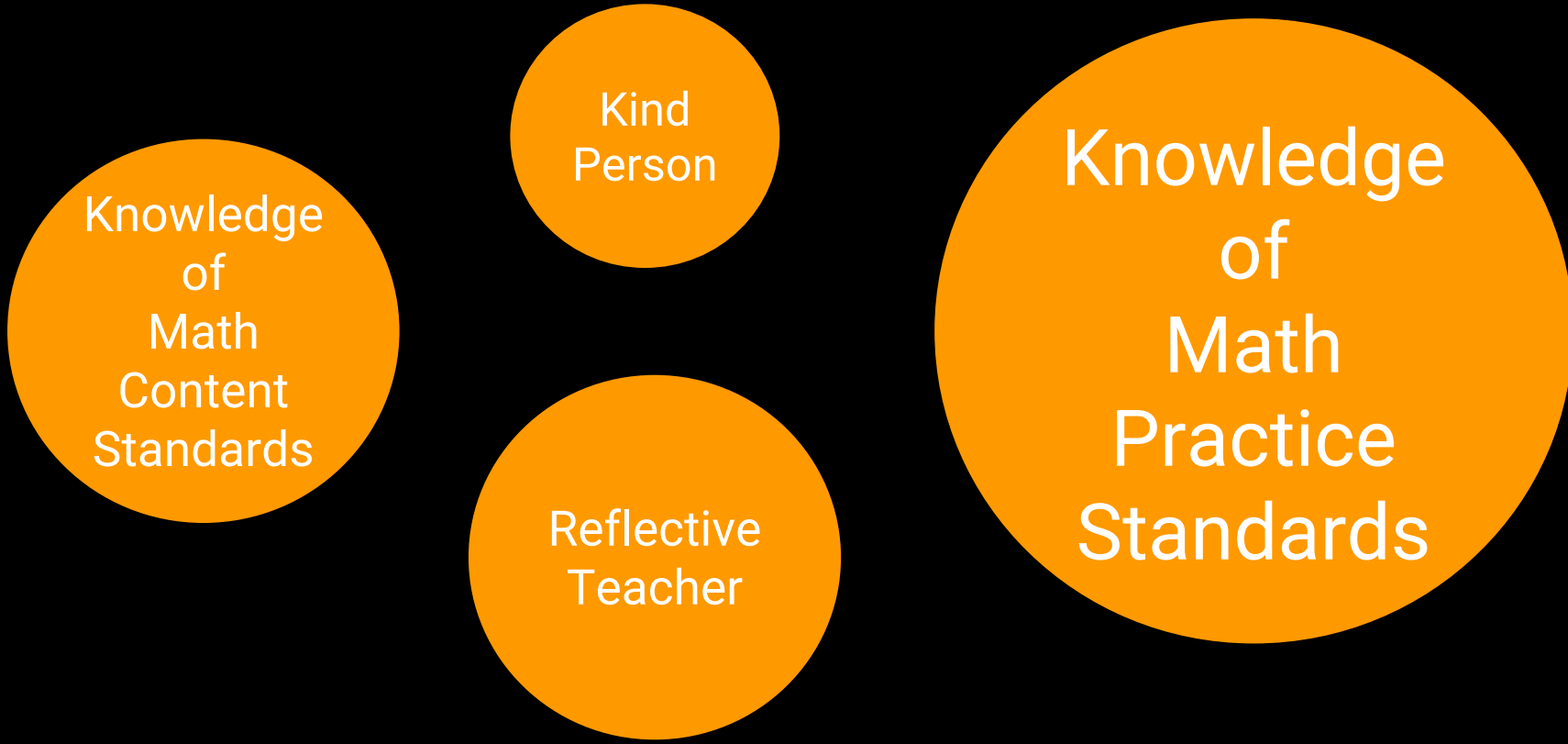
GROSSMONT UNION
HIGH SCHOOL DISTRICT

CELEBRATING
75
YEARS

A PROMISE TO KEEP
A FUTURE TO BUILD

Y384
010





A diagram consisting of four orange circles of varying sizes on a black background. The circles are arranged with one large circle on the right and three smaller circles on the left. The text inside each circle is white and centered.

Knowledge
of
Math
Content
Standards

Kind
Person

Reflective
Teacher

Knowledge
of
Math
Practice
Standards

BUILDING THINKING CLASSROOMS

RESEARCH: @pgiljedahl
 SKETCHNOTE: @wheeler_laura

① Begin w/ a Problem

Give a problem-solving task

To start:

- Problems should be
 - engaging
 - not-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 NonPermanent Surfaces

- Vertical
- Erasable



WHITEBOARD



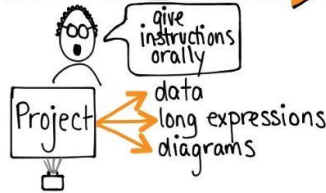
CHALKBOARD



WINDOW

- 1 marker or chalk per group
 ↳ promotes discussion

④ Oral Instructions

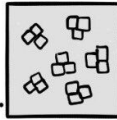


→ groups will discuss
 (instead of decoding text)

⑤ De-front 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

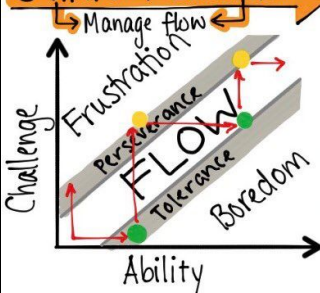
Answer:

- ✓ 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



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
 - reorganize
- ideas

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

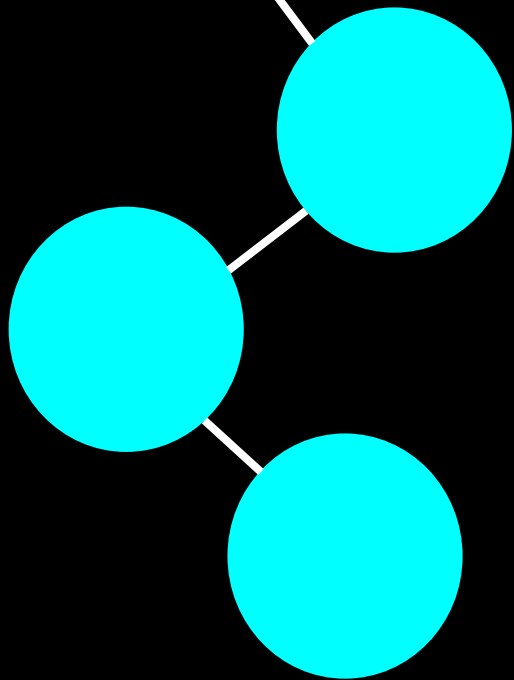
Trig identities

Slope

Derivatives

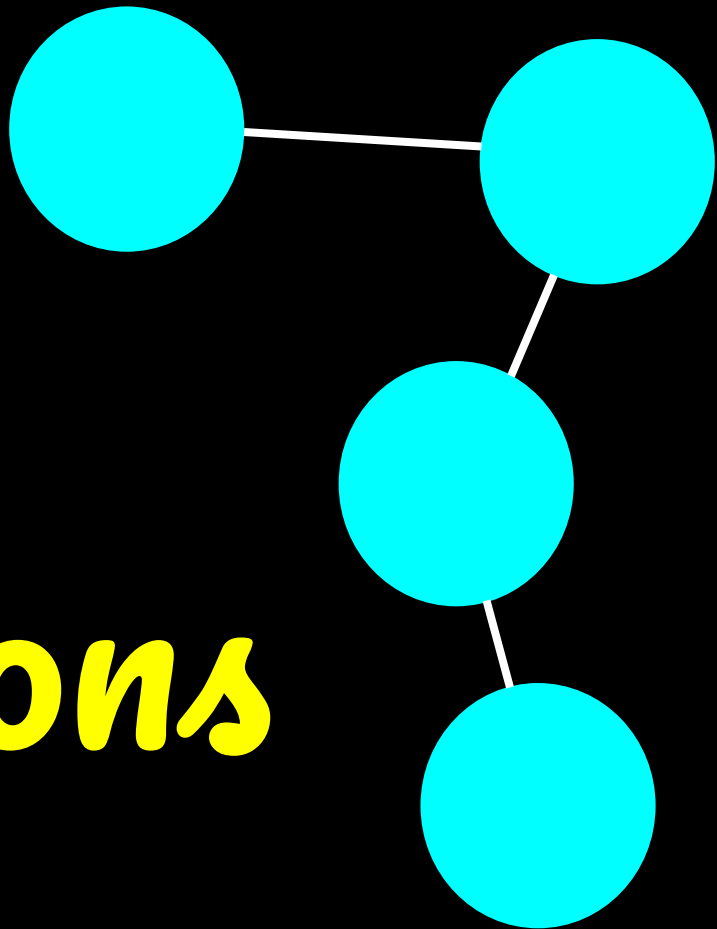
Volumes of solids





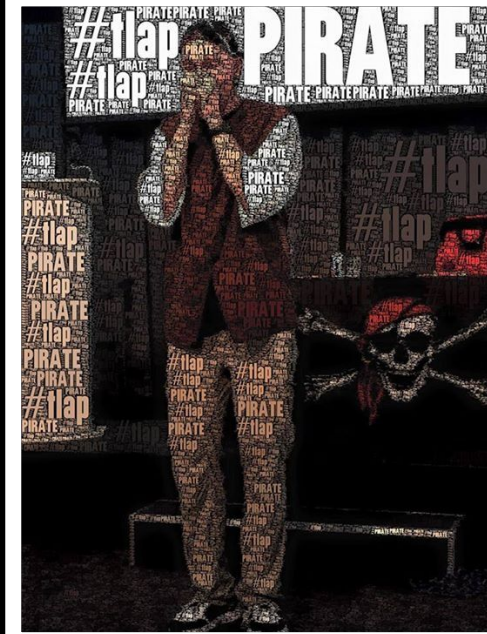
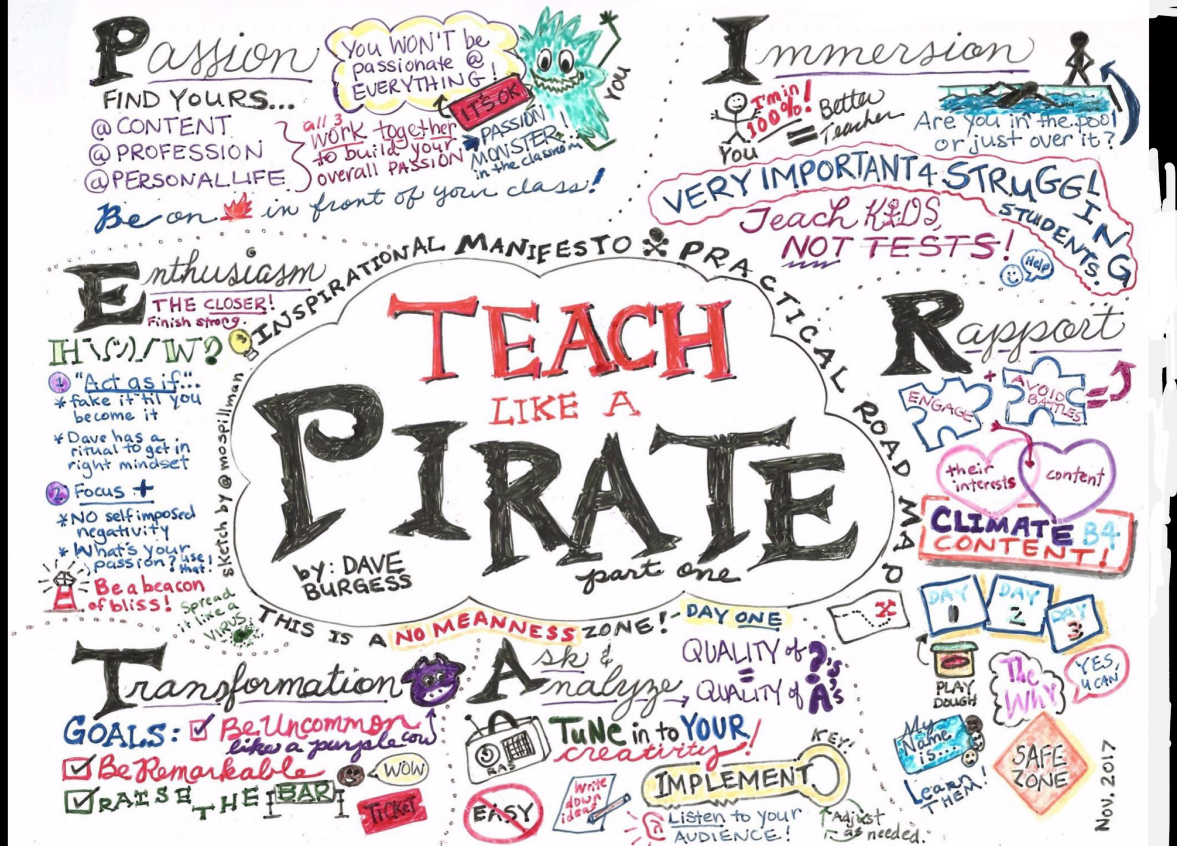
**Amplify
your**

Passions

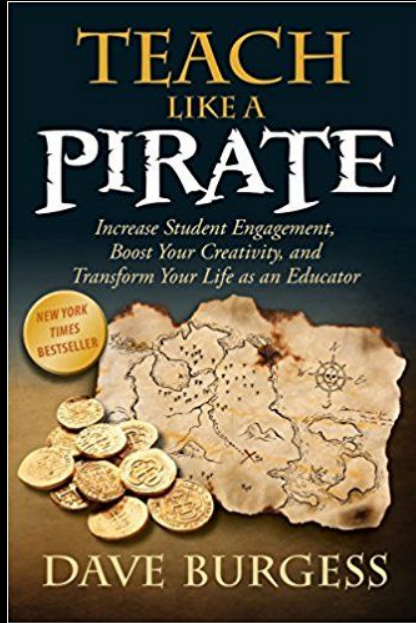


Pick a topic you LOVE outside of teaching.

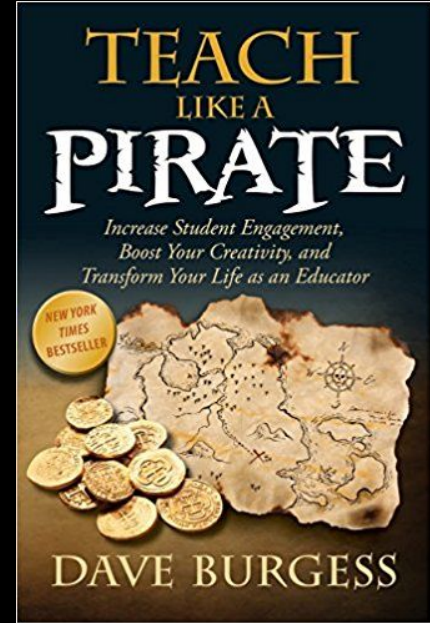




Dave Burgess



#tlap
#NCTMannual
@johnberray
Dos libros

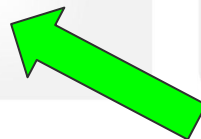
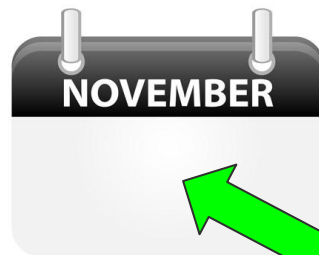
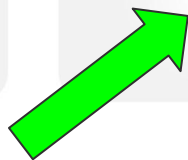


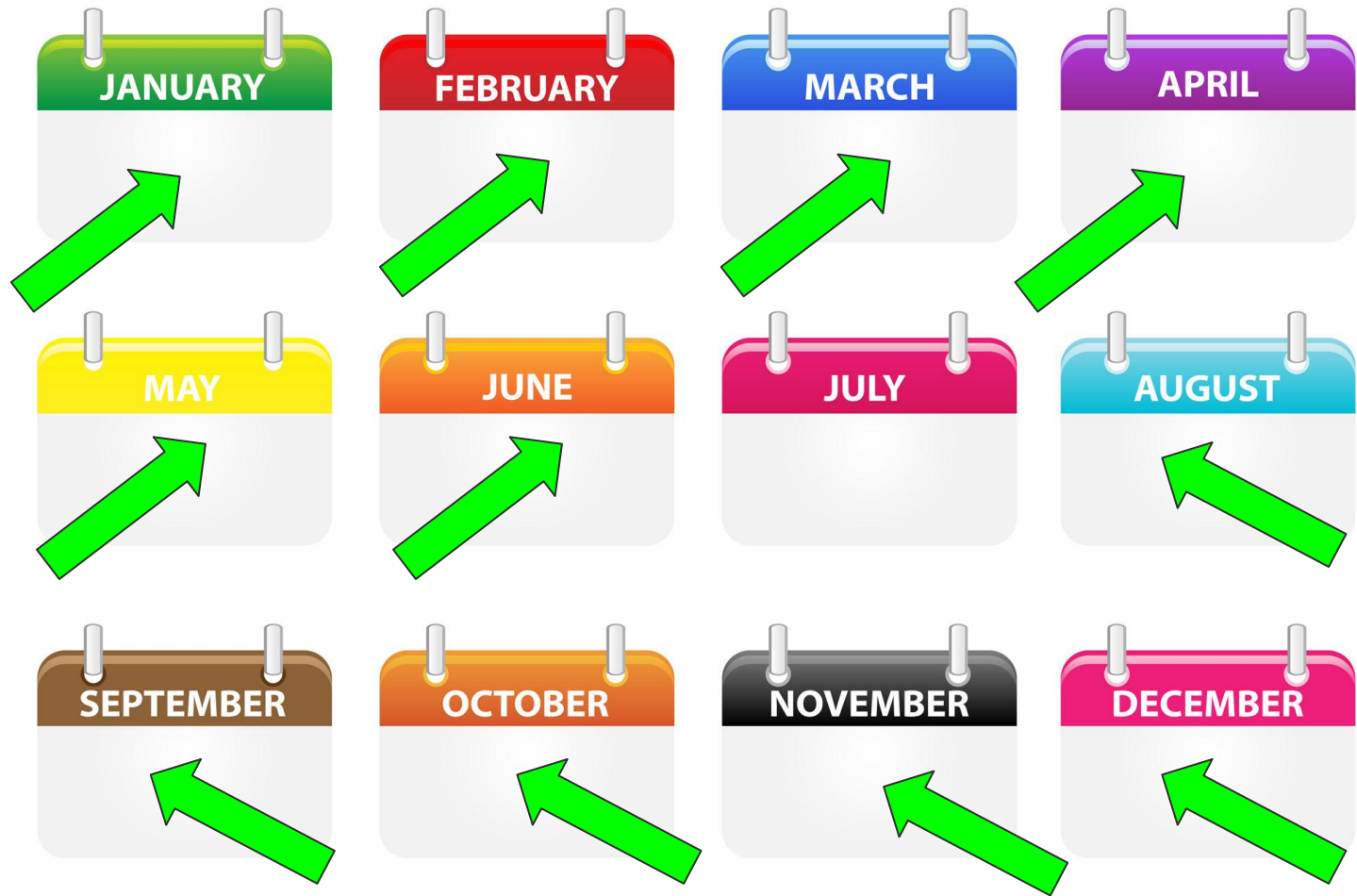
Personal Passion
Professional Passion
Content Passion



“Touchstone Experiences” -Peg Cagle

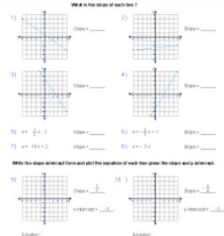




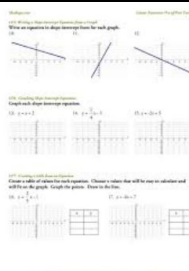
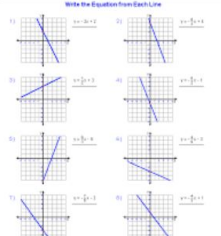


Name : _____ Score : _____
Teacher : _____ Date : _____

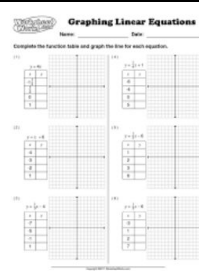
Name : _____ Score : _____
Teacher : _____ Date : _____



Web site:



For help with these topics go to Section 4 at MindTap.com



| Order | Equation | Graph | Graph/Particular |
|-----------|-------------------------|-------|--|
| 1st Order | $\frac{dy}{dx} = p$ | | $y = px + c$ $c = \text{constant} = 0$ $y = px$ $p = \text{slope}$ $x = 0$ |
| 2nd Order | $\frac{d^2y}{dx^2} = p$ | | $y = \frac{1}{2}px^2 + c_1x + c_2$ $c_1 = \text{constant} = 0$ $c_2 = \text{constant} = 0$ $y = \frac{1}{2}px^2$ $p = \text{slope}$ $x = 0$ |
| 3rd Order | $\frac{d^3y}{dx^3} = p$ | | $y = \frac{1}{6}px^3 + c_1x^2 + c_2x + c_3$ $c_1 = \text{constant} = 0$ $c_2 = \text{constant} = 0$ $c_3 = \text{constant} = 0$ $y = \frac{1}{6}px^3$ $p = \text{slope}$ $x = 0$ |
| 4th Order | $\frac{d^4y}{dx^4} = p$ | | $y = \frac{1}{24}px^4 + c_1x^3 + c_2x^2 + c_3x + c_4$ $c_1 = \text{constant} = 0$ $c_2 = \text{constant} = 0$ $c_3 = \text{constant} = 0$ $c_4 = \text{constant} = 0$ $y = \frac{1}{24}px^4$ $p = \text{slope}$ $x = 0$ |


Graphing Linear Functions

Write _____

Compute the function value. Graph the graph of each function.


1. $f(x) = 2x + 1$

| | | | | | | | |
|--------|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| $f(x)$ | | | | | | | |




2. $f(x) = x + 5$

| | | | | | | | |
|--------|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| $f(x)$ | | | | | | | |




3. $f(x) = 4x - 6$

| | | | | | | | |
|--------|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| $f(x)$ | | | | | | | |




4. $f(x) = 2x$

| | | | | | | | |
|--------|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| $f(x)$ | | | | | | | |




5. $f(x) = x + 2$

| | | | | | | | |
|--------|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| $f(x)$ | | | | | | | |




6. $f(x) = 3x + 1$

| | | | | | | | |
|--------|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| $f(x)$ | | | | | | | |




7. $f(x) = -2x$

| | | | | | | | |
|--------|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| $f(x)$ | | | | | | | |




8. $f(x) = x + 3$

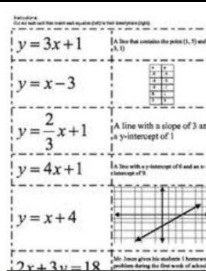
| | | | | | | | |
|--------|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| $f(x)$ | | | | | | | |



9. $f(x) = 3x - 2$

| | | | | | | | |
|--------|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| $f(x)$ | | | | | | | |





HW 21: Algebraic Solution Date: _____

Write down the system of equations and then find the Substitution or Elimination method that you prefer to use.

1. $3x + 2y = 12$

2. $x - y = 3$

| | |
|-----|-----|
| x | y |
| 0 | 6 |
| 1 | 5 |
| 2 | 4 |
| 3 | 3 |
| 4 | 2 |
| 5 | 1 |
| 6 | 0 |

| | |
|-----|-----|
| x | y |
| 0 | 2 |
| 1 | 1 |
| 2 | 0 |
| 3 | -1 |
| 4 | -2 |
| 5 | -3 |
| 6 | -4 |

3. $2x + 3y = 12$

4. $x - y = 3$

| | |
|-----|-----|
| x | y |
| 0 | 4 |
| 1 | 3 |
| 2 | 2 |
| 3 | 1 |
| 4 | 0 |
| 5 | -1 |
| 6 | -2 |

| | |
|-----|-----|
| x | y |
| 0 | 2 |
| 1 | 1 |
| 2 | 0 |
| 3 | -1 |
| 4 | -2 |
| 5 | -3 |
| 6 | -4 |

5. $2x + 3y = 12$

6. $x - y = 3$

| | |
|-----|-----|
| x | y |
| 0 | 4 |
| 1 | 3 |
| 2 | 2 |
| 3 | 1 |
| 4 | 0 |
| 5 | -1 |
| 6 | -2 |

| | |
|-----|-----|
| x | y |
| 0 | 2 |
| 1 | 1 |
| 2 | 0 |
| 3 | -1 |
| 4 | -2 |
| 5 | -3 |
| 6 | -4 |

7. $2x + 3y = 12$

8. $x - y = 3$

| | |
|-----|-----|
| x | y |
| 0 | 4 |
| 1 | 3 |
| 2 | 2 |
| 3 | 1 |
| 4 | 0 |
| 5 | -1 |
| 6 | -2 |

| | |
|-----|-----|
| x | y |
| 0 | 2 |
| 1 | 1 |
| 2 | 0 |
| 3 | -1 |
| 4 | -2 |
| 5 | -3 |
| 6 | -4 |

9. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

10. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

11. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

12. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

13. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

14. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

15. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

16. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

17. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

18. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

19. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

20. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

21. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

22. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

23. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

24. x = _____, y = _____ (Simplify the table of values for the equation $y = 2x + 3$.)

| | |
|-----|-----|
| x | y |
| 0 | 3 |
| | |

Name: _____ Date: _____

Graphing Linear Equations

Complete the table. Use the answers to graph the line.

| 1. $2x + 3y = 6$ | 2. $x - 2y = 4$ | 3. $3x - 2y = 6$ |
|---|--|--|
| <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> $2x + 3y = 6$ </div> | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> $x - 2y = 4$ </div> | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> $3x - 2y = 6$ </div> |
| <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> $5x + 3y = 15$ </div> | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> $8x - y = 12$ </div> | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> $x + 3y = 6$ </div> |
| <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> $x - 4y = 8$ </div> | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> $10x - y = 2$ </div> | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> $3x - 2y = 6$ </div> |

[illegible]

Paper Model

5. Graph the inverse function $f^{-1}(x) = \frac{1}{2} \log_2(x - 4)$.
Write a short paragraph about the function.

| x | $f(x) = 2^x + 4$ | $f^{-1}(x)$ |
|----|------------------|-------------|
| -2 | | |
| -1 | | |
| 0 | | |
| 1 | | |
| 2 | | |

Equation _____

6. Graph the function $f(x) = \log_2(x - 4)$.

| x | $f(x) = \log_2(x - 4)$ |
|----|------------------------|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

Equation _____

Function Tables

Complete the function table. Plot the points on a graph and graph the function.

1. $y = 2x + 1$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

2. $y = -x + 3$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

3. $y = x + 1$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

4. $y = 2x - 1$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

5. $y = -x + 1$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

6. $y = x - 1$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

7. $y = 2x + 3$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

8. $y = -x + 2$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

9. $y = x + 2$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

10. $y = 2x - 3$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

11. $y = -x + 4$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

12. $y = x + 4$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

13. $y = 2x + 4$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

14. $y = -x + 5$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

15. $y = x + 5$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

16. $y = 2x + 5$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

17. $y = -x + 6$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

18. $y = x + 6$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

19. $y = 2x + 6$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

20. $y = -x + 7$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

21. $y = x + 7$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

22. $y = 2x + 7$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

23. $y = -x + 8$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

24. $y = x + 8$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

25. $y = 2x + 8$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

26. $y = -x + 9$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

27. $y = x + 9$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

28. $y = 2x + 9$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

29. $y = -x + 10$

| x | y |
|----|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

30. $y = x + 10$

| x |
|---|
|---|

Write the matrix for each equation for the three circles.

1. $x^2 + y^2 = 16$

| x | y | xy |
|-----|-----|------|
| 0 | 4 | 0 |
| 4 | 0 | 0 |
| 0 | -4 | 0 |
| -4 | 0 | 0 |

2. $x^2 + y^2 = 25$

| x | y | xy |
|-----|-----|------|
| 0 | 5 | 0 |
| 5 | 0 | 0 |
| 0 | -5 | 0 |
| -5 | 0 | 0 |

3. $x^2 + y^2 = 9$

| x | y | xy |
|-----|-----|------|
| 0 | 3 | 0 |
| 3 | 0 | 0 |
| 0 | -3 | 0 |
| -3 | 0 | 0 |

Equation _____ Equation _____ Total _____

4. $x^2 + y^2 = 10$

| x | y | xy |
|-------|-------|------|
| 0 | 3.16 | 0 |
| 3.16 | 0 | 0 |
| 0 | -3.16 | 0 |
| -3.16 | 0 | 0 |

5. $x^2 + y^2 = 13$

| x | y | xy |
|-------|-------|------|
| 0 | 3.61 | 0 |
| 3.61 | 0 | 0 |
| 0 | -3.61 | 0 |
| -3.61 | 0 | 0 |

6. $x^2 + y^2 = 17$

| x | y | xy |
|-------|-------|------|
| 0 | 4.12 | 0 |
| 4.12 | 0 | 0 |
| 0 | -4.12 | 0 |
| -4.12 | 0 | 0 |

7. $x^2 + y^2 = 20$

| x | y | xy |
|-------|-------|------|
| 0 | 4.47 | 0 |
| 4.47 | 0 | 0 |
| 0 | -4.47 | 0 |
| -4.47 | 0 | 0 |

8. $x^2 + y^2 = 25$

| x | y | xy |
|-------|-------|------|
| 0 | 5.00 | 0 |
| 5.00 | 0 | 0 |
| 0 | -5.00 | 0 |
| -5.00 | 0 | 0 |

9. $x^2 + y^2 = 30$

| x | y | xy |
|-------|-------|------|
| 0 | 5.48 | 0 |
| 5.48 | 0 | 0 |
| 0 | -5.48 | 0 |
| -5.48 | 0 | 0 |

10. $x^2 + y^2 = 37$

| x | y | xy |
|-------|-------|------|
| 0 | 6.08 | 0 |
| 6.08 | 0 | 0 |
| 0 | -6.08 | 0 |
| -6.08 | 0 | 0 |

11. $x^2 + y^2 = 40$

| x | y | xy |
|-------|-------|------|
| 0 | 6.32 | 0 |
| 6.32 | 0 | 0 |
| 0 | -6.32 | 0 |
| -6.32 | 0 | 0 |

12. $x^2 + y^2 = 45$

| x | y | xy |
|-------|-------|------|
| 0 | 6.71 | 0 |
| 6.71 | 0 | 0 |
| 0 | -6.71 | 0 |
| -6.71 | 0 | 0 |

13. $x^2 + y^2 = 50$

| x | y | xy |
|-------|-------|------|
| 0 | 7.07 | 0 |
| 7.07 | 0 | 0 |
| 0 | -7.07 | 0 |
| -7.07 | 0 | 0 |

14. $x^2 + y^2 = 55$

| x | y | xy |
|-------|-------|------|
| 0 | 7.42 | 0 |
| 7.42 | 0 | 0 |
| 0 | -7.42 | 0 |
| -7.42 | 0 | 0 |

15. $x^2 + y^2 = 60$

| x | y | xy |
|-------|-------|------|
| 0 | 7.75 | 0 |
| 7.75 | 0 | 0 |
| 0 | -7.75 | 0 |
| -7.75 | 0 | 0 |

16. $x^2 + y^2 = 65$

| x | y | xy |
|-------|-------|------|
| 0 | 8.06 | 0 |
| 8.06 | 0 | 0 |
| 0 | -8.06 | 0 |
| -8.06 | 0 | 0 |

17. $x^2 + y^2 = 70$

| x | y | xy |
|-------|-------|------|
| 0 | 8.37 | 0 |
| 8.37 | 0 | 0 |
| 0 | -8.37 | 0 |
| -8.37 | 0 | 0 |

18. $x^2 + y^2 = 75$

| x | y | xy |
|-------|-------|------|
| 0 | 8.66 | 0 |
| 8.66 | 0 | 0 |
| 0 | -8.66 | 0 |
| -8.66 | 0 | 0 |

19. $x^2 + y^2 = 80$

| x | y | xy |
|-------|-------|------|
| 0 | 8.94 | 0 |
| 8.94 | 0 | 0 |
| 0 | -8.94 | 0 |
| -8.94 | 0 | 0 |

20. $x^2 + y^2 = 85$

| x | y | xy |
|-------|-------|------|
| 0 | 9.22 | 0 |
| 9.22 | 0 | 0 |
| 0 | -9.22 | 0 |
| -9.22 | 0 | 0 |

21. $x^2 + y^2 = 90$

| x | y | xy |
|-------|-------|------|
| 0 | 9.49 | 0 |
| 9.49 | 0 | 0 |
| 0 | -9.49 | 0 |
| -9.49 | 0 | 0 |

22. $x^2 + y^2 = 95$

| x | y | xy |
|-------|-------|------|
| 0 | 9.75 | 0 |
| 9.75 | 0 | 0 |
| 0 | -9.75 | 0 |
| -9.75 | 0 | 0 |

23. $x^2 + y^2 = 100$

| x | y | xy |
|--------|--------|------|
| 0 | 10.00 | 0 |
| 10.00 | 0 | 0 |
| 0 | -10.00 | 0 |
| -10.00 | 0 | 0 |

24. $x^2 + y^2 = 105$

| x | y | xy |
|--------|--------|------|
| 0 | 10.25 | 0 |
| 10.25 | 0 | 0 |
| 0 | -10.25 | 0 |
| -10.25 | 0 | 0 |

25. $x^2 + y^2 = 110$

[illegible][illegible]

Equations of Lines #3: _____ Date: _____ Period: _____

a.) Equation: _____

b.) _____

c.) Complete the table using your equation.

| X | Y |
|---|---|
| 0 | |
| 1 | |
| 2 | |

d.) Sketch the equation and b on an ordered pairs.

Equations of Lines #4: _____

a.) Equation: _____

b.) _____

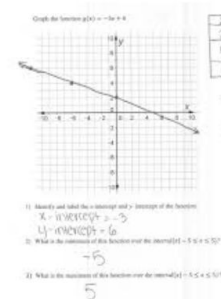
c.) Complete the table using your equation.

| X | Y |
|---|---|
| 0 | |
| 1 | |
| 2 | |

d.) Sketch the equation and b on an ordered pairs.

Modeling with linear functions

| | |
|---|--|
| Name: _____ | Date: _____ |
| <p>Teacher: _____</p> <p>Sketch the Graph of Each Line</p> | |
| <p>1) $y = 2x + 3$</p> <p style="text-align: center;">y-intercept: <u>3</u></p> | <p>2) $y = -\frac{1}{2}x - 1$</p> <p style="text-align: center;">y-intercept: <u>-1</u></p> |
| <p>3) $y = x + 1$</p> <p style="text-align: center;">y-intercept: <u>1</u></p> | <p>4) $y = 3x - 2$</p> <p style="text-align: center;">y-intercept: <u>-2</u></p> |
| <p>5) $y = -2x + 5$</p> <p style="text-align: center;">y-intercept: <u>5</u></p> | <p>6) $y = -\frac{3}{4}x + 3$</p> <p style="text-align: center;">y-intercept: <u>3</u></p> |
| <p>7) $y = x - 4$</p> <p style="text-align: center;">y-intercept: <u>-4</u></p> | <p>8) $y = 3x + 2$</p> <p style="text-align: center;">y-intercept: <u>2</u></p> |





















$-5x + 6$
 $-3(2) + 6$
 $-6 + 6$
 $-3(6) + 6$
 $-18 + 6$

$3(10) + 6 = 36$
 $6 + 4$
 $3x + 6 = 4$

| Equation | Answer |
|--------------------|---------|
| $3x + 6 = 0$ | |
| Classmate's Answer | $x = 2$ |
| My Answer | |
| $3x + 6 = 0$ | |
| Classmate's Answer | $x = 2$ |
| My Answer | |
| $3x + 6 = 0$ | |
| Classmate's Answer | $x = 2$ |
| My Answer | |

| Graph | Equation | Answer |
|-------|--|---|
| | a intercept = $(2, 3)$ y intercept = $(-3, 3)$ $m = 0$ | Parallel to existing line? No $y = 3$ Does Opposite Parallel? |
| | a intercept = $(2, 3)$ y intercept = $(-3, 3)$ $m = 0$ | Parallel? Parallel Does Opposite Parallel? |
| | a intercept = $(1, 3)$ y intercept = $(-3, 2)$ $m = 1/2$ | Parallel? Parallel Does Opposite Parallel? |
| | a intercept = $(1, 3)$ y intercept = $(-3, 2)$ $m = 1$ | Parallel? Parallel Does Opposite Parallel? |







| Learning Level Equivalent | Mathematical Proficiency | Grade | Item Description |
|--|--|--|---|
|  Intermediate, entry class |  Entry |  Entry | a. $\text{intercept} = \underline{\hspace{2cm}}$ $y = \text{slope}(\underline{\hspace{2cm}}) + \text{intercept}$ b. $\text{slope} = \underline{\hspace{2cm}}$ |
|  Entry |  Entry |  Entry | a. $\text{intercept} = \underline{\hspace{2cm}}$ $y = \text{slope}(\underline{\hspace{2cm}}) + \text{intercept}$ b. $\text{slope} = \underline{\hspace{2cm}}$ |
|  Entry |  Entry |  Entry | a. $\text{intercept} = \underline{\hspace{2cm}}$ $y = \text{slope}(\underline{\hspace{2cm}}) + \text{intercept}$ b. $\text{slope} = \underline{\hspace{2cm}}$ |
|  Entry |  Entry |  Entry | a. $\text{intercept} = \underline{\hspace{2cm}}$ $y = \text{slope}(\underline{\hspace{2cm}}) + \text{intercept}$ b. $\text{slope} = \underline{\hspace{2cm}}$ |
|  Entry |  Entry |  Entry | a. $\text{intercept} = \underline{\hspace{2cm}}$ $y = \text{slope}(\underline{\hspace{2cm}}) + \text{intercept}$ b. $\text{slope} = \underline{\hspace{2cm}}$ |
|  Entry |  Entry |  Entry | a. $\text{intercept} = \underline{\hspace{2cm}}$ $y = \text{slope}(\underline{\hspace{2cm}}) + \text{intercept}$ b. $\text{slope} = \underline{\hspace{2cm}}$ |

| | | |
|--|--------------|--|
| | Score: _____ | |
| | Date: _____ | |

Slope and Y-intercept for Each Equation

| | | |
|--|---|--|
| $3x + 2y = 12$ Slope: _____ Y-intercept: _____ | $2) \ y = \frac{3}{2}x - 4$ Slope: _____ Y-intercept: _____ | $3x + 2y = 12$ Slope: _____ Y-intercept: _____ |
| $3x + 2y = 12$ Slope: _____ Y-intercept: _____ | $4) \ y = 6x + 15$ Slope: _____ Y-intercept: _____ | $3x + 2y = 12$ Slope: _____ Y-intercept: _____ |
| $3x + 2y = 12$ Slope: _____ Y-intercept: _____ | $5) \ 4x - 1 = 3y - 15$ Slope: _____ Y-intercept: _____ | $3x + 2y = 12$ Slope: _____ Y-intercept: _____ |
| $3x + 2y = 12$ Slope: _____ Y-intercept: _____ | $6) \ 2x + 3 = 9$ Slope: _____ Y-intercept: _____ | $3x + 2y = 12$ Slope: _____ Y-intercept: _____ |
| $3x + 2y = 12$ Slope: _____ Y-intercept: _____ | $7) \ y = \frac{3}{2}x - 3$ Slope: _____ Y-intercept: _____ | $3x + 2y = 12$ Slope: _____ Y-intercept: _____ |



| Linear Equations | | Name _____ |
|---|---|------------|
| Solve for x and graph the equation. | | |
| 1. $2x + 3 = 7$ | 2. $3x - 5 = 10$ | |
|  |  | |
| 3. $4x - 2 = 10$ | 4. $5x + 1 = 11$ | |
|  |  | |
| 5. $6x - 4 = 14$ | 6. $7x + 2 = 12$ | |
|  |  | |

$\frac{dy}{dx} = -2x + 6$
 A function $f(x) = -x^2 + 6x + 6$

$f(x) = -x^2 + 6x + 6$
 $f'(x) = -2x + 6$

| x | $f(x)$ | $f'(x)$ |
|-----|--------|---------|
| -2 | 0 | 10 |
| 0 | 6 | 6 |
| 3 | 15 | 0 |
| 8 | 0 | -10 |

and label the x -intercept and y -intercept of the function
 x -intercept: $x = 8$
 y -intercept: $y = 6$
 $x = 3$ is the x -coordinate of the vertex.

the maximum of the function over the interval $(x) = [-5, 8.5]$ is
 15

the minimum of the function over the interval $(x) = [-5, 8.5]$ is
 -10



CULT OF PEDAGOGY



26
MAR
2018

FRICKIN' PACKETS

by Jennifer Gonzalez

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



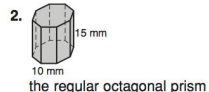
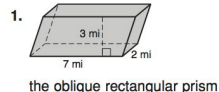
**Food
meets
algebra!**

**Robert
Kaplinsky**

Name _____ Date _____ Class _____

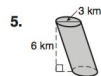
LESSON 10-3 Practice B **Volume of Prisms and Cylinders**

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



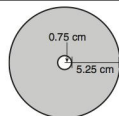
3. a cube with edge length 0.75 m

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

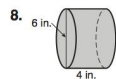


6. a cylinder with base circumference 18π ft and height 10 ft

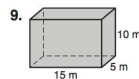
7. CDs have the dimensions shown in the figure. Each CD is 1 mm thick. Find the volume in cubic centimeters of a stack of 25 CDs. Round to the nearest tenth.



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

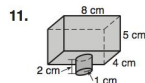
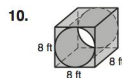


The dimensions are halved.

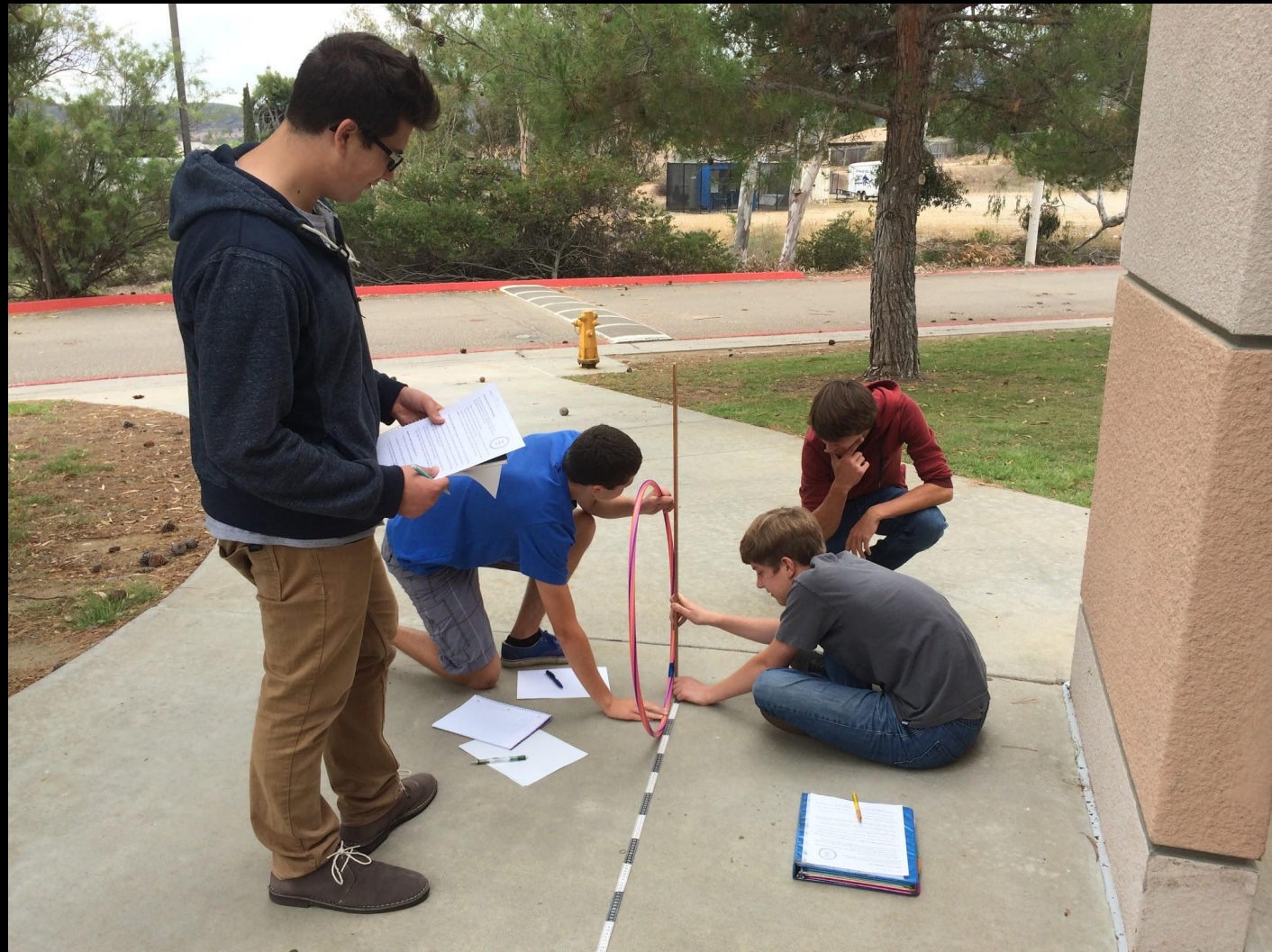


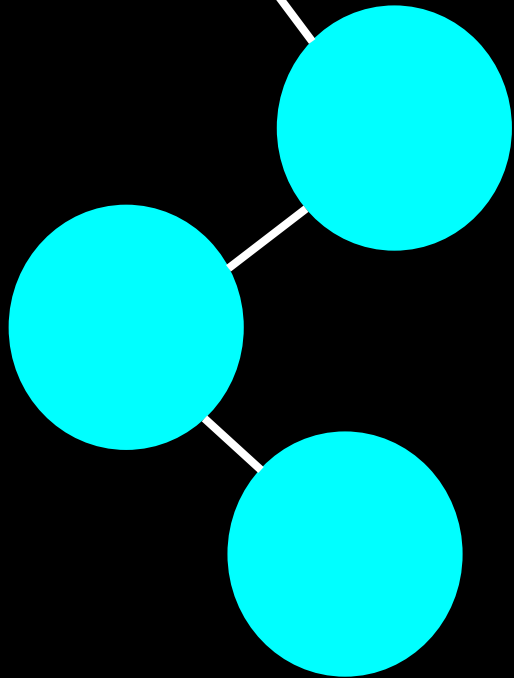
The dimensions are divided by 5.

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

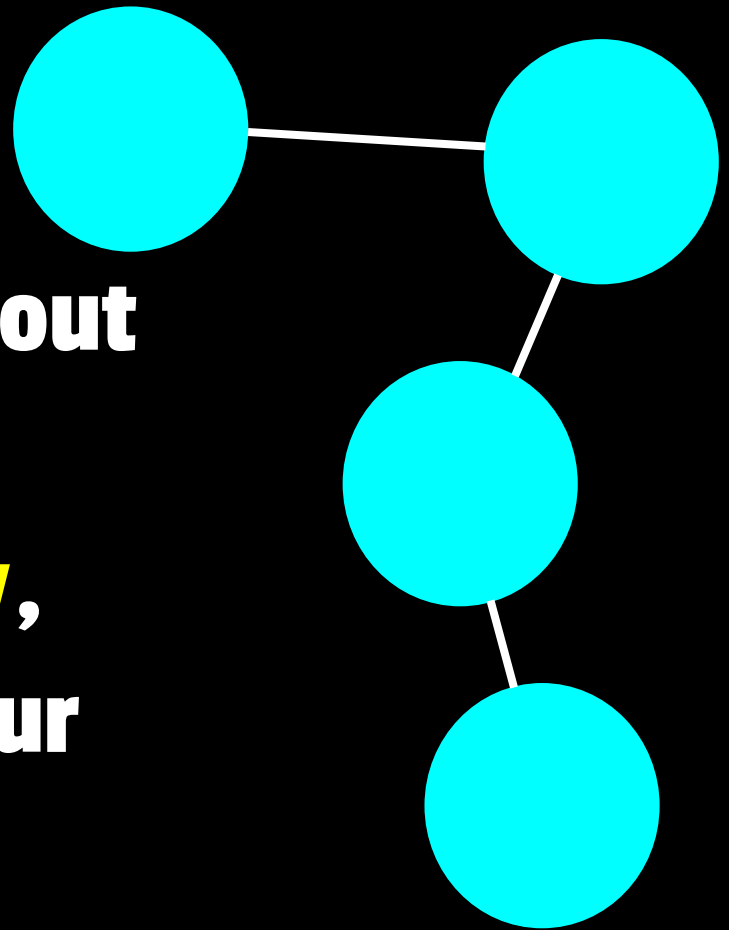


Girl Scout Cookies Dan Meyer





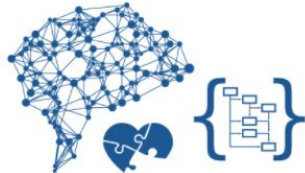
What are you
passionate about
personally,
professionally,
and within your
content area?



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



Top 10 skills

in 2020

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in 2015

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



Critical Thinking

Communication

Collaboration

Creativity

Critical Thinking

Communication

Collaboration

Creativity

Critical Thinking

Communication

Collaboration

Creativity



Michael Fenton

Indifference

Curiosity

Consumption

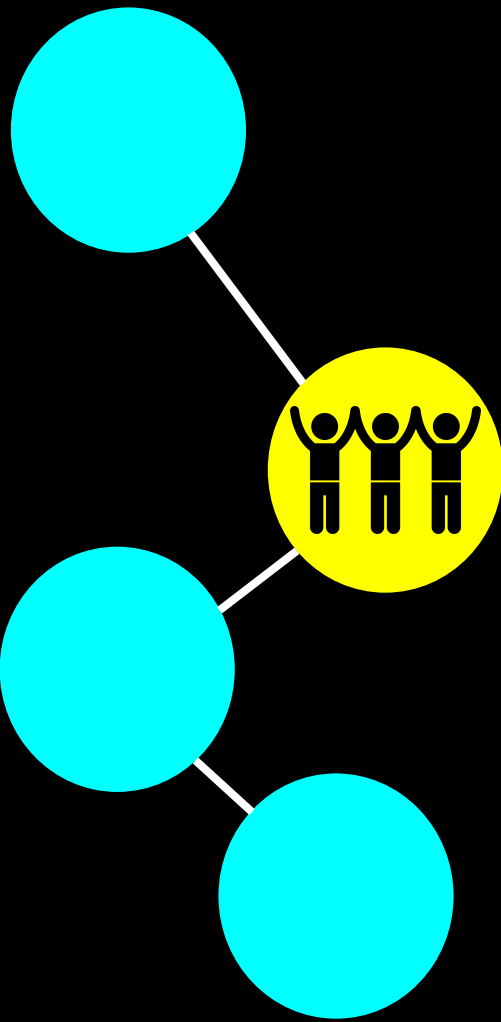
Creativity

Competition

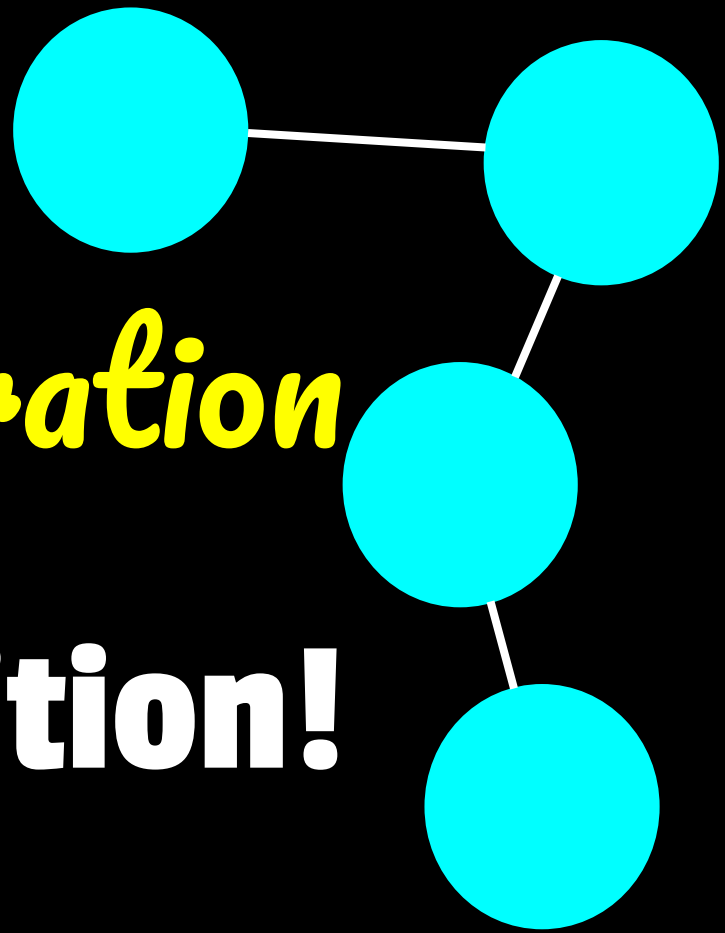
Collaboration

Isolation

Conversation






Choose
Collaboration
Over
Competition!



Collaboration can be...

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

 Anonymize
  Pacing
  Pause

27 STUDENTS

5 Which fr...
 Select all the fruits you find difficult to

6 Focus o...
 You told me that both these two fruits are

7 Now sho...
 Place each fruit precisely where you think it

8 Matching...
 Let's see if your graph and your checkboxes agree.

9 Randall ...
 Tell us everything

10 Alex di...
 Tell us everything

11 Which f...
 Click a fruit below

12 How do...
 How do you

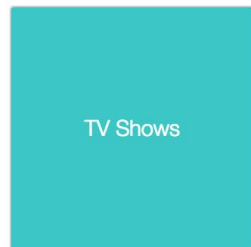
13 Mr. Mu...
 If all of the students

14 Class G...

Screen 14 of 14

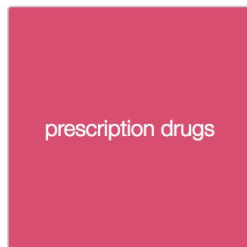
Submitted Challenges

Maryan Mirzakhani



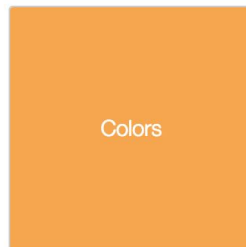
✓ 4

Al-Khwarizmi



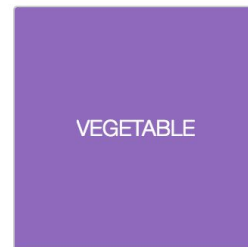
✓ 1

Jean d'Alembert



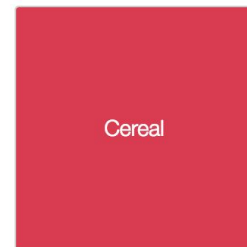
✓ 3

Karen Uhlenbeck



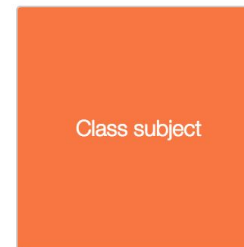
✓ 3

Mina Rees



✓ 4

Diophantus



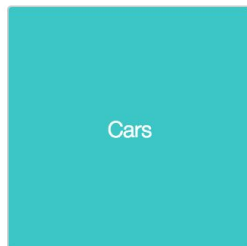
✓ 4

Hermann Minkowski



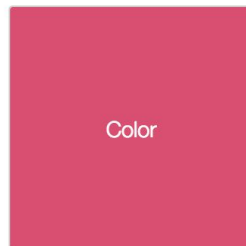
✓ 3

Richard Dedekind



✓ 4

Katherine Johnson



✓ 1

Shiing Shen Chern



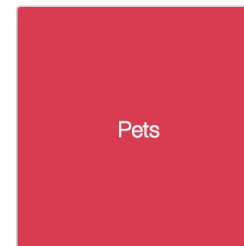
✓ 4

Christine Ladd-Franklin

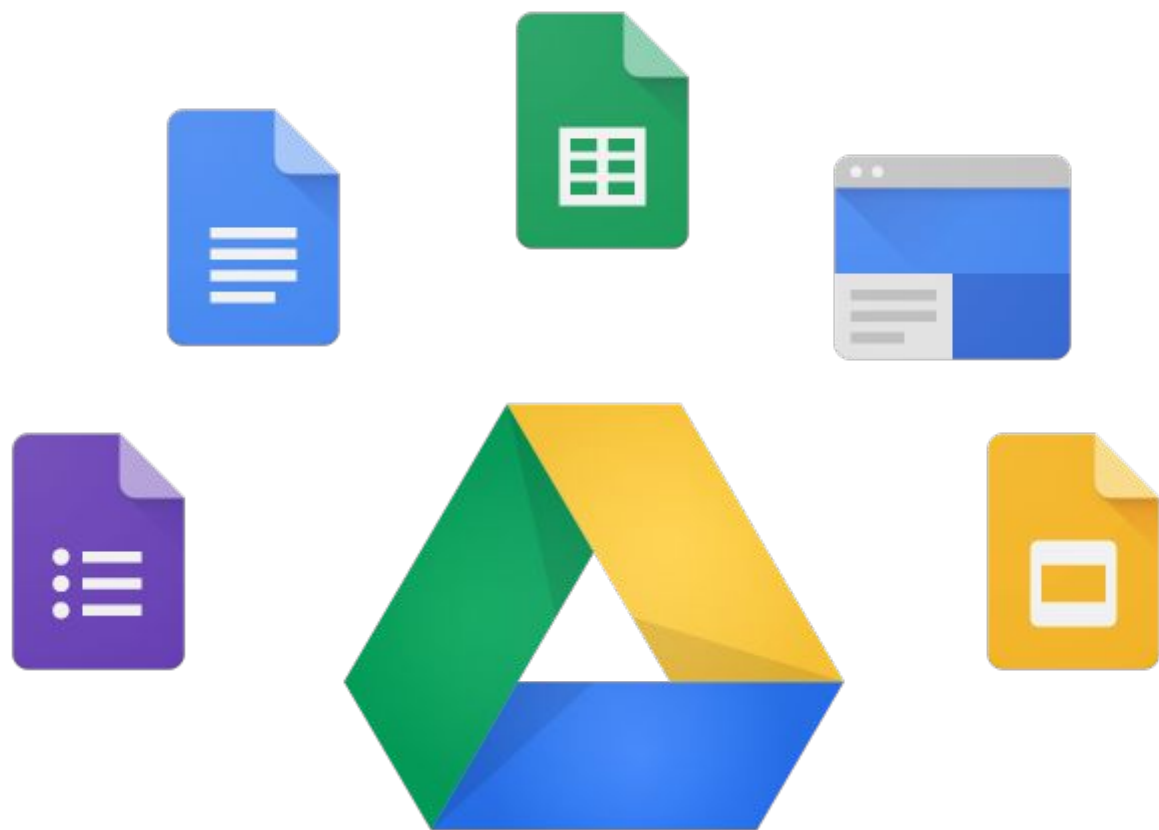


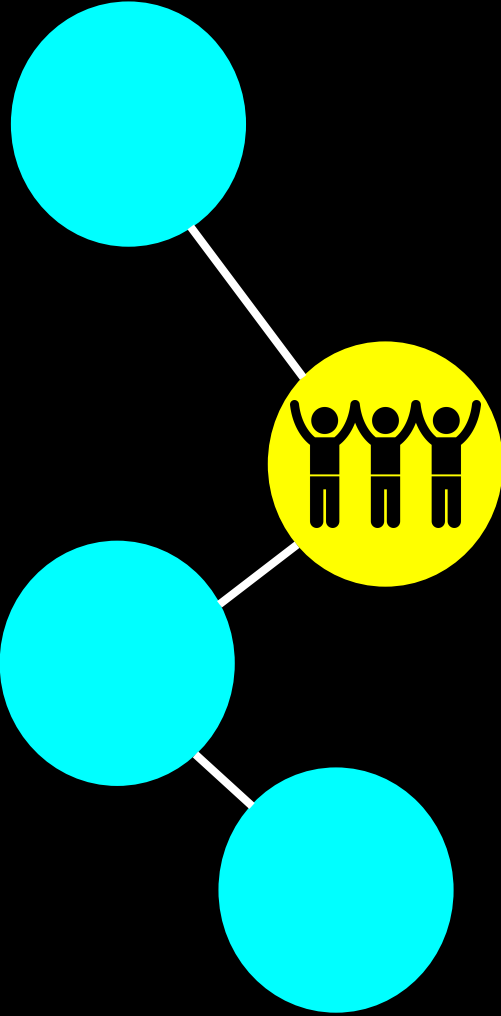
✓ 2

Carl Siegel

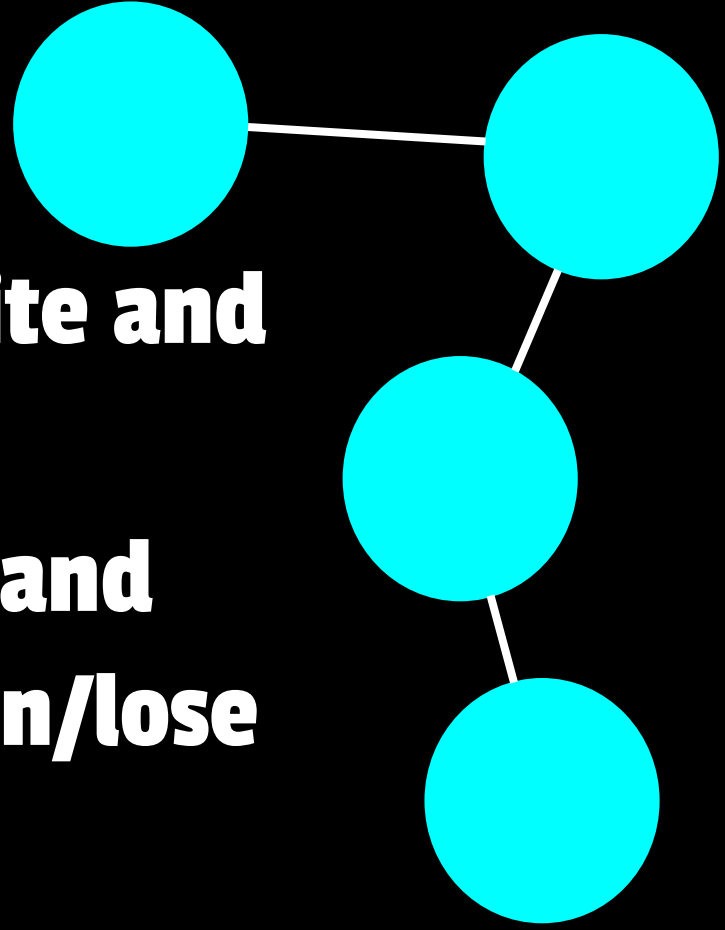


✓ 1





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



Abby

Alley

Savanna

Isabella

LeLani

Lia

Marli

Raglee

Itzel

Kate

~~Sophie~~

~~Olivia~~ Olivia

Sophie



**YOU ORDERED SOMETHING
REALLY AWESOME!**

OPEN WITH CAUTION:
YOUR PREVIOUS WILL BE JEALOUS
OF THE CONTENTS OF THIS
PACKAGE AND MAY TRY TO STEAL
IT FROM YOU WHEN AT YOUR
OWN RISK AND YOU'VE
BEEN WARNED.

**Many want to know how to
win a contest. It's easy!
@wearyourshirt**

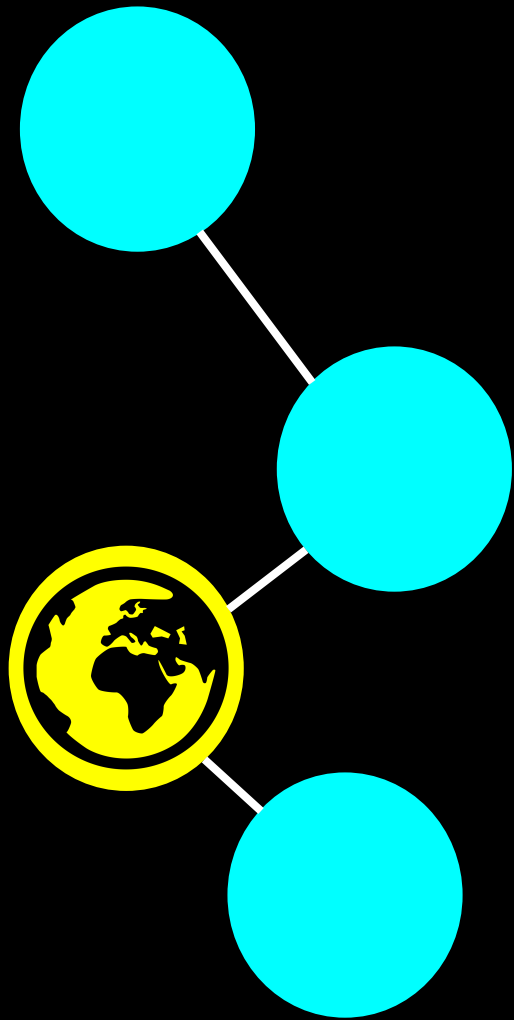
wearyourshirt.com



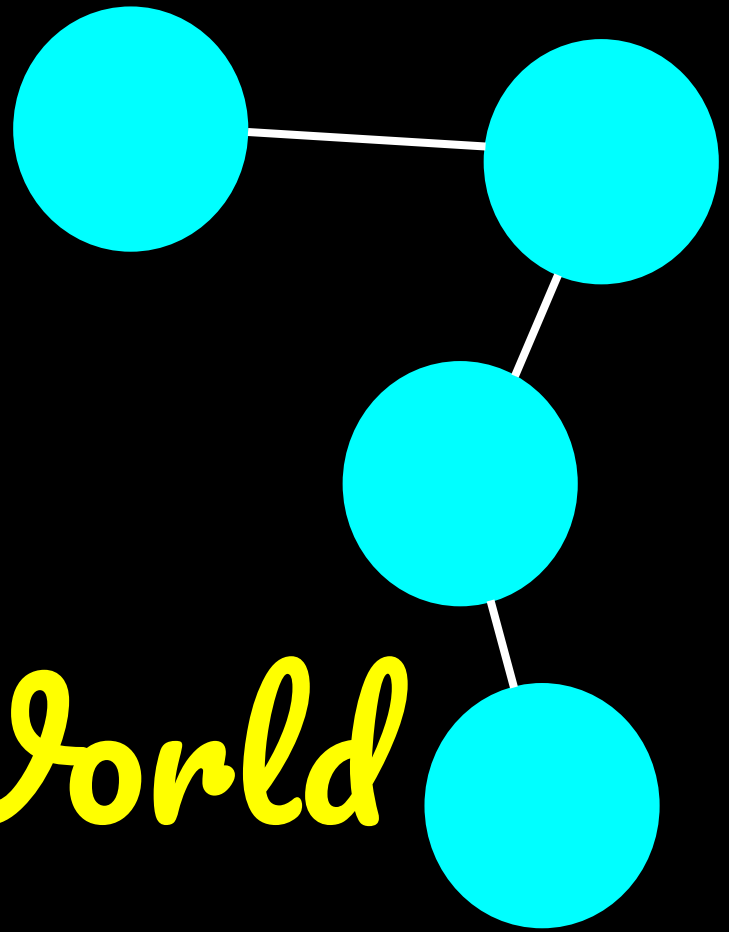
I  **BIG**

CANS





**Connect
to the
*Real World***



$$ax^2 + bx + c = 0$$

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

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

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

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

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

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

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

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

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

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

General Form of a quadratic equation

Divide by a

Subtract $\frac{c}{a}$ from both sides

Complete the square

Factor on left

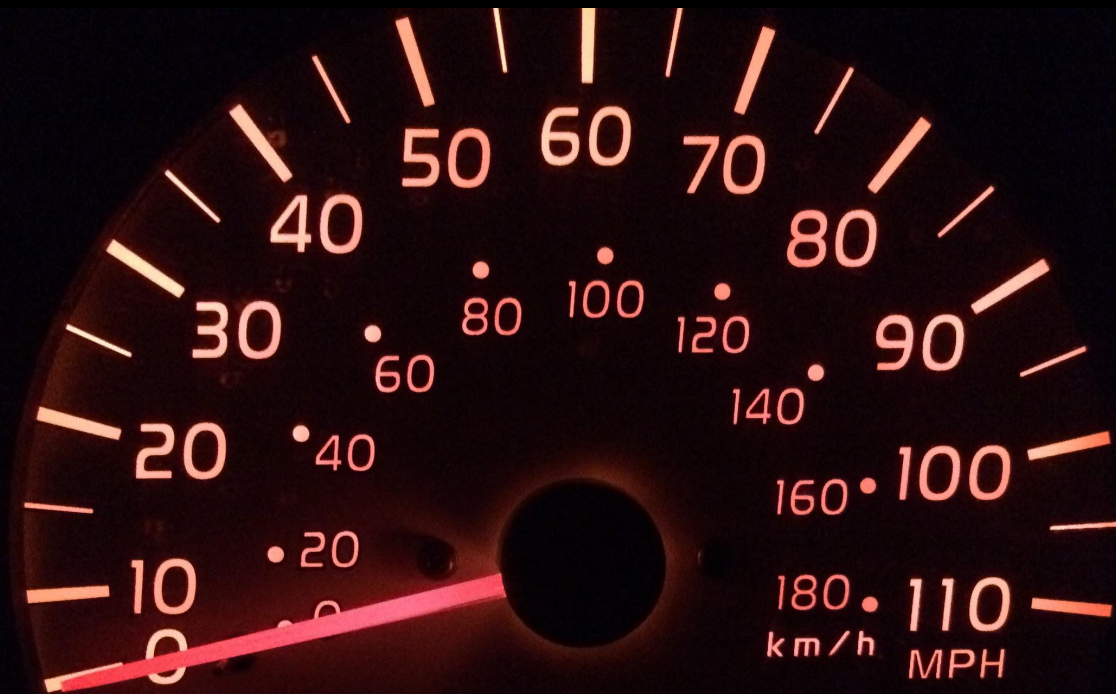
Find LCD on right

Simplify

Take square root of both sides

Simplify

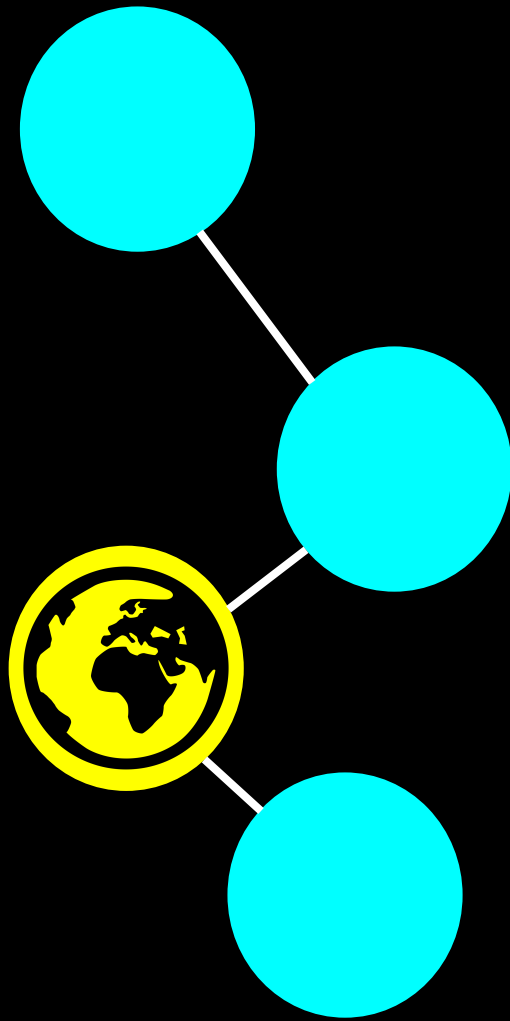
Subtract $-\frac{b}{2a}$ from both sides



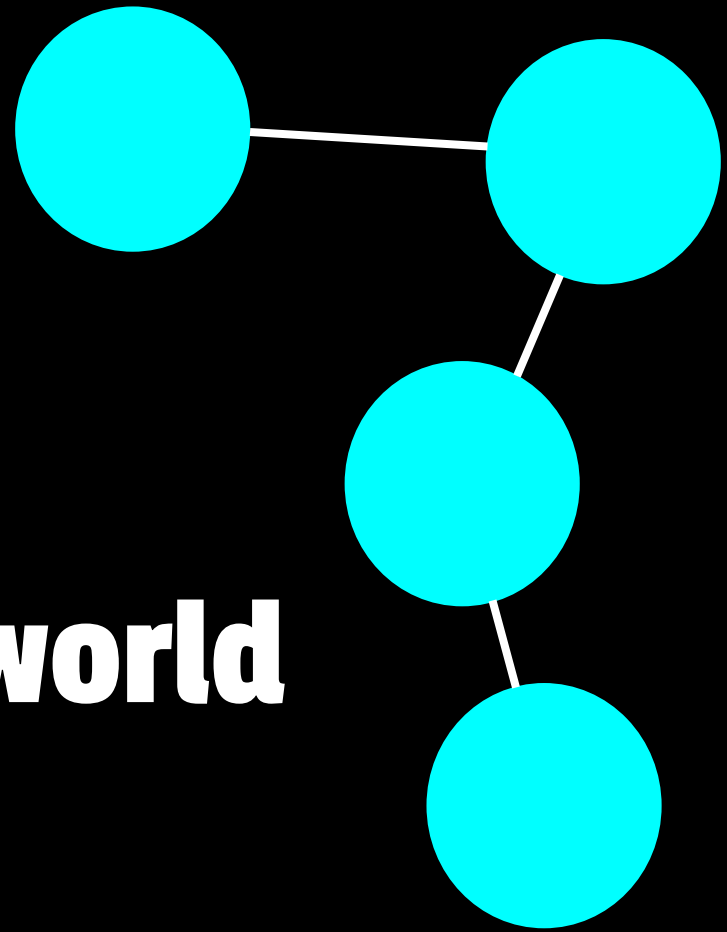
ODO 99343



Barbie
Bungie!
Are you
kidding
me?!



**How can I
bring the
OUTSIDE world
IN?**





Hack the

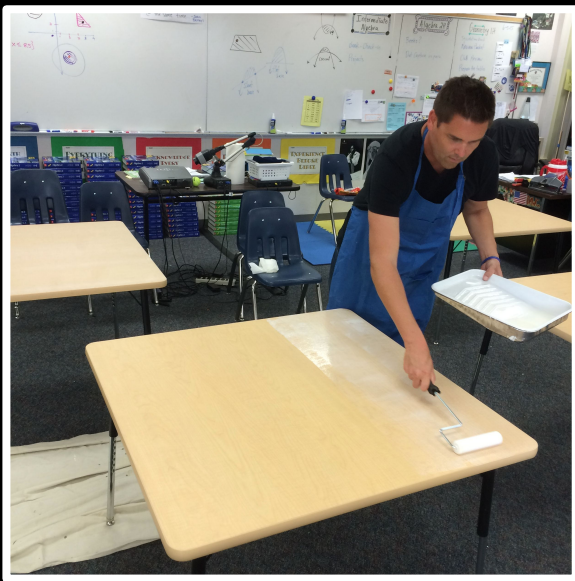
Physical Space

& 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

Steelecase

A large, bright, modern classroom or collaborative workspace with large windows overlooking a green campus. Several students and a teacher are working at long wooden tables with orange chairs. Whiteboards are attached to the tables, showing math problems and a table of values. The room has a high ceiling and a carpeted floor.

Whiteboard 1 (left):

$$\text{Assets} = 1000 - \text{Liabilities}$$

$$2000 = \text{FV}$$

Whiteboard 2 (middle):

| 2000 | 2003 | 2004 |
|----------|----------|----------|
| \$14,527 | \$11,154 | \$17,587 |
| 2005 | 2006 | 2007 |
| \$19,117 | \$20,845 | \$22,761 |

Steelecase



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

 DonorsChoose.org

Find a classroom to support

About us

Help

Sign in

Search topics, teachers & schools

near

city, state, or zip

Search

0 projects

SUBJECT

☐ Applied Learning

☐ Health & Sports

☐ History & Civics

☐ Literacy & Language

☐ Math & Science

☐ Music & The Arts

☐ Special Needs

☐ Warmth, Care & Hunger

SHOW ONLY

☐ Match offers

☐ Never before funded teachers

☐ Projects with no donations

☐ More than half of students from low-income households

☐ Fully funded projects

Thanks to #BestSchoolDay, the site is looking a tad sparse.

As new classroom requests roll in, give below to make sure teachers in every community have the resources they need.

\$

Give



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!





Movement



[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.

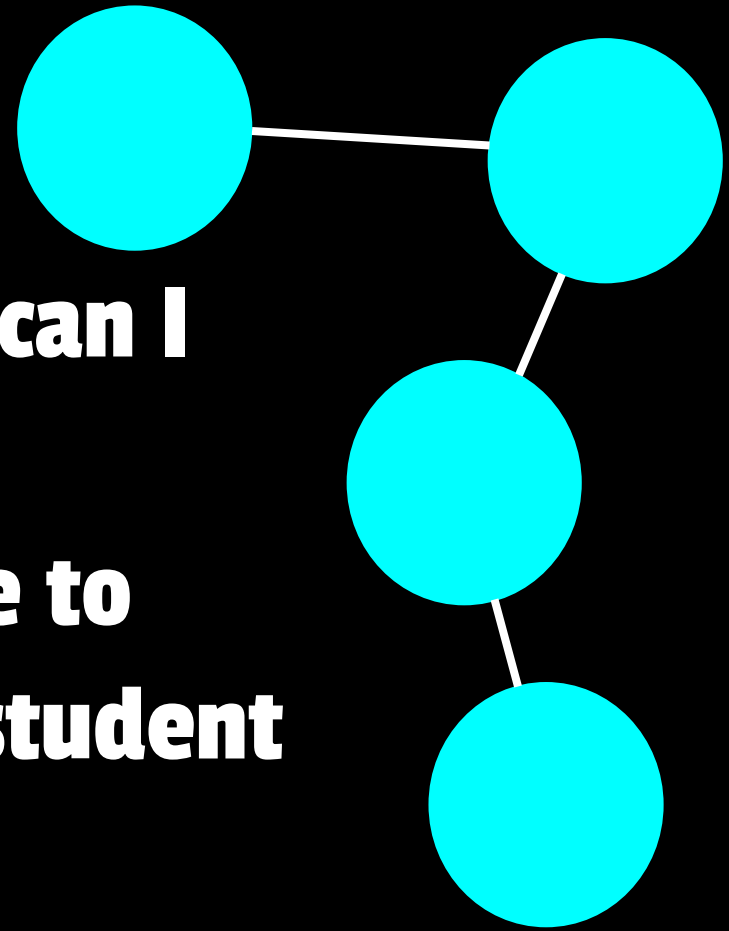
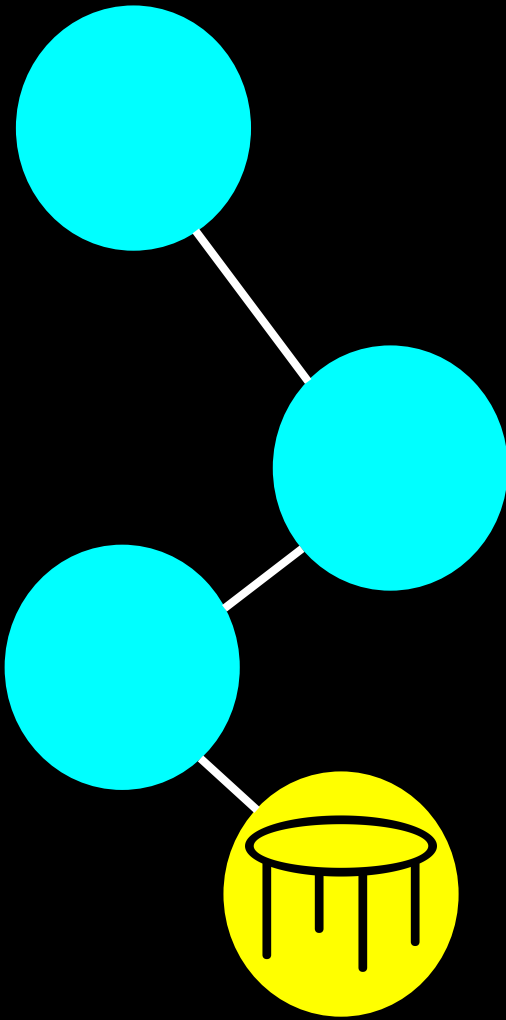
Key takeaway 1: Students sit all day, and sitting is exhausting.

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?**



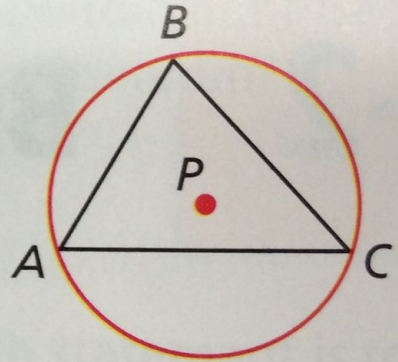


The image features a central text graphic on a black background. The word "Leverage" is in white, bold, sans-serif font, and "Technology" is in yellow, italicized, script font. To the left and right of the text are network diagrams consisting of cyan circles connected by white lines. At the top right, a yellow circle contains a black icon of a laptop and a smartphone.

Leverage

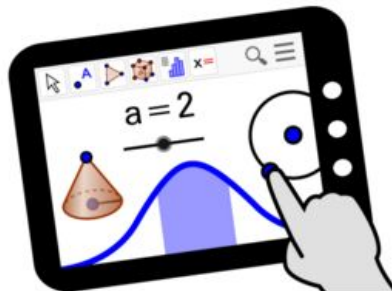
Technology

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**

Home

Most Popular

Latest

YOUR ACTIVITIES

Bookmarked

Custom

History

BUNDLES

Conics

Exponential

Expressions

Functions

Inequalities

Linear

Linear Systems

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:



Explore math with Desmos.

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

[Start Graphing >](#)



Four Function and Scientific

Check out the newest additions to the Desmos calculator family.

[Four Function](#)

[Scientific](#)



Teacher.desmos.com

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

[Classroom Activities](#)



Learn.desmos.com

Level up your Desmos skills with videos, challenges, and more.

[Learn More](#)



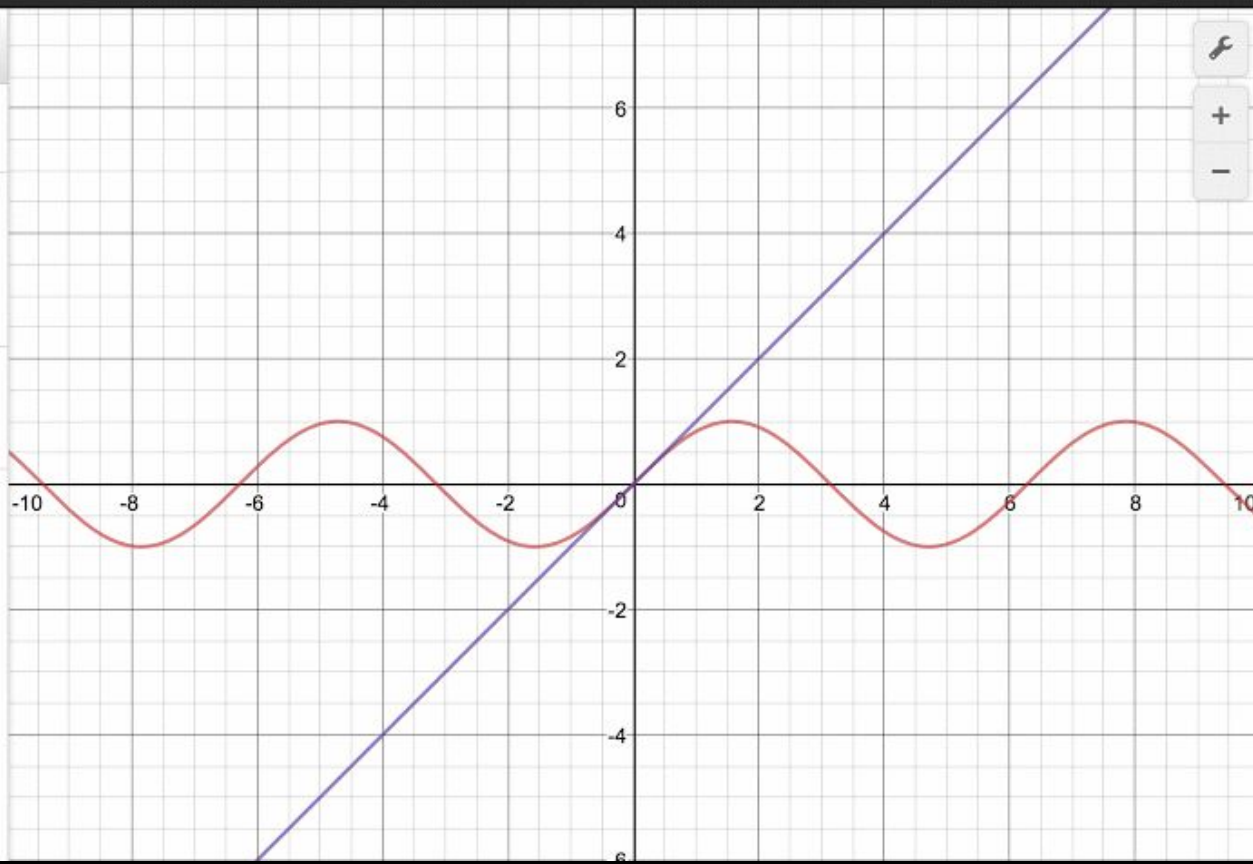
$$y = \sin(x)$$



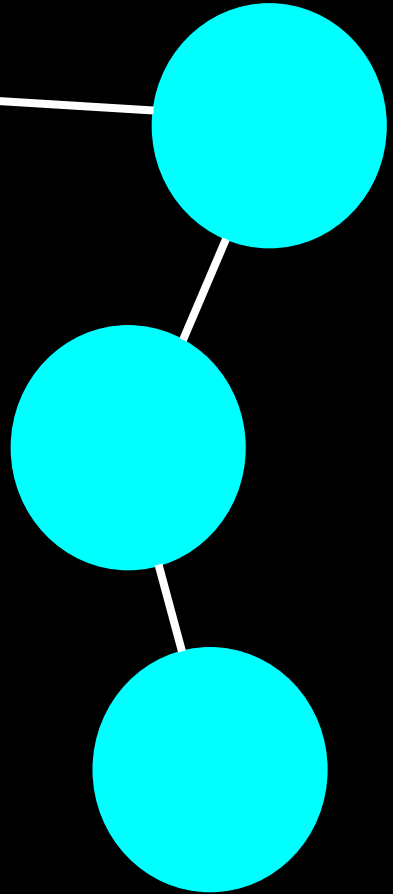
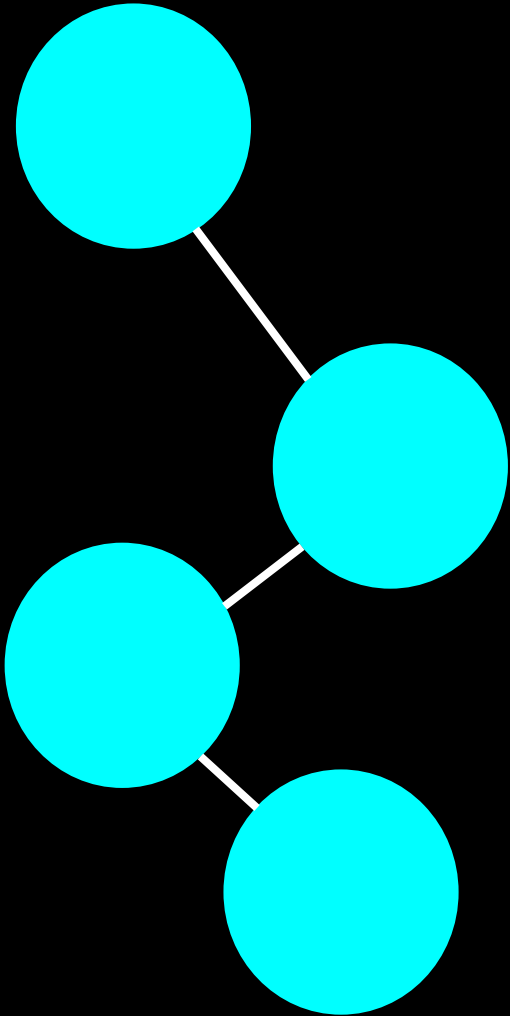
$$y = \sum_{n=0}^a \frac{(-1)^n x^{(2n+1)}}{(2n+1)!}$$



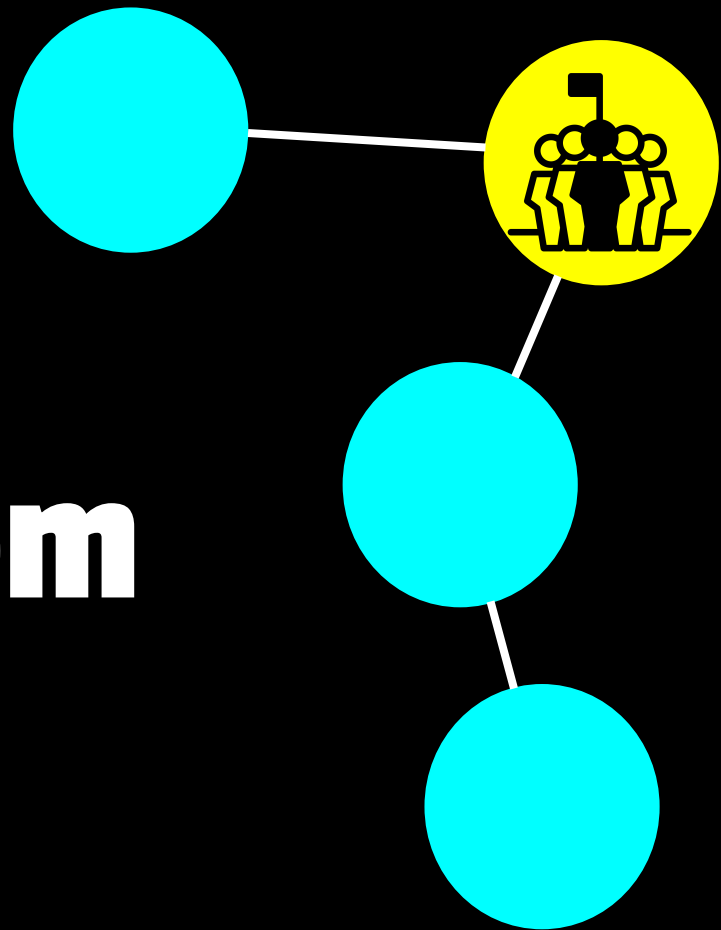
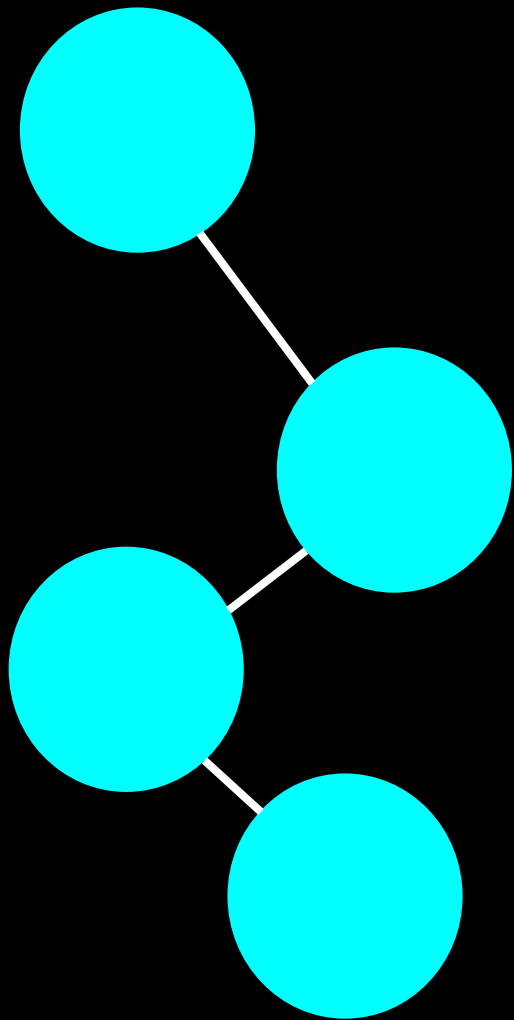
$$a = 0$$



**How can I use
technology to
deepen
conceptual
understanding?**



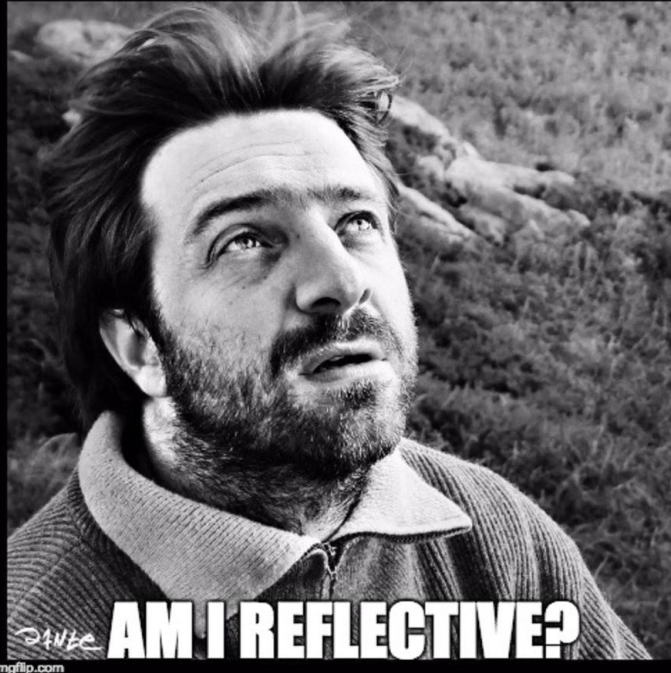
Lead
**the
Classroom
Culture!**





**Leaders
provide
protection
and
direction.**

Culture of reflection?





**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?**



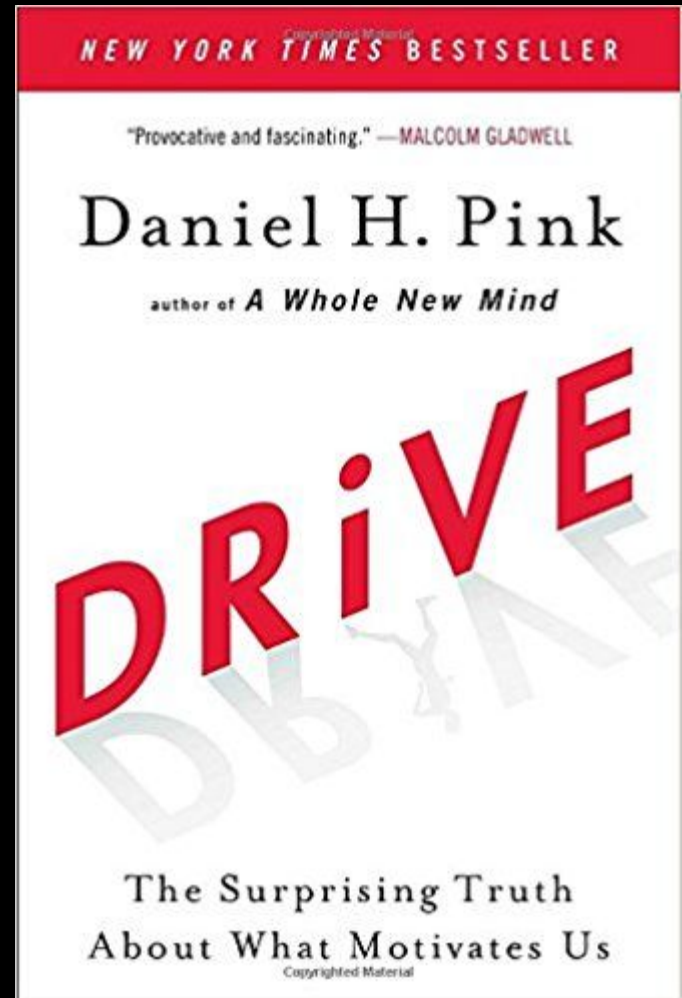


Motivate
**Your
Students!**

Motivation 3.0: Intrinsic

Motivation 2.0: Carrot / Stick

Motivation 1.0: Survival



Motivation 3.0

1) *Autonomy*

Time

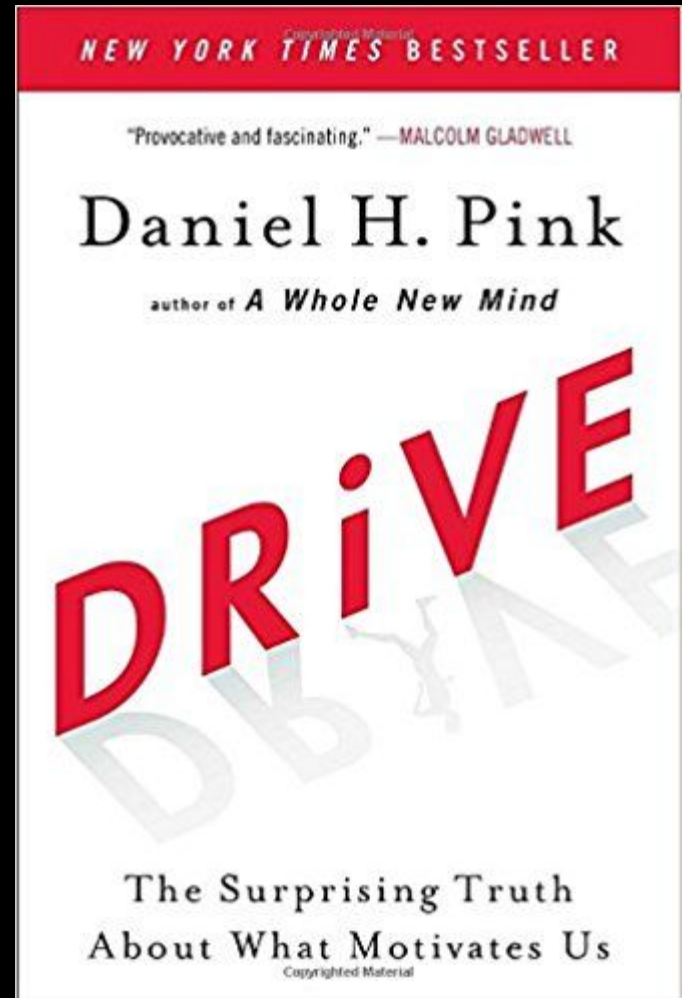
Task

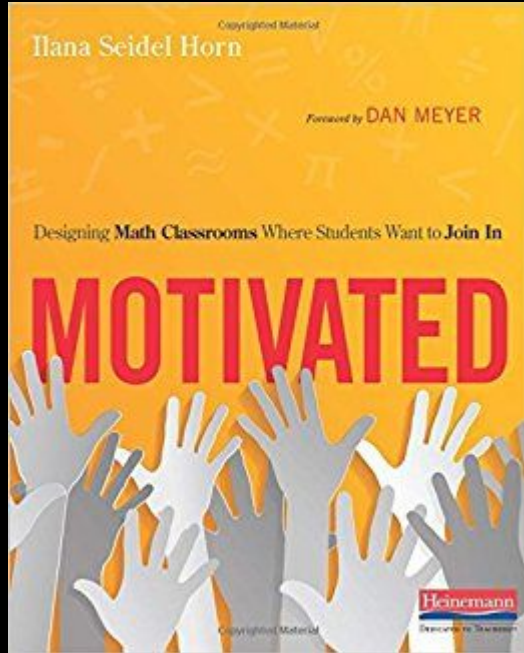
Technique

Team

2) *Mastery*

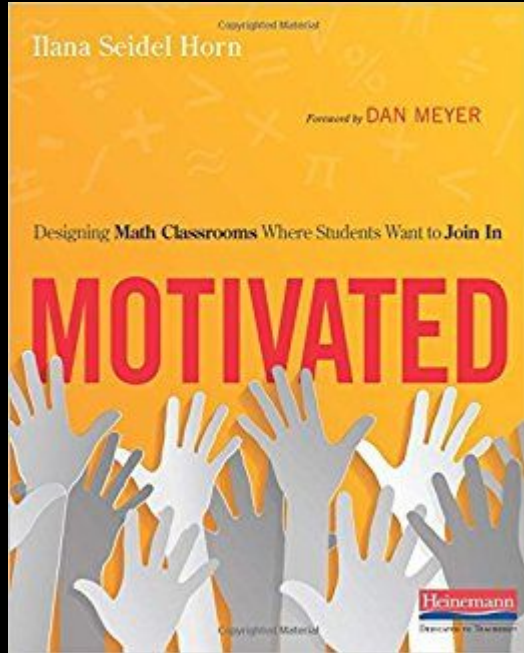
3) *Purpose*





Ilana Horn

Mind. Blown.

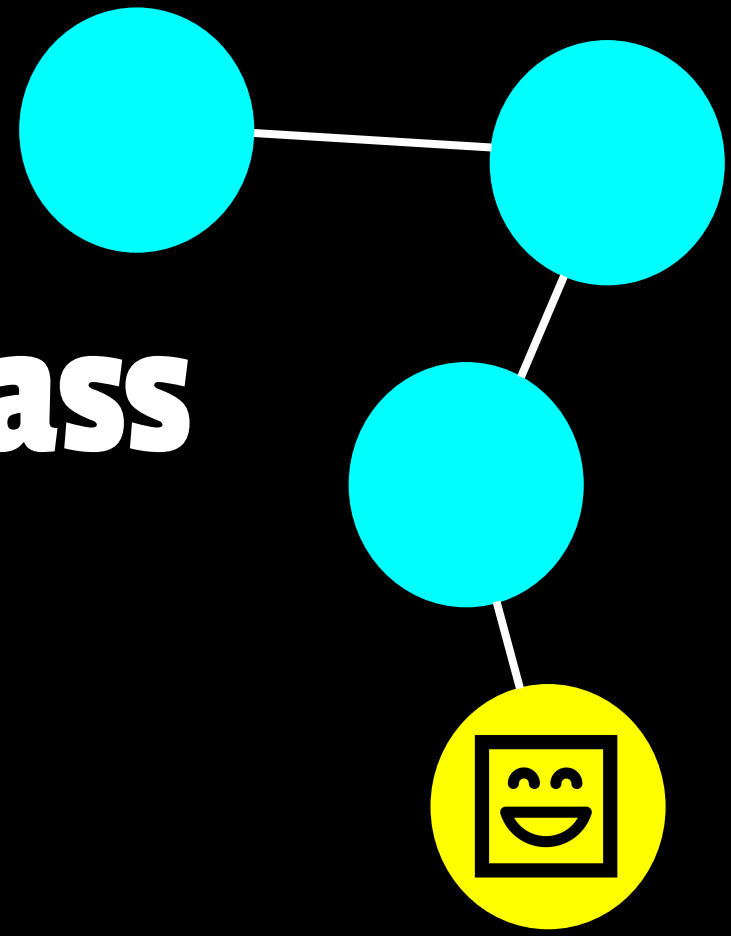
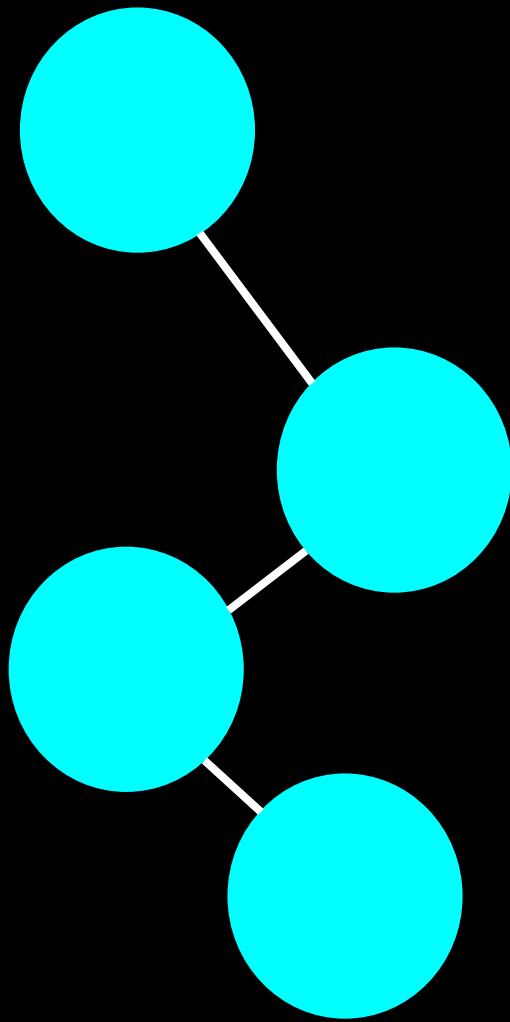


Belonging
Meaningfulness
Competence
Accountability
Autonomy

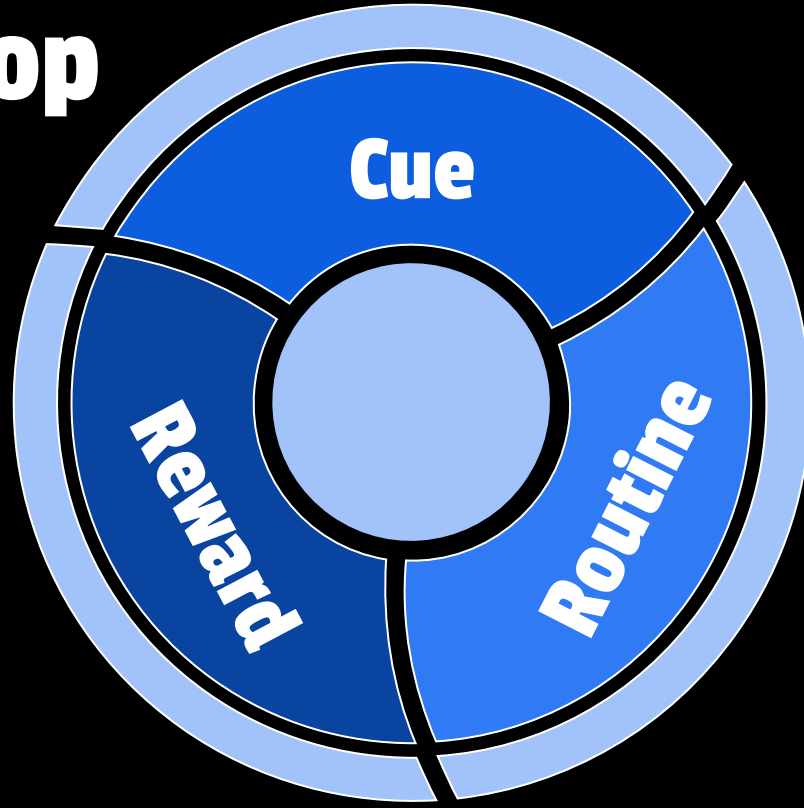
**Would YOU want
to be a student
in your own
class?**



Make Class
Fun!



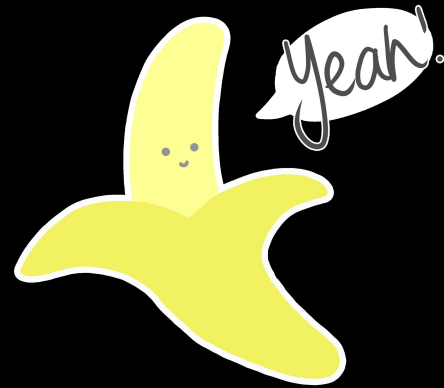
Habit Loop

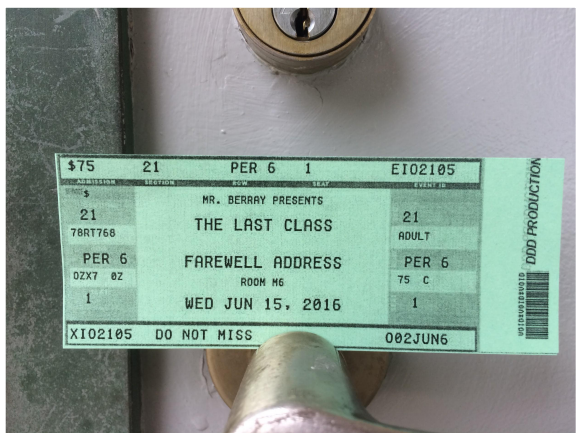




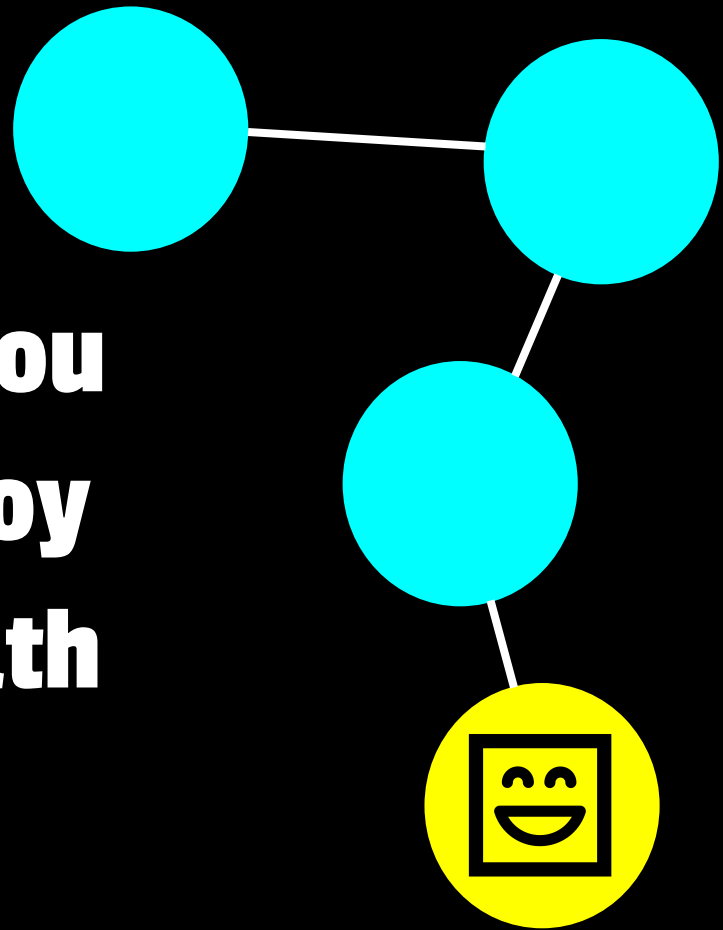
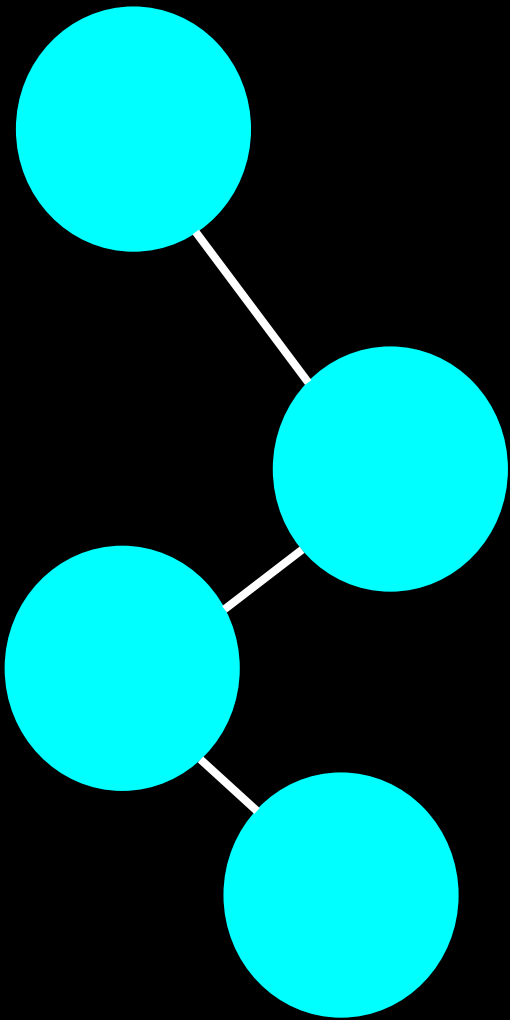


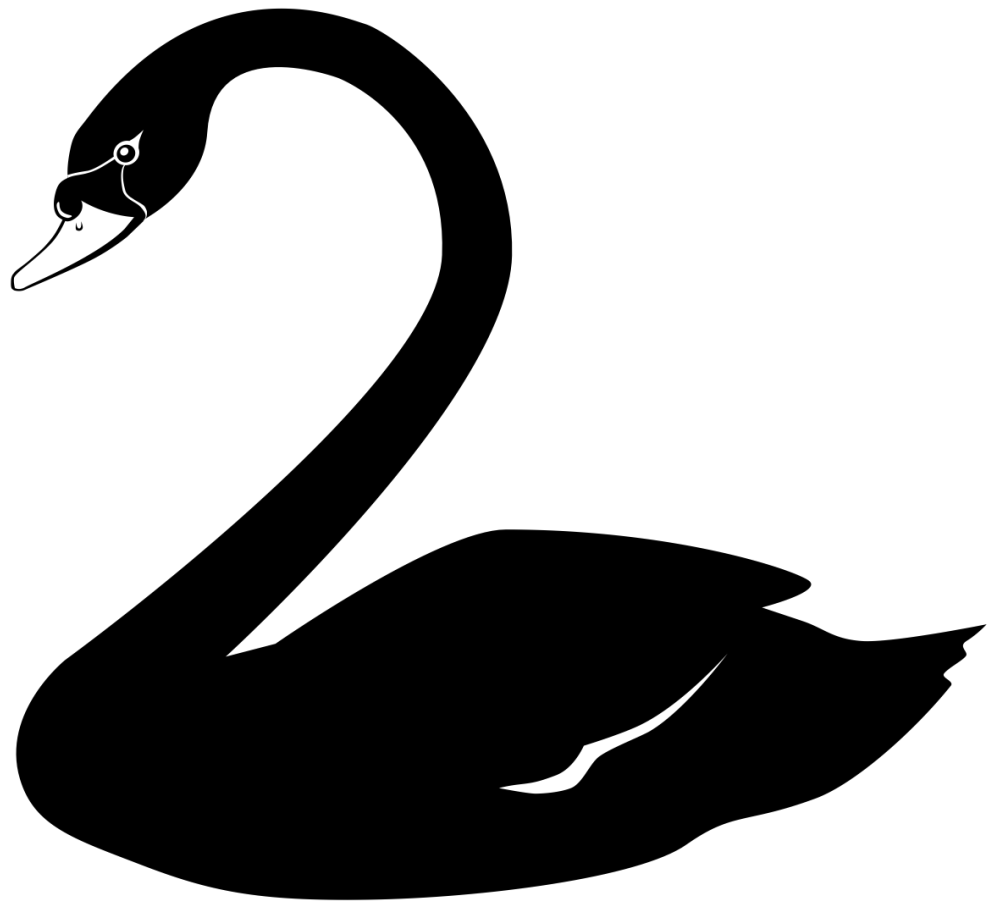
Σ **WHHS** \div
honors algeberray 2
 $+$ $=$

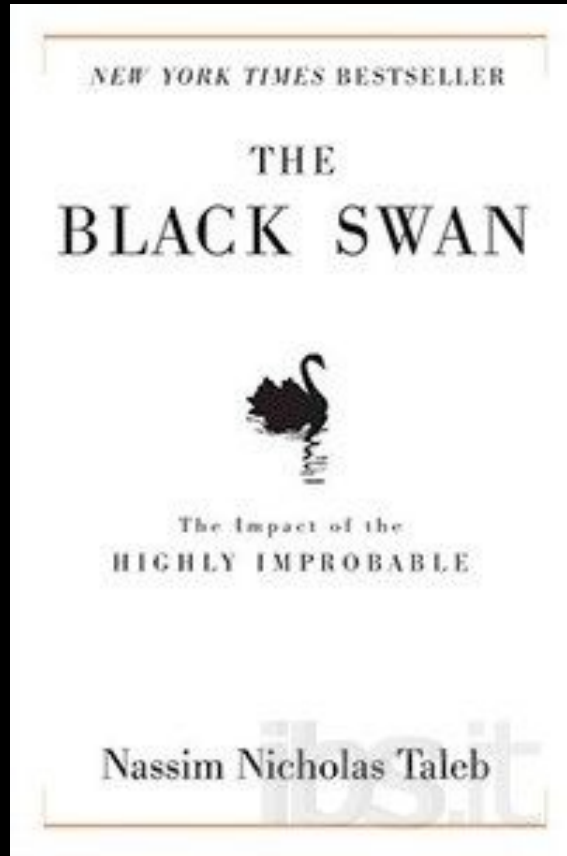




**How might you
bring more joy
into your math
class?**



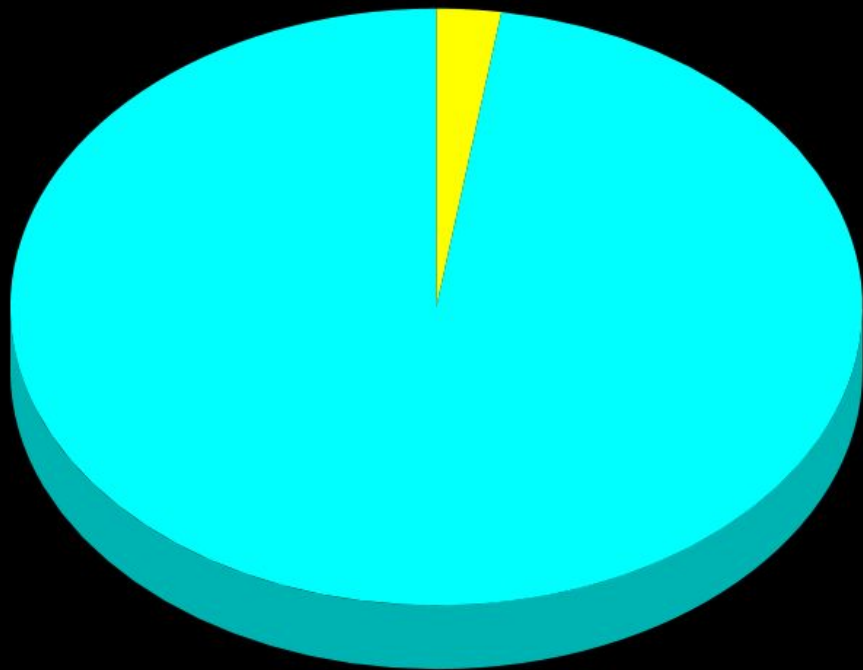




- 3 Characteristics:**
- 1) outlier**
 - 2) extreme impact**
 - 3) explicable narrative after it occurs**

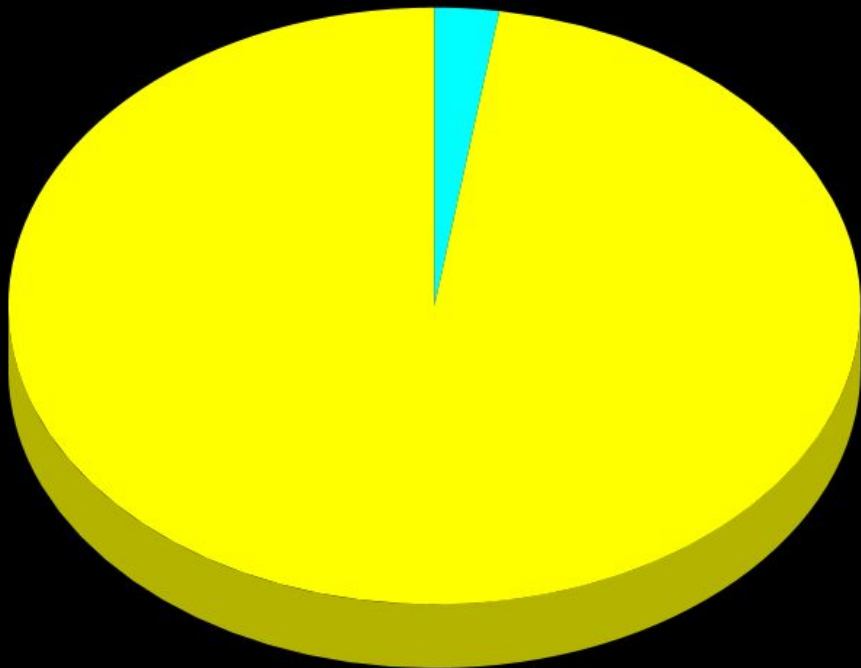
Chance of Student Landing a Legendary Math Class

- Lucky
- Not So Lucky



Chance of Student Landing a Legendary Math Class

- Not So Lucky
- Lucky



Reflection Cove





Thank you!

**jberray8@gmail.com
@johnberray**

**See you at NCTM 2019
in San Diego!**