SAMPLE CLAIMS: WHICH ONES INTEREST YOU MOST?

- There aren't many "Oscar-worthy" roles for older women.
- Original movies are better than sequels.
- Arm span is a better predictor of a person's height than their kneeling height.
- Engine size has a bigger impact on gas mileage than the car's weight.
- Individuals with more education are less likely to be unemployed.
- African American juveniles are more likely to be incarcerated for violent crimes, property crimes, and drug-related crimes than white juveniles.

LET'S ARGUE: ENGAGING HIGH SCHOOL STUDENTS BY TEACHING STATISTICS THROUGH CLAIMS

NCTM Annual Meeting 2018

Pamela Rawson

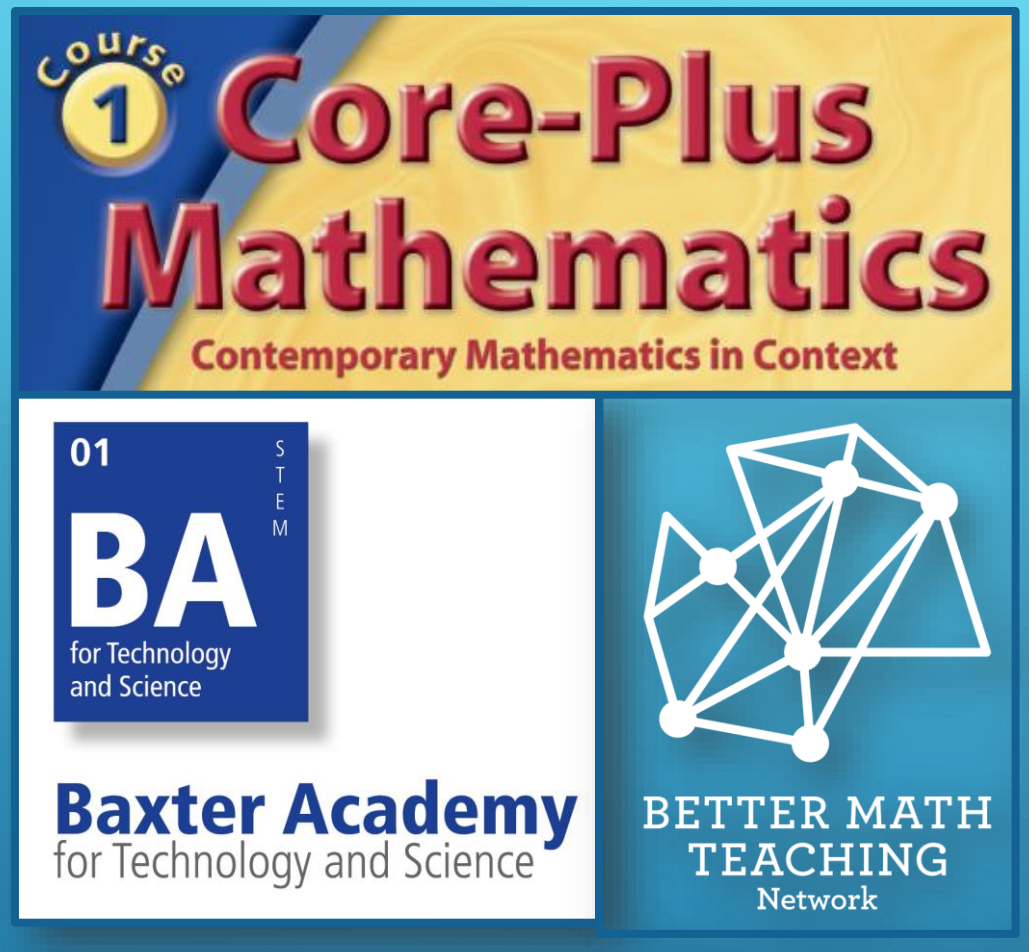
Baxter Academy for Technology & Science

Portland, ME

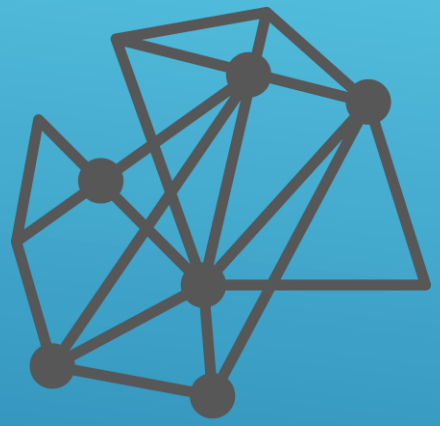
pamela.rawson@gmail.com

@rawsonmath

rawsonmath.com



A BIT ABOUT ME

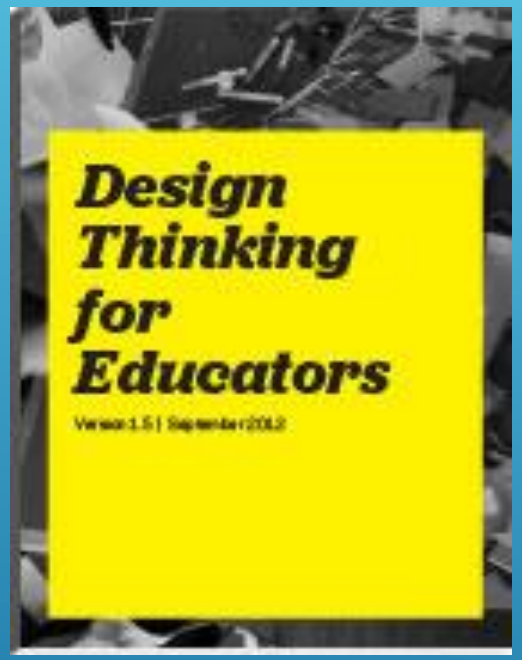


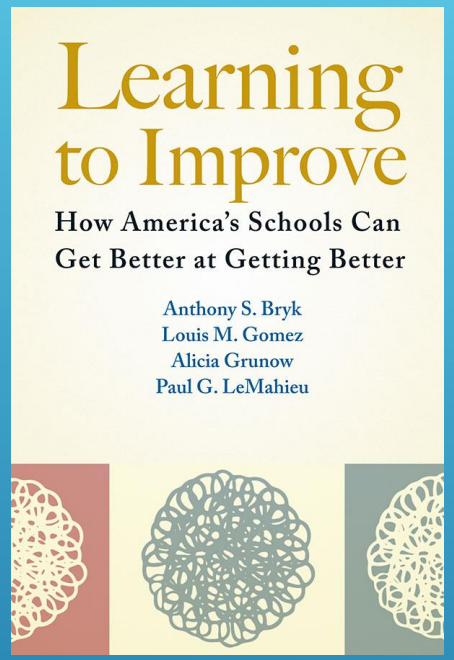
BETTER MATH TEACHING
Network

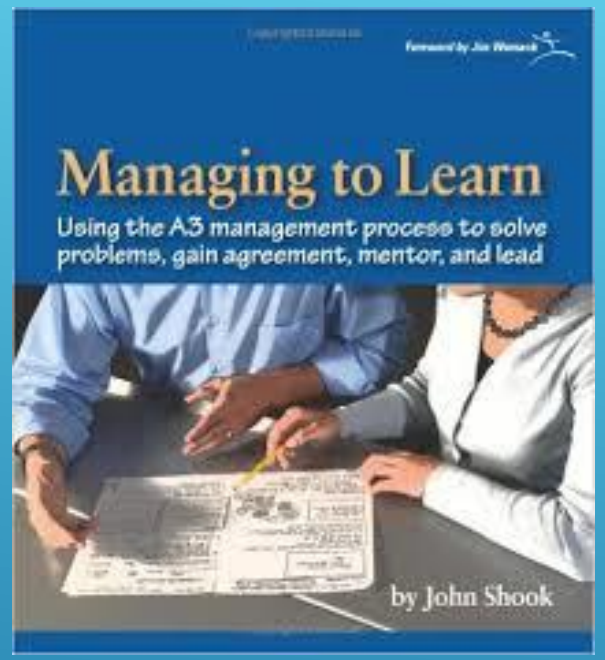
AIR®
American Institutes for Research®

nellie mae EDUCATION FOUNDATION

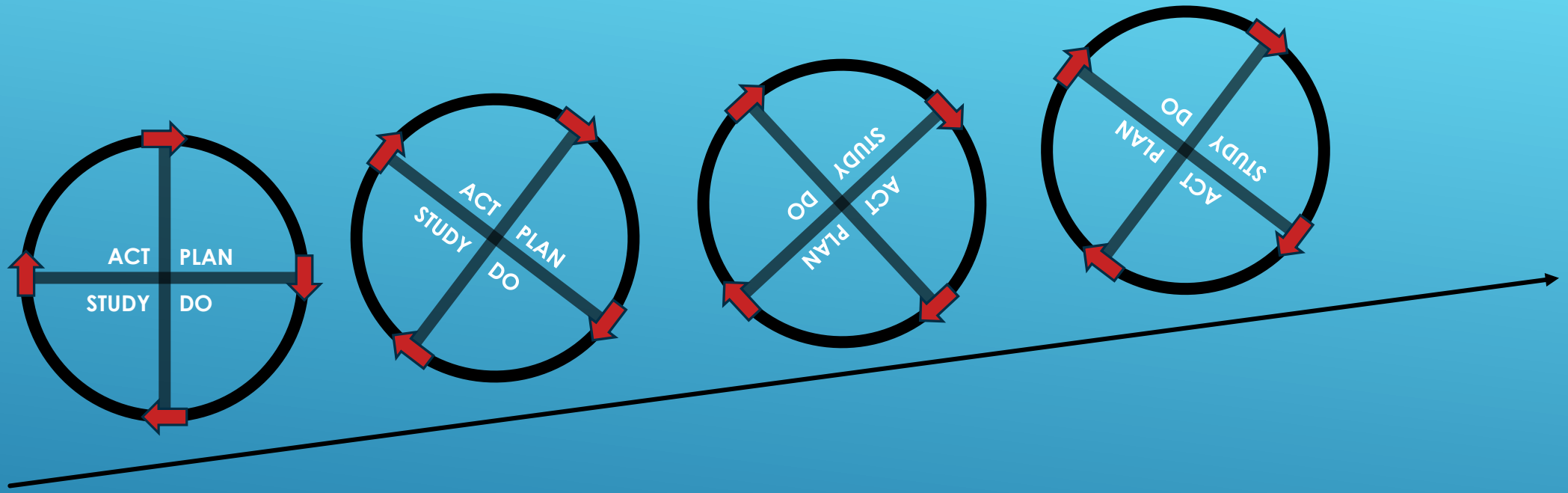
A BIT ABOUT BMTN



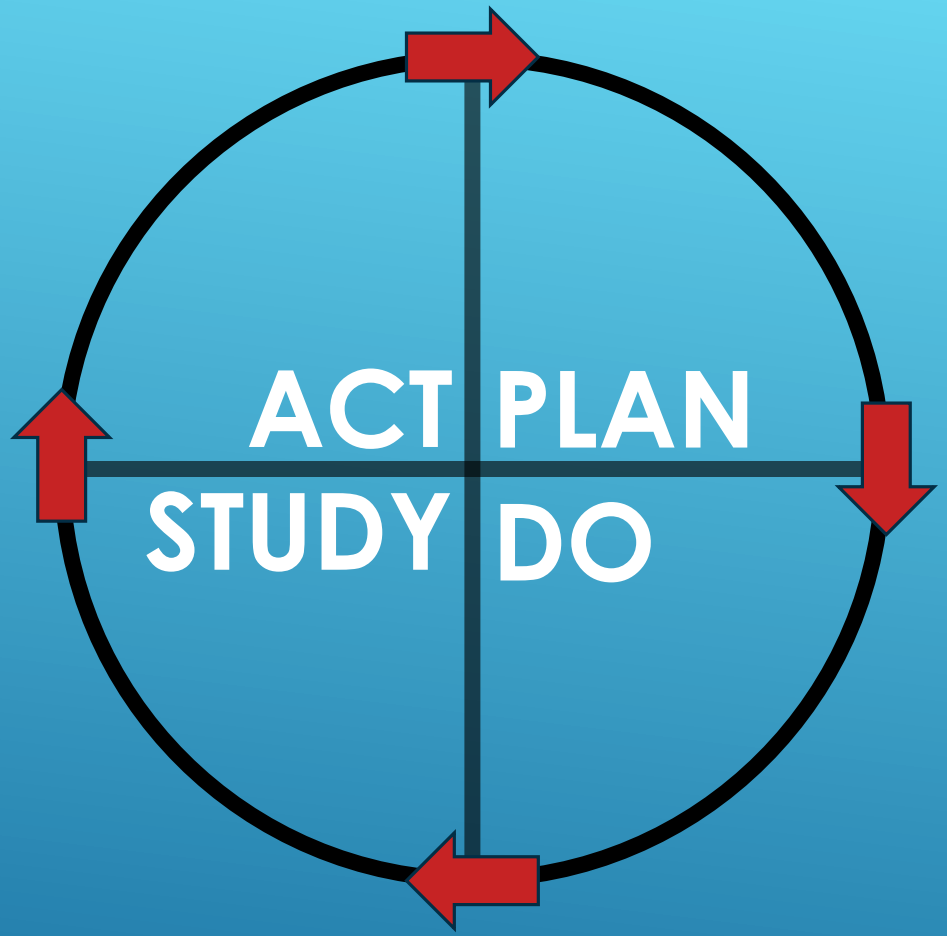




IMPROVEMENT SCIENCE



SHORT CYCLE CONTINUOUS IMPROVEMENT



THE PDSA CYCLE

DECIDING WHAT TO CHANGE

What problem was I trying to solve?

ASSESSING STUDENT WORK

The rubrics I used

Below Target	On Target	Above Target
Analyzes the quality, relevance, and limitations of data, but is unable to build an argument Contextual references to specific statistics are flawed Includes no representation of the data	Builds an argument based in evidence with reference to the data Contextual references to specific statistics are correct Includes at least one representation of the data to illustrate a point	Makes inferences that move beyond the initial idea Contextual references to specific statistics are correct, clear, and explicit Includes at least one representation of the data to illustrate a point

Math Practice 3: Construct viable arguments and critique the reasoning of others

RUBRICS

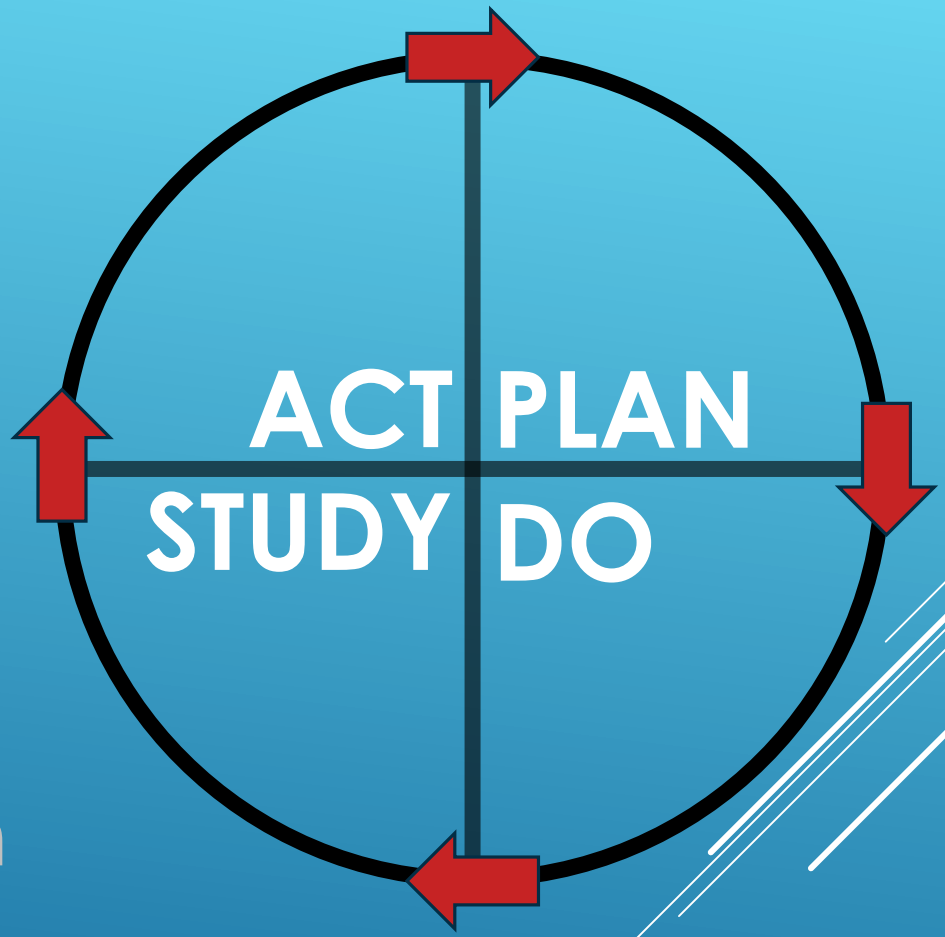
Below Target	On Target	Above Target
Represents data with appropriate plots (for both single variables and paired data) Uses statistics appropriate to the shape of the data to compare center and spread of two or more different data sets	Interprets linear models (including slope, intercept, and correlation coefficient) Fits an appropriate model to data that represents two quantitative variables	Conveys a depth of understanding of basic statistical measures as demonstrated through arguments, claims, and interpretations

Math Standard: Statistics & Probability

RUBRICS

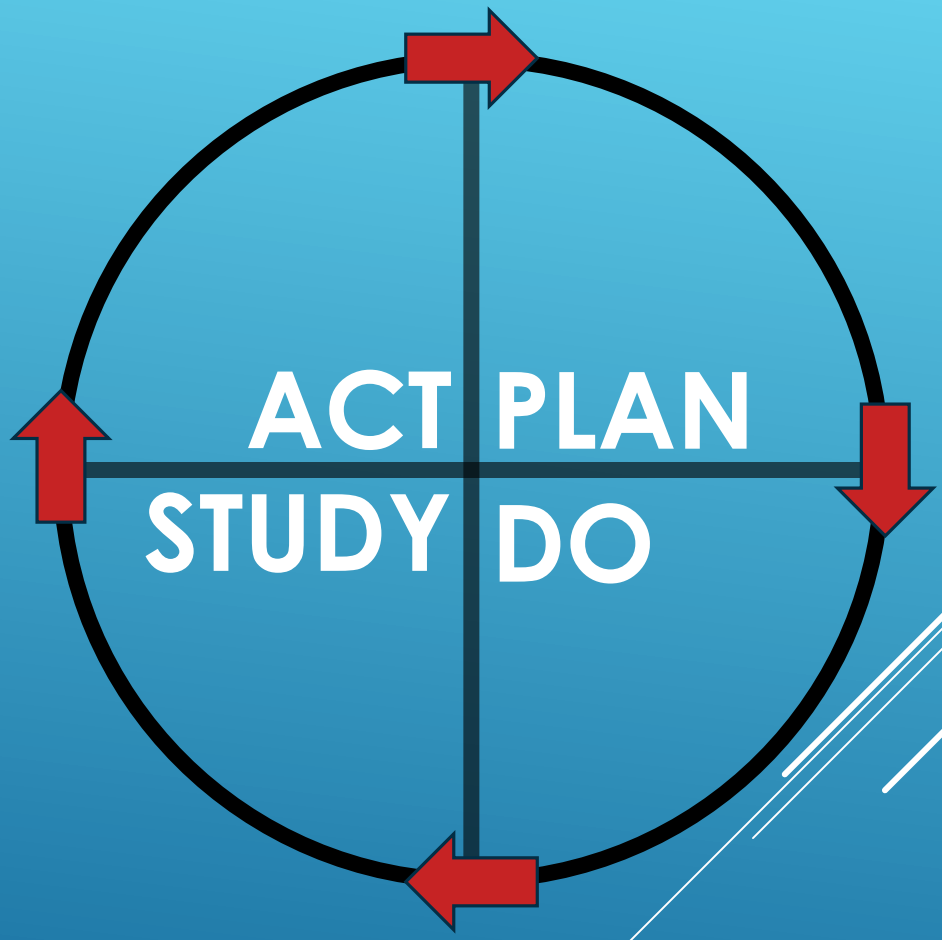
FIRST ITERATION

I thought I had a fool-proof plan



SECOND ITERATION

Get some help!



LOOKING AT DATA

- What do you notice?
- What do you wonder?
- What statistics can you calculate to answer your questions?

Minutes between blasts for Old Faithful for 7 days

	A blast	B day1	C day2	D day3	E day4	F day5	G day6	H day7	I	J
=										
1	1	102	93	101	89	98	105	88		
2	2	88	106	98	94	96	84	107		
3	3	99	96	91	93	89	95	103		
4	4	92	99	92	98	97	94	83		
5	5	105	101	96	84	97	93	103		
6	6	91	99	100	105	96	91	90		
7	7	96	104	93	90	103	95	97		
8	8	98	64	100	99	90	88	95		
9	9	94	107	96	102	101	83	107		
10	10	92	103	98	100	99	111	89		
11	11	92	105	94	106	67	94	105		
12	12	95	95	99	90	112	104	83		
13	13	98	100	98	109	88	89	98		
14	14	96	102	125	106	94	101			
15	15	100		89	102	94	104			

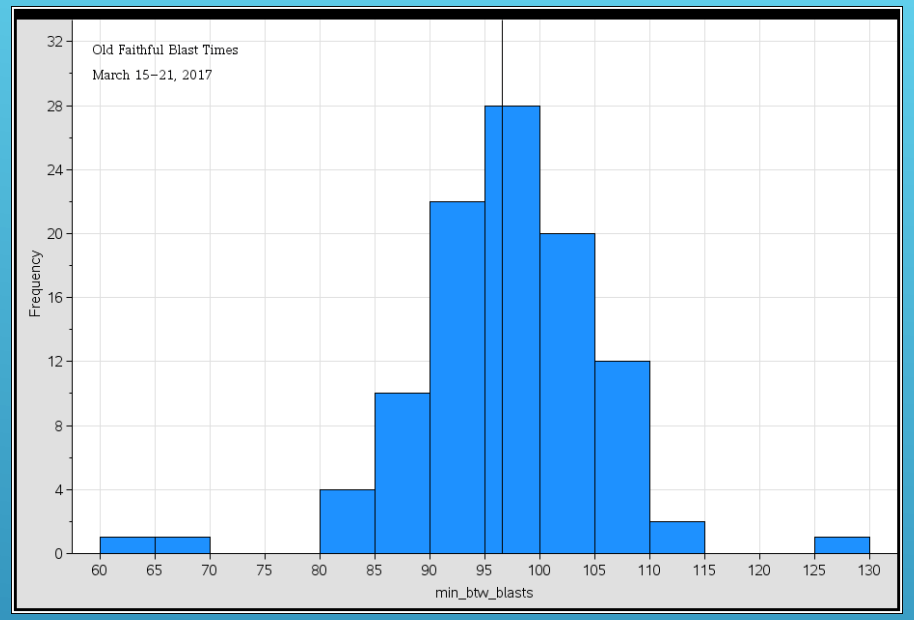
A1 1

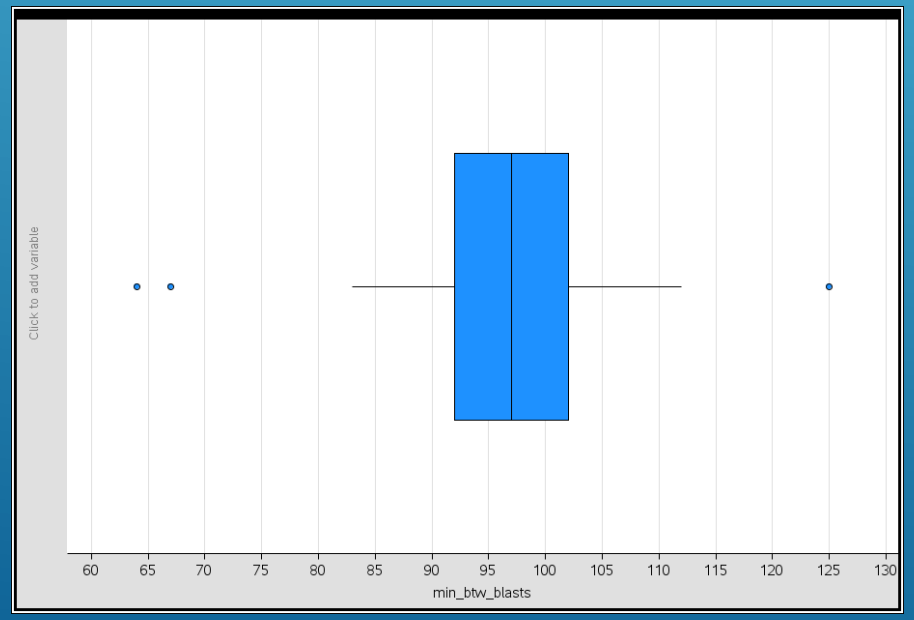
STARTING WITH CLAIMS

https://commons.wikimedia.org/wiki/File:Old_Faithful_Rainbow.jpg

Discovered in 1870 by the Washburn Expedition, Old Faithful geyser was named for its frequent eruptions — which number more than a million since Yellowstone became the world's first national park in 1872. Old Faithful erupts about 15 times each day.

- What would you expect to see in the data – minutes between blasts – for Old Faithful?
- How much variation would you expect to see in the minutes between blasts? A lot? A little?
- How confident are you about your predictions?

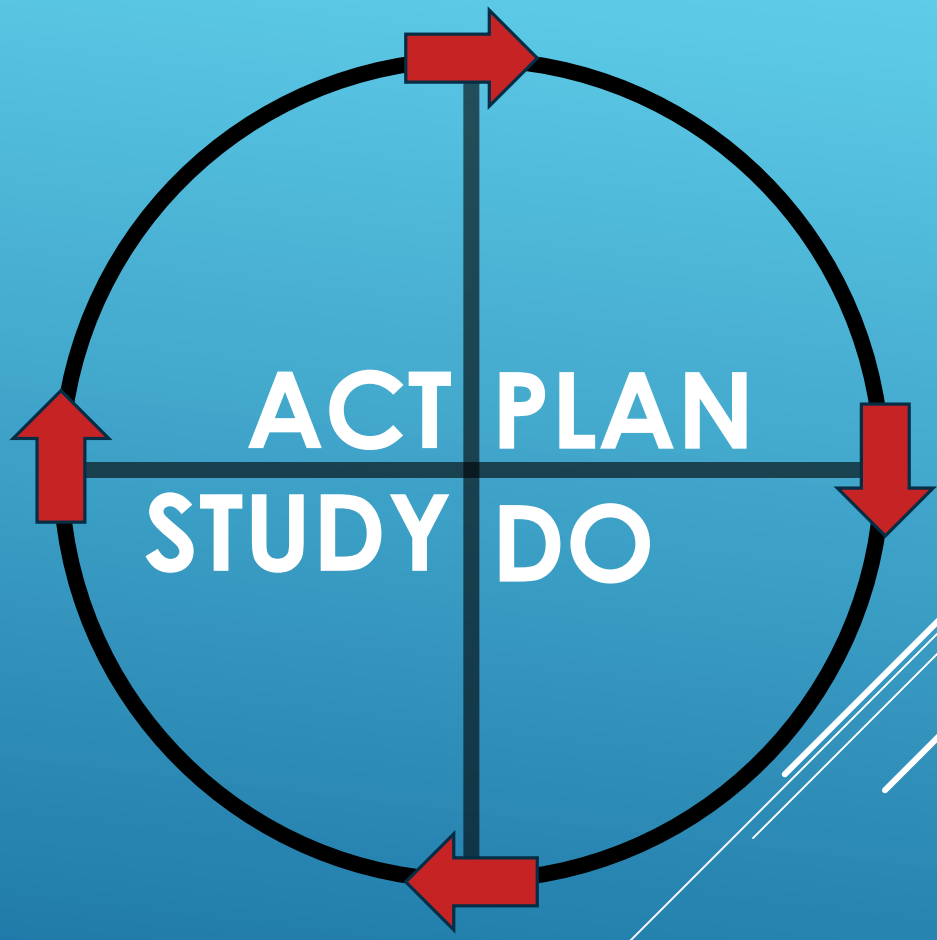




- The fact that the ***mean is 96.5743*** supports the claim that the time between blasts will be 1hr 36 min because 96 mins is 1 hr 36 mins. The non outliers supports my claim because they fall between ***±20 mins***.
- The fact that the eruptions being ***over 85 minutes apart*** refutes the claim that it erupts every 75 minutes +/- 30 minutes. This is because ***the mean is about every 97 minutes***.
- The fact that the ***mean is 96.5 minutes*** between each blast supports the claim that the time between blasts will be 1hr, 30min, because 96.5min equals 1hr, 36min they are roughly the same amount of time. This shows the times are similar which makes the evidence support my claim.
- The fact that the ***mean of the minutes between blasts is 97 minutes*** refutes the claim that the minutes between blasts is 30 minutes because 97 minutes is longer than 30 minutes.

THIRD & FOURTH ITERATIONS

Refined & tested the process



REFINED PROCESS

- Present students with some information about the variables included in a set of data.
- Ask students to make predictions about what they might expect to see in the data. Use a think-pair-share model.
- Form predictions into claims.
- Provide students with data in a usable form (e.g., a spreadsheet)
- Students analyze the data and decide if it supports or refutes the claim. Then they write statements of evidence & reasoning connecting their analysis to the claim.
- Collect student statements and, as a class or in small groups, review them against the rubric.

- There aren't many "Oscar-worthy" roles for older women.
- Original movies are better than sequels.
- Arm span is a better predictor of a person's height than their kneeling height.
- Engine size has a bigger impact on gas mileage than the car's weight.
- Individuals with more education are less likely to be unemployed.
- African American juveniles are more likely to be incarcerated for violent crimes, property crimes, and drug-related crimes than white juveniles.

LET'S GO BACK

MAKE SOME PREDICTIONS

CHECK OUT THE DATA

RESULTS

Why I think this worked

THE GROUPS

Fall Term

- 23 students
- 14 males, 9 females
- 17 students with IEP/504 plans

Only slightly revised approach with this group

Winter Term

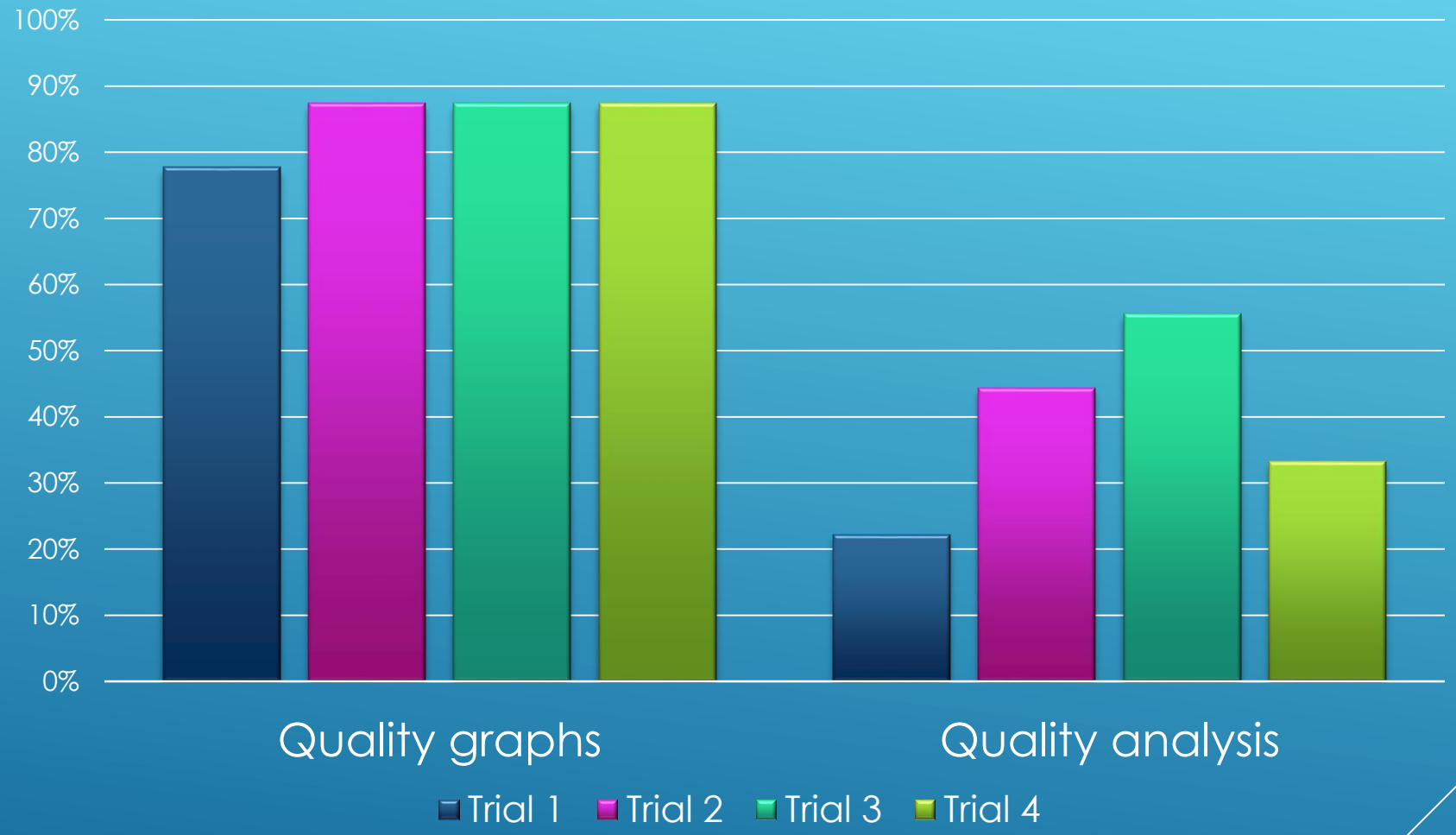
- 9 students
- 7 males, 2 females
- 2 students with IEP/504 plans

Spring Term

- 11 students
- 9 males, 2 females
- 6 students with IEP/504 plans

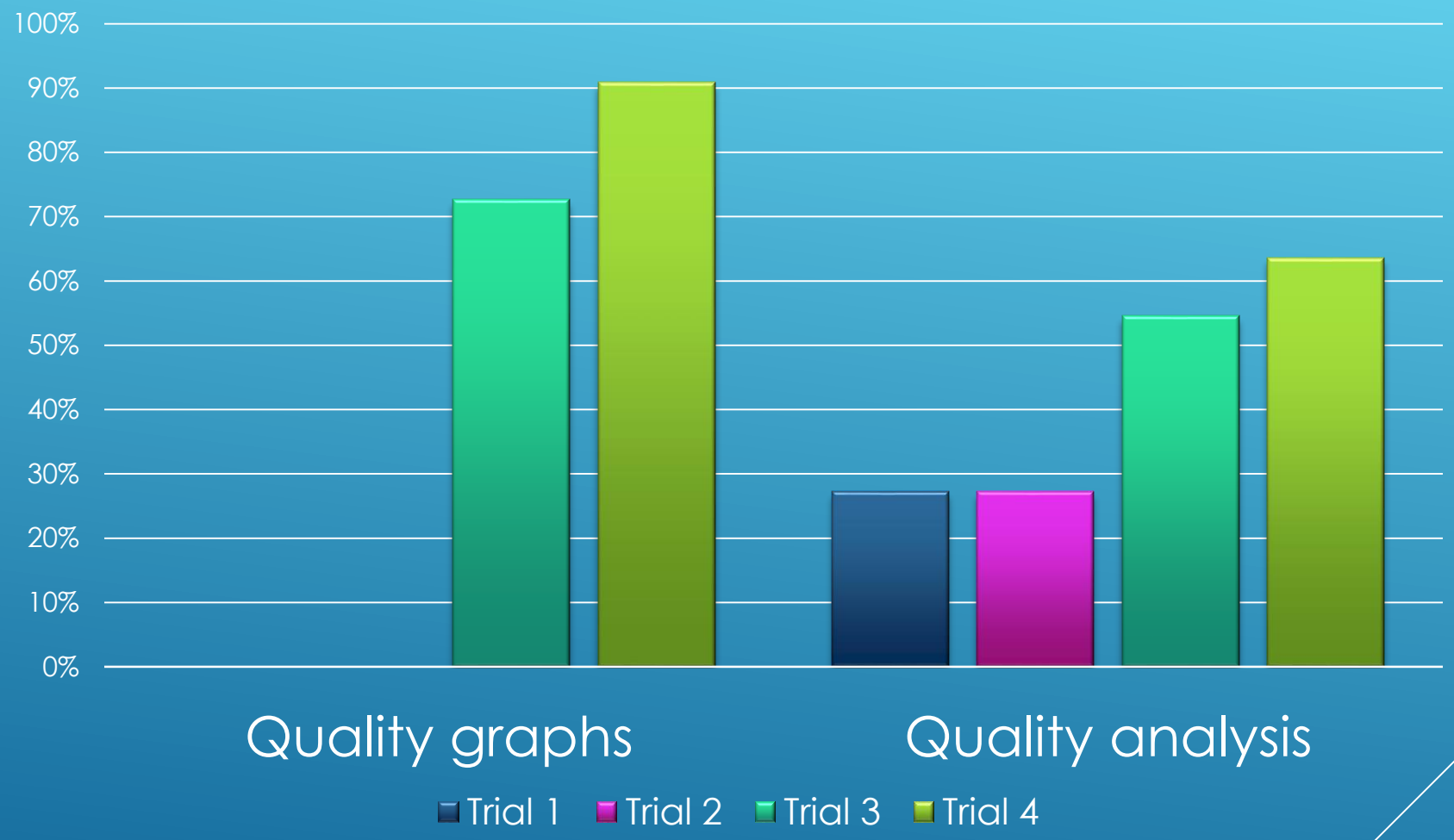
Completely revised approach with this group

Results: Cycle 2



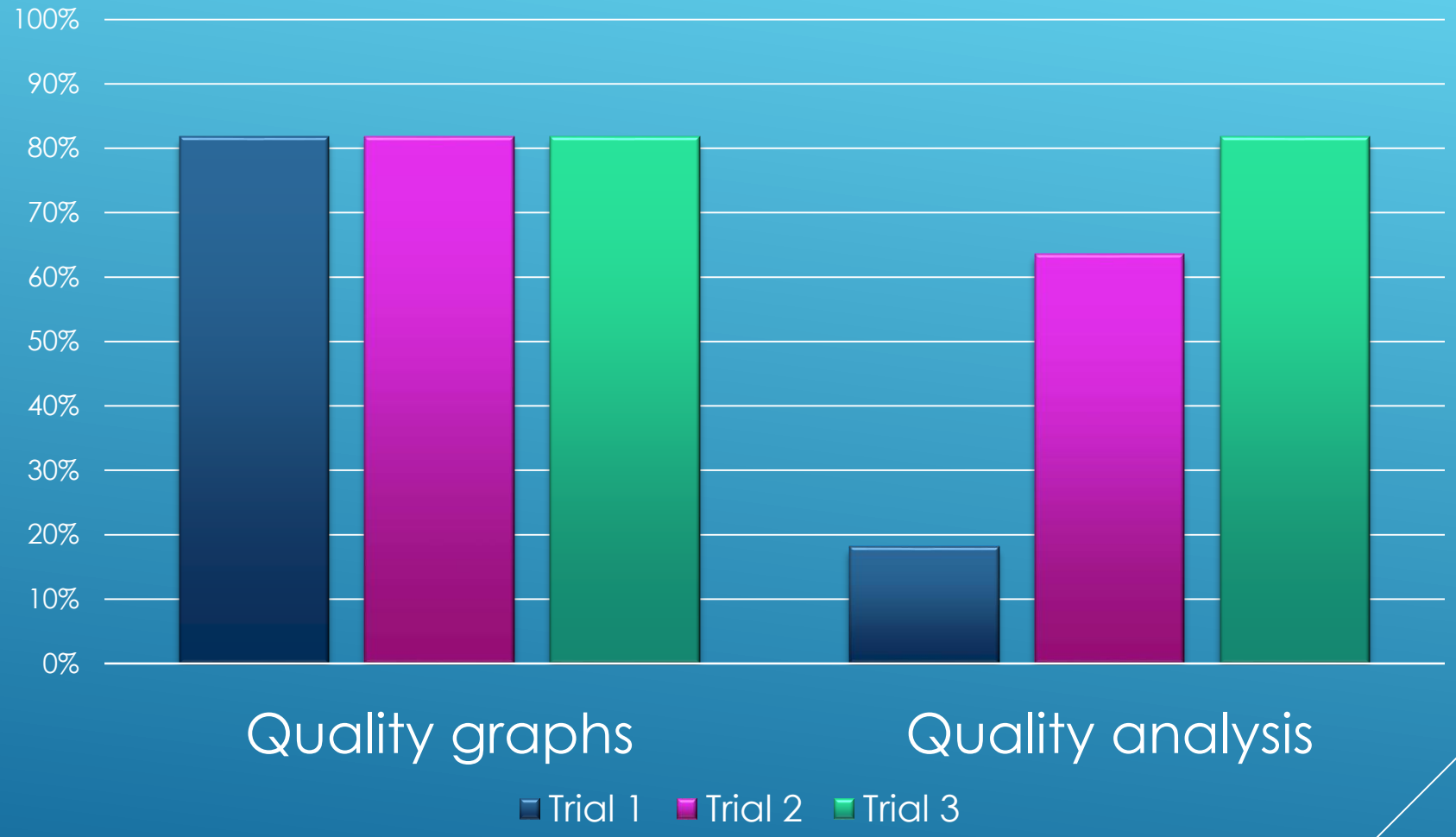
CYCLE 2 – REBOOT

Cycle 3: Results



CYCLE 3 – BEGINNING A NEW TERM

Cycle 4: Results



CYCLE 4

QUESTIONS?

THANKS FOR COMING!

pamela.rawson@gmail.com
@rawsonmath
rawsonmath.com