

Hello Carla,

I am sorry you had trouble logging back into the zoom. Here is a link to watch the rest of the class. You can just make a doc with your chat responses for the class & put it into the dropbox for credit. Please reach out to Deanna to work on your Math Modeling Project.

https://endeavorstemeducation.zoom.us/rec/share/sflnT5Jzo_y4c5qJcJ_qBxD8EO33u4HeWZTJQy7TQybl74dGC8L7xN09xJFByul.p6l2hhWNBk6DCHrY

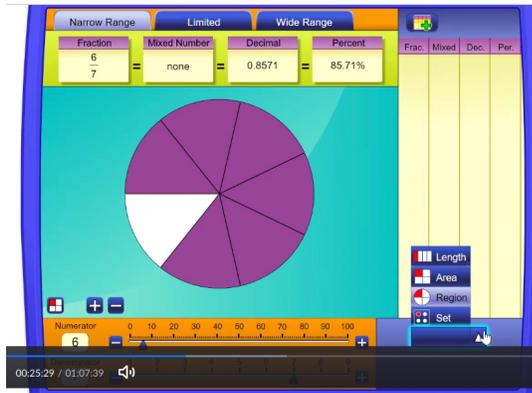
Passcode: QcLU!6CJ

Let me know if you have any questions,

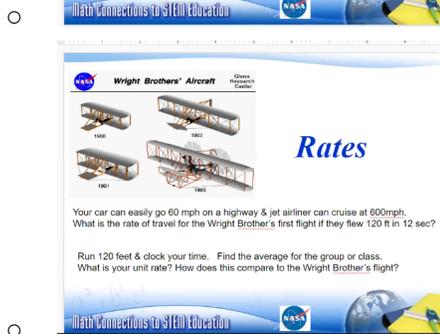
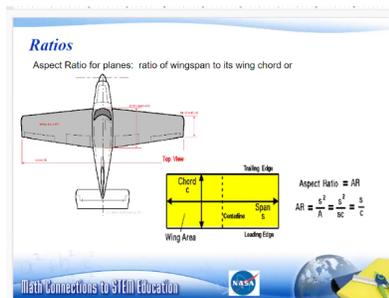
Lisa

Notes from LIVE Session:

- JPL Resource - so cool! Love this! Thank you for sharing!
- SpaceMath@NASA - I remember learning about this resource in a prior course "Methods of STEM Education." Really cool site!
- Elementary Example from Space Math Examples
 - Chat: You could take this data and have students create a story graph or operations with fractions or positive/negative numbers.
- Algebra Example: Moore's Law
 - Have you seen a graph similar to this? - No, not that graph exactly, but I have seen a line graph before...
 - Oh, Exponential Growth! Cool! Covid Graphs would be a great example to pull into the classroom.
 - Data trends!
 - Love how you said we teach math so they get this concept in science class and also in life!
- Progression of Fractions!!! - I hadn't really thought about it like that.
- <https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Fraction-Models/>



- I had not seen this before, but I think it looks like a fantastic resource!



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- Authentic Data -
 - How can you find it using technology?
 - There are online simulators that can be used for data sets.
 - What sources are reputable?
 - I believe that the NASA resources are reputable.
 - I have run across <https://datanuggets.org/resources/data/> which includes a collection of websites that offer freely available online data.
 - How can you collect your own?
 - I have had students create surveys, collect data from their classmates to use for a persuasive writing piece.
 - I have also had them to research data from local businesses when working with systems of equations.
 - Some idea listed from my classmates in the chat were:
 - Eyes on Earth
 - NASA resources

- USDA
- USGS
- <https://www.gapminder.org/data/>
- NOAA Meteorologist
- website had to end in .org or .gov to be a reputable source

Real World Scale Models to collect DATA

- Gliders, planes, kites
- Cars, trains, Legos, K'Nex
- Rockets- air, water



What others can you add for data collection?

Considerations when using real data

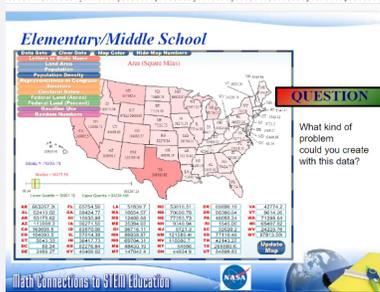
- ✓ the importance of preparation exercises
Use of technology, ability to analyze & read visuals
- ✓ anticipating challenges to student success
scaffold experiences, class practice, pair/share, std demonstrations
- ✓ making time for the societal component
climate change, sea ice, sea levels, populations, economy, temperature

Math Connections to STEM Education



NCTM Illuminations.... High School Example

- <https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Pandemics-How-Are-Viruses-Spread/> - I have not seen this before! That is awesome! Seeing the real-time changes.



The possibilities with this data are endless! Cool resource!

Progression of Statistics

CCSS Content Standards Addressed:

GD6 Develop understanding of statistical variability.

- * Understand data can be described by its center, spread, and overall shape.
- * Display data in plots on a number line, dot plots, histograms, and box plots.

GD7 Use random sampling to draw inferences about a population.

- * Measuring difference between centers; expressing as a multiple measure of variability
- * Construct & interpret two-way tables; summarizing data on two categorical variables collected from the same subjects
- * Express and understand likelihood of an event. Develop probability model to find probabilities of an event. (ie; lists, tables, tree diagrams, simulations)

GD8 Investigate patterns of association in bivariate data.

- * Construct and interpret scatter plots to investigate patterns between two quantities.
- * Construct best fit lines; interpreting patterns in data such as slope and intercepts

HS ALGEBRA & STATISTICS

NGSS Addressed: Life & Physical Science

Math Connections to STEM Education



Elementary Example



Engage

- How strong are you?
- Do you think this is inherited?
Can we change your strength aptitude?
- Does this differ for girls & boys? How does this differ in space?

Math Connections to STEM Education



- Click clothes pins and record number in 1 min. - gather data
- Do the same for non-dominant hand
- Do this again over some weeks, hopefully see some growth, building stamina.
- What do you expect to see?

Analyzing your Data

	Trial 1	2	3
Initial Test	82	80	70
Wk 1	M 83	83	75
	W 85	84	75
	F 85	84	77
Wk 2	M 86	85	78
	W 89	86	78
	F 90	88	80

Have the students write to EXPLAIN what happened to their hand strength. Why do you suppose it turned out this way?

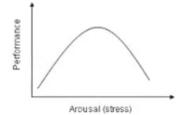
Math Connections to STEM Education



- What conclusions can you make?
- Not a linear relationship, increases & decreases.
- Tie this to building muscle mass (muscle stress)
- How does NASA develop astronauts, how do we prepare them for space and how do our bodies respond differently on earth vs. space?

Stress on Your Body

- **ENGAGE** class discussion
Good stress vs. bad
- NASA Twins research- Kelly brothers
check out NASA ScienceCasts: Separated at Launch
- Discuss how physical stress
can have an effect on muscles & bone over time



Math Connections to STEM Education

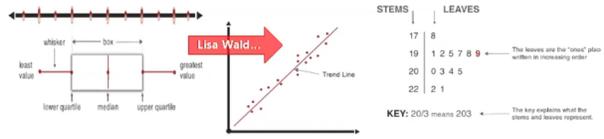


- Challenge kids by asking them to graph the data, without directions of HOW to do it. Allow them time to THINK about the different ways .
- box & whisker plot <https://www.geogebra.org/m/p4bdvjdu>
- line of best fit <http://illuminations.nctm.org/Activity.aspx?id=4186>
- stem & leaf plot
<http://www.shodor.org/interactivate/activities/StemAndLeafPlotter/>

Explain & Evaluate

How did the muscle strength in your hand change over the conditioning period?
What type of graph is the most appropriate to visually demonstrate this?

How did the muscle stamina in your hand change over the conditioning period?
What type of graph is the most appropriate to visually demonstrate this?



- With my background in what I teach, I am partial to the line of best fit, but I don't think it works as well for the data as the Stem-in-leaf does.

StatsCalculator.com
By Analysts. For Analysts.

Explore Single Series

- Histogram Chart
- Box & Whisker
- Outlier Detection
- Empirical Rule

Explore (X,Y) Pairs

- Scatter Plot
- Regression
- Correlation Coefficient

Test Single Sample

- 1 Sample t-test
- Z Score

Compare Samples

Box and Whisker Plot Maker

Box and Whisker Plot

Observations

1, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 3, 3, 4, 4, 4, 4, 4, 4, 5, 6, 7, 8, 11, 15, 26, 7

Click To Clear; enter values separated by commas or new lines. Cut & Paste from Excel also works.

Calculate Save Share

Free statistics calculators designed for data scientists. This Box and Whisker Plot Maker:

- Generates A Box and Whisker Plot
- Calculates Key Quartile Statistics

Using The Box and Whisker Plot Maker

Enter your data as a string of numbers, separated by commas. Then hit calculate. The Box and Whisker Plot Maker will generate a lot of key measures and make a box plot chart to show the distribution.

For easy entry, you can copy and paste your data into the box plot maker from Excel. You can save your data for use with this calculator and other calculators on this site. Just hit the "save data" button. It will save the data in your browser (not on our server, it remains private). Saved data sets will appear on the list of saved datasets below the data entry panel. To retrieve it, click the "load data" button next to it. This is useful if

- Geogebra.org

geogebra.org/m/p4bchjdu

GeoGebra

Done with Minimum

Done with Q_1

Done with Median

Done with Q_3

Done with Maximum

Draw Your Box Plot

Reset

Box Plot Maker

Done with Minimum

Done with Q_1

Done with Median

Done with Q_3

Done with Maximum

Draw Your Box Plot

Reset

- Extension:

docs.google.com/presentation/d/1bA5XEZEBvGAebypefXCUC8ac_IYwo2...

Standards for Math... Classroom Sapphire Suite - Lo... Socrative Keystone Exams Classic - GeoGebra Desmos Graphing...

2022 SP7X ☆ ☰ ☰

ert Format Slide Arrange Tools Help Last edit was 57 minutes ago

Background Layout Theme Transition

Extend

Collect the last day's Trial 1 data from all the students on one chart.
Arrange the chart to have 1 column for girls & 1 column for boys.

Based on the class data, which group had greater muscle strength?
Verify your answer graphically.

What does that mean for our astronauts in space?
What tests would you suggest for the Kelly twins?



Lisa Waldman →

INTERACTIVE: <http://www.shodor.org/interactivate/activities/StemAndLeafPlotter/>
Stem & leaf plot or box & whisker plot would show the best representation for this bivariate data.
VISUAL: https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcT72V6Cz3f88Yk38GL989m_KmiPvTMeoywPeT1ASiW6TzP4uIc

- Group Modeling Project:

Breakout Rooms for COLLABORATION!

Grade Level Groups for group Modeling Project-
YOU CHOOSE the room #1-3 Elementary
#4-7 Middle School
#8-10 HS/Interventionist/
Coaches/Leaders

Have you found a way to incorporate
math & science?
Do you have connections to ELA & technology?

PRESENTATIONS 7/13
POST SLIDE to present your Math
Modeling Group Project in DROPBOX

