# Carrying Mathematics Across the Curriculum, Grades PK-4

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## Let's look at some "numbers"

Warm
Yay
Light
Curve
Sharp

Take a minute and memorize the order of each of these….

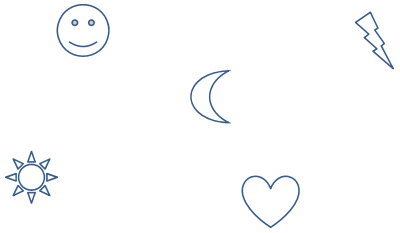
## Let's look at some "numbers"

What is the order of the "numbers"?
What comes before curve?
What comes after curve?

What comes before yay?
What comes after yay?

What comes before sharp?
What comes after sharp?

## Put them in the correct order please…



## Put them in the correct order please…

Curve

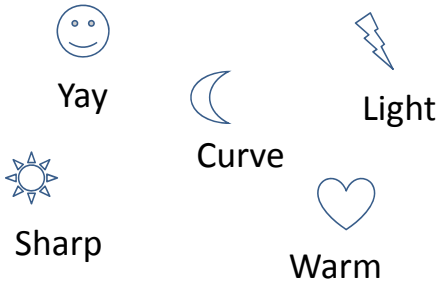
Warm

Yay

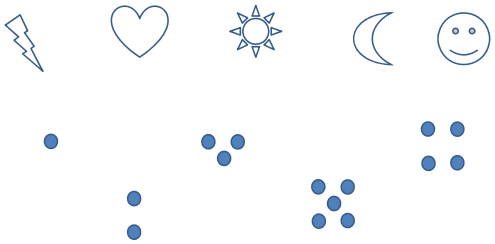
Light

Sharp

## Put them in the correct order please…



## Match the symbol with the quantity



## Symbol numbers

- How did you make you feel?
- What is the connection to you as a teacher?

## Pulse check

- On a scale of 1 to 10 (seldom to always) think about:
  - Other than math lessons how often do math topics come up? Any examples?
  - During math lessons how often do I bring in content from other areas? Any examples?
  - In a typical week how often do my students share/discuss math ideas? Write about math? Any examples?

## Goals

- Do some mathematics
- Consider ideas about mathematics transcending other subjects in the curriculum
- Prepare and plan ways to incorporate mathematics and other subjects

## Quilt Designing

- You want to make a class quilt.
- On one square make a design that includes a specific number of triangles, squares and rectangles. Use between 2 to 8 of each shape on your quilt square.
- Now you want to make your quilt by joining your square with other squares around you. Combine with a few other people (total of 4) around you and find the total number of each shape on your squares.
- If you wanted to make 2 copies of your quilt how many of each shape would you have?
- What about 3 copies?
- What about 10 copies?
- What about 15 copies?

| Quilt squares | Square | Triangle | Rectangle |
|---|---|---|---|
| 1 | 4 | 8 | 4 |
| 2 | 8 | 16 | 8 |
| 3 | 12 | 24 | 12 |
| | | | |

## Quilt Designing

- It costs you $2 of costs to make your quilt.
- Based on your quilt design how much should you sell your quilt for?
- Based on the costs you pay and how much you make per quilt how long will it take for you to earn a profit of $5? $10? $20?

## Quilt Designing

- What were your processes that you did?
- Where is the math?
- Where does “design” fit in with STEM?

## What do you notice about the picture?

## Brainstorm

- Create a list of questions that your students might come up with based on this picture

## Question Sharing

## What mathematical tasks/problems can we create based on the context?

## Examples of Mathematical Tasks

## How many cans and bottles are there?

## Example Tasks

- There are 10 bottles and cans on the table. There are some of each. How many of each could there be? Find all of the possible combinations. Explain how you know you have every combination.
- The picture below shows a group of soda cans. How many cans are there? How do you know?

## Example Tasks

- One bag is full of only empty cans. A can weighs 10 grams. If the bag has between 80 to 100 grams of cans in it how many cans could there be? How do you know?
- One bag is full of only empty cans. A lighter can weighs only 8 grams. If the bag has between 45 and 65 grams of cans in it how many cans could there be? How do you know?

## Example Tasks

- What did you notice about these examples?
- Are they rigorous or relatively easy?
- Open-ended, multiple correct answers

## The Context

- Picture is the anchor
  - Provides background information
  - Provides a visual
  - Gives a real-life context
- Bringing into the mathematics classroom…
  - Communication
    - Mathematical explanations and justification
    - Writing about mathematical concepts
  - Other contexts… recycling

## Making Connections in Other Ways

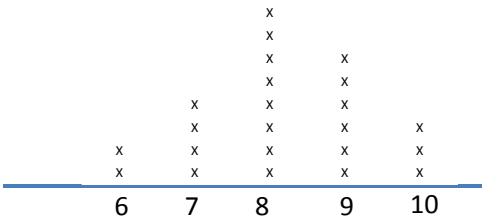
## What do you notice?

| Label | Value |
|---|---|
| 6 | 2 |
| 7 | 4 |
| 8 | 9 |
| 9 | 6 |
| 10 | 3 |

## Another way to display this data?

| Label | Value |
|---|---|
| 6 | 2 |
| 7 | 4 |
| 8 | 8 |
| 9 | 6 |
| 10 | 3 |

## What do you notice?




## This data…

- Was collected in a classroom of Grade 1 students
- Students estimated the label that best represented them
- The question involved “the number of hours” for a specific activity
- Any ideas?

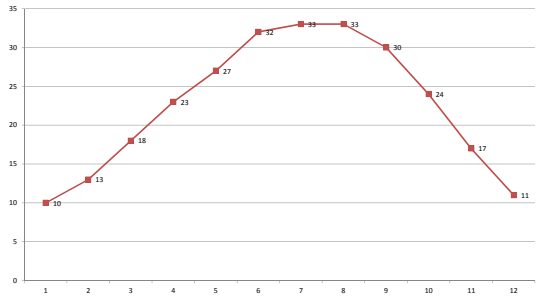
## What do you notice?

| Order | Data | Order | Data |
|---|---|---|---|
| 1 | 10 | 7 | 33 |
| 2 | 13 | 8 | 33 |
| 3 | 18 | 9 | 30 |
| 4 | 23 | 10 | 24 |
| 5 | 27 | 11 | 17 |
| 6 | 32 | 12 | 11 |

## What is another way to show this data?

| Order | Data | Order | Data |
|---|---|---|---|
| 1 | 10 | 7 | 33 |
| 2 | 13 | 8 | 33 |
| 3 | 18 | 9 | 30 |
| 4 | 23 | 10 | 24 |
| 5 | 27 | 11 | 17 |
| 6 | 32 | 12 | 11 |

## What do you notice?




## Chart and Graph

- The same data was plotted on both the table and the graph.
- Data was collected outside.
- Data was collected over a long period of time.
- Data was collected using this…


## Extending the Chart and Graph Tasks

- Data analysis process
  - Posing a question
  - Collecting data
  - Analyzing data (make representations, describe what you notice)
  - Interpret data (answer questions)
- So let's do this!

## Collecting Data from a Situation

- In small groups you will conduct the experiment and record data
- We will then share data with others after
- 1) Resting pulse… record your pulse for 30 seconds. Double it. Do this three times. Use the middle number.
- 2) Somewhat active pulse… stand up and pump your arms back and forth for 30 seconds as fast as you can.. Record your pulse. Do this three times. Use the middle number.
- 3) Share both middle numbers with others. You want 15 to 20 data points for each if possible.

## Heart rates

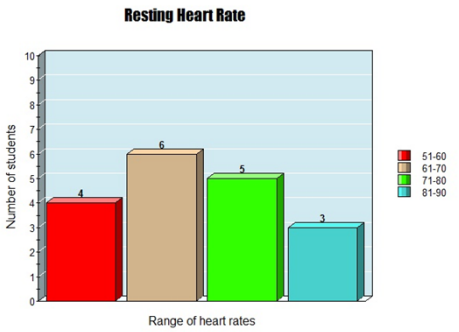
- Resting
- 72, 78, 75, 60, 44, 72, 72, 76, 75, 70
- Working
- 64, 54, 96, 85, 99, 112, 111, 100, 88, 72, 82

## Data Analysis Processes

- Data analysis process
  - Posing a question
  - Collecting data
  - **Analyzing data (make representations, describe what you notice)**
  - Interpret data (answer questions)

## Working with our data

- Share your middle number for both resting and active pulse with others. You want between 10 to 15 data points for each.
- Display your data in a chart/table as well as 1 type of graph…
  - Make your graph using this website
  - http://nces.ed.gov/nceskids/graphing/classic/




## Data Analysis Processes

- Data analysis process
  - Posing a question
  - Collecting data
  - Analyzing data (make representations, describe what you notice)
  - **Interpret data (answer questions)**

## Data Collection Contexts

- Experiments
  - Ideas?
- Survey questions
  - Ideas?

## Data Collection Contexts

- Experiments
  - Pulse- resting and active
  - Standing on one foot with eyes closed- dominant vs. non-dominant foot
  - Timing how long it takes for hot water to cool or ice to melt
  - Friction and force experiments in science
- Research
  - Comparing prices for food, toys, etc.

## Mathematics and Literacy

- ShowMe/Educreations – screen casting
  - Free iPad apps
  - Both let you import photos or write on a blank screen
  - Both store files as private links that you can keep or send to parents or post somewhere
- Here is an example…

## Mathematics and Literacy

- Children's Literature
  - Quack and Count (K)
  - The Mission of Addition (1-2)
  - 365 Penguins (Gr 3-4)
- http://www.the-best-childrens-books.org/math-for-kids.html

## Mathematics and Literacy

- Writing about mathematics
  - Write in detailed sentences the specific step by step process of solving 302 minus 176.
- Outlets for writing
  - Mathematics journals
  - Blogs, class blog or individual blogs
  - Story Jumper- make a digital book with pictures

## Talking about Mathematical Ideas

- Number Talks
- Estimate the answer to 27 + 34 + 13 + 16
- Share your thoughts with your neighbor
- Find the answer and explain your strategies
- Write a word problem to match the equation

## Number Talks

- Mental math
- Opportunity for discourse and reasoning with individual thought time, partners, whole class discussion
- Write your own number talk for your grade level.
- How could you incorporate writing into number talks?

## Elevator Movement

- Margaret gets on the elevator on the 17th floor. Right before Margaret, Samuel had gone up on the elevator 9 floors. Right before Samuel, Angela rides the elevator down 7 floors. Right before Angela, Tom rode the elevator up either 9 or 10 floors. Before Tom, Nina rode the elevators down between 2 to 5 floors. What floor could Nina have gotten on the elevators?

## Elevator Movement

- Strategies ?
- Math concepts?
- Modifications for your grade?

## Mathematics Across the Curriculum

- Bringing concepts into mathematics
  - Recycling example
  - Mystery graphs
- Mathematics in science
  - Data collection, experiments
- Mathematics and literacy
  - Writing about mathematics
  - Non-fiction books about mathematics concepts

## Contact information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