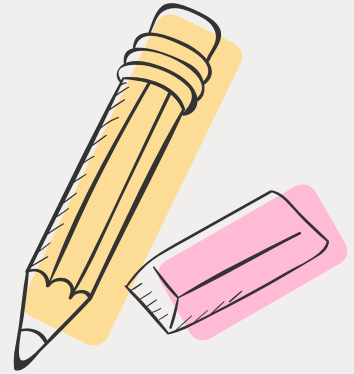
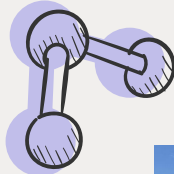


# Final RET Presentation



Anne Goralczyk



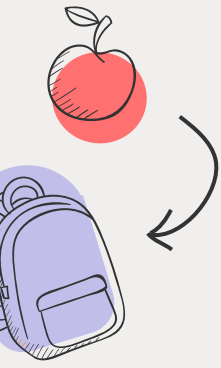


# Get to Know Me

**Anne Goralczyk**

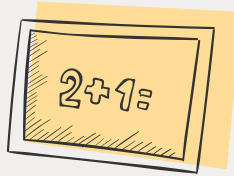
- Meadow's Edge Elementary School
  - 4th grade
  - 3rd year teaching
  - High school basketball coach
- 
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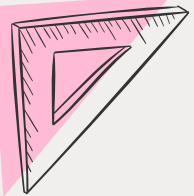




# My Module

At the end of this module, SWBAT demonstrate their understanding of data centers orally and through written language by performing mathematical operations, evaluating data, and converting unit measurements.





# 4th Grade Standards



## Math: Number Sense

**4.NS.5:** Write tenths and hundredths in decimal and fraction notations. Use words, models, standard form, and expanded form to represent decimal numbers to hundredths.



## Math: Measurement

**4.M.2:** Within given measurement systems, convert larger units to smaller units, including km, m, cm; kg, g; lb, oz; l, ml; hr, min, sec, and use these conversions to solve real world problems.

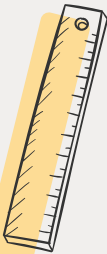


## Math: Data Analysis

**4.DA.1:** Formulate questions that can be addressed with data. Collect, organize, and graph data from observations, surveys, and experiments using line plots with whole number intervals, single- and scaled bar graphs, and frequency tables. Solve real world problems by analyzing and interpreting the data using grade level computation and comparison strategies.



## Reading: Comm & Collaboration



**4.CC.7:** Recognize claims in print, image, and multimedia and identify evidence used to support these claims.



## Computer Science

**3-5.IC.1:** Describe the positive and negative impacts of technology on one's personal life, society, and our culture.



## Computer Science

**3-5.DI.5:** Use data to highlight or propose cause-and-effect relationships, predict outcomes, or communicate an idea.



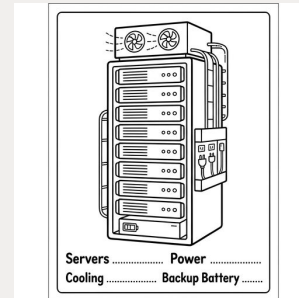
# Lesson #1

## Students will:

- Take a brief pre assessment to determine their knowledge on the topic
- Learn what a data center and its purpose is, as well as what companies have data centers
- Identify the 4 main parts that keep a data center running
- Explain how information travels from data centers to their devices at home via a hands on demo

## Resources:

- Data Center Presentation
- Exit Ticket (formative assessment)
- “The Great Data Center Adventure” book
- Data center rack template



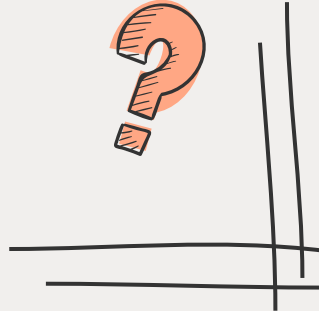
# Lesson #2

## Students will:

- Begin by reviewing decimals & how to compare them
- Complete a variety of review questions
- Learn about how decimals are used in data centers
- Apply the review to compare decimal numbers in data centers

## Resources:

- Decimal Review Powerpoint
- Decimal Review Worksheet



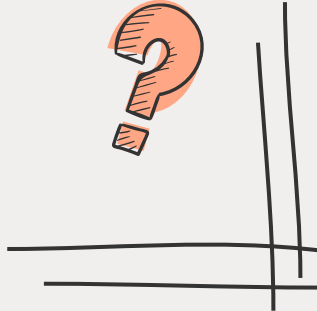
# Lesson #3

## Students will:

- Begin by reviewing measurements & what they're used for
- Complete a variety of review questions on measurements & conversions
- Make a connection between numbers used to measure computer data & conversions used with them
- Apply the review to conversions in computer data measurements

## Resources:

- Conversions Review Powerpoint
- Data Center Conversion Worksheet



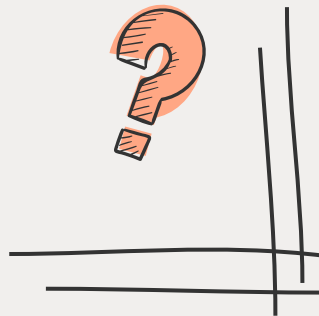
# Lesson #4

## Students will:

- Learn about the importance of graphs, data analysis, and why they are used
- Independently work to graph their data from the previous two lessons (conversions and decimal comparisons)
- Begin to think about what the numbers represent and what decisions they would make about data centers based on the data

## Resources:

- Graphing Templates



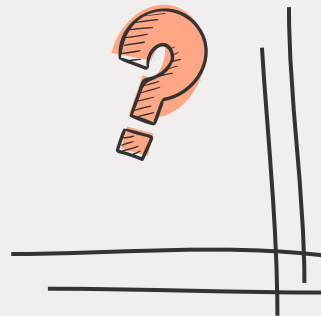
# Lesson #5

## Students will:

- Individually analyze their worksheets and graphs to make an informed decision about which data center they would choose to have in their community
- Work in partners to construct written responses to a variety of questions about which data center is the best, based on the data

## Resources:

- Final Reflection Worksheet





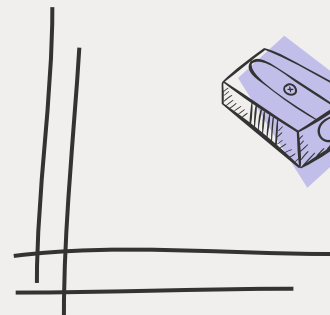
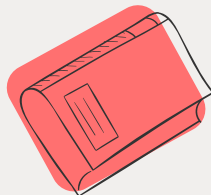
# RET Connections

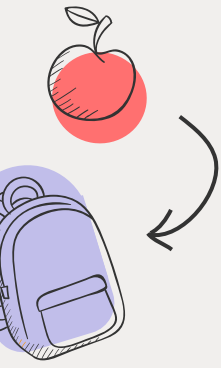
2

AI Energy Footprint - Mike Niemer

Human-Computer Interaction - Diego Gomez-Zara

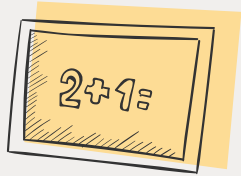
Summer Research: What does a token really cost?

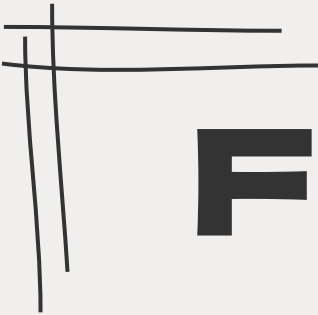




# Research Project

A ledger was developed to show the real-world numbers behind AI data centers so that claims about cost and energy can be traced to real numbers and a source.





# First thing's first:

What do these measurements mean?

| Term                                  | Definition                                                                                                                                                                                                 |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frontier API token price              | the fee you pay an AI company based on the amount of text processed where frontier refers to one of the newest and most capable AI models and API represents a way for software to communicate with the AI |
| Open / commodity token price          | the fee charged for using a <b>standard</b> (not frontier/advanced) AI model based on the amount of text processed                                                                                         |
| Industrial electricity rate (Indiana) | the price that factories, warehouses, and other large businesses pay for electricity that differs from typical household electric costs; referring specifically to Indiana with this data                  |
| Power Usage Effectiveness (PUE)       | a score that shows how efficiently electricity in a data center is used, with less wasted power meaning a better score                                                                                     |
| Accelerator board power               | the amount of electricity a specialized computer chip needs to run; the chip allows the computer to perform demanding tasks faster                                                                         |
| Announced facility capacity           | the maximum amount of work, production, or service a data center is expected to handle after its completion, based on public announcements                                                                 |
| Facility utilization                  | the percentage/amount of a facility's capacity that is actually being used compared to its maximum capacity                                                                                                |
| Contract/discount electricity rates   | reduced electricity prices that a customer receives through a negotiated agreement or long-term contract; typically awarded specifically to large companies/entities                                       |

# Token Price

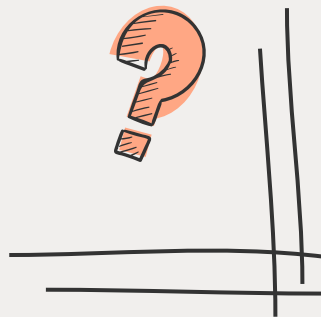
All data regarding specific AI numbers was pulled from OpenAI's ChatGPT-5.5 model.

**Frontier API Value = 4.35 (\$/millions of tokens)**

- This means that the company pays \$4.35 per every million tokens used

**Open/Commodity Value = 0.86 (\$/millions of tokens)**

- This means that the company pays \$0.86 per every million tokens used with the most widely used version of the service



# Electricity Used

The local anchor used for some of these numbers (PUE & announced facility capacity) was Project Rainier in New Carlisle.

Power Usage Effectiveness = 1.14

- The lower the number, the better more effectively power is being used

Accelerated Board Power = 1 (kW / accelerator)

Announced Facility Capacity = 2208 MW



# Payment for Electricity

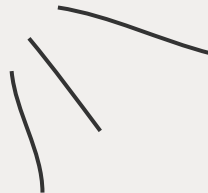
The local anchor used for some of these numbers was Project Rainier in New Carlisle & homes powered by Indiana Michigan Power.

Contract/discount Electricity Rates = 0.37 cents/KWh

Average Home Electricity Rates = 16.19 cents/KWh



# Link to spreadsheet



# Tornado Inputs: What matters most?



## First: Token price

- This input directly determines how much money is earned per tokens produced. The higher the token price, the more money made. The more of a token that is sold, the more money made.

## Then: Utilization

- More utilization means that more of the facility is being used, which means that there is more capacity for more tokens being sold

## Last: Electricity price

- This variable affects profitability (rather than revenue) because more money spent = less money earned.

