WAMC Lab Template

Math Concept(s):	Measurement types and systems
Source / Text:	Adapted for CORD Mathematics: A contextual approach to Geometry
Developed by:	Christopher Beyrouty
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Date:	6/21/2022

Attach and or link the following documents	
Lab Instructions	https://docs.google.com/document/d/1V_JPTR3tDx1eSK9tRb0UdX7QtFLoOgol6-3o3fsbR0U/edit?usp=sharing
Student Handout(s)	https://docs.google.com/document/d/1_Uw87-CXdpI_aycNvLAcVMJ6vpcRyDV9ifPFTwFqJjk/edit?usp=sharing
Rubric and/or Assessment Tool	none

Short Description
(Be sure to include where in your instruction this lab takes place)

Students will be doing a card sort. Groups of 2 to 3 students will be employed to sort the cards into measurement types and systems.

Lab Plan

Lab Title:	What Measurement
Prerequisite Skills:	None. First lesson of the year
Lab Objective:	Students will demonstrate their understanding of the different types of measurements and which system they belong to.

Standards
Note SPECIFIC relationship to Science, Technology and or Engineering

Mathematics K-12 Learning standards:

- A-SSE 4

Standards for Mathematical Practice:

- 3. Construct viable arguments and critique the reasoning of others.

K-12 Learning Standards - ELA (Reading, Writing, Speaking & Listening):

-

K-12 Science Standards

-

Technology

-

Engineering

-

Social Emotional Learning

- Benchmark 5A: Demonstrates a range of communication and social skills to interact effectively with others.
- Benchmark 6B: Demonstrates the ability to work with others to set, monitor, adapt, achieve, and evaluate goals.

Leadership / 21st Century Skills

21st Century Interdisciplinary Themes

[x] Global Awareness	[ ] Financial/Economic/Business/Entrepreneurial Literacy	[ ] Civic Literacy
[ ] Health/Safety Literacy	[ ] Environmental Literacy	

21st century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION	INFORMATION, MEDIA & TECHNOLOGY SKILLS	LIFE & CAREER SKILLS	
Creativity and Innovation [x] Think Creatively [x] Work Creatively with others [ ] Implement Innovations	Information Literacy [ ] Access and Evaluate Information [ ] Use and manage information	Flexibility and Adaptability [ ] Adapt to Change [ ] Be Flexible	Productivity and Accountability [ ] Manage Projects [ ] Produce Results
Critical Thinking and Problem Solving [ ] Reason Effectively [ ] Use Systems Thinking	Media Literacy [ ] Analyze Media [ ] Create Media Products	Initiative and Self-Direction [x] Manage Goals and Time [ ] Work Independently [ ] Be Self-Directed Learners	Leadership and Responsibility [ ] Guide and Lead Others [ ] Be Responsible to Others

[x] Make Judgments & Decisions [ ] Solve Problems			
Communications and Collaboration [x] Communicate Clearly [x] Collaborate with Others	Information, Communications and Technology (ICT Literacy) [ ] Apply Technology Effectively	Social and Cross-Cultural [x] Interact Effectively with Others [x] Work Effectively in Diverse Teams	

Teacher Preparation:
What materials and set-up are required for this lab?

Materials

- https://www.merriam-webster.com/words-at-play/usage-carat-vs-karat
- https://docs.google.com/document/d/1_Uw87-CXdpI_aycNvLAcVMJ6vpcRyDV9ifPFTwFqJjk/edit?usp=sharing
-

Set-Up Required

- Get a set of cards for each group of students.
- Cut cards and place a rubber band around them or put them in a plastic bag.

Lab Organization Strategies

Leadership (Connect to 21st Century Skills selected)

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Cooperative Learning

- Students will be group in groups of 2 to 3 students

Expectations

- Students will discuss and agree upon which units will be in which groups.
- Students will complete the 60 card sort

Timeline

- 5 min for reviewing the cards and seeing if there are any that they have questions about.
- 10 minutes for the first round of sorting - getting the initial groups of measurement types
-

Post Lab Follow-Up/Conclusions

Discuss real world application of learning from lab

- Which system of measurement do we use in our area?
- Which system of measurement is used most commonly around the world?
-

Career Applications

- Are their industries that use one system of measure over the other? Which system do they use?
-

Optional or Extension Activities

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seconds	minutes
hours	days
weeks	months
years	decades
centuries	millennium

farenheit	celcius
kelvin	inch
foot	yard
mile	Nautical mile
fathom	millimeter

centimeter	decimeter
meter	dekameter
kilometer	light year
ounces	pound
ton	carat

milligram	centigram
gram	kilogram
ounce	cup
teaspoon	tablespoon
pint	quart

gallon	bushel
milliliter	centiliter
liter	deciliter
kiloliter	caret
karat	carrot

square inches	square feet
square meters	square miles
acre	square centimeters
square kilometers	

Metric system vs US system

Objective

- Students will be able to identify which measurements belong to lengths, weight, time, capacity, temperature as well as which units are part of the metric system and the US system.

Grouping

- Make groups of about 2 to 3 students

Time

- 30 minutes

Materials

- set of cards for each group of students
- Answers
    - https://docs.google.com/document/d/1f3jr3azlI7l_zajFb7lA7kjZvq9_IqakCpGZbxQ-b5c/edit?usp=sharing
- Masters for card sets
    - https://docs.google.com/document/d/1_Uw87-CXdpI_aycNvLAcVMJ6vpcRyDV9ifPFTwFqJjk/edit?usp=sharing

Directions

- Grouped in a manner consistent with your classroom. Make groups of 2 to 3 students.
- Students will receive a packet of the cards.
- Have students review the cards and see if there are any that they have questions about. On the carrot and caret these are not measurements. These are the easter eggs that don't fit in for measurements but are placed there to prompt discussion later on about karat, carat, caret, and carrot. Reference Marriam-Webster website. https://www.merriam-webster.com/words-at-play/usage-carat-vs-karat#:~:text=A%20carat%20is%20a%20unit,is%2018%2F24%20parts%20gold. If asked about one of the four words I would recommend these responses.
    - Carrot - the orange vegetable
    - Caret - a key on a keyboard
    - Karat - a measurement
    - Carat - a measurement
- Have students break up the measurements into different types of measurements. What they should be aiming for is Time, Weight, Temperature, Length, Area, and Capacity (or volume). They will find there are three blank cards they can write down a measurement they think is missing, they have heard, or are curious about. Have the students group the cards. Don't tell them how many groups or what type of groups they are making. See what they come up with.
- After they have grouped the cards, have each group explain how they grouped their cards. A variation of this could be a gallery walk and have one group member ask why a particular group is the way they did.
    - Are there any similarities to how groups grouped their cards?

    - Any cards that didn't fit? How did they deal with those cards?
    - Did everyone have them group the same?
- If they haven’t group the measurements by systems, have the students try to split the groups of types of measurements into groups that might indicate a system of measurement.
- Have the students go through and put the measurements in each grouping in order of smallest units to the largest unit.
- Have students go around and see that they all agree with the organizing of the units.
    - Looking at the arrangement of the units. Is there a common factor going from one unit up to the next one? What you should be trying to get the kids to think about is that in the US system there is not a consistent factor going from one unit to another where the metric system is base 10. Some units might be missing and this would be a good time to put the missing ones on the blank cards.
- Have students write on the cards an abbreviation of the unit. Encourage kids to use the conventions for the abbreviations.

Conclusion Questions

- What is the difference between the different types of measurements?
- Is there an easy way to determine which measurement belongs to which type of unit?
- Which system of measurement do you think it will be easier to convert between?

WAMC
Summer 2023

CORD Mathematics: A Contextual Approach to Geometry

Answers to Card sort of measurement types

System	Type of measurement					
	Time	**Temperature**	**Length**	**Area**	**Weight/Mass**	**Capacity/Volume**
US		Fahrenheit	Inch Foot Yard Fathom Mile Nautical mile Light year	Square inches Square feet Acre Square miles	Carat Ounce Pound Ton	Teaspoon Tablespoon Ounces cup Pint Quart Gallon Bushel
Metric		Celsius Kelvin	Millimeter Centimeter Decimeter Meter Dekameter Kilometer Light year	Square centimeter Square meter Square kilometer	milligram Centigram Gram Kilogram	Milliliter Centiliter Deciliter Liter Kiloliter
Not in systems	Seconds Minutes Hours Days Weeks Months Years Decades Centuries Millennium	carrot	caret			

WAMC Lesson Plan

Name(s): Christopher Beyrouty
Email Address: ChristopherB@WapatoSD.org
Lesson Title: V1C1 - US vs Metric measurements Card Sort
Date: June 22, 2022
Text: CORD Mathematics: A contextual Approach to Geometry
STEM Correlation: Engineering, Science
Lesson Length: 30 minutes

Big Idea (Cluster): Measurement	
Mathematics K–12 Learning Standards: A-SSE 4,	
Mathematical Practice(s): 3. Construct viable arguments and critique the reasoning of others.	
Content Objectives: Students will develop the vocabulary around the different types and systems of measurements	**Language Objectives (ELL):** Learn the vocabulary of measurements used in US system and Metric.
Vocabulary: measurement names associated with capacity/volume, length, area, weight/mass, temperature, time	**Connections to Prior Learning** building on the students' understanding of basic measurement names they are familiar with.
Questions to Develop Mathematical Thinking: ● What connections do you see between measurements that are proceeding or subsequent to a particular measurement? ●	**Common Misconceptions:** ● The US system is base 10 in nature. ●

Assessment (Formative and Summative):

- Formative assessment - Check to see which measurements the students are familiar with and which ones they need some explanations.

Materials:

- Card for card sort

Instruction Plan:

Introduction:
Today we are going to be reviewing and possibly learning some words associated with different types and systems of measurements.

Explore:
Divide the students into groups of 2 or 3 students. Give students a pack of cards and ask them to sort them into two piles, those words they are familiar with and those they are not familiar with.

Have students rely on each other to “define” the words they are not familiar with. We will wait on any “official” definition of the words. I do have a couple “easter eggs” in the deck of measurement.

When I observe students:

Students should be working together to divide the cards into groups. Students should be having discussions about what the groups should be and which measurements would go into those groups.

Questions to Develop Mathematical Thinking as you observe:

- Sort the cards into groups based on the type of measurements. What would you call each of the groups? Or what is the common "theme" for each group?
- Now sort the groups based on the system of measurement.
- Write the abbreviation for the measurements on the cards
- Sort the measurements from smallest to largest
- Pick a measurement, how many times larger is the one you picked vs the smaller measurement? Notate this on the card. Do this a total of 4 times for each type of measurement?
- Write down an example of how the measurement would be used
- Do you see any patterns or similarities or differences within the system and between the system of measurements?

Answers (to questions above):

- Common themes would be type of measurement; time, temperature, length, area, weight/mass, and capacity/volume.
- There should be two systems; metric and US. However students may struggle with where to put time. It could go in both or in neither arguing that it belongs to both.
- This is an opportunity to see which abriabtion they are familiar with and which conventions they are familiar with.
- the document linked here has the measurements grouped and placed in order. https://docs.google.com/document/d/1f3jr3azll7l_zajFb7lA7kjZvq9_IqakCpGZbxQ-b5c/edit?usp=sharing
- Relationships between measurements will vary depending on which ones students select. For the metric it should be a factor of 10. The US system would vary greatly.
- Answers for how the measurement could be used will vary depending on student experiences.
- Trying to get students to see that in metric it is a different prefix for the same base measurement for length, weight, and capacity.

Summarize:

At the end of this lab students should have an understanding of the unit of measurements and that they can be split into 5 basic areas. They also should be able to identify which measurements are associated with which systems.

Career Application(s):

- Construction, Engineering, Science related

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

☒ Global Awareness ☐ Financial/Economic/Business/Entrepreneurial Literacy ☐ Civic Literacy
☐ Health/Safety Literacy ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION
Creativity and Innovation
☒ Think Creatively
☒ Work Creatively with Others
☐ Implement Innovations
Critical Thinking and Problem Solving
☐ Reason Effectively
☐ Use Systems Thinking

INFORMATION, MEDIA & TECHNOLOGY SKILLS
Information Literacy
☐ Access and Evaluate Information
☐ Use and manage Information
Media Literacy
☐ Analyze Media
☐ Create Media Products

LIFE & CAREER SKILLS
Flexibility and Adaptability
☐ Adapt to Change
☐ Be Flexible
Initiative and Self-Direction
☒ Manage Goals and Time
☐ Work Independently
☐ Be Self-Directed Learners
Social and Cross-Cultural

Productivity and Accountability
☐ Manage Projects
☐ Produce Results
Leadership and Responsibility
☐ Guide and Lead Others

☒ Make Judgments and Decisions ☐ Solve Problems Communication and Collaboration ☒ Communicate Clearly ☒ Collaborate with Others	Information, Communications and Technology (ICT Literacy) ☐ Apply Technology Effectively	☒ Interact Effectively with Others ☒ Work Effectively in Diverse Teams	☐ Be Responsible to Others