UbD Template 2.0

Grade Level: 5th

Topic or Content Area: Measurement

Please list the Big Idea or Ideas: STEM

Stage 1 Desired Results	
ESTABLISHED GOALS	*Transfer*
Standard:	Students will be able to independently use their learning to…
NGSS 5-PS1-3. Make observations and measurements to identify materials based on their properties.	● Use Mathematics and Computational Thinking
	Meaning

CCSS-M	UNDERSTANDINGS ccc/dci	ESSENTIAL QUESTIONS- Label Facets
MP.4 Model with mathematics. 5.NBT.A.1 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. 5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems	*Students will understand that…* - How and when to use appropriate tools strategically - patterns happen when multiplying and dividing by a power of 10	1. How do we measure units in the USA vs World? 2. Where do we see measurements being used? 3. How do I choose the appropriate tool and unit when measuring? 4. How do you use weight and measurement in your life?
	Acquisition	
	Students will know…vocab - metric - length; meter, cm, mm, km	*Students will be skilled at…sci/eng practices*

	- Customary; inches, feet, yards, miles	● Planning and Carrying Out Investigations
	- convert	● Using Mathematics and Computational Thinking
	- powers of 10	● Reason abstractly and quantitatively
	- weight; lb, oz	
	- capacity; gallon, quart	● Model with mathematics

Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
- End of Unit Project	- Choose a business to design and must include all of the forms of measurements that were discussed throughout the unit (ex: Circus = how high the tight rope is (cm from the ground and X feet long, how many gallons of water needed to supply for animals, etc.)
- Exit slips	- At the end of each mini-lesson (length, width, capacity) provide an exit slip

- mini projects	- mini projects within each mini-unit
	- Gallon man, Monster project, boatloads

Stage 3 – Learning Plan
Summary of Key Learning Events and Instruction

5th

Session 1 US Length

● Discuss New unit

  ○ Project-based

  ○ Estimation

  ○ Converting

  ○ **Engage**:

    ■ How we measure units in **America vs World** (graphic organizer)

    ■ https://www.youtube.com/watch?v=7bUVjJWA6Vw

    ■ What do we know about Length (graphic organizer) graphic org

    ■ Have students interact on the smartboard with document

- - ■ Have examples of different tools we measure

  - Station work **Explore**

    - Station 1:

      - ■ Estimation Standard Length

        - Find your hand length, leg length, and arm span length

      - ■ Station 2

        - [Measuring around MV](#)

  - Groups

    - Review Ruler-[break down of ruler](#)

    - Extend word problems 'stoichiometry' (in-cm)
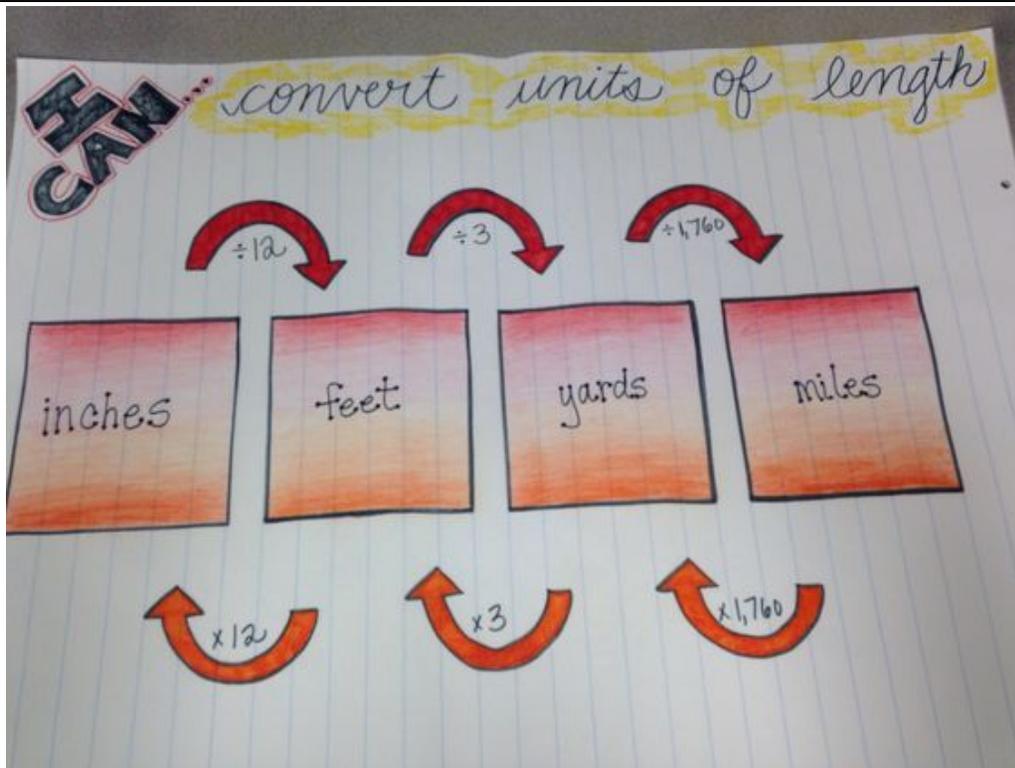
Session 2

- Work on Group projects

  - Practice presenting, have a model to display and discuss, make sure your checklist is complete

  - Station work

Session 3 US Weight

Explain

- Start with Length

    - Take notes on conversions

- Stations:

        - Rock, paper, scissors game

- Groups

    - inches to feet to yards conversion

    - **Extend** word problems 'stoichiometry' (in-cm)

- ■

- ■ **Evaluate** Practice problem

    - 546in _____ft?

    - 49 ft __in?

    - 4 yds__in?

Session 4 Capacity

- **Engage** https://www.brainpop.com/math/geometryandmeasurement/customaryunits/

- Review:

  - Review measurements of on chart paper

  - How do we measure weight in America? Fill in the chart from length. Running customary note taking sheet

    a. pounds, ounces, tons

    b. Talk about where do we see these measurements being used?

    c. Ask "which is the smallest unit? How many ounces are in a pound, how many pounds in a ton?"

    d. Display two bags full of sugar, one show 1lb the other showing 1oz

    e. Practice some conversions

- **Station Explore**

  - Sugar sheet measurement lab

- Group **Explain/Extent**

  - Practice problems conversion

  - Using scales (triple beam- call one group up at a time to practice and ounces/pounds)

Session 5

- **Engage** Whole class Gallon Man

- Station **Explore**

  - Inquiry-Based rice in cups

- Group **Explain**

  - Converting sheet

- Exit slip over customary units

Adding and Subtracting

- Customary Quiz **Evaluate**

Session 6 Metric Length

- Quiz corrections **90 minutes**

- How we measure units in math and sci (metric) (graphic organizer)

  - Pull small groups for test corrections

  - [measuring in m/s graphic organizer](#)

  - **Engage** Watch video altogether

  - Station 1

    - Watch the video and take notes https://www.flocabulary.com/unit/metric-system/

- - Station 2 **Explore** pokemon scavenger hunt

    - vocab. Builder (made this HW)

    - Station 3 Metric Mania converting sheet (notes altogether)

        - Flocab notes for practice **Explain**

- Metric weight

    - **Explore/Engage** Station 1

        - Metric Weight lab activity "boats"

        https://docs.google.com/document/d/1CoQJStiV0aPUdLN3ylJsV_IZTmjVZagvknD-fFQQ6ig/edit

- Volume lab (using graduated cylinders to find the volume of irregular shapes)

    - Station 2

        - **Layering liquids**

        - **https://www.jpl.nasa.gov/edu/teach/activity/tracking-water-using-nasa-satellite-data/**

            - **using graduated cylinders to track how many 'cm' of water was accumulated over time**

- **Session 7 Metric Olympics Extend/Eval**

- Power of ten mini-lesson https://www.themathpage.com/ARITH/multiply-by-powers-of-10.htm#q1

    - ONLY discuss what happens when you multiply vs divide by 10

- - Take notes using base ten blocks

    - Notes on the exponent and how it looks the same (for ext.)

  - Use metric KHD chart to apply

  - Discuss multi/divide with moving the decimal

Session 8

- Final test and begin a project

Resources

(n.d.). Retrieved July 17, 2019, from https://www.brainpop.com/math/geometryandmeasurement/customaryunits/

(n.d.). Retrieved July 17, 2019, from https://www.flocabulary.com/unit/metric-system/

TED-Ed. (2016, July 21). Retrieved July 17, 2019, from https://www.youtube.com/watch?v=7bUVjJWA6Vw

Tracking Water Using NASA Satellite Data Activity | NASA/JPL Edu. (2019, June 26). Retrieved from

https://www.jpl.nasa.gov/edu/teach/activity/tracking-water-using-nasa-satellite-data/

Extension Problems

1. A large bench is 7 1/2 feet long. It is 10 inches longer than a shorter bench. How many inches long is the shorter bench?

2. A girl's height is 3 1/3 feet. A giraffe's height is 3 times that of the girl's. How many inches taller is the giraffe than the girl?

3. Five ounces of pretzels are put into each bag. How many bags can be made from 22 3/4 pounds of pretzels?

4. Twenty servings of pancakes require 15 ounces of pancake mix. a. How much pancake mix is needed for 120 servings?

    a. Extension: The mix is bought in 2 1/2 -pound bags. How many bags will be needed to make 120 servings?

5. A large bench is 7 1/6 feet long. It is 17 inches longer than a shorter bench. How many inches long is the shorter bench?

69

6. A girl's height is 3 1/3 feet. A giraffe's height is 3 times that of the girl's. How many inches taller is the giraffe than the girl?
girl= 40in
giraffe=120

80in taller

7. Five ounces of pretzels are put into each bag. How many bags can be made from 22 3/4 pounds of pretzels?

22 ¾ lb = 22 and 12 oz
352 oz + 12 oz = 364
364/5 = 72

8. Twenty servings of pancakes require 15 ounces of pancake mix. a. How much pancake mix is needed for 120 servings?

90

a. Extension: The mix is bought in 2 1/2 -pound bags. How many bags will be needed to make 120 servings?

How do we measure units in USA?

Unit: Length	Unit: Weight	Unit:
Example: Inches (in) Feet (ft) Yards (yd) Miles (mi)	Example: Pounds (lb) Ounces (oz) Tons (T)	Example:
Tools: Ruler Yard stick Gps Fitbit	Tools: Scale Balance	Tools:

Scale on map Tape measurer (measuring tape)		
Conversions:	Conversions:	Conversions:

ESTIMATION Scavenger Hunt

Object	Best Tool	Estimation	Precise
longest length of a table			
Thumb to pinky			
Floor to ceiling			
Walking spand			

*Key

How do we measure units in USA?

Unit: Length	Unit: Capacity	Unit: Weight
Example: Feet, inches, miles	Example: Cup, pint, quart, gallon	Example: Ounces, pounds, tons
Tools: Yard stick Ruler Tape measure	Tools: Measuring cups Milk jugs	Tools: scale

Metric Conversion

Directions: In the first row, complete the acronym (letter) from the song we've been using for the metric system. In the second row, write what that letter actually stands for. In the third row, write the abbreviation typically associated with the word. In the last row, write the number associated with the word.

			Base Units			
			Unit			
			Abbreviation			
			Amount of Units			

Cup	Pints	Quarts	Gallons
8 oz = 1 cup	__ cups = 1 Pint	__pints = 1 quart	____ quarts = 1 gallon

1.How many ways can you make 2-gallons? List at *least* **TWO WAYS**. Use many different units of measure.

2. Mr. Jackson told Becky to bring at least 2 quarts of juice for the party. Becky brought 5 pints of juice. Did she bring enough?_____Explain.

3. Susan was using one cup to fill a gallon jug with water. The jug is 3 quarts full. How many more cups does Susan have to pour? _____ Explain how you know your answer.

TEAM INVESTIGATIONS CONVERTING CUPS, PINTS, QUARTS, AND GALLONS

Team Name: _____

Work independently to investigate and solve the following problems. Use your set of containers to check for accuracy. You must show all work and will not need to use a calculator.

1. 1 pt = _____c   11. 6 c = _____pt

2. 1 g = _____qt   12. 8 pt = _____qt

3. 1 qt = _____pt   13. 12 qt = _____g

4. 1 qt = _____c   14. 3 pt = _____c

5. 1 g = _____pt   15. 2 qt = _____pt

6. 1 g = _____c

7. 2 g = _____qt

8. 4 c = _____pt

9. 4 pt = _____qt

10. 8 qt = _____g

16. 3 qt = _____c

17. 6 pt = _____qt

18. 8 c = _____pt

19. 16 pt = _____g

20. 32 c = _____g

STATION 2

A:

Using the yard stick provided (1 yard stick only), measure the distance from Mrs. Clark's classroom to the UI Library.

1. About how many yard sticks is one trip? _____

2. Convert this unit into feet. Show all work

    _____ yards = _____feet

3. **Challenge Question**: How many times would you have to walk this distance to walk one mile? Show all work
    _____.

B:

Using the yard stick provided (1 yard stick only) measure the distance from Mrs. Clark's smartboard to the Biodiversity sign.

4. How many yard sticks is one trip? _____

5. Convert this unit into feet. Show all work

_____ yards = _____feet

6. **Challenge Question**: How many times would you have to walk this distance to walk one mile? Show all work

_____

C: EXTRA (IF, you have time)

Using the yard stick provided (1 yard stick only), measure the distance from Mrs. Clark's outside cabinet to the Primary outside cabinet.

7. How many yard sticks is one trip? _____

8. How many yards is one trip?_____

9. Convert this unit into feet. Show all work

_____ yards = _____feet

10. **Challenge Question**: How many times would you have to walk this distance to walk one mile? Show all work

_____.

D: EXTRA (IF, you have time)

Using the yard stick provided (1 yard stick only), measure the distance from the spanish room to the first entrance of the cafeteria.

11. How many yards is one trip?_____

12. Convert this unit into feet. Show all work

   _____ yards = _____ feet

13. **Challenge Question**: How many times would you have to walk this distance to walk one mile? Show all work
   _____.

Directions:

1. Research the nutritional facts of your favorite drink on a chromebook to figure out how many grams of sugar are in one serving size.
   a. **For example**: 12 ounce pepsi bottle = 41 grams of sugar
2. Write your prediction: "If I drink one ____ every day, I will have consumed _____ pounds of sugar in one year"
3. Print this paper after inserting your images
4. Use the provided scale to measure out the correct number of sugar. Press the "unit" button on the scale until the units are in customary ounces.
5. Record the number of ounces of sugar on your table
6. Complete the table to understand **"If I drink ___ amount sugar every day, how many pounds of sugar will I consume in one year"**

Picture of drink	Picture of Nutritional Facts	Hypothesis/Prediction
		"If I drink one can of pepsi (41g) = (13 oz) every day, I will have consumed 10 pounds of sugar in one year"

*Round to the tenth place

Container name: Pepsi	Size of drink: 41 g	How many kilograms of sugar in 1 year	Size of drink: _____oz	How many pounds of sugar in 1 year
Number of days	Sugar consumed (g)	Sugar consumed (Kg)	Sugar consumed (oz)	Sugar consumed in (lbs)
1	41g	41g = ___kg Divide 1000	13	
2	41 X 2=		13 X 2= 26 oz	
3	41 X 3 =		13 X 3 = 39oz	
4				

5 (1 school week)				
10 (2 school weeks)				
20 (1 month in school)				
180 days (1 year in school)				
365 days in a year				

Conclusion:

Boat Loads Lab
(Finding metric weight)

Directions: With a partner, use aluminum foil to construct one boat hull, and then compare your data with another group that has a different size or shape. Add pennies to determine how much load your boat can hold. Next, use the scale to determine how many grams your boat could hold. After you find your density, create a hand graph using graph paper!

Boat hull	Volume (in cm³) LxWxH	Number of beans it Supported	Weight it Supported (in grams)	Density Before Sinking (D=M/V) (in grams per cm³)
1 (your data)				
2 (find a classmates data)				
3 (find a classmates data)				

1. **Create a bar graph for the volume, weight, or density (your choice)**
   a. Write a conclusion comparing the size of the boat vs the amount of weight the boat can support.
2. **Which is larger?**
   a. Circle your choice for each one.

1 Pound or 100 Grams   1 Kilogram or 1 Pound   1 Ounce or 1000 Milligrams

87 g = _____ mg

19.7 kg = _____ mg

1978.33 mg = _____ kg

3. The base unit of mass in the metric system in the _____ and is represented by _____.

4. Which is larger? Circle your choice for each one.

1 kilogram or 152.99 grams   129.7 milligrams or .7 kilograms

126.0 milligrams or 1 gram   4 kilograms or 45.03 grams

● Tomas dropped off two packages to be shipped. One packaged weighed 1.38 kilograms and the other package weighed 720 grams. What was the total weight of the packages in grams? Show all work.

● Apples sell for £2.10 for 1 kg in London. How much will 500g of apples cost in London?
   ○ **Challenge, replace the problem with standard units (units we use in USA):
      ■ if 1 Kg = 2.2lbs

- - £1 euro = $1.15
  - Which country is cheaper? If a 2lb bag of apples cost $2.99 at Kroger?

- Glue costs $199.00 per gram. If you needed 5 kg of glue, how much will it cost?
  - Later on, you began with 5 kg of glue, but used up 3 kg and 400 g of glue. How much glue will you have left for you next project?

1. Brandy solved to find $8*10^2$. In your own words what did she do?

[blank box]

2. Aiden earned $5.00 for each lawn that he mows. There are 10 lawns in a neighborhood. If he mows the lawns of 10 neighborhoods, how much money will he earn? Write an expression using exponents of 10 to show how much he earned for mowing 10 lawns, and then in 10 neighborhoods. How much did he earn in 10 neighborhoods? Justify your answer.

[blank box]

3. How many seconds are there in a year?

4. How many walking paces are there approximately as you walk down Main Street (0.25 miles)? (1 mile = 5280 feet; 1 foot = 12 inches; 22 inches = 1 walking pace)

5. How many **feet** are between the first and second story of a building (1 story)?
(1 story = 3.33 meters; 100 centimeters = 1 meter; 1 inch = 2.54 cm; 1 foot = 12 inches)

6. How many decades are equal to 17 billion minutes?
 (60 min = 1 hour 24 hours = 1 day 7 days = 1 week 52 weeks = 1 year 10 years = 1 decade)

7. The amount of oxygen required to burn propane varies directly as the amount of propane to be burned. If 272 grams of oxygen is required to burn 75 grams of propane, how much oxygen is required to burn 130 grams of propane?

8. A plane averaged 352 miles per hour on a trip that lasted 3¾ hours. How far did the plane fly? (distance = rate * time)

9. According to the graph, one gallon is approximately how many liters?
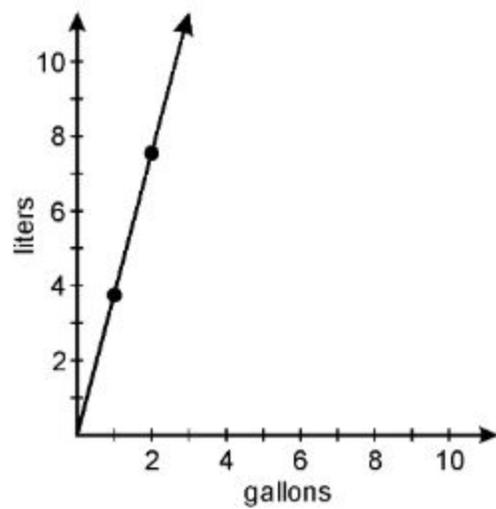
DIrections: Show all work for each answer and try your best!!

1. Complete the table.

| |
|---|
| _____ inches = 1 foot |
| _____ inches = 1 yard |
| 3 feet = _____ yard |
| _____ feet = 1 mile |
| _____ yards = 1 mile |

    a. List the customary units of length in order from least to greatest.

2. How many yards is 13 feet of fabric?

3. Use <, > or = to make a true comparison.
    a. 600 ft _ 1 mile

4. Alvin is 5 feet 10 inches tall. How many inches tall is Alvin?

5. **Extension Challenge Problems (A-B)**
   a. Mr. Jones bought 1 yard of rope. He used 24 inches of the rope to tie down the trunk of his car. What fractional part of the rope did he use?

   b. Subtract 8 yd 1 ft 10 in. from 16 yd 2 ft 3 in.

6. What is the length of AB in millimeters?

A   B
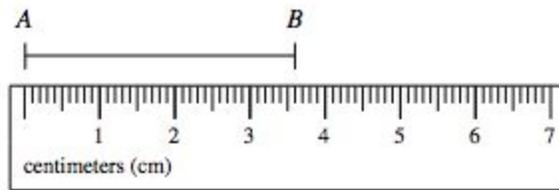
centimeters (cm)

   a.

7. 3,000 meters is equivalent to: _____?

8. 4200 m = _____km

9. Jose cut 1-meter board into ve equal pieces. How long is each piece in centimeters?

10. _____ lb = 3 tons   24 oz = _____ lb

11. The holiday tin contains 48 ounces of cookies. How many pounds is this?

12. Maggie bought 3 lb 2 oz of bananas, 2 lb 3 oz of grapes and 8 lb 10 oz of peaches for a fruit salad. What was the total weight of the fruit that she bought?

13. 17000 mg = _____g

14. An average size apple has a mass of 160 g. How many apples will there be in a 3.2 kg container of apples?

15. Sherry cleaned out her refrigerator after a party. She noticed that there were 16 quarts of apple juice left. To conserve space, Sherry will pour the apple juice into gallon sized containers.
    a. How many gallon sized containers will hold the apple juice?

16. A can of soda contains 354 milliliters. How many cans would it take to get at least a liter?

17. A bottle of olive oil contains 500 mL. How many liters does the bottle contain?

18. Fran made a super chocolate milk shake with 2 pints of Double Chocolate Ice Cream and 1 pint of chocolate milk. What is the smallest container she could put the shake in would have to hold at least how much?