Magic conversion application

Big Idea: Design Conversion application that depends on mathematics operations to convert between different types of measuring units.

Design Challenge:

Everyone in our Applied Measurements office has this engineering unit conversion calculator on their computer. It proves invaluable time and again when an exact conversion from one set of engineering units to another is required quickly. In addition to length, mass, volume and distance, there are a wealth of other things that it can convert including temperature and computer bits & bytes!

Instructions

A unit is a measurement of a quantity that is defined or adopted by tradition or law. Other quantities can be expressed as a multiple of the unit.

In human history, various unit systems were developed and used in different regions and cultures. Currently, the global standard of measurement is the International System of Units (SI), which is a modern form of the metric system. Although SI is intended for global use, it has not been fully adopted, and some other systems of measurement are still used in parts of the world.

1

Understand

- What is a conversion?
- Why are conversions important?
- How will you learn how to convert between measuring units ?

STEAM integration

Math : Mathematics conversions

Science : Measuring units - Measuring tools

Technology: Design Application - Programming - Scratch App

Art : Design conversions set using recycled carton

mathematics conversions practice

Q.1

Q.2

Q.3

Q.4

Describe your steps:

_____
_____
_____
_____
_____
_____

Q.5

Q.6

1

Understand

- What are the programms that you will use to design the app?

- What is a storyboard?
- What things should you have in a storyboard?

2

Define

- What specifics do you need to focus on to complete your project?
- What will you consider a success?
- How will you embed the math skills into the design of your app?

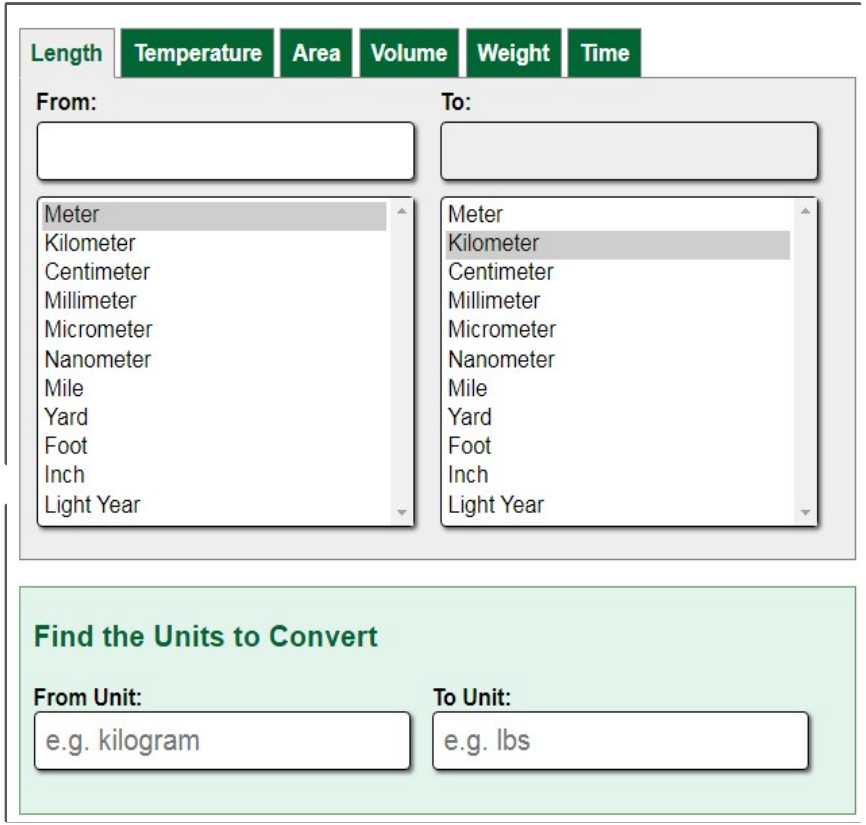
4

Ideate

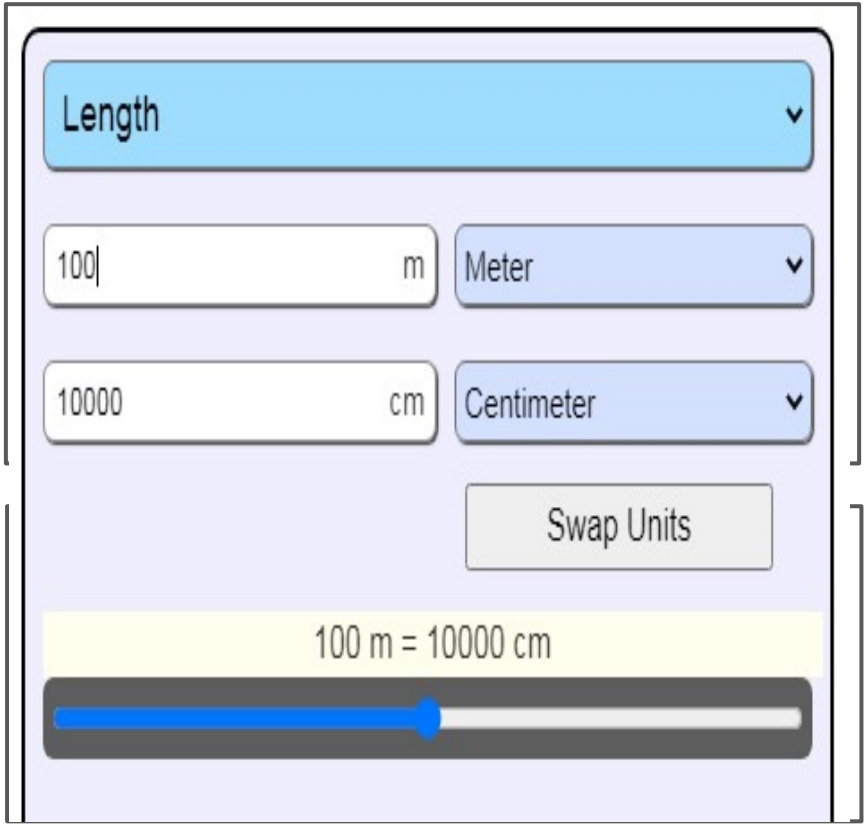
- What are the different ways you can design your app?
- How will you embed the math into your app?
- Use the Ideate templates to come up with two to four different ways to design your app.

4 Ideate

Idea 1

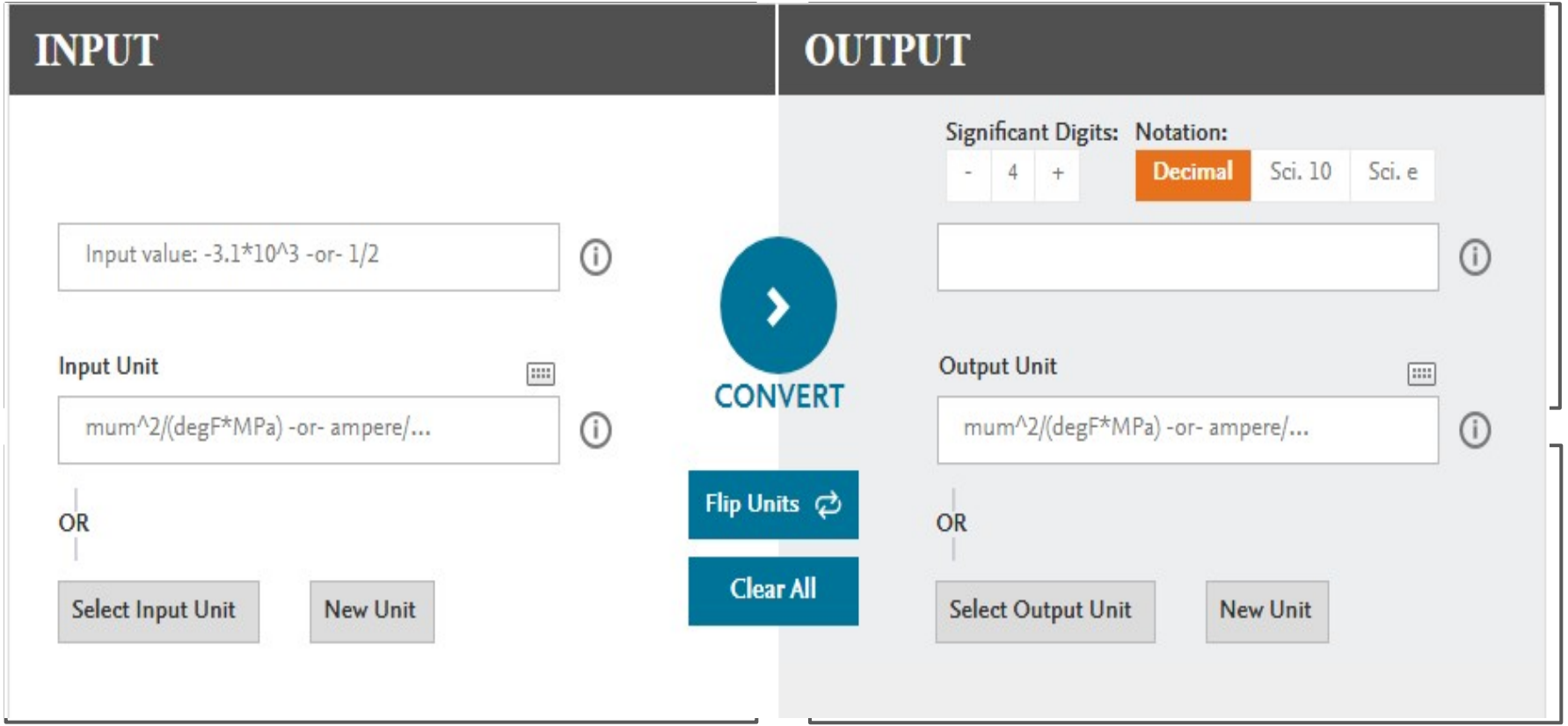


Idea 2



4 Ideate

Idea 3



Measurement :-

You make a measurement every time when you

1- Measure your height.
2- Read your watch.
3- Take your temperature.
4- Weigh a cantaloupe.

Measuring tool :-

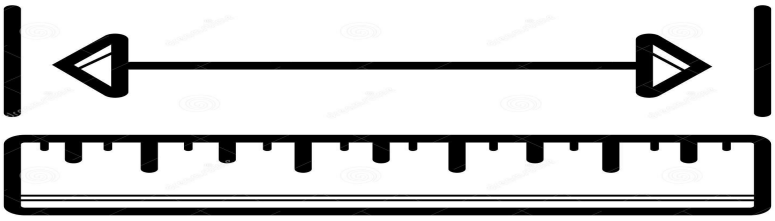
a measuring tool is used to compare some dimension of an object to a standard.

Stating a Measurement

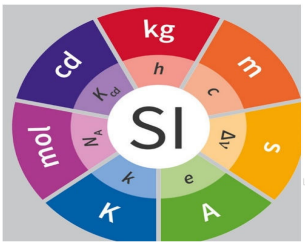
In every measurement, a **number** is *followed* by a **unit**

Observe the following examples of measurements:

Number and Unit	
35	m
0.25	L
225	lb
3.4	hr



The 7 Basic Fundamental SI Units



Physical Quantity	Name of Unit	Abbreviation
Mass	kilogram	kg
Length	meter	m
Time	second	s
Temperature	kelvin	K
Electric current	ampere	A
Amount of substance	mole	mol
Luminous intensity	candela	cd

Length Measurement

Length

is measured using a meter stick.

uses the unit of **meter (m)** in both the metric and SI systems.

Inches and Centimeters

The unit of an inch is equal to exactly 2.54 centimeters in the metric (SI) system.

1 in. = 2.54 cm

Volume Measurement

Volume

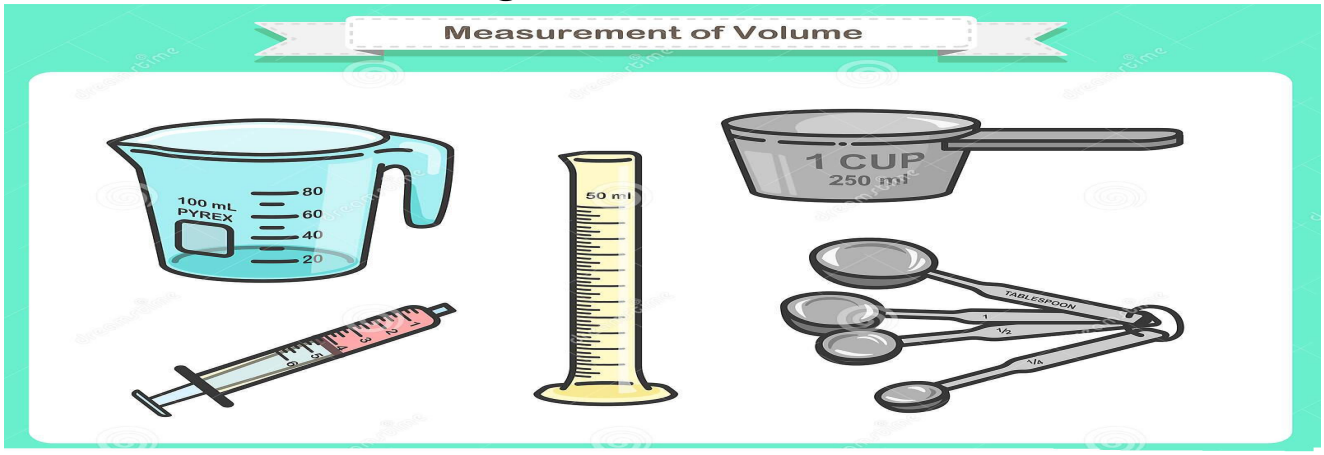
is the space occupied by a substance.

uses the unit **liter (L)** in metric system.

1 L = 1.057 qt

uses the unit **m^3(cubic meter)** in the SI system.

is measured using a graduated cylinder.



Mass Measurement

The **mass** of an object is the quantity of material it contains.

is measured on a balance.

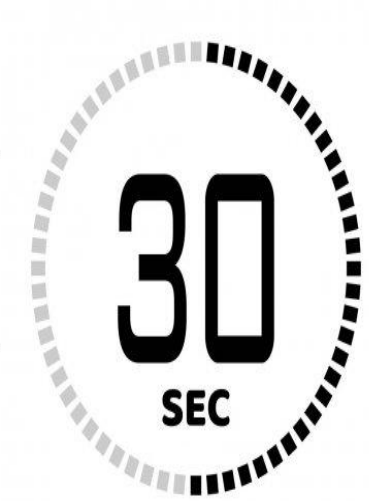
uses the unit **gram (g)** metric system.

uses the unit **kilogram (kg)** in the SI system.

Time Measurement

Time measurement uses the unit **second(s)** in both the metric and SIsystems.

is based on an atomic clock that uses a frequency emitted by cesium atoms.



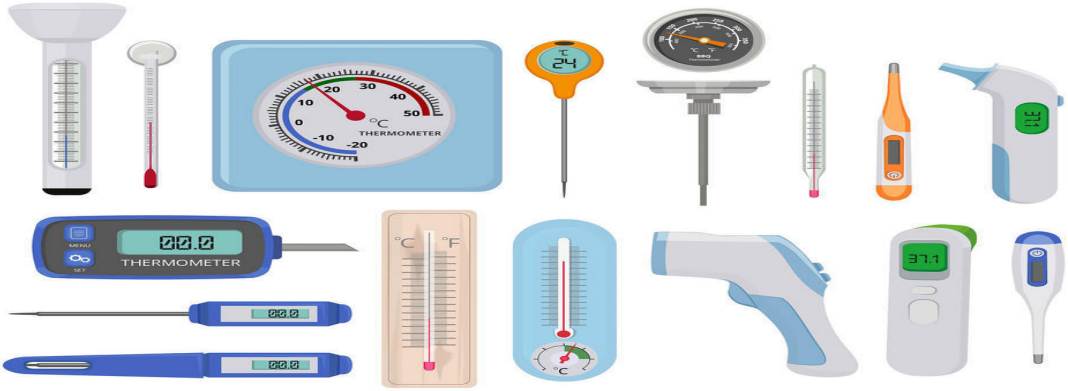
Temperature Measurement

The **temperature** of a substance indicates how hot or cold it is.

is measured on the **Celsius(°C)** scale in the metric system.

on this thermometer is 18ºC or 64ºF.

in the SI system uses the **Kelvin (K)** scale.



Common SI Units

Measurement	Unit	Symbol	Equivalents
Length	1 millimeter 1 centimeter 1 meter 1 kilometer	mm cm m km	1000 micrometers (µm) 10 millimeters (mm) 100 centimeters (cm) 1000 meters (m)
Area	1 square meter 1 square kilometer	m^2 km^2	10 000 square centimeters (cm^2) 1 000 000 square meters m^2)
Volume	1 milliliter 1 liter	mL L	1 cubic centimeter (cm^3 or cc) 1000 milliliters (mL)
Mass	1 gram 1 kilogram 1 ton	g kg t	1000 milligrams (mg) 1000 grams (g) 1000 kilograms (kg) = 1 metric ton
Time	1 second	s	
Temperature	1 Kelvin	K	1 degree Celsius (°C)

Metric Conversion Tables

When You Know	Multiply by	To Find		
		When You Know	Multiply by	To Find
inches	2.54	centimeters	0.394	inches
feet	0.3048	meters	3.281	feet
yards	0.914	meters	1.0936	yards
miles	1.609	kilometers	0.62	miles
square inches	6.45	square centimeters	0.155	square inches
square feet	0.093	square meters	10.76	square feet
square yards	0.836	square meters	1.196	square yards
acres	0.405	hectares	2.471	acres
square miles	2.59	square kilometers	0.386	square miles
cubic inches	16.387	cubic centimeters	0.061	cubic inches
cubic feet	0.028	cubic meters	35.315	cubic feet
cubic yards	0.765	cubic meters	1.31	cubic yards
fluid ounces	29.57	milliliters	0.0338	fluid ounces
quarts	0.946	liters	1.057	quarts
gallons	3.785	liters	0.264	gallons
ounces	28.35	grams	0.0353	ounces
pounds	0.4536	kilograms	2.2046	pounds
tons	0.907	metric tons	1.102	tons

When You Know		
Fahrenheit	subtract 32; then *divide* by 1.8	to find Celsius
Celsius	multiply by 1.8; then *add* 32	to find Fahrenheit

5

Prototype

- Choose your one best idea from the Ideate phase and create it using the game storyboards.
- Why did you choose this version over others? What do you like about this version?

STEM Lesson Checklist

	Self-Assessment - Developing (1) - Satisfactory (2) - Outstanding (3)
1. Aligned to Grade-Level Standards The lesson is aligned to appropriate state and/or national math, science, technology, and engineering standards.	
2. Multidisciplinary A true STEM lesson must integrate science, technology, engineering, and mathematics.	
3. Addresses Authentic Challenges The lesson presents students with real-world challenges or problems with practical and meaningful implications.	
4. Integrates 21st Century Skills The lesson encourages students to develop creativity, critical thinking, problem solving, and teamwork.	
5. More Than One Solution The lesson includes problems or challenges that have more than one possible solution.	
6. Uses the Engineering Design Process Any design, construction, or prototyping follows the steps of the engineering design process.	
7. Hands-On The lesson encourages hands-on manipulation of technology or materials to solve a problem or engineer a design.	
8. Integrates Technology The lesson incorporates technology is a way that is seemly and appropriate, simplifying rather than complicating the lesson.	
Overall Score	