

20.1 Measure & Convert

Dimensional Analysis Lab



What you'll learn ...

Length, time, volume, and mass can be written in scientific notation. Also, the SI system is useful when converting units of measure.

What you'll do ...

Make basic measurements using standard units of measure: meter, second, liter, and gram. Rewrite measured values in scientific notation. Then convert the rewritten values into other units of measure.

Things you'll need ...

Meter stick, stop watch (or, timer), graduated cylinder, scale, and a calculator for computing averages. (Also, blocks, water, and pencil).

Other considerations ...

When using the graduated cylinder, pay attention to the meniscus. A meniscus occurs because of surface tension in the liquid and must be read at eye level. For a concave meniscus, the correct volume will be read at the bottom of the curve.

SI system prefix table

kilo	k	1000	10^3
hecto	h	100	10^2
deca	da	10	10^1
(none)	(none)	1	10^0
deci	d	0.1	10^{-1}
centi	c	0.01	10^{-2}
milli	m	0.001	10^{-3}

Examples of scientific notation

Decimal notation	Scientific notation
2	2×10^0
300	3×10^2
4,321.768	$4.321\ 768 \times 10^3$
-53,000	-5.3×10^4
6,720,000,000	6.72×10^9
0.2	2×10^{-1}
0.000 000 007 51	7.51×10^{-9}

https://en.wikipedia.org/wiki/Scientific_notation

Science Concepts

Before starting, read and summarize each paragraph below.

The length of things in science is usually written in meters (m). Often, the numbers are written in scientific notation. The reason lengths are stated in meters is to make comparisons easy. Scientific notation can also make comparisons easier.

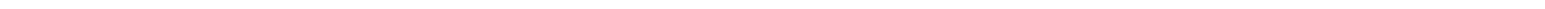
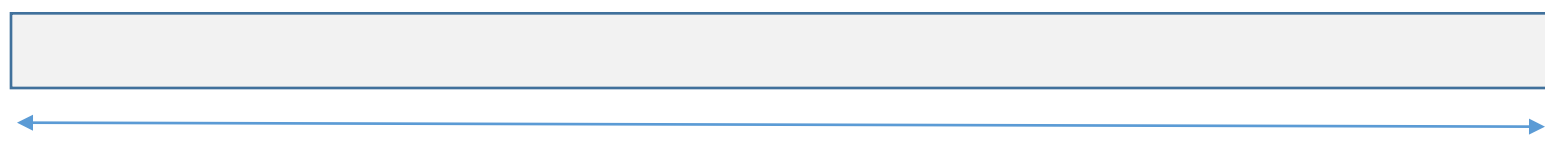
The measurement of meters is one of the important standardized measurements in the SI system. Using a prefix in front of the word “meter” is a convenient way to talk about really long things, or really short things. For example, centimeters are $1/100^{\text{th}}$ of a meter.

Review the “SI system prefix table” on the previous page. The prefix “centi” can be placed in front of any of the four measurement types in this activity: meter, second, liter, and gram. A centimeter is $1/100^{\text{th}}$ of a meter. A centiliter is $1/100^{\text{th}}$ of a liter. (And so on ...)

The prefixes “deci” and “deca” are very easy to confuse. The prefix “deci” means $1/10^{\text{th}}$... whereas “deca” means 10 times.

- If something is 5 meters long, then it is 50 decimeters long.
- That same object would be measured as 0.5 decameters.

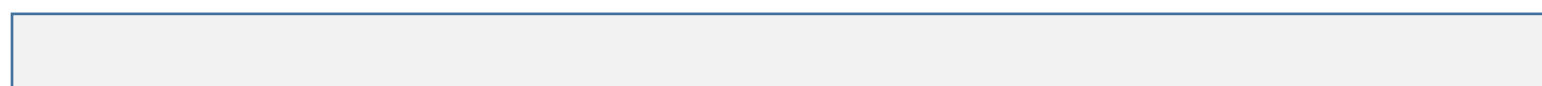
Step-by-Step Practice



The illustration above is a *pretend* unit of measure.
It is “1 Keota” long.

If something were twice as long as this it would be 2 Keotas.

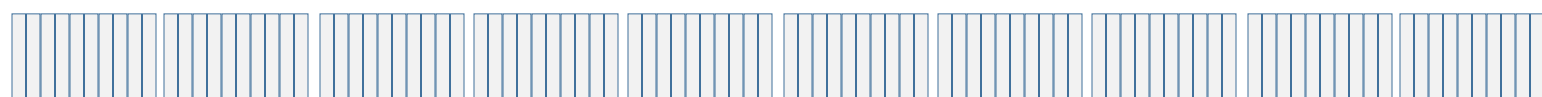
Using prefixes from the first page



This is 1 Keota

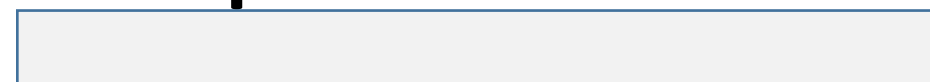


This is 10 deciKeotas



This is 100 centiKeotas

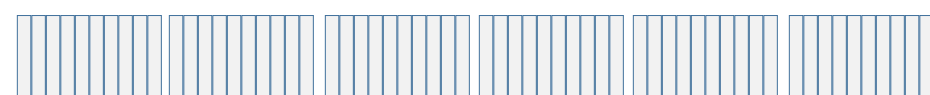
Example



This is 0.6 Keotas

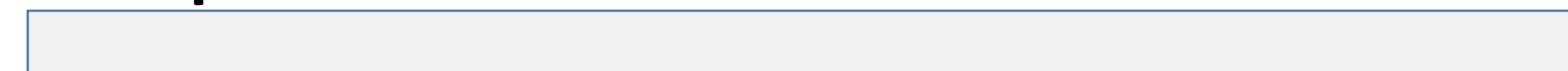


This is 6 deciKeotas



This is 60 centiKeotas

Example



This is 1.2 Keotas



This is 12 deciKeotas



This is 120 centiKeotas

Fill in the blanks

 This is ____ Keotas

 This is ____ deciKeotas

 This is ____ centiKeotas

Fill in the blanks

 ____ Keotas

 ____ deciKeotas

 ____ centiKeotas

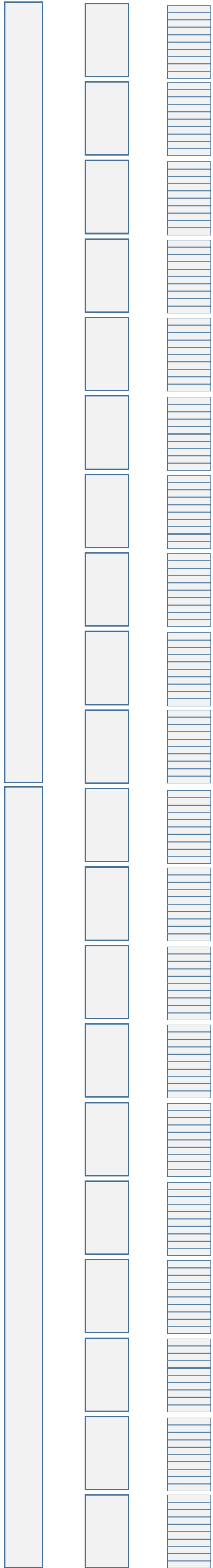
Step-by-Step Practice

Example

This is 2 Keotas

This is 20 deciKeotas

This is 200 centiKeotas

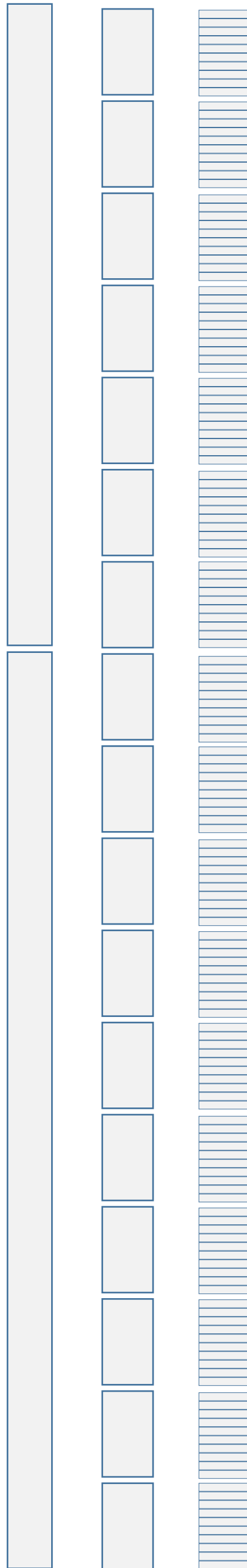


Fill in the blanks

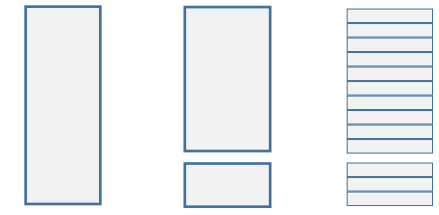
This is _____ Keotas

This is _____ deciKeotas

This is _____ centiKeotas



Fill in the blanks



This is _____ Keotas

This is _____ deciKeotas

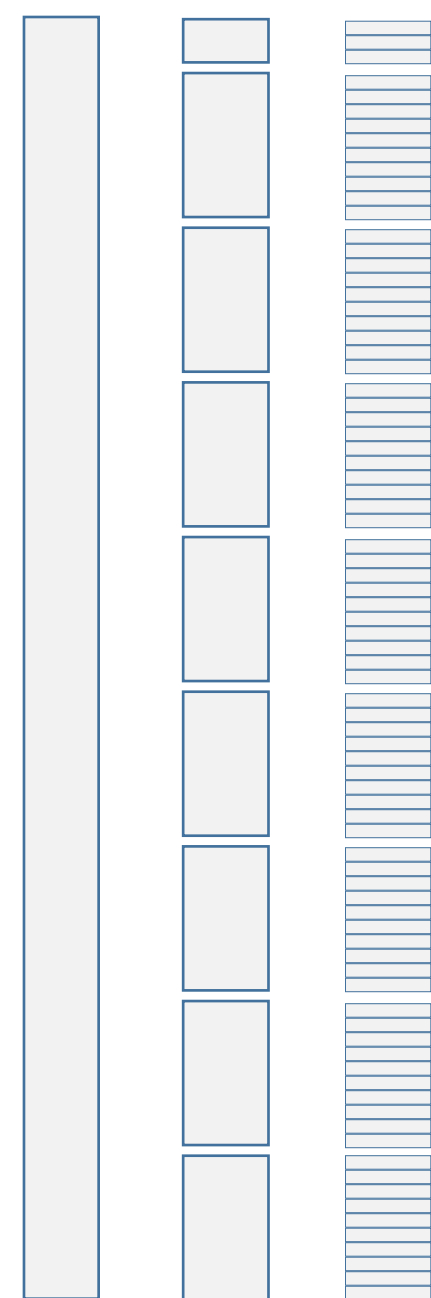
This is _____ centiKeotas

Fill in the blanks

This is _____ Keotas

This is _____ deciKeotas

This is _____ centiKeotas



More Practice



On this page, practice using the prefixes “deci” and “centi” with the SI units of meters, seconds, liters, and grams.

If something is 1 meter long, how many decimeters is that object?

_____ decimeters. *Remember there are 10 decimeters in each meter.*

If something is 2 meters long, how many decimeters is that object?

_____ decimeters.

If a liquid is 1 liter, how many deciliters is that fluid?

_____ deciliters.

If a liquid is 5 liters, how many deciliters is that fluid?

_____ deciliters.

If you take 1 second to sneeze, how many deciseconds is the sneeze?

_____ deciseconds.

If you take 1 second to sneeze, how many centiseconds is the sneeze?

_____ centiseconds.

If the mass is 80 grams, how many centigrams is it?

_____ centigrams.

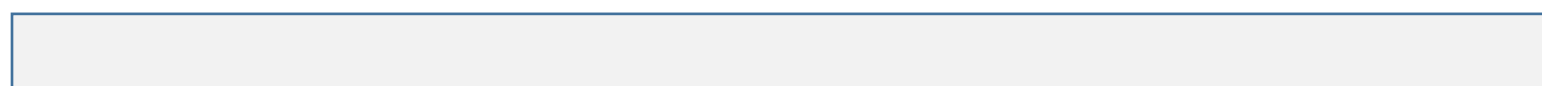
Using Scientific Notation



If the figure above is 1 Keota long, measured in centiKeotas, it would be 1×10^2 centiKeotas (using scientific notation).

Remember that 10^2 is 10 multiplied by itself twice (10×10).

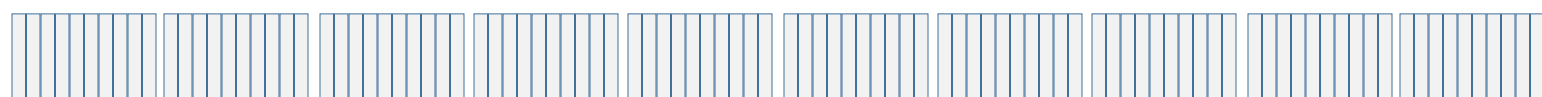
Compare this to the “step-by-step” practice page



This is 1 Keota

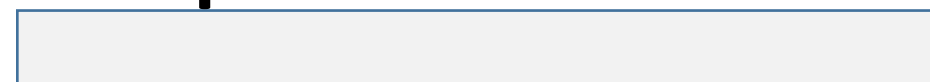


This is 1×10^1 deciKeotas



This is 1×10^2 centiKeotas

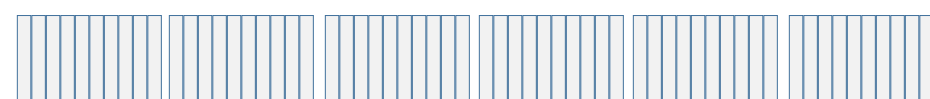
Compare this to the “step-by-step” practice page



This is 6×10^{-1} Keotas

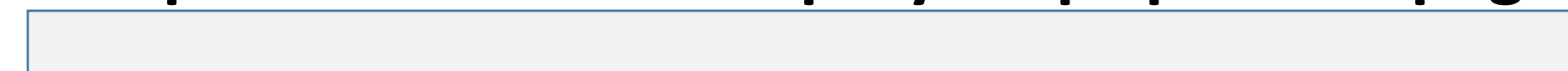


This is 6 deciKeotas



This is 6×10^1 centiKeotas

Compare this to the “step-by-step” practice page



This is 1.2 Keotas



This is 1.2×10^1 deciKeotas



This is 1.2×10^2 centiKeotas

Fill in the blanks using scientific notation

 This is _____ Keotas

 This is _____ deciKeotas

 This is _____ centiKeotas

Now Do This!



Write all answers in scientific notation.

Use no more than three decimal places in the final answer.

Measure the length of the whiteboard

_____ centimeters (cm)

_____ hectometers (hm)

_____ kilometers (km)

Average Height of Group Members

_____ centimeters (cm)

_____ millimeters (mm)

_____ dekameters (dam)

Time to say the alphabet backwards

_____ seconds (s)

_____ hectoseconds (hs)

_____ milliseconds (ms)

Height of tower (Build for 30 seconds, then measure the height)

_____ meters (m)

_____ hectometers (hm)

_____ decimeters (dm)

Volume of water in Graduated Cylinder

_____ milliliters (mL)

_____ dekaliters (daL)

_____ kiloliters (kL)

Mass of a pencil or pen on Scale

_____ grams (g)

_____ kilograms (kg)

_____ milligrams (mg)

