**Words to Know**

*Fill in this table as you work through the lesson. You may also use the glossary to help you.*

**Lesson Question**



**?**

**W**

**2K**

.

**Perform** metric system

temperature.

of the

and

metric system.

length,

mass, volume, and

**Identify** the

**Explain** how things are measured using the

.

**Lesson Goals**

|  |  |
| --- | --- |
| International System of Units (SI) | the modern form of the ; units  of measurement built around seven base units |
| length | the distance from one to another |
| mass | the amount of in an object |



**2K**

**W**

.

* communicating

.

* providing

.

* collecting

.

* performing

.

* asking a

**Scientific Inquiry**

Scientific inquiry involves:

|  |  |
| --- | --- |
| meniscus | the upper surface of a column of liquid |
| temperature | a measure of the average of the  particles in a substance |
| Volume | the amount of an object takes up |

**Slide**

.

and

* SI units are

for measurements.

* Science uses the

(SI).

* It uses the

in 1799.

**The Metric System**

* The metric system originated in

**Comparison of Units**

•

is the distance from one point to another.

•

is the amount of space an object takes up.

•

is the amount of matter in an object.

•

is a measure of the average kinetic energy of the

particles in a substance.

*Fill in the missing information in the table.*

**2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **SI Unit** | **Symbol** | **English Unit** |
|  | meter |  | yard or foot |
| volume |  | L |  |
| mass | gram |  |  |
|  | degrees Celsius | °C | degrees Fahrenheit |
| kelvins |  |

**2**

**7**

**Metric Unit Conversions**

**Convert to a smaller unit by**

**.**

**Convert to a larger unit by**

**.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **kilo** | **hecto** | **deca** | **base unit** | **deci** | **centi** | **milli** |

**Slide**

**The Metric System: Multiples of 10**

*Fill in the missing information in the table.*

To remember the order of prefixes and base units, you can use this memory device:

**K**ing **H**enry **D**ied **B**y **D**rinking **C**hocolate **M**ilk.

|  |  |  |
| --- | --- | --- |
| **Prefix** | **Symbol** | **Multiple of 10** |
|  | k | 1,000 |
| hecto- |  | 100 |
| deca- | da |  |
| base unit |  |  |
| deci- | d |  |
|  |  | 0.01 |
| milli- | m |  |

**Slide**



mm

5.64 cm =

Here is another way to convert centimeters to millimeters. Since we are multiplying by 10, we can simply move the decimal place to the right one space (making the

number larger). We move it one space because the number 10 contains one zero.

= 5.64

5.64 ×

5.64 cm =

.

* Select the multiple of 10. In this example, the multiple is

.

* Decide whether to multiply or divide. In this example, you will

**Metric Unit Conversions**

**Example: Convert from a Larger Unit to Smaller Unit**

Convert 5.64 centimeters to millimeters.

**7**

**9**

We can move the decimal place to make this conversion. Since we are dividing by 1,000, we can move the decimal place to the left three spaces (making the number

smaller). We move it three spaces because the number 1,000 contains three zeros.

= 0.0253

25.3 g ÷

.

* Select the multiple of 10. In this example, the multiple is

.

* Decide whether to multiply or divide. In this example, you will

**Metric Unit Conversions**

**Example: Convert from a Smaller Unit to Larger Unit**

Convert 25.3 grams to kilograms.

**Slide**

## Metric Unit Conversions

**Example: Convert from a Smaller Unit to Larger Unit**

Convert 91.7 kilowatts to milliwatts.

* To convert from a larger unit to smaller unit, we .

**Step 1:** Convert to the base unit first.

* To convert from kilowatts to watts, multiply by .
* The number 1,000 has zeros.
* We are converting a larger unit to a smaller unit, so the decimal will

move to the right three places.

* 1. kilowatts = 91.7 ×

# = 91,700

**Step 2:** Convert from the base unit to the smaller unit.

* + - To convert from a larger unit to smaller unit, we .
    - To convert from watts to milliwatts, again multiply by 1,000.

91,700 watts = 91.700 ×

# = 91,700,000

**11**

These two steps can be done as one. Multiplying by 1,000 twice means you

have six zeros. So the decimal place will move six places to the right.

91.700 kilowatts = 91.7 × × 1000 = mw

[Meter stick]

**14**



cm long.

The line is

*Circle the “0” mark on the ruler.*

mark on the ruler.

the edge of the object with the

•

units.

* Whenever possible, use

**Measurement with a Ruler**

**Slide**

**Measurements of Length**

Length can be measured using:

* Ruler

•

* Micrometer

•

**Slide**

balance

•

* Electronic

balance

•

**Measurements of Mass**

Mass can be measured using:

**16**

the object on the pan.

of

sliders to find the

the numbers from the

4.

marker.)

mark. (Always start with the

until the pointer rests at the

3. Move the sliders

.

2. Place the object on the

when the pan is empty.

so the balance reads

to the far

1. Move the

**Triple-Beam Balance**

**18**

* Buret

and volumetric

* Pipette

•

cylinder

•

**Measurements of Volume of a Liquid**

The volume of a liquid can be measured using:

of water measures the volume of irregular solids.

* The

of the meniscus.

* Measurement is taken at the

.

* Liquid forms a concave

**Graduated Cylinder**

**Slide**

.

**Measurements of Volume of a Solid**

* The volume of a regular solid is measured using a
* The volume of an irregular solid is measured using

.

* + The irregularly shaped solid is placed into a known volume of water, and the volume change of the water is observed.
  + The change in volume is equal to the volume of the solid.

**Slide**

thermometer

•

* Liquid

The temperature can be measured using:

**Measurements of Temperature**

**20**

.

* Measure in degrees

.

* Do not use for

.

* Keep the bulb away from

the bulb in the liquid.

* Completely

.

* Handle carefully to prevent

**Thermometer**

How are things measured using the metric system?

**Lesson Question**

**Slide**

**2**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **King** | **Henry** | **Died** | **By** | **Drinking** | **Chocolate** | **Milk** |
| **Prefix** |  | hecto- |  | base unit |  | centi- |  |
| **Symbol** | k |  | da |  | d |  | m |
| **Multiple of 10** |  | 100 |  |  |  | 0.01 |  |

**?**

**Review: Key Concepts**

* Science uses the

system for measurements.

*Complete the table by writing the metric prefix represented by each word in the mnemonic device. Then write the symbol and multiple of 10 that each prefix*

*represents.*

**Answer**

**Slide**

## Review: Key Concepts

*Complete the table by writing the missing Properties, SI Units, and Common Measuring Devices.*

**2**

|  |  |  |
| --- | --- | --- |
| **Property** | **SI Unit** | **Common Measuring Device** |
| length |  | ruler |
|  | liter |  |
| mass |  | triple-beam balance |
|  | degrees Celsius |  |
| kelvins |

*Use this space to write any questions or thoughts about this lesson.*