

CHAPTER 1

EXPLORING PHYSICAL SCIENCE

I. WHAT IS SCIENCE?

- WHAT DO SCIENTISTS DISCOVER?
- THEORY: THE MOST LOGICAL EXPLANATION OF EVENTS THAT OCCUR IN NATURE, MUST BE TESTED OVER AND OVER AGAIN.
- LAW: A THEORY THAT HAS BEEN SUCCESSFULLY TESTED SEVERAL TIMES AND IS NOW REGARDED AS TRUE

I. WHAT IS SCIENCE?

■ SCIENTIFIC METHOD

➤ STATING THE **PROBLEM**

➤ GATHERING **INFORMATION** ON THE PROBLEM

- READ WHAT EARLIER SCIENTISTS HAVE FOUND OUT

➤ FORMING A **HYPOTHESIS**

HYPOTHESIS — PROPOSED SOLUTION TO A PROBLEM, AN **EDUCATED GUESS**

I. WHAT IS SCIENCE

(CONT'D)

- PERFORMING EXPERIMENTS TO TEST THE HYPOTHESIS
 - INDEPENDENT VARIABLE THE ONE FACTOR THAT IS BEING TESTED
 - EXPERIMENTAL GROUP (SETUP): THE PART OF THE EXPERIMENT THAT CONTAINS THE INDEPENDENT VARIABLE. (YOUR TEST GROUP)
 - CONTROL GROUP (SETUP): THE PART OF THE EXPERIMENT THAT DOES NOT CONTAIN THE INDEPENDENT VARIABLE. (YOUR COMPARISON GROUP)
- RECORDING AND ANALYZING DATA
 - GRAPHS AND DATA TABLES HELP SHOW TRENDS BETTER THAN RAW DATA
- STATING A CONCLUSION
 - HYPOTHESIS WILL EITHER BE CORRECT OR INCORRECT — EITHER CONCLUSION IS VALUABLE!

II. OBSERVATIONS & INFERENCES

- OBSERVATION: A PIECE OF INFORMATION DERIVED FROM ONE OR MORE OF YOUR SENSES.
 - EX. MR. MILLER IS A SCIENCE TEACHER
- INFERENCE: AN EDUCATED CONCLUSION BASED UPON YOUR OBSERVATIONS AND PRIOR KNOWLEDGE.
 - EX. MR. MILLER LOVES SCIENCE.

OBSERVATION OR INFERENCE?

- THE SKY IS BLUE _____
- MR. MILLER IS OVER 6' TALL _____
- MR. MILLER IS WEARING A BELT _____
- THE SUN WILL RISE TOMORROW _____
- IT IS NIGHTTIME IN CHINA RIGHT NOW _____
- THERE IS A POSTER OF A HAPPY FACE AT THE FRONT OF THE ROOM _____
- WE WILL BE DISMISSED TODAY AT 2:35PM _____
- MR. MILLER IS MARRIED _____

HOW DO SCIENTISTS
MAKE ACCURATE
OBSERVATIONS AND
MEASUREMENTS?

III. SCIENTIFIC

MEASUREMENTS

■ WHY MEASURE? ACCURATE

MEASUREMENTS MAKE EXPERIMENTAL OBSERVATIONS MORE MEANINGFUL

■ MEASUREMENT — COMPARISON WITH A CERTAIN STANDARD (CALLED A UNIT)

➤ E.G., THE FENCE IS 29.4 METERS LONG = THE FENCE IS 29.4 TIMES LONGER THAN THE LENGTH OF THE STANDARD METER

■ METRIC SYSTEM (AKA INTERNATIONAL SYSTEM OF UNITS, SI) — THE STANDARD SYSTEM USED BY ALL SCIENTISTS, BASED ON THE NUMBER 10

III. SCIENTIFIC MEASUREMENTS (CONT'D)

■ ADVANTAGES OF THE METRIC SYSTEM:

- EASIER **CONVERSIONS**
- STANDARD **PREFIXES** FOR DIFFERENT SIZE MEASUREMENTS
- BASED ON THE NUMBER 10

III. SCIENTIFIC MEASUREMENTS (CONT'D)

METRIC UNITS OF MEASUREMENT

<u>PHYSICAL QUANTITY</u> <u>SYMBOL</u>	<u>METRIC UNIT</u>	<u>METRIC</u>
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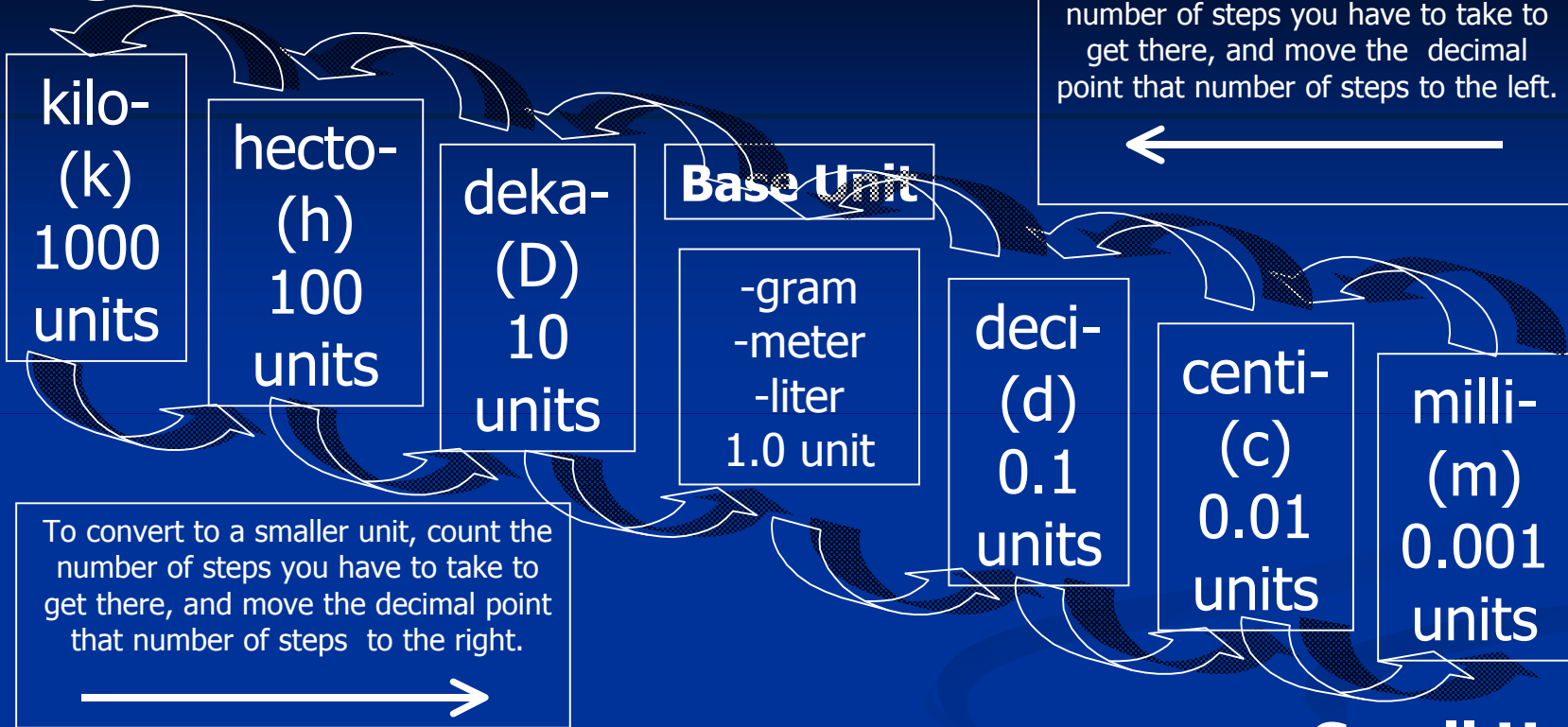
- | | | |
|---------------|----------------|-----|
| ■ LENGTH | METER | m |
| ■ MASS | GRAM | g |
| ■ VOLUME | LITER | L |
| ■ TEMPERATURE | DEGREE CELSIUS | ° C |

III. SCIENTIFIC MEASUREMENTS (CONT'D)

METRIC PREFIXES

<u>PREFIX</u>	<u>SYMBOL</u>	<u>FACTOR</u>	<u>(FRACTION)</u>	<u>FACTOR</u> <u>(EXPONENT)</u>
■ KILO-	k	1 000		10^3
■ HECTO-	h	100		10^2
■ DEKA-	D	10		10^1
■ (NONE)	(NONE)	1		10^0
■ DECI-	d	1/10		10^{-1}
■ CENTI-	c	1/100		10^{-2}
■ MILLI-	m	1/1000		10^{-3}

Large Unit



To convert to a smaller unit, count the number of steps you have to take to get there, and move the decimal point that number of steps to the right.

→

To convert to a larger unit, count the number of steps you have to take to get there, and move the decimal point that number of steps to the left.

←

Small Unit

Use the steps to convert metric measures between units

BASE UNITS

- grams (g) measure mass
- liters (L) measure volume
- meters (m) measure length

III. SCIENTIFIC

MEASUREMENTS (CONT'D)

- USE THE “STEP CHART” TO CONVERT THE FOLLOWING MEASUREMENTS

- $1.2 \text{ km} = \underline{\hspace{2cm}} \text{ dm}$

- $33.7 \text{ mg} = \underline{\hspace{2cm}} \text{ g}$

- $2785.22 \text{ cL} = \underline{\hspace{2cm}} \text{ kL}$

- $78 \text{ hg} = \underline{\hspace{2cm}} \text{ cg}$

- $97.0045 \text{ Dm} = \underline{\hspace{2cm}} \text{ mm}$