

Today in this class...

1. How to use iClicker
2. Chapter 1. Introduction

1

How to use iClicker

1. Press On/Off button to turn on
2. Frequency setting: Press and hold ON/OFF button until power light flashes.

Enter 2 key frequency code : A A

2

iClicker Quiz

What are the three basic units in the SI Unit system?

(a) pound, inch, hour

(b) m, kg, s

(c) m, g, s

(d) km, g, s

(e) m, cm, km

3

Last class...

Chapter 1. Introduction

Fundamental quantities in Physics: Length, Mass, Time

SI units

4

Today, we will learn

Math: Power and Exponents

Prefixes for units

Conversion of units

Dimensional analysis

5

Math Review: Powers and Exponents

See notes and Appendix A.2 in B1

6

iClicker Quiz

- $10^{-4} = ?$
- (a) 10,000
 - (b) 6
 - (c) -10,000
 - (d) 0.0001
 - (e) 0.00001

7

iClicker Quiz

- $(10^{-2})^3 = ?$
- (a) 10^{-6}
 - (b) 10^1
 - (c) 0.1
 - (d) -60
 - (e) -10

8

Prefix for SI unit

$$3000 \text{ m} = 3 \times 1,000 \text{ m} = 3 \times 10^3 \text{ m} = 3 \text{ km} \quad (1000 = \text{kilo} = \text{k})$$

$$1,000,000,000 = 10^9 = \text{giga} = G$$

$$1,000,000 = 10^6 = \text{mega} = M$$

$$1,000 = 10^3 = \text{kilo} = \text{k}$$

$$0.005 \text{ s} = 5 \times 0.001 \text{ s} = 5 \times (1/1000) \text{ s} = 5 \times 10^{-3} \text{ s} = 5 \text{ ms}$$

$$0.01 = 10^{-2} = \text{centi} = \text{c}$$

$$0.001 = 10^{-3} = \text{mili} = \text{m}$$

$$0.000\ 001 = 10^{-6} = \text{micro} = \mu$$

$$0.000\ 000\ 001 = 10^{-9} = \text{nano} = \text{n}$$

9

Example of Other units and conversion of units

$$1 \text{ mile} = 1609 \text{ m} \approx 1.6 \text{ km}$$

$$1 \text{ g} = 0.001 \text{ kg} = 10^{-3} \text{ kg}$$

$$1 \text{ hour} = 60 \text{ min} = 60 \times 60 \text{ sec} = 3600 \text{ s}$$

Conversion factors

→ See Table A.1 in Appendix A in B2

10

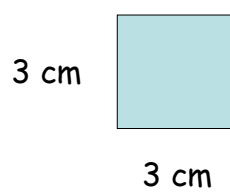
Example 1

$$1 \text{ mile} = 1609 \text{ m.}$$

$$4.1 \text{ mile} = ? \text{ m}$$

11

Example 2:



Find the area in m^2

12

Dimension

("Dimension" in Physics) = (Physical nature of a quantity)

Length: L Mass: M Time: T

[X] = (dimension of a quantity X)

Examples:

$$[\text{time}] = [t] = T$$

$$[\text{velocity}] = [v] = \left[\frac{\text{length}}{\text{time}} \right] = \frac{L}{T}$$

$$[1 \text{ hour} + 30 \text{ min}] = [\text{time}] = T$$

$$[\text{area}] = [\text{length}^2] = L^2$$

13

Dimensional analysis

Rule 1: Both sides of an equation must have the same dimension.

→ For example, "3 km = 3000 m" makes sense, but NOT "3 km = 2 s".

Rule 2: You can add or subtract quantities of the same dimension only.

→ For example, "3 km + 2 m" makes sense, but NOT "3 km + 2 s".

14

Example

If $x = bt^3$

, where x represents the position of an object at time t ,
what is the dimension of b ?

15

Assignment

Study Appendix A in B1, "Mathematical Review".
Some Quiz problems will be from it.

Create UT EID, request enrollment for the course, download
and start HW #1 (due 1pm central time on 9/14 Monday).

Announcement

Bring iClicker every class.

Lecture Quiz on every **Monday**

Sect. 001: Thursday 10-11:25 at 313 FMH

Sect. 003: Thursday 11:30-12:55 at 319 FMH

16