Today in this class...

1. How to use iClicker

2. Chapter 1. Introduction

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**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
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

Last class...

Chapter 1. Introduction

Fundamental quantities in Physics: Length, Mass, Time

SI units
Today, we will learn

Math: Power and Exponents
Prefixes for units
Conversion of units
Dimensional analysis

Math Review: Powers and Exponents

See notes and Appendix A.2 in B1
iClicker Quiz

$10^{-4} = ?$

(a) 10,000
(b) 6
(c) -10,000
(d) 0.0001
(e) 0.00001

iClicker Quiz

$(10^{-2})^3 = ?$

(a) $10^{-6}$
(b) $10^1$
(c) 0.1
(d) -60
(e) -10
Prefix for SI unit

3000 m = 3 x 1000 m = 3 x 10^3 m = 3 km (1000 = kilo = k)

1,000,000,000 = 10^9 = giga = G

1,000,000 = 10^6 = mega = M

1,000 = 10^3 = kilo = k

0.005 s = 5 x 0.001 s = 5 x (1/1000) s = 5 x 10^{-3} s = 5 ms

0.01 = 10^{-2} = centi = c

0.001 = 10^{-3} = mili = m

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

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

Example of Other units and conversion of units

1 mile = 1609 m \approx 1.6 km

1 g = 0.001 kg = 10^{-3} kg

1 hour = 60 min = 60 x 60 sec = 3600 s

Conversion factors

\rightarrow See Table A.1 in Appendix A in B2
Example 1

1 mile = 1609 m.
4.1 mile = ? m

Example 2:

3 cm

Find the area in m²

3 cm
**Dimension**

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

Length: \( L \)  
Mass: \( M \)  
Time: \( T \)

\[ [X] = \text{(dimension of a quantity } X) \]

Examples:

\[ [\text{time}] = [t] = T \]
\[ [\text{velocity}] = [v] = \frac{\text{length}}{\text{time}} = \frac{L}{T} \]
\[ [1 \text{ hour } + 30 \text{ min }] = [\text{time}] = T \]
\[ [\text{area}] = [\text{length}^2] = L^2 \]

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**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".
Example

If \( x = bt^3 \), where \( x \) represents the position of an object at time \( t \),

what is the dimension of \( b \) ?

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