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 1. University Physics, Bauer and Westfall, McGraw-Hill, 2011.
 2. Principles of Physics, Halliday, Resnick, and Walker, Wiley, 8th and 9th Ed.
- The rest is made by me.

General Physics 1

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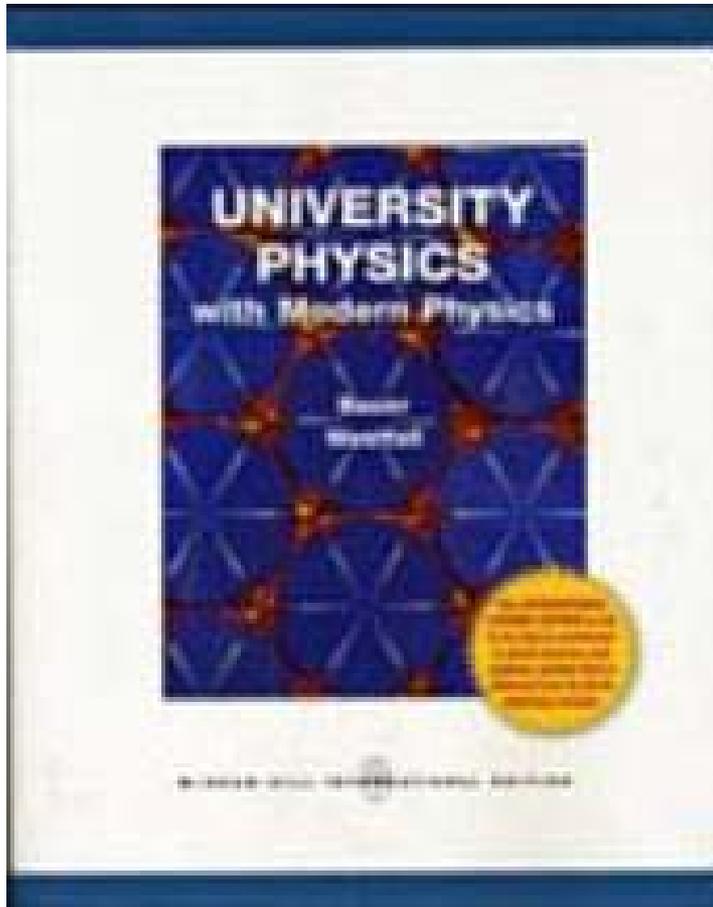
강의 소개

1. 구성
강의 (75분 x 2), 연습 (1시간), [실험-따로 반드시 수강]
2. 성적
시험 (3번, 각 100점), 연습+출석 (80점)
3. 조교 소개
4. 연습시간 결정

Textbook

University Physics with Modern Physics

Bauer, Westfall



1학기에는 20장까지

Homework format
(cover)

General Physics
Homework 1

제출일: 2012. 3. 17.
담당교수: 권 태현

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Outline of the lecture

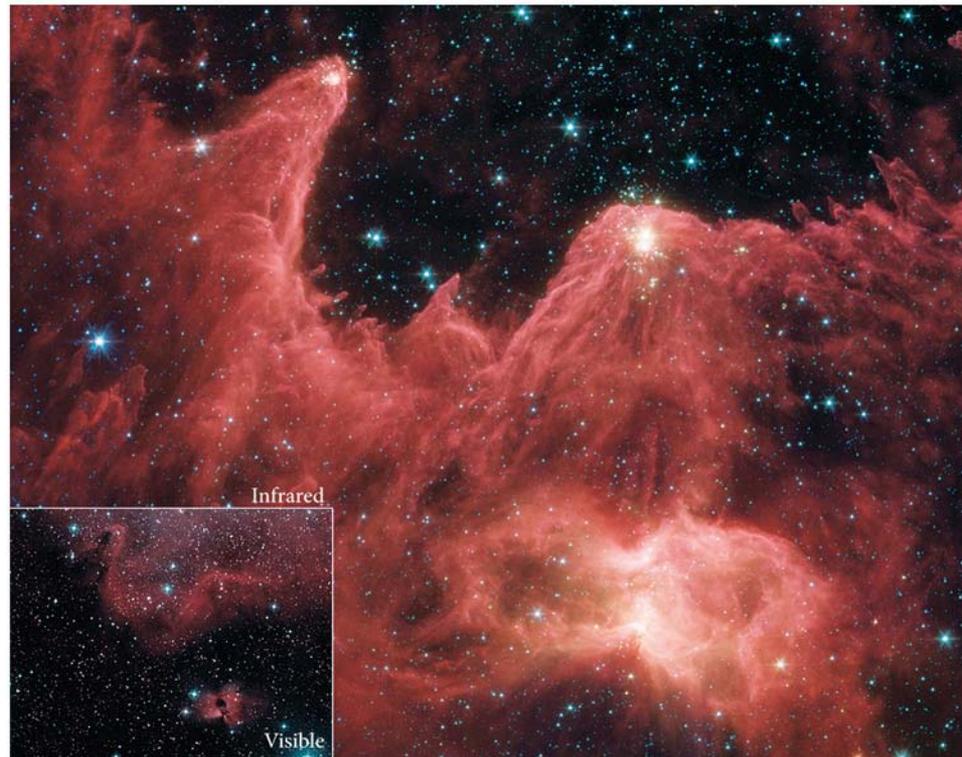
General Physics 1: mechanics, waves, fluid mechanics, thermodynamics

General Physics 2: ElectroMagnetism, EM waves, modern physics

1. Chap. 1: overview – units and vectors
2. Chaps. 2-3: kinematics – motion, velocity, acceleration
3. Chap. 4: dynamics – Newton's law
4. Chaps. 4-6: work and energy – energy conservation
5. Chaps. 7-8: many-particle system– center of mass, momentum
6. Chaps. 9-11: rigid body – rotation, equilibrium
7. Chap. 12: gravitation
8. Chap. 13: fluid mechanics
9. Chaps. 14-16: oscillations and waves
10. Chaps. 17-20: thermodynamics

Chapter 1 Overview

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NASA/JPL-Caltech/L. Allen (Harvard Smithsonian CfA)

Big and small numbers

- power를 이용하여 표현

$$3\,560\,000\,000\text{ m} = 3.56 \times 10^9\text{ m}$$

$$0.000\,000\,492\text{ s} = 4.92 \times 10^{-7}\text{ s}.$$

- prefix를 이용하여 표현

$$1.27 \times 10^9\text{ watts} = 1.27\text{ gigawatts} = 1.27\text{ GW}$$

$$2.35 \times 10^{-9}\text{ s} = 2.35\text{ nanoseconds} = 2.35\text{ ns}.$$

Prefix

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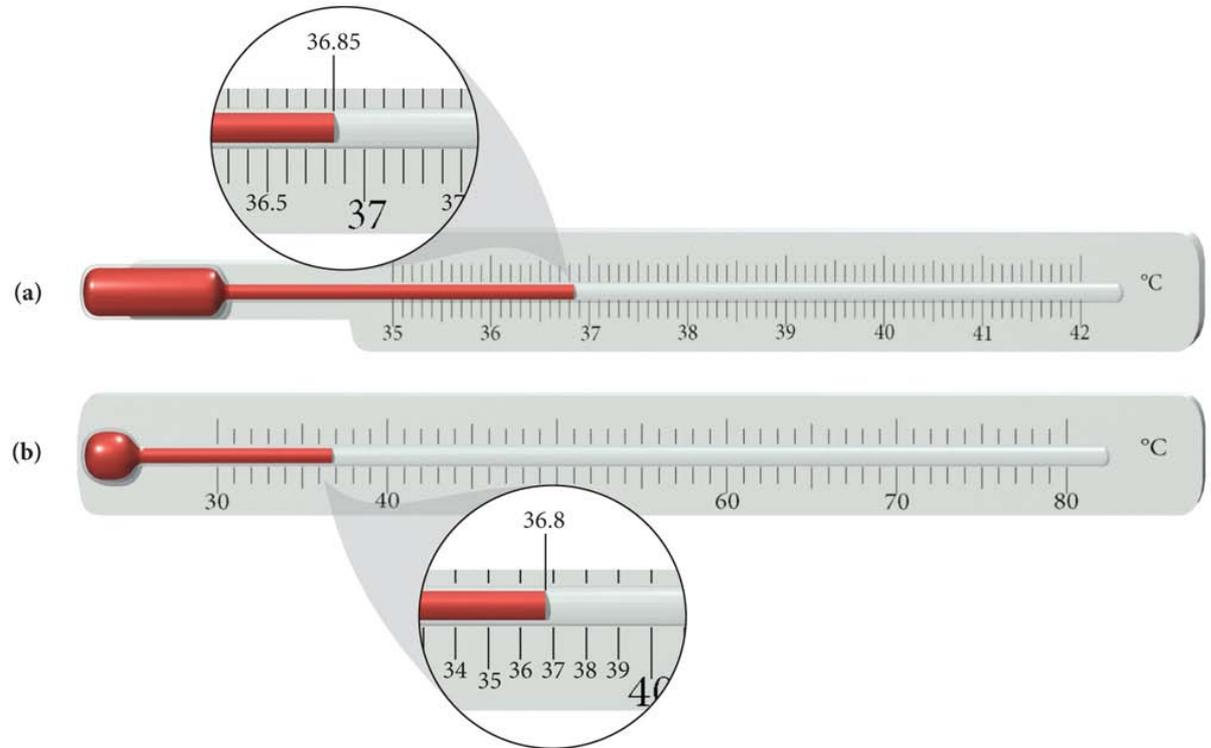
Table 1.3 SI Standard Prefixes

Factor	Prefix	Symbol	Factor	Prefix	Symbol
10^{24}	yotta-	Y	10^{-24}	yocto-	y
10^{21}	zetta-	Z	10^{-21}	zepto-	z
10^{18}	exa-	E	10^{-18}	atto-	a
10^{15}	peta-	P	10^{-15}	femto-	f
10^{12}	tera-	T	10^{-12}	pico-	p
10^9	giga-	G	10^{-9}	nano-	n
10^6	mega-	M	10^{-6}	micro-	μ
10^3	kilo-	k	10^{-3}	milli-	m
10^2	hecto-	h	10^{-2}	centi-	c
10^1	deka-	da	10^{-1}	deci-	d

Significant numbers

측정할 때 측정기기의 최소눈금의 1/10까지 읽는다.

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덧셈과 곱셈

$$3.56 + 2.1 = 5.7$$

$$3.56 \times 2.1 = 7.5$$

SI Unit System

Le **S**ysteme **I**nternational d'Unites

Fundamental units

Units for Three SI Base Quantities

Quantity	Unit Name	Unit Symbol
Length	meter	m
Time	second	s
Mass	kilogram	kg

각 단위들이
어떻게
정의되었는지
교재를
참조할 것

Derived units

위의 기본단위들을 조합하여 모든 물리량의 단위를 만들어낼 수 있다.

예: density $\rho : \text{kg}/\text{m}^3$

power $1 \text{ watt} = 1 W = 1 \text{ kg} \cdot \text{m}^2/\text{s}^3$

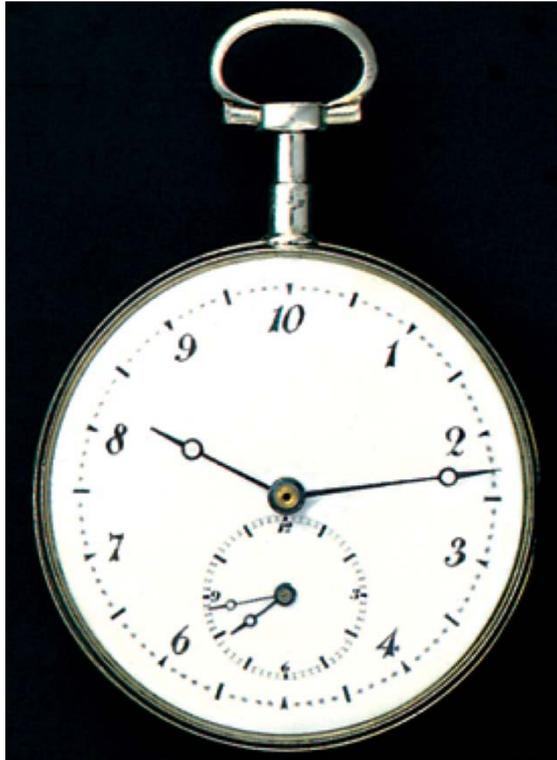
length: 1 m: 빛이 진공에서 1/299,792,458초 동안 진행한 거리

$$c = 299,792,458 \text{ m/s}$$

Some Approximate Lengths

Measurement	Length in Meters
Distance to the first galaxies formed	2×10^{26}
Distance to the Andromeda galaxy	2×10^{22}
Distance to the nearby star Proxima Centauri	4×10^{16}
Distance to Pluto	6×10^{12}
Radius of Earth	6×10^6
Height of Mt. Everest	9×10^3
Thickness of this page	1×10^{-4}
Length of a typical virus	1×10^{-8}
Radius of a hydrogen atom	5×10^{-11}
Radius of a proton	1×10^{-15}

time: 1 s – Cs-133원자의 특정한
 파장의 빛이
 9,192,631,770번
 진동하는 데 걸리는 시간



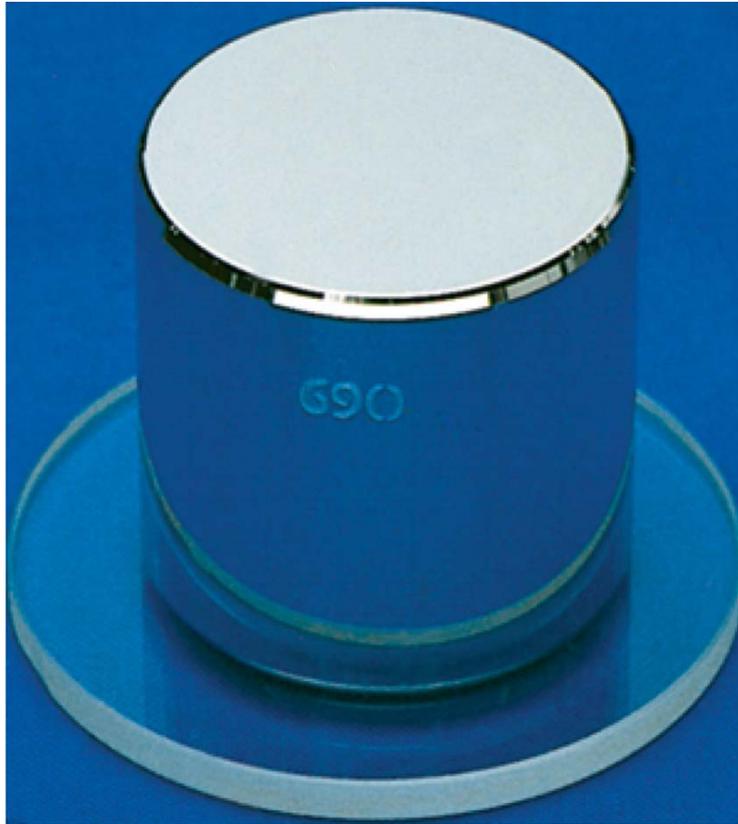
Some Approximate Time Intervals

Measurement	Time Interval in Seconds
Lifetime of the proton (predicted)	3×10^{40}
Age of the universe	5×10^{17}
Age of the pyramid of Cheops	1×10^{11}
Human life expectancy	2×10^9
Length of a day	9×10^4
Time between human heartbeats	8×10^{-1}
Lifetime of the muon	2×10^{-6}
Shortest lab light pulse	1×10^{-16}
Lifetime of the most unstable particle	1×10^{-23}
The Planck time ^a	1×10^{-43}

^aThis is the earliest time after the big bang at which the laws of physics as we know them can be applied.

mass: 1 kg: C-12 원자 1 몰의 질량을 0.012 kg으로 정의

$$1 \text{ u} = 1.6605402 \times 10^{-27} \text{ kg}$$



Some Approximate Masses

Object	Mass in Kilograms
Known universe	1×10^{53}
Our galaxy	2×10^{41}
Sun	2×10^{30}
Moon	7×10^{22}
Asteroid Eros	5×10^{15}
Small mountain	1×10^{12}
Ocean liner	7×10^7
Elephant	5×10^3
Grape	3×10^{-3}
Speck of dust	7×10^{-10}
Penicillin molecule	5×10^{-17}
Uranium atom	4×10^{-25}
Proton	2×10^{-27}
Electron	9×10^{-31}

dimension

1. 물체의 위치를 기술하는 독립적인 좌표의 개수

2차원 $\mathbf{r} = (x, y)$

3차원 $\mathbf{r} = (x, y, z)$

2. 물리량을 길이[L], 질량[M], 시간[T]의 차수로 표시하는 방법

$$[\rho] = [\text{kg}/\text{m}^3] = ML^{-3}$$

$$[\text{Power}] = [W] = [\text{kg} \cdot \text{m}^2/\text{s}^3] = ML^2T^{-3}$$

Dimensional analysis

mass m , length l , 중력가속도 g 일 경우 진자의 주기

$$[T] = kM^x (LT^{-2})^y L^z = T^1$$

k 는 dimensionless
constant

$$x = 0, y + z = 0, -2y = 1 \longrightarrow x = 0, y = -\frac{1}{2}, z = \frac{1}{2}$$

$$T = k \sqrt{\frac{l}{g}}, \quad (k = 2\pi)$$