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国际著名物理图书

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1

Principles of Physics

(Third Edition)

物理学原理 (下)

(第3版)

Serway & Jewett

A Calculus-Based Text

基于微积分的读本



清华大学出版社



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北京

Principles of Physics, Third Edition
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distributed by any means, or stored in a database or retrieval system, without the prior written permission of the publisher.

本书比较贴近现代，最后几章涉及量子物理、核物理和粒子物理，甚至到了核理论、M-理论，使学生能接触到物理学的前沿。本书中关于相对论的应用，如时空技术、激光技术等，是能量及其转化、电磁学等。本书特别注重对行星运动一章，而相对论也占有相当大的篇幅。

本书十分注意联系实际，在书中随处可见有关自然现象的讨论，如行星运动、天体物理、核物理等。本书在编排上，把全书内容组织成8个“故事线”，如“行星运动”、“电磁学”、“量子物理”等。这种做法对激发学生学习兴趣，使其“主动联系”为故事线等。这种做法对激发学生学习兴趣，使其“主动联系”为故事线等。

本书还经常对学生学习方法的指导，在序言之后，就写了一篇“如何学习物理学”的文章，在每一章的开始，还写有“学习目标”和“本章小结”。此外，本书还附有“快速测试”等小栏目，及时向学生提出问题以改进其学习过程。

总体而言，本书选材上注重基本，遍及现代，讲解上力求深入浅出，用词准确，行文流畅，图文并茂，全书行文流畅易懂，词意准确，插图清晰美观。我国各大学物理系、物理专业、物理教育专业等，均可作为教材或参考书。特此推荐影印出版。

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Pedagogical Color Chart

Mechanics

Displacement and position vectors



Linear (v) and angular (ω) velocity vectors



Velocity component vectors



Force vectors (F)



Force component vectors



Acceleration vectors (a)



Acceleration component vectors



Linear (p) and angular (L) momentum vectors



Torque vectors (τ)



Linear or rotational motion directions



Springs



Pulleys



Electricity and Magnetism

Electric fields



Magnetic fields



Positive charges



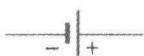
Negative charges



Resistors



Batteries and other dc power supplies



Switches



Capacitors



Inductors (coils)



Voltmeters



Ammeters



Galvanometers



ac Generators



Ground symbol

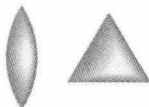


Light and Optics

Light rays



Lenses and prisms



Mirrors



Objects



Images



Some Fundamental Constants^a

Quantity	Symbol	Value ^b
Atomic mass unit	u	1.660 540 2(10) × 10 ⁻²⁷ kg 931.494 32(2 8) MeV/c ²
Avogadro's number	N _A	6.022 136 7(36) × 10 ²³ particles/mol
Bohr magneton	$\mu_B = \frac{e\hbar}{2m_e}$	9.274 015 4(31) × 10 ⁻²⁴ J/T
Bohr radius	$a_0 = \frac{\hbar^2}{m_e e^2 k_e}$	5.291 772 49 (24) × 10 ⁻¹¹ m
Boltzmann's constant	$k_B = R/N_A$	1.380 658 (12) × 10 ⁻²³ J/K
Compton wavelength	$\lambda_C = \frac{h}{m_e c}$	2.426 310 58(2 2) × 10 ⁻¹² m
Coulomb constant	$k_e = \frac{1}{4\pi\epsilon_0}$	8.987 551 787 × 10 ⁹ N·m ² /C ² (exact)
Deuteron mass	m _d	3.343 586 0(20) × 10 ⁻²⁷ kg 2.013 553 214 (24) u
Electron mass	m _e	9.109 389 7(54) × 10 ⁻³¹ kg 5.485 799 03(1 3) × 10 ⁻⁴ u 0.510 999 06(1 5) MeV/c ²
Electron-volt	eV	1.602 177 33(4 9) × 10 ⁻¹⁹ J
Elementary charge	e	1.602 177 33(4 9) × 10 ⁻¹⁹ C
Gas constant	R	8.314 510 (70) J/K·mol
Gravitational constant	G	6.672 59(8 5) × 10 ⁻¹¹ N·m ² /kg ²
Hydrogen ground state energy	$E_1 = -\frac{e^2 k_e}{2a_0}$	-13.605 698 (40) eV
Josephson frequency-voltage ratio	2e/h	4.835 976 7(14) × 10 ¹⁴ Hz/V
Magnetic flux quantum	$\Phi_0 = \frac{h}{2e}$	2.067 834 61(6 1) × 10 ⁻¹⁵ T·m ²
Neutron mass	m _n	1.674 928 6(10) × 10 ⁻²⁷ kg 1.008 664 904 (14) u 939.565 63(2 8) MeV/c ²
Nuclear magneton	$\mu_n = \frac{e\hbar}{2m_p}$	5.050 786 6(17) × 10 ⁻²⁷ J/T
Permeability of free space	μ ₀	4π × 10 ⁻⁷ T·m/A (exact)
Permittivity of free space	ε ₀ = 1/μ ₀ c ²	8.854 187 817 × 10 ⁻¹² C ² /N·m ² (exact)
Planck's constant	h	6.626 075 (40) × 10 ⁻³⁴ J·s
	ħ = h/2π	1.054 572 66(6 3) × 10 ⁻³⁴ J·s
Proton mass	m _p	1.672 623 (10) × 10 ⁻²⁷ kg 1.007 276 470 (12) u 938.272 3(28) MeV/c ²
Rydberg constant	R _H	1.097 373 153 4(13) × 10 ⁷ m ⁻¹
Speed of light in vacuum	c	2.997 924 58 × 10 ⁸ m/s (exact)

^a These constants are the values recommended in 1986 by CODATA, based on a least-squares adjustment of data from different measurements. For a more complete list, see E. R. Cohen and B. N. Taylor, *Rev. Mod. Phys.* 59:1121, 1987.

^b The numbers in parentheses for the values above represent the uncertainties of the last two digits.

Solar System Data

Body	Mass (kg)	Mean Radius (m)	Period (s)	Distance from the Sun (m)
Mercury	3.18×10^{23}	2.43×10^6	7.60×10^6	5.79×10^{10}
Venus	4.88×10^{24}	6.06×10^6	1.94×10^7	1.08×10^{11}
Earth	5.98×10^{24}	6.37×10^6	3.156×10^7	1.496×10^{11}
Mars	6.42×10^{23}	3.37×10^6	5.94×10^7	2.28×10^{11}
Jupiter	1.90×10^{27}	6.99×10^7	3.74×10^8	7.78×10^{11}
Saturn	5.68×10^{26}	5.85×10^7	9.35×10^8	1.43×10^{12}
Uranus	8.68×10^{25}	2.33×10^7	2.64×10^9	2.87×10^{12}
Neptune	1.03×10^{26}	2.21×10^7	5.22×10^9	4.50×10^{12}
Pluto	$\approx 1.4 \times 10^{22}$	$\approx 1.5 \times 10^6$	7.82×10^9	5.91×10^{12}
Moon	7.36×10^{22}	1.74×10^6	—	—
Sun	1.991×10^{30}	6.96×10^8	—	—

Physical Data Often Used^a

Average Earth–Moon distance	3.84×10^8 m
Average Earth–Sun distance	1.496×10^{11} m
Average radius of the Earth	6.37×10^6 m
Density of air (20°C and 1 atm)	1.20 kg/m^3
Density of water (20°C and 1 atm)	$1.00 \times 10^3 \text{ kg/m}^3$
Free-fall acceleration	9.80 m/s^2
Mass of the Earth	5.98×10^{24} kg
Mass of the Moon	7.36×10^{22} kg
Mass of the Sun	1.99×10^{30} kg
Standard atmospheric pressure	1.013×10^5 Pa

^a These are the values of the constants as used in the text.

Some Prefixes for Powers of Ten

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

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Problem 1.12

CHAPTER 3: Motion in Two Dimensions

Problem 3.7

Problem 3.18

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CHAPTER 5: More Applications of Newton's Laws

Question 5.10

CHAPTER 6: Energy and Energy Transfer

Problem 6.39

Problem 6.40

Problem 6.41

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Page 250, Boxing and Brain Injury

Problem 8.6

CHAPTER 9: Relativity

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CHAPTER 10: Rotational Motion

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Problem 28.4

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Page 1149, Carbon dating and the ice man

Problem 30.18

Problem 30.19

Problem 30.47

CHAPTER 31: Particle Physics

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Problem 31.2

Pedagogical Color Chart

Mechanics

Displacement and position vectors



Linear (p) and angular (L) momentum vectors



Linear (v) and angular (ω) velocity vectors



Torque vectors (τ)



Velocity component vectors



Linear or rotational motion directions



Force vectors (F)



Springs



Force component vectors



Pulleys



Acceleration vectors (a)



Acceleration component vectors

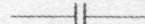


Electricity and Magnetism

Electric fields



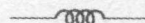
Capacitors



Magnetic fields



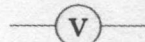
Inductors (coils)



Positive charges



Voltmeters



Negative charges



Ammeters



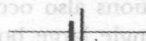
Resistors



Galvanometers



Batteries and other dc power supplies



ac Generators



Switches



Ground symbol



Light and Optics

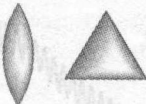
Light rays



Objects



Lenses and prisms



Images



Mirrors

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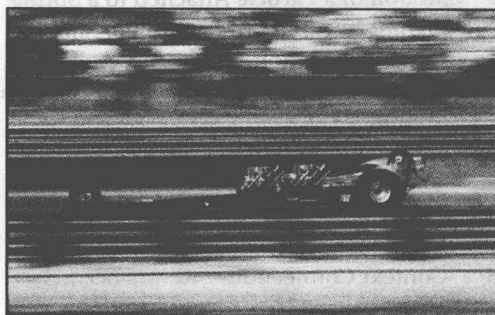
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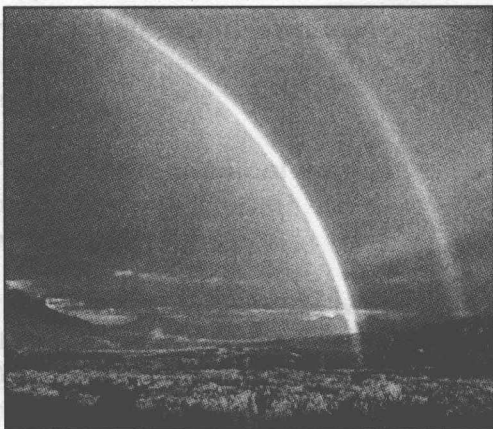
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