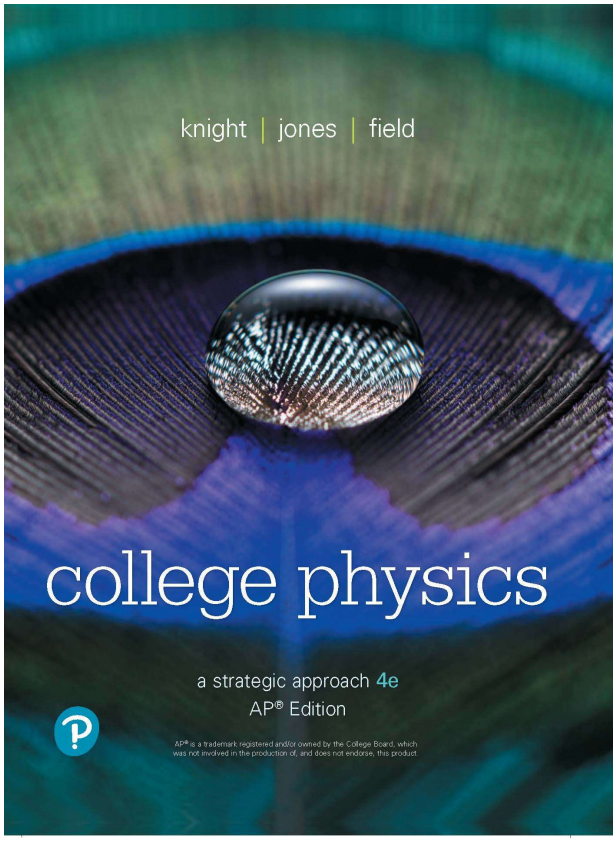
A Correlation of

College Physics:
A Strategic Approach

4th Edition, AP® Edition ©2019



To the

AP® Physics 1
Curriculum Framework
Effective Fall 2019

Pearson

Table of Contents

The units above reflect the College Board's AP® Physics 1 Curriculum Framework.

Big Idea Summary

Big Idea 1: [SYS] Systems
Objects and systems have properties such as mass and charge. Systems may have internal structure.

Big Idea 2: [FLD] Fields
Fields existing in space can be used to explain interactions.

Big Idea 3: [INT] Interactions
The interactions of an object with other objects can be described by forces.

Big Idea 4: [CHA] Change
Interactions between systems can result in changes in those systems.

Big Idea 5: [CON] Conservation
Changes that occur as a result of interactions are constrained by conservation laws.

Big Idea 6: [WAV] Waves
Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena.

Big Idea 7: [PRO] Probability
The mathematics of probability can be used to describe the behavior of complex systems and to interpret the behavior of quantum mechanical systems.

Unit 1: Kinematics (2 topics) AP® Physics 1 Curriculum Framework		
Big Ideas	**Enduring Understandings**	**College Physics: A Strategic Approach 4e Chapters, Sections, and Science Practices**
Big Idea 3: [INT] Force Interactions	3.A: All forces share certain common characteristics when considered by observers in inertial reference frames.	3.A.1: Sections 2.1, 2.2, 2.3, 2.4, 2.5, 3.8 Science Practices: SP 1.5, 2.1, 2.2, 4.2, 5.1
Big Idea 4: [CHA] Change	4.A: The acceleration of the center of mass of a system is related to the net force exerted on the system, where $\vec{a} = \frac{\Sigma \vec{F}}{m}$.	4.A.1: Section 1.1, 1.2, 2.4, 2.5 Science Practices: SP 1.2, 1.4, 2.3, 6.4 4.A.2: Chapter 2, Sections 2.4, 2.5 Science Practices: SP 1.4, 2.2, 6.4

Unit 2: Dynamics (7 topics) AP® Physics 1 Curriculum Framework		
Big Ideas	**Enduring Understandings**	**College Physics: A Strategic Approach 4e Chapters, Sections, and Science Practices**
Big Idea 1: [SYS] Systems	1.A: The internal structure of a system determines many properties of the system	1.A.1: Section 4.1, 4.2 1.A.5: Sections 1.2, 4.2, 4.3 Science Practice 1.1, 7.1
	1.C: Objects and systems have properties of inertial mass and gravitational mass that are experimentally verified to be the same and that satisfy conservation principles.	1.C.1: Chapter 4.4, 4.5, 5.2 Science Practice 4.2 1.C.3: Section 2.7, 4.5 Science Practice 4.2
Big Idea 2: [FLD] Fields	**2.B:** A gravitational field is caused by an object with mass.	2.B.1: Sections 2.7, 5.2, 5.3 Science Practice 2.2, 7.2

Big Idea 3: [INT] Interactions	**3.A:** All forces share certain common characteristics when considered by observers in inertial reference frames.	3.A.2: Sections 4.1 Science Practice 1.1 3.A.3 Sections 4.1, 4.4, 4.5, 4.7, 5.1, 5.2, 5.7 Science Practice 1.4, 6.1, 6.4, 7.2 3.A.4: Section 4.7, 5.7, 5.8 Science Practice 1.4, 6.2, 6.4, 7.2
	3.B: Classically, the acceleration of an object interacting with other objects can be predicted by using $\vec{a} = \frac{\Sigma \vec{F}}{m}$.	3.B.1: Sections 5.1, 5.2 Science Practices: 1.5, 2.2, 5.1, 6.4, 7.2 3.B.2: Sections 4.2, 4.3, 4.6 Science Practices: 1.1, 1.4, 2.2
	3.C: At the macroscopic level, forces can be categorized as either long-range (action-at-a-distance) forces or contact forces.	3.C.4: Sections 5.7, 5.8 Science Practices: 6.1, 6.2
Big Idea 4: [CHA] Change	4.A: The acceleration of the center of mass of a system is related to the net force exerted on the system, where $\vec{a} = \frac{\Sigma \vec{F}}{m}$.	4.A.1: Sections: 4.4, 4.5, 5.1, 5.2 Science Practices: SP 1.2, 1.4, 2.3, 6.4 4.A.2: Sections: 4.4, 4.5, 5.1, 5.2 Science Practices: SP 5.3 4. A. 3: Sections: 5.7

Unit 3: Circular Motion & Gravitation (8 topics) AP® Physics 1 Curriculum Framework		
Big Ideas	**Enduring Understandings**	**College Physics: A Strategic Approach 4e Chapters, Sections, and Science Practices**
Big Idea 1: [SYS] Systems	1.C: Objects and systems have properties of inertial mass and gravitational mass that are experimentally verified to be the same and that satisfy conservation principles.	1.C.2: Chapter: 6.5, 6.6 1.C.3: Section: 2.7, 4.5 Science Practice: 4.2
Big Idea 2: [FLD] Fields	**2.A:** A field associates a value of some physical quantity with every point in space. Field models are useful for describing interactions that occur at a distance (long-range forces), as well as a variety of other physical phenomena.	2.A.1: Sections: 20.4
	2.B: A gravitational field is caused by an object with mass.	2.B.1 Sections: 6.5, 6.6 Science Practice: 2.2, 7.2 2.B.2 Sections: 6.5, 6.6 Science Practice: 2.2
Big Idea 3: [INT] Interactions	**3.A:** All forces share certain common characteristics when considered by observers in inertial reference frames	3.A.1: Sections: 6.1, 6.2, 6.3, 7.1, 7.2 Science Practice: 1.5, 2.1, 2.2, 4.2, 5.1 3.A.2: Sections: 6.2 Science Practice 1.1 3.A.3:

		Section: 6.2, 6.3 Science Practice 1.4, 6.4, 7.2 3.A.4: Sections: 6.5 Science Practices 1.4, 6.2, 6.4, 7.2
	3.B: Classically, the acceleration of an object interacting with other objects can be predicted by using $\vec{a} = \frac{\Sigma \vec{F}}{m}$.	3.B.1: Sections: 6.2 Science Practices: 1.5, 2.2, 4.2, 5.1 3.B.2: Sections: 6.2, 6.3 Science Practices: 1.1, 1.4, 2.2
	3.C: At the macroscopic level, forces can be categorized as either long-range (action-at-a-distance) forces or contact forces.	3.C.1: Section: 6.5
	3.G: Certain types of forces are considered fundamental	3.G.1: Section 6.5, page 273
Big Idea 4: [CHA] Change	4.A: The acceleration of the center of mass of a system is related to the net force exerted on the system, where $\vec{a} = \frac{\Sigma \vec{F}}{m}$.	4.A.2: Section: 6.2 Science Practices: SP 5.3

Unit 4: Energy (3 topics) AP® Physics 1 Curriculum Framework		
Big Ideas	**Enduring Understandings**	**College Physics: A Strategic Approach 4e Chapters, Sections, and Science Practices**
Big Idea 3: [INT] Interactions	**3.E:** A force exerted on an object can change the kinetic energy of the object.	3.E.1: Sections:10.1, 10.2, 10.3 Science Practices 6.4, 7.2
Big Idea 4: [CHA] Change	**4.C:** Interactions with other objects or systems can change the total energy of a system.	4.C.1: Section: 10.1, 10.2, 10.3, 10.4, 10.5, 10.8 Science Practices: SP 1.4, 2.1, 2.2, 6.4 4.C.2: Sections: 10.1, 10.2 Science Practices: SP 1.4, 2.2, 6.4, 7.2
Big Idea 5: [CON] Conservation	**5.A:** Certain quantities are conserved, in the sense that the changes of those quantities in a given system are always equal to the transfer of that quantity to or from the system by all possible interactions with other systems	5.A.1: Section: 10.1, 10.6
	5.B: The energy of a system is conserved	5.B.1: Section: 10.1, 10.2, 10.6 Science Practices: SP 1.4, 1.5, 2.2 5.B.2: Sections: 10.4, 10.5 Science Practices: SP 1.4, 2.1 5.B.3: Sections: 10.1, 10.5, 10.8 Science Practices: SP 1.4, 2.2, 6.4, 7.2 5.B.4: Sections: 10.5, 10.8 Science Practices: SP 1.4, 2.1, 2.2 5.B.5: Sections: 10.1, 10.2, 10.10 Science Practices: SP 1.4, 2.2, 4.2, 5.1, 6.4, 7.2

Unit 5: Momentum (4 topics) AP® Physics 1 Curriculum Framework		
Big Ideas	**Enduring Understandings**	**College Physics: A Strategic Approach 4e Chapters, Sections, and Science Practices**
Big Idea 3: [INT] Interactions	**3.D:** A force exerted on an object can change the momentum of the object.	3.D.1: Sections: 9.2 Science Practices 4.1 3.D.2: Sections: 9.1, 9.2 Science Practices 2.1, 4.2, 5.1, 6.4
Big Idea 4: [CHA] Change	**4.B:** Interactions with other objects or systems can change the total linear momentum of a system.	4.B.1: Section: 7.2, 9.2 Science Practices: SP 1.4, 2.2, 5.1 4.B.2: Sections: 9.1, 9.2 Science Practices: SP 2.2, 5.1
Big Idea 5: [CON] Conservation	**5.A:** Certain quantities are conserved, in the sense that the changes of those quantities in a given system are always equal to the transfer of that quantity to or from the system by all possible interactions with other systems	5.A.2: Section: 9.5, 10.9 Science Practices: SP 6.4, 7.2
	5.D: The linear momentum of a system is conserved.	5.D.1: Section: 9.4, 9.5, 10.9 Science Practices: SP 6.4, 7.2 5.D.2: Sections: 9.4, 9.5, 10.9 Science Practices: SP 2.1, 2.2, 4.1, 4.2, 4.4, 5.1, 5.3, 6.4, 7.2 5.D.3: Sections: 7.7 Science Practices: SP 6.4

Unit 6: Simple Harmonic Motion (2 topics) AP® Physics 1 Curriculum Framework		
Big Ideas	**Enduring Understandings**	**College Physics: A Strategic Approach 4e Chapters, Sections, and Science Practices**
Big Idea 3: [INT] Interactions	**3.B:** Classically, the acceleration of an object interacting with other objects can be predicted by using $\vec{a} = \frac{\Sigma \vec{F}}{m}$.	3.B.3: Sections: 14.1, 14.2, 14.3, 14.5 Science Practices 2.2, 4.2, 5.1, 6.2, 6.4, 7.2
Big Idea 5: [CON] Conservation	**5.B:** The energy of a system is conserved.	5.B.2: Section: 14.4 Science Practices: SP 4.1, 2.1 5.B.3: Section: 14.3, 14.4, 14.5 Science Practices: SP 4.1, 2.2, 6.4, 7.2 5.B.4: Section: 14.3, 14.4, 14.5 Science Practices: SP 4.1, 2.1, 2.2, 6.4, 7.2

Unit 7: Torque and Rotational Motion (4 topics) AP® Physics 1 Curriculum Framework		
Big Ideas	**Enduring Understandings**	**College Physics: A Strategic Approach 4e Chapters, Sections, and Science Practices**
Big Idea 3: [INT] Interactions	**3.A:** All forces share certain common characteristics when considered by observers in inertial reference frames.	3.A.1: Sections: 7.1, 7,2 Science Practices: SP 1.5, 2.1, 2.2
	3.F: A force exerted on an object can cause a torque on that object.	3.F.1: Sections: 7.2, 7.3 Science Practices: SP 1.5, 2.1, 2.2 3.F.2: Sections: 7.1, 7.2, 7.3, 7.5, 7.6 Science Practices: SP 4.1, 4.2, 5.1, 6.4 3.F.3: Sections: 9.7 Science Practices: SP 2.1, 4.1, 4.2, 5.1, 5.3, 6.4, 7.3
Big Idea 4: [CHA] Change	**4.D:** A net torque exerted on a system by other objects or systems will change the angular momentum of the system.	4.D.1: Sections: 7.1, 7.3, 7.5, 7.6, 9.7 Science Practices: SP 1.2, 1.4, 3.2, 4.1, 4.2, 5.1, 5.3 4.D.2: Sections: 9.7 Science Practices: SP 1.2, 1.4, 4.2 4.D.3: Sections: 9.7 Science Practices: SP 2.2, 4.1, 4.2
Big Idea 5: [CON] Conservation	**5.E:** The angular momentum of a system is conserved.	5.E.1: Section: 8.1, 8.2, 9.7 Science Practices: SP 2.1, 2.2, 6.4, 7.2 5.E.2: Section: 7.5 Science Practices: SP 2.2

Unit 8: Electric Charge and Electric Fields (3 topics) AP® Physics 1 Curriculum Framework		
Big Ideas	**Enduring Understandings**	**College Physics: A Strategic Approach 4e Chapters, Sections, and Science Practices**
Big Idea 1: [SYS] Systems	**1.B:** Electric charge is a property of an object or a system that affects its interactions with other objects or systems containing charge.	1.B.1: Sections: 20.1, 20.2 Science Practices: SP 6.4, 7.2 1.B.2: Sections: 20.1, 20.2, 20.3 Science Practices: SP 6.2 1.B.3: Sections: 20.2 Science Practices: SP 1.5, 6.1, 7.2
Big Idea 3: [INT] Interactions	**3.C:** At the macroscopic level, forces can be categorized as either long-range (action-at-a-distance) forces or contact forces.	3.C.2: Sections: 20.2, 20.3 Science Practices: SP 2.2, 6.4, 7.2
Big Idea 5: [CON] Conservation	**5.A:** Certain quantities are conserved, in the sense that the changes of those quantities in a given system are always equal to the transfer of that quantity to or from the system by all possible interactions with other systems.	5.A.2: Section: 20.1, 20.2 Science Practices: SP 6.4, 7.2

Unit 9: DC Circuits (4 topics) AP® Physics 1 Curriculum Framework		
Big Ideas	**Enduring Understandings**	**College Physics: A Strategic Approach 4e Chapters, Sections, and Science Practices**
Big Idea 1: [SYS] Systems	**1.B:** Electric charge is a property of an object or a system that affects its interactions with other objects or systems containing charge.	1.B.1: Sections: 22.1, 22.2 Science Practices: SP 6.4, 7.2
	1.E: Materials have many macroscopic properties that result from the arrangement and interactions of the atoms and molecules that make up the material.	1.E.2: Sections: 22.4 Science Practices: SP 4.1
Big Idea 5: [CON] Conservation	**5.B:** The energy of a system is conserved.	5.B.9: Section: 22.2, 22.3, 22.4, 22.5, 22.6 Science Practices: SP 1.1, 1.4, 2.2, 4.2, 6.4, 7.2
	5.C: The electric charge of a system is conserved.	5.C.3: Section: 22.2 Science Practices: SP 1.4, 2.2, 4.1, 4.2, 5.1, 6.4, 7.2

Unit 10: Mechanical Waves and Sound (3 topics) AP® Physics 1 Curriculum Framework		
Big Ideas	**Enduring Understandings**	**College Physics: A Strategic Approach 4e Chapters, Sections, and Science Practices**
Big Idea 6: [WAV] Waves	**6.A:** A wave is a traveling disturbance that transfers energy and momentum.	6.A.1: Section: 14.1, 15.1, 15.2 Science Practices: SP 1.2, 6.2 6.A.2: Section: 15.1, 15.2, 15.4 Science Practices: SP 6.4, 7.2 6.A.3: Section: 14.1 Science Practices: SP 1.4 6.A.4: Section: 15.4 Science Practices: SP 6.4

	6.B: A periodic wave is one that repeats as a function of both time and position and can be described by its amplitude, frequency, wavelength, speed, and energy.	6.B.1: Section: 14.1 Science Practices: SP 1.4, 2.2 6.B.2: Section: 14.1 Science Practices: SP 1.4 6.B.4: Section: 15.4 Science Practices: SP 4.2, 5.1, 7.2 6.B.5: Section: 15.7 Science Practices: SP 1.4
	6.D: Interference and superposition lead to standing waves and beats.	6.D.1: Section: 16.1 Science Practices: SP 1.1, 1.4, 4.2, 5.1 6.D.2: Section: 16.1, 16.6 Science Practices: SP 5.1 6.D.3: Section: 16.2, 16.3, 16.4 Science Practices: SP 1.2, 2.1, 3.2, 4.2, 5.1, 5.2, 5.3, 6.4 6.D.4: Section: 16.2, 16.3, 16.4 Science Practices: SP 1.5, 2.2, 6.1 6.D.5: Section: 16.7 Science Practices: SP 1.2