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From 967 pages to 945 due to style updates.

Errata:

Below is a table containing submitted errata and the resolutions that OpenStax has provided for this latest text.

Location	Detail	Resolution
Unit 1 Mechanics: Chapter 1 Units and Measurement: Section 1.1 The Scope and Scale of Physics	"It is simply a way of rounding numbers consistently to the nearest power of 10." The order of magnitude of 450 is 3, since 4.5 > 10^0.5 and 450 = 4.5 x 10^2, or log(450)=2.65 which rounds up to 3. The closest power of 10 is 100, which is 350 units away compared to 550 units to 1000. Therefore, computing the order of magnitude in this regard does not round consistently to the nearest power of 10 as stated in the text, but still provides a means to reason about the scale of numbers in a general way.	Revise "to the nearest power of 10." to "to the nearest (on a logarithmic scale) power of 10. In other words, if numbers differ by one order of magnitude, the one is larger than the other by about ten."
Unit 1 Mechanics: Chapter 1 Units and Measurement: Section 1.1 The Scope and Scale of Physics	The sentence, "The kinetic theory of gases, on the other hand, is a model in which a gas is viewed as being composed of atoms and molecules." which attempts to help students better understand what theories are needs to be removed. It "explains" one unknown (theories) in terms of another unknown (kinetic theory of gasses) from student perspective.	Delete the sentences "The kinetic theory of gases, on the other hand, is a model in which a gas is viewed as being composed of atoms and molecules. Atoms and molecules are too small to be observed directly with our senses—thus, we picture them mentally to understand what

		the instruments tell us about the behavior of gases."
Unit 1 Mechanics: Chapter 1 Units and Measurement: Section 1.1 The Scope and Scale of Physics	In my view, in introduction to Newtonian physics giving an example (Bohr model) from introduction to atomic physics is pedagogically incorrect. It causes unnecessary confusion. Instead of giving Bohr model as an example of "models" in physics, we need to come up with another example from the domain of existing knowledge and experience of students.	Figure 1.6 will be updated.
Unit 1 Mechanics: Chapter 1 Units and Measurement: Section 1.2 Units and Standards	The sentence, "The length of the meter will change if the speed of light is someday measured with greater accuracy." is not needed. Now the length of meter is defined to be constant and from it the speed of light is derived as a constant with zero uncertainty. In other words, the speed of light is already, by definition, measured with infinitely high accuracy.	Delete the sentence "The length of the meter will change if the speed of light is someday measured with greater accuracy."
Unit 1 Mechanics: Chapter 1 Units and Measurement: Section 1.2 Units and Standards	"all physical quantities can be expressed as combinations of only seven base physical quantities." --> all physical quantities can be expressed as combinations of only seven base **units**.	Revise "physical quantities" to "physical units".
Unit 1 Mechanics: Chapter 1 Units and Measurement: Section 1.3 Unit Conversion	Shouldn't it say "Given that 1 lbf (pound-force) is approximately 4.45 N, were the numbers being output by SM_FORCES too big or too small?" instead of "Given that 1 lb (pound) is 4.45 N, were the numbers being output by SM_FORCES too big or too small?"?	Revise "pound-seconds" to "pound-force-seconds", "lb-s" to "lbf-s", "pound" to "pound-force" and "lb" to "lbf".
Unit 1 Mechanics: Chapter 1 Units and Measurement: Section 1.3 Unit Conversion	"but is something you will undoubtedly learn later in your academic career." could be rewritten as something you may learn if you study advanced physics courses	Revise "will undoubtedly" to "may".
Unit 1 Mechanics: Chapter 1 Units and Measurement:	A reference to significant figures is made without explaining what it is (which is explained in the next section).	Revise "There is no need to go beyond one significant figure when doing calculations to

Section 1.5 Estimates and Fermi Calculations	"One “sig. fig.” is fine. There is no need to go beyond one significant figure when doing calculations to obtain an estimate. In most cases, the order of magnitude is good enough. The goal is just to get in the ballpark figure, so keep the arithmetic as simple as possible." Students do not know yet what sig fig is.	obtain an estimate." to "There is no need to go beyond one significant figure, or one digit in the coefficient of an expression in scientific notation, when doing calculations to obtain an estimate."
Unit 1 Mechanics: Chapter 1 Units and Measurement: Section 1.5 Estimates and Fermi Calculations	The sentence "You develop these skills by thinking more quantitatively and by being willing to take risks." needs grammatical revision. - GM	Revise the sentence to " "You develop these skills by thinking quantitatively and being willing to take risks."
Unit 1 Mechanics: Chapter 1 Units and Measurement: Section 1.6 Significant Figures	The issue in the attached image needs to be fixed.	The extra space will be removed.
Unit 1 Mechanics: Chapter 1 Units and Measurement: Section 1.6 Significant Figures	"(that is, the biggest less the smallest)" is not clear.	Revise "biggest less the smallest" to "largest minus the smallest".
Unit 1 Mechanics: Chapter 1 Units and Measurement: Section 1.6 Significant Figures	Book states: "When combining measurements with different degrees of precision, the number of significant digits in the final answer can be no greater than the number of significant digits in the least-precise measured value." This may be true for addition, subtraction, multiplication, and division, but it is not true for other common mathematics such as exponentials or trig functions. Consider an uncertainty of ±0.5% (i.e. two significant figures or 1% absolute bound): • log(98) vs log(99): error of only 0.2%. log() can actually *increase* the number of significant figures. • tan(98°) vs tan(99°): error of 11%. • tan(98rad) vs tan(99rad): error of 3500%. Not even 1 sig fig. • 10^98 vs 10^99: error of 900%. Only 1 sig fig. • 98! vs 99!: error of 9900%. Not even 1 sig fig! • Sphere radius from surface area r = (3A/(4π))^(1/3), using 98 vs 99: 2.8698/2.8601	Revise the sentence "When combining measurements with..." to "When combining measurements with different degrees of precision with the mathematical operations of addition, subtraction, multiplication, or division, then the number of significant digits in the final answer can be no greater than the number of significant digits in the least-precise measured value."

	or 0.34% error. Only 3rd digit changes. Almost 3 sig figs! This may seem a minor point, but it matters in places where we frequently take logs or higher exponents, like pH or thermal physics, respectively. Suggested resolution: "When combining measurements with different degrees of precision, if the only mathematical operations are addition, subtraction, multiplication, or division, then the number of significant digits in the final answer can be no greater than the number of significant digits in the least-precise measured value. ...For other operations such as exp(x) or log(x), the actual uncertainty should be calculated instead of relying only on significant digits.	
Unit 1 Mechanics: Chapter 1 Units and Measurement: Chapter Review: Summary	From the first point of the summary for section 1.3, > multiply by conversions factors correction: Change "conversions" to "conversion".	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 1 Units and Measurement: Chapter Review	can you all please fix the formatting for these questions? https://openstax.file.force.com/servlet/servlet.FileDownload?file=00PPc00000Bh7mHMAR&operationContext=S1 case # 103680	Our team is working to resolve this issue.
Unit 1 Mechanics: Chapter 1 Units and Measurement: Chapter Review: Problems	"r" is used is part (e) of this problem, but its dimensions are not defined for the student	This problem will be updated.
Unit 1 Mechanics: Chapter 1 Units and Measurement: Chapter Review:	See File, confusing wording middle of paragraph.	This assessment stem will be updated.

Challenge Problems		
Unit 1 Mechanics: Chapter 2 Vectors: Section 2.2 Coordinate Systems and Components of a Vector	"2.7 35.2 m/s = 126.4 km/h" Correction: 35.2 m/s = 126.7 km/h	Revise "126.4" to "126.7".
Unit 1 Mechanics: Chapter 2 Vectors: Section 2.2 Coordinate Systems and Components of a Vector	The xyz axes in figure 2.21 are confusing since previously in the section the y axis points towards the top of the screen and the x axis points to the the right. In the current diagram the y axis points to the right of the screen and the x axis points out of the screen. The z axis points where the y axis used to point in all previous diagrams. This seems to add a needless layer of complication for students new to the topic.	Add the following to the end of the paragraph before Figure 2.21: Notice that while previously the y-axis was used for the upward direction, in three dimensions we usually choose z to represent the vertical. A right-handed coordinate system with z up and with one of the remaining axes pointing to the right and the other out of the page must have the y-axis pointing right and x out of the page, as illustrated here.
Unit 1 Mechanics: Chapter 2 Vectors: Section 2.2 Coordinate Systems and Components of a Vector	"Even in everyday life we naturally invoke the concept of orthogonal projections in a rectangular coordinate system. For example, if you ask someone for directions to a particular location, you will more likely be told to go 40 km east and 30 km north than 50 km in the direction 37° north of east." This is apparently the only definition of orthogonal projection presented in the text. Clearly the author knows what it is but a new reader might not. ". In the Cartesian system, the x and y vector components of a vector are the orthogonal projections of this vector onto the x- and y-axes, respectively. In this way, following the parallelogram rule for vector addition, each vector on a Cartesian plane can be expressed as	Revise "orthogonal projections" to "vector components" in the first paragraph. Revise "In the Cartesian system, the x and y vector components of a vector are the orthogonal projections..." to "In the Cartesian system, the x and y vector components of a vector are the orthogonal projections, as illustrated in Figure 2.16,...".

	the vector sum of its vector components:" The definition of vector components as orthogonal projections adds needless jargon. "projection" is basically an undefined term in which the reader is meant to infer that 30 km North and 40 km East are projections from the previous paragraph. There seems to be no further clarification of "projection" when it later comes up more appropriately in vector multiplication.	
Unit 1 Mechanics: Chapter 2 Vectors: Section 2.2 Coordinate Systems and Components of a Vector	the image "CNX_UPhysics_02_01_problems_img_new.jpg " (media id "fs-id1262132294765") needs alt text written	Alt text will be added to this figure: The figure shows an x-y axis in the upper left corner followed by 5 unique vectors drawn on the x-y plane. Vector A has a magnitude of 10.0 and points 30 degrees above the x-axis. Vector B has a magnitude of 5.0 and points 53 degrees above the x-axis. Vector C has a magnitude of 12.0 and points 60 degrees below the x-axis. Vector D has a magnitude of 20.0 and points 37 degrees above the negative x-axis. Vector F has a magnitude of 20.0 and points 30 degrees below the negative x-axis.
Unit 1 Mechanics: Chapter 2 Vectors: Section 2.3 Algebra of Vectors	For the displacement vector D_TB, the description should be from point T at the top of the stairs to the fountain at point B. Case 87251	This issue was addressed in another report and will be corrected in web view.
Unit 1 Mechanics: Chapter 2 Vectors: Section 2.3 Algebra of Vectors	In the "solution" section of example 2.13, the equation for calculating displacement vector D_AT has redundant brackets: [(-90.0 + 50.0)i + 30.0j)]m (notice the extra bracket after the "j") correction:	Delete the parenthesis ")" after j.

	[(-90.0 + 50.0)i + 30.0j]m	
Unit 1 Mechanics: Chapter 2 Vectors: Section 2.3 Algebra of Vectors	In the "solution" section of example 2.13: > "Therefore, his displacement vector D_TB along the stairs is" The vector should be D_AT, as that is the one going along the stairs, and is also the one being calculated in the equation that follows.	Revise the subscript "TB" to "AT".
Unit 1 Mechanics: Chapter 2 Vectors: Section 2.3 Algebra of Vectors	In the "strategy" section of example 2.13: > (from point A at the top of the stairs to the fountain at point T) The fountain is at point B and the top of the stairs is at point T, therefore it would have been right to say: "(from point T at the top of the stairs to the fountain at point B)"	Revise "point A" to "point T" and "point T" to "point B".
Unit 1 Mechanics: Chapter 2 Vectors: Chapter Review: Problems	The problem says |A| = |B| = 5, |A+B| = 3, and |A-B| = 3, and it asks for the angle between A and B. That's contradictory: Given the magnitudes of both vectors and their sum, the problem can be solved with the law of cosines to give theta = arccos(-41/50), whereas given their difference, theta = arccos(+41/50). Another way to look at is that |A+B| = |A-B| only if the angle between them is 90°, or if either A or B = 0. (Succinctly, |A+B| = |A-B| iff A·B = 0). Some piece of information, such as |A-B|, needs to be removed from the problem.	This problem will be updated.
Unit 1 Mechanics: Chapter 2 Vectors: Chapter Review: Problems	Problem 61. Insufficient information given to correctly and accurately answer the problem. Only positional-altitude and angles (azimuth and above xy-plane) of velocity vector are given. Exact bearing, distance, and speed relative to the tower are all missing (the information given for each aircraft is just an altitude and 3D orientation of velocity vector with no information on actual speed or where on the xy-plane the aircraft may be located). Solution to problem also contains an erroneous	This problem will be updated.

	LHS of an equation for part a) (number of 34.290 km appears out of context). I would propose to completely remove the problem, or fully reword so as to explicitly state the presumption being made in the solution. The solution to the problem, as given, has mistakes, but it can be reconstructed if one presumes that both aircraft have been continuously moving away from the tower along a straight-line path with the tower as their common origin, so their velocity and position vectors are colinear (which isn't generally true). However, such an assumption/presumption is not justified in general as all vectors are invariant under translation. The minimal information given is valid independent of the airport tower, but one aircraft could be, say from JFK and the other from LGA: the minimal information may still be accurate, but the presumption that they started climbing from the same airport (tower) is wrong. The only way to make the minimal information provided sufficient for a valid and unambiguous solution is to explicitly state that both aircraft can be presumed to be moving (velocity) continuously in a straight line with their common take-off origin being the base (ground level) of the tower.	
Unit 1 Mechanics: Chapter 2 Vectors: Chapter Review: Problems	Unclosed bracket. > "[...] above the line AB (see the figure and the other tugboat pulls [...]" correction: "(see the figure)"	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 2 Vectors: Chapter Review: Problems	In the instructor solution manual, chapter 2, problem 28, part c has an incorrect answer. The answer is listed as -3.5 degrees but it should be 176.5 degrees. (The resultant vector that comes from the addition is in the second quadrant, not the 4th.)	The solution manual will be updated.
Unit 1 Mechanics: Chapter 2 Vectors:	Several of the solutions to the parts of question 52 are incorrect based on the figure shown. For	The solutions for parts a, b, and d will be updated.

Chapter Review: Problems	example, part a has a solution which is larger than is possible for the two vectors.	
Unit 1 Mechanics: Chapter 2 Vectors: Chapter Review: Problems	The answer key lists a distance of 5.27. The distance is closer to 6.3 and the magnitude is 4.5	Revise "5.27 m" to "6.09 m".
Unit 1 Mechanics: Chapter 2 Vectors: Additional Problems	Answer key gives (2r, phi+2pi) as the answer. It should be (2r, phi+pi) or (2r, phi-pi).	The answer will be updated.
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.1 Position, Displacement, and Average Velocity	In the sentence, "time [...] between the two points approaches zero." saying time between two points is not correct. Time interval or time between two events is a correct notion.	Revise "two points" to "two events".
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.1 Position, Displacement, and Average Velocity	In Eq. 3.3 the "Elapsed time between two points" is not a correct way of saying. The elapsed time between two events, the time needed to make the displacement would be two correct versions.	Revise the text in the denominator to "Time needed to make the displacement".
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.2 Instantaneous Velocity and Speed	The 3rd item says: "Calculate the instantaneous velocity given the mathematical equation for the velocity." I assume the last word should be "position".	Revise "for the velocity" to "for the position".
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.2 Instantaneous Velocity and Speed	There should be a comma before v(0.25 s) to distinguish between that v(0.25 s) and v(t). It was done for the rest of the expressions within the example so I'm sure you just missed it on accident. Thank you for your work.	Add a comma before "v(0.25 s)".
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.2 Instantaneous Velocity and Speed	The equation x(t)=−3t^2m is not dimensionally consistent.	This equation will be updated.

Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.2 Instantaneous Velocity and Speed	The equation x(t)=3.0t−3t^2 m is not dimensionally consistent. The units of the coefficients are not given.	This example will be updated.
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.2 Instantaneous Velocity and Speed	The expression x(t)=3.0t+0.5t3m is not dimensionally consistent because the units of the coefficients are not specified.	This example will be updated.
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.3 Average and Instantaneous Acceleration	Example problem 3.6 has the wrong units for the functional form of the velocity. Should be: v(t)=(20 m/s/s) * t - (5 m/s^3)t^2.	This example will be updated.
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.3 Average and Instantaneous Acceleration	The equation v(t)=20t−5t^2m/s is not dimensionally consistent.	This example will be updated.
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.4 Motion with Constant Acceleration	In Example 3.8: put "Figure 3.20" in parentheses: (Figure 3.20).	Add parentheses.
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.4 Motion with Constant Acceleration	Example 3.8, Strategy: put "Figure 3.21" in parentheses: (Figure 3.21).	Add parentheses.
Unit 1 Mechanics: Chapter 3 Motion Along a Straight	In example 3.15: put "Figure 3.28" in parentheses: "(Figure 3.28)"	Add parentheses.

Line: Section 3.5 Free Fall		
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Section 3.6 Finding Velocity and Displacement from Acceleration	Units are inconsistently specified in Example 3.17. While the unit for a(t) is correctly specified in the expression a(t)=-(1/4)t m/s^3 (imputing a time dimension to variable t, I think the submitter of errata 13235 was making this mistake, not realizing variable t has its own unit), in the remainder of the work, units are not consistently specified. For example, the line for obtaining v(t) by integration simply has no units, resulting in final answer of -(1/8)t^2+C1, where it should be -(1/8 m/s^3)*t^2+C1. This mistake is replicated elsewhere in the example, resulting in dimensionally inconsistent expressions such as v(t)=5.0m/s - (1/8)t^2 at the end of derivation for (a), or x(t)=5.0t-(1/24)t^3 at the end of (c), as well as work in (d). I would suggest either meticulously correcting each of these mistakes (making sure every coefficient has a unit attached with it), or making the entire example unitless, specifying at the beginning of the example that time is given in seconds and distance is given in meters (and otherwise written without unit for the rest of the example).	This example will be updated to add units throughout.
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Chapter Review: Key Equations	There are two forms given for average velocity, but the label "constant acceleration" is applied to the general average velocity equation instead of the subsequent version where it actually is a meaningful limitation.	These labels will be updated.
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Chapter Review: Conceptual Questions	Why does the acceleration caused by gravity have the opposite direction on the moon than on Earth?	Add a negative sign before "g/6".
Unit 1 Mechanics: Chapter 3 Motion Along a Straight	The instructor's manual solution is correct, but the final answer is not correct. The incorrect final answer is also listed in the textbook	Revise the answer to part a to "525 m" and the answer to part b to "v = 180 m/s".

Line: Chapter Review: Problems	solution (student facing). 45. A particle moves in a straight line with an initial velocity of 30 m/s and constant acceleration 30 m/s2. (a) What is its displacement at t = 5 s? (b) What is its velocity at this same time? Solution a. answer given is 375 m - should be 525 m b. answer given is 150 m/s - should be 180 m/s	
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Chapter Review: Problems	Does change in velocity cause acceleration, or does acceleration cause change in velocity?	Revise the first two bullets to: - Acceleration is the rate at which velocity changes. The SI unit for acceleration is meters per second squared. - Acceleration is a vector. It has both magnitude and direction and so can be the rate of change of the magnitude or direction of the velocity, or both.
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Chapter Review: Problems	Ch. 3 review problem 76. Standing at the base of one of the cliffs of Mt. Arapiles in Victoria, Australia, a hiker hears a rock break loose from a height of 105.0 m. He can't see the rock right away, but then does, 1.50 s later. (a) How far above the hiker is the rock when he can hear it? (b) How much time does he have to move before the rock hits his head? I believe part a should be asking when they first see it, given it states they hear it at 105.0m and doesn't state where it's at when they hear it 1.50s later.	This question will be updated.
Unit 1 Mechanics: Chapter 3 Motion Along a Straight Line: Chapter Review: Additional Problems	The initial velocity is 248 m/s and not 28.3 m/s. The final velocity is 258 m/s and not 178.3 m/s. See attached file.	The solution will be updated. Also revise "5.0" to "5.00" in the question.
Unit 1 Mechanics: Chapter 3 Motion	In the problem, it states that the window is 7.50 m off the ground, but the solution uses 7.00 m.	Revise "14.1 m/s" to "14.5 m/s".

Along a Straight Line: Chapter Review: Additional Problems	Either the problem needs to be changed to 7.00 m or the solution needs to be changed to 14.5 m/s.	
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Section 4.1 Displacement and Velocity Vectors	The solution to problem 4.23 contains a typo. The average velocity should have a value of 2.0k-hat, not 3.0 k-hat.	The solution will be updated.
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Section 4.1 Displacement and Velocity Vectors	The Figure 4.6 has y-hat instead of j-hat. Needs correction as that notion is not used in this textbook.	This figure will be updated.
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Section 4.1 Displacement and Velocity Vectors	There was an earlier errata that addressed this same figure, but I believe the caption for the figure is still incorrect. As best as I can tell, the role of the red stars and blue dots are reversed. The blue dots are the projection onto the xy plane, and the red stars are the actual positions in 3-D.	In the caption, revise "blue dots" to "red stars" and "red stars" to "blue dots".
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Section 4.1 Displacement and Velocity Vectors	There are two earlier reports on this solution whereas now, the final answer is correct but the intermediate scalars are incorrect. Please refer to the report 13693 where the scalars are correct. 188 and 20 are incorrect. Instead, there must be 192 and 24.	The answer will be updated.
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Section 4.2 Acceleration Vector	Not t is approaching to nought but the change of t.	Revise "t" to "Δt".
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions:	The last sentence of Example 4.8, solution part (a), states: "Thus, any projectile that has an initial vertical velocity of 21.2 m/s and lands 10.0 m below its	Revise "below" to "above".

Section 4.3 Projectile Motion	starting altitude spends 3.79 s in the air." However, it should say that this is applicable for "any projectile that has an initial vertical velocity of 21.2 m/s and lands 10.0 m [above] its starting altitude" because that is what was solved for in the example.	
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Section 4.3 Projectile Motion	The claim "Note from Figure 4.16 that two projectiles launched at the same speed but at different angles have the same range if the launch angles add to 90°." is not obvious. It needs proving.	Revise the sentence to "Note from Figure 4.16 that if the two projectiles were launched at the same speed but at different angles, the projectiles would have the same range as long as the angles were less than 90°."
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Section 4.4 Uniform Circular Motion	The title of the section "Uniform Circular Motion" is misleading. It should just be "Circular Motion" since both uniform and non-uniform circular motion is discussed in the section. A little bit annoying since I was trying to find the section where nonuniform circular motion was discussed.	Revise the title to "Uniform and Nonuniform Circular Motion".
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Section 4.4 Uniform Circular Motion	The first equation in the solution for Example 4.11 for the period T of circular motion is given as $T = 2\pi r/v$ This comes from the definition of average speed as circumference divided by the time it takes to go in a circle: $v = 2\pi r/T$ It seems obvious to a physics teacher where the equation comes from but as it comes almost immediately after period T is defined, students new to the material may need further explication as to the origins of $T = 2\pi r/v$. --- The equation should be preceded by	The solution will be updated.

	According to equation 3.5 Average speed = Total distance/Elapsed time. Since the distance around a circle is $2\pi r$ and the time it takes an object to go in a circle is T we have: $v = 2\pi r/T$	
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Section 4.5 Relative Motion in One and Two Dimensions	CHECK YOUR UNDERSTANDING 4.6 A boat heads north in still water at 4.5 m/s directly across a river that is running east at 3.0 m/s. What is the velocity of the boat with respect to Earth? This should read: A boat that can travel at 4.5 m/s in still water heads north on a river that is running east at 3.0 m/s...	Revise "A boat heads due north, moving at 4.5 m/s directly across a river that is running east at 3.0 m/s." to "A boat heads north in still water at 4.5 m/s relative to the water of a river that is running east at 3.0 m/s."
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Section 4.5 Relative Motion in One and Two Dimensions	It would be prudent to mention that almost all the equations in this section are approximations that break down near the speed of light.	Add the following to the end of the paragraph before the Relative Motion in One Dimension heading: This method makes an approximation that breaks down near the speed of light, where the more accurate methods or special relativity are needed, but is extremely accurate for everyday speeds (Relativity).
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Section 4.5 Relative Motion in One and Two Dimensions	Solution misses important steps.	This example will be updated.
Unit 1 Mechanics: Chapter 4 Motion in Two and Three	1) The problem gives the speeds as 4 m/s and 7 m/s, but the solutions guide uses 4.0 and 7.0, which are different significant figures.	Revise "4 m/s" to "4.0 m/s" and "7 m/s" to "7.0 m/s".

Dimensions: Chapter Review: Problems	2) The instructor solutions guide gives the calculation of -7 sin(60 degrees) + 4.0 = -2.0, which is rounded wrong. -7 sin(60 degrees) + 4.0 = -2.06217782649, which rounds to -2.1. 3) Furthermore, it then uses that rounded value in sqrt((-2.0)^2 + (3.5)^2) instead of using the exact calculation, resulting in 4.03 instead of of 4.06. 4) The answer given is 4.03, which is again different significant figures from both the calculations used (4.0 and 7.0), and the given values (4 and 7)	
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Chapter Review: Problems	Errata #22756 indicates that the wrong answer to problem 23.b. was corrected in Spring 2024. The Instructor and Student Solution Manuals and the textbook PDF all show the corrected answer (4i+2k), but the the online version still shows the incorrect answer (4i+3k).	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 4 Motion in Two and Three Dimensions: Chapter Review: Challenge Problems	The velocity of boat B' with respect to the water should be v_B'W = 0.5 m/s, not 0.75 m/s.	The solution will be updated.
Unit 1 Mechanics Chapter 5 Newton's Laws of Motion Section 5.3 Newton's Second Law	The answer states 770 as the y-component, however it should be 764. The calculation yields Fnet = 159 i + 764 j Where Fnet = Fa + Fb and Fa = <-380sin10, 380cos10>, Fb = <450sin30, 450cos30> Fa = <-66, 374>, Fb = <225, 390> Fnet = <159, 764> Therefore, Fnet = 159 i + 764 j, and acceleration given m = 1000 kg is a = .159 i + .764 j	The answer will be updated.
Unit 1 Mechanics Chapter 5 Newton's Laws of Motion Section 5.3	You did introduce the idea of components of vectors being vectors (e.g., \vec{A}_x = A_x \hat{i}) back in 2.2, which is kind of a weird thing to do but makes sense in the very limited context of drawing the x and y components of a	Equation 5.5 will be updated.

Newton's Second Law	vector and being unable to resist the urge to put arrows at the ends. However, it seems like a really bad idea to continue using this concept in places where it only confuses rather than clarifies. That most definitely includes the component version of Newton's Second Law presented here in equation 5.5, where the _whole point_ of using components is taking one 3-D vector problem and turning it into three 1-D _scalar_ problems. Students can turn your equation 5.5 into a normal version using just the (scalar) components... but only if they remember that subtle detail from section 2.2 and think to cancel out the unit vectors on both sides, which few will do, particularly since your presentation of vector components is nonstandard and most instructors won't follow it in class.	
Unit 1 Mechanics Chapter 5 Newton's Laws of Motion Section 5.3 Newton's Second Law	The first sentence in the box titled "NEWTON'S SECOND LAW OF MOTION" reads, "...and is inversely proportion to its mass." "proportion" should be changed to "proportional".	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.4 Mass and Weight	The lunar lander sim is the flash version and no longer works. It does not appear to have an html conversion.	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.4 Mass and Weight	However, when objects on Earth fall downward, they are never truly in free fall because there is always some upward resistance force from the air acting on the object. This should read: However, when objects on Earth fall downward through the air, they are never truly in free fall because there is always some upward resistance force from the air acting on the object.	Revise "...fall downward..." to "...fall downward through the air...".

	There are several places on Earth where an object can fall through vacuum. One of which is the drop tower Fallturm Bremen.	
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.4 Mass and Weight	Explain why falling objects on Earth are never truly in free fall Should read: Explain why objects falling through the air are never truly in free fall. The drop tower Fallturm Bremen is a 110 m tall evacuated tower and it is located on Earth. In addition NASA owns at least two large evacuated chambers on Earth where objects can be dropped in near vacuum.	Revise the second objective to "Explain why objects falling through the air are never truly in free fall".
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.4 Mass and Weight	The book currently states, "Weight varies dramatically if we leave Earth's surface. On the Moon, for example, acceleration due to gravity is only 1.67 m/s^2. A 1.0-kg mass thus has a weight of 9.8 N on Earth and only about 1.7 N on the Moon." However, this value of 1.67 m/s^2 is not accurate. On the lunar surface, g is 1.625 m/s^2 (1.63 m/s^2 to 2 sig figs). Therefore, the 1.0-km mass would have a weight of 1.6 N on the Moon rather than 1.7 N. Please fix the value of g_Moon and the weight of the mass on the Moon.	Revise "1.67" to "1.62" and "1.7 N" to "1.6 N".
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.5 Newton's Third Law	Example 5.10, in the caption text of Figure 5.20. Change "...too small to drawn to scale..." into "...too small to BE drawn to scale..."	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.5 Newton's Third Law	Example 5.9 has no question; I suggest to turn it into one as follows: ++++++++++++++++++++++++++++++++++++++ EXAMPLE 5.9 Forces on a Stationary Object ==========	This example will be revised.

	The package in <url>Figure 5.19</url> is sitting on a scale. For the scale and package at rest (i.e. not accelerating), show that the scale indicates the weight of the package. Strategy ======== The forces on the package are <vector S>, which is due to the scale, and −<vector w>, which is due to Earth's gravitational field. The reaction forces that the package exerts are −<vector S> on the scale and <vector w> on Earth. Because the package is not accelerating, the sum of forces on the package are zero. Solution ======== For the package, application of the second law yields <vector S> − <vector w> = m <vector a> = <vector 0> so <vector S> = <vector w> The scale reading indicates the magnitude of the force <vector S>, which is equal to the magnitude of the package's weight. Significance ========== The scale actually does not measure the weight of the package; it measures the force −<vector S> on its surface. If the system would be accelerating, <vector S> and −<vector w> are not equal, as explained in <url>Applications of Newton's Laws</url>.	
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.5 Newton's Third Law	In Figure 5.20, the forces F_foot and F_floor should be drawn with equal length, because they are a action-reaction force pair and hence are equal in magnitude. In the figure, F_floor is noticeably shorter (measuring their actual lengths, length of F_floor is only 75% of F_foot). While this isn't a serious error, it's the kind of detail that is nice to get right.	This figure will be updated.

Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.6 Common Forces	Extraneous Text "object resting on horizontal surface": "object resting on horizontal surface. In scalar form, this becomes" N=mg "object resting on horizontal surface. The normal force can be less than the object's weight if the object is on an incline."	Delete "object resting on horizontal surface."
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.6 Common Forces	Submitted by Customer Support on behalf of user, Case 82944 In university physics, Vol 1, page 225, there is a typesetting error: in the equation at the foot of the page the .pdf copy shows Fnetx = Wx - mg sin 25 degrees. this should be Fnetx = Wx = mg sin 25 degrees. viz an equal to rather than minus. cordially, GN	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.6 Common Forces	The last line on page 225 contains a minor typo/error. It reads 'Fnet = Wx - mgsin25°' which is incorrect in this context since subtracting would result in zero. So the - was probably meant to be = and would make the statement true.	This equation will be updated.
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.6 Common Forces	The spring force equation should have a box and an equation number. It is a "fundamental" equation, equivalent to w = mg.	This equation will be numbered and set in a box. It will also be added to the key equations list.
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.6 Common Forces	These equations should not be boxed or numbered. They are not fundamental and are often incorrect (that is, they apply only to limited situations). Equation numbers in the rest of the book seem to be limited to fundamental statements (e.g. F = ma, w = mg). By applying equation numbers and highlighting with boxes, students may perceive these 4 equations as equally fundamental. This is especially problematic with the normal and	The formatting on these equations will be updated.

	tension forces, which are a source of wide-spread misconceptions, such as those given in these equations (e.g. N = mg).	
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Section 5.7 Drawing Free-Body Diagrams	In example 5.15, there is no question. Add a line as follows: "A force is applied to two blocks in contact, as shown. Draw the reaction forces between the two blocks."	Add " Draw the reaction forces between the two blocks." after the first line in the example.
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Chapter Review: Problems	ch. 5 Problem 71. The image wrongly describes the exercise. The resultant force that should go in the opposite direction to the T3 goes in the wrong direction. So instead of going in the opposite direction, it goes at an angle. case# 99115	This figure in the solution will be updated.
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Chapter Review: Problems	problem 57b asks for the tension between the ropes but instead we get acceleration as the answer	Revise the answer to part b to "65 N".
Unit 1 Mechanics: Chapter 5 Newton's Laws of Motion: Chapter Review: Problems	Ref: 25770 and 19291 As pointed out in ID 25770, the numeric answers to ch5 #57 should be changed from a. 65 N (wrong value and unit), b. 1.22×10^4 m/s^2 (wrong unit) to a. 0.106 m/s^2, b. 12,215 N = 1.22x10^4 N But also, the ISG/SSG has the correct answer for part a, but still has an incorrect answer for part b. b. 65 N ID 19291 (submitted in 2022) indicates that these errors were corrected in Spring of 2023, but it seems that wrong answers still lurk in both the web and ISG/SSG.	This issue was addressed in another report and will be corrected in web view.
Unit 1 Mechanics: Chapter 5 Newton's Laws of	The attached picture is extremely unclear. It isn't at all clear that pulley 4 is in contact with the foot. It also seems odd that the length of the force vectors are different, but their lengths	The figure will be updated. Also add to the end of the question: "Express answers in terms of

Motion: Chapter Review: Problems	have no physical significance. That is very confusing.	the unknown masses and angle."
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.1 Solving Problems with Newton's Laws	Submitted by Customer Support on behalf of user, Case 70464 I think there are errors in the correction, but I'm not sure #27. There are 3 Forces acting on a particle and asking to find the 3rd force, but in the solution the 3rd force is the negative of the first and second force, which should leave the velocity to 0, and not (3, 2)! #61. If I set the weight to 54k instead of 52k and use the formula a) g*cos(15)*54 b) g*sin(31)*54 I get the same answer, otherwise it's a bit off, so I'm I wrong with my logic or the problems have errors?	Remove the k direction from the problem and solution.
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.1 Solving Problems with Newton's Laws	its -500 not -5x10^3.	Revise "10^3" to "10^2".
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.2 Friction	"... glides down a slope that is inclined at θ=13^0 to the horizontal." "0" in the superscript should be °.	The superscript will be updated.
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.2 Friction	In Example 6.12 in the 'Strategy' section, the tension T is twice given as "Ti". For both occurrences change this into "T".	Revise "Ti" to "T".
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.2 Friction	Table 6.1 lists the coefficient of static friction between steel and ice (the last row) as being 0.4. Presumably it should be 0.04, which is the value listed in Table 5.1 of College Physics 2e.	Revise "0.4" to "0.04."

Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.2 Friction	Figure 6.19 b is said to be a free body diagram. In section 5.7 force vectors on free body diagrams have to extend away from the system. The force vectors in figure 6.19 b do not extend away from the system. The diagram should be corrected as it sets a bad example for drawing free body diagrams.	This figure will be updated.
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.2 Friction	The diagram in Example 6.13 is referred to as a free body diagram: "Figure 6.18 (a) A crate rests on the bed of the truck that is accelerating forward. (b) The free-body diagram of the crate.." Figure 6.18 b in fact violates the guidelines for free body diagrams set out in section 5.7. Specifically force vectors must extend away from the system. The force vectors do not extend away from the system in figure 6.18 b. The figure should be corrected to be a proper free body diagram as it sets a bad example for formalism on exams and consistency with the previous chapter.	This figure will be updated.
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.2 Friction	The diagram in Example 6.12 b is referred to as a free body diagram: "Figure 6.17 (a) Each block moves at constant velocity. (b) Free-body diagrams for the blocks." Figure 6.17 b in fact violates the guidelines for free body diagrams set out in section 5.7. Specifically force vectors must extend away from the system. They do not do so in figure 6.17 b. The figure should be corrected to be a proper free body diagram as it sets a bad example for	This figure will be updated.

	formalism on exams and consistency with the previous chapter.	
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.2 Friction	The diagram in Example 6.10 b is referred to as a free body diagram "The free-body diagram of the crate is shown in Figure 6.13(b). " 6.10 b in fact violates the guidelines for free body diagrams set out in section 5.7. Specifically force vectors must extend away from the system. They do not do so in figure 6.10 b. The figure should be corrected to be a proper free body diagram as it sets a bad example for formalism on exams and consistency with the previous chapter.	This figure will be updated.
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.2 Friction	The second last sentence before Example 6.10 reads, "For instance, neither formula is accurate for lubricated surfaces or for two surfaces siding across each other at high speeds." I think "siding" should be "sliding".	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.2 Friction	"The snowboarder is now moving down a hill with incline 10.0 degrees. What is the skier's acceleration?" The error is that it first refers to a snowboarder, then to a skier. The second sentence should instead read: "What is the *snowboarder's* acceleration?", or "What is *his/her/their* acceleration?"	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.3 Centripetal Force	chapter 6.3, Example 6.16. It says that tan31 = 0.609, but it is actually 0.6009. Case #00095590	This example will be updated.
Unit 1 Mechanics: Chapter 6	The inertial forces section in 6.3 introduces the term "inertial forces" with no reference to	Revise "inertial forces—forces" to "inertial forces—fictitious

Applications of Newton's Laws: Section 6.3 Centripetal Force	section 5.6 Common Forces in which the same phenomena are called "fictitious forces". It is not made clear whether fictitious forces are the same or different from inertial forces. Figure 6.24 has a force labeled Ffict which is clearly meant to be a fictitious force to the experienced reader but only inertial forces are mentioned in the section. This section should replace inertial force with fictitious force or explain that they are the same thing.	forces" and in the Figure 6.24 caption revise "an inertial force arising" to "a fictitious inertial force arising". Delete the sentence "This inertial force is said to be an inertial force because it does not have a physical origin, such as gravity."
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.4 Drag Force and Terminal Speed	author uses .7 m^2 for the area. It's unexplained where that number comes from. How can the cross-sectional area while falling horizontal be smaller than the one while falling standing?	Add the following to the end of the question stem: "Assume that in the spread-eagle position, the diver has a cross-sectional area of 0.70 m^2."
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Section 6.4 Drag Force and Terminal Speed	The 2nd interactive talks about the Reynold's number but the text does not contain any information about the Reynold's number.	Delete "the Reynolds number and".
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Chapter Review: Conceptual Questions	The question refers in the figure to the merry go-rounds rotating frame of reference, and emphasizes this by referring to the "dust trail of the lunchbox". In the *rotating frame* where the dust trail is viewed, not the inertial frame, the lunchbox will not leave a straight line dust trail (B) as suggested in the solution to the conceptual problem, but will be a trail moving radially outward (no line is drawn for this option). To help visualize this, consider that to leave a dust trail along lines any of paths A, B, or C, the lunch box will have to receive an angular acceleration to move it *ahead* of the child in the rotating reference frame.	The question and answer will be updated.
Unit 1 Mechanics: Chapter 6 Applications of	The answer to 63b is 0.655 m/s^2	Revise the answer to "0.655 m/s^2".

Newton's Laws: Chapter Review: Problems		
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Chapter Review: Problems	The answers in the solution guide have been changed and are much better for the problem. The problem should have a b = 175.0 or something in that range not .750. 0.750 results in a terminal velocity over 1000 m/s. As an aside, with b = 175 the terminal velocity is correct in the answer guide.	In the question stem, revise "0.750" to "7.50". Then update the answer for part d to "10.1 s".
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Chapter Review: Problems	In the ISG, the solution for 42c is incorrectly shown as 2.67 N. The correct answer 26.1 N. (They forgot to multiply by g.)	The solution will be updated.
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Chapter Review: Problems	Good morning i would like to report an error in chapter 6 task 76. In book circumference of The CERN particle accelerator is a 7km but reality is 26,659km. Also in this task we have to calculate acceleration of prtoton that moves with 5% of the speed of light which doesn't make sense since the main point of this particle accelerator is to make protons move with almost speed of the light (99.9999991%) so calcullating the task for speed of only 5% of the light doesn't make any sense.	Revise "7.0" to "26.7". The answer will also be updated.
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Chapter Review: Problems	In the question text, drag coefficient is given as 1.0 ("Use a drag coefficient for a horizontal skydiver.") for a squirrel. This gives a terminal velocity of 9.82 m/s (approx). However in the answer key, terminal velocity of a squirrel is given as 11.8 m/s, which can be only obtained by taking the drag coefficient as 0.7, which is the drag coefficient for a feet first falling skydiver, not horizontal. Either the question text or solution needs to be corrected.	Revise "horizontal skydiver" to "skydiver falling feet first".
Unit 1 Mechanics: Chapter 6 Applications of	Problem 128 in Chapter 6 appears to have the wrong answer in the instructor solution manual.	The answer will be updated.

Newton's Laws: Chapter Review: Additional Problems	When I do the calculation myself, I get 0.83 m/s^2 but the solution manual says 0.54.	
Unit 1 Mechanics: Chapter 6 Applications of Newton's Laws: Chapter Review: Additional Problems	The problem states "A child has mass 6.0 kg and slides down a 35° incline with constant speed under the action of a 34-N force acting up and parallel to the incline. What is the coefficient of kinetic friction between the child and the surface of the incline?" If the applied force is actually directed up and parallel to the incline, it's hard to imagine the child sliding down the incline, as the applied force is slightly larger than the component of the gravitational force that is directed down and parallel to the incline. Also, since the applied force that is supposedly acting up and parallel to the incline is only slightly larger than the component of the gravitational force that is directed down and parallel to the incline, it's not clear why the coefficient of kinetic friction given as the answer (0.42 from the instructor solution guide) would be so large. I feel as there is either an issue with the problem statement, the provided answer, or both.	Revise "34-N" to "13.4-N".
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Section 7.1 Work	Current text reads: For part (a), x_A=0 and x_B=6cm; for part (b), x_B=6cm and x_B=12cm. Please correct "x_B=6cm" in part (b) to read: "x_A=6cm" Full text given below for context For part (a), x_A=0 and x_B=6cm; for part (b), x_A=6cm and x_B=12cm.	Revise "x_B" to "x_A".
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Section 7.1 Work	Add an "(a)" at the beginning of the text: "(a) You lift an oversized library book...".	Add "(a)" before "How much work...".
Unit 1 Mechanics: Chapter 7 Work	The second equation in this section refers to a path integral and assumes knowledge of multivariable calculus. For instance students are	This section will be updated. Our reviewers determined that while students are likely to be

and Kinetic Energy: Section 7.1 Work	expected to know that dr is dx+dy+dz. These concepts are not introduced until volume 3 of openstax calculus. Since this is volume 1 of University Physics we can expect that most students will be bewildered by the beginning of this section if they are taking both calculus and physics in the usual sequence in college. This section should start with single variable calculus concepts or better yet start with work done by a constant force. Work in 3 dimensions with a constant force can be used to introduce work in 3 dimensions as this only requires knowledge of the scalar product which has already been covered in section 2.4. Placing multivariable calculus at the beginning of this section creates a needless barrier to students just starting calculus. Only two problems seem to require multivariable calculus in the review section, so it does not appear to be particularly important to the author and yet multivariable calculus seems central to the development of the section. Work as a 3 dimensional integral should be left to the end of the chapter so it can be ignored by students in Volume 1 of openstax Calculus as it is essentially ignored in the homework problems.	confused by the details of a line integral, this revision attempts to meet the problem head on and steer the students to familiar math. It removes the details that really are not helpful or necessary. Leaving Example 7.4 provides an opportunity to extend the math a little for those interested, but contains it within a well-defined space. This example also uses a simple example and reassures the student that the math required is not anything they do not already know.
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Section 7.2 Kinetic Energy	There is a typo in the solution to part (b). The two possible answers are for the kinetic energy relative to the tracks and not relative to the car as stated.	Revise "car" to "track".
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy:	The link to the PhET simulation called "the ramp" is broken. The link is https://openstax.org/l/21PhETSimRamp. It probably should be this one:	This link will be updated.

Section 7.3 Work-Energy Theorem	https://phet.colorado.edu/en/simulations/the-ramp	
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Section 7.3 Work-Energy Theorem	y2 = 2R not R	Revise "R" to "2R".
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Section 7.3 Work-Energy Theorem	broken link: https://openstax.org/l/21carcollvidrol	This link will be updated.
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Section 7.3 Work-Energy Theorem	The equation in the solution currently reads: N = -mgR + (m v_2^2)/R = (-mg + 2mg(y_1-R)) / R > 0. This is wrong. It should read: N = -mg + (m v_2^2)/R = (-mgR + 2mg(y_1-R)) / R > 0.	Revise the equation on the left to: N = −mg + (mv_2^2)/R = (−mgR + 2mg(y_1 − R)) / R > 0.
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Chapter Review: Problems	vf = sqrt(2*(-F*d + 0.5mv^2)/m) = 305.7 m/s m = 0.0026 kg v = 335 m/s F = 960 N d = 0.0254 m = 1 inch	Revise the answer to "313 m/s".
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Chapter Review: Problems	The answer should be 592 kJ Fup - mg - 100 = 0 Fup = mg + 100 Fup*d = (mg + 100)*d = (1500*9.8 + 100)*40 = 592 kJ	Revise the answer for part a to "592 kJ" and part b to "–588 kJ".
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Chapter Review: Problems	The work done by the boy pulling his sister does not depend on the force of friction acting on the wagon since we are given the force that the boy exerts. I suggest deleting the second sentence. It is misleading.	Delete "Assume no friction acts on the wagon."
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Chapter Review: Problems	Problem 7.25 is poorly worded: "work done on the lift" is British English for "work done on the elevator car", and is easily misunderstood. I would urge that the question ask about the "work done on the elevator car".	Revise "lift" to "elevator car" in the question stem.
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Chapter Review: Problems	7.24) Answer reported as 1480 J, but I get 1840 J -- could it be a transposition of the digits?	The solution will be updated.

Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Chapter Review: Additional Problems	Problem 7.93, part b, I believe is missing a negative sign: the spring does negative work on the crate. P.S. By and large, this is a marvelous textbook and resource. I am most grateful.	Revise "10. J" to "–10. J".
Unit 1 Mechanics: Chapter 7 Work and Kinetic Energy: Chapter Review: Additional Problems	Problem 7.91, part a: I believe the answer should be -0.50 J, rather than what is listed. The remainder of the problem seems to be correct.	Revise "−0.9 N · m" to "−0.5 N · m".
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.1 Potential Energy of a System	After the integration of ax^2 it's still showing ax^2 instead of ax^3 (does show the 1/3 and integration sign is gone with the evaluation limits showing on the right, so this is definitely post integration)	This issue was addressed in another report and will be corrected in web view.
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.1 Potential Energy of a System	In the solution for part (b) I suggest you put in the symbolic form of the result before putting in numbers. Plug in know symbolic expressions before plugging in numbers. Text says "The position of yB is half of the position at yC or −0.20m ." I suggest "The position of yB is half of the position at yC or yB=yC/2=-mg/k." Then use that result along with know y_C to plug into the first line of the solution: UB=$mgyB$+(1/2)k(yB)^2 UB=mg(yC/2)+(1/2)k(yC/2)^2 UB=mg(-mg/k)+(1/2)k(-mg/k)^2=-(mg)^2/(2k)=-0.12 J where we have used Y_C = -2mg/k from part (a)	This example will be updated.
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.1 Potential Energy of a System	In the solution part a) denominator has "6.0N/m" should be "6.0 N/m" (need space) part c) denominator has "9.8m/s^2" should be "9.8 m/s^2" (need space)	This example will be updated.

Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.1 Potential Energy of a System	It is left to the reader to infer that ΔU is the change in potential energy in equation 8.1. ΔUAB = UB−UA= −WAB. The sentence previous to equation 8.1: Based on this scenario, we can define the difference of potential energy from point A to point B as the negative of the work done: Should be changed to: Based on this scenario, the difference of potential energy from point A to point B (ΔUAB) can be defined as the negative of the work done by the force of gravity. Note that the scenario describes a kicked football. The illustration includes the work done by the kick as well as the work done by gravity. It should be made clear which work is meant in equation 8.1, or the work done by the kick should be omitted from the illustration.	Figure 8.2 will be updated. Before the figure, revise "ignore friction and air resistance" to "ignore friction and air resistance and begin the analysis immediately after the kick, at the start of the projectile motion of the ball"
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.1 Potential Energy of a System	The second last sentence before Example 8.3 reads, "Then, the constant is Equation 8.7 is zero.". The first "is" should be "in".	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.1 Potential Energy of a System	Potential energy for B is given as the summation of gravitational and elastic potential energy. However, the expression for elastic potential energy is false. It is given as k/2 * (yc)^2. It should be given as k/2 * (yb)^2. In the next line, both yc and yb are subbed out for -0.20 m. yb does equal -0.20 m, but yc does not. yc = -0.40 m. The solution to the problem remains correct.	Revise "y_C" to "y_B".
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation	The first sentence of 8.2 reads: "In Potential Energy and Conservation of Energy, any transition between kinetic and	Revise the sentence "In Potential Energy and Conservation of Energy, any transition..." to "In the

of Energy: Section 8.2 Conservative and Non-Conservative Forces	potential energy conserved the total energy of the system." This sentence seems to refer to section 8.3 assuming the reader is already familiar with conservation of energy. Conservation of energy has yet to be defined in this chapter. Since conservative and nonconservative forces only make sense in the context of conservation of energy this entire section should be moved to be after 8.3.	interactions we considered in Potential Energy and Conservation of Energy, any transition between kinetic and potential energy did not change the total energy of the system."
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.3 Conservation of Energy	Step 3 of the problem-solving strategy reads: "Determine whether each force that does work is conservative. If a non-conservative force (e.g., friction) is doing work, then mechanical energy is not conserved. The system must then be analyzed with non-conservative work, Equation 8.13." But equation 8.13 is for when there is no work done by non-conservative forces. Equation 8.12 is for the case when the work done by non-conservative forces is *not* zero, and should be referenced in the problem-solving strategy instead.	Steps 3-5 will be updated.
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.3 Conservation of Energy	Example 8.9 has U(x)=-E(x/x0), but then the solution assumes that U(x)=E(x/x0). Not sure which one is intended to be correct.	Revise "E" to "–E".
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.3 Conservation of Energy	The answer key gives the height of the mass above the lowest point of the pendulum curve when velocity = 0.81m/s as 3.3 cm, when the correct answer is 10cm. The 3.3cm is actually the displacement from the base of the triangle in the figure, and even then it should be negative.	Revise the answer to "0.10 m".
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.4 Potential	"This implies that U(x) has a relative minimum there. If the force on either side of an equilibrium point has a direction opposite from that direction of position change, the equilibrium is termed unstable, and this implies that U(x) has a relative maximum there." This is	This example will be updated.

Energy Diagrams and Stability	wrong, since if the force on either side of an equilibrium point has a direction opposite from that direction of position change, the equilibrium is termed STABLE, and this implies that U(x) has a relative MINIMUM there.	
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.5 Sources of Energy	The last sentence in the second last paragraph reads, "This concept has to do with seeking to decrease the amount of energy used by an individual or group through reducing activities (e.g., turning down thermostats, diving fewer kilometers) and/or increasing conversion efficiencies in the performance of a particular task, such as developing and using more efficient room heaters, cars that have greater miles-per-gallon ratings, energy-efficient compact fluorescent lights, etc." I think that "diving" should have been "driving".	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Section 8.5 Sources of Energy	The sentence, "Note that thermal energy can also be transferred from one place to another, not transformed or converted, by the familiar processes of conduction, convection, and radiation. In this case, the energy is known as heat energy." needs to be reviewed for better clarity. Trying to explain such a frequently confusing difference with such a sentence only creates more confusion.	Delete "Note that thermal energy can also be transferred from one place to another, not transformed or converted, by the familiar processes of conduction, convection, and radiation."
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Chapter Review: Problems	Please clear up question #22 in chapter 8 problems of the book University Physics Volume 1. It doesn't make sense. 00103171	Revise "from the water line" to "above the water line".
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Chapter Review: Problems	The given solution for problem 53 is 8700N/m. A woman weighing (an approximate guess of) 600N could not pull a spring with this spring constant back 1.5m. That would require almost 13000N of force - more than 20 times the weight of a typical person. Using the information given in the problem, and assuming the target to be on the ground (the problem doesn't say), we calculate a spring constant of about 1200N/m. Although closer to	This problem and answer will be updated.

	reasonable, this is still unreasonably high. Looking closely at the video we note at least two things that don't match the problem description. One, the watermelons do not appear to be 12kg - although they do grow that large, these appear to be a smaller variety - perhaps 3-6kg. Two, the woman appears to pull the slingshot back significantly further than 1.5m. Assuming she is about 1.5m tall - it appears she pulls it back a couple body lengths - perhaps 3-4m - although it is hard to find a frame in the video at maximum stretch - and it is hard to estimate the unstretched length. The other parameters, like the release point height, target distance, and even target height might also be more closely estimated. More careful measurements could produce a more accurate estimate - but the problem should at least be adjusted to give a reasonable answer that is physically possible - something that, at maximum stretch, requires a force of a few hundred N would seem about right.	
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Chapter Review: Problems	The solution manual says that the answer to part d of problem 74 in chapter 8 should be 1.3m but I keep on getting 1.1m. Is this an error (see screenshot attached)? Please advise. Thank you so much!	The solution will be updated.
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Chapter Review: Problems	In part b, it is unclear what FINAL kinetic energy means. What is the final state of the system? Assuming that this means the state just before the hanging block of mass m_2 hits the ground, the solution has an error. It should read ((1/2)*m_1 - m_2))*g*h. The answer in the book has the (1/2) factor on the wrong term. The factor of (1/2) comes from sin(30 degrees), which is multiplying the gravitational potential energy of the m_1 block on the inclined ramp.	Revise part b to "What is the final kinetic energy of the system, when m_2 hits the ground?" The solution will also be updated.

Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Chapter Review: Problems	The solution to part b) incorrectly states that the tension at the top of the swing is 40 N. This neglects the fact that the speed of the 1kg mass is lower at the top of the swing. Analyzing the situation at the top of the swing, the centripetal force is made up of the tension in the string + the force of gravity, both acting downward. Thus, the tension force is F_tension = F_centripetal - F_gravity = -mv^2/r + mg. Using the correct numbers, m = 1 kg, v = 4.6 m/s, r = 2 m, and g = 9.8 m/s^2, we get F_t = -0.8 N, or a magnitude of 0.8 N, directed downward. The answer in the solutions manual evidently uses the incorrect speed of v = 10 m/s, which is only correct at the bottom of the swing, NOT at the top. Using v = 10 m/s, we obtain F_t = 40 N. Therefore, the correct tension at the top of the swing is 0.8 N, directed downward.	The solution will be updated.
Unit 1 Mechanics: Chapter 8 Potential Energy and Conservation of Energy: Chapter Review: Problems	8.26) The answer reported in the solutions is dU/dx, but force is -dU/dx, so I get the negative of the answer reported.	The solution will be updated.
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Introduction	The Chapter 9 learning objectives state: * A single object can explode into multiple objects (explosions). * Multiple objects can collide and stick together, forming a single object (inelastic). * Multiple objects can collide and bounce off of each other, remaining as multiple objects (elastic). If they do bounce off each other, then they may recoil at the same speeds with which they approached each other before the collision, or they may move off more slowly. The description of elastic collisions is incorrect, and the description of inelastic collisions is misleading. An elastic collision is one that	Revise the bullets after "The possibilities include:" as follows: • A single object can explode into multiple objects (explosions). • Multiple objects can collide and bounce off each other, called an elastic collision, resulting in the same kinetic energy of the system before and after the collision. • Multiple objects can collide and the system loses kinetic energy, called an inelastic collision. One such case is where the two objects stick

	occurs with no energy loss. It is correct that objects move away from each other at the same relative velocities in elastic collisions ("recoil at the same speeds"), but it is NOT true that objects move away from each other at lower relative velocities ("move off more slowly") after elastic collisions. The description implies that if the objects move away from each other and remain as multiple objects the collision is elastic. This is NOT true. Objects can lose energy in an inelastic collision and still move apart remaining as multiple objects at lower relative velocities. This is the most common type of collision in the macroscopic world. The description also implies that a perfectly inelastic collision, in which the objects stick together, is the only type of inelastic collision. This is NOT true. See the paragraph above. Another issue with this description is that it implies that an explosion is the only case where the objects gain energy during a collision. This is NOT true. There are other situations where work is done to give the objects more energy after the collision. An example is where ice skaters collide and push each other away, increasing their kinetic energy. Few people would describe this as an "explosion." You should address this and consider changing your description. One suggestion for how to address this is to use the terms in the description in Thornton and Marion (2004). Classical Dynamics of Particles and Systems, 5th Ed. Thompson Brooks Cole, pp 358-359. Those authors define an energy change parameter, Q. Another misrepresentation in the same section is in the description of the different energy changes. The text says	together, forming a single object.

	* If $0<Kf<Ki$, the collision is inelastic. * If $Kf=0$, the collision is perfectly inelastic. * If $Kf=Ki$, the collision is elastic. * If $Kf>Ki$, the interaction is an explosion. While the case where the final kinetic energy is zero is one example of a perfectly inelastic collision, the description implies (but does not say) that the final kinetic energy is 0 for all perfectly inelastic collisions, which is not true. Some perfectly inelastic collisions have nonzero final kinetic energy. Also, the categorization of all collisions that gain energy as explosions is misleading. See the discussion earlier in this post. One way to handle this is to introduce the terms exoergic (energy gained), elastic (energy remains the same), and endoergic (energy lost) used by Thornton and Marion (2004) to describe the different cases.	
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.1 Linear Momentum	The caption currently reads "The velocity and momentum vectors for the ball are in the same direction. The mass of the ball is about 0.5 kg, so the momentum vector is about half the length of the velocity vector because momentum is velocity times mass. (credit: modification of work by Ben Sutherland)" Velocity and momentum have different units and therefore their vector magnitudes can't be compared. I suggest removing the second sentence of the caption.	The caption will be updated.
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.1 Linear Momentum	The second sentence in the description of Figure 9.2 reads, "The mass of the ball is about 0.5 kg, so the momentum vector is about half the length of the velocity vector because momentum is velocity time mass." I think "velocity time mass" should be "velocity times mass".	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 9 Linear	Your conceptual description of physics as "how hard it is to change an object's motion" is not	Add the following to the end of the sentence beginning "This is

Momentum and Collisions: Section 9.1 Linear Momentum	accurate. Momentum can be described as how hard it is to change an object's motion (speed or direction) over a short time. Kinetic energy could be described similarly, but with two key changes. Kinetic energy does not include direction and relates to distance. Kinetic energy reflects how hard it is to change an object's speed over a short distance. The difference between kinetic energy's relation to distance and momentum's relation to time is a primary concept in conservation. In a collision, two colliding objects do not move in the same direction or over the same distance. Kinetic energy need not be conserved. Both objects do move over the same amount of time, so momentum is conserved. If an engineer wishes to build a device to stop an object over a short distance, that engineer must be concerned with energy. If an engineer wishes to build a device to stop an object over a short time, that engineer must be concerned with momentum. If the student looks for it, then this difference can be seen in the definitions of work and impulse. If I were a student reading this text, I would be led to remember the equations and the procedures than to comprehend such very important differences that are difficult to notice and never really talked about in the text. The text should be aimed more at preparing students for course sequences for which the course is often a prerequisite than at helping students become end-of-chapter problem experts.	one of the things...": " over a short time interval".
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.2 Impulse and Collisions	There are two problems with this example that make it a misleading and confusing application. It is not clear that the phrase "one-quarter impulse" uses the word "impulse" in a sense that is consistent with the physics definition provided in this chapter. A specified impulse from the engines would produce a specified change in momentum, not a specified final speed, as seems to be implied. The word	This example will be updated.

	"impulse" certainly cannot be taken to mean "light speed" in a physics textbook. On the other hand, a quick Google search suggests that this is a misquote and that the actual term is "impulse power" which now implies an acceleration (proportional to the engine power, like a rocket). At any rate, if physics terms are misused in the quote then this needs to be either carefully explained, or -- probably better -- the quote deleted to avoid causing confusion. The significance states "This is an unimaginably huge force. It goes almost without saying that such a force would kill everyone on board instantly." This is not at all correct. The Earth is continuously subject to huge forces from the Sun but that causes us no harm -- it is acceleration (as discussed elsewhere in this chapter, and even in CHECK YOUR UNDERSTANDING 9.1) which would cause damage. A huge force divided by a large mass is not a problem. I recommend that the "Significance" be deleted, or that the acceleration be calculated in the problem, and then it be compared to the 10g benchmark from the Air Force as in the box below. The acceleration certainly is unimaginably huge and the significance can comment on that instead.	
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.2 Impulse and Collisions	Section 9.2 About 1/3 down: I think this is stated backwards: "Thus, you must subtract the final momentum from the initial momentum,...". It is the opposite of the figure where impulse and delta momentum are in the same direction. Case 58936	Revise "subtract the final momentum from the initial momentum" to "subtract the initial momentum from the final momentum".
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.2 Impulse and Collisions	seatbelt says seatback	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 9 Linear	Figure 9.17 in Example 9.7: the figure shows four stages of the collision between the ball and	This figure will be updated.

Momentum and Collisions: Section 9.3 Conservation of Linear Momentum	the ground at times t0, t1, t2, and t3. Therefore the horizontal axis is the timeline, not an 'x-coordinate' as written in the figure. Please replace 'x' by 'time'.	
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.3 Conservation of Linear Momentum	The second question is a duplicate of the first, letter-for-letter. Since the problem was talking about a ball and the Earth, I suspect the second question should be asking about the Earth.	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.4 Types of Collisions	The stated "second solution" is $v1,f=-2.5m/s$, $v2,f=0$. This is not a solution and obviously does not conserve kinetic energy. I believe what is meant was $v2,f=2.5m/s$, $v1,f=0$ -- i.e. the blue puck simply bounces back.	Revise "There is a second solution" to "There is a possible mathematical second."
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.4 Types of Collisions	the sign of the final velocities are wrong. After collision Blue puck (m2) is moving to R, therefore V2,f should be positive. Red puck (m1) is moving to L , so its velocity should be -2.22 m/s (not + as shown in book). Thanks!	Revise "Substituting the given numbers, we obtain" to "Substituting with the given numbers where a positive direction is to the left, we obtain".
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.4 Types of Collisions	The significance part at the end it says: "This is an example of the type of analysis done by investigators of major car accidents." However, the given situation is very unrealistic. The kinetic energy after the collision is greater than before. In a real car crash kinetic energy is lost (for bending steel, breaking car parts, sound, etc.). An investigator should frown his/her eyebrows when confronted with the analysis in this example.... I think it's a unrealistic presumption that a heavy truck comes to complete standstill in the collision with a small car and it's this part of the problem that needs changes. I am willing to discuss an alternative for example 9.13, if the reviewer agrees with my argumentation (I guess you know how to reach out to me).	This example will be updated.
Unit 1 Mechanics: Chapter 9 Linear	The image in the example contradicts the written description of the particles. The image	This example will be updated.

Momentum and Collisions: Section 9.4 Types of Collisions	shows the proton moving right and the neutron moving left. The written description says "What is the velocity of the deuteron if it is formed from a proton moving with velocity 7.0×106m/s to the left and a neutron moving with velocity 4.0×106m/s to the right?" the solution matches the image, not the written description, so please alter the written description to read: What is the velocity of the deuteron if it is formed from a proton moving with velocity 7.0×106m/s to the RIGHT and a neutron moving with velocity 4.0×106m/s to the LEFT?	
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.4 Types of Collisions	It is not "work-kinetic energy theorem." It is "work-energy theorem."	Revise "work-kinetic energy" to "work-energy".
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.4 Types of Collisions	The values presented as the solutions of the system are incorrect. Just substitute them into the conservation of kinetic energy equation and you will see that it is not correct. And the answer given in the end of the textbook is incorrect.	Revise v_1, f to "0" and v_2, f to "–2.5 m/s".
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.6 Center of Mass	The sentence, "Next, we assume that each of the particles making up our object can interact (apply forces on) every other particle of the object." needs "with".	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Section 9.7 Rocket Propulsion	In the example details (the question part itself, not the solution) we can see in part c that it wants the acceleration of the spacecraft at t = 35s. In the solution right below though, all the other parts of part c are answered except when t = 35s. Obviously it'll be the same as when t = 30s since the thrusters stopped working and thus no external forces are acting on the body, but that should still be clarified in the answer.	This example will be updated.
Unit 1 Mechanics: Chapter 9 Linear Momentum and	A sentence reads, "It was originally derived by the Soviet physicist Konstantin Tsiolkovsky in 1897." Back in 1897 Soviet Union did not exist.	Revise "Soviet physicist" to "Russian rocket scientist".

Collisions: Section 9.7 Rocket Propulsion	More accurate expression would be "Russian rocket scientist".	
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Chapter Review: Problems	Chapter 9, Problem 59. It looks like the answer provided in the solutions manual and at the end of the ebook is incorrect. I'm getting an answer of -1.47m/s i + 1.75 m/s j. Could you please check this? Thanks!	This solution will be updated.
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Chapter Review: Problems	Problem 38 says, "38. A 20-kg child is coasting at 3.3 m/s over flat ground in a 4.0-kg wagon. The child drops a 1.0-kg ball out the back of the wagon. What is the final speed of the child and wagon?" If the intended correct answer is "3.3 m/s" (that is, the 1.0 kg ball is dropped with a speed of 3.3 m/s relative to ground, so there's no reason for the wagon's speed to change), it feels like a trick question that doesn't help students learn. If the intended correct answer is 3.44 m/s, then it is necessary to clarify that the ball is released to be at rest in the ground reference frame, something like: "38. A 20-kg child is coasting at 3.3 m/s over flat ground in a 4.0-kg wagon. The child drops a 1.0-kg ball out the back of the wagon, so that the ball is at rest on the ground. What is the final speed of the child and wagon?"	Revise the question to: A 20-kg child is coasting at 3.3 m/s over flat ground in a 4.0-kg wagon. a. If the child drops a 1-kg ball out the back of the wagon, what is the final speed of the child and wagon? b. If the child drops a 1-kg ball out the back of the wagon so that the ball is at rest relative to the ground, what is the final speed of the child and wagon?
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Chapter Review: Problems	The figure below the problem is not an accurate representation of the situation described in the problem.	This figure will be updated.
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Chapter Review: Additional Problems	Question 92 does not provide enough information in order to solve for the impuulse.	Add "70 kg" before driver in the question stem.
Unit 1 Mechanics: Chapter 9 Linear Momentum and	My answer differs from the one given in the Instructor Solutions Guide and in the on-line answer key. I include my solution in a pdf file.	The answer will be updated.

Collisions: Chapter Review: Additional Problems		
Unit 1 Mechanics: Chapter 9 Linear Momentum and Collisions: Chapter Review: Additional Problems	The solution given in the guide is for skydiver 1 moving 1.2 m/s east instead of 1.2 m/s north as given in the problem. The given answers do not correspond to the stated question.	Revise "north" to "east".
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Section 10.1 Rotational Variables	The equation (which also appears in the caption of the figure) is simply wrong. Consider |theta|=2pi. Clearly, s should be zero, but the RHS is not zero. This equation is only valid for infinitesimal s and theta and needs to be clarified.	The equations are correct, but this section will be updated to clarify.
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Section 10.1 Rotational Variables	The unit analysis doesn't work in ω(t)=[(ts^−1−30.0)^2/100.0]rad/s. If t has the unit of inverse second then what is the unit of other numbers (30 and 100)?	Add the following to the end of the sentence beginning "It takes 30 s for the turbine...": ", where t is the time in seconds."
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Section 10.4 Moment of Inertia and Rotational Kinetic Energy	Several places in figure 10.20 the italicized character for capital letter i is used interchangeably for both moment of inertia and length. For example the moment of inertia for a thin rod about an axis through one end to length is I = M I^2/3. I know this is likely a font error, but it is deeply confusing to students and must be corrected.	Revise italicized, capital I to italicized, capital L.
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Section 10.4 Moment of Inertia and Rotational Kinetic Energy	The caption refers to "rotational inertia" for what in the text is called "moment of inertia". I recommend that the caption text be changed to: "Figure 10.20 Moment of inertia for common shapes of objects."	Revise "values of rotational inertia" to "values of moment of inertia" and in Figure 10.20 caption, revise "Values of rotational inertia" to "Moment of inertia". Our reviewers determined Table 10.4 was ok as is.
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation:	The last sentence of the second paragraph after Figure 10.27 reads, "The infinitesimal area of each ring dA is therefore given by the length of	Our reviewers accepted this change, and it will be included in the next print cycle.

Section 10.5 Calculating Moments of Inertia	each ring (2πr) times the infinitesimmal width of each ring dr:" The second "infinitesimal" has been misspelt.	
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Section 10.5 Calculating Moments of Inertia	The second sentence of the second paragraph after Figure 10.27 reads, "The area can be thought of as made up of a series of thin rings, where each ring is a mass increment dm of radius r equidistanct from the axis, as shown in part (b) of the figure." "equidistanct" should be "equidistant".	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Section 10.5 Calculating Moments of Inertia	In "The change in potential energy is equal to the change in rotational kinetic energy, $\Delta U+\Delta K=0$. At the top of the swing: $U=mghcm=mgL2(cos\theta)$. At the bottom of the swing, U=mgL2." it does not say with respect to which point is the gravitational potential energy is calculated.	Add "with respect to the lowest point the rod swings" to the end of sentence beginning "At the top of the...".
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Section 10.5 Calculating Moments of Inertia	In the check your understanding 10.5, it is, to apply the parallel-axis theorem, we need to find the moment of inertia of the axis that goes through the center of mass of the object, which would be the center of the circle right? And calculated right below it, the moment of inertia of an disk, with the axis of rotation right through the center of the circle is (1/2) MR^2. Meaning you would expect the answer to be I = (1/2)MR^2 + Md^2, or I = (3/2)MR^2, since d = R, however, in the answer key, the answer is given as I = MR^2 + MR^2. I = MR^2 is the equation for moment of inertia of a hoop around a cylinder axis, not a cylinder around a cylinder axis, which is what (I believe the question is asking for). Thus I think the answer is I = (3/2)MR^2, not I = 2MR^2	Revise "2" to "(3/2)".
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Section 10.6 Torque	This equation has a scalar on the right side and a vector on the left side. Needs correction.	Delete the vertical bars.

Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Section 10.7 Newton's Second Law for Rotation	Equation 10.25 $\sum\tau = I\alpha$. Should read $\tau net = \sum\tau = I\alpha$ or just $\tau net = I\alpha$ to be consistent with section 5.3 Newton's 2nd Law equations 5.3 or 5.4.	Add "τnet = "to the beginning of equations 10.25 and 10.26.
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Chapter Review: Problems	The answer says that the tangential acceleration 0.1m/s, it should be 0.1m/s^2.	Revise "0.1 m/s" to "0.10 m/s^2" in the answer to part c.
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Chapter Review: Problems	In Problem 91, the definition of "day" may not be clear, as the Earth's rotation rate is changing. Maybe it should define a day as "according to the current length" or "24 current hours" or some such. Also, "after 6 days" should probably be "for 6 days".	Revise "torque after 6 days, it" to "torque for 6 days according to the current length of a day, it".
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Chapter Review: Problems	The problem asks for the direction of a, but that requires the position of the blade. Maybe the problem should ask for the acceleration of a blade that lies along the positive x axis. Also, "blades" should be "blade".	Revise "tip of the blades" to "tip of the blade that lies along the positive x-axis".
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Chapter Review: Problems	You forgot to state the distance 50 cm that the block slides down the plane.	Add "The block slides a distance of 0.50 m." before "(a)" in the question stem.
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Chapter Review: Problems	Since the problem depends on the change of height of the sphere's CM, it would be helpful to adjust the figure so the axes "before" and "after" are the same height. Also, it would be more explicit to say in the first sentence that the axis is tangent to the highest point of the sphere, and to specify in the last sentence that the diagonal is through the axis, though both of those can be determined from the figure.	This figure will be updated.

Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Chapter Review: Problems	I don't understand how these problems can be done without stating a relationship between the linear velocity and the angular velocity of the propeller. Assuming they're proportional would make the problem possible, though it doesn't seem physically reasonable that the constant would be the same whether the propeller is attached or not, but if students are supposed to make that assumption, it should be stated explicitly.	These problems will be revised.
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Chapter Review: Problems	Hello, The instructor's solution manual has an incorrect answer for 10.88, part b. They forgot to square the time of 20 seconds. The answer should be 500 radians.	The solution will be updated.
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Chapter Review: Problems	Hello, In chapter 10, problem 75, the solution provided would require students to use the inner radius for the mass on the incline and use the outer radius for the hanging mass, but this is not clear from the image. If this is what students need to assume to complete the question, I think the wording might be a little misleading. I think this could be made more clear by one of these options: 1) Use the same radius for both masses in the solution 2) Update the wording and the figure to show that the string connected to the mass on the incline is wrapped around the smaller radius and that the string connected to the hanging mass is wrapped around the outer radius.	Revise the last sentence in the question stem to: The mass on the plane is connected to a cord that wraps around the pulley's inner radius of 20 cm. The hanging mass is connected to a cord that wraps around the pulley's outer radius of 30 cm. The figure will also be updated.
Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Chapter Review: Problems	In the course of this solution, the solution manual incorrectly evaluates the tangential acceleration of the child at 5 seconds, stating that a_t = r*alpha = (3.0m *0.25 rad/s^2) = 1.9 m/s^2, when clearly this equals 0.75 m/s. With this correct tangential acceleration, the correct total acceleration should be 4.75 m/s^2, and the required force should be 190 N. The conclusion that the child remains on the merry-go-round remains the same.	This solution will be updated.

Unit 1 Mechanics: Chapter 10 Fixed-Axis Rotation: Chapter Review: Problems	Problem 10-109, part b), in the Solutions manual and in the Answer Key at back of text, one needs to convert "105.0 rad" to "16.7 revolutions" in order to answer the question as it was asked.	Revise "angular acceleration" to "angular acceleration, in radians/s^2," and in the answer, revise "105.0 rad" to "16.7 revolutions".
Unit 1 Mechanics: Chapter 11 Angular Momentum: Section 11.1 Rolling Motion	In the paragraph after Eq 11.4 this sentence appears: "Note that the acceleration is less than that for an object sliding down a frictionless plane with no rotation." English sentences can be ambiguous based on emphasis. This: "Note that the acceleration is less than that for an object sliding down a frictionless plane with no rotation." has the opposite meaning to this: " Note that the acceleration is less than that for an object sliding down a frictionless plane with no rotation.". One could say " Note that the acceleration is less than that of an object sliding down a frictionless plane with no rotation." Case #58936	Revise "for" to "of".
Unit 1 Mechanics: Chapter 11 Angular Momentum: Section 11.1 Rolling Motion	The figure shows the angular acceleration is the ratio of \alpha_{CM} to R, but the numerator should be a_{CM}, as this is what is shown in the free-body diagram.	This figure will be updated.
Unit 1 Mechanics: Chapter 11 Angular Momentum: Section 11.1 Rolling Motion	Figure 11.3 (a) thr direction of the static friction must be to the left not to the right.	This figure will be updated.
Unit 1 Mechanics: Chapter 11 Angular Momentum: Section 11.4 Precession of a Gyroscope	The precession angle is labeled d_ϕ; should simply be dϕ.	This figure will be updated.
Unit 1 Mechanics: Chapter 11 Angular Momentum:	In the second line of the solution, a 2 was lost in the solution once the numbers were plugged in.	The solution will be updated.

Chapter Review: Problems		
Unit 1 Mechanics: Chapter 11 Angular Momentum: Chapter Review: Problems	Online book problem: A gyroscope has a 0.5-kg disk that spins at 40 rev/s. The center of mass of the disk is 5 cm from a pivot with a radius of the disk of 10 cm. What is the precession angular velocity? Old solution guide used 10cm for both CG/Pivot distance and radius of disk. Errata and updated solution guide use 15 cm for CG/Pivot distance.	Revise "5 cm" to "15 cm" in the question stem.
Unit 1 Mechanics: Chapter 11 Angular Momentum: Chapter Review: Problems	Problem 33 states that the hollow cylinder is given an initial velocity of 5.0 m/s and rolls to a height of 1.0 m. This is incorrect, as a conservation of mechanical energy calculation shows that a hollow cylinder initially rolling at 5.0 m/s does not stop at a height of 1.0 m. In any case, the initial velocity is unnecessary information to solve the problem (and its incorrect value makes the problem confusing). What is important is just that the initial velocities of the two objects are the SAME. I suggest the following correction: "A hollow cylinder that is rolling without slipping is given an initial velocity and rolls up an incline to a vertical height of 1.0 m. If a hollow sphere is given the same initial velocity, how high vertically does it roll up the incline?" Note: the fact that the mass and radii of the two objects is the same is also unnecessary information (although not as confusing as the incorrect initial velocity value) so I removed that. The solution to the problem also needs to be corrected. Thanks!	This question stem and answer will be updated.
Unit 1 Mechanics: Chapter 11 Angular Momentum: Chapter Review: Problems	For the given apogee and perigee, the velocity at apogee is pre-determined by conservation of energy and must be 1.677 km/s. It can not be 3.0 km/s without having to change the perigee radius.	In the question stem, revise "3.0" to "1.68". In the answer, revise "18.3" to "10.2".

Unit 1 Mechanics: Chapter 11 Angular Momentum: Chapter Review: Problems	There is an error in Ch 11 problem 33 and its solution. This stems from the fact that 'h' and 'v' are not independently specifiable. You can see this easily by adapting the given solutions. Instead of subtracting the equations, solve for h_{cyl} and h_{sph} directly in terms of v_0. This gives: $$ h_{cyl} = v_0^2 / g $$ and $$ h_{sph} = (5/6) v_0^2 / g $$ So indeed it is true that the difference in height is $v_0^2/(6g)$ as the solution claims. But $h_{cyl} = 1 m$ is simply not valid for $v_0 = 5 m/s$ so the final answer as well as the problem itself makes no sense. This issue was flagged already (correctly) under errata 8226, but for some reason the reviewers rejected it (perhaps because the expression for δh is correct even though the final answer is not?). I recommend changing the question along the lines of the original errata.	The answer will be updated.
Unit 1 Mechanics: Chapter 11 Angular Momentum: Chapter Review: Problems	The problem currently reads: "The center of mass of the disk is 10 cm from a pivot which is also the radius of the disk. What is the precession angular velocity?" What is meant by this is that the center of mass is 10 cm from the pivot point of the gyroscope, and additionally, the radius of the gyroscope is 10 cm. These are completely unrelated quantities and the current wording is very confusing. Suggested correction would be to give the disk a unique radius and state it separately.	Revise the second sentence in problem 75 to "The center of mass of the disk is 15 cm from a pivot with a radius of the disk of 10 cm." Revise the answer to problem 75 to "1.17 rad/s". Revise the last sentence in problem 76 to "If the mass of the rotating disk is 0.4 kg and its radius is 30 cm, and the distance from the center of mass to the pivot is 40 cm, what

		is the rotation rate in rev/s of the disk?"
Unit 1 Mechanics: Chapter 12 Static Equilibrium and Elasticity: Section 12.2 Examples of Static Equilibrium	In Example 12.5 there is static friction on the ladder. Throughout the solution the static friction is taken as equal to "μs x N", but this is the MAXIMUM static friction, which is NOT the actual static friction on the ladder. In this example we can calculate the static friction, but NOT the coefficient μs. UNLESS the given 53 degrees is the critical angle at which the ladder starts sliding away....	This example will be updated.
Unit 1 Mechanics: Chapter 12 Static Equilibrium and Elasticity: Section 12.3 Stress, Strain, and Elastic Modulus	the use of "British system of units," is misleading. These units are not used in Britain. "Imperial units" would be a better term.	Revise "British" to "Imperial".
Unit 1 Mechanics: Chapter 12 Static Equilibrium and Elasticity: Chapter Review: Problems	The values in the solution have way too many sig figs and the angle is lacking the degree symbol as well as relative direction. Should read: T = 171 kN; force at A = 188 kN at 31.3º above the horizontal Or, if you don't want to use kN that's fine, but either way the values should have 3 sig figs.	The solution will be updated.
Unit 1 Mechanics: Chapter 12 Static Equilibrium and Elasticity: Chapter Review: Problems	the answer is changed from 32.9 cm in English version to 9 cm in Polish version	We have shared this correction with our Polish translation partner.
Unit 1 Mechanics: Chapter 12 Static Equilibrium and Elasticity: Chapter Review: Problems	The use of 45 degrees for the angle of the boom is not good practice pedagogically, as students could use sin(45 degrees) or cos(45 degrees) in calculating the torques, and get the same correct answer, without really verifying that they know how to correctly identify what angle to use in the "rF*sin(theta)" equation (or, equivalently, how to calculate the lever arm). It would be better to use any angle other than 45	The angle will be updated in the figure.

	degrees. This would require modifying the diagram as well.	
Unit 1 Mechanics: Chapter 12 Static Equilibrium and Elasticity: Chapter Review: Problems	There are several issues with Problem #51. First of all, it appears that the solution is incorrect (I believe it lists the deformation as 0.149 μm when it should be 14 μm). For comparison, virtually all parameters of this problem are the same as Problem 50, except the height of the cylinder is larger. Since Δx, the shear deformation, is proportional to L_0, the height, a larger height should result in a larger shear deformation, not a smaller one. Second, the problem asks the student to compare the answer to the preceding problem. In order to compare apples to apples, the shear force that is given should be equal — either 500 N or 600 N for both problems. Finally, I believe that the problem expects the student to say that problems with disks are more common, since it's phrased "Are spinal problems more common in disks than in vertebrae?" and indeed, that *is* the case. However, this answer isn't really supported by the problems, since the deformation of the vertebra is actually greater than the disk. This part of the problem should either be modified or removed. (In actuality, I suspect that problems with disks — usually the fact that they slip — doesn't have to do with the shearing of the disk itself!)	Delete "How does your result compare with the result obtained in the preceding problem? Are spinal problems more common in disks than in vertebrae?" from the question stem. In the answer, revise "0.149" to "11.9".
Unit 1 Mechanics: Chapter 13 Gravitation: Section 13.1 Newton's Law of Universal Gravitation	The book claims "Nicolaus Copernicus (1473–1543) is generally credited as being the first to challenge Ptolemy’s geocentric (Earth-centered) system and suggest a heliocentric system, in which the Sun is at the center of the solar system." This is false. Copernicus himself makes great pains to clarify that these ideas were proposed by the ancients. In particular, we know from Archimedes that Aristarchus of Samos proposed a heliocentric model around 1800 years before	Revise the sentence "Nicolaus Copernicus (1473–1543) is generally credited..." to "The idea of heliocentrism, in which the Sun is at the center of the solar system, dates at least as far back as Aristarchus of Samos in the third century BCE, but attracted little attention, and Ptolemy’s geocentric (Earth-centered) model held sway in Europe until the sixteenth

	Copernicus. It would be accurate to say that Copernicus proposed the idea and brought it to prominence in the Renaissance and Early Modern eras. It would also be accurate to say he was the first to produce a detailed mathematical model of a heliocentric system (on par with Ptolemy's model).	century. Nicolaus Copernicus (1473–1543) is generally credited as being the first to produce a mathematical model of a heliocentric system and to challenge Ptolemy's geocentric system."
Unit 1 Mechanics: Chapter 13 Gravitation: Section 13.1 Newton's Law of Universal Gravitation	In the velocity calculation, where numerical values are plugged in, the acceleration is written as 2.2e-9 N. It should be 2.2e-9 m/s^2	Revise "N" to "m/s^2".
Unit 1 Mechanics: Chapter 13 Gravitation: Section 13.2 Gravitation Near Earth's Surface	The names of vectors in Fig.13.9 are inconsistent with the text. In the text, it is mentioned that at the equator the scale exerts an upward force F_S, while in in Fig.13.9 it is denoted F_SE. In the figure, F_S is used for the point at angle lambda; for that point the third red vector is not named. The caption of the figure discusses only accelerations (not show in the figure), and does not mention forces (shown). Symbols F_SN and F_SE used in the figure are not explained or used in any way in the text or in the caption. Additionally, using F_S in the discussion 'Results Away from the Equator' may be misleading when compared with the figure.	These will be updated in the text.
Unit 1 Mechanics: Chapter 13 Gravitation: Section 13.2 Gravitation Near Earth's Surface	I would recommend either removing this section entirely or expanding it a fair bit and making it a separate section of the book (which most instructors could then skip over and not have their students read). As is, it won't make sense to any student. Lines like "As is true for any vector field, the direction of $\vec{\mathbf{g}}$ is parallel to the field lines at any point" are a giveaway - the book hasn't discussed field lines _at all_ up to this point, and still doesn't explain them here! The diagram shown illustrating the vector field doesn't even use field lines! There's a reason that standard treatments talk about this kind of thing when	Our reviewers determined removing or expanding this section would require a significant book revision. While we cannot make this change at this time, we will consider it for future editions of this book. However, smaller changes will be made to improve the existing section and Figure 13.8.

	getting to electricity but not before. Even more broadly, I think that at this point in their studies most students would find confusing the concept of “g” as something that exists at all points in space. We’re _just_ starting to get them to generalize from the mg of chapter 5 to Newton’s law of gravity, and they’ve all memorized that g = 9.8 m/s^2. Telling them that they can use mg everywhere is not helpful at this point. Also, keep in mind that the vast majority of students who use this text will _not_ be continuing on in physics as majors, and will never need or use the concept of a gravitational field. Instructors who wish to introduce it here are perfectly capable of doing it as a supplement on their own (or with a separate section of this book). Regardless, there are a number of things in this section that do not actually fall under the category of the section title of "Gravitation Near Earth's Surface".	
Unit 1 Mechanics: Chapter 13 Gravitation: Section 13.3 Gravitational Potential Energy and Total Energy	In example 13.7 it is listed that "Earth is rotating, at a speed of nearly 1.7 km/s at the equator, and we can use that velocity to help escape, or to achieve orbit." However, this is not correct. At the equator Earth is rotating with a velocity of Earth's circumference/1 day = 2*pi*6371/(60*60*24) = 0.46 km/s.	Revise 1.7km/s to 460 m/s.
Unit 1 Mechanics: Chapter 13 Gravitation: Section 13.4 Satellite Orbits and Energy	The final method for calculating total energy appears to be incorrect. Either the comment about another way to calculate total energy is intended in which case it should be: Eorbit=Korbit+Uorbit=-2.65x10^11J (but that equation was already printed above), OR The intention is to calculate the CHANGE of total energy in which case the equation listed should be: <Delta>E=Korbit+<Delta>U=2.98x10^11J.	This equation will be updated.

Unit 1 Mechanics: Chapter 13 Gravitation: Section 13.4 Satellite Orbits and Energy	The caption says "r_orbit = 1/2r". It should read "r_orbit = r/2"; "1/2r" makes it look like "r" should be in the denominator.	Revise "1/2r" to "r/2".
Unit 1 Mechanics: Chapter 13 Gravitation: Section 13.6 Tidal Forces	The caption to Fig. 13.7.1 reads, "It is the difference between the gravitational force from the far side to the near side that creates the tidal bulge on both sides of the planet," and the graphic illustrates this claim, but this is totally, radically wrong; no description of the tides that omits the fact that the Earth and Moon are _orbiting_ each other, giving rise to centrifugal (virtual) forces, can account for Earth's tidal bulge on the far side from the Moon. It is the centrifugal force arising from the Earth and Moon orbiting around their barycenter, not a mere difference in gravitational force, that raises this bulge. Chapter 13's whole explanation of the tides should be re-written and re-illustrated. For an accurate account of how two daily tides arise on Earth, see https://tidesandcurrents.noaa.gov/restles3.html	The caption will be updated.
Unit 1 Mechanics: Chapter 13 Gravitation: Section 13.6 Tidal Forces	there isn't enough information in the text or in the link itself to find the correct page	This link will be updated.
Unit 1 Mechanics: Chapter 13 Gravitation: Chapter Review: Problems	i, Chapter 13, problem 70 is confusing as the diameter is given as a range, 578 - 458 km, and the radius of the object is outside of that range, 520 km or 1040 km diameter. I just had the class use 520 km and ignored the inconsistency. 72. After Ceres was promoted to a dwarf planet, we now recognize the largest known asteroid to be Vesta, with a mass of 2.67×1020kg and a diameter ranging from 578 km to 458 km. Assuming that Vesta is spherical with radius 520 km, find the approximate escape velocity from its surface.	In exercise #72, revise "578 km to 458 km" to "458 km to 578 km". Our reviewers determined there were no errors in #70.

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Unit 1 Mechanics: Chapter 13 Gravitation: Chapter Review: Problems	This problem has two main issues: (1) the observations of the Milky Way that indicate its mass to be 8 x 10^11 solar masses are based on *luminous* matter, so this should be made clear; (2) the discrepancy between the measured orbital periods and actual orbital periods of stars at the periphery of the galaxy is *far* too great to be explained by the existence of a black hold at the MW's center (and never mind the fact that rotation curves do not support this as a possibility, either). I suggest the following revision to the wording of the problem: "Astronomical observations of light from our Milky Way galaxy's stars indicate that it has a mass of about 8.0 × 10^11 solar masses. A star orbiting on the galaxy's periphery is about 6.0 × 10^4 light-years from its center. (a) What should the orbital period of that star be? (b) If its period is 6.0 × 10^7 years instead, what is the mass of the galaxy? Such calculations are used to imply the existence of mass that does not emit any light. Scientists do not what it is comprised of, so this mass is known simply as "dark matter" and remains an enduring astronomical mystery."	Revise "Astronomical observations of our Milky Way galaxy..." to "Astronomical observations of light from our Milky Way galaxy's stars..." and revise "Such calculations..." to "Such calculations are used to imply the existence of mass that does not emit any light. Scientists do not what it is comprised of, so this mass is known simply as "dark matter" and remains an enduring astronomical mystery."
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.1 Fluids, Density, and Pressure	In Table 14.1, the density of methane is given as 7.20×10^{−2} kg/m^3 -- which is less dense than everything else listed (including Hydrogen and Helium). This is incorrect - it should be 7.20×10^{−1} kg/m^3 .	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.1 Fluids, Density, and Pressure	Submitted by Customer Support on behalf of user, Case 71800 I would like to offer three corrections for University Physics, Vol. 1, Chapter 14. - Table 14.1: density of uranium should be 1.87 x 10^4, not 10^3	In Table 14.1, revise the density of uranium to "1.87 x 10^4". In Example 14.8, revise "artery" to "conduit". Table 14.4 was updated in errata 18185.

	- Table 14.4 viscosities should be multiplied 10^-3, not 10^3 - Example 14.8 replace reference to "artery" with "conduit"	
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.2 Measuring Pressure	In the solution one gets to the equality rho_1 h _1 = rho_2 h_2. However, the next line does not follow. I belive it should be h_2 - h_1 = h_2 - \frac{rho_2}{rho_1} h_2 = h_2(1- \frac{rho_2}{rho_1}). Note that the current answer and text below replace densith with pressure and has the indices messed up. Hope that helps! Thanks for the great content.	Revise "ρ_1/ρ_2" to "ρ_2/ρ_1".
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.3 Pascal's Principle and Hydraulics	Submitted by Customer Support on behalf of user, Case 67901 Hello, I found a typo (really, a missing word) in Chapter 14.3 of University Physics Volume 1. The sentence in question reads: "Thus, the pressure at the bottom also increases by Mg/A. The pressure at the bottom of the container is equal to the sum of the atmospheric pressure, the pressure due the fluid, and the pressure supplied by the mass." I think the authors meant "the pressure due *to* the fluid".	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.4 Archimedes' Principle and Buoyancy	The sentence "If the buoyant force is greater than the object's weight, the object rises to the surface and floats" is correct but poorly worded and misleading to students. I would recommend changing this to "If the buoyant force is greater than the object's weight, the object accelerates upward". There are two reasons for this. First, some students will take away from this sentence that an object floating on the surface has greater buoyant force than weight force ("If the buoyant force is greater than the object's weight, the object... floats"!). There is no mention that once the object reaches the surface the buoyant force will _change_. "Floating" suggests an equilibrium. (I just gave a	This sentence and the surrounding paragraph will be updated.

	reading quiz on this section, and I had students incorrectly answer a question and then specifically cite this line in support of their answer. I had to give them credit, because this sentence is so poorly worded that I could understand how they got confused.) Second, we spent a lot of time back when we introduced acceleration getting students to distinguish it from velocity, so why not continue that care? An object could rise, for a bit, even if the buoyant force is less than its weight force. E.g., if you add air to any projectile motion problem we did in earlier chapters. And an object could still sink, for a while, even if the buoyant force is greater than the weight force (e.g., an air-filled box dropped off a bridge).	
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.4 Archimedes' Principle and Buoyancy	Figure 14.23 shows a coin that is weighed in air and in water. The Weight (Force due to Gravity) of the coin is shown to be the same in both scenarios when looking at the pictorial depiction. But, in the Free Body Diagram (FBD) of the coin in water, it shows the Weight (Force due to Gravity) of the coin (which has not changed mass) as larger in magnitude than the Weight (Force due to Gravity) in the FBD of the coin weighed in air. If the mass of the coin is constant, then I imagine that the force due to gravity is the same in both BFDs (F^G = mg). It also shows the Force due to Tension (F^T) as same magnitude in all depictions, which I disagree with. Since the coin is stationary, the sum of upward and downward forces is zero (F_net = 0 N); shouldn't the Force of Tension (an upward force) decrease when the coin is submerged in water to compensate for the new Force due to Buoyancy (a new upward force) so that they are equal in magnitude to the Weight of the coin (the downward Force due to Gravity).	This figure will be updated.

	In the picture, it then states that the Force due to Tension (F^T) is equal the Weight (Force due to Gravity) of the coin when in air, and that the F^T is then equal to the Apparent Weight when submerged in water. In the section below it states that the Appetent Weight of the submerged coin is less than the Weight (Force due to Gravity) of the coin in air; this also leads me to believe that the magnitude of the F^T in the of the coin weighted in water should be smaller that the F^T of the coin weighed in air, while the magnitude of the Weight (Force due to Gravity) is constant in all scenarios.	
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.5 Fluid Dynamics	Dear All Kindly see Pg No 707 in UNIVERSITY PHYSICS VOLUME 1 The Text "Consider Figure 14.28. The pipe in the figure starts at the inlet with a cross sectional area of and" needs to be replaced with "Consider Figure 14.27....." Thanks for the Great Work . Warm Regards 96481	This figure reference will be updated.
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.5 Fluid Dynamics	The answer to part (b) should be 4.42 m/s, and the answer to part (d) should be 1.63 cm.	This solution will be updated.
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.6 Bernoulli's Equation	With the values given, the gauge pressure at the nozzle is nonzero. To three significant figures (which is consistent with the values given), you find the gauge pressure at the nozzle to be -1.82 kPa. This is certainly small compared to atmospheric pressure, but it is disingenuous to say it is zero. I recommend either given all values to more	This example will be updated.

	significant figures, or giving a more detailed explanation under Significance.	
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.6 Bernoulli's Equation	The sentence just before Figure 14.30 reads, "...—and since the fluid in incompressible, the shaded volumes must be equal." That "in" should be "is".	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.6 Bernoulli's Equation	In Figure 14.30: the area A2 has a superfluous subscript 'a'. Change A_{2a} into A_{2}.	This figure will be updated.
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.6 Bernoulli's Equation	I plugged in the equation for p2 and p2 does not equal 0	Revise "–1.82" to "–2.9".
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.7 Viscosity and Turbulence	In the third column heading, viscosity is given without units. For pedagogical consistency (and consistency with the second column heading in the same table), I recommend changing this heading to "Viscosity η (10^–3 Pa·s)". We spend a lot of effort teaching our students to always use units, so it's important that we model the practice ourselves.	Revise "10^–3" to "10^–3 Pa · s".
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.7 Viscosity and Turbulence	In three places in this example, Reynold's number is given the symbol R. However, in the main text (Eq.14.20) it is given the symbol N_R; the symbol R is used in Eq. 14.18 to mean the flow resistance. For consistence Reynold's number should be called N_R everywhere, and the symbol R reserved for flow resistance.	Revise "R" to "N_R".
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Section 14.7 Viscosity and Turbulence	In header of Table 14.4, the Viscosity has a multiplication factor of 10^3. This is incorrect. The factor should be 10^(-3). See attached screenshot.	Revise "10^3" to "10^–3".
Unit 1 Mechanics: Chapter 14 Fluid Mechanics:	Chapter 14 Question 80 reports the first answer as 0.402 L/s when it should be 4.02 * 10^-4 L/s	The answer will be updated.

Chapter Review: Conceptual Questions		
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Chapter Review: Problems	The question refers to Archimedes' principle. Answer key refers to Pascal's principle.	This question will be updated.
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Chapter Review: Problems	Problem 14-113: There is a typo in the statement of the problem: the flow rate of blood through the capillary should be 3.80 x 10^{-9} cm^3/s, not the unphysical value of 3.80 x 10^{+9} cm^3/s. The solution, however, uses the correct value.	Revise "10^9" to "10^–9".
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Chapter Review: Problems	Submitted by Customer Support on behalf of user, Case 70656 There is an error in the Solution book of Vol 1 ch. 14 Problem 76: The solution is not 1,39 cm^3/s but 83,3 cm^3/s. and accordingly in (b) there is also a mistake.	The solution will be updated.
Unit 1 Mechanics: Chapter 14 Fluid Mechanics: Chapter Review: Additional Problems	The answer to Chapter 14, Question 75 is listed as 2.77, but it should be 2.78 (the answer is 2.77777..., and thus should round up to 2.78)	Revise "2.77" to "2.78".
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.1 Simple Harmonic Motion	The sentence reads: The maximum acceleration occurs at the position (x=−A), and the acceleration at the position (x=−A) and is equal to −amax. It should read: The maximum acceleration occurs at the position (x=−A), and the acceleration at the position (x=−A) and is equal to amax. At x=-A the force must be in the positive direction so amax must be positive and not negative.	Delete the negative sign before amax.

Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.1 Simple Harmonic Motion	The equation incorrectly uses ω instead of ϕ (this is after the 3rd equality sign in Aωsin(ωt + ω) replace with Aωsin(ωt + ϕ) Additionally figure 15.8b has a horrendously skewed/distorted cosine plot, it should be replaced with a plot which truly looks like shifted cosine.	This figure will be updated.
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.1 Simple Harmonic Motion	Hello, The first equation under this section states that Fnet=ky−ky0−(ky0−ky1)=−k(y−y1). It is unclear how the ky_0 cancels out if they both are the same sign. It may be necessary to not put the negative sign for the delta y in the equation −k(−Δy)=mg, under figure 15.9, as the delta y seems to describe the magnitude of the displacement, since the k is negative, showing that the force is acting opposite of the direction of displacement. This would make the second equation under figure 15.9 -k(Δy) = mg -k(y_0 - y_1) - mg = 0 mg = -k(y_0 - y_1) This may help with the terms canceling for the later equation. Sorry, the previous correction I submitted (20131) is incorrect. This may work instead: When it is described that the block is displaced to position"y", the Fspring part of the net force equation should be -k(y-y_0) instead of k(y-y_0) since the spring force is acting in the opposite direction of the displacement. Changing to position y makes the displacement positive, which would make the spring force negative.	The equations in this section will be updated.
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.1 Simple Harmonic Motion	The velocity equation for simple harmonic motion has -Awsin(wt+w). I think it should be -Awsin(wt+phi) instead.	Revise "ω" to "ϕ".

Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.4 Pendulums	Example 15.5: "l = 0.30m" change small "l" into capital "L", conform Figure 15.23.	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.4 Pendulums	In Step 3 of the solution, the period of a physical pendulum is given as T = 2*pi*\sqrt{I / mgL}. In that formula, the variable L is supposed to be the distance between the pivot point and the center of mass (see Fig. 15.21). However, in the example, the variable L has already been defined as the entire length of the physical pendulum inside the skyscraper, which is twice the distance from the pivot point to the center of mass. This leads to confusion in the remainder of Step 3, where L in the expression for T is replaced by L/2 with no explanation. It would be better to define the length of the physical pendulum using a different letter, for example "H" for height. Then H = 2L, where L is the variable in the expression for T.	The solution will be updated.
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.4 Pendulums	The 2nd sentence in the paragraph before Equation 15.17 reads: But note that for small angles (less than 15 degrees), sinθ and θ differ by less than 1%, so we can use the small angle approximation sinθ≈θ. It should read But note that for small angles (less than 15 degrees or about 0.26 radians), sinθ and θ differ by less than 1% if θ is measured in radians. We can then use the small angle approximation sinθ≈θ. The original sentence neglects to mention that θ must be in radians for small angle approximation to work.	Revise "...(less than 15 degrees), and differ by less than 1%, so we can use the small angle..." to "...(less than 15 degrees or about 0.26 radians), and differ by less than 1% if θ is measured in radians. We can then use the small angle..."
Unit 2 Waves and Acoustics: Chapter 15 Oscillations:	The calculation for 2L in step 4 is wrong.	Delete step 4 from the solution.

Section 15.4 Pendulums		
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.4 Pendulums	I think the answer to example 15.4 of University Physics, Volume 1 is not correct. Why is L = 1.49 m and how can H = 2L = 5.86 m?	Revise "5.96" to "2.98".
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.6 Forced Oscillations	figure 15.31 is wrong, at high ω or f the amplitude should drop to zero, the book plot does not show such behavior. At the same plot the maximum amplitude position is not at f0 and should shift to the left as dumping increases (if you analyze eq.15.29, you will see it). For the correct plot see for example Wikipedia https://en.wikipedia.org/wiki/Resonance#The_driven,_damped_harmonic_oscillator note that your 2b/m is their 2ω0ζ.	This figure will be updated.
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.6 Forced Oscillations	the book has plainly wrong definition of Q=2b/m at the page 756 right above the figure 15.32 (units of Q are wrong since it should be unit less, and the overall behavior is wrong: Q should grow as b decreases). Overall, it would be better to introduce a γ coefficient in charge of dumping (2b/m) so solutions are more general and applicable beyond a mass on a spring problem. The correct answer is (ωo/ (2b/m)). Also Δω is not defined at figure 15.32 it corresponds to the resonance width but it is not labeled.	This figure will be updated. The equation was addressed in a previous report and will be updated in web view.
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.6 Forced Oscillations	"For a small damping, the quality is approximately equal to $Q \approx 2b/\text{m}$." The above statement is incorrect. It suggests for large damping b, you will achieve a high quality factor resonator. The opposite is true. A correct equation is: Q = m w0 / b	The text at the end of the paragraph after Figure 15.31 will be updated.
Unit 2 Waves and Acoustics: Chapter 15 Oscillations:	"where \omega_0=\sqrt{k}{m} is the angular frequency of the driving force." This is probably a typo as \omega_0 is not the	Revise "driving force" to "mass/spring system".

Section 15.6 Forced Oscillations	driving frequency, but rather the natural frequency of the mass/spring being driven. A few paragraphs before, referring to figure 15.30, the textbook says, "The motor turns with an angular driving frequency of \omega." In contradiction to the line after equation 15.29.	
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Section 15.6 Forced Oscillations	There is an error in University Physics Volume 1 Chapter 15 Section 6. After equation 15.29, the text incorrectly states the omega_0 is the angular frequency of the driving force; however, it is the natural frequency. The angular frequency of the driving force is just omega (without the zero subscript).	Revise "angular" to "natural".
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Chapter Review: Problems	Problem 44 in Ch. 16 has an incorrect answer given in the instructor solutions manual. The question states that the echo returns after 2.00 s, but then a value of 1.00 s was used in the solution, so the solution ends up being half as large as it should be. The correct answer is 3.43 minutes.	The solution will be updated.
Unit 2 Waves and Acoustics: Chapter 15 Oscillations: Chapter Review: Additional Problems	The solution uses a string length of 1.20 m, while the problem states that the string length is 1.00 m. Using the correct string length the answers are: a) wavelength = 0.33 m frequency = 173.3 Hz b) wavelength = 1.98 m	Revise "1.00" to "1.20".
Unit 2 Waves and Acoustics: Chapter 16 Waves: Section 16.1 Traveling Waves	This figure is very confusing, because of the sine wave used to represent the spring. It makes readers think of a transverse wave, although it's attempting to represent a longitudinal wave, and is very puzzling for students just learning the definition of wavelength. The representation in figure 17.3 is much better. It's possible to use the slinky representation too, but it requires careful representation of a stretched spring in a way that's clearly distinct from a sine wave. (You can do this with a generalization of a cycloid that allows some slipping.) For what it's worth, this one figure alone was enough to make me abandon	This figure will be updated.

	OpenStax for chapter 16 and instead use Halliday & Resnick for that entire chapter.	
Unit 2 Waves and Acoustics: Chapter 16 Waves: Section 16.1 Traveling Waves	Change "A medium is the substance a mechanical waves propagates through, and..." into "A medium is the substance mechanical waves propagate through, and...". That is: (1) remove article 'a', and (2) change verb 'propagates' into 'propagate'.	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Section 16.2 Mathematics of Waves	First partial of yR with respect to x: I believe first term should be +Akcos rather than -Akcos.	Revise "–" to "+".
Unit 2 Waves and Acoustics: Chapter 16 Waves: Section 16.2 Mathematics of Waves	The function given in the problem and Step 1 of the solution should depend on Greek letter omega, not Roman letter w.	This example will be updated.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Section 16.3 Wave Speed on a Stretched String	Example 16.5 title: change "Spring" into "String".	Change "Spring" to "String".
Unit 2 Waves and Acoustics: Chapter 16 Waves: Section 16.3 Wave Speed on a Stretched String	"is on" should be just "on" in "The net force is on the small mass element can be written as"	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Section 16.3 Wave Speed on a Stretched String	"string" should be "strings" in "In this chapter, we consider only string with a constant linear density."	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Section 16.4 Energy and Power of a Wave	Submitted by Customer Support on behalf of user, Case 58313 The last paragraph of 16.4 says "In the case of the two-dimensional circular wave, the wave	Revise "amplitude decreases proportional" to "intensity decreases proportional".

	moves out, increasing the circumference of the wave as the radius of the circle increases. If you toss a pebble in a pond, the surface ripple moves out as a circular wave. As the ripple moves away from the source, the amplitude decreases. The energy of the wave spreads around a larger circumference and the amplitude decreases proportional to 1/r, which is also the same in the case of a spherical wave, since intensity is proportional to the amplitude squared." This is not true. For a circular wave, *intensity* decreases proportionally to 1/r, not amplitude. This is also not the same falloff with r as the case for a spherical wave, because the dimensionality is different.	
Unit 2 Waves and Acoustics: Chapter 16 Waves: Section 16.5 Interference of Waves	“When the wave is reflected, the amplitude of the reflected way is exactly the same as… “ - Typo, I expect “way” should be “wave”.	Revise "way" to "wave".
Unit 2 Waves and Acoustics: Chapter 16 Waves: Section 16.6 Standing Waves and Resonance	In Example 16.7: "Consider a string of L = 2.00 m. attached..." change "m." into "m," (change dot into comma).	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Conceptual Questions	Currently, it reads "A sinusoidal wave with an angular frequency and amplitude produced by some external driving force." This perhaps should simply be "A sinusoidal wave is produced by some external driving force." No need to call out frequency and amplitude, since (a) the current sentence doesn't make grammatical sense and (b) all sinusoidal waves have frequency and amplitude, so simply stating that it's a sinusoidal wave is sufficient.	Revise the question to: Consider a string with under tension with a constant linear mass density. A sinusoidal wave is produced by some external driving force. If the frequency, keeping the wave amplitude as it was originally, how is the time averaged power of the wave affected? If the amplitude of the wave is decreased by half, keeping the wave frequency as it was originally, how is the time-averaged power affected? Explain your answer.

Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Problems	the data in the problem is inconsistent v = w/k = 100/8 =12.5 v= sqrt(tension/mass per unit length) = sqrt(50/.008) = 79.1	The problem will be revised.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Problems	Problem 90 has an incorrect answer listed in the instructor's solution manual. Two waves are added together, and while the height of the first wave is correct (0.15 m), the height of the second wave is incorrect (should be 0.20 m), such that the total height is incorrect (should be 0.35 m).	The solution will be updated.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Problems	Problem 69 has the incorrect answer written in both the back of the textbook and in the instructor's solution manual. In fact, the formula written out for the problem is correct (and attached as screenshot below), but the number computed is incorrect. It should be 2.21 ms.	Revise "1.69" to "2.21".
Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Problems	The answer listed angular frequency as 142.43 / s, which is equal to the wave speed, 223.61 m / s, divided by the wave number, 1.57 / m, both also given in the answer. I believe that the correct angular frequency should be the product of the wave speed and wave number, which would give 351.07 / s.	The answer will be updated.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Problems	The problem refers to "the preceding figure," which does not exist.	This text will be deleted: is shown in the preceding figure.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Problems	The wave equation provided is missing the 't' that will make it valid. In addition, the values given for angular frequency and wave number produce a different wave speed than what is calculated by using the SQUAREROOT (Tension / linear mass density)	Add missing "t" to the end of the equation.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Problems	On problem 88, the text currently reads "P=120 V", which I believe should read "V=120V".	Revise "P" to "V".

Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Problems	The data given in the problem do not match the data used in the key. The key uses mass density 0.02 kg/m, but the problem gives it as 0.2 kg/m. This error is in the student solutions manual and in the answers given in the textbook itself.	Revise "0.2" to "0.02" in the problem.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Additional Problems	The solution is off by a factor of ten for omega and k, and it should be 0.40sin(0.0015x+0.15t). It likely is due to a miscalculation with using centimetres in the calculation for omega. This is a resubmission of Submission #23039, which I previously incorrectly labelled as "Chapter 15" instead of "Chapter 16".	This assessment will be updated.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Additional Problems	The problem asks for tension, but the solution solved for linear mass density.	This solution will be updated.
Unit 2 Waves and Acoustics: Chapter 16 Waves: Chapter Review: Additional Problems	Question 136 is an exact repeat of Question 135	Revise "cos" to "sin" in problem 136.
Unit 2 Waves and Acoustics: Chapter 17 Sound: Section 17.2 Speed of Sound	Text between Eq 17.4 and Eq 17.5: "The speed of sound in a solid the depends on the Young's modulus of the medium and the density," Remove "the" between the words "solid" and "depends".	Our reviewers accepted this change, and it will be included in the next print cycle.
Unit 2 Waves and Acoustics: Chapter 17 Sound: Section 17.4 Normal Modes of a Standing Sound Wave	The term normal mode is used in the title of this section, and nowhere else in the section. It is used in the previous chapter (16.6 Standing Waves and Resonance). If the text is going to use the term "normal mode" for the section title, it should at least show up in the text once to help clarify the connection to the previous discussion of normal modes.	Revise "...standing waves, while other..." to "...standing waves, also called normal modes, while other...".
Unit 2 Waves and Acoustics: Chapter 17 Sound: Section 17.7 The Doppler Effect	"v/fs = vs/fs" in third equation should be "v/fs + vs/fs"	Revise "=" to "+".

Unit 2 Waves and Acoustics: Chapter 17 Sound: Section 17.8 Shock Waves	I believe ws in the demoninator is intended to be vs	Revise "w" to "v".
Unit 2 Waves and Acoustics: Chapter 17 Sound: Chapter Review: Key Equations	The equation for speed of sound in a fluid should use the symbol B instead of β (beta) for bulk modulus. This is done correctly in Section 17.2 (Equation 17.4).	This equation will be updated.
Unit 2 Waves and Acoustics: Chapter 17 Sound: Chapter Review: Problems	Problem 87 states: "Students in a physics lab are asked to find the length of an air column in a tube closed at one end that has a fundamental frequency of 256 Hz....." The last part of this sentence "that has a fundamental frequency of 256 Hz" should be removed. Because the length of the air column is constantly changing, so is its fundamental frequency. Therefore it is not correct (and also confusing to students) to state a fundamental frequency value for the air column. The frequency value needed is just that of the tuning fork which was given later in the problem.	This question will be updated.
Unit 2 Waves and Acoustics: Chapter 17 Sound: Chapter Review: Problems	The problem lists the velocity of the source as 110 km/h, which is 30.6 m/s. It looks like the solutions use 110 m/s to calculate the answer instead of 30.6 m/s. I got frequencies of 876 Hz when the source is moving toward the observer and 735 Hz when the source is moving away from the observer.	The solution will be updated.
Unit 2 Waves and Acoustics: Chapter 17 Sound: Chapter Review: Problems	The solution to problem 17.103 uses 135.42 m/s as the value for v_A instead of 135.87 m/s. This causes the solution to be 15 Hz instead of 13.9 Hz.	Revise "15.00 Hz" to "13.9 Hz". In the solution manual, "135.42" will be updated to "135.87".
Unit 2 Waves and Acoustics: Chapter 17 Sound: Chapter Review: Problems	Raw text instead of link to figure: "(See [link]Figure 17_03_HumEar[/link].)"	Our team is working to resolve this issue.
Unit 2 Waves and Acoustics: Chapter 17 Sound: Chapter Review: Problems	I believe the answer given in the ISM is the power output of the speaker. For a 1% efficiency, the power input is 100 times the output.	The correct answer will be updated.

Unit 2 Waves and Acoustics: Chapter 17 Sound: Chapter Review: Problems	The wording of the problem implies there is a simple unit conversion between dB and W/m^2, when in fact these measure different physical quantities. I recommend rewording the question to "What is the intensity of this sound in watts per meter squared?"	This problem stem will be updated.
Unit 2 Waves and Acoustics: Chapter 17 Sound: Chapter Review: Problems	The data used in the key bear no relation to the data given in the problem. The textbook says the temperature is 90 F, but the key uses 95 F. The textbook gives the time delays as 1.00 s and 3.00 s, but the key uses 0.10 s and 0.15 s, respectively.	Revise "90.00" to "95.00", "1.00" to "0.10", and "3.00" to "0.15".
Unit 2 Waves and Acoustics: Chapter 17 Sound: Chapter Review: Challenge Problems	I'd suggest to explicitly state that d < wavelength in problem, because provided answer is incorrect for cases where d > wavelength	Add to the end of the question: Assume the distance, d, between the slits is larger than the wavelength of the sound.
Appendix A Units	lists Pascal as "pastcal (P)" spelling error	Our reviewers accepted this change, and it will be included in the next print cycle.
Appendix B Conversion Factors	The reference page says that 1 mi equals 1.609 * 10^4 cm but 1 mi is actually equal to 1.609 * 10^5 cm	Revise "10^4" to "10^5".
Appendix D Astronomical Data	bottom half, rightmost column: currently empty could show the gravity at the equator case #92660	Our reviewers determined the empty last column in part of the table is ok as is, however, the last two rows of the table will be deleted.
Appendix E Mathematical Formulas	Not an error, but an omission. I think you should add the arc length of a circular path to the important formulae. arc length = radius x angle described by the ends of the arc s = R x theta	Arc length will be added to the list: $s = r\theta$.
Answer Key: Chapter 2	69.c) (A * F)(D x B) A & F are antiparallel, A*F = |A| |F| cos(180) = 10*20* -1 = -200 DxB = (-15.97, 12.04) x (3.01, 3.99) (-15.97*3.99 - 12.04*3.01) = -100k	The answer will be updated.

	-100k * -200 = 20,000k I don't think it should be +-	
Answer Key: Chapter 2	67.c) D x C D = -15.97i + 12.04j C = 6.0i - 10.392j DxC = (-15.97 * -10.392 -12.04 * 6.0) = 93.85k The answer in the book is -94k, wrong sign.	The answer will be updated.
Answer Key: Chapter 2	The true right answer for degree is ArcTan 25/18 = 54.2 degrees, your answer is uses arctan 18/25 = 35.7 which is wrong.	Add "(equivalently, 54.2° north of west or 125.7° from east)" to the answer.
Answer Key: Chapter 2	The components of the resultant vector (R) should have metres (m) as units. The question defines vector D to have metres as units. According to the equation, vector R should have the same units. From the answer key, > "R = -3i - 16j" correction: R = (-3i - 16j)m or, R = -(3i + 16j)m	The answer will be updated.
Answer Key: Chapter 2	The conversion from polar to Cartesian coordinates is correct, but the distance between P1 at (2.165m, 1.250m) and P2 at (-1.900, 3.290 m), by the Pythagorean Theorem as suggested, should be sqrt((-1.9-2.165)^2+(3.290-1.250^2), or 4.55 meters. The "back of the book" answer incorrectly says 5.27m.	Revise "6.09" to "4.55".
Answer Key: Chapter 3	Chapter 3 question 29 part b asks us to compare the speed of the blast wave to the speed of sound. We are given 343 m/s as the speed of sound and the correct answer for the blast wave in part a is 902 m/s. However, the book answer for part b is only 163%. It should be 263% (also, 163% of 343 m/s is only 559 m/s.)	The answer will be updated.
Answer Key: Chapter 3	The instructor's solutions for Problem 29 have been improved as a result of Errata 6569, but the entirety of that new solution hasn't been	Revise "156.7" to "902".

	included in the print or web versions of the textbook. Answer 3.29(a) still reports 156.7 m/s as the speed of the blast wave, when it should be 902 m/s (as correctly included in the instructor's solution). See screenshot showing these two resources side-by-side.	
Answer Key: Chapter 3	The units should be km not m	Revise "m" to "km".
Answer Key: Chapter 3	a.) The answer is listed as 525m, but correct answer is 375m. b.) The answer is listed as 180m/s, but correct answer is 150m/s.	Revise "525" to "375" in part a and revise "180" to "150" in part b.
Answer Key: Chapter 4	It should be 4.0i + 3.0k m/s	Revise "2.0" to "3.0".
Answer Key: Chapter 4	The answer to 29e shows r(t) (which isn't really part of the answer), then a large vertical gap of blank space, then the actual answer of v average. The large gap caused many of my students to think that r(t) was the answer and they completely missed the v(t) shown further down. If you don't look carefully, it looks like v(t) is part of the answer to next problem. Removing r(t) and the gap would make the answer much more readable. This gap shows up in the online version and PDF versions.	Our team is working to resolve this issue.
Answer Key: Chapter 4	Answer to Check your understanding 4.1 has a miscalculation for vector r(t2)=194 and fails to acknowledge the j vectors which cancel out to zero. the final answer 84 m/s for v-avg is correct.	The answer will be updated.
Answer Key: Chapter 5	Part (a) asks for the acceleration and for which team wins. The solution gives an answer in N and doesn't say which team wins. My result is that a = 0.106 m/s^2 and the second team wins. Part (b) asks for the tension in the rope. I believe the number is right, but the unit is given as m/s^2, and it should be N. By the way, the word "each" could be deleted from the first sentence of the problem.	This issue was addressed in another report and will be corrected in web view.

Answer Key: Chapter 7	Suggested errata in the solution in both the SSG and ISG to problem 7.97 in University Physics V.1	Revise "10" to "20" and "20" to "40."
Answer Key: Chapter 7	In University Physics Volume 1, Example 8.9 is incorrect, in my evaluation... it seems as though when substituting U(x) into the integral, a minus sign was forgotten... it should say xo + x, not x0 - x, which leads to the incorrect answer. You may want to change U (x) to be something that actually simplifies to what they put under the radical in the first step of the explanation.	Delete the negative sign before E.
Answer Key: Chapter 8	There is an error in the derivative of U(x) see enclosed GIF file.	The answer will be updated.
Answer Key: Chapter 8	Problem 34 (b)'s answer is written as 60N, 40N, but this should be 60N, 1N (or zero, depending on significant figures). 40 N represents the answer if the ball was still traveling at 10m/s at the top of the circle, but part a clearly shows that it is not.	This issue was addressed in another report and is correct in the current version of the solution manual.
Answer Key: Chapter 10	The question of Check Your Understanding 10.2 says "A centrifuge used in DNA extraction spins at a maximum rate of 7000 rpm, producing a “g-force” on the sample that is 6000 times the force of gravity. If the centrifuge takes 10 seconds to come to rest from the maximum spin rate: (a) What is the angular acceleration of the centrifuge? For (a), I believe the angular acceleration should be -73.3 rad/s^2 instead of 73.3 rad/s^2 since the centrifuge "comes to rest from the maximum spin rate", meaning it should slow down till rest which is what a negative acceleration usually suggests. Besides, according to the equation of angular acceleration a=(w-w0)/t, as the question suggests "comes to rest from the maximum spin rate", it seems w should be 0, and w0 should be 7000rpm, which, if plugged into the equation would end up with a negative angular acceleration. Lastly, the answer key of (b) of 10.2 says w=0, w0=733, if they are consistent with when using them in (a), then a=(w-w0)/t=(0-733)/10=-73.3 rad/s^2. Therefore, I believe something is not right there for the above reasons.	The answer will be updated.

Answer Key: Chapter 10	Chp10 question #99. I think that it should be 1776.528792J, not 888.5J. I think that the student manual solution is correct in terms of the work, but the math is wrong and shouldn't give 888.5J. Thanks.	The solution manual will be updated.
Answer Key: Chapter 10	In this problem solution, when using the parallel axis theorem to calculate the moment of inertia of the sphere, L = 3.0 m was used, but this is only the length of the rod, and does not include the radius of the sphere, which would then make L the distance between the center of mass of the sphere and the axis of rotation. L should be 3.5 m with the radius, resulting in a moment of inertia of 12.35 kg*m². Thus the answer should actually be P = 19.8 W.	The solution will be updated.
Answer Key: Chapter 10	Q 10.49 (c) either the direction angle is negative OR it's clockwise from a_sub_c but not both! Case #58936	Revise "clockwise" to "counterclockwise".
Answer Key: Chapter 11	The answer to question 77 part (c) appears to be incorrect. Using simply the provided values, wherein torque is equal to 1.4*10^22 N*m, and assuming the radius of Earth is 6,371 km at the equator, a value of 1.1*10^15 is produced for F. The 0.2*10^15 difference is rather significant. Solving backward for the radius of Earth, it would suggest that the radius of Earth is around 5,384 km. The Earth has enough problems—shrinking it to a radius 84.5% of its existing radius would only make those problems closer to each other. I might add in this comment that I have been rather disturbed by the lack of values given for problems such as this. I do not think it is unreasonable to suggest that it would make for a far greater experience to students if values—such as the radius of Earth—are given in problems similar to this where they are necessitated.	Revise the answer to "1.1 × 10^15". Our reviewers determined that adding values to problems like this would require a significant book revision. While we cannot make this change at this time, we will consider it for future editions of this book.

Answer Key: Chapter 15	The answers for part b and c are still wrong! Others have suggested that the correct equation to use is mg(2 meters + x) = (1/2)kx^2, which I also believe is correct, and the Errata list said this was corrected years ago, but if you solve the above quadratic equation for x, given m = 90 kg, k = 1.4 x 10^4 N/m, and g = 9.81 m/s^2, then we get x = 0.569 m = 56.9 cm, not 44.3 cm as the answer key states. For part c), using 4 meters in the above equation gives a stretching of 77.6 cm.	Revise the answer to part b to "56.9 cm" and to part c to "77.6 cm".
Answer Key: Chapter 17	When a guitar string is plucked, the sound it produces is predominantly the frequency of the fundamental, n=1. With the data given in the problem, the fundamental frequency of the string is about 37.3 Hz. The question states that the tube, open at both ends, resonates in its n=3 mode at this frequency: so f_3 for the tube is 37.3 Hz. This makes f_1 for the tube 12.4 Hz, making the length of the tube 13.8 metres. The key seems to imply that the *string* is vibrating in its n=3 mode, but there is no indication that this is so in the problem statement.	Revise the fourth sentence in the problem to "The string is plucked and resonates at the fundamental frequency while the tube resonates at the n = 3 mode." The answer will also be updated.