RELEASE NOTES

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Page Count Difference:

The page count in this revision is 803, down from 818 last revision. This difference is due to errata changes.

Errata:

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

Location	Detail	Resolution Notes	Error Type
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Section 1.3 Thermal Expansion	Equation (1.1) is expressed in terms of dL and dT. However, the description/definition of each term given right after the equation is in terms of delta L and delta T.	The explanation in the blue box will be updated.	Typo
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Section 1.3 Thermal Expansion	The relationship between volume and temperature dV/dT has an extra ΔT. It should be βV, not βVΔT.	Delete the "ΔT" after dV/dT = βV in the first line.	Typo
Unit 1 Thermodynamics: Chapter 1 Temperatur	Example 1.8: In the equation of the specific heat, the K of Kelvin should be a capital letter, not "k".	Revise "k" to "K".	Typo

e and Heat: Section 1.4 Heat Transfer, Specific Heat, and Calorimetry			
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Section 1.4 Heat Transfer, Specific Heat, and Calorimetry	"In this example, the heat transferred to the container is a significant fraction of the total transferred heat." In this sentence, it should be as ' the heat transferred to the water is more than the Aluminum Pan'.	Revise the sentence "In this example, the heat..." to "In this example, the heat transferred to the water is more than the aluminum pan."	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Section 1.4 Heat Transfer, Specific Heat, and Calorimetry	Example 1.8 starts with giving an approximation for specific heat where the first term is 3.33 * 10^4. However, later on when calculating the integral, this term is used but without a dot, 333 * 10^4, resulting in an answer that is off by a factor of 10^2.	Near the end of the example, revise "333 × 10^4" to "3.33 × 10^−6" and also revise "30.2" to "0.302".	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Section 1.5 Phase Changes	The answer provided to Problem #81 is incorrect. The instructor solution manual uses C at constant volume, but it should use C at constant pressure. The correct answer is 9.35 L.	Revise the answer to 9.35.	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 1 Temperatur	The paragraph just after Example 1.9 starts "Like solid-liquid and and liquid-vapor transitions". "And" is repeated unnecessarily, and it should be	Delete the second "and".	Typo

e and Heat: Section 1.5 Phase Changes	"Like solid-liquid and liquid-vapor transitions".		
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Section 1.6 Mechanisms of Heat Transfer	There are two consecutive sentences starting "However" directly under Figure 1.25, and the second one doesn't contrast with the first one. (Did something get deleted in editing?) The simplest solution might be to delete the second "However" and start a new paragraph with that sentence, so the paragraph would begin, "Air is a poor conductor." With some thought, a better solution might be found.	Delete the second "however" and revise as needed.	General/pedagogical suggestion or question
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Section 1.6 Mechanisms of Heat Transfer	Example 1.10: In the equation for Q, 86,400 is printed 86.400. By the way, it's probably not necessary to say twice that that's the number of seconds in a day.	Revise solution as appropriate.	Typo
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Section 1.6 Mechanisms of Heat Transfer	In Fig 1.19, an object T 3000 k would be a bright yellow. "Red hot" is closer to 1000 K. https://hypertextbook.com/facts/2000/StephanieLum.shtml	This figure will be updated.	Other factual inaccuracy in content

Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Section 1.6 Mechanisms of Heat Transfer	The text says: "Thus, on a clear summer night, the asphalt is colder than the gray sidewalk, because black radiates the energy more rapidly than gray." The cooling is due to IR radiation, so the color in the visible range has no impact. Both concrete and asphalt have approximately equal emissivity (~ 0.94, although it does depend significantly on surface roughness) for IR, so both should cool at similar rates. If there are indeed differences in temperature, it would be do other factors, like thermal conductivity. (Does asphalt *rally* get cooler, or is this just and expectation.) https://ennologic.com/ultimate-emissivity-table/ "Because clouds have lower emissivity than either oceans or land masses, they reflect some of the radiation back to the surface, greatly reducing heat transfer into dark space," water has an emissivity close to 1, as do thick clouds. They absorb almost all the upward IR. They keep the surface warm at night primarily because they *EMIT* IR due to their temperature, not because they REFLECT surface IR back down.	Revise "reflect" to "emit".	Other factual inaccuracy in content
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Section 1.6	Equation 1.9 had P = dQ/dT, but should be P = dQ/dt. (dT → dt) This typo is also repeated two pages later when this equation is used in the solution of Example 1.10.	Our reviewers accepted this change.	Typo

Mechanisms of Heat Transfer			
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Additional Problems	Problem #109 states that the specific heat of the plate is 0.9 J/kg K. I believe it should be 0.9 kJ/kg K (or 900 J/kg K). The answer listed for this problem can only be calculated when using 0.9 kJ/kg K (or 900 J/kg K). Furthermore, a specific heat of 0.9 J/kg K is pretty absurd. A specific heat of 900 J/kg K puts the specific heat more in line with Aluminum, which is a reasonable material for a plate to be made out of.	Revise "J" to "kJ" as indicated.	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Chapter Review: Challenge Problems	Part (a) asks to show that the period increases by a fraction (alpha L dT/2) but the inclusion of the length L is a typo. It should read (alpha dT/2). That combination of quantities is unitless as needed for a fraction.	Delete "L" after alpha in part a.	Typo
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Challenge Problems	Problem #127 is clearly based on problem 120 and should refer back to it in order to explain the physical situation and the reference to "the flask" as well.	Revise the first sentence in question 127 to "Find the growth of an ice layer as a function of time in a Dewar flask as seen in problem 120."	General/pedagogical suggestion or question
Unit 1 Thermodynamics: Chapter 1 Temperature and Heat: Challenge Problems	The solutions to parts a, b, and c of Problem #129 should all be multiplied by 4. Also, the solution to e might be clearer if each term in it were multiplied by 4.	Revise solutions to parts a, b, and c as appropriate.	Incorrect answer, calculation, or solution

Unit 1 Thermodynamics: Chapter 2 The Kinetic Theory of Gases: Section 2.1 Molecular Model of an Ideal Gas	Example 2.3 asked using the STP values for temperature and pressure. While the temperature is correct in using 0 degree Celsius or 273 K (if ignoring the decimal places), the use of 1.00 atm is incorrect. It could be correct if ignoring the significant figures when converting from 1 bar or 10^5 Pa as the STP pressure to atm but fun the calculation 1.01 \times 10^5 Pa are used. If the author had planned to use 1 atm as the standard pressure, then they would also need to use a temperature value of 20 degree Celsius and call it NTP as used by NIST and EPA.	Revise "1.01" to "1.00", "44.5" to "44.1", "1.29" to "1.28", and "0.896" to "0.889"	Other factual inaccuracy in content
Unit 1 Thermodynamics: Chapter 2 The Kinetic Theory of Gases: Section 2.1 Molecular Model of an Ideal Gas	It is stated: "A mole (abbreviated mol) is defined as the amount of any substance that contains as many molecules as there are atoms in exactly 12 grams (0.012 kg) of carbon-12." I would introduce in the book the new universal constants and explain that they are now exact constants. I missed this before for the Boltzmann constant and it will probably also apply later for the elementary charge and Planck's constant.	Delete "in exactly 12 grams (0.012 kg) of carbon-12".	Other factual inaccuracy in content
Unit 1 Thermodynamics: Chapter 2 The Kinetic Theory of Gases: Section 2.1	In Figure 2.7's caption, "increasing temperature (T)" should be changed to "increasing pressure (p)" in the following line: "The blue curves have an oscillation in which volume (V) increases with increasing temperature (T)..."	Revise "temperature (T)" to "pressure (P)".	Typo

Molecular Model of an Ideal Gas			
Unit 1 Thermodynamics: Chapter 2 The Kinetic Theory of Gases: Section 2.4 Distribution of Molecular Speeds	In a sample of nitrogen (N2, with a molar mass of 28.0 g/mol) at a temperature of 273°C, find the ratio of the number of molecules with a speed very close to 300 m/s to the number with a speed very close to 100 m/s. It should be 27 degrees celsius and not 273°C.	Revise to "27 °C".	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 2 The Kinetic Theory of Gases: Section 2.4 Distribution of Molecular Speeds	I'm not sure if this is an accepted convention, but equation 2.15 (Maxwell-Boltzmann Distribution of Speeds) contains an exponent that is wrongly interpreted if you follow order of operations. In other words e^(-mv^2/2*k_B*T) should be interpreted as e^(-0.5mv^2*k_B*T) when following order of operations, but it is incorrect for this equation. Again, I'm not sure if this is how it is usually written because I am quite novice, but I couldn't find any reason why it is written like this and to me it would remove ambiguity if that portion of the equation was for example written as e^(-mv^2/(2*k_B*T)).	Add parentheses around the fraction and denominator in the exponent.	Other factual inaccuracy in content
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics	The textbook treats "isolated" and "closed" as synonyms, as exemplified in the sentence fragment, "A system is called an isolated or closed system if..." But that is not the most widely accepted use of the	Revise "or" to "and".	Other factual inaccuracy in content

amics: Section 3.1 Thermodynamic Systems	terms "isolated" and "closed". To most chemists and physicists I know, "closed" means no exchange of matter, while "isolated" means no exchange of matter *or* energy (see for example: https://en.wikipedia.org/wiki/Isolated_system).		
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.2 Work, Heat, and Internal Energy	Forgot a dV in the integral.	Add "dV" at the end of the integral formula.	Typo
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.2 Work, Heat, and Internal Energy	The solution to Problem #25 doesn't match the problem, since the fractional increase should be less than 1, not 1.4. I get 0.31.	Revise "1.4 times" to "0.31".	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.2 Work, Heat,	Problem #29, part (b) is unnecessarily confusing. Part (a) of the question asks, "Calculate the work done by the gas...". Part (b) asks the student to consider the scenario "if the process is carried out in the opposite direction", but it asks for "work done by the gas", which leaves the student to wonder if a	Revise "by" to "on".	General/pedagogical suggestion or question

and Internal Energy	negative answer is expected, or if there is a typo in the question. Better is to ask for "work done on the gas" (this phrasing works both for students who are well-versed in the material and for the struggling students who are trying to learn the difference between "by" and "on") or make the question open-ended, for example, "(b) If the process is carried out in the opposite direction, how is this new process different? Describe and explain."		
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.3 First Law of Thermodynamics	Problem #45: the numbers for work and heat flow do not make any sense. Process A to C is listed as doing less work than process A to B even though the area under the A to C line is larger. Also the change in internal energy for A to C would turn out negative implying a drop in temperature even though the temperature would have to increase since the product pV at C is larger than at A.	Revise the problem to "When a gas expands along AB (see below), it does 20 J of work and absorbs 30 J of heat. When the gas expands along AC, it does 40 J of work and absorbs 70 J of heat. (a) How much heat does the gas exchange along BC? (b) When the gas makes the transition from C to A along CDA, 60 J of work are done on it from C to D. How much heat does it exchange along CDA?" Revise the answers to "a. 20 J; b. 90 J"	Other
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.3 First Law of	The numbers given in Problem #39 are impossible. In an isobaric expansion, the ratio of work done and increase in internal energy is constrained by the value of gamma (=5/3, 7/5, or 4/3, depending on the three types of ideal gas identified in the textbook). Specifically, for a change of temperature that corresponds	Remove the specific initial conditions and specific isobaric process in the problem.	General/pedagogical suggestion or question

Thermodynamics	to increase in internal energy of 80 J, for constant-volume process, that exact amount is heat absorbed. Then, for monatomic gas, 133 J (80 J * 5/3) of heat is needed for the same temperature change under a constant-pressure (isobaric) process, meaning for the given number of 80 J of internal energy increase, the work done *must* be 53 J (for monatomic gas), not 500 J. While I understand that this is not the point of the question (the point of the question is for students to use the First Law), the numbers given should describe a situation that can actually happen, under the constraints imposed by laws of physics (it speaks to the level of care that went into writing the questions).		
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.3 First Law of Thermodynamics	Problem #42 says, "During the isobaric expansion from A to B represented below, 130 J of heat are removed from the gas. What is the change in its internal energy?" There is no possible solution to this question as it describes an impossible situation. Isobaric expansion necessarily involves an increase in internal energy (gas moves from a low-temperature isotherm to a high-temperature isotherm) while doing work (so work done takes energy out of the gas). If heat transfer is also in the direction that takes energy out of the gas, conservation of energy prevents the	Revise "130" to "3,100" and "removed from" to "added to". Revise the solution as needed.	Other factual inaccuracy in content

	thermodynamic process from occurring. I suggest changing the question text so that heat is input to the system, at an amount substantially more than 130 J. Heat input must be enough to provide for the work done *and* temperature increase of the gas (you can't really "make up" a number here without actually working out the problem).		
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.3 First Law of Thermodynamics	The solution to Problem #45, part (a) is Q = -150 J for a process in which pressure *increases* at constant volume. A loss of heat causing an increase in p at constant V is obviously unphysical and confused at least one of my students. Also, in the given constant-pressure expansion, Q is negative, which is unphysical. (For real gases, isobars on T-V diagrams are monotonically increasing.) The given numbers need to be changed, or possibly the problem can be fixed by just changing the pV diagram.	Revise "700 J of work" to "400 J of work". Revise the solution for (a) to "150 J" and the solution for (b) to "700 J".	General/pedagogical suggestion or question
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.3 First Law of Thermodynamics	Problem #45: "Transmission" should be a different word, maybe "transition".	Revise "transmission" to "transition".	Typo

Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.3 First Law of Thermodynamics	Example 3.3: The solution for part (a) incorrectly lists value of velocity as 0.1 m/s (in "W=−FvΔt=−(20N)(0.1m/s)(1.2×10^2s)"). It is supposed to be 1.0 m/s, and it does look like the calculation itself is done with v=1.0 m/s (2.4×10^3 J is equal to (20N)(1.0m/s)(1.2×10^2s)), but the typo should be fixed.	Revise "0.1 m/s" to "1.0 m/s".	Typo
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.4 Thermodynamic Processes	Problem #58 should not list heat transfers for processes AB and BC. By giving the complete PV diagram (with numerical values of pressure and volume listed), all energetical aspects of the setup is already completely specified. Giving heat transfer overdefines the system (and in this case 3600 J and 2400 J are inconsistent with the numbers you would derive from the information in the figure). There are a number of ways to fix this problem (including changing the figure to remove some pressure and volume information), but the best (easiest) way to fix it would be to simply take out the sentence "In the processes AB and BC, 3600 J and 2400 J of heat are added to the system, respectively". And in order to make (b), (c), (d), and (e) answerable, the type of gas must be specified (monatomic, diatomic, or polyatomic; given the section the problem is in, I recommend monatomic).	Delete "In the processes AB and BC, 3600 J and 2400 J of heat are added to the system, respectively."	General/pedagogical suggestion or question

Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.4 Thermodynamic Processes	Problem #58: Replace "information give" with "information given".	Revise "information give" to "information given".	Typo
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.4 Thermodynamic Processes	https://openstax.org/l/21idegaspvdiag redirect is broken; needs new link.	This link will be updated.	Broken link
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.5 Heat Capacities of an Ideal Gas	Problem #66 says, "One mole of a dilute diatomic gas occupying a volume of 10.00 L expands against a constant pressure of 2.000 atm when it is slowly heated. If the temperature of the gas rises by 10.00 K and 400.0 J of heat are added in the process,..." However, in this situation, the heat added can be calculated simply by Q = n C_p Delta T = (1)(7R/2)(10 K) = 291 J, which is inconsistent. Maybe the Delta T should be omitted. Then students can find initial T from the ideal-gas law and final T from C_p, and calculate the	Revise "If the temperature of the gas rises by 10.00 K and 400.0 J of heat are added in the process, what is its final volume?" to "If 400.0 J of heat are added in the process, what is its final volume?"	Other factual inaccuracy in content

	final volume from the ideal-gas law again.		
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.5 Heat Capacities of an Ideal Gas	For all equations in section 3.5, the number of moles "n" is missing. The gray-boxed results are still correct as "n" cancels, but the derivations to get to these results are not correct.	This section will be updated to include the missing "n".	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.6 Adiabatic Processes for an Ideal Gas	I believe that problem #71 is worded wrong. It states that a gas is "...slowly compressed adiabatically and reversibly to twice its volume." Being compressed to a bigger volume does not make sense. The solution guide answer may also need to be updated. I believe there is also a mistake between the statement of #72 and the solution guide. I think the guide gives an answer for a tripling of volume, rather than a decrease by three.	Revise questions 71 and 72 as appropriate.	Other factual inaccuracy in content
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.6 Adiabatic Processes	Problem #71 says "An ideal diatomic gas at 80 K is slowly compressed adiabatically and reversibly to twice its volume." It should instead say "An ideal diatomic gas at 80 K is slowly compressed adiabatically and reversibly to half its volume."	Revise "twice" to "half".	Typo

for an Ideal Gas			
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Section 3.6 Adiabatic Processes for an Ideal Gas	For all equations in section 3.6, the number of moles "n" is missing. The gray-boxed results are still correct as "n" cancels, but the derivations to get to these results are not correct.	This section will be updated to include the missing "n".	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 3 The First Law of Thermodynamics: Challenge Problems	Problem #92 says "monatomic gas" and "oxygen" which are conflicting descriptions.	Revise "oxygen" to "helium".	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 4 The Second Law of Thermodynamics: Section 4.1 Reversible and Irreversible Processes	Problem #19: The solution given is 4.53kJ, however this is not what was asked for. What is asked for is the heat transferred during the process. Q = 11kJ	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 4 The Second Law of	Problem #21: I think you meant to say "adiabatically" where you say "compressed back to its original volume isobarically". Isobaric compression necessarily	Revise "isobarically" to "adiabatically".	Typo

Thermodynamics: Section 4.1 Reversible and Irreversible Processes	involves temperature decrease, and after that, you would need to put in heat, not remove heat. But if you replace "isobarically" with "adiabatically", every part of the question makes sense.		
Unit 1 Thermodynamics: Chapter 4 The Second Law of Thermodynamics: Section 4.2 Heat Engines	The answers listed for Problem #25 are incorrect. They should be 0.200 and 25 J.	Revise the answers to a. 0.200; b. 25 J.	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 4 The Second Law of Thermodynamics: Section 4.2 Heat Engines	The answers listed for Problem #27 are incorrect. The correct answers are a) 0.67, b) 75 J, c) 25 J.	Revise the answers to a. 0.67; b. 75 J; c. 25 J.	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 4 The Second Law of Thermodynamics: Section 4.5 The Carnot Cycle	The solution to Problem #39 used Celsius temperatures where Kelvin should have been used. The answers should be (a) 381 J (b) 619 J.	Revise answers as appropriate.	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 4	Example 4.6: The arrow in step CD of the Stirling engine is pointing the wrong way.	This figure will be updated.	Other factual inaccuracy in content

The Second Law of Thermodynamics: Section 4.6 Entropy			
Unit 1 Thermodynamics: Chapter 4 The Second Law of Thermodynamics: Section 4.6 Entropy	The answers are incorrect. They should be a) -709 J/K, b) 1300 J/K, c) 591 J/K.	Revise the answers to a. –709 J/K; b. 1300 J/K; c. 591 J/K.	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 4 The Second Law of Thermodynamics: Section 4.6 Entropy	The calculation of the efficiency should read 0.5/3.5=0.0.14 instead of 0.5/4.5=0.11. The heat exchanges Q_AB and Q_DA add to 3.5 not 4.5.	Revise the last two sections of the calculation to "= 0.5/3.5 = 0.14".	Incorrect answer, calculation, or solution
Unit 1 Thermodynamics: Chapter 4 The Second Law of Thermodynamics: Section 4.6 Entropy	The alt text for the figure in the solution of Example 4.6 says "The four points A (0.10, 26), B (0.20, 17), C (0.20, 13) ad D (0.10, 26) are connected", and here, "and" is misspelled as "ad".	The alt text will be updated.	Typo
Unit 1 Thermodynamics: Chapter 4 The Second Law of Thermodynamics:	Problem #69: Gamma is given as 7.5, which should be 7/5.	Revise "7.5" to "7/5".	Typo

Additional Problems			
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.1 Electric Charge	The phrase "action at a distance" is wrongly attributed to Albert Einstein. Instead, Clerk Maxwell in his "A Treatise on Electricity and Magnetism" discusses "action at a distance" in detail (Part IV, Ch.23). I believe the author was confused with Einstein's "spooky action at a distance" to refute entanglement in Quantum Physics.	Change "Albert Einstein" to "James Clerk Maxwell".	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.2 Conductors, Insulators, and Charging by Induction	As I was reading the physics volume 2 textbook, I noticed in chapter 5 section 5.2 (conductors, insulators, and charging by induction) the solution to one of the practice problem is wrong. I did the calculations and the amount of excess electrons should be 3.12*10^10 and the total electrons should be 1.0312*10^12. The problem is the miscalculations of 5*10^-9 C (6.242*10^18 e/C). The answer should be 3.12*10^10 electrons instead of 3.12*10^19 electrons.	Revise the solution to exercise 43 as follows: 5.00 × 10^-9 C (6.242 × 10^18 e/C) = 3.121 × 10^10 e; 3.121 × 10^10 e +1.0000 × 10^12 e = 1.0312 × 10^12 e	
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.3 Coulomb's Law	The text below the Coulomb's law equation in the Chapter 5 Review for Section 5.3 says "where q_2 and q_2 are two point charges." It should instead say "where q_1 and q_2 are two point charges."	Revise the first "q_2" to "q_1".	Typo
Unit 2 Electricity	In the review section 5.3 it says Coulomb's Law gives the	Revise the first sentence in the 5.3 summary to "Coulomb’s	Other factual

and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.3 Coulomb's Law	magnitude of the force between point charges. This is incorrect. Coulomb's Law gives the force VECTOR between point charges.	law gives the magnitude of the force vector between point charges."	inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.3 Coulomb's Law	In the "Coulomb's Law" box near the start of Chapter 5.3, the sentence starts with "The magnitude of the electric force ... is equal to..." The equation follows this state is, in fact, a vector form, not a magnitude. Then, based on this equation, the Fig. 5.14 showed the force on q_1 (F_12) should be F_12 = ... r^12. However, the definition for r(vector)_12 (defined two paragraph above the Coulomb's Law box) is "the vector displacement from q1 to q2. If use this definition, the force on q_1, F_12 will be written as the same direction of r(vector)_12, which is wrong. The suggestion is, use Eq. (5.1) without absolute value sign and define F_12 as the force q_1 acting on q_2, to be consistent with the definition of r(vector)_12. By doing so, Fig. 5.14 will need to change the label of the forces. The force on q_1 (acted by q_2) will be F(vector)_21.	Revise the text before Figure 5.14 to "The unit vector r has a magnitude of 1 and points along the axis as the charges. If the charges have the same sign, the force is in the same direction as r showing a repelling force. If the charges have different signs, the force is in the opposite direction of r showing an attracting force." Figure 5.14 will also be updated.	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 5 Electric	Example 5.2: In the solution part, after explaining why the two forces can't be added because they point in different directions, the forces are mislabeled. The force that	Revise the forces to "F_23" and "F_21".	Typo

Charges and Fields: Section 5.3 Coulomb's Law	points in -x-direction is the F23 and the one in the +y-direction is the F21. As shown in the diagram above.		
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.3 Coulomb's Law	"Like all forces that we have seen up to now, the net electric force on our test charge is simply the vector sum of each individual electric force exerted on it by each of the individual test charges." Should say (at the last part) "individual source charges."	Revise "test" to "source".	Typo
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.4 Electric Field	Answer to Problem #65 (a) is given as E=2.0x10^-2 N/C, when it should be E=2.0x10^2 N/C.	Revise "E = 2.0 × 10^−2 N/C" to "E = 2.0 × 10^2 N/C".	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.4 Electric Field	The field vector arrows in Figure 5.18 should all start at point P and point away from it. As it is now, they all start at different points in space and point towards point P, which is an inaccurate representation. Vectors in a vector field diagram are intended to represent quantities at the points in space coinciding with their tails. I did not see this error in any other vector illustrations in this chapter, only on this one figure, though I have not checked the entire book. Since this figure will have to be	This figure will be updated.	General/pedagogical suggestion or question

	reconstructed to fix this issue (the arrows will have to be redrawn), I would also suggest that fewer charges and arrows be used so the picture is not as cluttered. Three to five charges and arrows should be sufficient to get the point across. I will try to submit an edited version of the figure to illustrate.		
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.4 Electric Field	On page 212 of Vol.2, Fig. 5.21 shows the two resolved vertically aligned electric field components: "Eyr" and "Eyl". I think they should be corrected as "Ezr" and "Ezl". This was sent to me by email from Prof. Yong X. Gan, Ph.D., P.E. Professor of Mechanical Engineering California State Polytechnic University Pomona	This figure will be updated.	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.5 Calculating Electric Fields of Charge Distributions	Equation 5.8: ”Point charge" should be "Point charges", since the equation is a summation over N charges.	Revise "Point charge" to "Point charges".	Typo
Unit 2 Electricity and Magnetism: Chapter 5 Electric	In Example 5.7, ”Find the electric potential..." should be "Find the electric field..."	Revise "electric potential" to "electric field".	Other factual inaccuracy in content

Charges and Fields: Section 5.5 Calculating Electric Fields of Charge Distributions			
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.5 Calculating Electric Fields of Charge Distributions	Strategy section: dA = 2πr'dr′ the first "prime" is strange prime character. Change to normal prime character (same as used for the dr′).	This will be updated.	Typo
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.5 Calculating Electric Fields of Charge Distributions	Problem #82 refers to moving 10^-11 electrons. That should be 10^11.	Revise from "10^−11 electrons" to "10^11 electrons".	Typo
Unit 2 Electricity and Magnetism: Chapter 5	At the beginning of Problem #86, "conducing" should be "conducting".	Our reviewers accepted this change.	Typo

Electric Charges and Fields: Section 5.5 Calculating Electric Fields of Charge Distributions			
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.5 Calculating Electric Fields of Charge Distributions	In Example 5.7, it tells you to "find the electric potential...", it should say "electric field."	Revise "potential" to "field".	Typo
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.6 Electric Field Lines	Problem #103: ”A quadrupole consists of two electric dipoles are placed anti-parallel..." should be replaced by "A quadrupole consists of two electric dipoles that are placed anti-parallel..."	Revise "...dipoles are placed..." to "...dipoles that are placed...".	Typo
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields:	I like the approach of Problem #107, requiring students to look up information and recognize extraneous information. However, there are problems. 1) According to chemistry textbooks, the charges on the atoms of polar	Revise the question stem to "A water molecule consists of two hydrogen atoms bonded with one oxygen atom. The bond angle between the two hydrogen atoms is 104° (see below). Calculate the net dipole moment of a	General/pedagogical suggestion or question

Section 5.7 Electric Dipoles	molecules are "partial", meaning less than multiples of e. If students are supposed to approximate the charges in this problem as e and -2e, the figure should be labeled that way, and maybe the text should say those charges are approximations. 2) Apparently the students are supposed to determine that the given electric field is negligible. This requires some ballpark number or intuitive understanding of the polarizability of a water molecule, which is a good deal harder to find than the O-H bond length, and polarizability is not covered in anything like a quantitative way in the chapter. I recommend removing the electric field from the problem or introducing it only to calculate a torque. 3) Maybe the text or problem should mention that one can superpose dipoles.	hypothetical water molecule where the charge at the oxygen molecule is −2e and at each hydrogen atom is +e. The net dipole moment of the molecule is the vector sum of the individual dipole moment between the two O-Hs. The separation O-H is 0.9578 angstroms." The figure will also be updated.	
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Section 5.7 Electric Dipoles	In the figure for both Problems #105 and #106, the positive charge is labeled -Q. It should be +Q.	This figure will be updated.	Typo
Unit 2 Electricity and Magnetism: Chapter 5 Electric	There should be a -ve sign in front of the RHS of the equation given in the top of page 219. Correct form of the equation would be	Add "–" before 1.	Typo

Charges and Fields: Section 5.7 Electric Dipoles	$\vec{E}(z)=-\frac{1}{4 \pi \epsilon_0}\frac{\vec{p}}{z^3}$		
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Key Terms	In the definition for electrostatic force, it says "the assumption is that the source charges remain motionless." The assumption is not necessarily that you remain motionless but rather that there is no acceleration; you are moving at a constant velocity.	Revise the definition to "amount and direction of attraction or repulsion between two charged bodies; the assumption is that the source charges have no acceleration"	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 5 Electric Charges and Fields: Additional Problems	Problem #111: The force in the x direction seems to be off in the answer key.	Our reviewers accepted this change.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 6 Gauss's Law: Section 6.1 Electric Flux	chapter 6 page 240, in the second paragraph, where E_i is defined, "field ver he ith patch" should be "field over he ith patch" (missing letter o).	Our reviewers accepted this change.	Typo
Unit 2 Electricity and Magnetism: Chapter 6 Gauss's Law: Section 6.1 Electric Flux	In chapter 6 page 239, in the formula (6.1) "flat su face" should be "flat surface".	Our reviewers accepted this change.	Typo

Unit 2 Electricity and Magnetism: Chapter 6 Gauss's Law: Section 6.2 Explaining Gauss's Law	Problem #30: The question wording is too vague. It just says "Determine the electric flux through each surface whose cross-section is shown below." Although most competent physics instructors should realize it is asking about *closed* surfaces, where you have to imagine a "matchbox" type surface where the loop is the cross-section of side surface, I'm not sure to how many students it will be clear that this is what's looked for. Electromagnetism is the first physics students will see that doesn't "generalize" from 3-dimensions to lower dimensions, so I think it's important to be specific. One possible way to clarify this would be to add following text to the question: "For each loop shown, imagine extending the loop perpendicular to the page, providing the side surface, and closing the top and bottom with a flat surface in the shape of the loop, to provide a closed cylindrical surface in three dimensions."	Revise the question to "Determine the electric flux through each closed surface where the cross-section inside the surface is shown below."	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 6 Gauss's Law: Section 6.2 Explaining Gauss's Law	In the first equation of Section 6.2 (found in the second paragraph), the right side of the equation should be multiplied by the charge q to be correct. E = Ke*q/r^2	Revise "1" to "q".	Typo
Unit 2 Electricity and	In the caption of Figure 6.17, flux is given as (q1+q2+q5)/Eo. In the diagram q2 and q5 are	Revise caption to "|q1| – |q2| – |q5|".	General/pedagogical

Magnetism: Chapter 6 Gauss's Law: Section 6.2 Explaining Gauss's Law	shown as negative particles. I've had students express confusion, could we replace with q1 - q2 - q5 with absolute values around each of the charges?		suggestion or question
Unit 2 Electricity and Magnetism: Chapter 6 Gauss's Law: Section 6.3 Applying Gauss's Law	chapter 6 page 252, line 9: 'electric field at the field point P' coil be replaced by 'electric field at the space point P' or simply 'electric field at point P'.	Revise from "The direction of the electric field at the field point P..." to "The direction of the electric field at point P...".	Typo
Unit 2 Electricity and Magnetism: Chapter 6 Gauss's Law: Challenge Problems	Problem #91: In the referenced abstract, P/A is given. The power of Vega can be directly calculated by multiplying by the surface area of a sphere where the radius is the distance between us and Vega. The answer in the back of the book is off by a factor of 4.51, which is the surface area of Hubble's mirror. Since we are already given P/A in the abstract, rather than intercepted power, this is an unneeded factor. Should probably also change question stem.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 7 Electric Potential: Section 7.1 Electric Potential Energy	Section 7.1 vacillates between talking about the potential energy of a charge due to another and the potential energy of a system of charges. On p. 289-290, there's "the potential energy of Q when it is separated from q by a distance r", then "best described as the potential energy of the two-charge system", then "Example 7.2:	Revise beginning of question stem: "A research Van de Graaff generator has a 2.00-m diameter metal sphere with a charge of 5.00 mC on it. Assume the potential energy is zero at a reference point infinitely far away from the Van de Graaff."	General/pedagogical suggestion or question

	Potential Energy of a Charged Particle", then "What is the change in the potential energy of the two-charge system," then "Check Your Understanding: What is the potential energy of Q relative to the zero reference at infinity?" Making that consistent might help straighten out Prob. 49; the answer makes sense only if the U is associated with the ion-sphere system, not the ion alone. (Or the problem could ask for kinetic energy, which would make it unambiguous and better.)		
Unit 2 Electricity and Magnetism: Chapter 7 Electric Potential: Section 7.1 Electric Potential Energy	The work done just below equation 7.1 and above Fig. 7.5 has the wrong sign. W12 should equal kqQ integral.... and not -kqQ integral.... Kane	Remove the negative sign.	Typo
Unit 2 Electricity and Magnetism: Chapter 7 Electric Potential: Section 7.2 Electric Potential and Potential Difference	The plates are the wrong sign on the left side of Figure 7.13. The left plate should be negative if it is to repel the electron... The field lines are also drawn in the wrong direction.	This figure will be updated.	Incorrect answer, calculation, or solution

Unit 2 Electricity and Magnetism: Chapter 7 Electric Potential: Section 7.3 Calculations of Electric Potential	For the answer to Problem #49 in the book to be correct, the question should ask for kinetic energy instead of energy. The total (mechanical) energy K+U of the electron will be equal to its original U, but the answer in the book is Delta U, which equals K.	Revise "energy" to "kinetic energy" in the last sentence of the question stem.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 7 Electric Potential: Section 7.5 Equipotential Surfaces and Conductors	Problem #59: Since there is a negative charge on the plate, the electric field points towards the plate. Since the field points in the direction of decreasing electrical potential, as you move away from the plate, the potential should increase. Also, the value for part C looks like it was calculated for a charge density of 300nC/m^2, rather than 3.00nC/m^2, as stated in the problem.	Revise answers to part a and c as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 7 Electric Potential: Section 7.5 Equipotential Surfaces and Conductors	In "Distribution of Charges on Conductors" in Section 7.5, Coulomb's constant shown with the radius in the denominator, like in [V(r) = 1/(4*pi*r*epsilon-naught) * q/r]. This occurs 4 times in this section. Considering this is a voltage formula, there is only supposed to be one 'r' in the denominator, so it is not simply misplaced or rearranged for clarity. Coulomb's constant is defined as k = 1/(4*pi*epsilon-naught).	Remove the extra "r" from the denominator of these equations.	Typo

Unit 2 Electricity and Magnetism: Chapter 7 Electric Potential: Section 7.6 Applications of Electrostatics	Problem #70 refers to Figure 7.70. In the problem, it says that electrons are released near the negative plate accelerated toward the positive plate, and in the positive plate there is a hole to let the electron escape. In Figure 7.70, the plus and minus signs are on the wrong plates. The figure shows the electron near the positive plate instead of the negative plate. The hole is in the negative plate. The field lines are pointing from - to +, which is backwards, and the electron will never go anywhere. All you have to do to fix the figure is to switch the charge signs on the plates, and everything will be fine.	This figure will be updated.	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 7 Electric Potential: Section 7.6 Applications of Electrostatics	Problem #73 asks for the amount of work done, and the work should be positive. The answer key lists the potential energy and it is listed as negative.	Revise the answers to part a from negative to positive.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 7 Electric Potential: Additional Problems	Problem #91 can't seem to decide if we are using a ring of charge, or a half-ring. The answer will be the same in either case, but the wording is confusing.	Revise first part of the question stem to "A uniformly charged half-ring of radius 10 cm..."	General/pedagogical suggestion or question

Unit 2 Electricity and Magnetism: Chapter 8 Capacitance : Introduction	The introduction section states that a capacitor "consists of at least two electrical conductors separated by a distance." This is contradicted by EXAMPLE 8.3 Capacitance of an Isolated Sphere. This shows that a single conductor is able to behave as a capacitor. So the minimum requirement for a capacitor must be a single conductor, not "at least two conductors". You could argue that there is always a second conductor infinitely far away but I think that is a mathematical argument. I would say that an almost spherical Van Der Graaf generator behaves as a single conductor capacitor.	Revise "It consists of at least..." to "Capacitors are generally with...".	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 8 Capacitance : Section 8.2 Capacitors in Series and in Parallel	As one of my students pointed out, it would be great to make the notation for equivalent capacitance and equivalent resistance consistent. As it is, Ch. 8 uses only C_S for series capacitance and C_P for parallel capacitance, while Ch. 10 uses only R_eq for any combination of resistors. (I'd be tempted to use eq for any combination and S and P for purely series and parallel combinations.)	"R_eq" will be revised for consistency.	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 8 Capacitance : Section 8.3 Energy	I think that part (d) of Problem #47 should say what's being held constant from part (c)--the charge, voltage, or energy?	In the part d question stem, revise "...these hypothetical shelves" to "...these hypothetical shelves with a connection to the same voltage".	General/pedagogical suggestion or question

Stored in a Capacitor			
Unit 2 Electricity and Magnetism: Chapter 8 Capacitance : Section 8.4 Capacitor with a Dielectric	In Problem #53, the capacitance is given in microcoulombs. It should be in microfarads.	This issue is correct in webview and the solution manual.	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 8 Capacitance : Section 8.4 Capacitor with a Dielectric	The error can be traced to 8.4 where showed that the energy is decreased by inserting a dielectric into the cappie. Perhaps you should emphasize at that point that the charge (not voltage) is held fixed. When I looked at the chapter summary and key equations, had to go back and figure out what you were talking about. In both the summary and the key equations of the Chapter Review you need to mention that the cappie has been disconnected from the voltage source. Better yet, omit this from the Chapter Review. I don't see how it is important.	Add to the end of the last bullet in the 8.4 summary: "while disconnecting the battery and keeping the charge on the capacitor constant."	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.1 Electrical Current	Problem #23 has an error in the answer key, please see the attached file.	Revise answer as appropriate.	Incorrect answer, calculation, or solution

Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.1 Electrical Current	In the definition of current, we are told that "ΔQ is the amount of charge passing through a given area in time Δt." This works in a simple model such as imagining the charge in a wire acts like cars on a freeway. However, if we go to a more realistic model of electrons in a wire, we would view them like gas molecules, and many would through the given area in both directions. The "amount of charge passing" would count all of these charges. I'd suggest using the term "net charge" rather than charge, and to specify that the area is a cross-sectional area.	Revise "amount of charge" to "amount of net charge" and "area" to "cross-sectional area".	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.2 Model of Conduction in Metals	Problem #31, I believe that the units should be micro-Amps, not milli-Amps.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.2 Model of Conduction in Metals	In the #29 problem (ch9, p424), the radius is given as 1 mm^2. I believe it should be 1 mm. The alternative: the area is 1 mm^2. Was not sure which, but the answer seems to imply that the radius is 1 mm. Thanks!	Revise the question stem to remove the square in the unit. The radius should read 1 mm.	Typo
Unit 2 Electricity	Problem #32 is identical to #29. It even has the same typo	Replace with new question 32.	Other

and Magnetism: Chapter 9 Current and Resistance: Section 9.2 Model of Conduction in Metals	about the radius being 1 mm^2.		
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.3 Resistivity and Resistance	Problem #39: I get an answer of 3cm, not 3mm. Please see attached file.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.3 Resistivity and Resistance	Example 9.5: Students are asked to calculate resistance for a given copper wire, but resistance has not been introduced yet.	Move Example 9.5 as indicated.	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.3 Resistivity and Resistance	The conductivity of Quartz (fused) also seems to be in error. The given resistivity matches a value I found online, but the conductivity should be the inverse of that value, and it's not. If I take the resistivity as correct, the conductivity should be 1.33E-18.	Revise the conductivity for quartz to "1.33 × 10^–18".	Other factual inaccuracy in content

Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.3 Resistivity and Resistance	I believe there's an error in Table 9.1. The resistivity of copper looks correct compared to other sources, but the conductivity should be the inverse of the resistivity, and it isn't. The conductivity value for pure carbon should be 2.86E+4, which would be the same as the high-end value for carbon. The low-end value for carbon should be 0.167E+4.	In carbon (pure) conductivity, revise "10^–6" to "10^4".	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.4 Ohm's Law	On the right hand side, Figure 9.19b, the plus and minus signs on the voltmeter should be swapped because the battery has changed orientation compared to Figure 19.9a.	This figure will be updated.	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.5 Electrical Energy and Power	UP Vol2, Problem 9.53 should have another sig fig in the answer key. The current is given as 0.1A, but 0.14A is a better answer. See attached file.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.5 Electrical Energy and Power	Problem #55 has some issues with the answer key. If the voltage is 20, then the current cannot have a leading digit of 3.	Revise answers as appropriate.	Incorrect answer, calculation, or solution

Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.5 Electrical Energy and Power	Example 9.9: Where it says "The upward force supplied by the motor is equal to the weight of the object because the acceleration is constant", it should say "The upward force supplied by the motor is equal to the weight of the object because the acceleration is zero." (Replace "zero" for "constant".) If the elevator had a non-zero constant acceleration, lifting force would not be equal to weight. (Alternately, you could instead say "... because the velocity is constant," but saying that acceleration is zero relates more directly to Newton's Second Law.)	Revise "constant" to "zero".	Typo
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Section 9.6 Superconductors	Problem #63: I get an R of 23.77 ohms, rather than 0.24 ohms. This is verified by https://www.rapidtables.com/calc/wire/wire-gauge-chart.html. This means that part B is also off by 100.	Revise answers as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Additional Problems	Problem #71: This answer is off by many orders of magnitude. L/A is on the order of 3E3 and the resistivity is 1E-6, so the answer cannot be 3E6.	Revise answers as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 9	This concerns UP Vol 2, Problem #91. The answers in the back are off in places by an order of magnitude. Please see the attached file.	Revise answers as appropriate.	Incorrect answer, calculation, or solution

Current and Resistance: Challenge Problems			
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Challenge Problems	In part C of the question, electrons are referenced, whereas the particles have been protons at all other points. In the answer key, only the answer to part b is given, but it is labelled as a velocity rather than a density (part a asked for the velocity). Please see attached file.	Revise answers as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Challenge Problems	Density of copper is given as 89.5 g/cm^3. This is off by a factor of 10, it should be 8.95 g/cm^3. Note that the answer in the back of the book is consistent with 8.95 rather than 89.5.	Change the density listed in the problem to 8.95 g/cm^3.	Typo
Unit 2 Electricity and Magnetism: Chapter 9 Current and Resistance: Challenge Problems	Problem #81: n has units of electrons/m^2. It should be electrons/m^3.	Revise answer as appropriate.	Typo
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Section 10.1 Electromotive Force	In section 10.1 the terminal voltage is defined as, "is voltage measured across the terminals of a battery when there is no load connected to the terminal." Isn't the "no load" requirement an error? Just a few paragraphs down from this, an equation for terminal voltage is given, Vterm = EMF - Ir, that is valid even when a load is connected	Delete "when there is no load connected to the terminal".	Other factual inaccuracy in content

	to the terminals. So I think the terminal voltage is a perfectly valid concept under no-load *and* 'loaded' conditions, and its value, given by the formula, in fact, depends on the nature of the load, via the current that is demanded by it. Would a better definition be, "The terminal voltage of a battery is voltage measured across the battery's terminals."		
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Section 10.2 Resistors in Series and Parallel	As one of my students pointed out, it would be great to make the notation for equivalent capacitance and equivalent resistance consistent. As it is, Ch. 8 uses only C_S for series capacitance and C_P for parallel capacitance, while Ch. 10 uses only R_eq for any combination of resistors. (I'd be tempted to use eq for any combination and S and P for purely series and parallel combinations.)	"R_eq" will be revised for consistency.	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Section 10.2 Resistors in Series and Parallel	In Problem #39, the value of R4 should be 18 ohms, not 6.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 10 Direct-	Part b of Problem #33 give the power consumed by the motor as 3.18kW. However, in the question the current is 15A for the circuit and the voltage is	Revise answer as appropriate.	Incorrect answer, calculation, or solution

Current Circuits: Section 10.2 Resistors in Series and Parallel	120A, so the circuit as a whole should max out at 1.8kW.		
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Section 10.2 Resistors in Series and Parallel	In Problem #34 part b, the word "the" is missing before "smaller resistor".	Revise to "equal to the smaller resistance".	Typo
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Section 10.2 Resistors in Series and Parallel	In the third equation of section 10.2, example 10.3, solution part C, it says I3 = V/R3 = 6V/2Ω = 1.5A, so the math is incorrect. I think it is supposed to be 3V/2Ω = 1.5A, because the problem says that V = 3V.	Revise "6.00" to "3.00".	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Section 10.3 Kirchhoff's Rules	In Problem #39 ("Consider the circuit shown below. Find V1,V2, and R4."), in the circuit diagram, the label I4 is used twice, once for the current that goes through R4 and for the current that goes through battery V2. I recommend that the current that goes through battery be re-labeled (either as "I" or "I6").	This figure will be updated.	Typo
Unit 2 Electricity and	The subscripts for the potentials in Figure 10.23 are mixed up. For subfigures A and	This figure will be updated.	Other factual

Magnetism: Chapter 10 Direct-Current Circuits: Section 10.3 Kirchhoff's Rules	C, Delta V should be V_b - V_a. For subfigures B and D, Delta V should be V_a - V_b.		inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Section 10.3 Kirchhoff's Rules	The answer to Problem #43 is in error. The pair of two ohm resistors in parallel reduce to a one ohm equivalent resistor, which then makes the circuit as a whole symmetric. So i2=i3 and i1 = 2i2.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Section 10.3 Kirchhoff's Rules	Resistors are mislabeled. They should be consistently labeled R1, R2, and R3. In Fig. 10.21, they are labeled R1, R1, and R2, while in the calculation of current through the loop they are labeled R1, R2, and R2.	This figure will be updated.	Typo
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Section 10.5 RC Circuits	Part (c) of Figure 10.38 is labeled (b).	This figure will be updated.	Typo
Unit 2 Electricity and Magnetism:	Just a simple units typo in Problem #51; the duration of a photographic flash is related to an RC time constant, which is	Revise from "F" to "s".	Typo

Chapter 10 Direct-Current Circuits: Section 10.5 RC Circuits	0.100μF for a certain camera. RC time constant should have units of micro-seconds, not micro-farads!		
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Chapter Review	Since both charging and discharging can be started by closing a switch, I think it would be helpful if the problem made it clear which process it's talking about. (I think my students determined that from the solution, though.)	Revise in the question stem "capacitor" to "uncharged capacitor".	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Additional Problems	There are multiple issues with the answer to Problem #71. The units for resistivity in the question prompt and the answer key are given as ohms/m rather than ohm m. Additionally, the resistor somehow gets 4.55 volts when the power supply is 0.5 volts.	Change the units for resistivity to ohm times meter, not ohm over meter. Revise answer to part b as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Additional Problems	For Problem #67, it appears that the answer in the back of the book is assuming five capacitors instead of four capacitors.	Revise answers as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits:	The answer key for Problem #75 gives an incorrect formula, U=CV^2, missing the factor of 1/2. Additionally, the numerical answers have issues beyond the factor of 1/2.	Revise answers as appropriate.	Incorrect answer, calculation, or solution

Additional Problems			
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Additional Problems	For Problem #71 part (b), I get an initial current of 1.42 mA and a resistor voltage at 1.00 s of 0.376 V. I can't tell where either the current or the final answer in the book comes from.	Revise "0.014" to "0.017" and "4.55" to "0.376" in the solution.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Additional Problems	In Problem #74, part (b) the words "of the" are missing between "resistance" and "variable resistor".	Revise "resistance variable resistor be adjusted" to "resistance of the variable resistor be adjusted".	Typo
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Additional Problems	As the book consistently uses conventional current, either the battery or the red arrow showing I_1 is upside-down in the diagram for Problem #78.	The arrow will be revised in this figure.	Typo
Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Challenge Problems	Part b of Problem #91 asks for the resistance of the parallel resistor. There is no parallel resistor, only a series resistor.	In part b, change the second to last word from "parallel" to "series."	General/pedagogical suggestion or question

Unit 2 Electricity and Magnetism: Chapter 10 Direct-Current Circuits: Challenge Problems	The answer for Problem #95 is (1+3^1/2), which is one of the roots of the quadratic needed to solve the problem. However, this is a negative (nonphysical) root, the correct solution is (3^1/2 -1). This can be verified by hand by calculating the resistance of small segments of the infinite chain.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 11 Magnetic Forces and Fields: Section 11.1 Magnetism and Its Historical Discoveries	Figure 11.2 shows the magnetic south pole near the geographic north pole. This is correct. But the text in the image is labeled "Magnetic North Pole". This label should be "Magnetic South Pole."	This figure will be updated.	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 11 Magnetic Forces and Fields: Section 11.3 Motion of a Charged Particle in a Magnetic Field	Answers to Problem #29 as given seem to be for a different question.	Revise answers as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 11 Magnetic	Problem #31: The voltage needs to be half of the energy in eV, since you have a double-charged ion.	Revise answer as appropriate.	Incorrect answer, calculation, or solution

Forces and Fields: Section 11.3 Motion of a Charged Particle in a Magnetic Field			
Unit 2 Electricity and Magnetism: Chapter 11 Magnetic Forces and Fields: Section 11.6 The Hall Effect	Hall potential is off by roughly a factor of ten in the answer to Problem #49.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 11 Magnetic Forces and Fields: Section 11.6 The Hall Effect	Figure 11.17 contains labels for both I (current) and l (length of slab). In the font used, these look identical, which causes confusion for students.	This figure will be updated.	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 11 Magnetic Forces and Fields: Section 11.7 Applications of Magnetic Forces and Fields	The answer to Problem #55 has some slight miscalculation in a, which carries over to b and c. In part e, the alpha particle's energy should match the energy of the proton, as the equation in question scales as q^2/m and the rations for the alpha particle are 2 and 4 respectively.	Revise answers as appropriate.	Incorrect answer, calculation, or solution

Unit 2 Electricity and Magnetism: Chapter 11 Magnetic Forces and Fields: Additional Problems	Problem #67, part (b) asks for the radius of curvature. The answer key gives the magnetic force instead.	Revise question stem: "What is the (a) path of a proton and (b) the magnetic force on the proton that is traveling west to east with a kinetic energy of 10 keV in Earth's magnetic field that has a horizontal component of 1.8 x 10^–5 T north and a vertical component of 5.0 x 10^–5 T down?"	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 11 Magnetic Forces and Fields: Challenge Problems	Problem #106: On the picture magnetic vectors coming into the page, but the text says "coming out of the page in the figure".	Revise "coming out of" to "coming into" in the question stem.	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 11 Magnetic Forces and Fields: Challenge Problems	Problem #107: There are arrows in the diagram of the mass spec down in the area where there is an accelerating voltage. Students find these confusing, as voltage is a scaler, and if these are meant to represent an electric field, they are pointing in the wrong direction. Please delete the arrows from the diagram.	Replace figure with updated version.	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.1 The Biot-Savart Law	The given answer to Problem #17 is 1E-8T, the legs of the square should give an answer on the order of 1E-5T.	Revise answer to "5.66 × 10^–5".	Incorrect answer, calculation, or solution

Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.3 Magnetic Force between Two Parallel Currents	Problem #31: For a pair of wires, each at 2A, at a distance of 0.1m, the force/length is given as 2E-5 N/m. By definition, a pair of wires with one amp each at 1m gives a force of 2E-7 N/m, so at 0.1m this would be 2E-6 N/m. Multiply by four (2Ax2A) gives 8E-6 N/m.	Revise answers as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.3 Magnetic Force between Two Parallel Currents	I believe the answer for Problem #33 is an error. It has the field pointing into the page, whereas the components of the field from each wire are solely in the plane of the page.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.3 Magnetic Force between Two Parallel Currents	I have just found a possible error in example 12.4. The force between these two wires 1 and 2 should be attractive because the currents in the two wires are in the same direction. So that "the force per unit length from wire 1 on wire 2" should be pointing in the (-i) and (+j) direction, but in the solution the direction is repulsive. Please check the solution and correct it if needed.	This example will be updated.	General/pedagogical suggestion or question

Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.4 Magnetic Field of a Current Loop	The symbol theta is a bit overused and I suggest using multiple symbols for the angles. Specifically, the theta in equation 12.13 is the right angle between dl and r, not the acute angle theta depicted as between r and R. The other use of theta, the angles of B and B' from the y axis are actually equal to the theta that is between r and R although I didn't see that mentioned in the text. I think that the easiest change is to change sin theta in Eq. 12.13 to sin(pi/2). Kane	Revise "sinθ" to "sinπ/2".	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.4 Magnetic Field of a Current Loop	The solution to Problem #39 ignores that the coils have N turns. The answer should be multiplied by N.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.4 Magnetic Field of a Current Loop	The first learning objective says, "... along a line perpendicular to thep lane of the loop." Where it says "thep lane of the loop" should be "the plane of the loop."	Our reviewers accepted this change.	Typo
Unit 2 Electricity	There is a minor error in Fig. 12.11. The hypotenuse of a	This figure will be updated.	Other factual

and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.4 Magnetic Field of a Current Loop	triangle has a vector labeled r-hat. It should be labeled r-vector. I corrected it on the attached myopenmath question.		inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.5 Ampère’s Law	There is an error on example 12.8, page 554. The solutions given in the example are in units of T*m/A when they should be T*m. Case #24437	Delete "/A" in solutions (b) and (c).	Typo
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.5 Ampère’s Law	The first paragraph of the section says this: "A fundamental property of a static magnetic field is that, unlike an electrostatic field, it is not conservative. A conservative field is one that does the same amount of work on a particle moving between two different points regardless of the path chosen. Magnetic fields do not have such a property." Although, on the subject of whether *magnetic force* is conservative or not conservative, different textbooks give different answers (magnetic force does not change mechanical energy of a particle but it fails some of the traditional criteria for conservative force in	Revise the sentence "A conservative field..." to "A conservative vector field is one whose line integral between two end points is the same regardless of the path chosen."	Other factual inaccuracy in content

	mechanics), it is not correct to say "A conservative field is one that does the same amount of work on a particle moving between two different points regardless of the path chosen." A conservative *vector field* is described in terms of its line integral (see: https://en.wikipedia.org/wiki/Conservative_vector_field) which is distinct from work done in case of magnetic field. The work done by magnetic field on a charged particle indeed does not depend on the path taken (it's always 0 for static magnetic field). Suggested correction for the second sentence: "A conservative vector field is one whose line integral between two end points is the same regardless of the path chosen."		
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.5 Ampère's Law	Good evening, I wanted to notify the editors of OpenStax University Physics Volume 2 that there is an error in calculation on Section 12.5, Example 12.8: Part (c). The solution is read to be 5.65 x 10^(-6) T•m, but the actual solution is twice that number: 1.13 x 10^(-5) T•m.	Revise "5.65 × 10^−6" to "1.13 × 10^−5".	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields:	In Equation 12.27, the 0 subscript for mu_0 is transposed one letter to the right, so instead of reading mu_0*I it reads mu*I_0. It is correct in the rest of the derivation.	Revise "μI_0" to "μ_0 I".	Typo

Section 12.6 Solenoids and Toroids			
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.6 Solenoids and Toroids	The paragraph after Equation 12.30 says "Outside the solenoid, one can draw an Ampère's law loop around the entire solenoid. This would enclose current flowing in both directions. Therefore, the net current inside the loop is zero. According to Ampère's law, if the net current is zero, the magnetic field must be zero. Therefore, for locations outside of the solenoid's radius, the magnetic field is zero." But this statement is incorrect. Ampere's law only says that the line integral of B.dl is zero (not that magnetic field B is zero necessarily along the entire path), and indeed if you draw the loop and consider the integral, you should see that even if magnetic field B is a non-zero constant value outside, the direction of loop segments (3 and 1, if in Figure 12.20 you imagine pulling segment 1 down past the boundary of solenoid) is such that the line integral will add up to zero even with a non-zero constant outside magnetic field. Suggested correction: Remove the paragraph altogether. It adds no new (correct) information (an assertion was already made above Figure 12.20 that "Along segment 3, B=0 because the magnetic field is zero outside the solenoid").	Delete the paragraph "Outside the solenoid, one can draw an Ampère's law loop around the entire solenoid. This would enclose current flowing in both directions. Therefore, the net current inside the loop is zero. According to Ampère's law, if the net current is zero, the magnetic field must be zero. Therefore, for locations outside of the solenoid's radius, the magnetic field is zero."	Other factual inaccuracy in content

	In order to properly *prove* that the magnetic field outside the solenoid is zero, the proof leading to Eq. 12.30 has to be substantially modified so that the segment 3 is at an arbitrarily large distance away from the solenoid (where you can ensure arbitrarily small magnetic field). And by bringing the segment in closer and noticing that nothing in the Ampere's law equation changes, you can prove that the magnetic field along segment 3 is zero, even when it is immediately outside the solenoid. But since this proof is a much more extensive modification, I suggest a simple removal of the extraneous (and erroneous) paragraph.		
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Section 12.7 Magnetism in Matter	Problem #63 is about a toroid, but we are not given a radius. The answer in the back of the book is 0.18T, which would imply a radius of 1m. Please see attached file.	Revise question stem to "...thin toroid with 200 turns per meter and a radius of 1 meter."	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Additional Problems	Posing Problem #71 in terms of "percentage change" is problematic, in that invites semantic squabbling. If r is decrease by a factor of 4, then B is increased by a factor of 4. But that's a 75% decrease in r and and a 300% increase in B. Change the wording to "fractional change" to avoid	Revise question stem to "How is the fractional change in the strength..."	General/pedagogical suggestion or question

	messing around with conventions around percentage change.		
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Additional Problems	Problem #79: There is a subscript on the first B which is v, it should be y. In other words, By rather than Bv.	Revise question stem to "...axial magnetic field B_y..."	Typo
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Additional Problems	Problem #73: The number of turns given in the back of the book, multiplied by the width of each wire, generates a length greater than the inner diameter of the toroid by an order of magnitude.	Revise answers as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 12 Sources of Magnetic Fields: Challenge Problems	The answer to Problem #89 is stated as UI/(2 pi x). However, this is the answer after the result has been tested by letting the limit of a go to zero, which is in essence an unstated "Part B" to the problem.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 13 Electromagnetic Induction: Section 13.2 Lenz's Law	The final 'Interactive' panel says "Visit this website for a demonstration of the jumping ring from MIT." The link (https://www.youtube.com/watch?v=gfJG4M4wi1o) does not show this demonstration. Perhaps this one was intended? https://www.youtube.com/watch?v=Pl7KyVIJ1iE	This link will be updated.	Broken link

Unit 2 Electricity and Magnetism: Chapter 13 Electromagnetic Induction: Section 13.3 Motional Emf	The answer to Problem #39 only accounts for the changing field, not for the motion of loop. It needs an additional term.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 13 Electromagnetic Induction: Section 13.4 Induced Electric Fields	I find an answer to Problem #47 which is different by a factor of two.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 13 Electromagnetic Induction: Section 13.4 Induced Electric Fields	Problem #53 involved a solenoid that has a changing current. We are asked to solve a Faraday's Law problem, but since that involves the derivative of a magnetic field, we cannot solve this unless we are also given the turn density of the solenoid, which is missing. Note that the answer key gives 7.1 microA.	Revise question stem to "The current in a long solenoid with 20 turns per centimeter of radius..."	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 13 Electromagnetic Induction: Section 13.5	The singular noun phrase, "the base of the pot" should agree with the "conductors", i.e. "the base of the pot needs to be a conductor". Or the whole sentence could be rephrased for clarity, since the cooktops operate with high efficiency when used with good	Revise the sentence "Induction cooktops have high..." to "Induction cooktops have high efficiencies and good response times when the base of the pot is a conductor, such as iron or steel."	Typo

Eddy Currents	conductors, but could still operate with low efficiencies in other cases. "Induction cooktops have high efficiencies and good response times but the base of the pot needs to be conductors, such as iron or steel, for induction to work."		
Unit 2 Electricity and Magnetism: Chapter 13 Electromagnetic Induction: Section 13.6 Electric Generators and Back Emf	In Problem #61, answers for (a), (b) and (c) appear to be correct. However part (d) is stated as 22.5W. This is true if we use the voltage seen by the resistors, but not if we look at the back-EMF. If we are consistent with the method shown in example 13.10, then we should have 37.5W. For the power from the resistors, if we use i^2R, we get 22.5W rather than the answer key's 2.5W. Note that 37.5+22.5=60, which matches the power drawn from the supply, this internal consistency is not seen if we follow the book's answers.	Revise answers for parts d and e as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 13 Electromagnetic Induction: Additional Problems	The answer to Problem #63 is off by a factor of u/2.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 13	The answer for Problem #77 appears to be incorrect. The problem is a classic Faraday Paradox, so the solution should be well known.	Revise answer as appropriate.	Incorrect answer, calculation, or solution

Electromagnetic Induction: Challenge Problems			
Unit 2 Electricity and Magnetism: Chapter 13 Electromagnetic Induction: Challenge Problems	Problem #90 says: “Assume that the magnetic field of the induced current is negligible compared to 3 T”. I recommend removing the statement or revising it due to conceptual difficulty it entails. Similar problems in other textbooks do not say that. If the B field induced by the current is ignored, then we are basically ignoring the induced current that creates it and then, there would be no force on the loop if there is no current. So either remove the sentence or instead suggest ignoring the flux that the induced B field creates.	Delete "Assume that the magnetic field of the induced current is negligible compared to 3 T."	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 13 Electromagnetic Induction: Challenge Problems	The answer to Problem #81 ignores that the outer coil has 8 turns, so all of the answers need to be multiplied by 8.	Revise answers to parts a and b as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Introduction	The introduction to Ch. 14 states "In Electric Charges and Fields, we saw that induction is the process by which an emf is induced by changing magnetic flux.” Chapter 5 doesn't discuss magnetic flux. It seems that this should be "In Electric Charges and Fields, we saw that induction is the process by	Revise to "...induction is the process by which an emf is induced by changing electric flux and separation of a dipole."	Other factual inaccuracy in content

	which an emf is induced by changing electric flux and separation of a dipole. " Kane		
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Section 14.2 Self-Inductance and Inductors	It calculates the self-inductance given the induced fem and rate of change of the current. The indicated solution is: L = 2V / (5A / 0.1S) = 4 Henry However, at least on the web, the answer given is 4e-2 H, 100 times less. Maybe the fem should be 20mV instead of 2V?	Revise "2.0 V" to "20 mV".	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Section 14.3 Energy in a Magnetic Field	It looks like the solution to problem #59 is not correct (in the textbook or in the instructor solution manual). I get the following: a. I_1 = I_2 = 1.7 A b. I_1 = 2.54 A, I_2 = 1.27 A c. I_1 = 0, I_2 = 1.27 A d. I_1 = I_2 = 0	Revise a, b, and c in the answer key to "b. I_1 = 2.54 A, I_2 = 1.27 A ; c. I_1 = 0, I_2 = 1.27 A".	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Section 14.3 Energy in a Magnetic Field	Example 14.3: The energy density and total energy in a cylindrical shell are the same formula. The latter which follows "the energy stored in a cylindrical shell of inner radius r, outer radius r+dr, and length l (see part (c) of the figure) is" should be something like: dU_m = (μ_0 I^2/(8π^2r^2))(2πrl)dr	Revise these two identical formulas.	Typo
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Section 14.3 Energy in a	Equations 14.21 and 14.22 use "i" for current, rather than the capital "I" that has been used previously. There is no alert to the reader that this is happening, which can be confusing. I suggest changing "i" to "I" for these equations. If there is a reason to leave them	In the sentence before equation 14.21, revise "so the power absorbed by the inductor is" to "where i is the induced current at that instance. Therefore, the power absorbed by the inductor is". Also revise the	General/pedagogical suggestion or question

Magnetic Field	as "i", I suggest that a note explaining this should be included.	lowercase "L" in equation 14.22 to capital "I".	
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Section 14.4 RL Circuits	The caption for Fig 14.12 references three circuits a) open circuit, b) battery connected (charging inductor), and c) battery disconnected (inductor discharging). ONLY figure c) is shown (and switches not labeled). This figure is referenced in the Conceptual Questions (CQ 14.11,12,15,16,17 are all linked to Fig 14.12 b) which does NOT exist -- link does work to Figure but only c) is shown). The instructor manual/solution guide shows the three circuits with switches (S1 and S2) properly set in its answers (the manual figure is attached -- text ONLY has c)).	Our reviewers accepted this change.	Other
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Section 14.4 RL Circuits	The answer to Problem #53, part (c) is incorrect. Using the correct answer from part (b) of a current of 2.426 A, the resulting voltage across both the inductor and the resistor should be 12.13 volts. Note that the book incorrectly suggests that the total voltage is VL plus VR, yet the 2 components are in parallel, so the voltage must be the same.	To eliminate confusion in part (c), revise "R" to "R_1" and add "R_1 = R_2 = R" to the end of the question. The figure will also be updated.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Section 14.4 RL Circuits	Problem #59: We should be told what R2 and R3 are.	Revise question stem to "...R_1 = 10 Ω, R_2 = R_3 = 19.4 Ω, and L =..."	Incorrect answer, calculation, or solution

Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Section 14.4 RL Circuits	Figure 14.12 does not match the description given in the text or the caption. It looks like the image alt text describes the correct figure (alt text: "Figure a shows a resistor R and an inductor L connected in series with two switches which are parallel to each other. Both switches are currently open. Closing switch S1 would connect R and L in series with a battery, whose positive terminal is towards L. Closing switch S2 would form a closed loop of R and L, without the battery. Figure b shows a closed circuit with R, L and the battery in series. The side of L towards the battery, is at positive potential. Current flows from the positive end of L, through it, to the negative end. Figure c shows R and L connected in series. The potential across L is reversed, but the current flows in the same direction as in figure b."); the figure itself needs to be changed so that it matches the alt text (and how the text refers to the figure).	This image has been updated.	Typo
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Section 14.5 Oscillations in an LC Circuit	Answer to Problem #63 should be 3.2E7 rad/sec, not 3.2E-7 rad/sec.	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity	The solution for Problem #65 appears to have issues. It gives	Revise answers as appropriate.	Incorrect answer,

and Magnetism: Chapter 14 Inductance: Section 14.5 Oscillations in an LC Circuit	the answer to part (b) as one-half of the answer to part (a), whereas it should be one-quarter. Also, I believe that part (a) is incorrectly calculated.		calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Section 14.6 RLC Series Circuits	Problem #72 should either state the value of the capacitance C, as the oscillation frequency depends on the capacitance, or state a fixed time period (not a fixed number of cycles).	Revise the first sentence of the question stem from "...inductor of the resulting..." to "...inductor and a 10μF capacitor of the resulting..."	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Section 14.6 RLC Series Circuits	openstax.org/l/21cirphysbascur is broken	This link will be updated.	Broken link
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Challenge Problems	Problem 90 on page 626 is same as problem 86 on page 660.	Delete problem 86 in Chapter 14.	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Challenge Problems	Problem #85 appears to be problematic. Part (a) asks for the field as a function of time. The problem needs to be re-stated, as one cannot get the field as a function of time from the information given, only the derivative of the field with respect to time. Part (b) looks good. In part (c) I get 4.4n A as	In the question stem, remove the statement “as a function of time from the current in the wire.” Revise the answer to part c as appropriate.	Incorrect answer, calculation, or solution

	opposed to the book's answer of 4.0nA.		
Unit 2 Electricity and Magnetism: Chapter 14 Inductance: Challenge Problems	Problem #83: The Quality Factor definition is missing a factor of 2Pi in the definition.	Revise "1/R" to "1/2πR"	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Section 15.1 AC Sources	The voltage given for US power is 156 volts, with a reference to 120 volts, which would be the RMS value. If 156 is used, then 110 volts should be referenced. Seeing at the US now uses mainly 120 volts RMS, we should use ~170 volts as the amplitude.	Revise two instances of "156" to "170".	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Section 15.1 AC Sources	Instead of "time t in seconds" should be "time t in milliseconds".	Revise to "t in milliseconds".	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Section 15.2 Simple AC Circuits	The text refers to Example 15.1 when it should have referred to Example 15.1 for the LRC and voltage used for resonance.	Revise to "(a) What is the resonant frequency of a circuit using the voltage and LRC values all wired in series from Example 15.1?"	Typo
Unit 2 Electricity	Problem #25, part (d) asks for voltages and the answer key	Revise part d answer as appropriate.	Incorrect answer,

and Magnetism: Chapter 15 Alternating-Current Circuits: Section 15.3 RLC Series Circuits with AC	give an amplitude of 120V. This is incorrect; that is the voltage from the power supply, which forms the hypotenuse in the phasor diagram.		calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Section 15.3 RLC Series Circuits with AC	Looking at the solutions for Problem #25 part (d), vR(t)=62cos(120πt) and vC(t)=103cos(120πt−π/2), we can see that vR is in phase with the EMF supplied by the voltage source which is said to be defined as v(t)=120cos(120πt) in the problem. However, because this is an RC circuit the voltage will be lagging the current (therefore lagging vR), and not in phase. This leads to the conclusion that the solution does not account for the phase angle phi. Additionally, kirchoffs law is not satisfied in the original solution for specific values of t. Once the phase angle has been accounted for, kirchoffs laws are satisfied.	Add a phase constant to the current solutions in part c for problems 25 and 26. Revise "cos(120πt)" to "(120πt – 0.33π)".	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Section 15.3 RLC Series Circuits with AC	Check Your Understanding 15.3: See attachment.	Revise from "+ pi/2" to "– pi/2".	Incorrect answer, calculation, or solution

Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Section 15.4 Power in an AC Circuit	In an equation deriving formula 15.12, the sin angle difference formula is wrongly distributed. It should have produced integrals of sin^2(wt)dt and sin(wt)cos(wt)dt, but instead the equation reads sin(wt)dt and sin^2(wt)cos(wt)dt. The error isn't carried over.	Revise "sin(wt)" to "sin^2(wt)" and "sin^2(wt)" to "sin(wt)".	Typo
Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Section 15.4 Power in an AC Circuit	The answer to Problem #35, part (b) is given as 52 ohms. But it asks for the value of the capacitance or self-inductance. Since the frequency of the power source is not given, the question should ask for the reactance instead (Z rather than C or L).	Revise part b question stem to "What is the value of the reactance across the inductor that will raise the power factor to unity?"	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Section 15.4 Power in an AC Circuit	The solutions to Problem #33 don't appear to consider the power factor cos(phi). I get 5.32 W for part a and 2.12 W for part b.	Revise solutions to "5.3 W" and "2.1 W".	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Section 15.5 Resonance	In Problem #41, the answer key gives 13 for for part C and 25 rad/s for part D. I believe that those answers are off by a factor of 2, and should be 6.32 and 50.	In the question stem for part b, replace the word "constant" with "resonant." Revise answers to parts c and d as appropriate.	Incorrect answer, calculation, or solution

in an AC Circuit			
Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Section 15.6 Transformers	In part c and d of example 15.6 it uses P = I^2 x R, which is the dissipated power of the resistor (in this case the transmission line) to get the answers. However when I use the equivalent P = V^2/R equation to get the same power I get two different values. To my understanding both I^2 x R and V^2/R both gives the power dissipated via a resistor and should give identical answers. Can you explain why this is not the case for this example?	Delete part d from the example. In part c, revise "200" to "6000" and "800" to "24,000".	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Key Equations	You label the impedance and phase angle for an "RLC series circuit" as being correct for an "ac circuit".	Revise key equations so "Phase angle of an ac circuit" is now "Phase angle of an RLC series circuit" and "Impedance of an ac circuit" is now "Impedance of an RLC series circuit."	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 15 Alternating-Current Circuits: Additional Problems	Problem #57: If there were no inductor or capacitor, and only the resistor, you would get the listed 36W. However, the added components limit the current through the circuit, thereby reducing the power.	Revise answer as appropriate.	Incorrect answer, calculation, or solution

Unit 2 Electricity and Magnetism: Chapter 16 Electromagnetic Waves: Section 16.1 Maxwell's Equations and Electromagnetic Waves	In the paragraph above Figure 16.3, it says, "This may not be surprising, because Ampère's law as applied in earlier chapters required a steady current, whereas the current in this experiment is changing with time and is not steady at all." And this statement is simply false in its entirety. It is false that Ampere's law requires a steady current: except for the correction needed for propagation speed of EM wave, Ampere's law works perfectly well for time-varying currents (otherwise we will have to question the inductance formulas derived earlier in Chapter 14). It is false that the current here is necessarily time-varying. All you need to do (experimentally) is connect the capacitor to a current source; the current source will provide a steady current up until a time when it maxes out in available voltage. I suggest that this erroneous sentence be taken out. If ending the paragraph with "Clearly, Ampere's law in its usual form does not work here" is too abrupt, I suggest a transition sentence, such as "This is an internal contradiction in the theory which requires a modification to the theory---Ampere's law---itself."	Revise the sentence "This may not be surprising..." to "This is an internal contradiction in the theory which requires a modification to the theory, Ampère's law, itself."	Other factual inaccuracy in content
Unit 2 Electricity and Magnetism:	The following sentence should reference Equation 16.6, not 16.5: "Therefore, we can replace the integral over S2 in	Revise to "Equation 16.6".	Typo

Chapter 16 Electromagnetic Waves: Section 16.1 Maxwell's Equations and Electromagnetic Waves	Equation 16.5 with the closed Gaussian surface S1+S2 and apply Gauss's law to obtain."		
Unit 2 Electricity and Magnetism: Chapter 16 Electromagnetic Waves: Section 16.2 Plane Electromagnetic Waves	In Equation 16.13, "Net flu" should be "Net flux". This one shouldn't be too controversial.	This has already been corrected in webview.	Typo
Unit 2 Electricity and Magnetism: Chapter 16 Electromagnetic Waves: Section 16.4 Momentum and Radiation Pressure	"The term deceleration ...., so we don't use it". I agree and the term should be removed/changed in Problem #67.	Revise "decelerates" to "accelerates opposite the motion". This will also be updated throughout the book.	General/pedagogical suggestion or question
Unit 2 Electricity and Magnetism: Chapter 16 Electromagnetic Waves: Section 16.5 The Electromagnetic Spectrum	The answer to Problem #79, part b is calculated in the book by dividing 8m by the speed of light. However, the question asks for the difference between a direct signal, and one that is received after it has reflected off of a wall 8m away. Given that the signal needs to get to the wall and then bounce back, that's 16m, and therefore the answer in	Revise answer as appropriate.	Incorrect answer, calculation, or solution

	the back of the book should be doubled.		
Unit 2 Electricity and Magnetism: Chapter 16 Electromagnetic Waves: Additional Problems	The solution given to Problem #89 is off by orders of magnitude. Note the parts are written out, and the factor of 5000 has no units on it (it should have units of inverse-time), this is probably what is leading to the confusion	Revise answer as appropriate.	Incorrect answer, calculation, or solution
Unit 2 Electricity and Magnetism: Chapter 16 Electromagnetic Waves: Additional Problems	Answer given for Problem #91 is 6E5km, which is 6E8m, which is two light-seconds. Seeing as we are looking at a time delay of 0.25 seconds, this is off by roughly an order of magnitude. For 1/4 of a light second, we would travel 7.5E7m, divide this by two for "there and back" to get 3.75E7m.	Revise correct answer as appropriate.	Incorrect answer, calculation, or solution