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Errata:

Issue	Resolution	Severity
Chapter 1: Section 1.7 The Universe on the Large Scale: PDF page 24, last line says: “knows more about science and did math than Sir Isaac Newton,..” It should say: “knows more about science and math than did Sir Isaac Newton… Andy Fraknoi	In the last sentence of page 24, revise “knows more about science and did math than Sir Isaac Newton" to “knows more about science and math than did Sir Isaac Newton".	Typo
Chapter 3: Section 3.1 The Laws of Planetary Motion: On the page named as 75 in the PDF LR book, there is a conceptual error in two sentences, during Example 3.2 in the box. The error is that two sentences point out the equality of the square of the orbital period (measured in Earth years) to the cube of the average distance from the Sun, or semi-major axis (measured in astronomical units). But the respective, essential terms "square" and "cube" are missing! A further complication is errors in the units (sometimes the units are years squared or AU cubed, not just years or AU). Original sentences (the ^ symbol denotes superscript or exponent typesetting for the following integer): AS WRITTEN: For Venus, P^2 = 0.62 × 0.62 = 0.38 year and a^3 = 0.72 × 0.72 × 0.72 = 0.37 AU (rounding numbers sometimes causes minor discrepancies like this). The orbital period (0.38 year) approximates the semimajor axis (0.37 AU). SUGGESTED CORRECTION: For Venus, P^2 = 0.62 × 0.62 = 0.38 year^2 and a^3 = 0.72 × 0.72 × 0.72 = 0.37 AU^3 (rounding numbers sometimes causes minor discrepancies like this). The square of the orbital period (0.38) approximates the cube of the semimajor axis (0.37). AS WRITTEN: For Earth,	Revise Example 3.2 Applying Kepler’s Third Law as follows: Using the orbital periods and semimajor axes for Venus and Earth that are provided here, calculate P^2 and a^3, and verify that they obey Kepler’s third law. Venus’ orbital period is 0.62 year, and its semimajor axis is 0.72 AU. Earth’s orbital period is 1.00 year, and its semimajor axis is 1.00 AU. Solution We can use the equation for Kepler’s third law, P^2 is proportional to a^3. For Venus, P^2 = 0.62 x 0.62 = 0.38 and a^3 = 0.72 x 0.72 x 0.72 = 0.37 (rounding numbers sometimes causes minor discrepancies like this). The square of the orbital period (0.38) approximates the cube of the semimajor axis (0.37). Therefore, Venus	Minor

P^2 = 1.00 × 1.00 = 1.00 year^2 and a^3 = 1.00 × 1.00 × 1.00 = 1.00 AU^3. The square of the orbital period (1.00) approximates (in this case, equals) the cube of the semimajor axis (1.00).	obeys Kepler's third law. For Earth, P^2 = 1.00 x 1.00 = 1.00 and a^3 = 1.00 x 1.00 x 1.00 = 1.00. The square of the orbital period (1.00) approximates (in this case, equals) the cube of the semimajor axis (1.00). Therefore, Earth obeys Kepler's third law. Check Your Learning Using the orbital periods and semimajor axes for Saturn and Jupiter that are provided here, calculate P^2 and a^3, and verify that they obey Kepler's third law. Saturn's orbital period is 29.46 years, and its semimajor axis is 9.54 AU. Jupiter's orbital period is 11.86 years, and its semimajor axis is 5.20 AU. Answer: For Saturn, P^2 = 29.46 x 29.46 = 867.9 and a^3 = 9.54 x 9.54 x 9.54 = 868.3. The square of the orbital period (867.9) approximates the cube of the semimajor axis (868.3). Therefore, Saturn obeys Kepler's third law.	
Chapter 3: Section 3.1 The Laws of Planetary Motion: P. 74, in Example 3.1, on the line that starts "If the object's orbit has a semi-major axis…" the 4 AU should be 50 AU. I am using the PDF version. Andrew Fraknoi	In the solution to Example 3.1 Calculating Periods, revise "4 AU" to "50 AU".	Typo
Chapter 4: Section 4.4 The Calendar: In the section on Mean Solar Time and Standard Time (p. 116) is the sentence: For example, noon occurs when the Sun is overhead. Many students will interpret "overhead" to mean the zenith, in which case this statement promotes the misconception that the sun is overhead at noon, which is never true anywhere in the continental U.S. I suggest changing this sentence to: For example, noon occurs when the Sun is highest in the sky -- on the	Revise the sentence "For example, noon occurs when the Sun is overhead." to "For example, noon occurs when the Sun is highest in the sky on the meridian (but not necessarily at the zenith)."	Typo

meridian, but not necessarily at the zenith. Andy Fraknoi		
Chapter 4: Section 4.7 Eclipses of the Sun and Moon: In Section 4.7 Figure 1 the shadows are labelled incorrectly. Area 1 is correctly labelled as the umbra. Sections 2 and 3 are blank but should be labelled penumbra. Section 4 is incorrectly labelled penumbra but should be labelled antumbra. This link shows a correct figure. https://en.wikipedia.org/wiki/Umbra,_penumbra_and_antumbra The attached screenshot is edited to correct the figure.	Revise Figure 4.21 Solar Eclipse as follows: Regions 1 and 4 should have darker shading than Regions 2 and 3. Remove label "penumbra".	Major
Chapter 5: Section 5.2 The Electromagnetic Spectrum: Section 5.2 -- need units nm*K on the Wien's law equation in the text (the boxed example has them correct, the paragraph above omits them)	In the paragraph above Example 5.3 Calculating the Temperature of a Blackbody, revise as follows: "The wavelength at which maximum power is... and the temperature is in K (the constant 3 x 10^6 has units of nm × K)."	Minor
Chapter 5: Section 5.2 The Electromagnetic Spectrum: P. 161, in the box, under Answer: “The 5800 K star has triple the temperature,” should say “The 8700 K star has….” I am using the PDF version	In Example 5.4 Calculating the Power of a Star, revise "5800" to "8700" in the Answer to the Check Your Learning question.	Typo
Chapter 5: 5.2 The Electromagnetic Spectrum: PDF page 170, Example 5.4, the last line (which is an equation) has 8000 in the denominator. That should be 6000! Andy Fraknoi	In the solution to Example 5.4 Calculating the Power of a Star, revise "8,000" in the denominator of the last equation to "6000".	Typo
Chapter 5: Section 5.4 The Structure of an Atom: 172 Chapter 5 Radiation and Spectra The first line is missing dimensions -- J s, Hz in the third equality Answer: E = h f = (6.626 × 10^–34)(5.5 × 10^14) = 3.6 × 10–19 J should read E = h f = (6.626 × 10^–34 J s)(5.5 × 10^14 Hz) = 3.6 × 10^–19 J	Revise the answer to the Check Your Learning Question in Example 5.5 The Energy of a Photon as follows: E = h f = (6.626 × 10^–34 J s)(5.5 × 10^14 Hz(1/s)) = 3.6 × 10^–19 J	Typo
Chapter 5: Section 5.5 Formation of Spectral Lines: Figure 1(Bohr Model of Hydrogen) in Section 5.5 (Formation of Spectral Lines) There seems to be an error in this figure. The transitions are ID'd as resulting in "red", "blue-green", and "violet" spectral	Revise Figure 5.19 Bohr Model for Hydrogen as follows: All 3 spectral lines end at the circle labeled "n = 2". The red spectral line	Major

lines. However, the transitions are between the wrong levels if this figure is supposed to be showing the transitions that produce these colors (the first three transitions in the Balmer series). Instead, the transitions shown are the first three in the Lyman series. Because these all produce UV photons, it seems like this must be an error, since leaving it this way means this figure could be a source of major confusion later on (such as when trying to explain the reason for the temperature dependence of the Balmer lines in stellar spectra, etc).	starts at the circle labeled "n = 3". The blue-green spectral line starts at the circle labeled "n = 4. The violet spectral line starts at the circle labeled "n = 5".	
Chapter 5: Section 5.6 The Doppler Effect: One of the learning goals on p. 176 is: “Describe how we can use the Doppler effect to deduce how astronomical objects are moving through space,” but “how” an object is moving through space is very vague and could mean many things. Consider changing this learning goal to: “Describe how we can use the Doppler effect to deduce how fast astronomical objects are moving through space.” Andy Fraknoi	Revise the second learning objective to ""Describe how we can use the Doppler effect to deduce how fast astronomical objects are moving through space."	Typo
Chapter 19: Section 19.3: Variable Stars: One Key to Cosmic Distances: Chap. 19, p. 670, under the heading Cepheid Variables, 3rd line: “stars in named” should be “stars is named” - Andy Fraknoi	In the first paragraph, revise “stars in named” to “stars is named”.	Typo
Chapter 20: Section 20.1 The Interstellar Medium: On the PDF page 690, the box that is headed Example 20.1 there is an error confusing diameter and radius. See the attached Word file for the correct text. - Andy Fraknoi	Revise the solution to Example 20.1 Estimating Interstellar Mass as follows: Solution If the diameter of the Galaxy is 100,000 light-years, then the radius is 50,000 light-years. Recall that 1 light-year = 9.5 x 10^12 km = 9.5 x 10^17 cm, so the volume of the Galaxy is V = pi(R^2)h = pi(50,000 x 9.5 x 10^17 cm)^2 (300 x 9.5 x 10^17 cm) = 2.0 x 10^66 cm^3 The total mass is therefore M = V x density of atoms x mass per atom 2.0 x 10^66 cm^3 x (1 atom/cm^3) x 1.7 x 10^-27 kg = 3.5 x 10^39 kg This is sufficient to	Typo

	make N = M/(2.0 x 10^30 kg) = 1.75 x 10^9 stars equal to the mass of the Sun. That's roughly 2 billion stars.	
Chapter 20: Section 20.5 The Life Cycle of Cosmic Material: p. 714, Fig. 20.20 Local Fluff In the caption all the superscripts have been lowered to the line. Cm3 should have the 3 be a superscript, e.g. - Andy Fraknoi	In the caption for Figure 20.20 Local Fluff, revise cm3 to cm^3.	Typo
Chapter 21: Section 21.3 Evidence that Planets Form Around Other Stars: On PDF p. 736, 2nd to last line says the Trapezium cluster can be seen in Figure 21.4. That should be 21.5. Andy Fraknoi	In the second paragraph of subsection The Orion Molecular Cloud, revise the second to last sentence to refer to Figure 21.5 Central Region of the Orion Nebula (not Figure 21.4).	Typo
Chapter 22: Section 22.4 Further Evolution of Stars: Chap. 22, p. 787, the first line in the paragraph just below figure 22.16, "helium fuel or carbon" should be "helium fuel to carbon" - Andy Fraknoi	In the second paragraph, revise "helium fuel or carbon" to "helium fuel to carbon".	Typo
Chapter 26: Section 26.1 The Discovery of Galaxies: P. 934, Voyagers box on Hubble, paragraph 3, line 4, 2.5-meter telescope on Palomar Mountain should be 5-meter telescope. I am using the PDF version of the Astronomy text. Andrew Fraknoi	In the third paragraph of feature box Voyagers in Astronomy: Edwin Hubble: Expanding the Universe, revise "2.5-meter telescope on Palomar Mountain" to "5-meter telescope on Palomar Mountain".	Typo
Appendix E: Boltzmann constant is missing the negative exponent -- should be 5.67 x 10^-8 not 5.67 x 10^8.	Revise the value given for the Stefan-Boltzmann constant to "5.67 x 10^-8".	Typo