IB Physics

Relativity and Astrophysics

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| Block | | Class | | Due on this class |
| 1 Mar 20 | | -The Michelson-Morley experiment  -Einstein's Gedanken  -The two postulates of Special Relativity  -Time Dilation  -The Twin Paradox and relative time  -Length Contraction and 4-D space-time  -Mass Dilation and the ultimate speed limit of the Universe | | **Read:** 26.1-6 |
| **Mar 21-29** | | **|: break yay Spring break yay Spring break yay Spring :|** | | (IB Folks finish as much of the exam and the climate change as possible) |
| 2 Mar 31 | | -Simultaneity  -Mass and energy: Relativistic kinetic energy  -Relativistic addition of velocities  -Energy-momentum relationship  **-PreQuiz 26.1** | | **Video Flip:** Relativistic KE, Velocity addition, Momentum  **Read:** 26.7-11 |
| 3  **Apr 2** | | Work on problems: (See Check #1 and #2)  -Time, length, mass  -Relativistic addition of velocities  -Energy and energy momentum  **-Skill Set 26.1** | | **Turn in:** PQ 26.1 |
| 4 Apr 6 | | **-Intro to Astrophysics**  **-The Structure of the Universe:**  -Our solar system/Galaxy  - /Nebulae/Clusters/Groups/Superclusters  **-Scale Model of the Solar System** | | **Read:** 33.1  **Check #1:** Worksheet 26: 7-13, 20, 22-25, 28-31 |
| 5 Apr 8 | | **-Units of distance:**  -Astronomical Units (au) /Parsecs (pc) /Light Years  **Stars: Part One – Distance and Brightness**  -Wien’s Law  -Absolute Luminosity  -Apparent Brightness | | **Read:** 33.3  **Check #2:** 26: 1, 4(69.1 Ly), 7, 8(0.436c), 13, 14(0.887 c), 26(0.866c), 28(2.23×10-9 J, 6.46 × 10-18 kg m/s), 29, 31, 43, 46(0.65c), 48(0.70c) |
| 6  **Apr 13** | | -Apparent and absolute magnitude  -H-R diagrams  **-Stars: Part Two - Stellar Evolution**  -Birth/Main sequence | | **Read:** 33.2  **Check #3:** Astro: 1-5, 33: 1, 3, 5, 7 |
| 7 Apr 15 | | -Red giants? Supernova? Pulsar? Neutron Star?  -Black Holes? White Dwarves  -Stellar Evolution Flowchart | | **Read:** 33.2  **Check #4:** Astro: 6-10, 33: 34(A: T+, L=, S-, B: T=, L-, S-, C: T-, L+, S+), 35 |
| Thurs, 4/16 | | **IB Review of last year stuff** | |  |
| 8Apr 17 | | **-The distance ladder**  -Measuring the AU/Measuring Parsecs  -Using H-R diagrams  -Variable stars: RR Lyrae, Cepheids  -Type I Supernovae/Galaxy brightness | | **Read:** Your notes?  **Check #5:** Astro: 11-14, 33: 8(1.3E3 W/m2, 3.7E26 W), 9, 11 |
| 9  **Apr 21** | | **-General relativity**  -Principle of equivalence  -Curved space  -Black holes and the Schwarzschild radius | | **Read:** 33.4  **Check #6:** 33: 12(2.33E-5 rad), 13, 14(5.4E17 kg/m3, 2.9E8x, 1.3x)  **Turn In:** Stell Evolution Flowchart |
| 10  **Apr 23** | | **-Expanding Space**  -Olber’s Paradox/steady state  -Redshift  -Hubble’s law  -**Prequiz**  **33** **– Take Home** | | **Read:** 33.5  **Check #7:** Astro: 15-17, 33: 18(2.95 km, 8.9 mm), 19 |
| 11  **Apr 27** | | **-The standard model (The Big Bang)**  -The precepts  -The cosmological principle  -The cosmic microwave background | | **Read:** 33.6  **Check #8:** Astro: 18-19, 33: 22(140 MLy), 23, 24(0.88c)  (Use the book’s version of the Hubble constant) |
| **Apr 28** | | IB Review!!! | | **Have completed the IB tests from 2014, and turn in your solutions to the Energy and Climate change chapter** |
| 12  **Apr 30** | | **-The standard model (The Big Bang)- Part II**  -Inflation and the future of the universe  -The shape of the Universe  -Where's the missing matter?  -Hubble Lab – Expanding Universe | | **Read:** 33.7-10  **Check #9:** Astro: 20, 33: 30(1.1E-3m), 44(1.4E16 K, hadron era), 25 |
| 13  **May 4** | | **Test on Astro and Relativity**  (IB folks must take this test before the IB test on May 8th)  (Maybe come in 3B on Wednesday May 6th) | | **Turn in: Homework – 9 stamps worth**  **Turn in: Hubble Lab**  **Turn in: PQ 33** |
| Two Prequizzes   * 26.1 – Special Relativity – length contraction, etc * 33 – Astrophysics – Hubble’s Law and stuff   One SkillSet   * 26.1 – Special Relativity   Two Labs (possibly):   * Stellar Flowchart - interactive online flowchart * Hubble Constant Lab – Expansion of a mini linear universe   Homework:   * 6 day’s worth!   One Test   * A normal Murray test – look at the review materials. | | Handouts:   * This Syllabus * PreQuiz 26.1 – Special Relativity * PreQuiz 33 – Hubble’s law and stuff * Chapter26Problems * Lab-HubbleConstant * Worksheet-Astrophysics * Many NoteGuides | | |