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Chapter 1 : Your IB Physics Course Book : Secondary: Oxford University Press

Your IB Physics Course Book. To help you gauge your progress and understanding, the answers for all the material in your IB Physics Course Book are available here.

When an observer on Earth photographs a relatively nearby star against a background of distant stars on two different occasions six months apart, the target star image will appear to have shifted against the more distant stellar background. The baseline shift of the observer on Earth is 2 astronomical units AU. So the velocity is proportional to the distance. Note that this does not work well for nearby galaxies because of two reasons. Then you do some simple algebra with the change in area. Wilson detected in microwave radiation coming equally from all directions in the sky, day and night. This radiation is like the one radiated by a black body at a temperature of 3 Kelvin, therefore the name 3K radiation. This discovery supports the theory of Big Bang, where strong shortwave radiation was supposed to be sent out. The radiation spread filling the expanding universe uniformly. With time it cooled, to the now observed temperature of 3K, and now strikes the Earth as microwaves. The apparent magnitude of a star is a measure of brightness of a star seen from earth in a relative system of classification. The higher the numerical value of apparent magnitude, the dimmer the star. This relates to absolute magnitude because the absolute magnitude is the apparent magnitude a start would have if observed from a distance of 10pc. To determine absolute magnitude, you use the following equation: Estimate its absolute magnitude. To solve this problem we would use the following equation: Basically put, it is the power radiated by the star. Luminosity depends on the surface temperatue and the surface area of the star. To relate luminosity to the spectrum, the higher the luminosity a star has, the higher up on the spectrum it will be. A star thats luminosity increases sharply and falls gently in a period of time, the period of time is related to the luminosity of the star. The Cephied variable is used to estimate the distance of the star. There is a relationship between the period of the light curve and the peak luminosity. On Cephieds have periods of one to fifty days. The variable provides information of the star structure developing theories for stellar structures. The higher the magnitude then the dimmer the star, brightness of stars were defined in assigned numbers that varied the magnitude of the start from Not all stars are the same distance, which is a factor in how the magnitude of a star is classified, while the brightness also varies as opposed to two starts in the same place, direction, and same brightness. The farther away a candle is from the other the less luminosity and brightness is seen from the observer. Distance is what takes away the luminosity and brightness of a star the farther away it is from the observers stand point of view. The outer layers of the star go through contractions and expansions periodically. If the universe was infinite and thereby contained an infinite amount of stars, then theoretically there would be an infinite amount of energy radiating from the stars making the night sky infinitely bright. The Olbers Paradox applies to all infinite models, but does not apply to finite models. This is due to the fact that: Within seconds, matter was accelerated through 3 dimensions, expanding and developing very rapidly. Time became a measure of the rate of that expansion, the necessary 4th dimension. Light must travel through the shortest distance available between two points, meaning that the curved path is the shortest distance, hence space itself is curved. The universe will continue to expand forever because the curvature of the universe is negative. The curvature is zero, the universe is infinite. The curvature is positive, so the universe is finite. About ten to twenty billion years ago,all matter and energy in the universe was concentrated in one area from which it expanded quickly. This expansion began when an explosion took place somewhere in space. There is no gravity in space acting on the debris of this explosion so it moves away from the site of the explosion at a velocity that is proportional to its distance from the spot where the explosion took place. Therefore, the farther away the debris is from the explosion, the faster it moves and likewise the closer it is the slower it moves. The big bang model is related to the four fundamental forces which include: It is assumed that at first these forces started out as one and later separated into the four. For more information refer to the Big Bang Model on Wikipedia.

Chapter 2 : Oxford IB Diploma Programme: Physics Course Companion: Oxford University Press

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