

DISTILL THE DEFINITION TO ITS BASIC MEANING

Instructions: Take the word on the left and find the most important information, words, or numbers associated with it to complete a shortened definition on the right. The full definitions of these words can be found elsewhere in Session Five. **You may not use anymore than six words for your core definition.** **Abbreviations will count as words,** such as mi./sec., equals miles/second, equals two words. Numbers, symbols, and punctuation will not count as words unless used incorrectly. Here is an example. “2 b or not 2 b” will mean “To be or not to be,” and will have six words, not four. The grammar police will also be arresting you! The word or a similar word may **NOT** be used in the definition unless there is an asterisk. The asterisk is only good for the word directly next to it. In Broken Eclipse* only “Eclipse” applies to this situation.

WORD	DEFINITION: NO MORE THAN SIX WORDS MAX.
Absorption Spectrum	
Absolute Magnitude	
Angstrom	
Apparent Magnitude	
Atom I	
Atom II	
Black Body	
Black Body Radiation Curve	
Bohr Model	
Burning	
Continuous Source/ Continuum	
Core Burning	
Doppler Shift	
Dwarfs (H-R Diagram)	
Electromagnetic Spectrum	
Emission Spectrum	
Frequency	
Giants	
Hertzprung-Russell Diagram	

WORD	DEFINITION: NO MORE THAN SIX WORDS MAX.
Ion	
Kirchhoff's First Law	
Kirchhoff's Second Law	
Kirchhoff's Third Law	
Luminosity	
Magnitude	
Main Sequence	
Metals	
Nanometer	
OB Associations	
Parallax	
Parsec	
Proplyds	
Quanta	
Quantum <u>Physics</u>*	
Red Dwarf	
Spectral Classification	
Shell Burning	
Shock Front	
Supergiants (blue and red)	
Supernova	
Turnoff Point	
Wavelength	
White Dwarf	
Zero Age Main Sequence	

STELLAR EVOLUTION WORD LIST

1. **Absorption Spectrum:** The dark lines superimposed over a continuum when intervening rarefied gases absorb radiation at specific wavelengths.
2. **Absolute Magnitude:** The brightness of a star when viewed from a standard distance of 10 parsecs or 32.6 light years.
3. **Angstrom:** (\AA) A unit of measurement in the metric system equal to one hundred billionth of a centimeter. (10^{-8} cm).
4. **Apparent Magnitude:** The brightness of an object in the night sky.
5. **(Name of Atom) I:** neutral form of an atom such as Na I, N I, etc... It is the atomic symbol and the Roman numeral one. Keep in mind that Roman numerals did not include a zero.
6. **(Name of Atom) Atom II:** singly ionized form of an atom such as He II, Ca II, etc...
7. **(Name of Atom) Atom III:** doubly ionized form of an atom such as Fe III, Si III, etc...
8. **Balmer Series:** A related series of absorptions and emissions in the Bohr model of the hydrogen atom. These transitions take place in the visible part of the spectrum. $N=2$ is the pivotal energy state from which the Balmer series originates.
9. **Base Line:** The separation between observing locations when determining distances trigonometrically. In determining the parallax of a star, the base line is one AU.
10. **Black Body:** An object which absorbs all of the energy which falls upon it. It is a perfect absorber and emitter of energy. The emitted radiation is a function of temperature.
11. **Black Body Radiation Curve:** The energy distribution coming from an object that is a perfect absorber/emitter of electromagnetic radiation.
12. **Blue Stragglers:** These stars have a later turnoff point from the main sequence than would be expected because of their mass. Better mixing of a star's interior with its outer layers, caused by a binary system in which one of its stars is spilling hydrogen onto the other component, may be the reason for these stars.
13. **Bohr Model:** A theory which proposes that electrons can only move between specified energy states. These energy quanta give an atom its specific spectral characteristics.
14. **Burning:** The astronomical term for thermonuclear fusion, changing a simpler element into a more complex element, such as hydrogen converted into helium. It occurs in the cores and shells of stars. It is not to be confused with combustion, where oxygen combines to form new compounds, but no new elements are formed.
15. **Color Index:** A method of determining a star's temperature or spectral type by accurately measuring its magnitude at standardized wavelengths (UBV).
16. **Continuous Source:** A source of electromagnetic radiation in which all wavelengths of energy are represented.
17. **Continuous Spectrum:** The type of electromagnetic radiation which is being produced when a solid, liquid, or gas (under pressure) is made to incandesce. All wavelengths are represented.
18. **Continuum:** A synonym for a continuous spectrum. All wavelengths are represented.
19. **Core Burning:** All thermonuclear fusion is occurring in the center of a star. Stars which have this structure belong to the main sequence.
20. **Diffraction:** The various phenomena which occur when a wave front encounters an opaque obstacle and amplification and cancellation of wave fronts result.
21. **Dispersion:** A particular property of refraction in which the angle and velocity of a wave front passing through a (dispersive) medium depend upon their frequency.

22. **Doppler Shift**: A phenomenon of increased or decreased frequency of the wave front observed whenever the source of waves is moving with respect to the observer. See Doppler shift after the spectroscopy section.
23. **Dwarfs**: The luminosity characteristics of main sequence stars which are about the mass of the sun or less.
24. **Electromagnetic Spectrum**: The array of the various energies which are found in nature and include, gamma, X-rays, ultraviolet, visible, infrared, microwave, and radio wavelengths.
25. **Emission Spectrum**: The type of spectrum which is produced when a rarefied gas is made to incandesce. The light is being emitted at specific wavelengths, which is a result of the electron structures of the atoms which are producing it.
26. **Energy (associated with wavelength)**: capable of doing work... As the wavelength of electromagnetic radiation decreases, the energy inherent in that wavelength increases. Put in another way, as the frequency of electromagnetic radiation increases, so too does the energy.
27. **Frequency**: The number of wave crests of sound or electromagnetic radiation passing a given location in a (unit) time interval.
28. **Giants**: The luminosity classification of low mass stars, such as the sun, after they have initiated shell hydrogen burning and moved away from the main sequence.
29. **H II Region**: A large cloud composed mostly of ionized hydrogen. The region surrounding an OB Association would be ionized due to the ultraviolet radiation coming from the young, luminous stars which compose it.
30. **Hertzsprung-Russell Diagram**: A two-dimensional representation highlighting the relationship between a star's absolute magnitude and its temperature. It is probably the best visual tool for understanding the evolution of stars.
31. **Horizontal Branch**: A region to the left of the red giant locale of an H-R diagram where low mass stars have lost mass during their red giant phase. The horizontal branch is seen in globular clusters, large aggregates of stars which are almost like miniature galaxies in our Milky Way.
32. **Horsehead Nebula**: One of the most famous dark nebulae in the heavens. It is located near the bottom belt star, Alnitak, of Orion the Hunter and looks like a chess piece called a Knight.
33. **Hyades**: An old, open cluster which forms the head of Taurus the Bull, minus the bright star Aldebaran.
34. **Interference**: A phenomenon in which two waves superimpose to form a resultant wave of greater amplitude (additive) or lower amplitude (subtractive).
35. **Ion**: An atom (or molecule) which is not electrically neutral.
36. **Kirchhoff's First Law of Spectroscopy**: A solid, liquid, or gas (under pressure) when made to incandesce will produce a continuous spectrum in which all of the energies of the spectrum are represented.
37. **Kirchhoff's Second Law of Spectroscopy**: A rarefied gas when made to incandesce will produce an emission spectrum unique to the gas creating it.
38. **Kirchhoff's Third Law of Spectroscopy**: A rarefied gas found between a continuous source and an observer will produce an absorption spectrum. The dark lines of the absorption spectrum are created when specific wavelengths of energy from the continuous source are filtered by the intervening rarefied gas.
39. **Line Strength**: The blackness and thickness of a dark line in an absorption spectrum.

40. **Lyman Series:** A related series of absorptions and emissions in the Bohr model of the hydrogen atom which take place in the ultraviolet. All of these transitions take place in the ultraviolet part of the spectrum. $N=1$ is the pivotal energy state from which the Lyman series is created.
41. **Luminosity:** The total brightness of a star represented by all of the electromagnetic radiation radiated from that body.
42. **Magnitude:** A quantitative method for accurately measuring the intensity differences among stars. The more negative the magnitude of a star, the brighter it becomes. The intensity difference between one whole magnitude equals 2.51
43. **Main Sequence:** It is the dominant S-shaped or propeller-shaped structure in a Hertzsprung-Russell diagram where stars are converting hydrogen into helium within their cores.
44. **Metals:** All elements heavier than hydrogen and helium which are contained within a star.
45. **Molecular Cloud:** A large volume of space within a galaxy where temperatures are low enough and densities high enough to support the formation of molecules, such as H_2 .
46. **$n = 1$:** Lowest energy level or ground state of an electron in the Bohr model of the atom.
47. **Nanometer:** A unit of measurement in the metric system equal to one billionth of a meter (10^{-9} meter).
48. **OB Associations:** A method of star formation by which hot, young OB stars in molecular clouds create shock fronts from their radiant energy. These shock fronts gravitationally collapse, forming new OB clusters which ripple through the cloud until most of the hydrogen has been used.
49. **Orion Nebula:** Found as the center star-like object in the sword of Orion the Hunter, it is the best example in the sky of an emission nebula and stellar nursery.
50. **Parallax:** The angular displacement of an astronomical body created by viewing it across a baseline. It is the same as obtaining the distance to a terrestrial object by viewing it from two different positions (the baseline).
51. **Parsec:** 3.2616 light years... A parallax angle of one second of arc, created by a baseline of one astronomical unit.
52. **Paschen Series:** A related sequence of absorptions and emissions in the Bohr model of the hydrogen atom which take place in the infrared. $N=3$ is the pivotal energy state from which these transition occur.
53. **Pillars of Creation:** A star-generating area in the Eagle Nebula being ripped apart by energy radiated from a new star cluster, also part of the Eagle. The young star cluster is blowing dust away from numerous contracting protostars, creating the light year sized columns made famous by the Hubble Space Telescope.
54. **Planck's Constant:** A numerical device which allows for the relationship of wavelength (frequency) and energy to be quantified.
55. **Planck's Law:** $E = hf = hc/\lambda$ where $h =$ Planck's constant 6.626×10^{-27} erg sec, $f =$ frequency, $\lambda =$ wavelength of the energy, and c is the speed of light.
56. **Pleiades:** The brightest and best example of an open or galactic star cluster in the heavens. The Pleiades are 425 light years distant, contain no more than 500 stars, and are found on the shoulder of Taurus the Bull. They are also called the Seven Sisters.
57. **Prancing Horse:** A dark nebula in the shape of its namesake found between the summer constellations of Scorpius and Sagittarius. Its ability to be photographed or seen visually is an indication of minimal light pollution.

58. **Proplyds**: A cloud of gas and dust surrounding a protostar in a stellar nursery like the Orion Nebula.
59. **Quanta**: An energy unit or energy packet in the Bohr model of the atom. In quantum physics, it is the messenger particle for the electromagnetic force.
60. **Quantum Physics**: The physics which governs the interactions of atoms and the nuclei of atoms. It is the physics of the very small.
61. **Radial Motion**: Line of sight motion towards or away from an observer.
62. **Red Dwarfs**: The luminosity characteristics of main-sequence stars of the lowest masses.
63. **Reflection**: The change in direction of a wave front at an interface between two different media so that the wave front returns into the medium from which it originated.
64. **Refraction**: The change in direction of a wave front passing from one medium into a second medium caused by the wave front's change in speed induced by the second medium.
65. **Roche Lobe**: Imaginary surfaces surrounding a binary system over which the gravitational field is constant. At the point between the binary system where the gravitational potential is equal, matter from a star filling its Roche lobe can spill over onto its component.
66. **Scattering**: The dispersal of a beam of particles or wave fronts into a range of directions.
67. **Spectral Classification**: A temperature dependent method of classifying stars based upon a comparison of the strengths of lines in absorption spectra.
68. **Shell Burning**: Thermonuclear fusion is occurring in a layer or numerous layers surrounding the core of a star. The star is no longer on the main sequence.
69. **Shock Front**: A region of higher density moving through a medium.
70. **Stephan's Law**: The total energy emitted from a black body is proportional to the temperature in K^4 .
71. **Supergiants**: Stars of the highest luminosity classification, Ia, Ib, or II... Blue Supergiants are found along the main sequence in the upper left of the H-R Diagram. Red Supergiants are found in the upper right of the H-R Diagram.
72. **Supernova**: A stellar explosion... The manner in which highly evolved stars, nine solar masses or greater, end their existence.
73. **Temperature**: A quantitative measurement which determines the kinetic energy of the matter being measured.
74. **Trapezium**: The name of the star cluster at the center of the Orion Nebula. It causes the nebulosity to fluoresce.
75. **Turnoff Point**: Location along the main sequence where a star switches from core hydrogen to shell hydrogen burning.
76. **Type I Supernova**: A stellar explosion precipitated by a star in a binary system in its later stages of evolution, filling its Roche lobe and dumping hydrogen onto a white dwarf. The extra mass causes compression, heating, and eventual thermonuclear fusion. If the fusion rips through the star at a speed greater than the speed of sound for that medium, the star explodes.
77. **Type II Supernova**: A stellar explosion precipitated by the halting of thermonuclear fusion inside the iron core of a red supergiant. The core implodes (0.2 second) sending temperatures "off the scale" and initiating fusion which produces all of the 92 naturally occurring elements. The star explodes seeding the regions with these new elements. Depending upon the remaining mass, what remains is a white dwarf, neutron star, or black hole.
78. **Wavelength**: Distance between energy wave crests in the electromagnetic spectrum.

79. **White Dwarf**: A luminosity classification on an H-R diagram conducive to the characteristics of cooling cores of fully evolved stars. The core of an evolved star is no longer undergoing thermonuclear fusion. Its mass must be less than 1.44 solar masses.
80. **Wien's Law**: $\lambda_{\max} T = 0.29 \times 10^{-8} \text{ A}$ or $T = 0.29 / \lambda_{\max}$ where λ (lambda) equals the wavelength of greatest energy emission in centimeters, and T is the temperature in absolute degrees Kelvin.
81. **Zero Age Main Sequence**: The position of a star on the main sequence when core hydrogen burning begins.