Name:___________________________

Intro Astro Lab Prep Quiz: Lab 8: Stars

Instructions: There are 10 to 20 multiple-choice problems each worth 1 mark for a total of 10 to 20 marks altogether. Choose the **BEST** answer, completion, etc., and **DARKEN** fully the appropriate circle on the table provided below. Read all responses carefully. **NOTE** long detailed responses won't depend on hidden keywords: keywords in such responses are bold-faced capitalized.
This is a 10 minute quiz.

Answer Table for the Multiple-Choice Questions

	a	b	c	d	e		a	b	c	d	e
1.	O	O	O	O	O	11.	O	O	O	O	O
2.	O	O	O	O	O	12.	O	O	O	O	O
3.	O	O	O	O	O	13.	O	O	O	O	O
4.	O	O	O	O	O	14.	O	O	O	O	O
5.	O	O	O	O	O	15.	O	O	O	O	O
6.	O	O	O	O	O	16.	O	O	O	O	O
7.	O	O	O	O	O	17.	O	O	O	O	O
8.	O	O	O	O	O	18.	O	O	O	O	O
9.	O	O	O	O	O	19.	O	O	O	O	O
10.	O	O	O	O	O	20.	O	O	O	O	O

1. Blackbody radiation is produced by any dense body that is:

   a) at zero temperature. b) all at one temperature. c) at two temperatures.
   d) at range of temperatures. e) at infinite temperature.

2. "Let's play *Jeopardy*! For \$100, the answer is:

   $$\lambda_{max} = \frac{2897.7729\,\mu\mathrm{m\,K}}{T}\ ,$$

   where T is Kelvin temperature. The is law gives the peak wavelength of blackbody radiation."

   What is ____________, Alex?

   a) the Stefan-Boltzmann law b) Hooke's law c) Rayleigh-Jeans law d) Gauss's law
   e) Wien's law

3. From Wien's law

   $$\lambda_{max} = \frac{2897.7729\,\mu\mathrm{m\,K}}{T}$$

   (where T is Kelvin temperature), the approximate peak wavelength for a blackbody radiator at 3000 K is:

   a) 3000 μm. b) 3 μm. c) 1 μm. d) 1/3 μm. e) 1/3000 μm.

4. The emission from a stellar photosphere approximates:

   a) white light. b) blackbody radiation. c) visible light. d) LED emission.
   e) an emission line spectrum.

5. "Let's play *Jeopardy*! For \$100, the answer is: It is a system of classification the apparent (i.e., as-viewed-from Earth) or absolute brightnesses of stars and other astro-bodies. It originated with the ancient Greek astronomers who classified stars into six classes: the stars in each category judged by naked-eye visual astronomy to be of comparable apparent brightnesses. The classes in order of **DECREASING**

brightness are 1st, 2nd, 3rd, 4th, 5th, and 6th magnitude. In the 19th century, it was decided to modernize this ancient classification system fixing its values to objective light flux measurements. (Flux is energy per unit time per unit area either per wavelength or integrated over some wavelength band.) The modernization was based on the discovery that the ancient magnitudes were roughly logarithmic in flux and that an **INCREASE** of 5 ancient magnitudes corresponded to roughly a factor of 100 **DECREASE** in flux. This rough result suggested the implemented prescription that an **INCREASE** of 5 magnitude corresponds to exactly a factor of 100 **DECREASE** in flux. The formula for the presription is

$$\Delta M = -2.5\log(F_2/F_1) ,$$

where ΔM is the difference in magnitude between 2 astro-bodies with fluxes F_1 and F_2. The negative sign makes magnitude difference increase with decreasing fraction F_2/F_1. If $F_2/F_1 = 1/100$, then $\Delta M = 5$. The inverse relationship is

$$\frac{F_2}{F_1} = 10^{-0.4\times\Delta M} .$$

We can see now that the logarithms are actually base

$$10^{0.4} = 2.511886\ldots \approx 2.512 .$$

This means an increase in magnitude by one corresponds to a decrease in flux by a factor of $\sim 1/2.512$.

In the modern system, fractional magnitudes occur and the magnitudes run over the whole real number line. Very bright objects have negative magnitudes.

Actually, many people (like yours truly) think that making modern system mimic the ancient system was a stupid idea. The modern system runs the wrong way—bigger/smaller is dimmer/brighter. This leads to endless confusion. And the modern system has a logarithm base used for nothing else. One could have made the definition

$$\Delta M = \log(F_2/F_1)$$

and then bigger/lower would be brighter/dimmer and 1 magnitude would correspond to a factor of 10 in flux. That would have been so easy to understand. But no. The dead hand of the past prevails."

What is the ____________, Alex?

a) Greek system b) magification system c) Roman system d) Ptolemaic system
e) magnitude system

6. "Let's play *Jeopardy*! For $100, the answer is: He/She left to posterity and may have invented the ancient Greek system of 6 stellar magnitudes."

Who is ____________, Alex?

a) Aristotle (384–322 BCE) b) Berossos, priest of Bel Marduk (3rd century BCE)
c) King Ptolemy I (c. 367–c. 283 BCE) d) Cleopatra (69–30 BCE)
e) Ptolemy (circa 100–175 CE)

7. In order report the intrinsic brightness of stars, we define ____________ to be the apparent magnitude measured at a distance of 10 parsecs. Why 10 parsecs? Maybe because its a round number that is typical for distances to nearby stars and yields ____________s that are not so different from apparent magnitudes for these nearby stars.

a) luminosity b) absolute magnitude c) flux d) raw magnitude e) watt

8. "Let's play *Jeopardy*! For $100, the answer is: This quantity is the difference between magnitudes in two passbands for a star: the redder passband magnitude is subtracted from the bluer passband magnitude. Because of the subtraction, the distance dependence of the passband magnitudes cancels out and the quantity is a measure of the instrinsic shape of the star's spectrum. The quantity can be used in many cases to determine the star's surface temperature, and is often used as substitude or proxy for surface temperature in plots and discussions. The flux in the bluer passband usually increases with temperature relative to the blux in the redder passband. But this means that the quantity decreases with increasing temperature—like magnitude, the quantity increases in the wrong way leading often to confusion. The most common version of this quantity is $B-V$: i.e., the B passband magnitude minus the V passband magnitude."

What is ____________, Alex?

a) absolute magnitude b) apparent magnitude c) luminosity d) color index or color e) blueness

9. The total energy output per unit time could reasonably be called star power or, less reasonably, star wattage, but, in fact, is called:

   a) flux. b) apparent magnitude. c) absolute magntiude. d) luminosity. e) color.

10. "Let's play *Jeopardy*! For $100, the answer is: This diagram is a plot that has logarithmic luminosity versus spectral type or color $B-V$ or photospheric temperature for stars. The luminosity can be replaced by absolute V magnitude which is a good proxy for logarithmic luminosity. Since spectral type and color $B-V$ increase to the right, temperature for consistency increases to the left."

    What is the ____________ diagram, Alex?

    a) Bertrand Russell or BR b) Hertzsprung-Russell or HR c) color-color d) star e) true star

11. "Let's play *Jeopardy*! For $100, the answer is: This narrow band of stars on an HR diagram starts high on the left-hand side, declines rapidly, then declines slowly in middle region of the diagram, and then declines rapidly toward the right-hand side. About 90 % of all stars (i.e., nuclear burning stars) in the Milky Way fall in the band and the same is roughly true of many other galaxies. The stars in the band are burning (in a nuclear sense) hydrogen to helium in their cores. The core-hydrogen-burning phase of a star's nuclear-burning life is the longest phase and this accounts for the abundance of stars in the band."

    What is the ____________, Alex?

    a) color sequence b) giant region c) supergiant region d) white dwarf e) main sequence

12. "Let's play *Jeopardy*! For $100, the answer is: Stars on this narrow curve on an HR diagram are just at the beginning of their core-hydrogen-burning phase. The curve is roughly speaking the lower-edge of the main sequence."

    What is ____________ main sequence, Alex?

    a) top b) bottom c) zero-age d) beginning e) infant