Introduction to Astronomy   Name _____

Assignment #4 Observing and Classifying Stars

This assignment can be used as **summative** coursework.
The final deadline for the activity portfolio is **December 18, 2015**.
Associated with Lecture 7 – Observing Stars

Directions: On a separate sheet of paper, use the following equations and diagrams to answer the questions below. Please turn this sheet in as a cover sheet.

A.   Brightness and Luminosity
Directions: Recalling the following relationships defining brightness and luminosity, answer the

$$ b = \frac{L}{4\pi d^2} \qquad L = (4\pi d^2)\, b $$

questions below.
where b is the brightness, L is the luminosity, d is the distance between the light source (star) and the observer.

$$ L = 4\pi r^2\, \sigma T^4 $$

where L is the luminosity, r is the stellar radius, and T is the stellar surface temperature.

1.   If two stars are known to have the same luminosity but appear to have different brightnesses, what else must be true?
2.   As a star is moved further away, what happens to its brightness?
3.   As a star is moved further away, what happens to its luminosity?
4.   If two stars have the same temperature but one has a higher luminosity, what must be true?
5.   If two stars have the same radius but one has a higher luminosity, what must be true?

B. Hertzsprung-Russell (HR) Diagram
Directions: Consider the following HR diagram and answer the questions below.

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* A.                                    * C.


                           * D.


     * B.                                * E.
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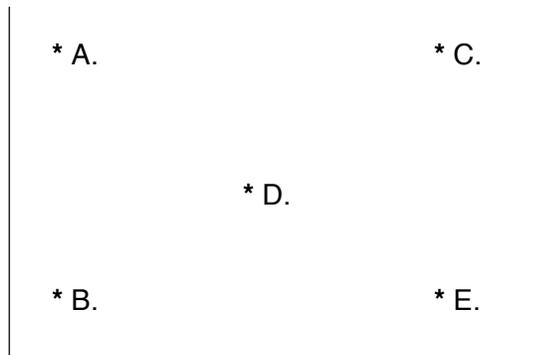
(the * represents a star)

1. On the HR diagram above, how should the x and y axes be labelled?
2. Does a cooler object emit more blue light or more red light?
3. Which area of the HR diagram contains the hottest stars (i.e. right, left, top, bottom)?
4. Which area of the HR diagram contains cool, luminous stars (i.e. top right, bottom left, etc.)?
5. On the HR diagram shown above, is the radius of the star at position B large or small?
6. Which stars on the HR diagram above are main sequence stars? Place them into order from low mass to high mass.