ASTR101
Unit 10 Assessment
Answer Key

1. Mass, luminosity, size, surface temperature, and age. Ordinary stars range in mass from about 60 solar masses to about 1/12 solar mass, in luminosity from about 1,000,000 to 1/10,000 solar luminosities, in radius from about 1,000 to 1/10 solar radii, in surface temperature from about 35,000 to 3,000 K, and in age, from about 13 billion years to stars that are just now being born.

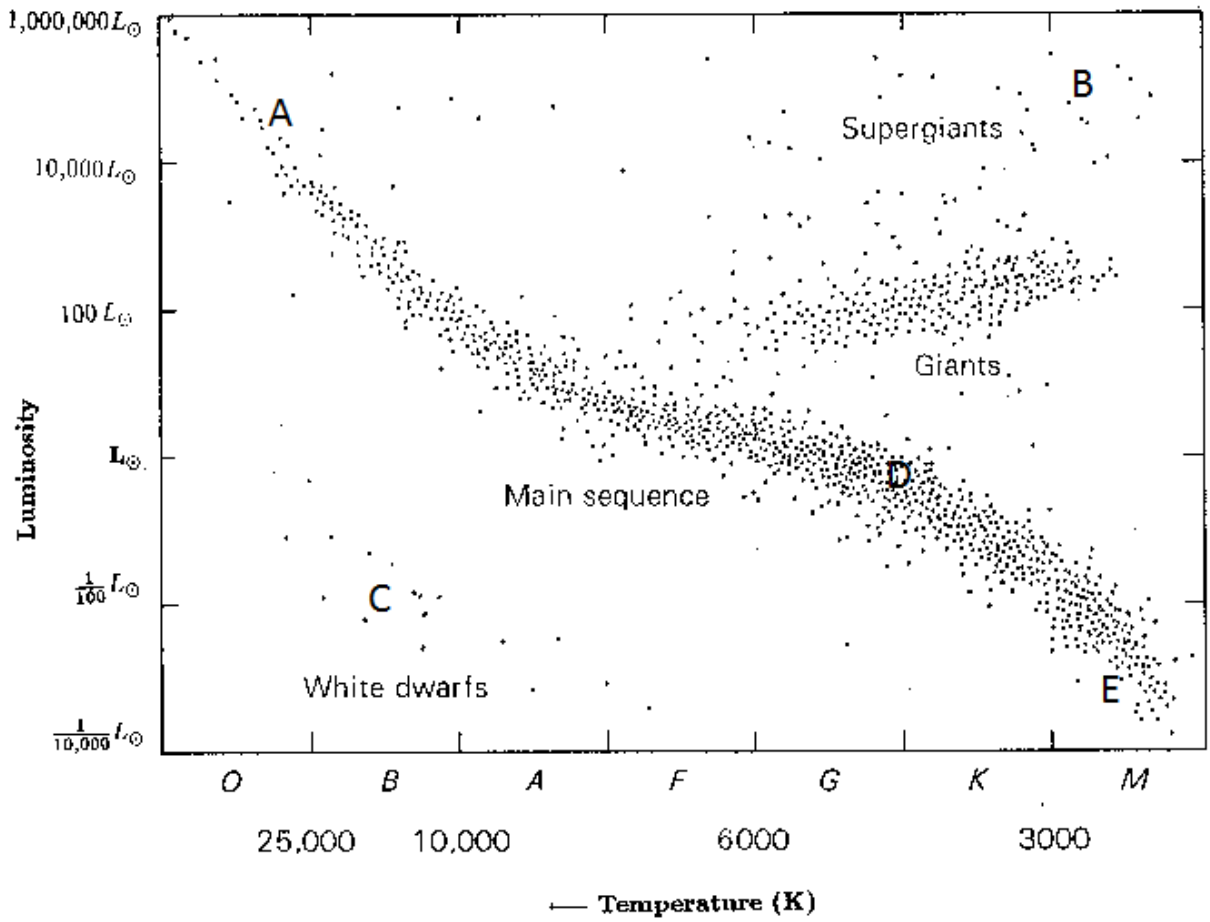
2. Luminosity is the amount of energy the star emits per second while apparent brightness depends on how much of that energy reaches earth, that is, on the distance to the star.

3. The distance to the star. As the earth moves in its orbit around the sun, the nearby stars shift their positions in the sky with respect to the more distant stars, with the amount of shift being greatest for the nearest stars. Knowing the amount of the shift and the distance between the sun and earth, the distance to the star can be determined by geometry.

4. The apparent brightness of a star decreases with the square of the distance to the star (the inverse-square law). Thus if the luminosity (energy emitted) is known and the apparent brightness (energy reaching earth) is measured, the distance can be calculated.

5. Apparent brightness decreases with the square of the distance, so if two stars have the same luminosity and one is three times farther away, the closed star will have nine times the apparent brightness. If two stars are at the same distance and one is emitting three times as much energy, the apparent brightness of the more luminous star will be three times greater.

6.


1,000,000 $L_\odot$
10,000 $L_\odot$
100 $L_\odot$
$L_\odot$
$\frac{1}{100} L_\odot$
$\frac{1}{10,000} L_\odot$
Luminosity
A
B
Supergiants
Giants
Main sequence
D
C
White dwarfs
E
O
B
A
F
G
K
M
25,000
10,000
6000
3000
← Temperature (K)