21. Based on the figure, the maximum of the blackbody curve will equal 75×10^6 watts per m^3 when the temperature of the blackbody is closest to:

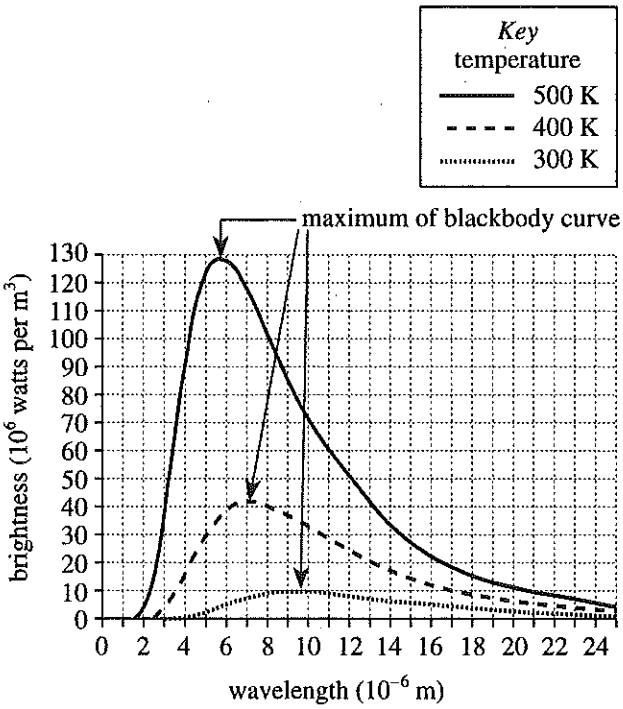
A. 250 K.
B. 350 K.
C. 450 K.
D. 550 K.

22. The frequency of radiation increases as the radiation's wavelength decreases. Based on this information, over all wavelengths in the figure, as the frequency of the radiation from a blackbody increases, the brightness of the radiation:

F. increases only.
G. decreases only.
H. increases, then decreases.
J. decreases, then increases.

Passage IV

A *blackbody* is an object that absorbs all of the radiation that strikes it. The blackbody also emits radiation at all wavelengths; the emitted radiation is called *blackbody radiation*. The brightness of blackbody radiation at a given wavelength depends on the temperature of the blackbody. A graph of brightness versus wavelength for a blackbody is called a *blackbody curve*. Blackbody curves for the same blackbody at 3 different temperatures are shown in the figure below.



(Note: 1 watt = 1 joule per second; joule is a unit of energy. At wavelengths above 25×10^{-6} m, the brightness of the blackbody at each temperature continues to decrease.)

18. The area under each blackbody curve gives the total amount of energy emitted every second by 1 m^2 of the blackbody. Which of the following correctly ranks the 3 curves, from *greatest* to *least*, according to the total amount of energy emitted every second by 1 m^2 of the blackbody at the wavelengths shown?

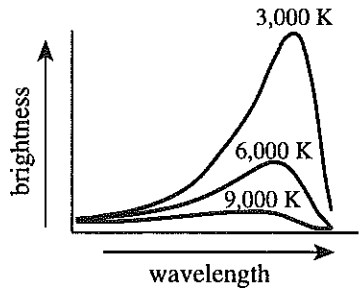
F. 300 K, 400 K, 500 K
G. 300 K, 500 K, 400 K
H. 400 K, 500 K, 300 K
J. 500 K, 400 K, 300 K

19. Based on the figure, at a temperature of 300 K and a wavelength of 30×10^{-6} m, the brightness of a blackbody will most likely be:

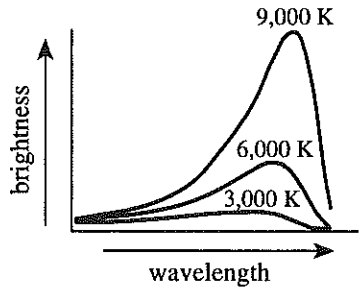
A. less than 5×10^6 watts per m^3.
B. between 5×10^6 watts per m^3 and 40×10^6 watts per m^3.
C. between 41×10^6 watts per m^3 and 130×10^6 watts per m^3.
D. greater than 130×10^6 watts per m^3.

20. The radiation emitted by a star can be represented by the radiation from a blackbody having the same temperature as the star's visible surface. Based on the figure, which of the following sets of blackbody curves best represents stars of equal diameter with surface temperatures of 3,000 K, 6,000 K, and 9,000 K ?

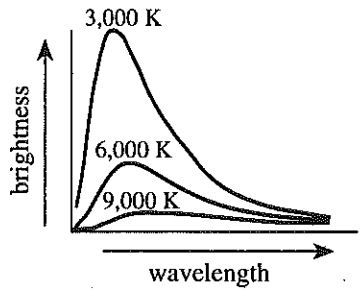
F.



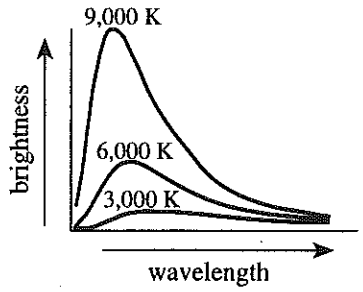
G.



H.



J.



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