Quiz 1 Review Answers

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1 Question 1

1.1 A

This is an example of an absorption spectrum. We can see this from the shape of the spectrum – the "spikes" are characteristic of absorption, since light is being taken away (hence the dip) from the source.

Spectra are invaluable in astronomy – we can learn about temperature, composition, motion, age, and much more by examining the shape and features of a spectrum.

1.2 B

We can use Doppler's Equation here and compare the wavelenfth of emission and observation.

$$\frac{\lambda - \lambda_0}{\lambda_0} = \frac{v}{c} \tag{1}$$

$$\frac{400 \text{ nm}}{\sim 480 \text{ nm}} = \frac{v}{c} \rightarrow v = 2.49 \times 10^8 \text{ m s}^{-1} \tag{2}$$

1.3 C

By the Doppler Effect/redshift of the spectrum, we can see that the object is moving away from us. We can see this since the wavelengths that are absorbing the light are longer than what was emitted.

2 Question 2

2.1 A

This is a "blackbody curve" – in other words, it tells you the intensity of light at each wavelength. We can use blackbody curves as an approximation for how a star radiates energy.

We can directly link the peak wavelength of emission to the temperature of a blackbody through Wien's Law:

$$\lambda_{peak} T_{object} = \text{constant} \tag{3}$$

2.2 B

Star 1 is hotter by a factor of 2, since the peak wavelength of emission differs by a factor of $\frac{1}{2}$.

2.3 C

Star 1 is more luminous by a factor of 16.

$$\frac{L_1}{L_2} = \left(\frac{R_1}{R_2}\right)^2 \left(\frac{T_1}{T_2}\right)^4 \tag{4}$$

$$\frac{L_1}{L_2} = \left(\frac{1}{1}\right)^2 (2)^4 \tag{5}$$

3 Question 3

3.1 A

The New Moon is on the left side, the Full Moon on the right side. First Quarter is above the Earth, and third quarter is below.

3.2 B

The order of the phases of the Moon would be in clockwise order on this diagram.

3.3 C

The answer to this is Midnight. I think the best way to see this would be to look at Class Slide 58b. This has the times of the overhead moon phases labelled for each phases of the Moon!

3.4 D

The Moon can eclipse the sun since it can pass in front of the disk of the sun and they appear the same size in the sky. If the Moon's apparent size were smaller, we wouldn't be able to fully block wthe Sun with the Moon's disk. If the Moon were larger, the Moon would cover up too much of the Sun!

Additionally, an eclipse doens't happen every lunar cycle since the Moon's orbit is inclined to the plane of the Solar System.