Answer on Question #45660, Physics Optics for completion

1.using scientific terminology (or using a manifestation of Rayeligh scattering of light) state

a)why the sky is blue

b) why the sunsets are reddish

c) why clouds appear white

2.state all the possibel properties of

a) all radiated electromagnetic waves and prove that speed of light is 3* 10^8 m/s

b)blackbody radiation

Answer

1.

Rayleigh scattering of sunlight by the inhomogeneities of the atmosphere (the air density fluctuation inhomogeneity) is due to the blue color of the sky. The rays of the sun are scattered at every point of the atmosphere - and more short-wavelength light diffuses. The eye sees all the scattered waves - from red (long wavelength) to violet (short-wave). On the edge of the optical spectrum violet goes buildup. Therefore, the integrated image perceived by the eye as a blue color from purple to push the edge, but it is tending to this side of the spectrum.

At sunset near the sun as there are other phenomena. If the point of the sky, away from the sun all the observer sees the same blue color, close to the sun - red. The fact is that at any point of the sky away from the sun, the observer still sees scattered, is short-wave (integrated blue) light. And at small scattering angles, where more direct rays of the sun, the observer comes more longwave (is red). This is due to the fact that in comparison with the position of the sun in the climax, the light travels several times the thickness of the atmosphere, and from violet light is left virtually nothing - it is scattered many times in other parties. And an integrated image is shifted toward the red end of the spectrum.

When cloudy weather most of the sunlight does not reach the ground. Same goes, refract water droplets suspended in the air. Drops a lot, and each has its own shape and, therefore, distorts its own way. That is, the clouds scatter light from the sky, and as a

result comes to the ground white light. If the clouds are large, the portion of the light is absorbed, and it turns gray light.

2.a

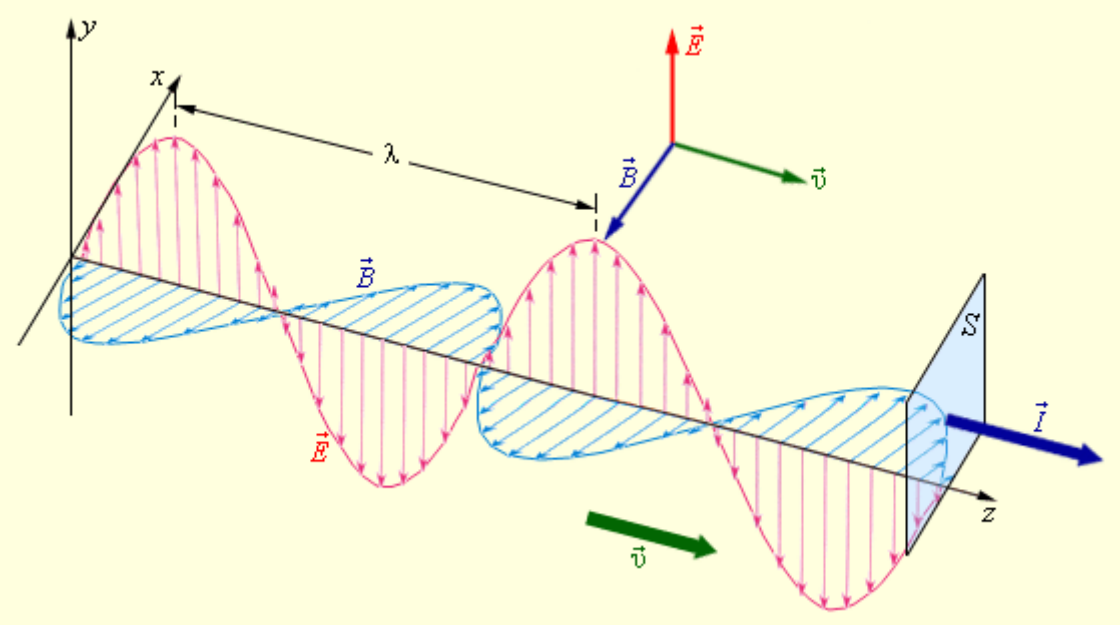

Fig.1

Electromagnetic waves are the propagation of electromagnetic fields in space and time.

The basic properties of electromagnetic waves.

1. Electromagnetic waves emitted by the oscillating charge.
1. The presence of acceleration - the main condition for the emission of electromagnetic waves.
2. Such waves can propagate not only in gases, liquids and solid media, but in a vacuum.
3. Electromagnetic waves are transverse.
4. The speed of electromagnetic waves in vacuum c = 300,000 km / s. One of the first measurement of the speed of light was conducted by Roemer. According to his calculations, the speed of light was equal to 220,000 km / s, which is 26% below the current value.
5. When moving from one environment to another wave frequency is not changed.
6. Electromagnetic waves can be absorbed by the substance.
7. Getting on the boundary between two media, part of the wave is reflected and part is held in a different environment, refracted.

2.b

The intensity of blackbody radiation as a function of temperature and frequency is determined by Planck's law:

$$I(v,T) = \frac{2h \cdot v^3}{c^2} \frac{1}{\exp\left[\frac{hv}{kT}\right] - 1}$$

where h is the Planck constant, k is the Boltzmann constant, c is the speed of light in vacuum.