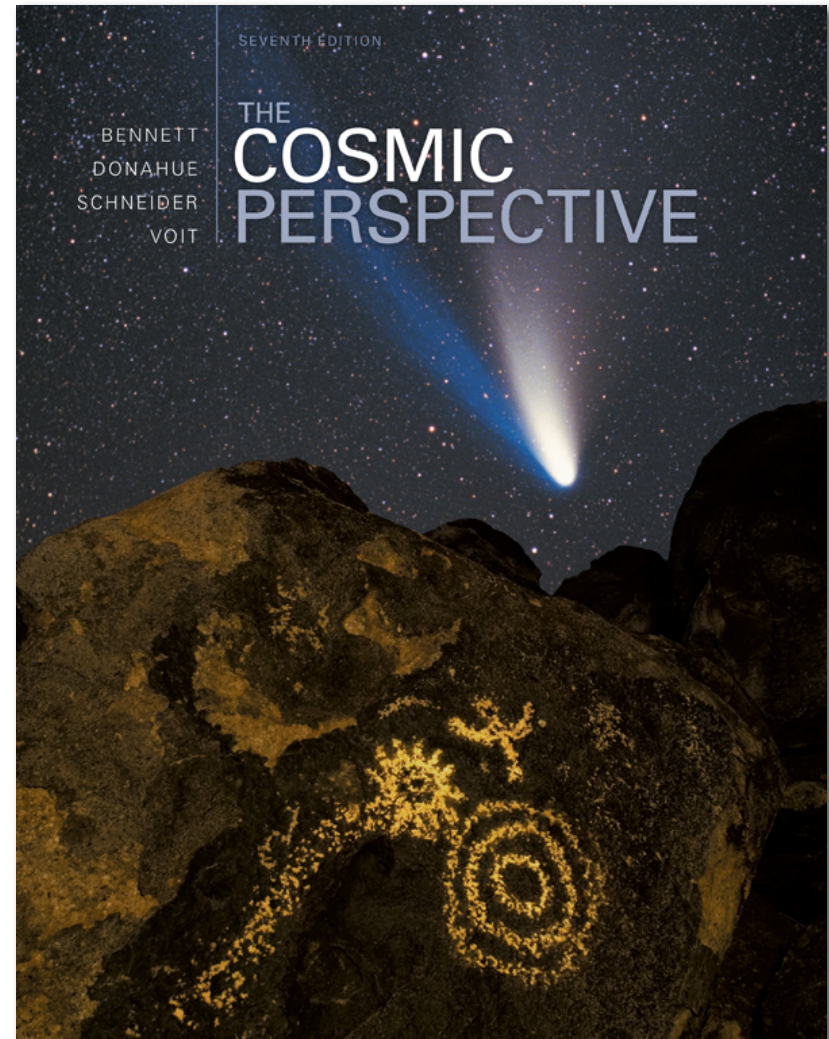


## The Cosmic Perspective

Seventh Edition

**Light and Matter:  
Reading Messages  
from  
the Cosmos**



## 5.1 Light in Everyday Life

- How do we experience light?
- How do light and matter interact?

What is the average power consumption of a human?

- a) 1 joule/s
- b) 1 watt
- c) 100 watts
- d) 107 watts
- e) A and B

# Chapter 5

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## What is a spectrum?

- a) A spectrum is the pattern of colors produced when light shines through a prism.
- b) A spectrum is the pattern of colors produced when light shines through a diffraction grating.
- c) A spectrum is a device used to study the constituent colors of light.
- d) A spectrum is the pattern of directions that light travels after reflecting off a surface.
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A red chair appears red to the eye because

- a) it emits red light.
- b) it transmits red light.
- c) it absorbs red light.
- d) it reflects red light.
- e) all of the above

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The speed of light is

- a) about 30,000 km/s.
- b) the product of its wavelength and its frequency.
- c) dependent on the strength of the electromagnetic field.
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## 5.2 Properties of Light

- What is light?
- What is the electromagnetic spectrum?

## Light with a short wavelength

- a) has a lower frequency than light with a long wavelength.
- b) is redder than light with a long wavelength.
- c) has less energy than light with a long wavelength.
- d) all of the above
- e) none of the above

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## How does visible light compare to radio waves?

- a) Visible light is a form of light wave while radio waves are not.
- b) Radio waves are a form of electromagnetic wave, while visible light is not.
- c) Visible light waves have a shorter wavelength than radio waves.
- d) Radio waves have a higher frequency than visible light waves.
- e) All of the above

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## A photon with a longer wavelength

- a) is more energetic than a photon with a short wavelength.
- b) travels slower than a photon with a short wavelength.
- c) is more blue than a photon with a short wavelength.
- d) has a lower frequency than a photon with a short wavelength.
- e) All of the above



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## Turning up the intensity of a light source

- a) increases the number of photons it emits per second.
- b) decreases the frequency of the photons it emits.
- c) increases the frequency of the photons it emits.
- d) increases the speed of the photons it emits.
- e) none of the above

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## 5.3 Properties of Matter

- What is the structure of matter?
- What are the phases of matter?
- How is energy stored in atoms?

# Chapter 5

What is the atomic mass number of carbon-13 (6 protons, 7 neutrons, 6 electrons)?

- a) 6
- b) 7
- c) 13
- d) 19
- e) 12

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A molecule is

- a) a collection of protons and neutrons.
- b) a collection of protons, neutrons, and electrons.
- c) two or more atoms linked together.
- d) an atom that is missing one or more electrons.

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Which lists the phases of matter in order of increasing temperature?

- a) solid, gas, plasma, liquid
- b) solid, liquid, plasma, gas
- c) plasma, gas, liquid, solid
- d) plasma, liquid, gas, solid
- e) solid, liquid, gas, plasma

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- d) plasma, liquid, gas, solid
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A plasma is a

- a) gas of ions.
- b) charged solid.
- c) neutral liquid.
- d) neutral gas.
- e) flat-screen television.

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What is the pressure exerted by Earth's atmosphere on the surface of Earth?

- a) 273 Kelvin
- b) 14.7 pounds per square inch
- c) 273 pounds per square inch
- d) 1 pound per square inch
- e) 147 pounds per square inch

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## How do electrons in an atom change energy?

- a) Electrons can only gain energy by leaving the atom (creating an ion).
- b) Electrons move between discrete energy levels, or escape the atom if given enough energy.
- c) Electrons can have any energy below the ionization energy within the atom, or escape if given enough energy.
- d) Electrons can have any energy within the atom, and cannot be given enough energy to cause them to escape the atom.
- e) Electrons move between discrete energy levels within the atom, and cannot accept an amount of energy that causes them to escape the atom.

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## 5.4 Learning from Light

- What are the three basic types of spectra?
- How does light tell us what things are made of?
- How does light tell us the temperature of planets and stars?
- How does light tell us the speed of a distant object?

The spectrum from an incandescent (with a filament) light bulb is a(n)

- a) continuous spectrum.
- b) emission line spectrum.
- c) absorption line spectrum.
- d) combination of A and B.
- e) combination of B and C.

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The wavelengths of emission lines from a gas depend on

- a) the electron energy levels of atoms in the gas.
- b) how ionized the gas is.
- c) the rotation and vibration energy levels of molecules in the gas.
- d) all of the above.
- e) none of the above.

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## Wien's Law states that

- a) hotter objects produce more emission lines than cooler objects.
- b) hotter objects produce emission lines at shorter wavelengths than cooler objects.
- c) hotter objects are brightest at a shorter wavelength than cooler objects.
- d) all of the above.
- e) none of the above.



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How does the Doppler effect affect an emission line spectrum if the emitting object is rotating?

- a) It does not change.
- b) The emission lines get broader.
- c) The emission lines get narrower.
- d) The emission lines move closer to each other.
- e) The emission lines move further from each other.

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