1. Photon E	A. The fastest speed in the universe: the speed of light.	1. Radio waves C	A. Electromagnetic waves we feel as heat.
2. 3×10^8 m/sec A	B. An orbit of electrons. To move from low to high requires energy.	2. Infrared A	B. Dangerous EM waves that have very high energy and come from nuclear reactions.
3. Prism D	C. All light: visible and invisible.	3. Ultraviolet E	C. EM waves that have very low energy and long wavelengths.
4. Light F	D. Used to separate white light into its colors.	4. X-rays D	D. EM waves that can pass through skin and have short wavelengths.
5. EM Spectrum C	E. A single particle or packet of light.	5. Gamma rays B	E. EM waves with more energy than visible light and can cause sunburns.
6. Energy Level B	F. A wave that can travel through a vacuum.	6. Microwaves F	F. Long wavelengths; used in cell phones.

Is light a wave or a particle. Prove your answer.

Both wave - can bend
particle - can go through a vacuum

Put these three in order from slowest to fastest:

Light waves, sound waves, water waves.

water, sound, light

Where does light come from?

electrons falling from higher to lower orbit

Put these from shortest to longest wavelengths

Radio waves	Ultraviolet	X-rays	Visible	Microwaves
5	2	1	3	4

Indicate whether there is positive (+) or negative (-) work being done on the object.

___ a. An eastward-moving car skids to a stop across dry pavement.

\+ b. A freshman stands on his toes and lifts a **World Civilization book** to the top shelf of his locker.

\+ c. At Great America, a **roller coaster car** is lifted to the peak of the first hill on the Shock Wave.

___ d. A catcher puts out his mitt and catches the **baseball**.

___ e. A falling **parachutist** opens the chute and slows down.

Read each of the following statements and identify them as having to do with kinetic energy (KE), potential energy (PE) or both (B).

KE, PE or B?	Statement:
KE	1. If an object is at rest, it certainly does NOT possess this form of energy.
PE	2. Depends upon object mass and object height.
KE	3. The energy an object possesses due to its motion.
B	4. The amount is expressed using the unit joule (abbreviated J).
PE	5. The energy stored in an object due to its position (or height).
PE	6. The amount depends upon the arbitrarily assigned *zero level*.
KE	7. Depends upon object mass and object speed.
PE	8. If an object is at rest on the ground (zero height), it certainly does NOT possess this form of energy.

Read the following descriptions and indicate whether the objects' KE, PE and TME increases, decreases or remains the same (=). If it is impossible to tell, then answer ???.

a. A marble begins at an elevated position on top of an inclined ruler and rolls down to the bottom of the ruler.

KE: (↑) ↓ = ??? PE: ↑ (↓) = ??? TME: ↑ ↓ (=) ???

b. A marble is rolling along a level table when it hits a note card and slides to a stop.

KE: ↑ (↓) = ??? PE: ↑ ↓ (=) ??? TME: ↑ (↓) = ???

c. A cart is pulled from the bottom of an incline to the top of the incline at a constant speed.

KE: ↑ ↓ (=) ??? PE: (↑) ↓ = ??? TME: (↑) ↓ = ???

d. A physics student runs up a staircase at a constant speed.

KE: ↑ ↓ (=) ??? PE: (↑) ↓ = ??? TME: (↑) ↓ = ???

e. A force is applied to a root beer mug to accelerate it from rest across a level countertop.

KE: (↑) ↓ = ??? PE: ↑ ↓ (=) ??? TME: (↑) ↓ = ???