The Nature of Light

Now let's turn our attention to the nature of light. If you shine a flashlight across the room, you'll see that the light travels straight. It doesn't bend around corners. You may also notice that the light travels fast, very fast.

In fact, light is the fastest thing we know of. It travels faster than a rocket, faster than the wind, even faster than a speeding bullet. Light travels at the incredible speed of 186,000 miles per second. That's like traveling from New York to San Francisco, 62 times in one second. Nothing but light can travel at that speed.

Light travels at different speeds through different substances. In the emptiness of space where there are no gases, light travels at its maximum speed. In air, glass, or water, light travels slower.

Normally light travels in a straight line. But when it goes from one substance to another, it may change direction because it slows down or speeds up. This change in speed causes the light to bend or, as scientists call it, refract. We can demonstrate refraction in a variety of ways.

If we look at this pencil in the glass of water, it appears that the pencil is bent. When this bird is fishing, it must take into consideration the fact that the fish is not where it appears to be because the reflected light from the fish bends when it moves from the water to the air. If the bird didn't know this, it would always be striking in the wrong place.

Fiber optics is a new technology that is used in a number of interesting ways. The fiber optic material is flexible glass or plastic that can be as thin as a human hair. Light that goes in one end of the fiber is reflected back and forth from side to side the entire length of the fiber. The fiber can be twisted and bent and the light still comes out the other end.

They are using this fiber optic to send telephone calls because more information can be carried than with the electric cables. It is also used to videotape in hard to reach places. Fiber optic material is used for lamps and even sold as a fun flash-like toy.

Reflectors are used on bicycles and emergency vehicles to alert people that they are there. Light that strikes a reflector is reflected back to the source of the light. This helps to see bicyclists and runners at night.

When light strikes an object that is transparent, the light goes through. Glass and clear plastic are transparent. Translucent materials are materials that let some of the light through, but the translucent materials scatter the light so that it is hard to see what is on the other side clearly. Most objects are opaque, which means they do not allow any light to go through them.

Here's an interesting demonstration. We will use a slide projector and a slide of a rhinoceros. First, we find the point where the image is focused. The white poster board will locate that spot. Then the poster board is put aside, and the image disappears. Now when we wave a dowel rod quickly back and forth, the image reappears. The image is there the whole time, but we can only see it when there is something to reflect it to our eyes.

The dowel rod creates that surface, and persistence of vision lets us see the whole image even though the reflected light comes to us in pieces. Persistence of vision helps us see this stick man made up of separate pictures walk. Our eyes retain or hold onto each image for a fraction of a second, so we see the entire rhino and the man walking.