Light Pollution and Glare

Glare

- Glare is a visual sensation caused by an overly bright, exposed bulb, meaning that you can see the light bulb itself.
- Glare can be disabling or simply uncomfortable. (See section on Disability vs Discomfort Glare.)
- Older people are usually more sensitive to glare due to the aging characteristics of the eye. (See section on Aging Eyes.)
- Because glare causes pain or discomfort, it can be very unsafe. When a light is glaring to the eye, it makes it very hard to see, especially while driving.
- Have you ever been blinded by car headlights? That’s glare!
- Glare affects everyone in some way.

Aging Eyes

- Glare can severely affect people with aging eyes.
- Many people of all ages wear glasses. Glare from lights can scatter off dust, dirt, scratches, or smudges on the lenses making the effects of glare worse.
- As some people age, they lose some control of the muscle that changes the size of the pupil when light levels change. This means that if a light is very bright, the pupil will stay open wider in older people and more light will enter the eye. This can be very painful.
- Cataracts cloud the lens inside the eye. Symptoms include blurriness, lights appearing brighter, poor color perception, and difficulty seeing at nighttime. Advanced cataracts can be corrected with surgery. The clouding causes more light to scatter inside the eye. Glaring lights can cause pain and more blurring!
- Nearly everyone over the age of 60 has pre-cataracts, which can cause yellowed or blurry vision.

Disability vs Discomfort Glare

- Disability glare is the reduction in vision caused by intense light sources in the field of view, while discomfort glare is the sensation of annoyance or even pain induced by overly bright sources.
- Disability glare degrades your vision by decreasing your ability to see contrasts and color perception. The loss of vision is caused by stray light being scattered within the eye.
- With discomfort glare, the light can be so painfully bright, that is causes you to have to look away from the light.

Now Try This!

- Post the eye chart at eye level on a wall. We’re going to use this to explore how glare affects people with and without aging eyes.
- Read the smallest line you can at a distance of 6 meters (20 feet) from the chart. Record the line number you read. For students with glasses, try to read the smallest line you can with and without your glasses. For perfect vision, you should be able to read line 8.
- Then try again with 1 layer of the fuzzy transparency immediately in front of your eyes; repeat with 2 layers, 3 layers, and then 4 layers. Each time, record the line numbers you read. The layers of transparency will simulate different severities of cataracts.
- Now make the room as dark as you can. Using the large flashlight in your box, fully illuminate the eye chart (so you can still see it). Repeat the second and third steps.
- Keeping the room lights off, have one person in the group stand near the eye chart pointing the Maglite toward you. Repeat the second and third steps under these conditions.
- What are the problems? Using your experience here and some background research online, formulate recommendations to solve the problems and to address the complaints from the Issues Poster for this case scenario.
- Create a powerpoint, a video, or a poster in which the issues, problem(s), and your resulting recommendations are presented to the Mayor.

Shielding and Dimming

- Glare is reduced when the light bulb is not exposed.
- Lights should be task-oriented, meaning they light what they were designed to light.
- When a shielded fixture orients all the light downward, often bright light is no longer needed and the wattage can be lowered.

The images show two examples of glaring lights.

A clear lens allows your eye to bring objects sharply into focus.

A mild cataract may slightly blur your vision because of extra scattering in the lens in the eye.

A dense cataract can severely blur your vision.

Key Ideas

- Glare
- Aging eyes
- Cataracts
- Glare and safety
- Disability glare
- Discomfort glare