Practice Quiz: Lenses

#1 Which kind of lens (converging or diverging) always produces a virtual image?

#2 Which kind of lens converges the energy of light to a focus (concave or convex)?

#3 The images formed by all lenses are (reversed, inverted, erect)?

#4 OPTIONAL: Draw incident rays and refracted rays to show approximately where the image would be and what it would look like.

# F

# F

#5 Which lens would focus the image closer to the lens (+100 or +200)?

6 OPTIONAL: Draw incident rays and refracted rays to show approximately where the image would be and what it would look like.



# F

# F

Label the diagram (convex or concave lens; incident rays, refracted rays, focal point, converging or diverging lens):

### 

### 

Subject is far away or “infinity”

Lens

rays

rays

Define Polarization and give three examples.

What is the function of the rod cells in your eye?

What is the function of the cone cells in your eye?

List THREE (3) parts of the human eye besides rods and cones that we discussed in class and give their function.

What is the most common form of color blindness?

Name TWO of the three pairs of complementary colors of light.

Name TWO of the three subtractive primary colors of light.

List TWO of the three additive primary colors of light.

Calculate the wavelength of yellow light when its frequency is 6.25 x 1014 Hertz. [The speed of light is 3.00 x 108 m/s.]

Show your work. (HINT: c = f λ)

Calculate the wavelength of **red** light when its frequency is 4.29 x 1014 Hertz. [The speed of light is 3.00 x 108 m/s.]

Show your work. (HINT: c = f λ)

**\_\_\_\_\_sightedness**, also called **myopia**, common name for impaired vision in which a person sees \_\_\_\_\_\_\_\_\_\_ objects clearly while \_\_\_\_\_\_\_\_\_\_ objects appear **blurred**. The distance between the lens and the retina is too long. As a result, light rays from distant objects focus before they strike the retina. Near objects appear clearly because light rays from them focus correctly on the retina. ***Nearsighted people need eyeglasses that are \_\_\_\_\_\_\_\_\_\_\_\_ lenses.***

Blurry image on retina

Image focuses on retina

The focal length is too short. The eye is converging the light rays too much.

By using a corrective, **concave** lens, the light rays are first diverged to the eye lens and then converged farther back to hit the retina.

**\_\_\_\_\_\_sightedness**, also called **hyperopia**, in which a person sees \_\_\_\_\_\_\_\_\_\_ objects with blurred vision, while \_\_\_\_\_\_\_\_\_\_\_ objects appear in **sharp focus**. The distance between the lens and the retina is too short. As a result, light rays from near objects strike the retina before they are in focus, which causes blurred vision. Distant objects appear clearly because light rays from them focus correctly on the retina.

No image on retina

Image focuses on retina

The focal length is too long. The eye is not converging the light rays enough.

By using a corrective, **convex** lens, the light rays are converged closer to hit the retina.

* Most hyperopic people can see distant objects because the light rays converge enough in the eye. However, they cannot focus on closer objects. Hyperopic people need to wear \_\_\_\_\_\_\_\_\_\_\_ lens … “coke bottles” … with the same principal as \_\_\_\_\_\_\_\_\_\_\_\_\_ glasses (therefore, their eyes “bug out”).

Practice Quiz ANSWERS

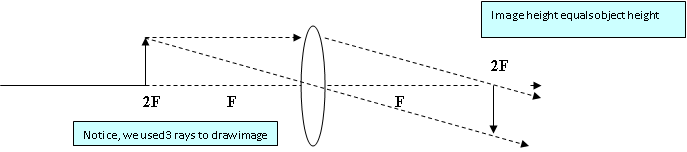
LENSES

#1 **DIVERGING** lenses always produces a virtual image

#2 **CONVEX** lens converges the energy of light to a focus

#3 The images formed by all lenses are (**REVERSED**, inverted, erect)?

#4 OPTIONAL: Draw incident rays and refracted rays to show approximately where the image would be and what it would look like.

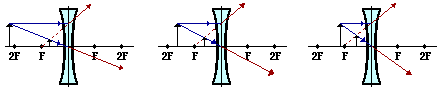


Refracted Rays

Incident Rays

#5 The thicker, more powerful lens would focus the image closer to the lens (**+200**)

6 OPTIONAL: Draw incident rays and refracted rays to show approximately where the image would be and what it would look like.



Label the diagram (convex or concave lens; incident rays, refracted rays, focal point, converging or diverging lens):

### F

### f

Subject is far away or “infinity”

Convex lens

Converging Lens

Incident rays

Refracted rays

Define Polarization and give three examples.

**Light is aligned along particular planes by filters**

**Sunglasses, Scoreboards, 3D movies, digital clocks use polarizing filters**

What is the function of the rod cells in your eye? **Light/dark sensitivity**

What is the function of the cone cells in your eye? **Color vision**

List THREE (3) parts of the human eye besides rods and cones that we discussed in class and give their function.

**Cornea (refraction, 45% power of sight); lens (25% power of sight); vitreous humor (liquid nourishing eye and 30% power of sight); retina (screen of vision; focus); optic nerve (sends impulses from eye to brain)**

What is the most common form of color blindness? **red-green color blindness**

Name TWO of the three pairs of complementary colors of light.

**Red + Cyan, Blue + Yellow, Green + Magenta**

Name TWO of the three subtractive primary colors of light. **Cyan, Magenta, Yellow**

List TWO of the three additive primary colors of light. **Red, Green, Blue**

Calculate the wavelength of yellow light when its frequency is 6.25 x 1014 Hertz. [The speed of light is 3.00 x 108 m/s.]

Show your work. (HINT: c = f λ)

**λ** = c/f 🡪 3.00 x 108 m/s **/** 6.25 x 1014 Hertz **= 4.8 x 10-7 m**

Calculate the wavelength of **red** light when its frequency is 4.29 x 1014 Hertz. [The speed of light is 3.00 x 108 m/s.]

Show your work. (HINT: c = f λ)

**λ** = c/f 🡪 3.00 x 108 m/s **/** 4.29 x 1014 Hertz **= 7.0 x 10-7 m Nearsightedness**, also called **myopia**, common name for impaired vision in which a person sees NEAR objects clearly while DISTANT objects appear **blurred**. The distance between the lens and the retina is too long. As a result, light rays from distant objects focus before they strike the retina. Near objects appear clearly because light rays from them focus correctly on the retina. ***Nearsighted people need eyeglasses that are concave lenses.***

Blurry image on retina

Image focuses on retina

The focal length is too short. The eye is converging the light rays too much.

By using a corrective, **concave** lens, the light rays are first diverged to the eye lens and then converged farther back to hit the retina.

**Farsightedness**, also called **hyperopia**, in which a person sees NEAR objects with blurred vision, while DISTANT objects appear in **sharp focus**. The distance between the lens and the retina is too short. As a result, light rays from near objects strike the retina before they are in focus, which causes blurred vision. Distant objects appear clearly because light rays from them focus correctly on the retina.

No image on retina

Image focuses on retina

The focal length is too long. The eye is not converging the light rays enough.

By using a corrective, **convex** lens, the light rays are converged closer to hit the retina.

* Most hyperopic people can see distant objects because the light rays converge enough in the eye. However, they cannot focus on closer objects. Hyperopic people need to wear convex lens … “coke bottles” … with the same principal as magnifying glasses (therefore, their eyes “bug out”).