

Quiz 7 Version A

- 1) I am wearing glasses to correct my near-sightedness. Which of the following statements most accurately describes the lenses in my glasses?
- A) The radii of the two spherical lens surfaces must have opposite sign.
 - B) The radii of the two spherical lens surfaces must be equal but have opposite sign.
 - C) The radii of the two spherical lens surfaces must be equal and same sign.
 - D) The radii of the two spherical lens surfaces must be such as to provide for a negative focal length.
 - E) The radii of the two spherical lens surfaces must be same sign but different size, with the larger radius being closer to my eye.

- 2) You look through a lens on this page and see the words magnified. Is the image you observe real or virtual?
- Is the lens concave or convex? (convex=fatter in the center; concave=fatter at the edges)
- A) real image; convex lens
 - B) real image; concave lens
 - C) virtual image; convex lens
 - D) virtual image; concave lens

A contact lense is in the shape of a convex meniscus. The inner surface is shaped to fit the eye. It has a curvature radius of 7.80mm. The lens is made out of plastic with an index of refraction

3) of $n=1.56$. The lens has a focal length of 44.4cm. What is the curvature radius of the outer surface of the lense?

- A) 7.16mm B) 7.32mm C) 7.56mm D) 7.75mm E) 8.02mm

4) A cameras zoom lens covers the focal length range from 38mm to 110 mm. You point the camera at a distant object and photograph it first at 50mm and then at 100mm. What's the ratio of the images on the two photos?

- A) 2.9 B) 4.0 C) 2.0 D) 1.5 E) 1.0

5) A converging lense has surfaces with radii $R_1=80\text{cm}$ and $R_2=-36\text{cm}$, and an index of refraction of $n=1.63$. An emerald that is 2cm tall is placed 15cm to the left of the lense. What will the magnification be? I.e. what is the ratio of image size divided by actual size of the emerald.

- A) 0.5 B) 1.0 C) 1.5 D) 2.0 E) 2.5

Note: Magnification is defined to be a positive number. So feel free to take $|h'|/|h|$

6) A compound microscope has objective and eyepiece focal lengths of 4.2mm and 6.9mm, respectively. If the lenses are 9.3cm apart, what is the approximate magnification of the instrument?

- a) 50-75 b) 100-150 c) 250-350 d) 400-500 e) 700-800

- 7) Two plano-convex lenses are geometrically identical, but made from glass with different index of refraction. The first has $n=1.52$, and an object at 45cm from the lens focuses to a real image at 85cm for the first lens, and at 53cm for the second lens. What is the index of refraction of the second lens?
- a) 1.50 b) 1.57 c) 1.63 d) 1.67 e) 1.72
- 8) A double convex lens with equal 38cm curvature radii is made from glass with refractive index that differ for blue light ($n_{\text{blue}} = 1.54$) and red light ($n_{\text{red}}=1.51$). If a point source of light that covers the entire color spectrum from red to blue is placed on the lens axis at 95cm from the lens, over what range will its visible image be smeared?
- a) 1.5cm b) 2.3cm c) 3.5cm d) 4.6cm e) 5.4cm

Consider a lens that is flat (i.e. planar) on one side, and convex on the other surface. Such a lens is called "plano-convex". It looks like it is cut off a sphere. The radius of curvature of this lens is 26cm. The refractive index is 1.62. An object is placed 68cm away from the lens on the convex side. Where and of what type is the image?

9)

- A) This is a real inverted image about 1m away from the lens on the opposite side of the object.
- B) This is a virtual image about 1m away from the lens right side up.
- C) This is a virtual image about 2m away from the lens right side up.
- D) This is a real inverted image about 2m away from the lens on the opposite side of the object.
- E) This is a virtual image about 50cm away from the lens inverted.

10)

A virtual image is located 40cm behind a concave mirror with focal length 18cm. Where is the object?

- a) 12.4cm b) 15.4cm c) 21.1cm d) 18.3cm e) 30.5cm