

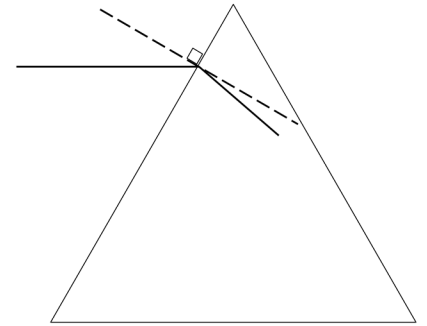
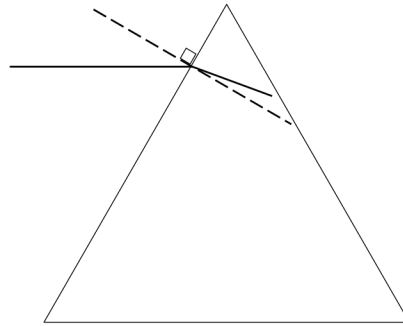
Rubric Codes: **S**

Student ID: _____

I certify by my signature that I will abide by the code of academic conduct of the University of California.

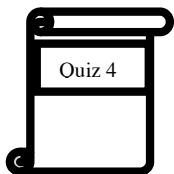
Signature _____

1. You are helping two friends draw the rays for a triangular prism in air. One draws the first refraction line like the figure on the left. The other friend draws it like the figure on the right. **Explain** which one is correct *and* tell them how they can avoid this confusion in the future.



2. You wish to spy on your physics instructor as she writes your quiz. Your morals may be questionable, but you figure that if you can use a mirror with enough perfection to determine what she types onto her computer, then you know the Law of Reflection well enough to deserve a good quiz score! She has not-so-cleverly left a mirror near her desk.

Where should you stand to see the quiz?



$$\theta_{\text{incident}} = \theta_{\text{reflected}}$$

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$n = c/v$$

Quiz 5 (A) Student ID: _____ Name: _____ , _____ | _____

Rubric Codes:

last

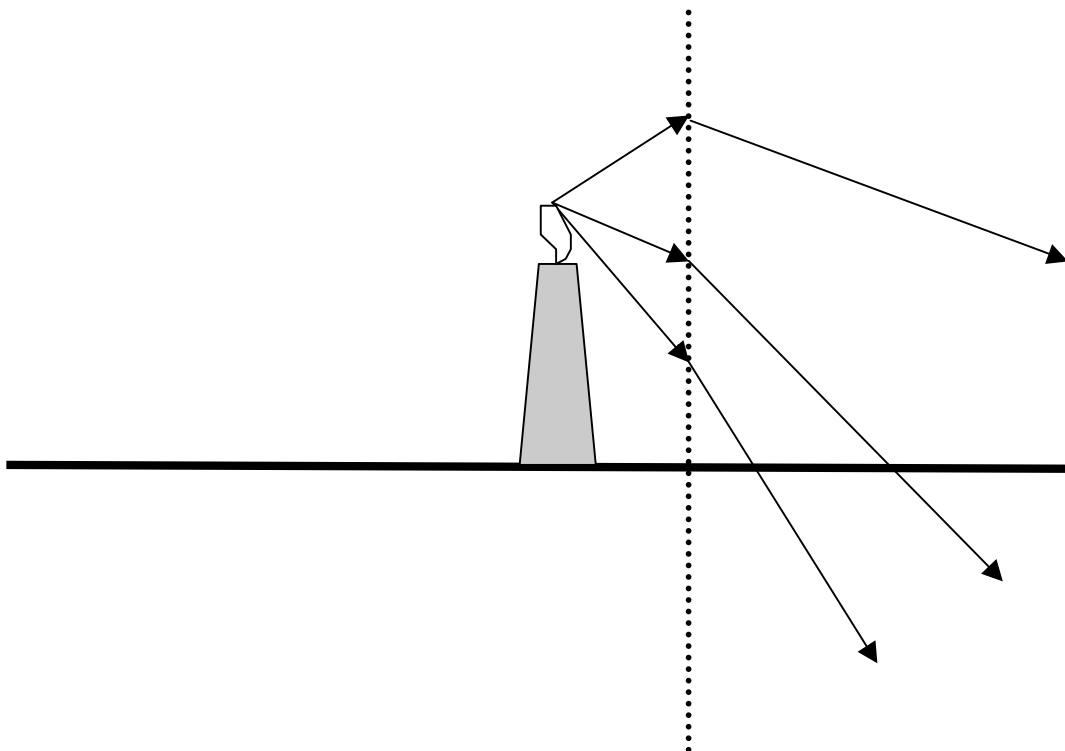
first

DL Sect. #

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ANSWERS WITHOUT WORK WILL RECEIVE NO CREDIT. MARK YOUR ANSWERS CLEARLY.

- 1) A candle stands in front of a lens. The candle flame emits light in all directions. Three light rays are shown—note that these are **not** the principal rays you often drew in DL. The lens is a type you are familiar with from DL, and is centered on the heavy black line.



- a) You stand somewhere far to the right and look through the lens. Describe what you see. Do you see an image? If so, what type (real image or virtual image? Upright or inverted? Bigger or smaller?) If not, why not? Be sure to explain, referencing the drawing—a ray tracing might be helpful.

- b) Locate the focal point of the lens. You will need to use a straightedge and sketch on the picture above. Explain your solution. You may write your explanation near your sketch, if you need more space.

Rubric Codes: 9

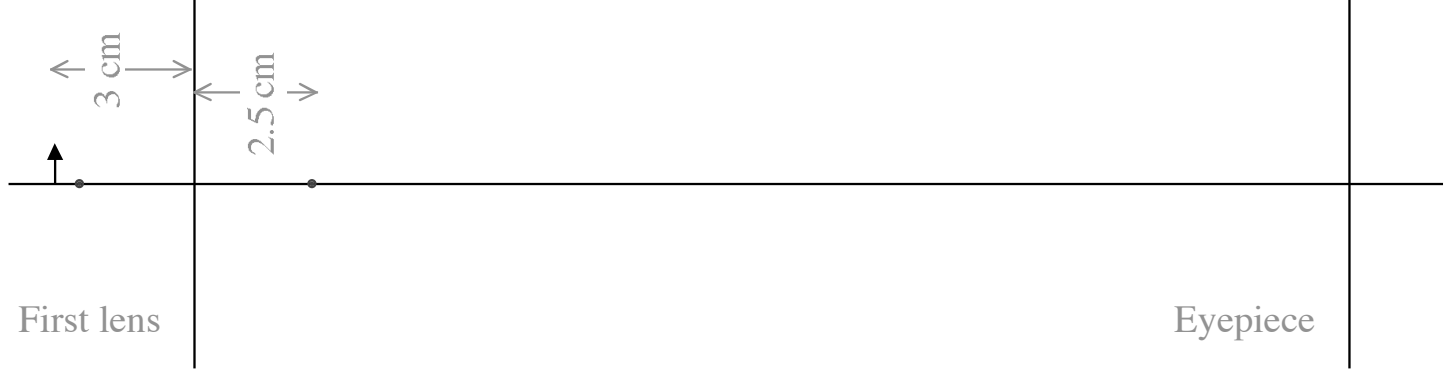
Student ID: _____

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1. Design a 10X microscope:

A. The first lens has a focal length of +2.5 cm. The object is 3 cm from the lens. Use ray tracing to show the location and orientation of the first image.



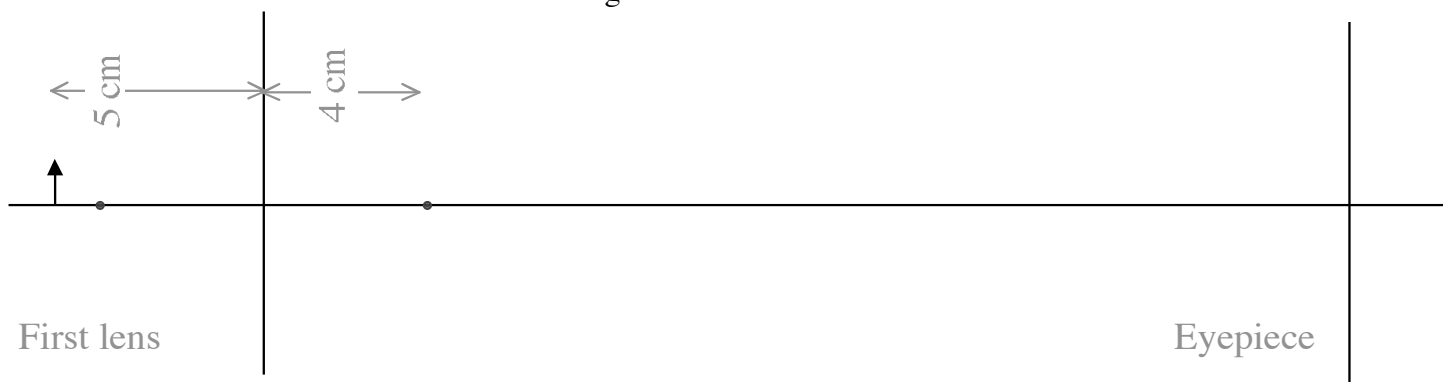
B. The second lens (eyepiece) will create a virtual image that is twice as large as the first image. This lens is located at 10 cm from the first image. Determine its *focal length* (is it *convergent or divergent?*).

Also determine the location of the final image. Show your work.

(Note: You do not need the results of part A to answer this question.)

2. More practice of the same idea: Design a 8X microscope:

A. The first lens has a focal length of +4 cm. The object is 5 cm from the lens. Use ray tracing to show the location and orientation of the first image.



B. The second lens (eyepiece) will create a virtual image that is twice as large as the first image. This lens is located at 7.5 cm from the first image. Determine its *focal length* (is it *convergent or divergent?*).

Also determine the location of the final image. Show your work.

(Note: You do not need the results of part A to answer this question.)

Quiz 5C Student ID: _____ Name: _____, _____ | _____

Rubric Codes: _____

last

first

D/L Section No.

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ANSWERS WITHOUT WORK WILL RECEIVE NO CREDIT. MARK YOUR ANSWERS CLEARLY.

Useful Information:

$$\frac{1}{f} = \frac{1}{o} + \frac{1}{i}, \quad m = -\frac{i}{o}, \quad n_1 \sin \theta_1 = n_2 \sin \theta_2, \quad n = \frac{c}{v}, \quad m = -\frac{h_i}{h_o}$$

Suppose we mold a hollow piece of plastic into the shape of a double convex lens. We fill it with air and make it watertight. We now place this lens in water, and shine a beam of light on it. Does the lens converge or diverge the beam of light? Explain your reasoning. Take:

$$n_{\text{plastic}} = n_{\text{water}} = 1.33$$

$$n_{\text{air}} = 1.00$$

