PART 1 - Lens Terminology

Match each variable to its definition and then use them to label each lens diagram.

h_i h_o d_i d_o f M

___ the height of the object

___ the distance of the object from the optical centre of the lens

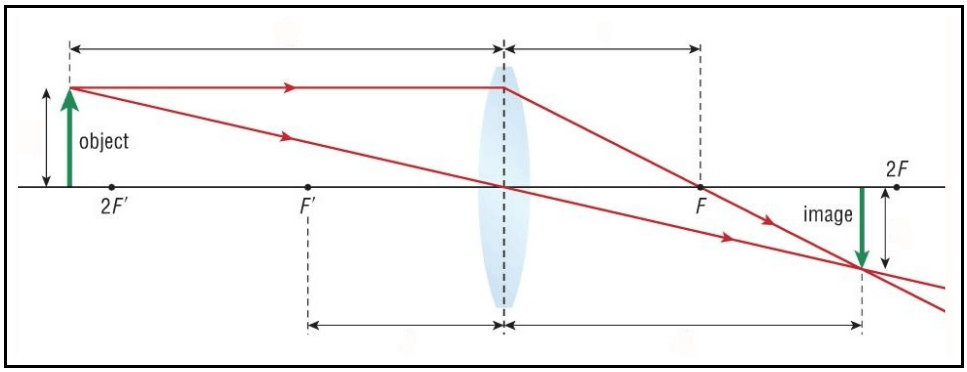
___ the height of the image

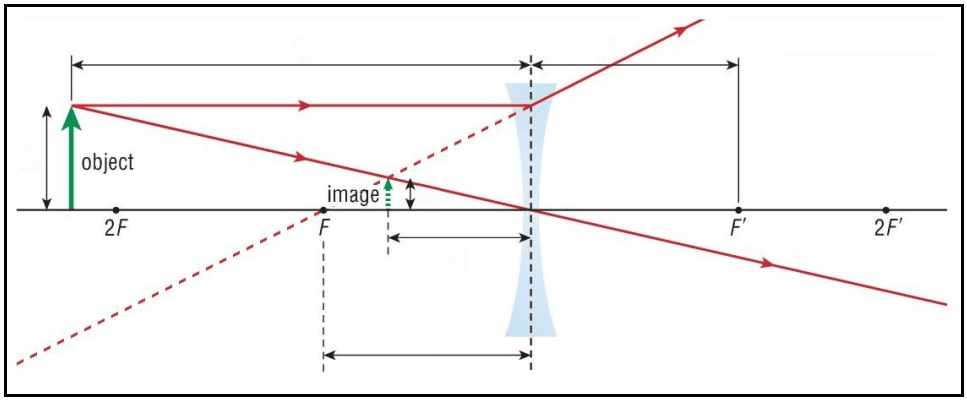
___ the distance of the image from the optical centre of the lens

___ the focal length of the lens (ie the distance from O to F or F′)

___ the magnification of the lens

NOTE: The distance F to O is the same as the distance from F′ to O.





PART 2 - Sign Convention

To use the curved lens equations there are some sign conventions you need to remember/understand (note: while the problems you attempt will already have the proper signage attached, it is important that you do NOT ignore the signage). Use the following statements to complete the table below:

- object distances are always positive
- the focal length is positive for converging lenses and negative for diverging lenses
- the object and image heights are positive when measured upward from the principal axis and negative when measured downward
- image distances are positive for real images (when the image is on the opposite side of the lens as the object) and negative for virtual images (when the image is on the same side of the lens as the object)
- magnification (M) is positive for an upright image and negative for an inverted image.

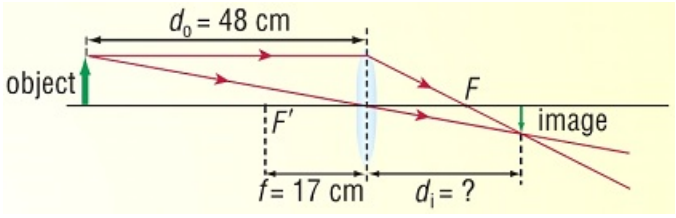
Variable	Sign	Condition	Image Type
d_o	+		
	–		
d_i	+		
	–		
h_o	+		
	–		
h_i	+		
	–		
f	+		
	–		
M	+		
	–		

PART 3 - Application of The Thin Lens Equation & Magnification Equation

These are the same questions used in the presentation (they are here for your reference). Hint: when solving these type of problems, ① be sure to use GRESS, ② include a quick sketch and ③ watch to make sure your units are the same.

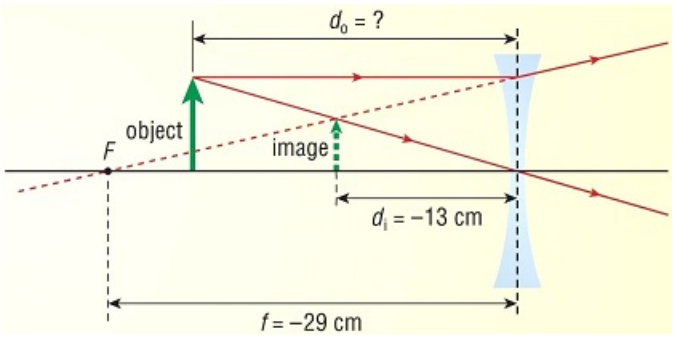
1. A converging lens has a focal length of +17 cm. A candle is located +48 cm from the lens. What type of image will be formed, and where will it be located?

   ANS: +26 cm from lens (the + sign indicates a real image that is on the opposite side as the object)



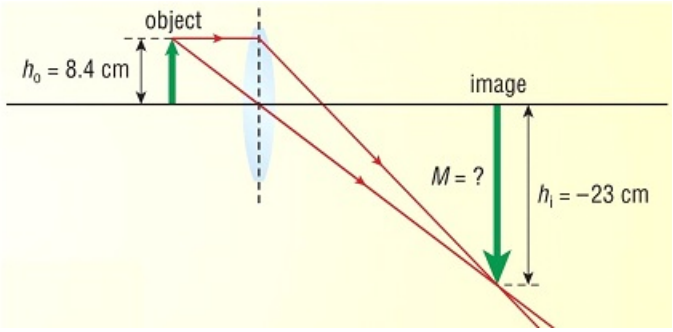
2. A diverging lens has a focal length of -29 cm. A virtual image of a marble is located -13 cm in front of the lens. Where is the marble located?

   ANS: +24 cm from lens (the + sign indicates a virtual image that is on the same side as the object)



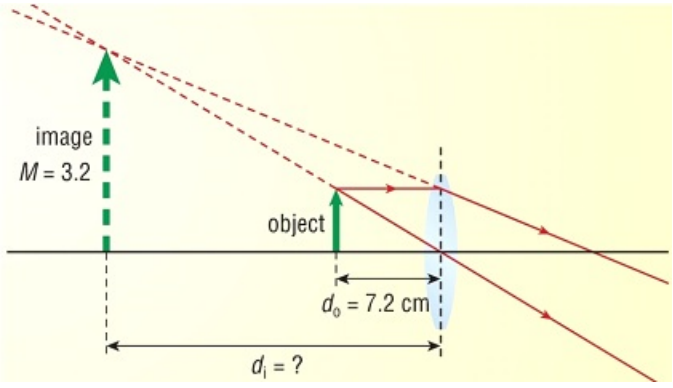
3. A toy of height +8.4 cm is balanced in front of a converging lens. An inverted, real image of height -23 cm is noticed on the other side of the lens. What is the magnification of the lens?

   ANS: -2.7 X



4. A small toy building block is placed +7.2 cm in front of a lens. An upright, virtual image of magnification +3.2 is noticed. Where is the image located?

   ANS: -23 cm from lens (the - sign indicates a virtual image that is on the same side as the object)



5. A coin of height +2.4 cm is placed in front of a diverging lens. An upright, virtual image of height +1.7 cm is noticed on the same side of the lens as the coin. What is the magnification of the lens?

   ANS: 0.71 X