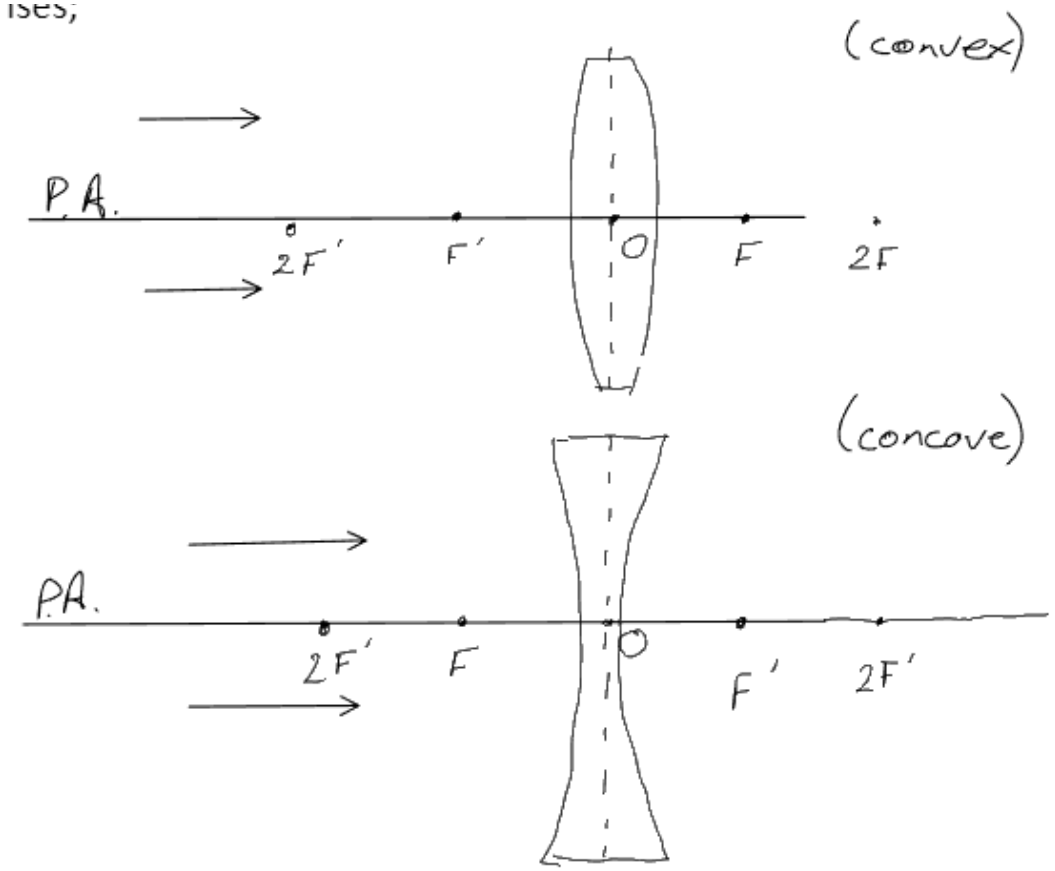
Thin Lens Equation Lesson

The following is a typical setup for the classic convex and concave lenses;



To find the location of an image, we have learned the skill of creating a ray diagram. An easier way of determining the exact position of the image is using the LENS EQUATION:

$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$$

… look familiar?

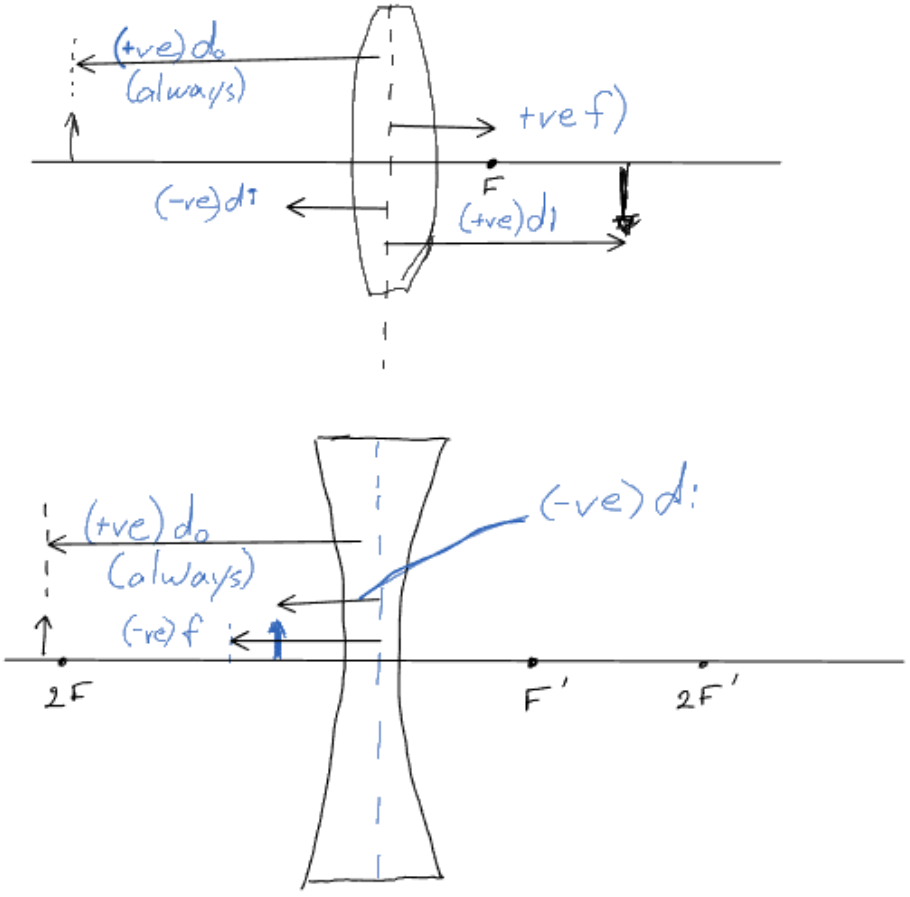
Where;

"f" is the distance: O to F

"d_o" is the horizontal distance: O to object

"d_i" is the horizontal distance: O to image

… all of these values may be put in the equation as positive or negative numbers. Use the following to guide you;



For example: Where is the image produced, when a 5cm tall object is placed 6cm away from a convex lens of focal length 3cm?

Once you have solved the problem of finding the location of the image, you can easily calculate how much the image has been magnified, and find the image height.
Just use the equation;

$$M = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$$

In this equation;
M = magnification of the lens
"h_i" = the height of the image
"h_o" = the height of the object
"d_i" and "d_o" - previously defined in lens equation.

For example:
What was the height of the image of the object that stood in front of the convex lens from this question;
“Where is the image produced, when a 5cm tall object is placed 6cm away from a convex lens of focal length 3cm?”

Example 2: A 2cm tall bug crawls up to a convex lens with a focal length of 15cm. The bug stops 10cm in front of the lens.

-draw a diagram of the situation

-find the location of the image of the little buggy

-find the height of the image of the bug

Example 3:

If a 5cm tall object is 6cm from a concave lens with a focal length of 3cm;

-draw a diagram to represent the scenario

-find the location of the image of the object

-find the height of the image