Divergent lens: q vs p plot and the ray diagram Ch24.15

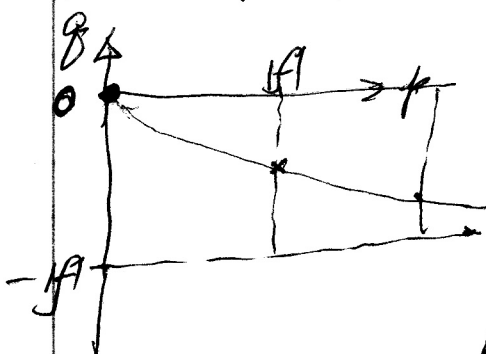
p	q
∞	$-\lvert f\rvert$
$2\lvert f\rvert$	$-\frac{2}{3}\lvert f\rvert$
$\lvert f\rvert$	$-\frac{1}{2}\lvert f\rvert$
0	0

For the divergent case: $f<0$.

We write it as $f=-\lvert f\rvert$.

$$q=\frac{f}{1-\frac{f}{p}}=\frac{-\lvert f\rvert}{1+\frac{\lvert f\rvert}{p}}$$

Since the denominator does not have 0, the plot is simple we need to choose less points.



$p=2\lvert f\rvert$, $q=\frac{-\lvert f\rvert}{1+\frac{1}{2}}=-\frac{2}{3}\lvert f\rvert$

$p=\lvert f\rvert$, $q=\frac{-\lvert f\rvert}{1+1}=-\frac{1}{2}\lvert f\rvert$

$p=0$, $q=0$

Example of a ray diagram:

For $p=2\lvert f\rvert$, check $q=-\frac{2}{3}\lvert f\rvert$

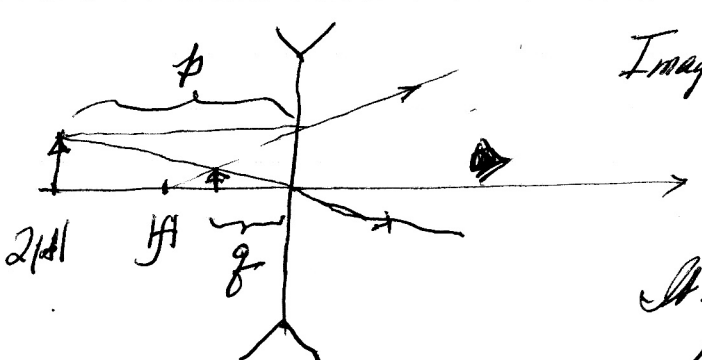


Image: Upright, reduced virtu

We observe the divergent rays.

It is a virtual image located at $q=-\frac{2}{3}\lvert f\rvert$

Absorption of momentum: Ch24.k3

As a photon with momentum p_0 hits a surface, there are two extreme cases.

1) Pure absorption. 100% of p_0 is absorbed or transferred to the surface

2) Pure reflection: $p_{refl} = -p_0$

Conservation of mom leads to $p_0 = p_{abs} + p_{refl}$

$= p_{abs} - p_0$

$\therefore \quad p_{abs} = 2p_0$.

Since have $\frac{1}{4}$ absorption + $\frac{3}{4}$ reflection,

total mom. absorbed by the surface is

$$p_{abs} = \frac{1}{4} * p_0 + \frac{3}{4} 2p_0 = \frac{7}{4} p_0$$