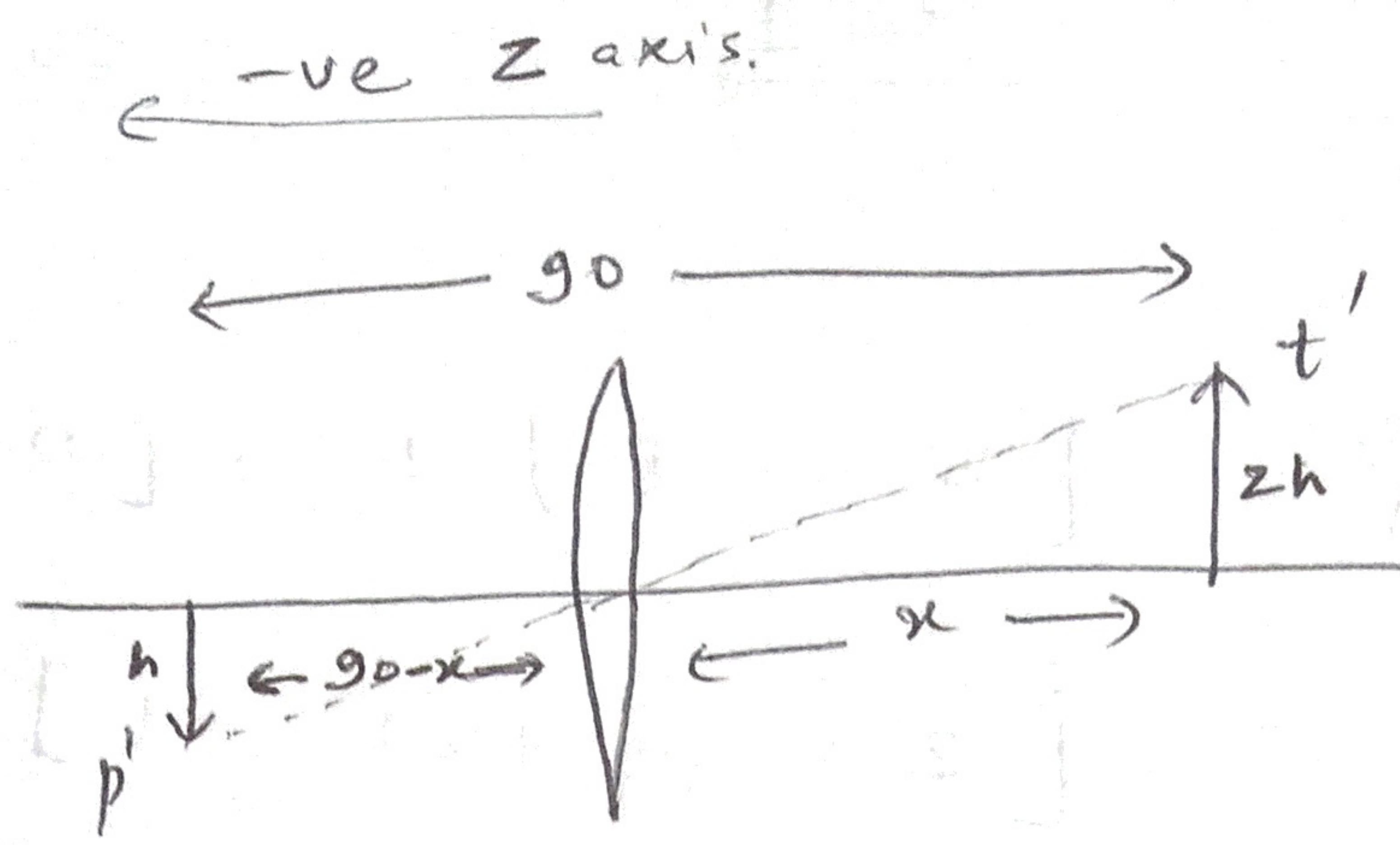


II

1.From thin lens equation

By similar triangles,

$$\frac{x}{2h} = \frac{90-x}{h}$$

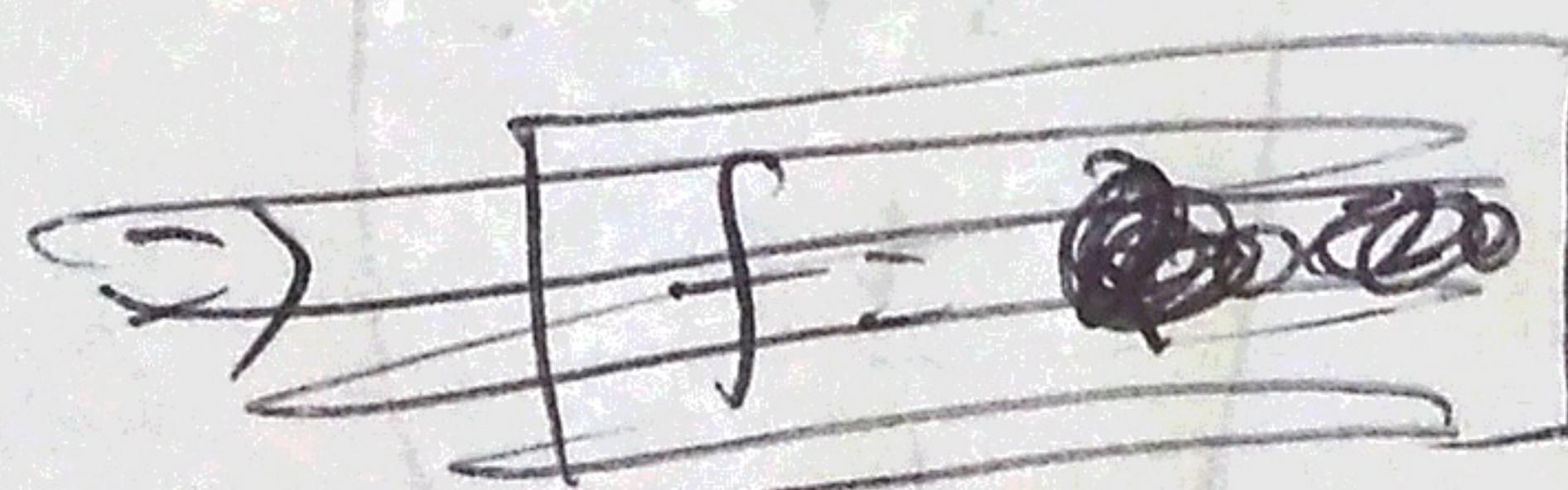
$$\Rightarrow x = 180 - 2x$$

$$\Rightarrow \boxed{x = 60}$$

2.

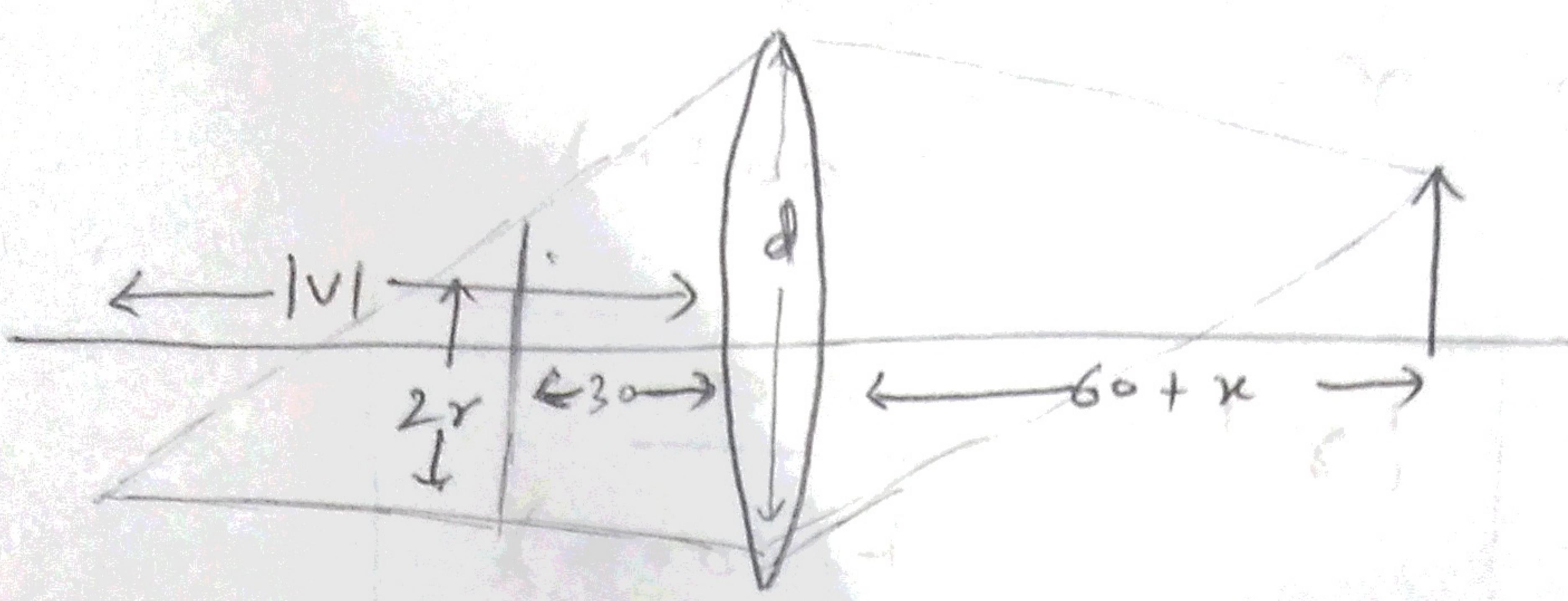
By thin lens equation

$$\frac{1}{f} = \frac{1}{-30} - \frac{1}{60} = -\frac{3}{60} = (-20)^{-1}$$



$$\boxed{f = -20}$$

3.



$$\frac{1}{-20} = \frac{1}{v} - \frac{1}{(60+x)} \quad [\text{Lens Equation}]$$

$$\Rightarrow \frac{1}{v} = \frac{1}{60+x} - \frac{1}{20}$$

$$= \frac{-(40+x)}{20(60+x)}$$

$$\Rightarrow |V| = \frac{20(60+x)}{(40+x)}$$

By similar triangles,

$$\frac{|V|}{d} = \frac{|V| - 30}{2\gamma}$$

$$\Rightarrow \gamma = \frac{d}{2} \left( 1 - \frac{30}{|V|} \right)$$

$$= \frac{d}{2} \left( 1 - \frac{3(40+x)}{2(60+x)} \right)$$

$$= \frac{d}{2} \left( \frac{120+2x - 120 - 3x}{2(60+x)} \right)$$

$$\Rightarrow \gamma = -\frac{xd}{4(60+x)}$$

$$\Rightarrow |\gamma| = \boxed{\frac{xd}{4(60+x)}}$$

$\gamma$  came negative because image formed before the image plane.