1 Snell's law

1.1 Disregarding ray velocity:

$$\eta_1 \sin \theta_1 = \eta_2 \sin \theta_2$$

1.2 Considering ray velocity:

$$\frac{\sin \theta_1}{\sin \theta_2} = \frac{v_1}{v_2} = \frac{\eta_1}{\eta_2}$$

2 Application of ray diagrams:

 $\bullet \;$ Beyond 2F

Image: \mathbb{R} , F' < I < 2F', inverted, smaller

• On 2F

Image: \mathbb{R} , I = 2F', inverted, same size

• Between 2F

Image: \mathbb{R} , I > F', inverted, larger

 \bullet On F

Image at ∞

 \bullet Between F and lens

Image: virtual, I < 2F, erect, larger

3 Gauss lens equations:

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

real-is-positive convention

4 Linear magnification ratio:

$$m = \frac{v}{u} = \frac{h_i}{h_o}$$

5 Arranged form of linear magn. ratio:

$$m = \frac{1}{f} \cdot v - 1$$