Optics

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Journal Club

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Geometrical optics

Useful for $> 90\%$ of calculation.

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Exceptions

- Focus
- Long propagation
- Diffraction optical elements
  e.g. gratings.

Geometrical optics

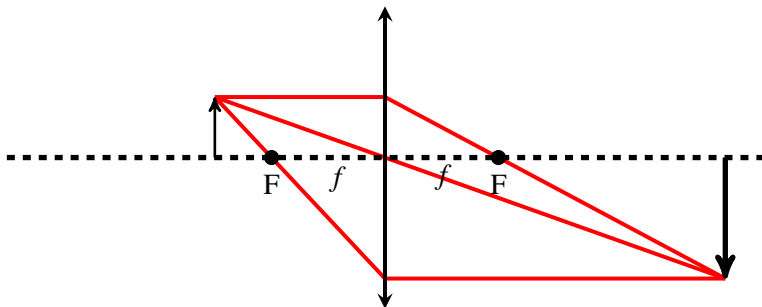**Useful for $> 90\%$ of calculation.**

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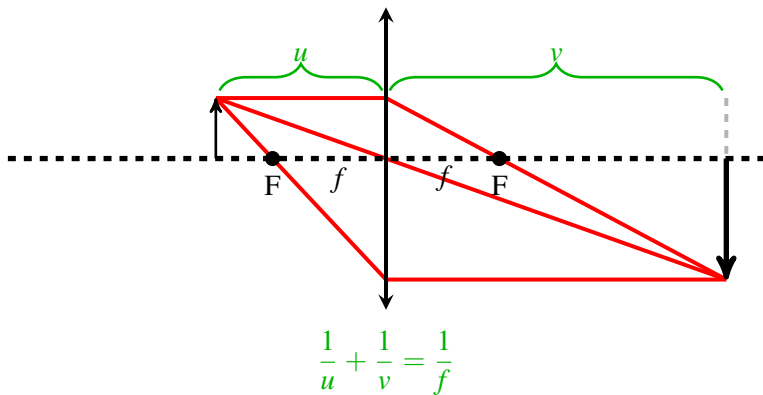
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Ideal Lens
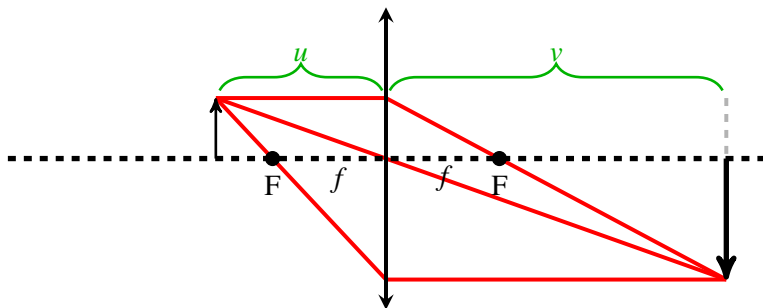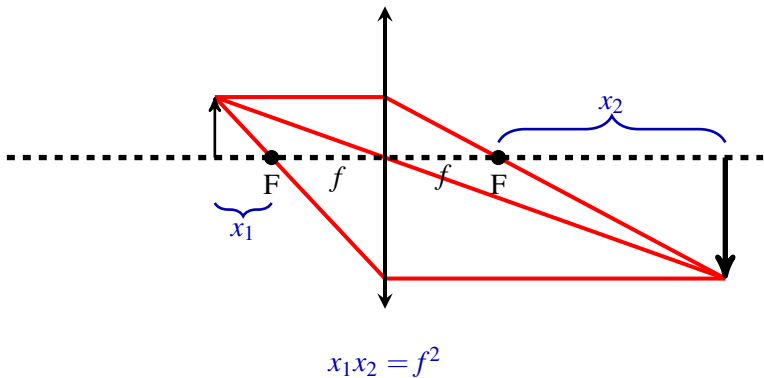
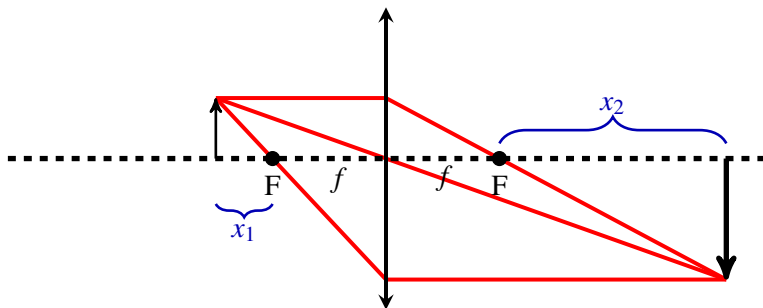# Ideal Lens

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

Ideal Lens

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$$M = \frac{v}{u}$$
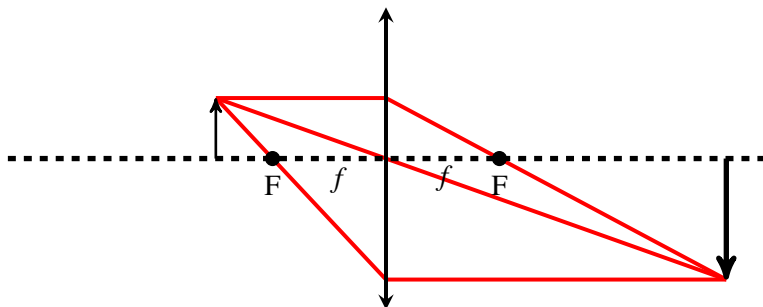
Ideal Lens

$$x_1 x_2 = f^2$$
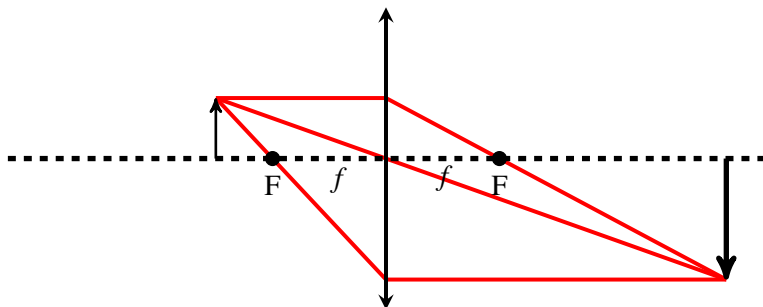
Ideal Lens

$$x_1 x_2 = f^2$$

$$M = \frac{f}{x_1} = \frac{x_2}{f} = \sqrt{\frac{x_2}{x_1}}$$
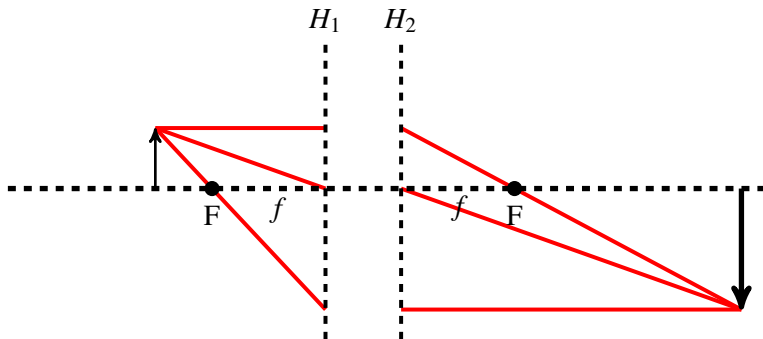
Ideal Lens

Conjugate plane: Perfect image under ray optics
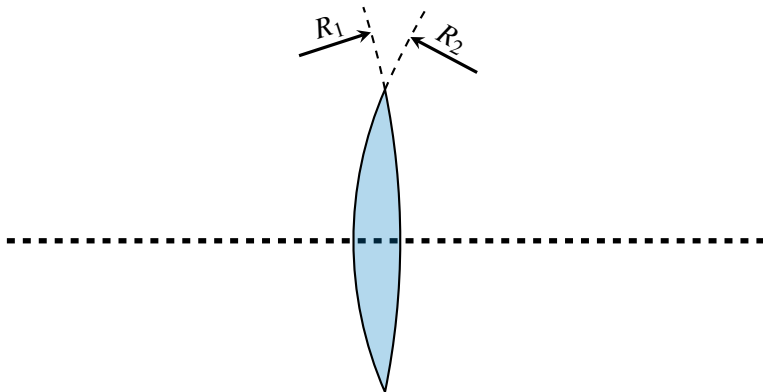
Ideal Lens

Conjugate plane: Perfect image under ray optics
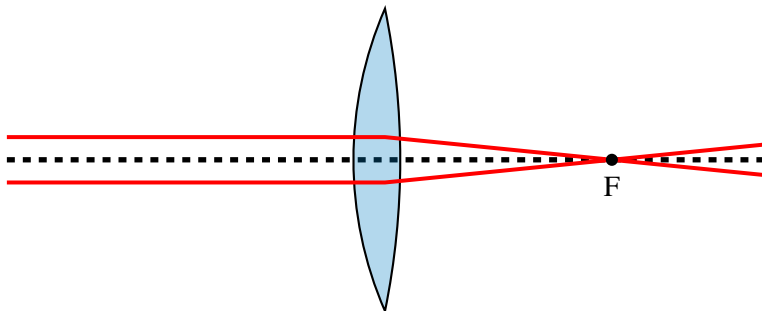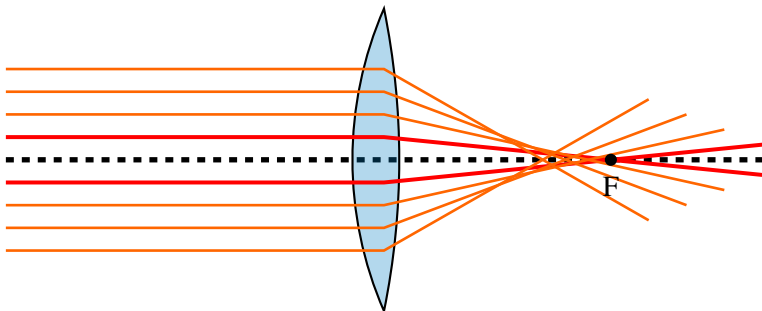Principal planes: Conjugate plane where $M = 1$

Ideal Lens

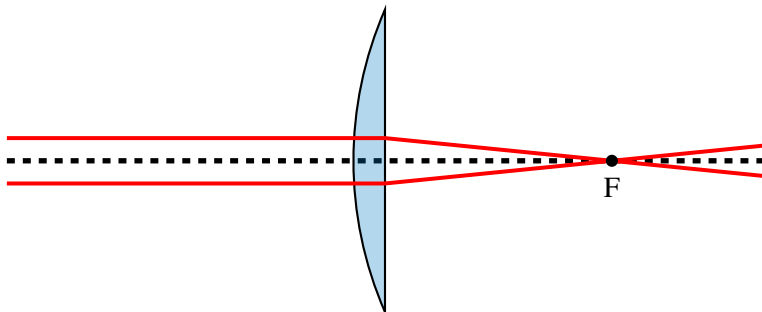# Spherical lens

Spherical lens

F
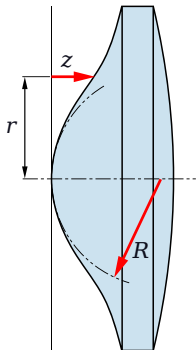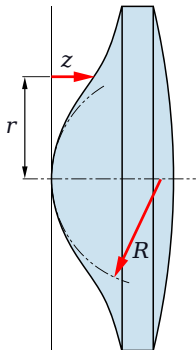
Spherical lens

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Aspherical lens

Aspherical lens

Use cases

- Collimation
- Fiber coupling

Other lens types

Reflective

- No chromatic shift
- Can be aspherical
- More difficult beam path layout

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Reflective

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- More difficult beam path layout

Lens set

- Could fix chromatic shift
- Could fix monochromatic aberration
- Better surface quality
- May not be UV compatible