

## Aulas 33 e 34 - Lentes esféricas: estudo gráfico

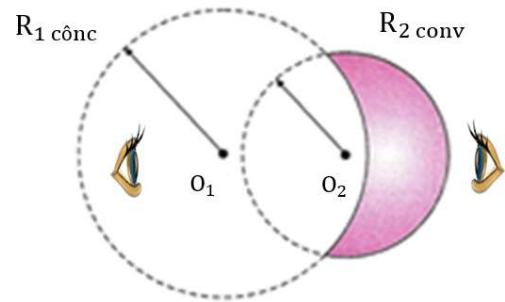
### 1. Lentes de bordas finas



Biconvexa



Plano-convexa



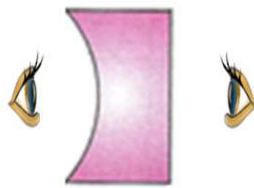
Côncavo-convexa ( $R_1 > R_2$ )

Se lente de vidro imersa no ar: convergente

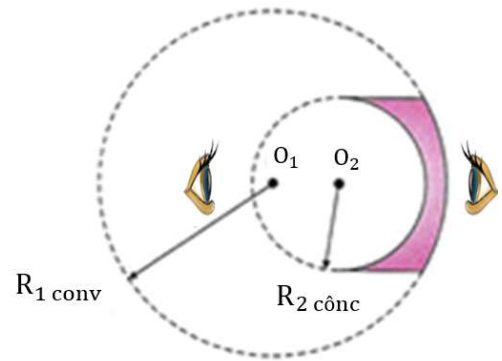
### 2. Lentes de bordas grossas



Bicôncava



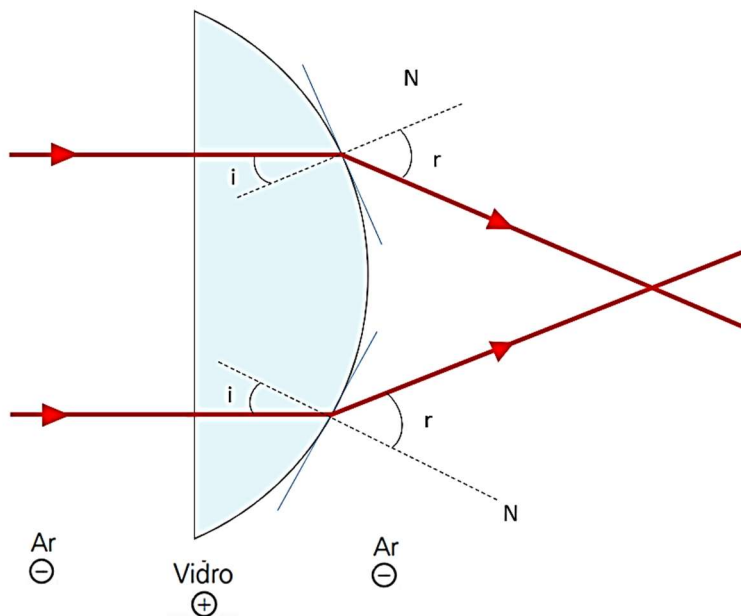
Plano-côncava



Convexo-côncava ( $R_1 > R_2$ )

Se lente de vidro imersa no ar: divergente

### 3. Comportamento óptico

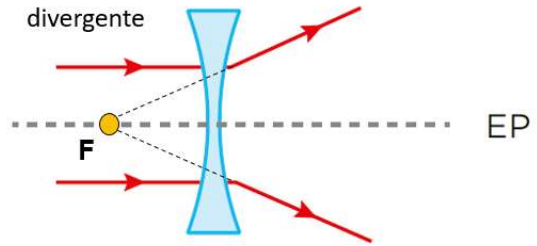
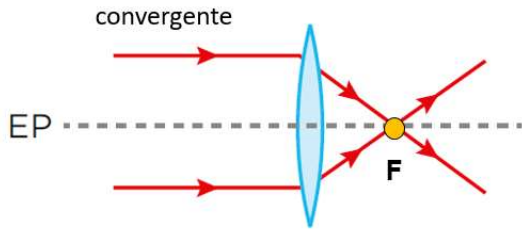


$$n_{\text{lente}} > n_{\text{meio}}$$

Comportamento convergente

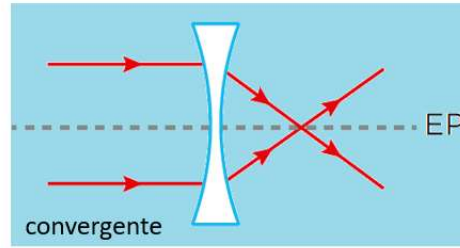
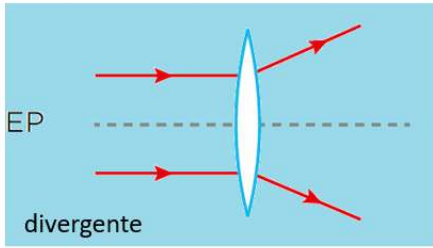
$$n_{lente} > n_{meio}$$

Caso mais importante. Exemplo: lente de vidro imersa no ar. Se o enunciado não fornecer informações, trataremos dessa maneira.



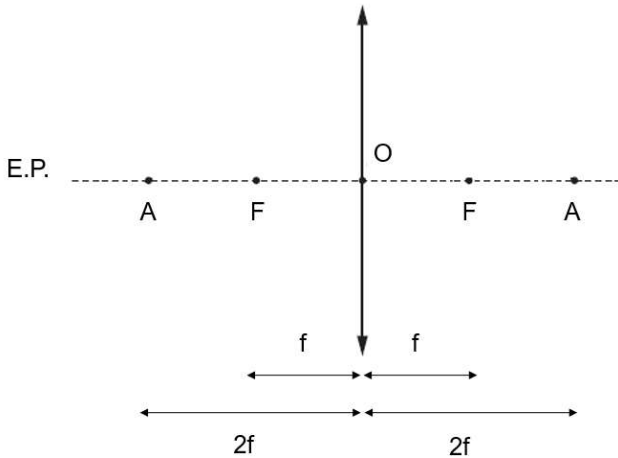
$$n_{lente} < n_{meio}$$

Exemplo: lente de ar escavada em um bloco de vidro e bolha de ar imersa na água.

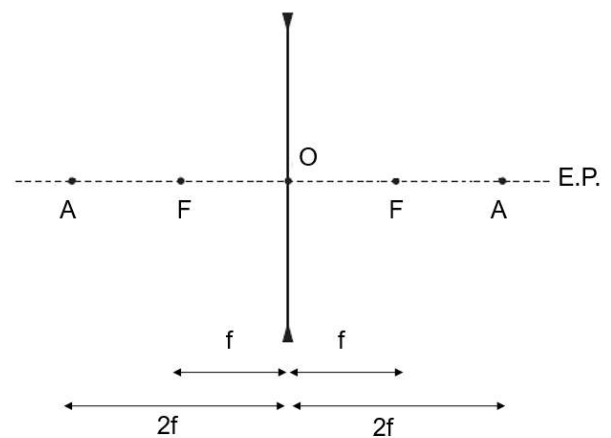


#### 4. Representação

Lente convergente



Lente divergente

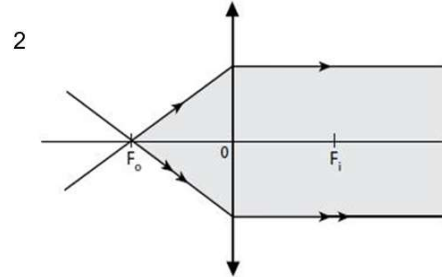
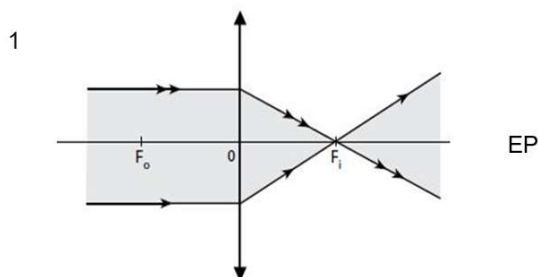


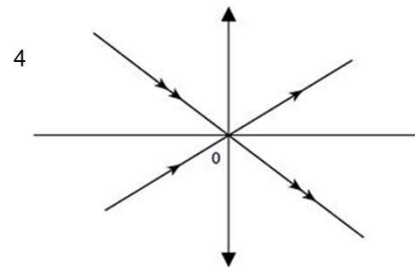
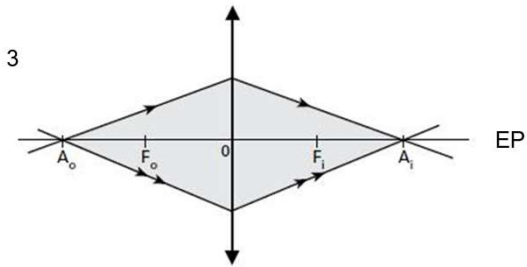
- A: pontos antiprincipais
- F: pontos focais principais
- O ou C: centro óptico
- E.P.: eixo principal

- f: distância focal

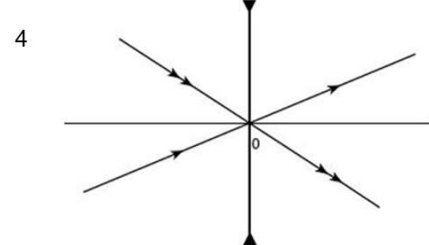
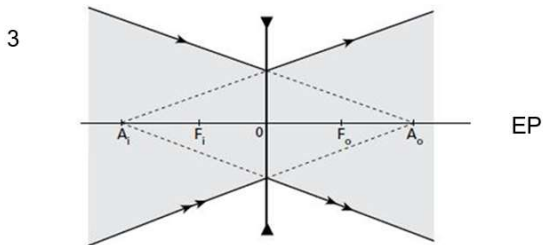
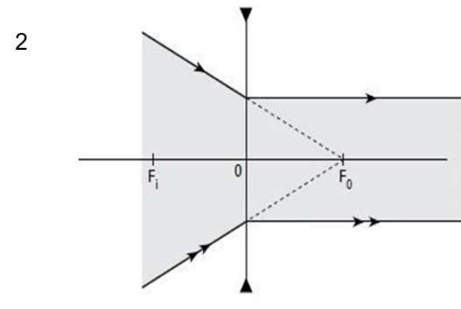
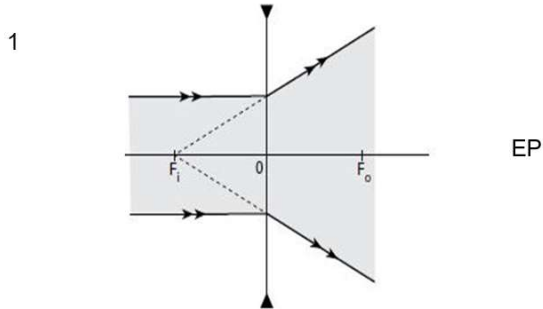
#### 5. Raios notáveis

Lente convergente





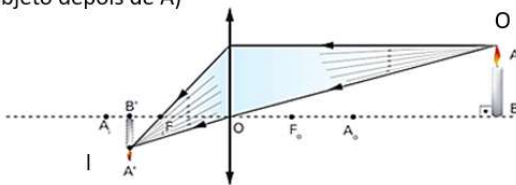
### Lente divergente



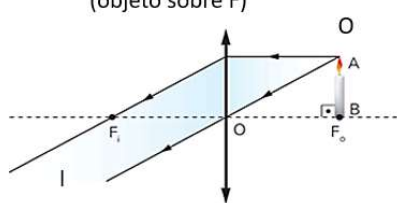
## 6. Conjugação de imagens

### Lente convergente

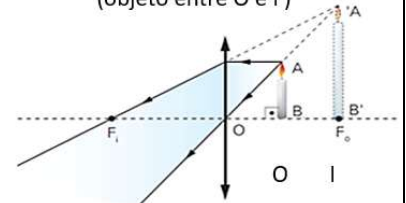
Caso 1  
(objeto depois de A)



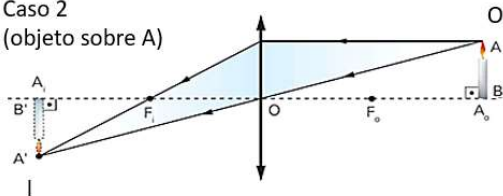
Caso 4  
(objeto sobre F)



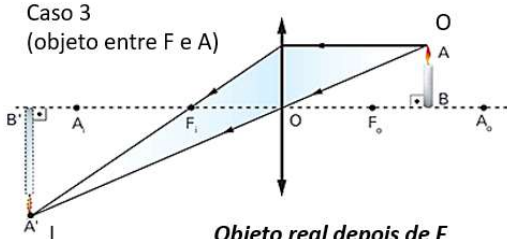
Caso 5  
(objeto entre O e F)



Caso 2  
(objeto sobre A)



Caso 3  
(objeto entre F e A)



*Objeto real depois de F  
Imagem real e invertida (menor, igual ou maior)*

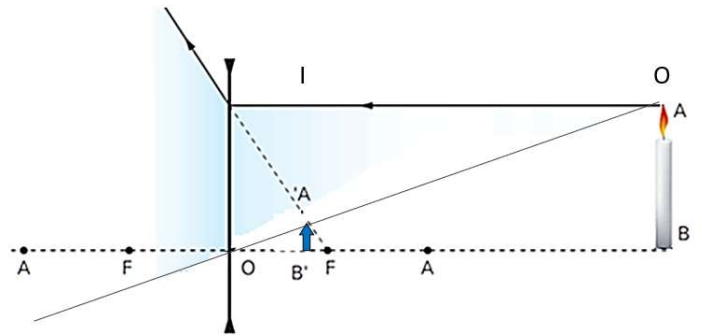
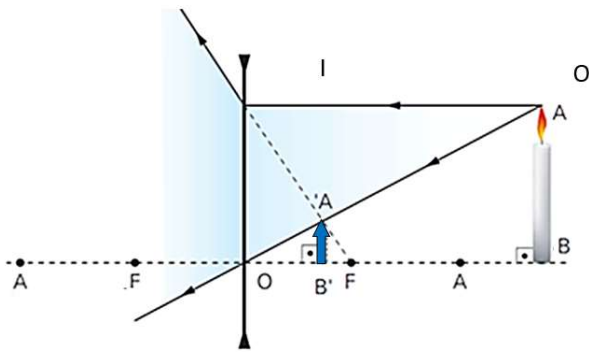
*Objeto real sobre F  
Imagem imprópria*

*Objeto real entre O e F  
Imagem virtual e direita*

## Lente divergente

Caso único

*Objeto real em qualquer posição*  
*Imagem virtual, direita, menor e entre O e F.*

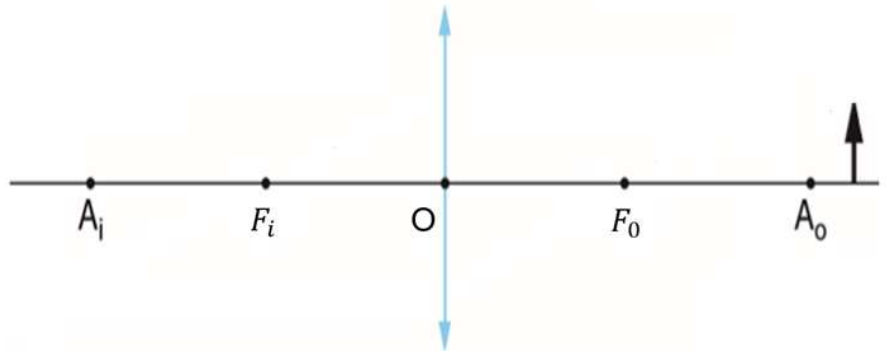


## 7. Exercícios do Caio

a) Lente convergente e objeto depois de A

**Imagem**

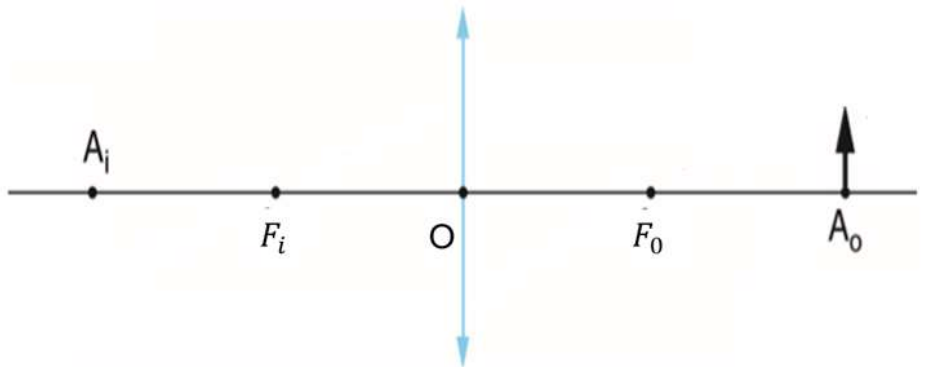
- Real
- Invertida
- Menor
- Entre A e F



b) Lente convergente com objeto real sobre A

**Imagem**

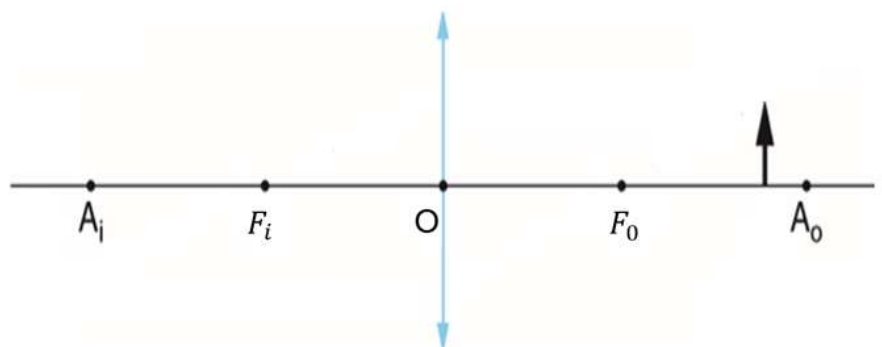
- Real
- Invertida
- Do mesmo tamanho
- Sobre A



c) Lente convergente com objeto real entre F e A

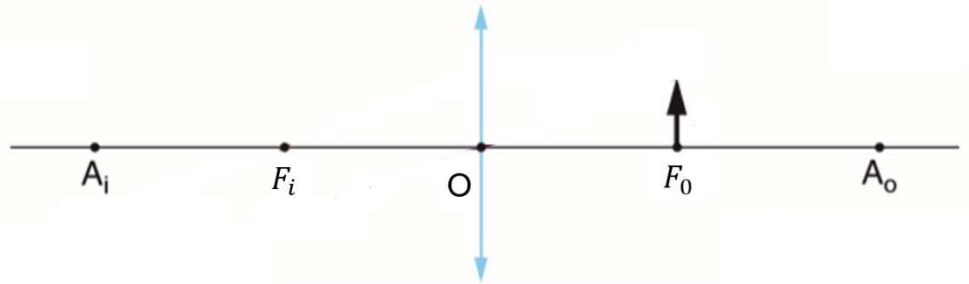
**Imagem**

- Real
- Invertida
- Maior
- Depois A

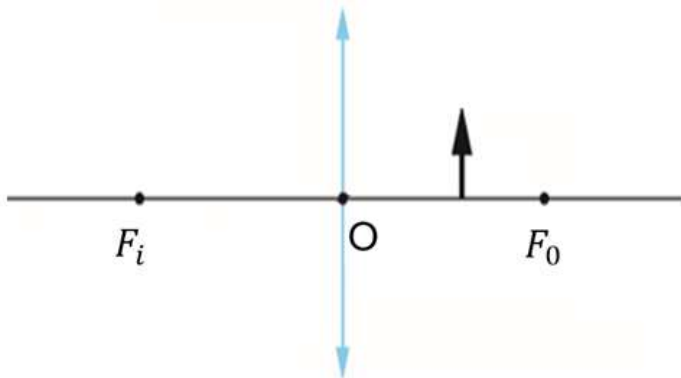


d) Lente convergente com objeto real sobre F

imagem imprópria



e) Lente convergente com objeto entre O e F

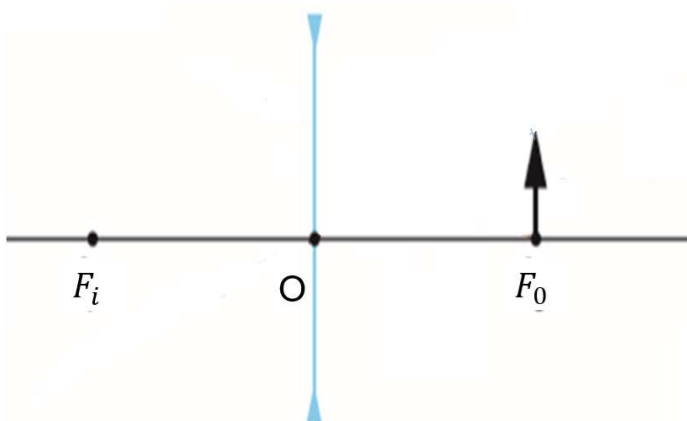


**Imagem**

- Virtual
- Direita
- Maior
- Do mesmo lado o objeto



f) Lente divergente e objeto real em qualquer posição



**Imagem**

- Virtual
- Direita
- Menor
- Mesmo lado do objeto  
(entre O e F)

