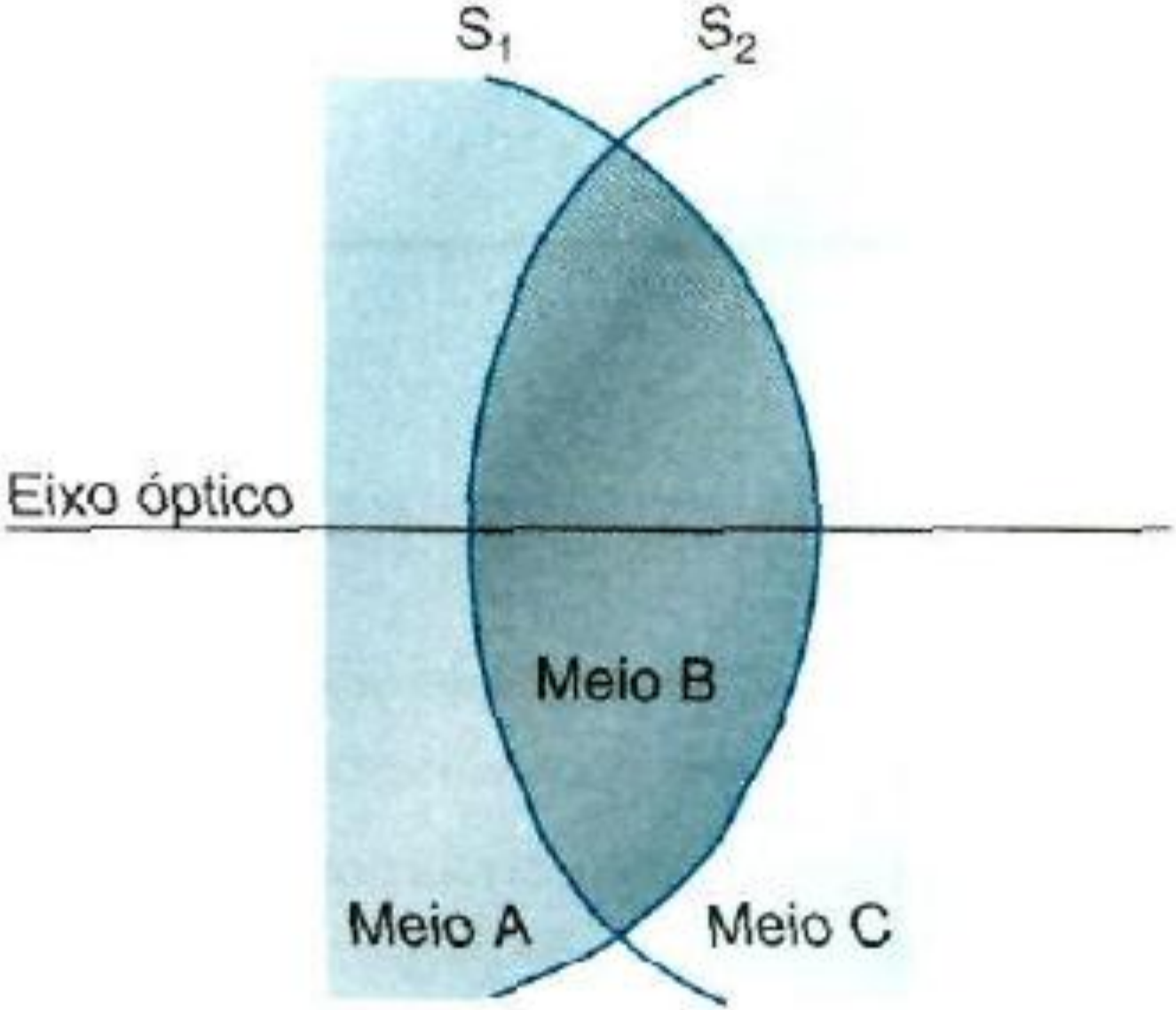
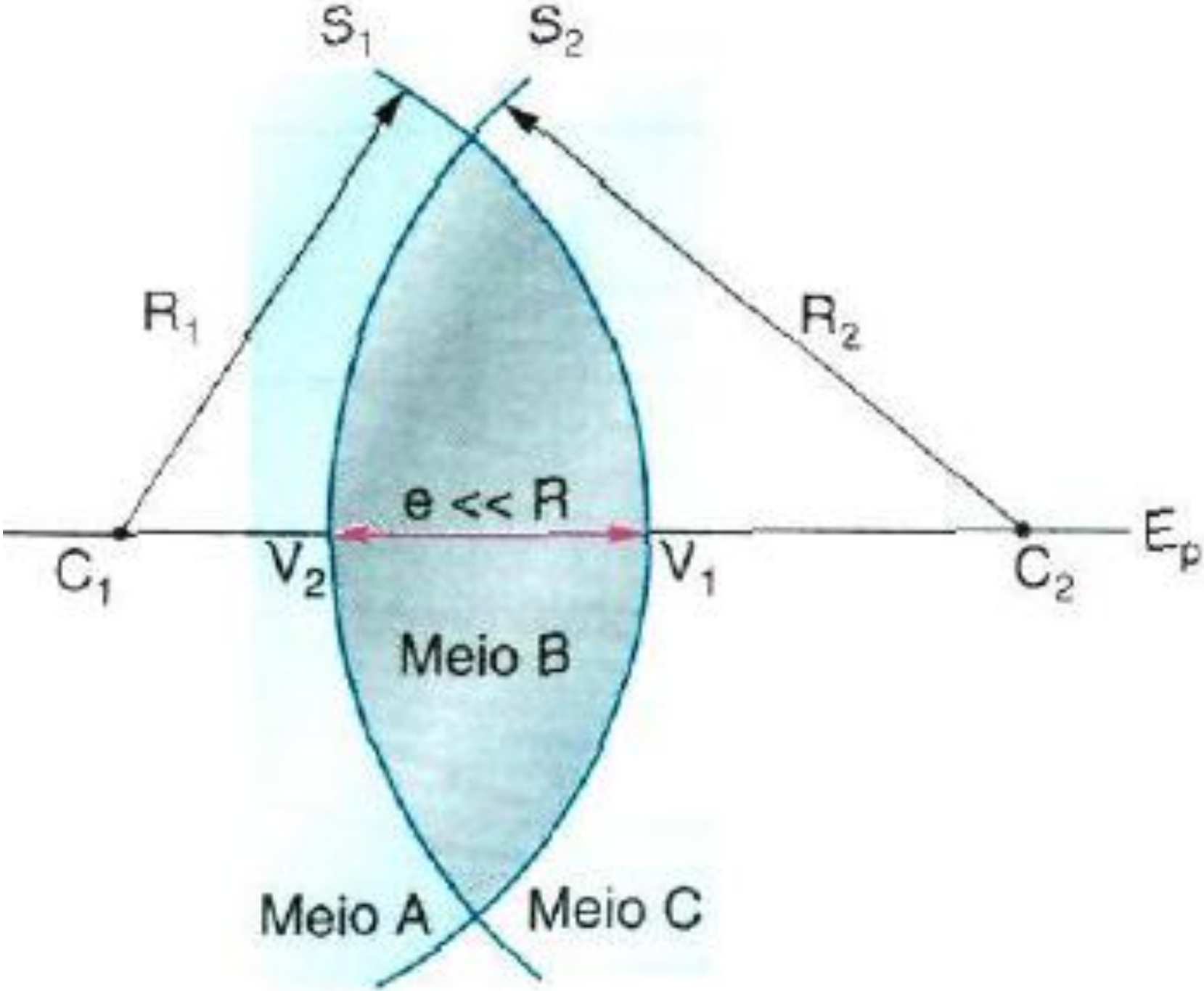
ÓPTICA

LENTES ESFÉRICAS

LENTES ESFÉRICAS


S_1
S_2
Eixo óptico
Meio B
Meio A
Meio C


S_1
S_2
R_1
R_2
e << R
C_1
V_2
V_1
C_2
E_p
Meio B
Meio A
Meio C

Biconvexa

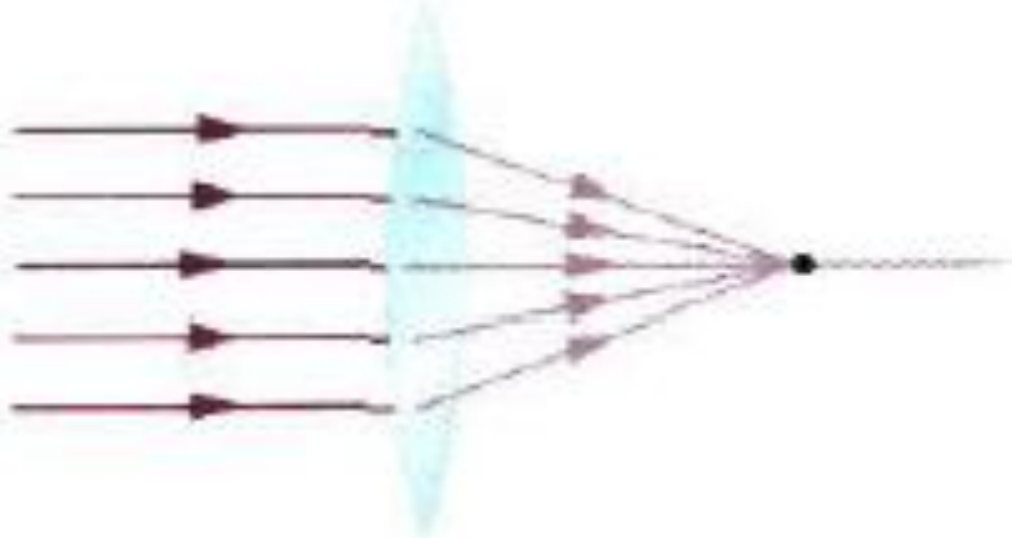
Plano-convexa

Côncavo-convexa

Bicôncava

Plano-côncava

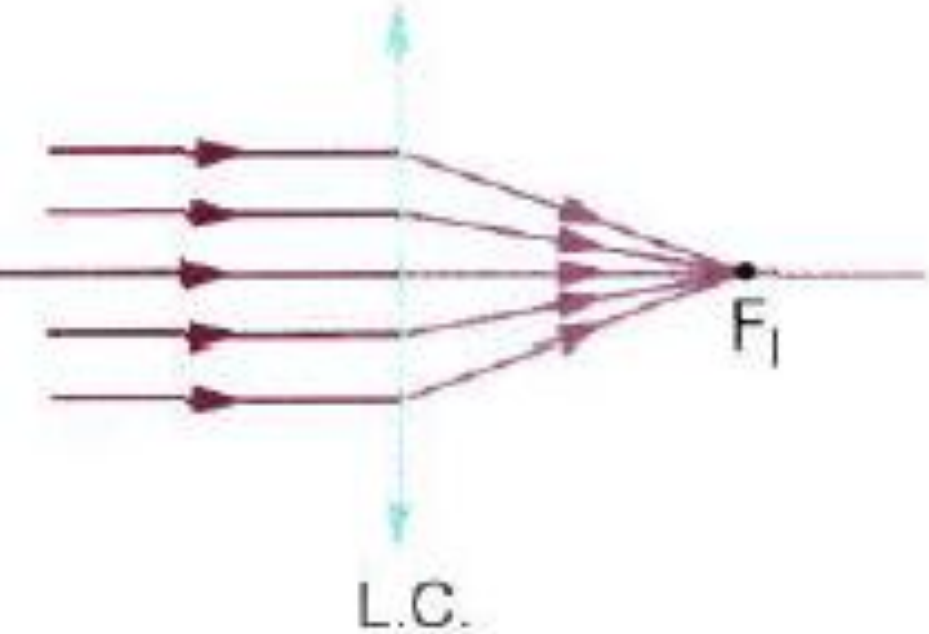
Convexo-côncava



Lente convergente

Lente divergente

lente convergente lente divergente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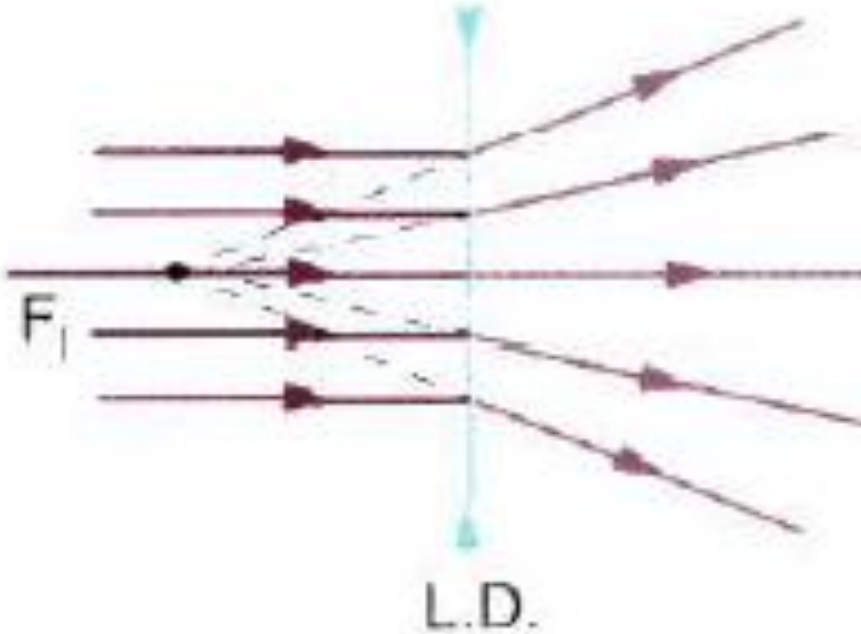
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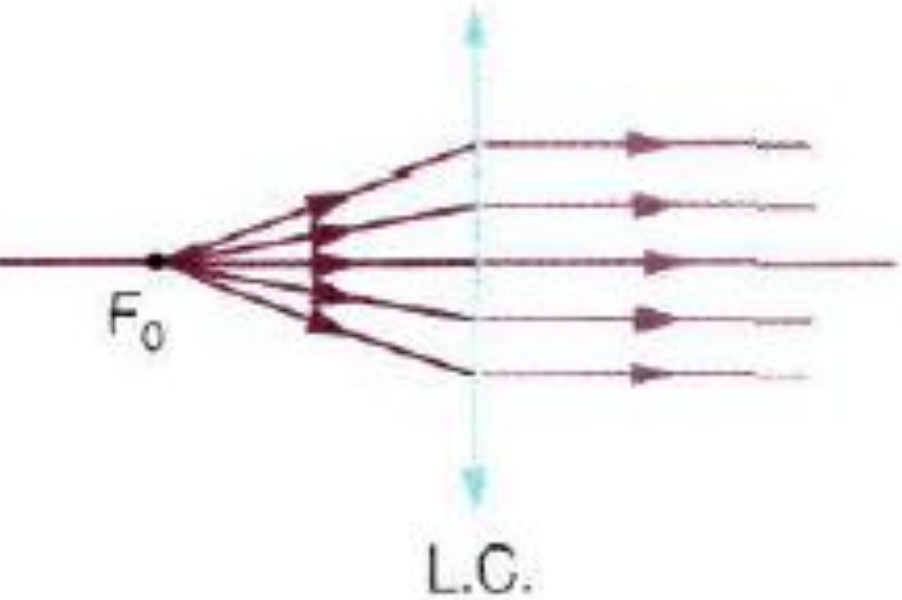
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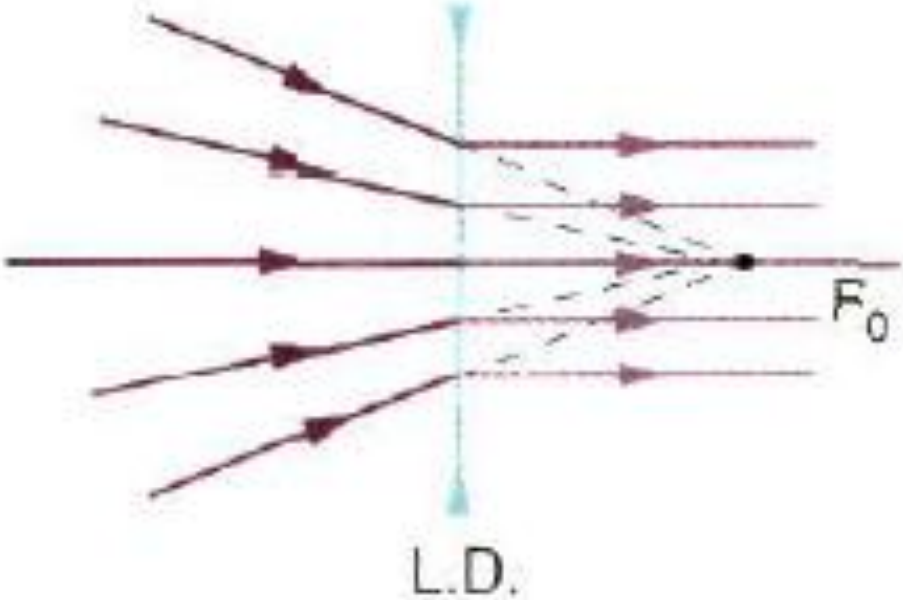
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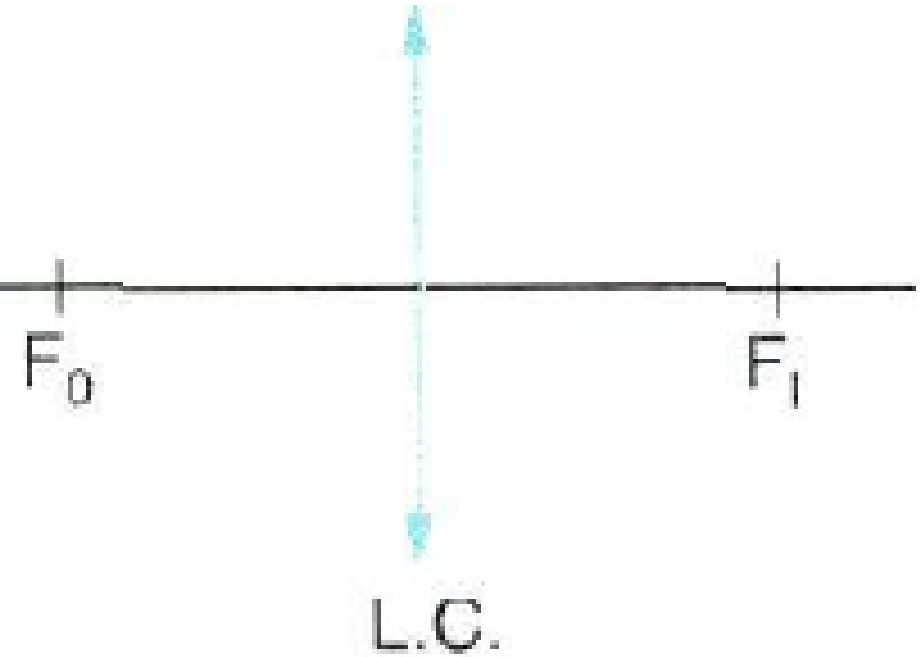
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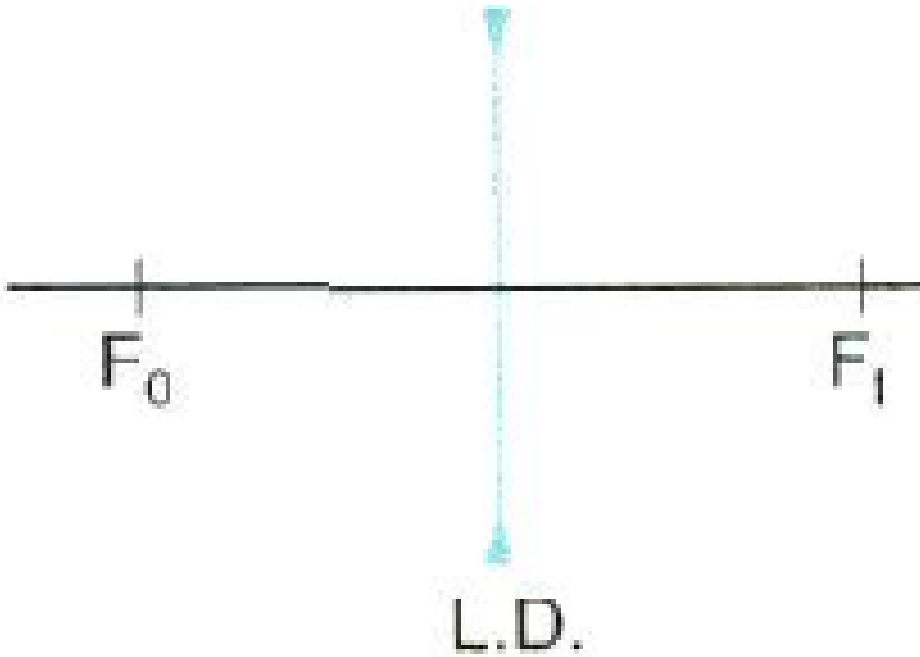
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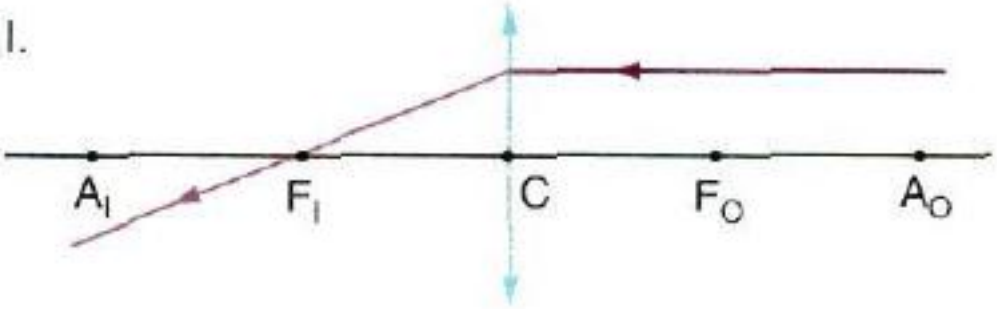

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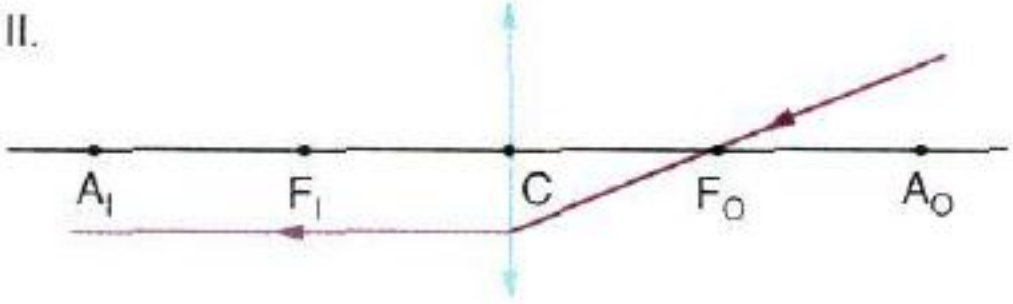

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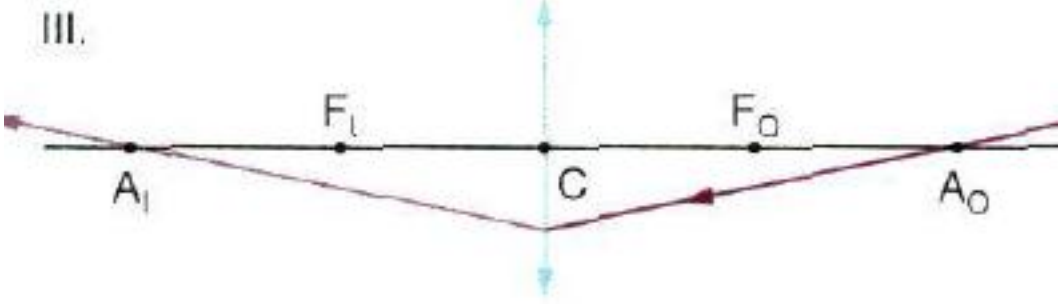

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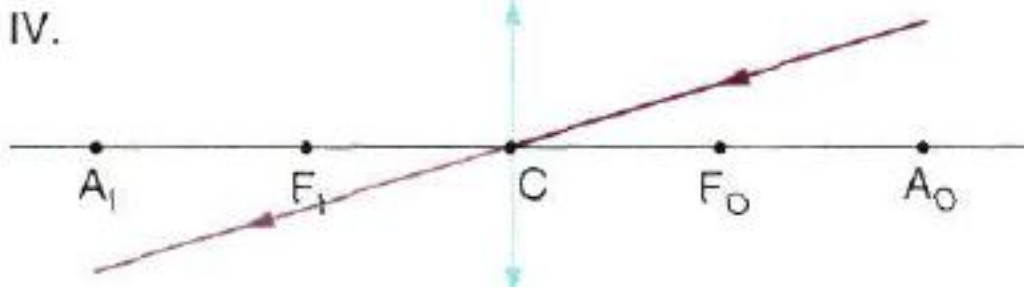
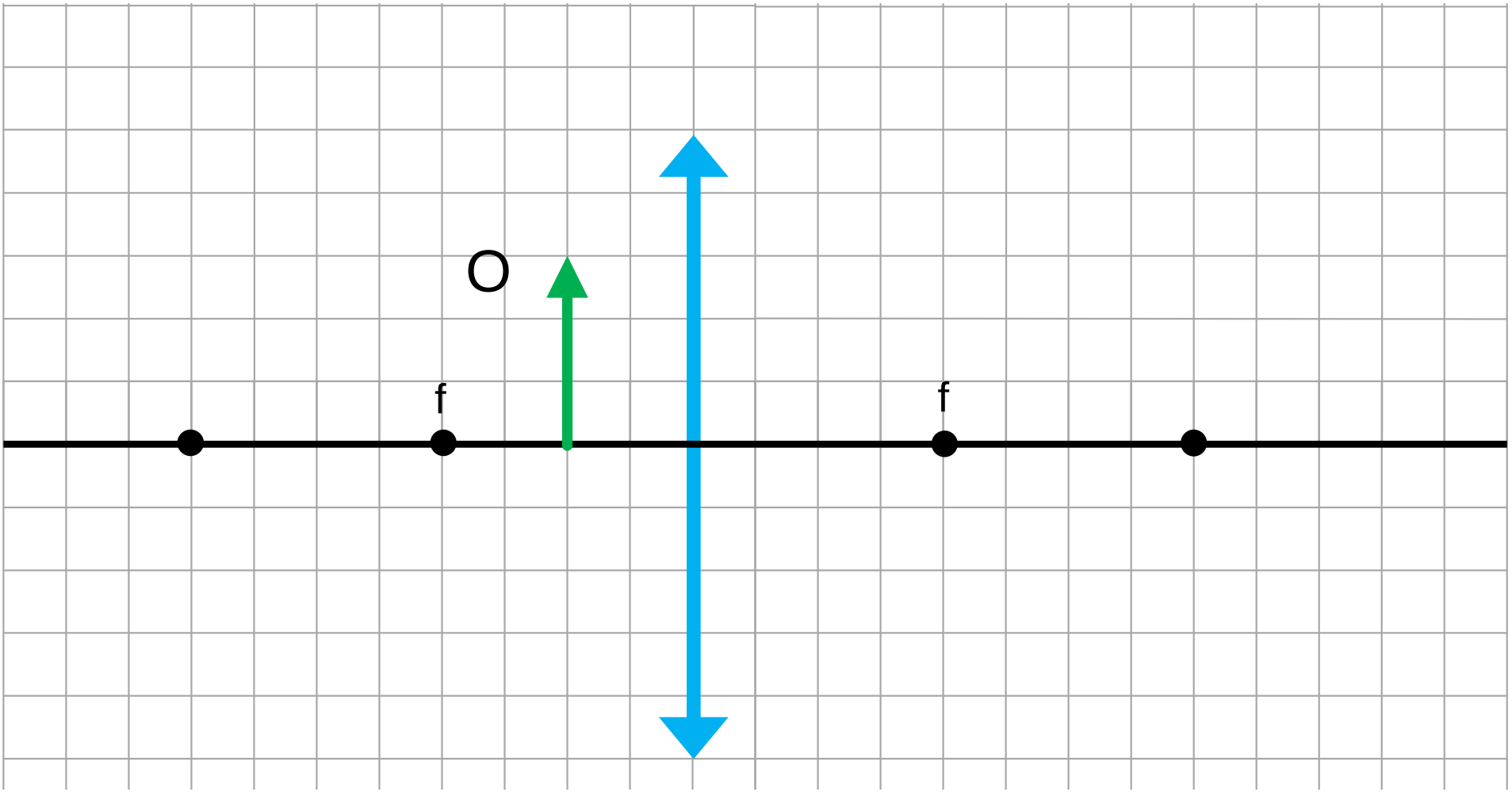


LENTES CONVERGENTES

Primeiro caso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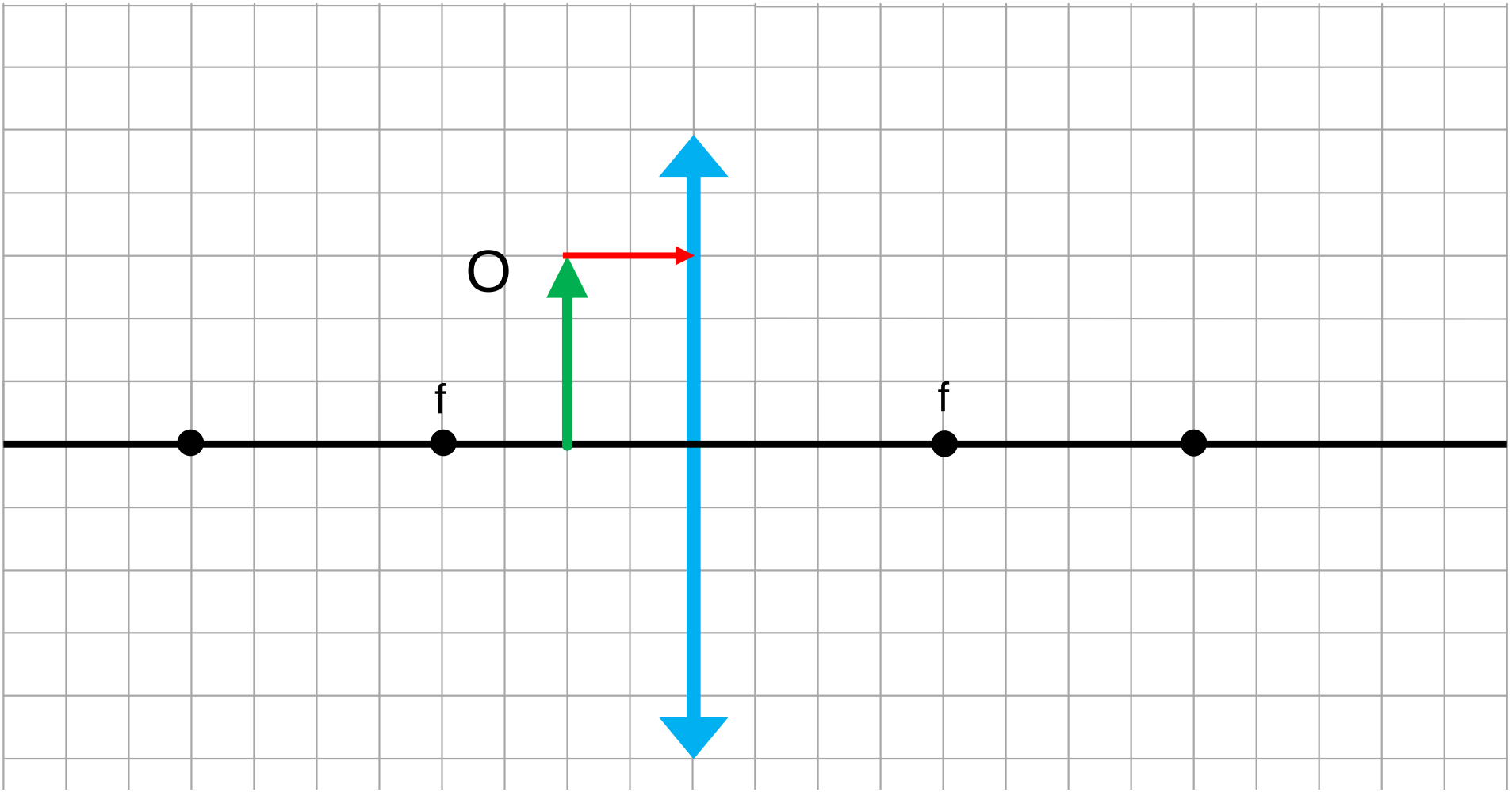
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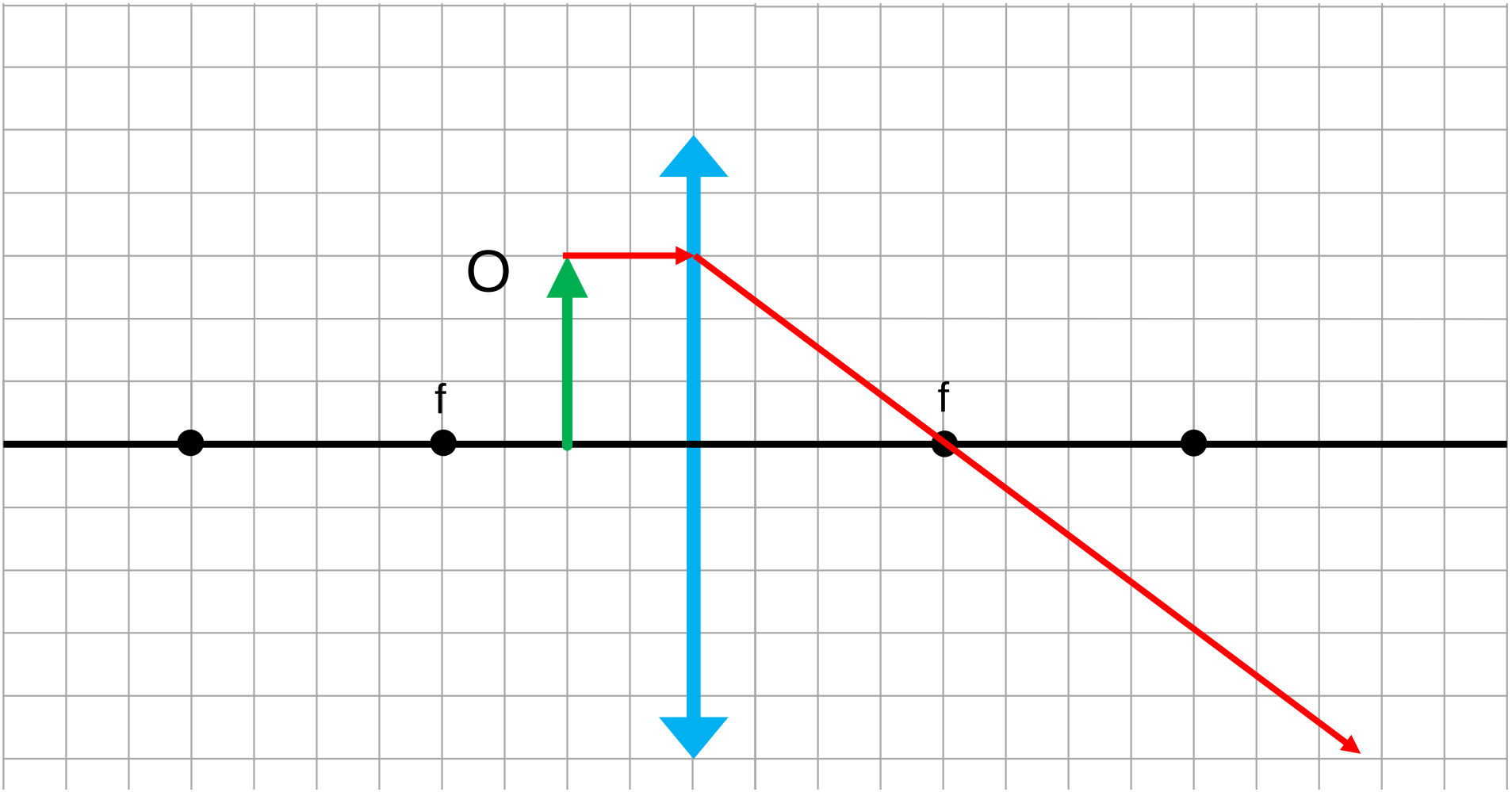
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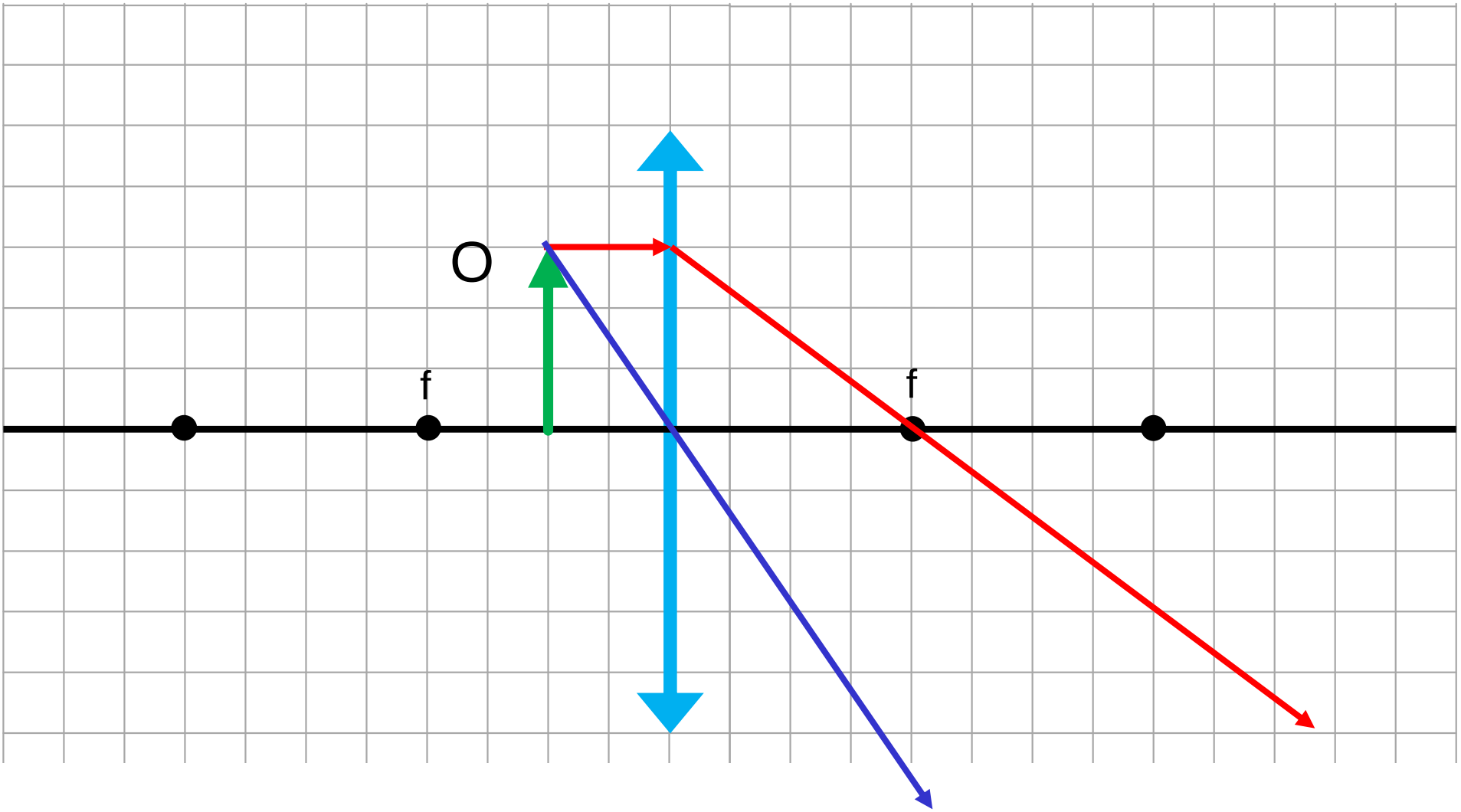
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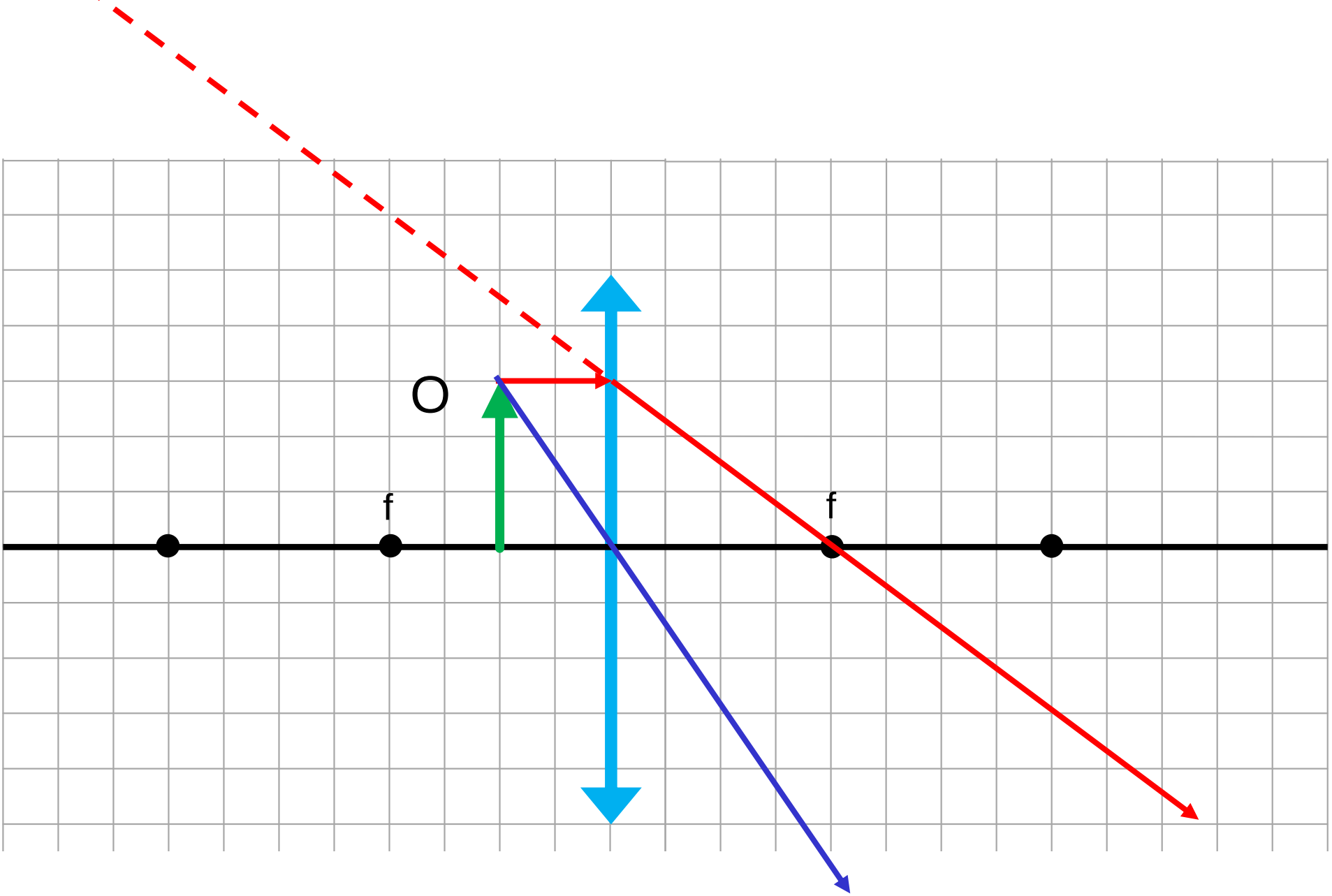
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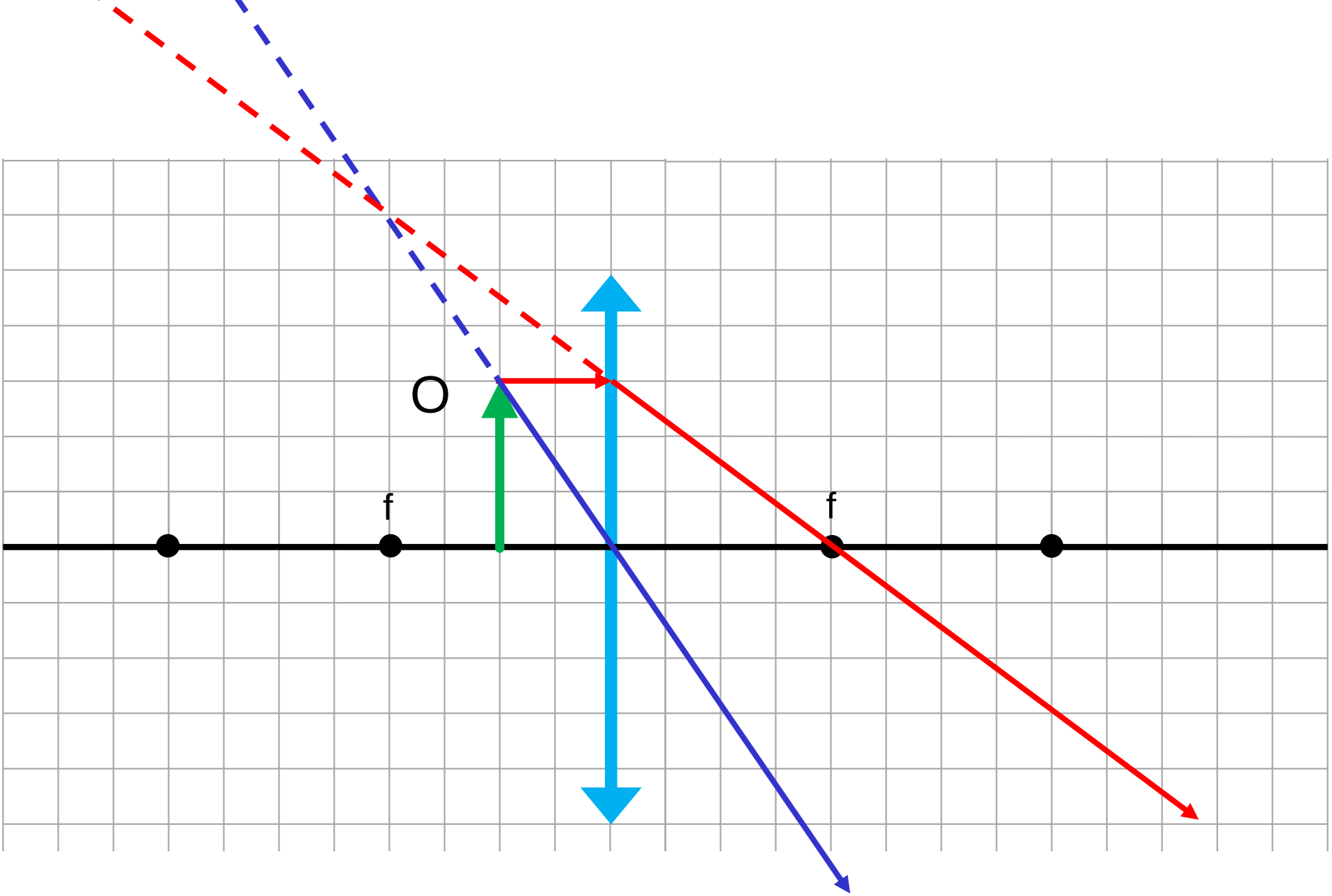
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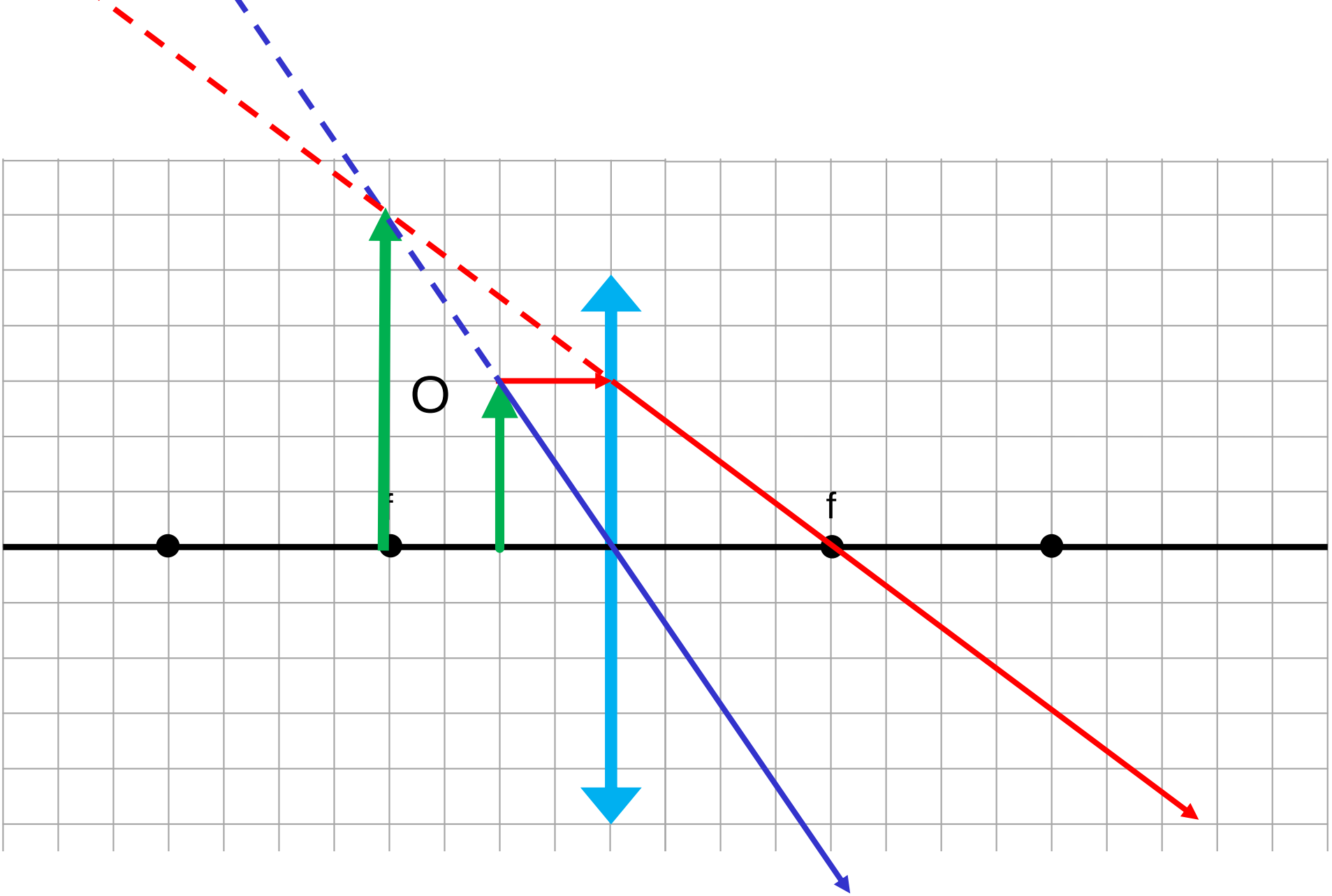
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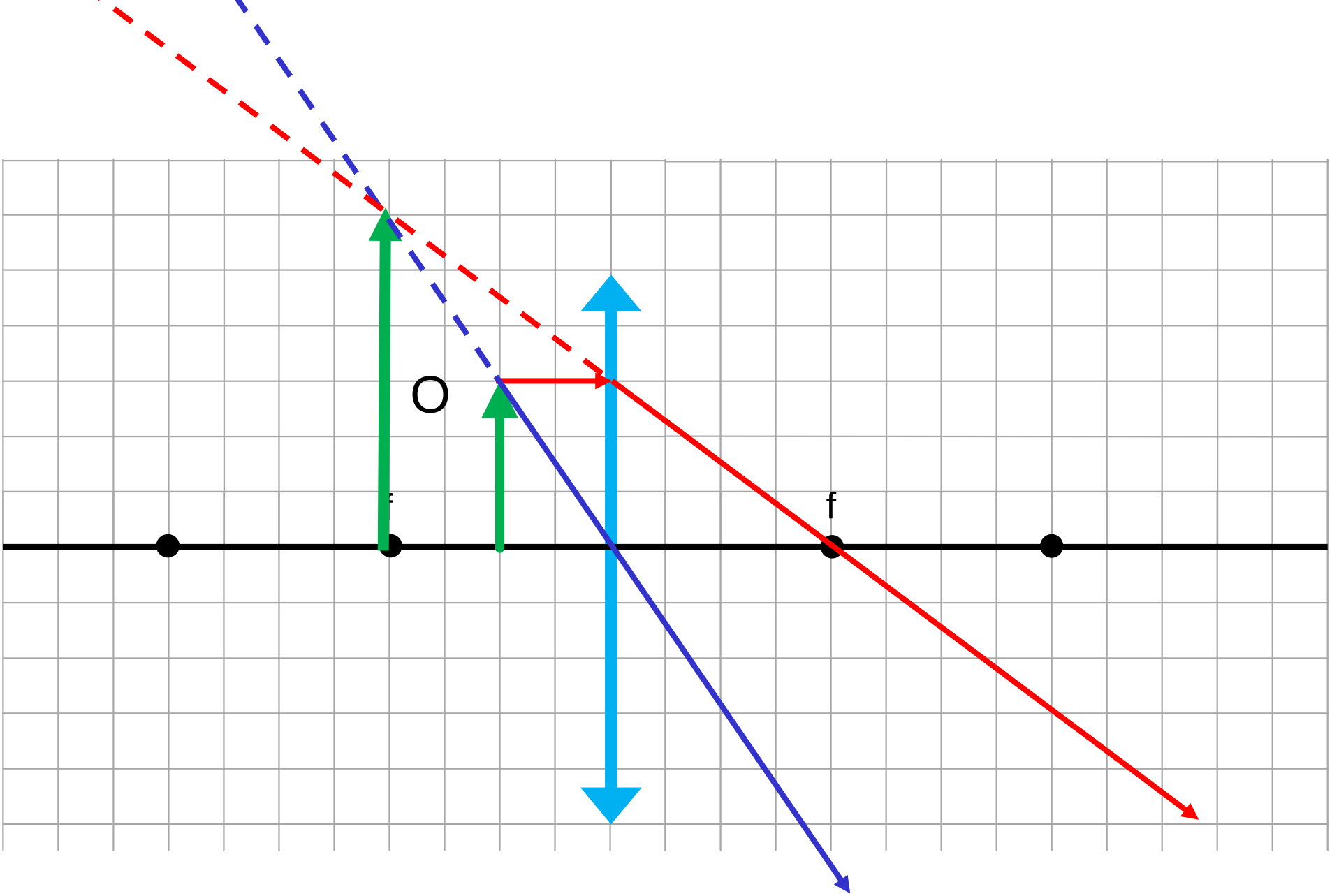
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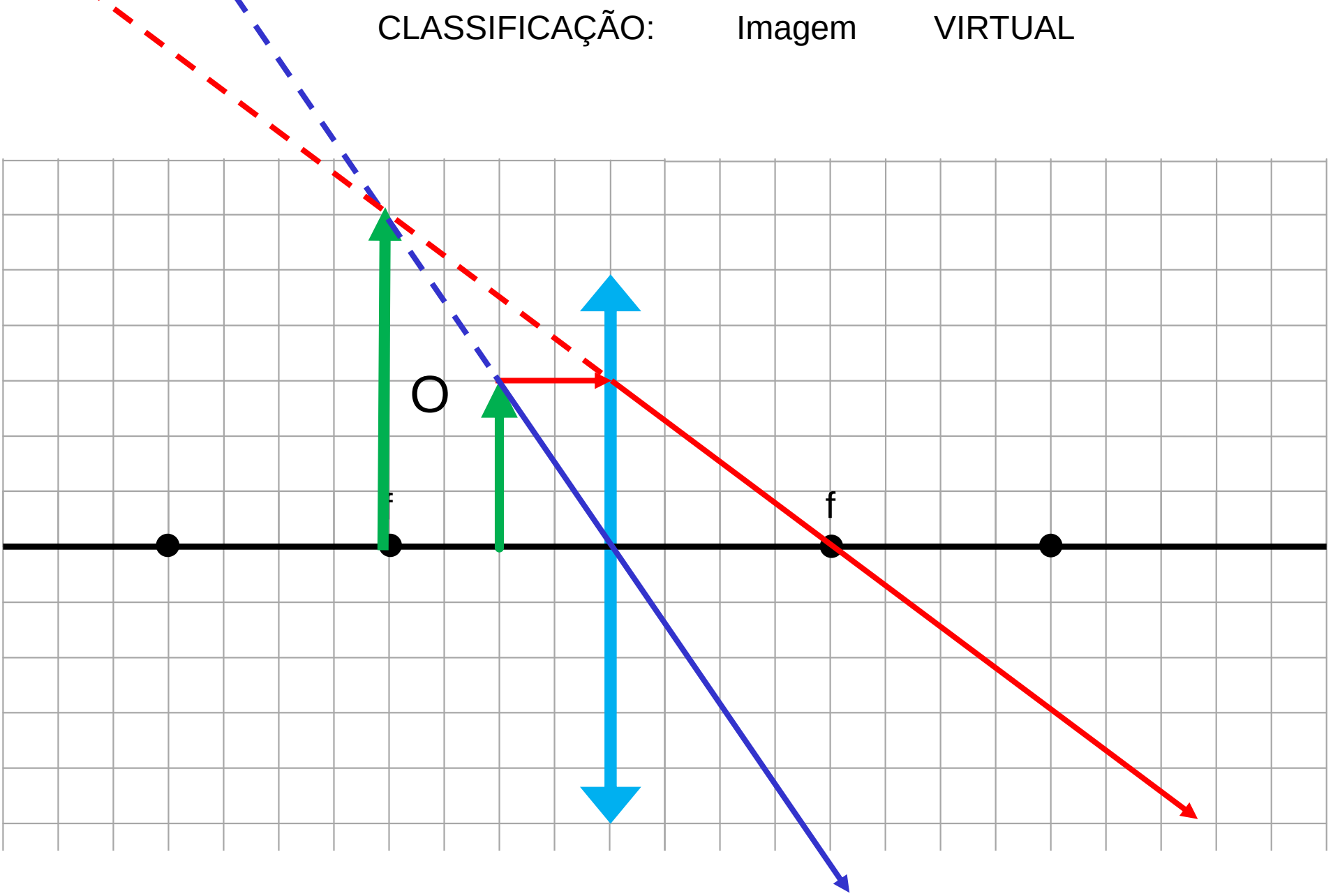
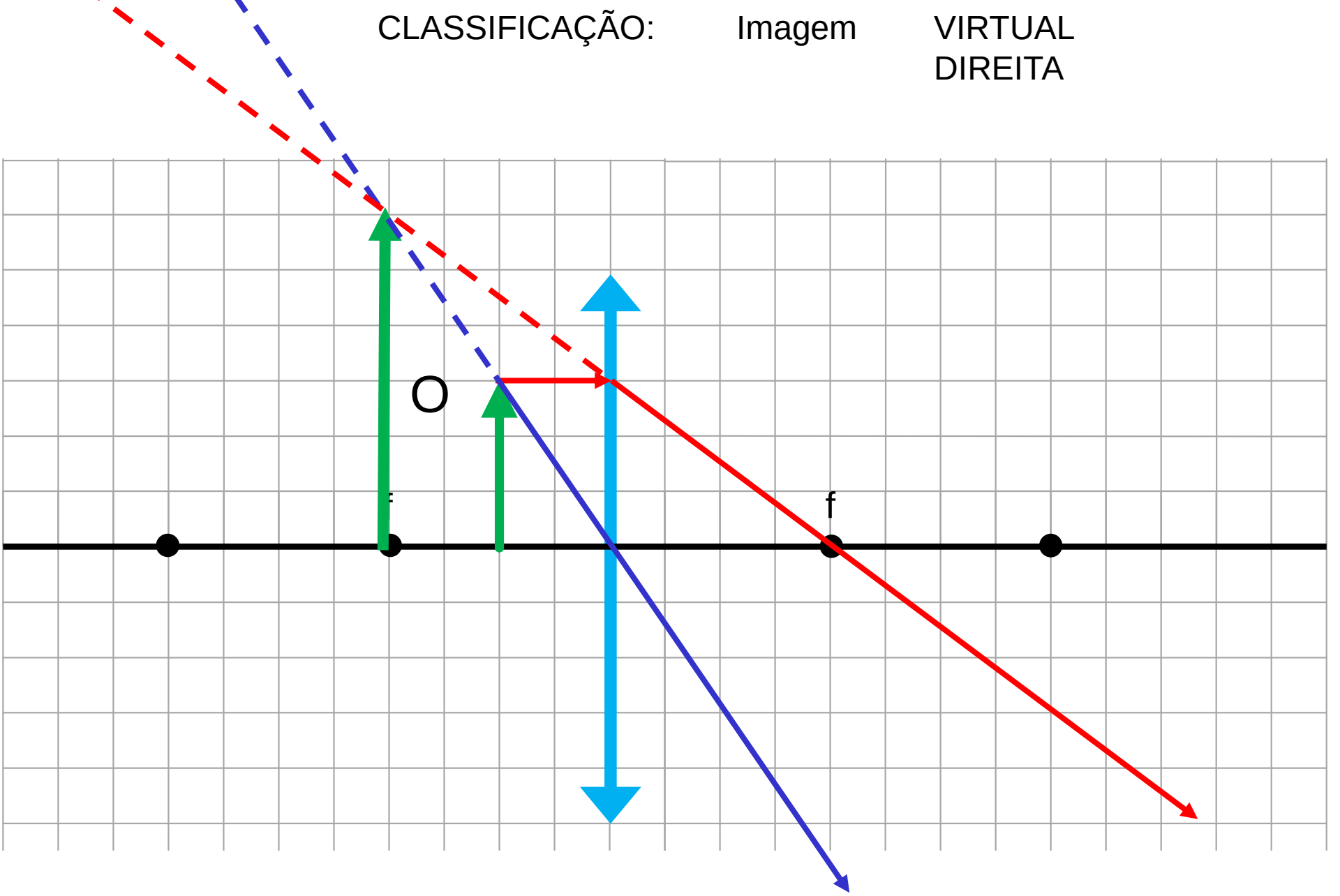
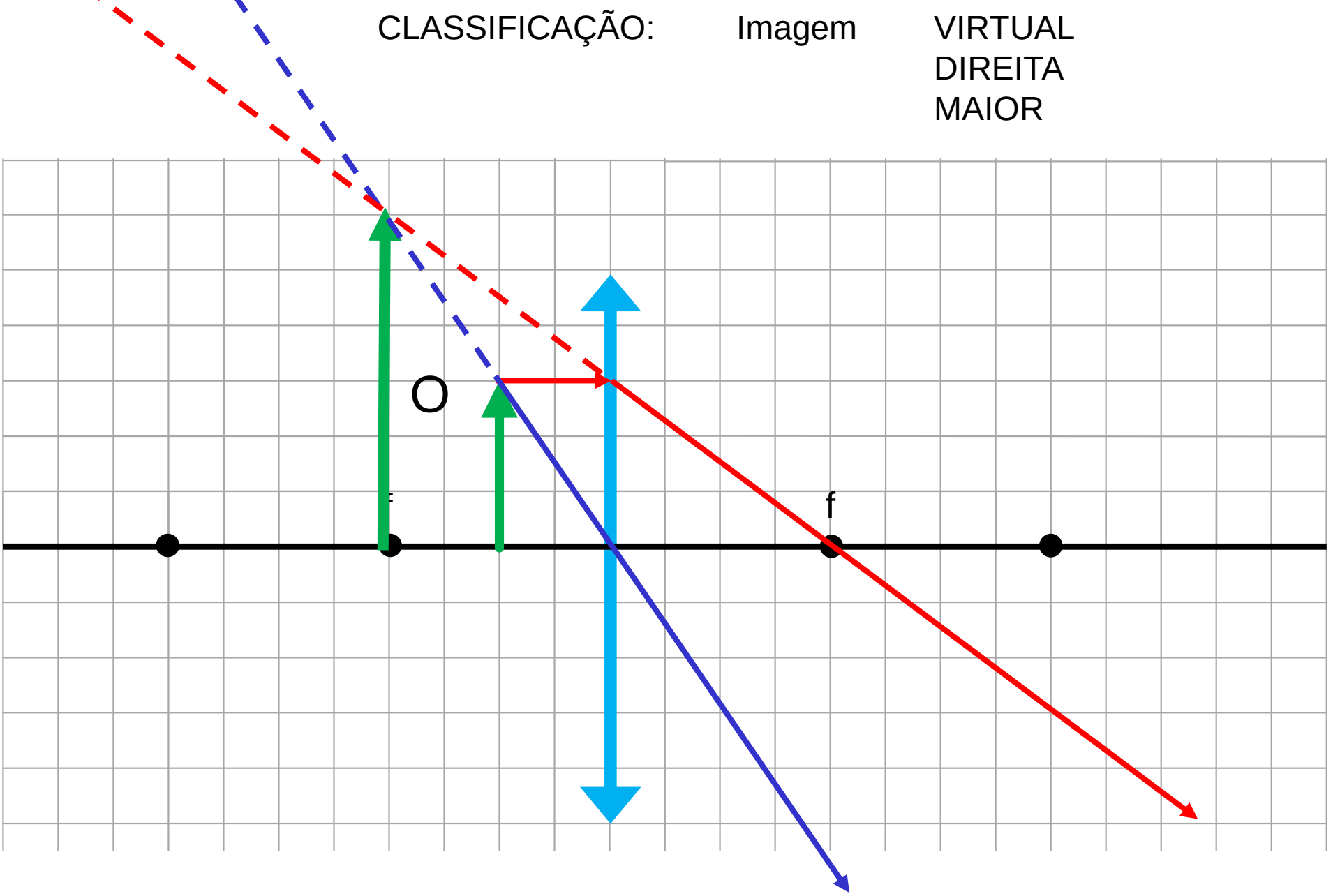
CLASSIFICAÇÃO: Imagem VIRTUAL

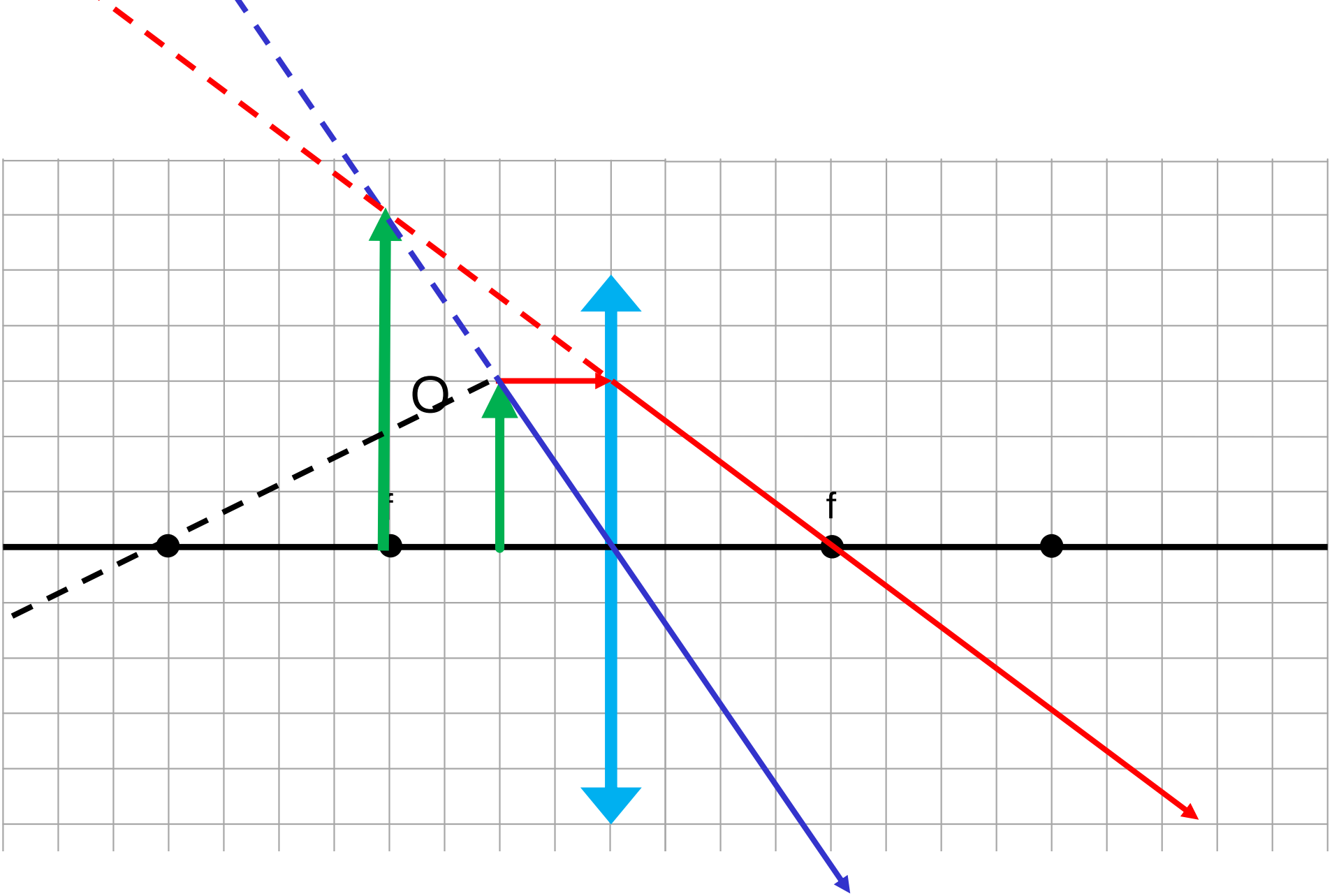


CLASSIFICAÇÃO: Imagem VIRTUAL DIREITA



CLASSIFICAÇÃO: Imagem VIRTUAL
DIREITA
MAIOR

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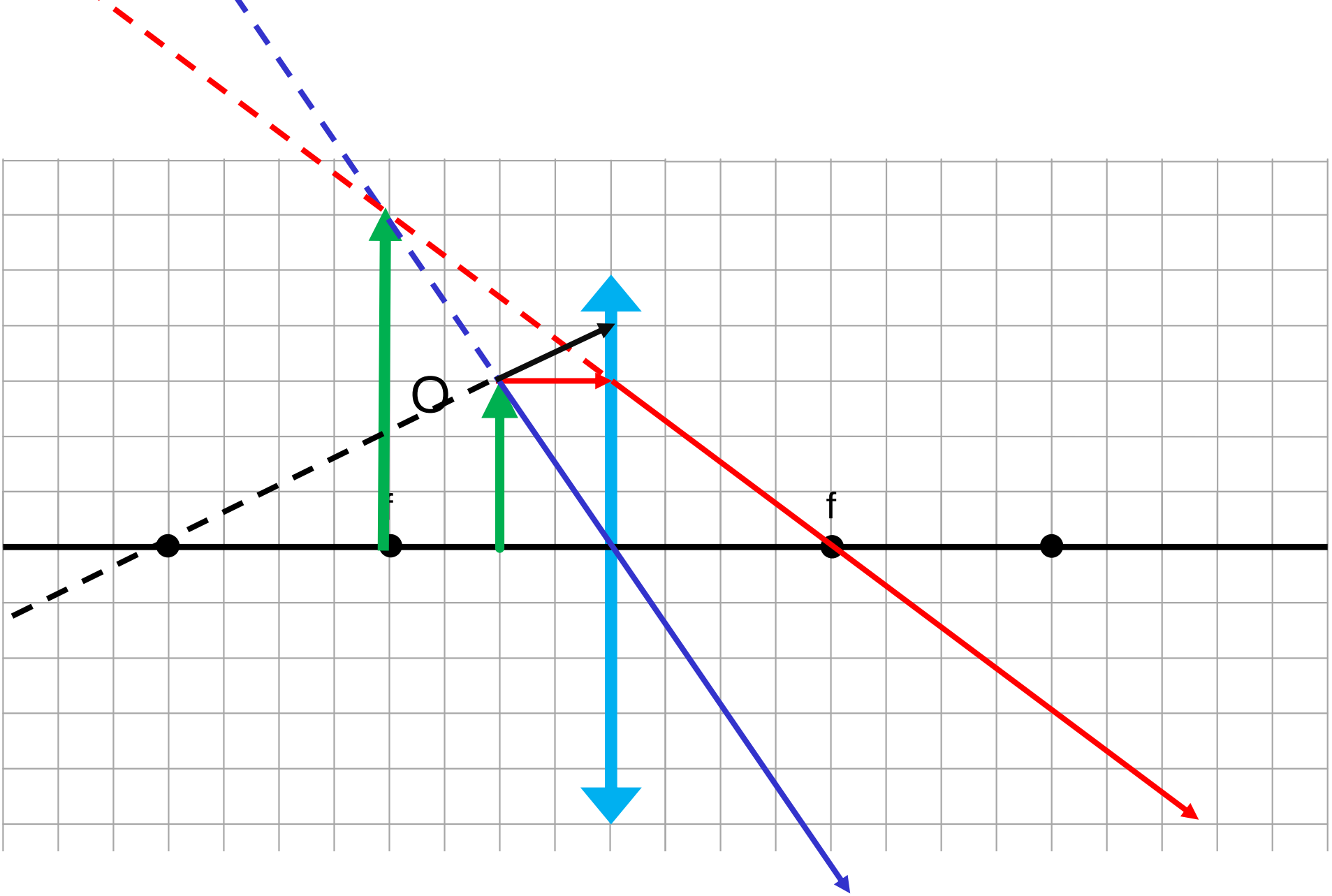
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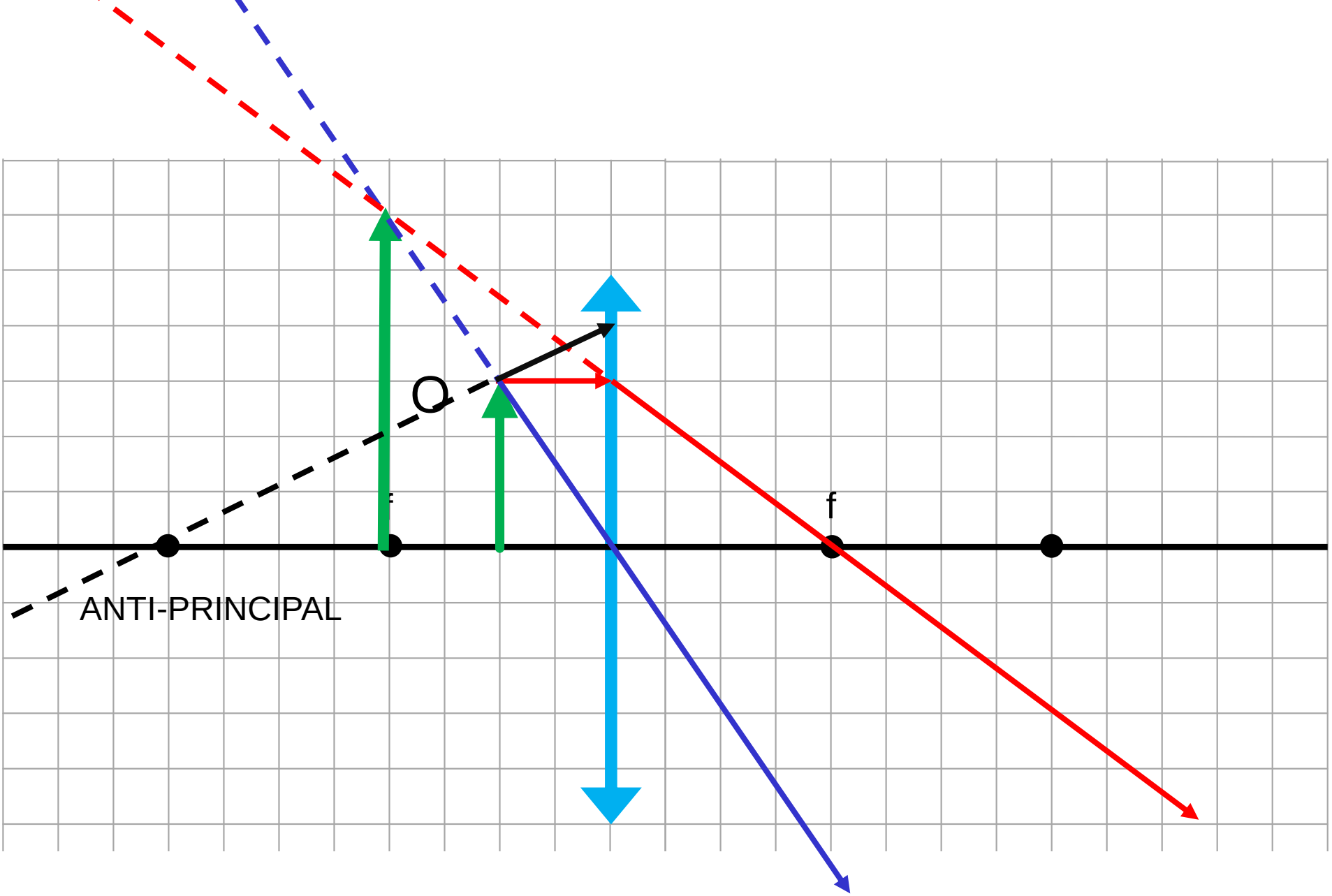
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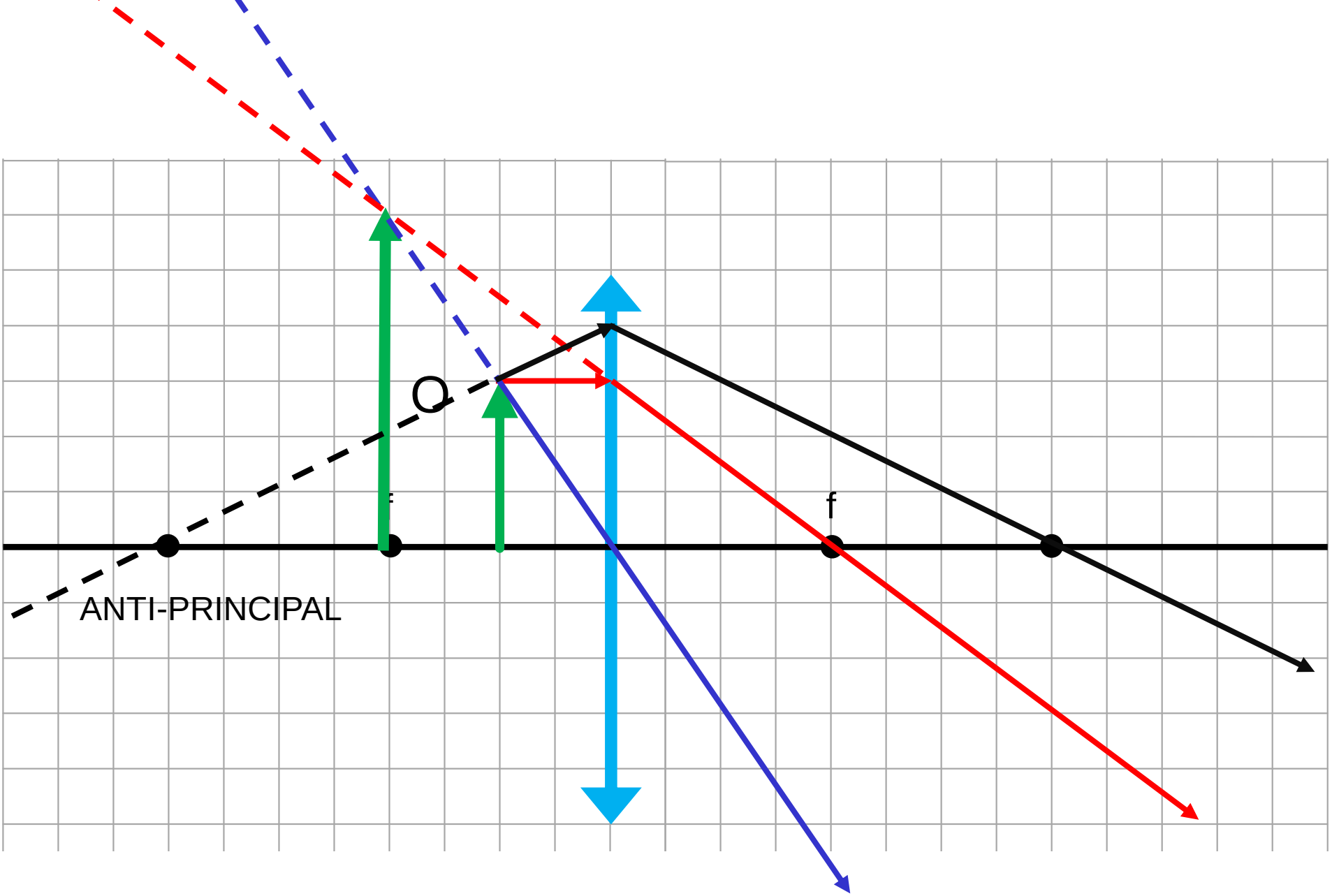
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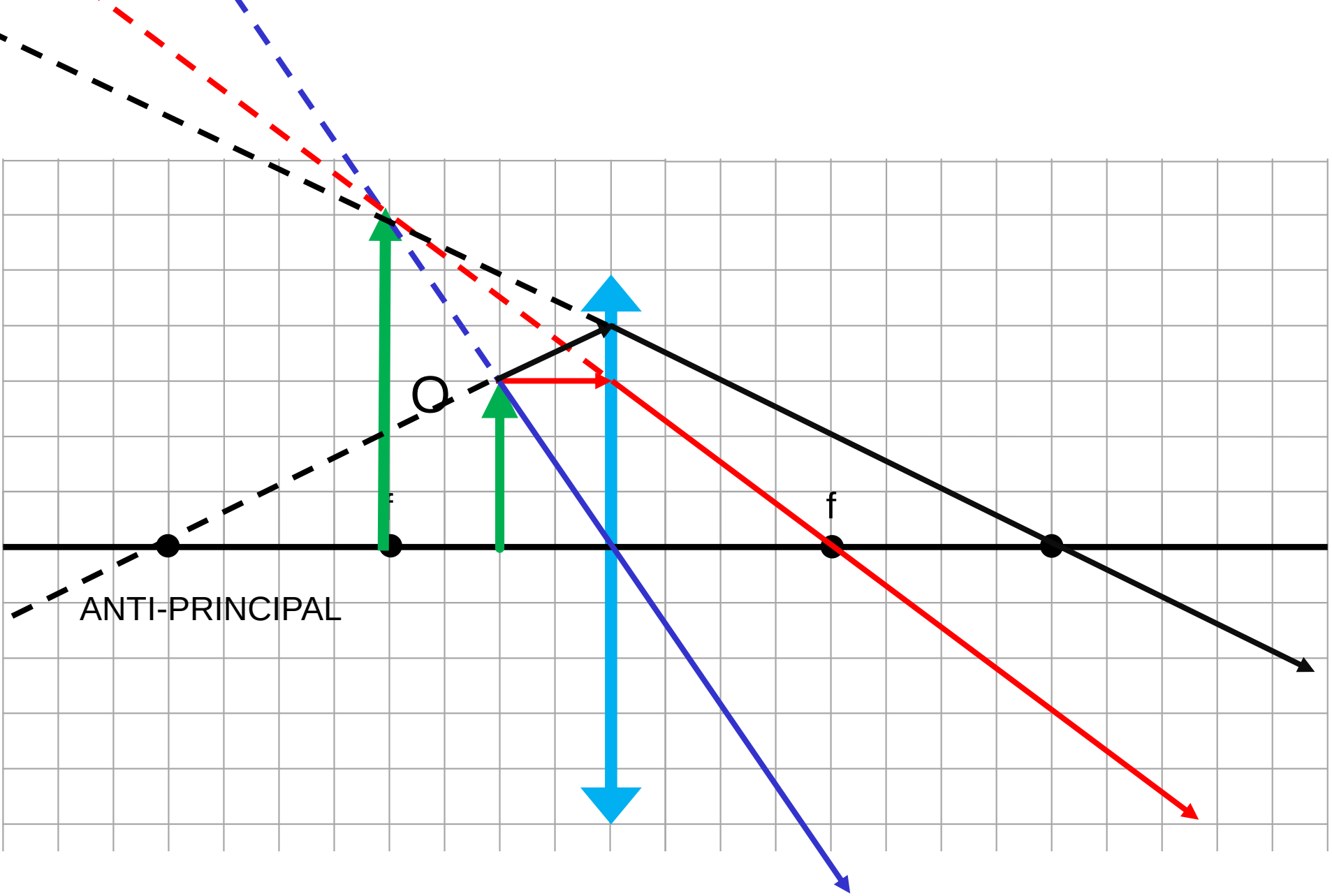
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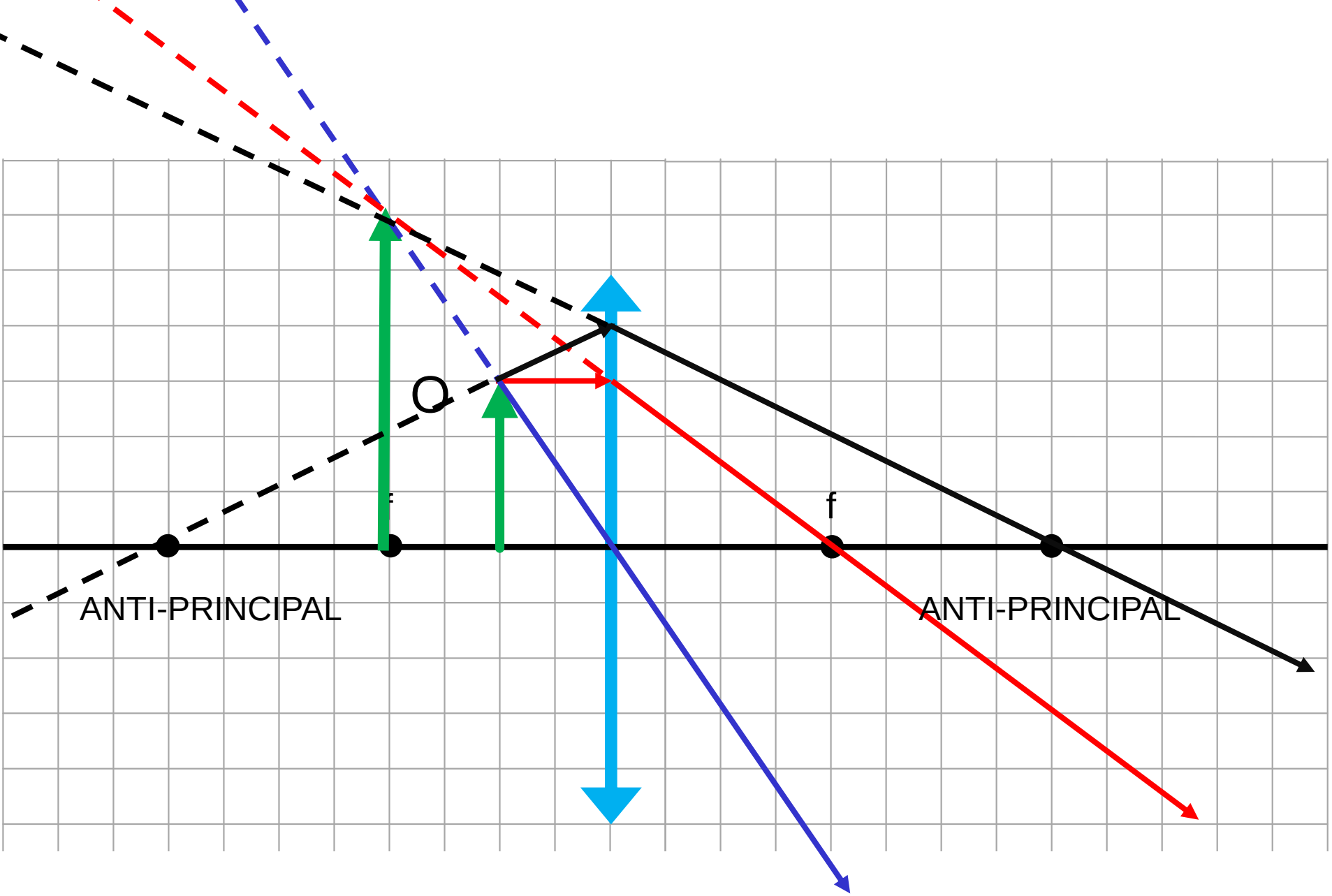
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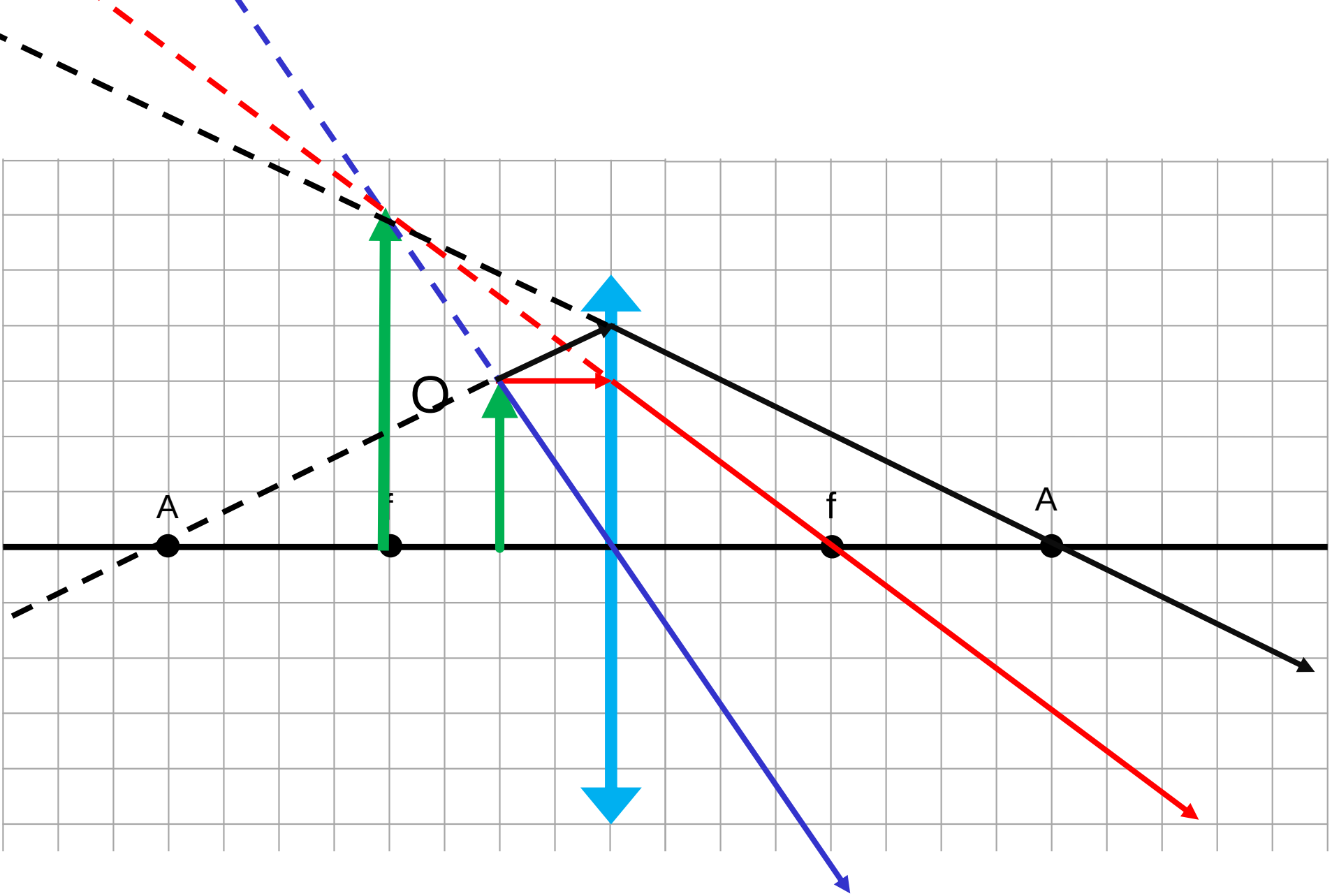
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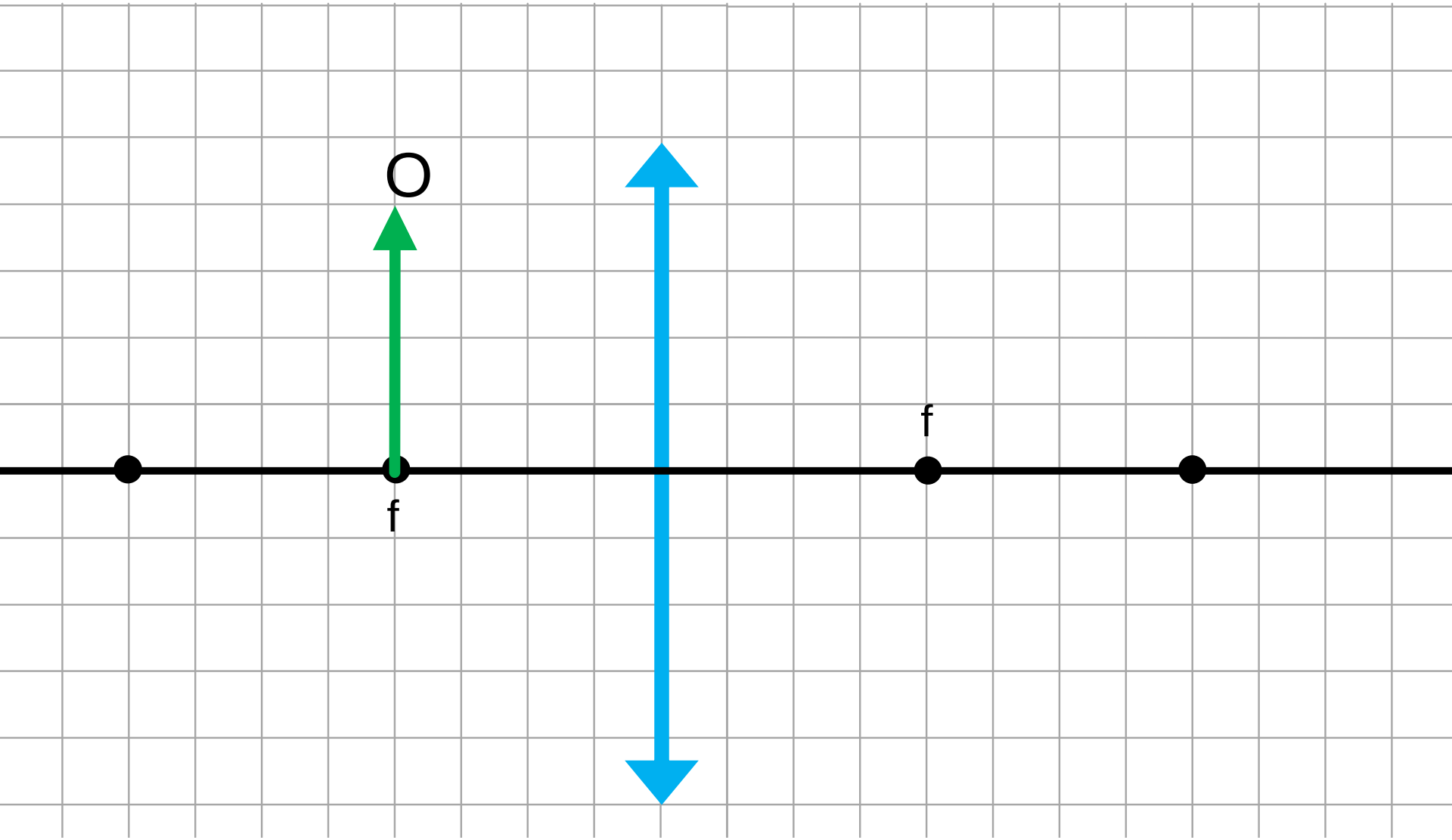
Segundo caso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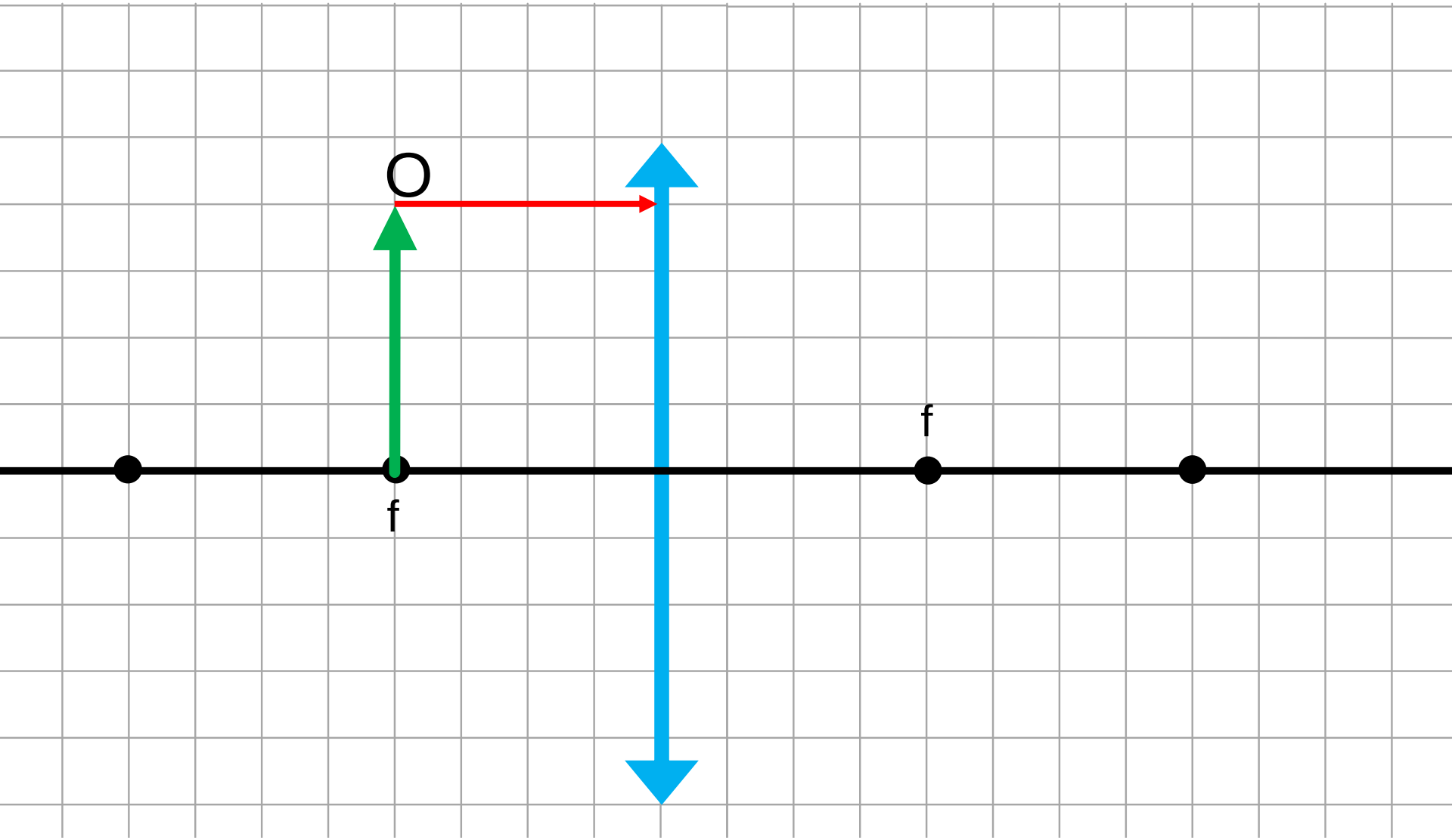
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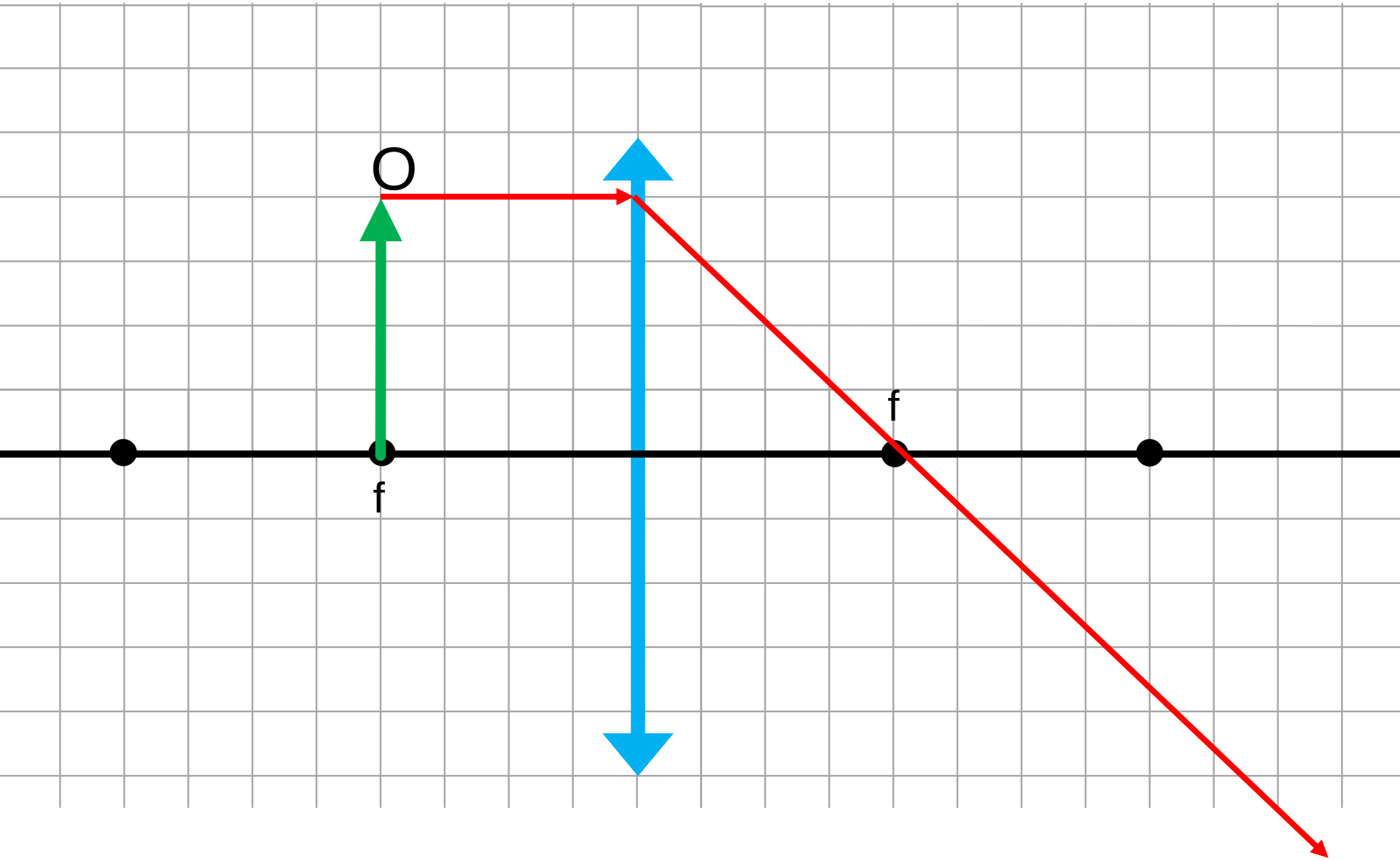
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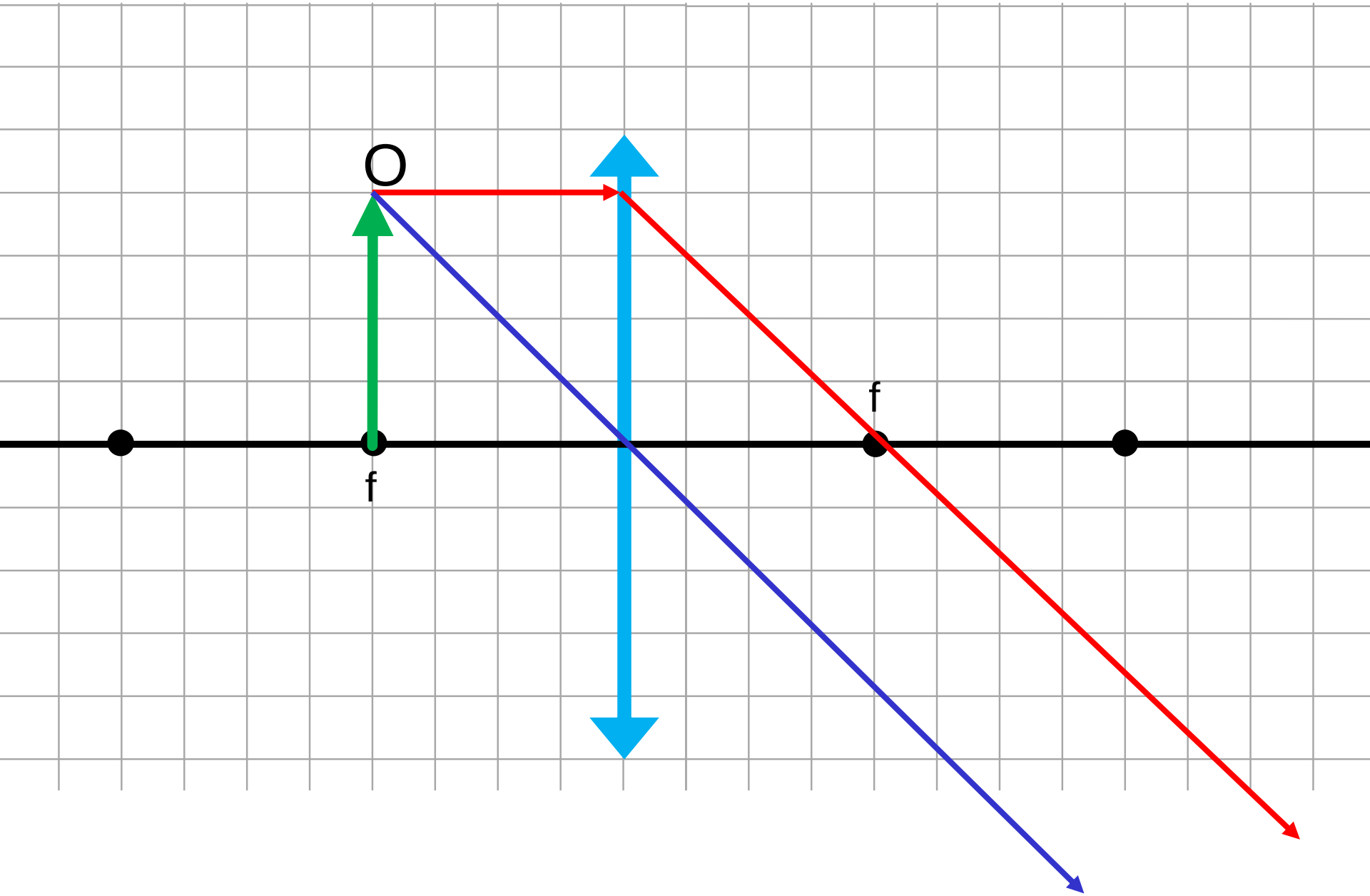
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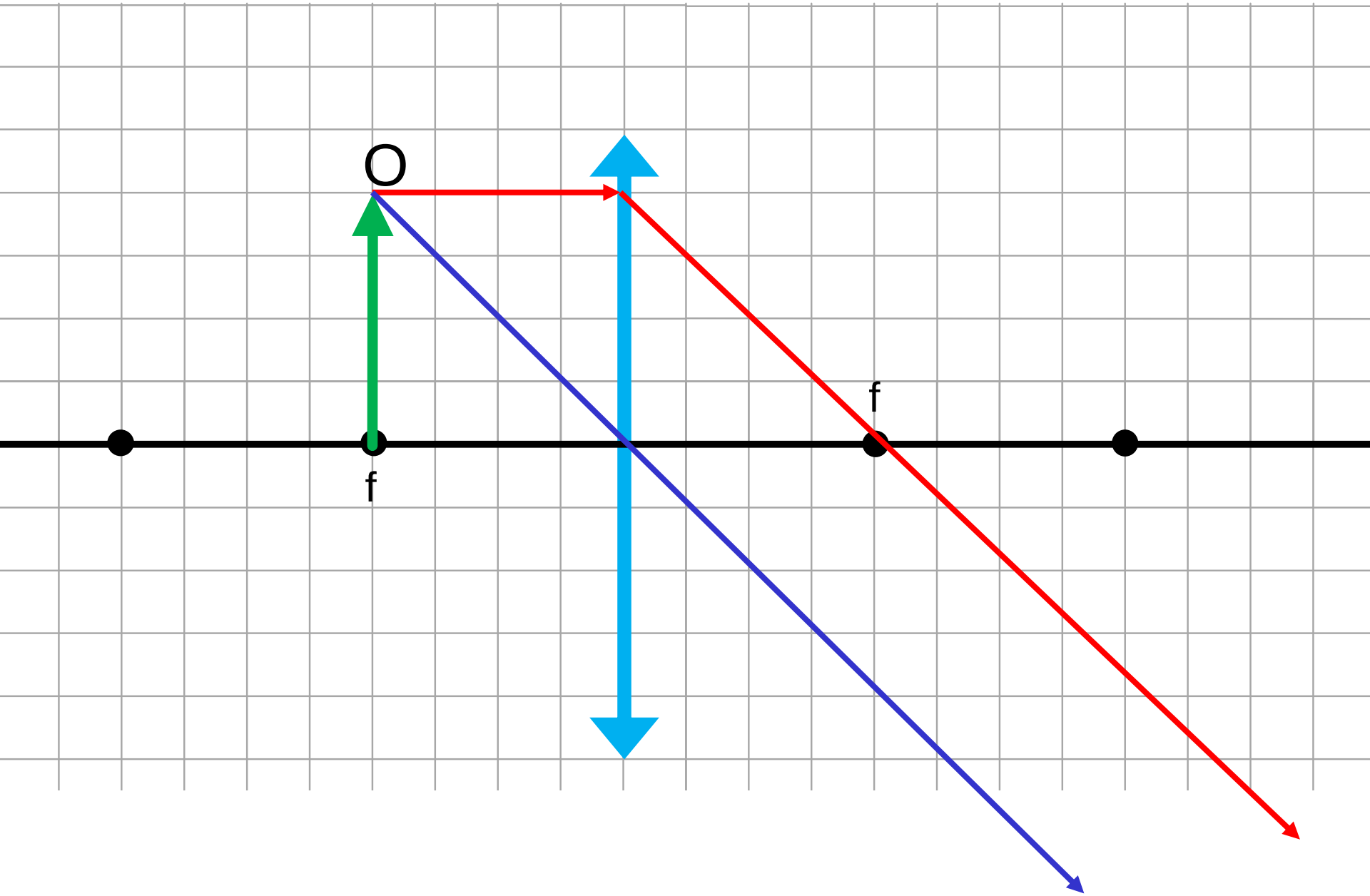
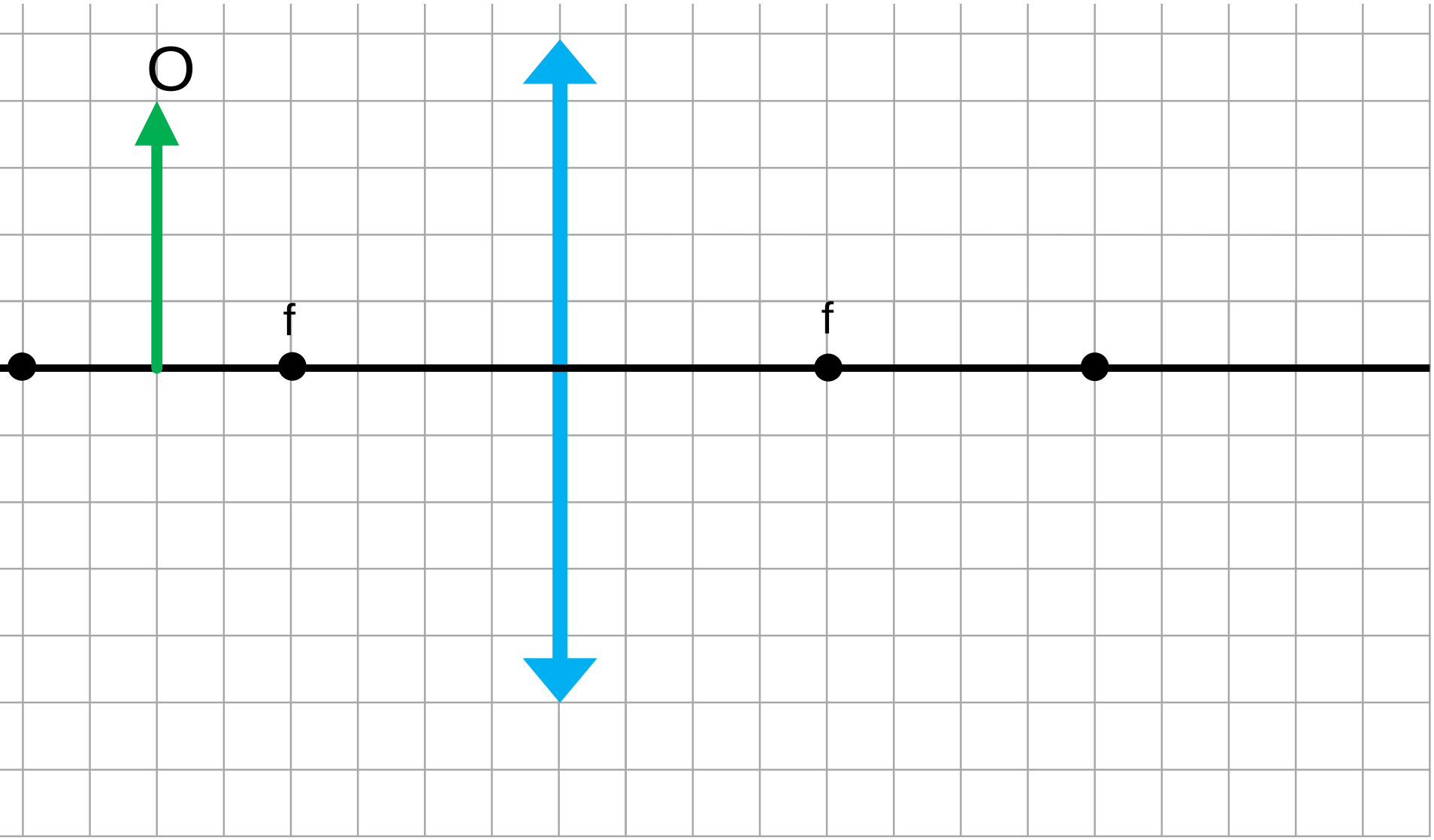
IMAGEM IMPRÓPRIA



Terceiro caso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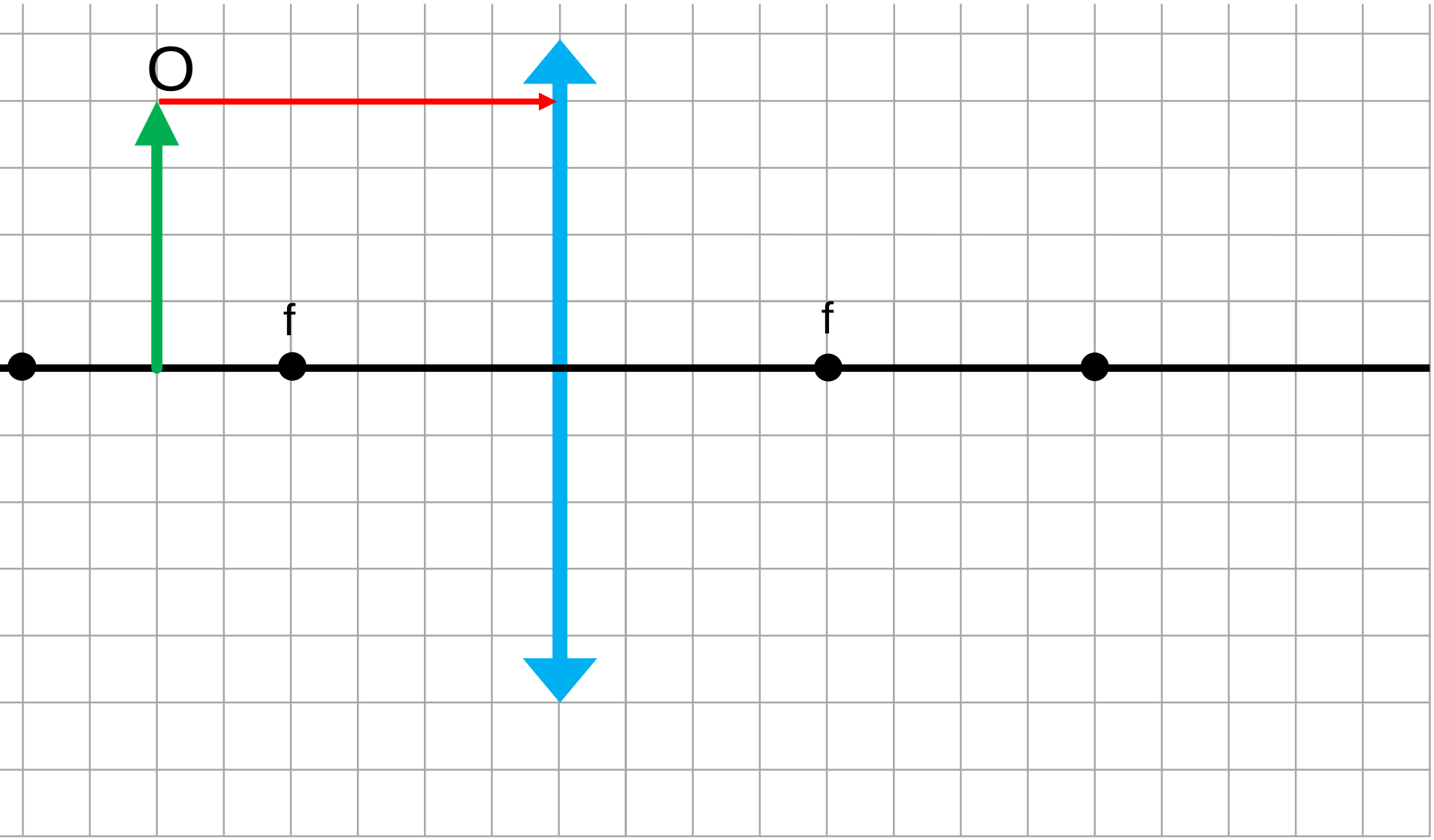
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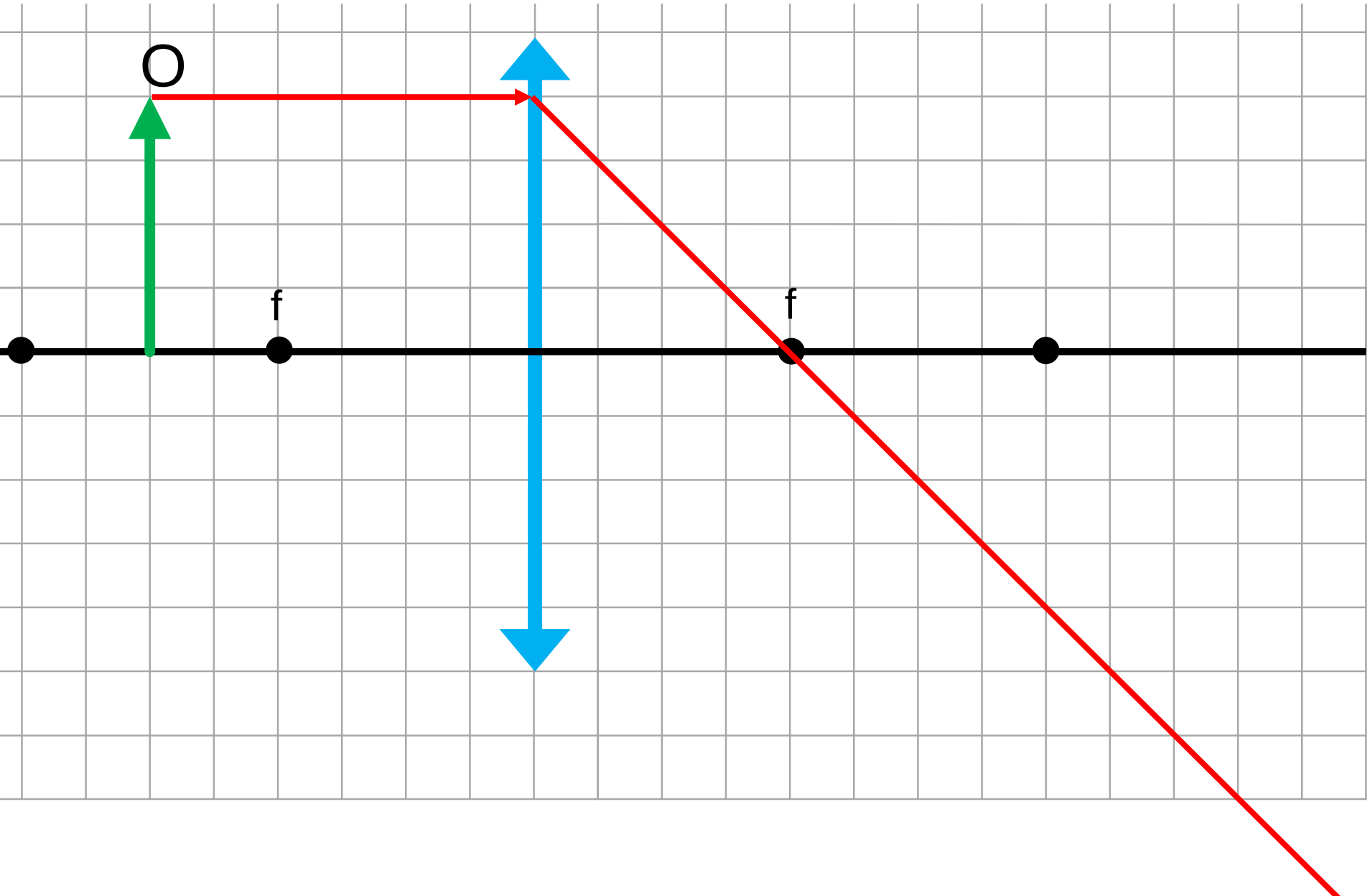
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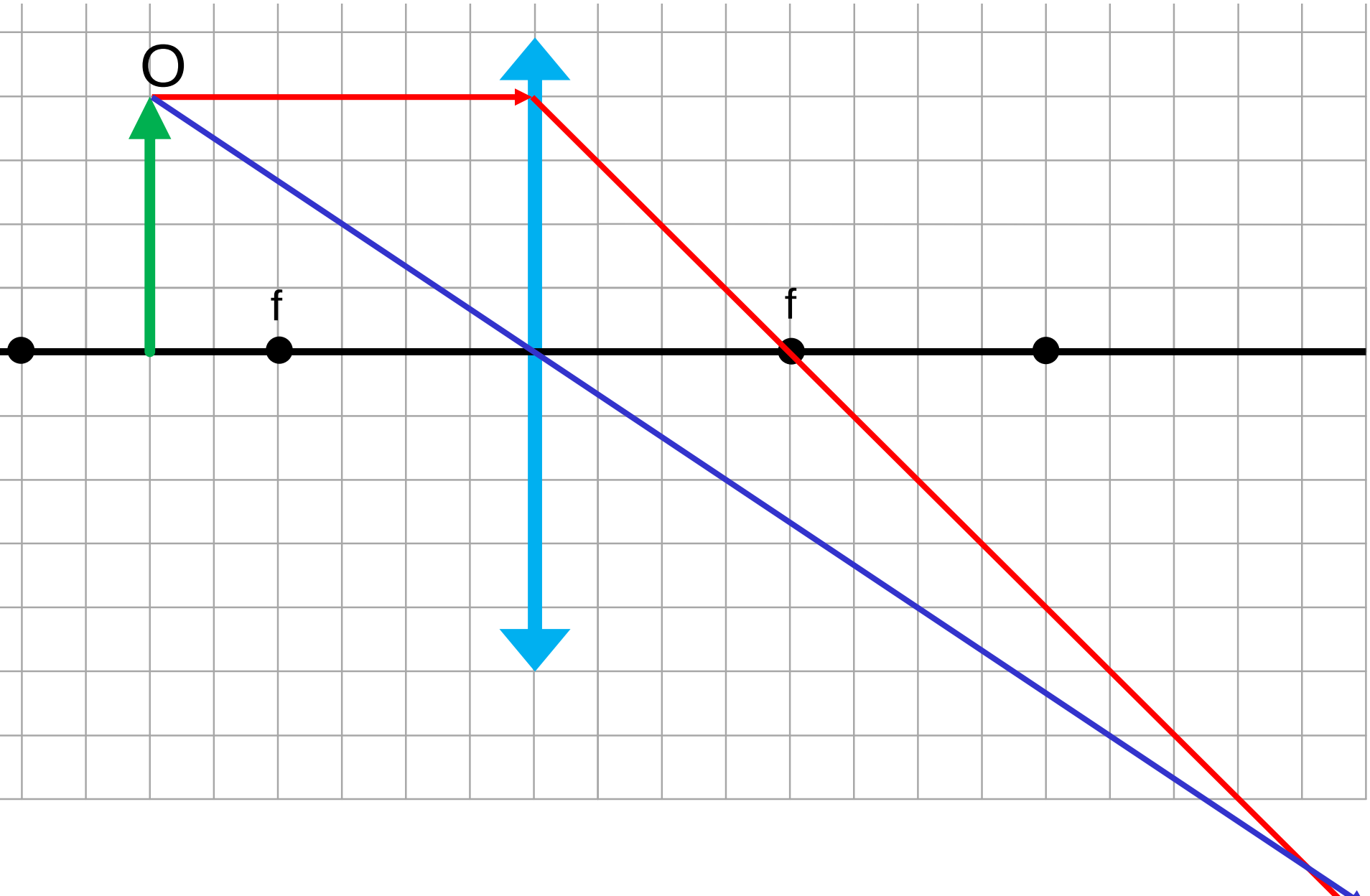
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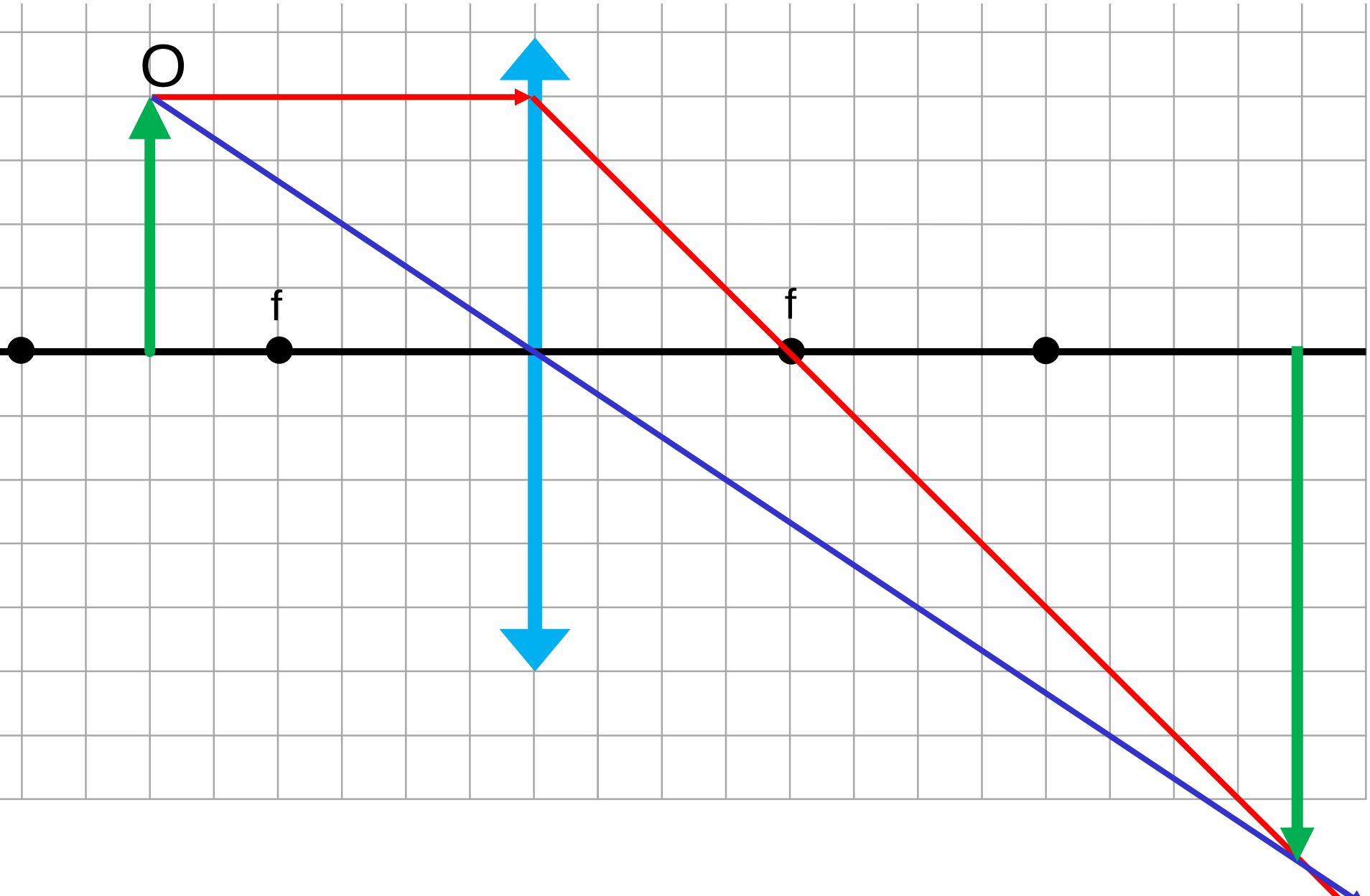
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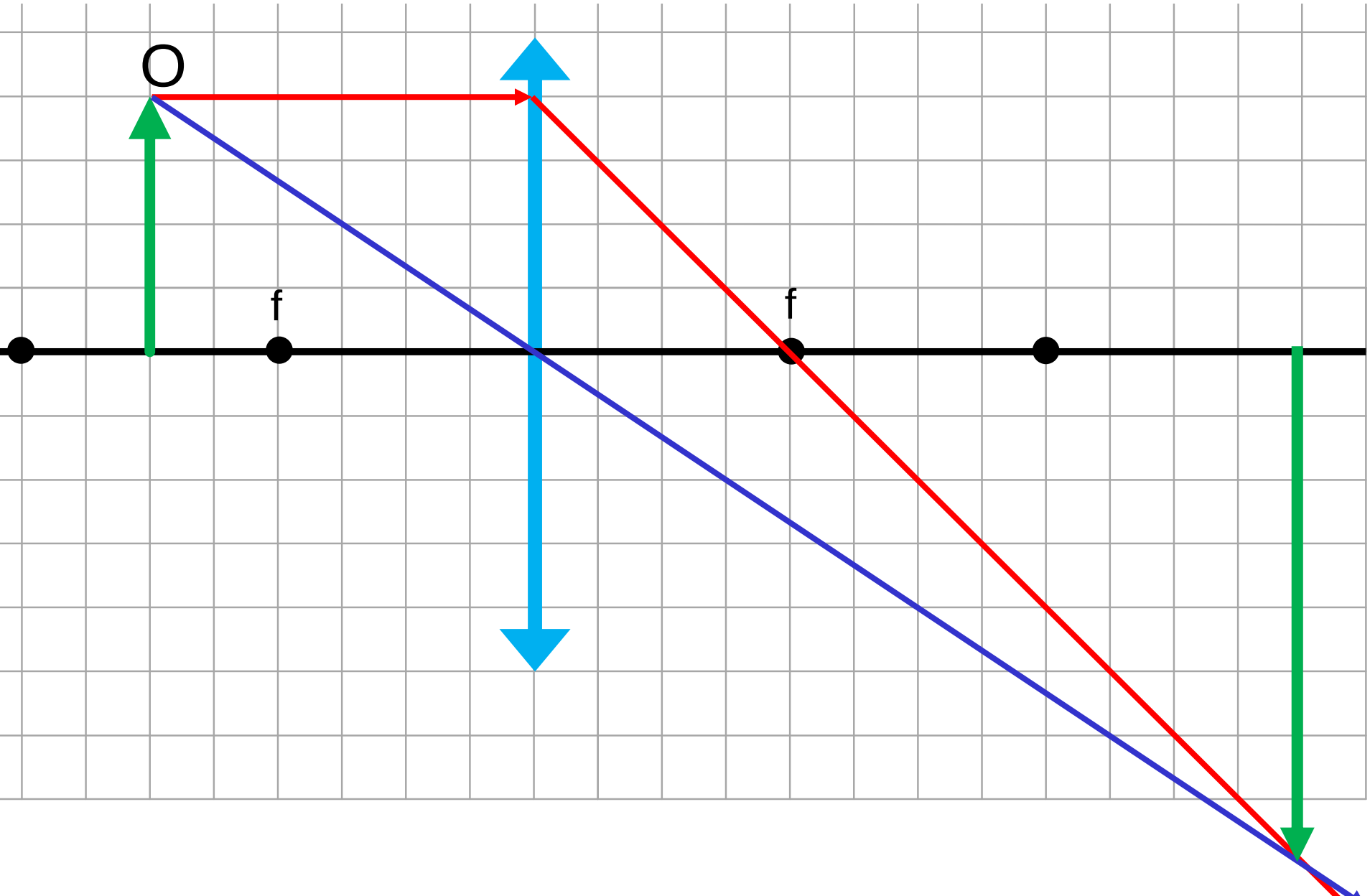
CLASSIFICAÇÃO: Imagem REAL



CLASSIFICAÇÃO: Imagem REAL
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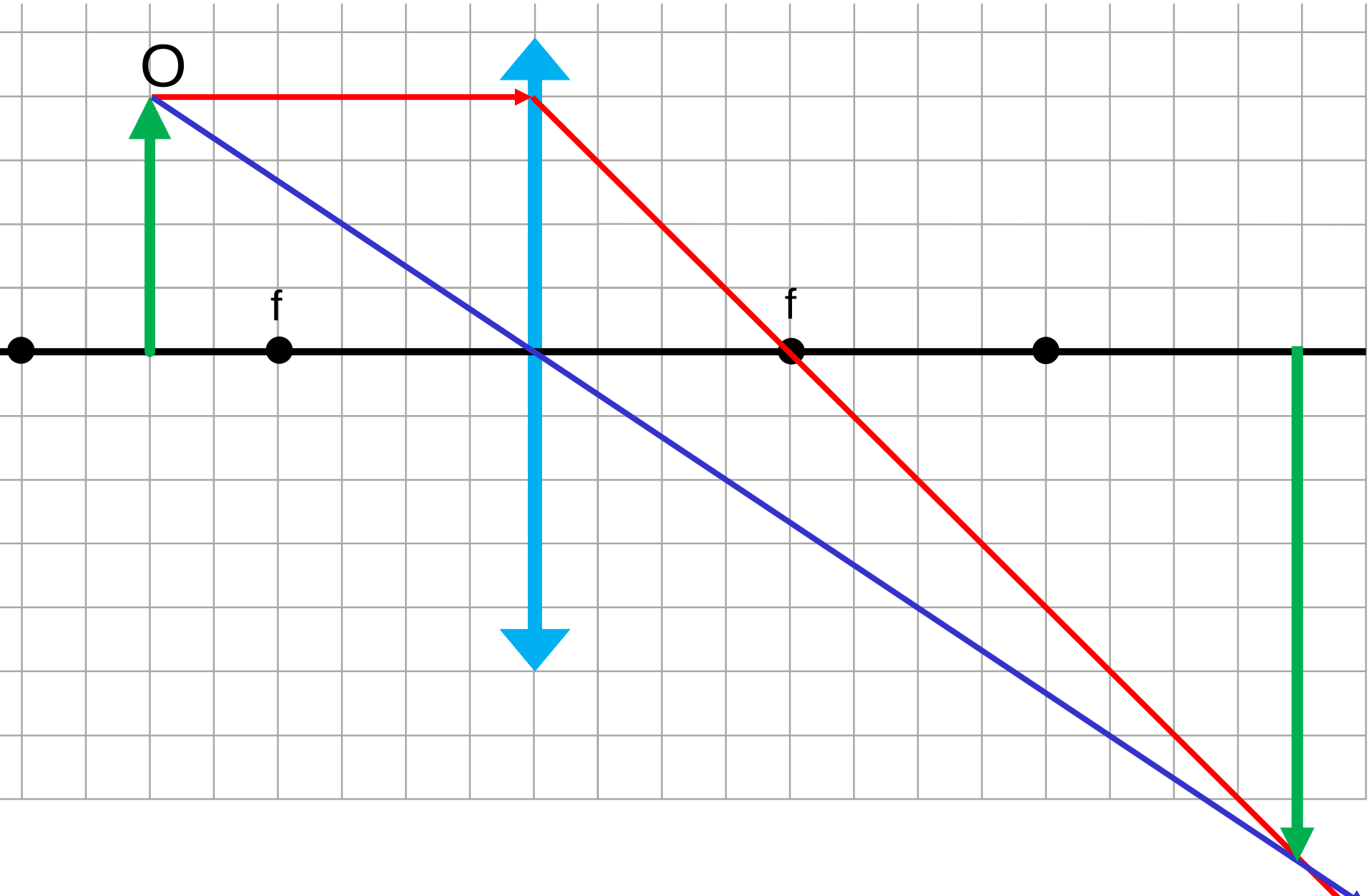

CLASSIFICAÇÃO: Imagem REAL
INVERTIDA
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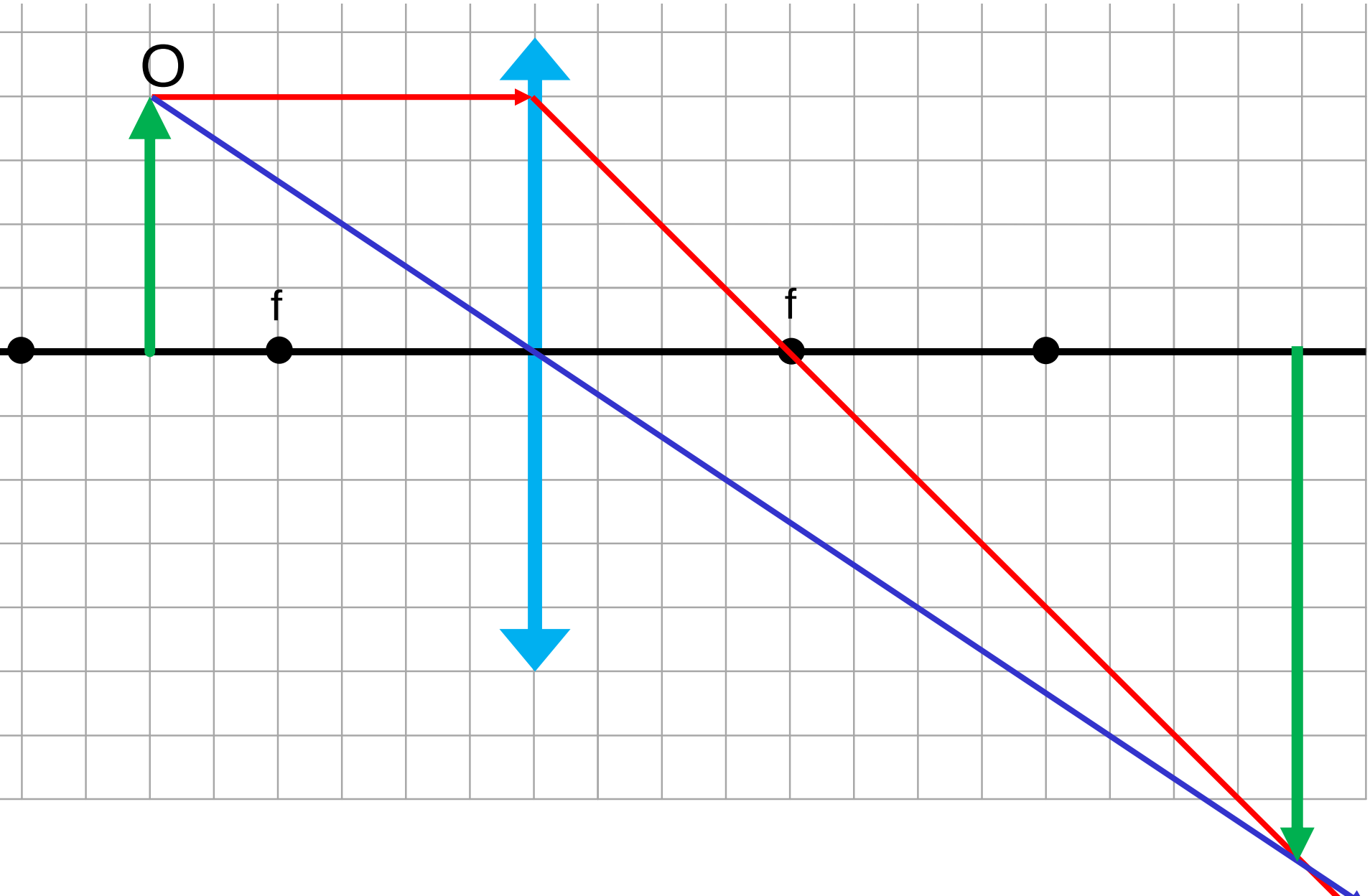
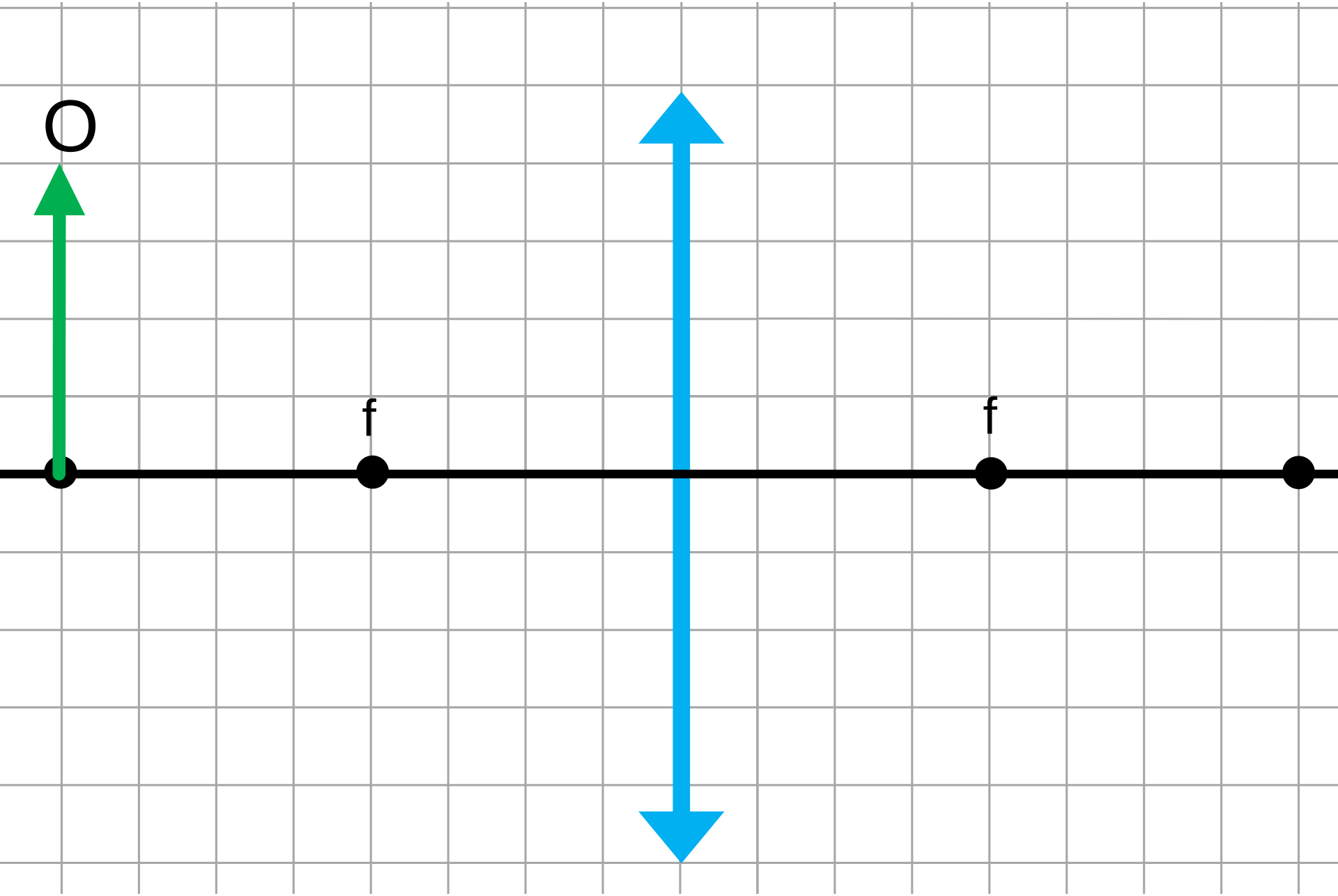


Quarto caso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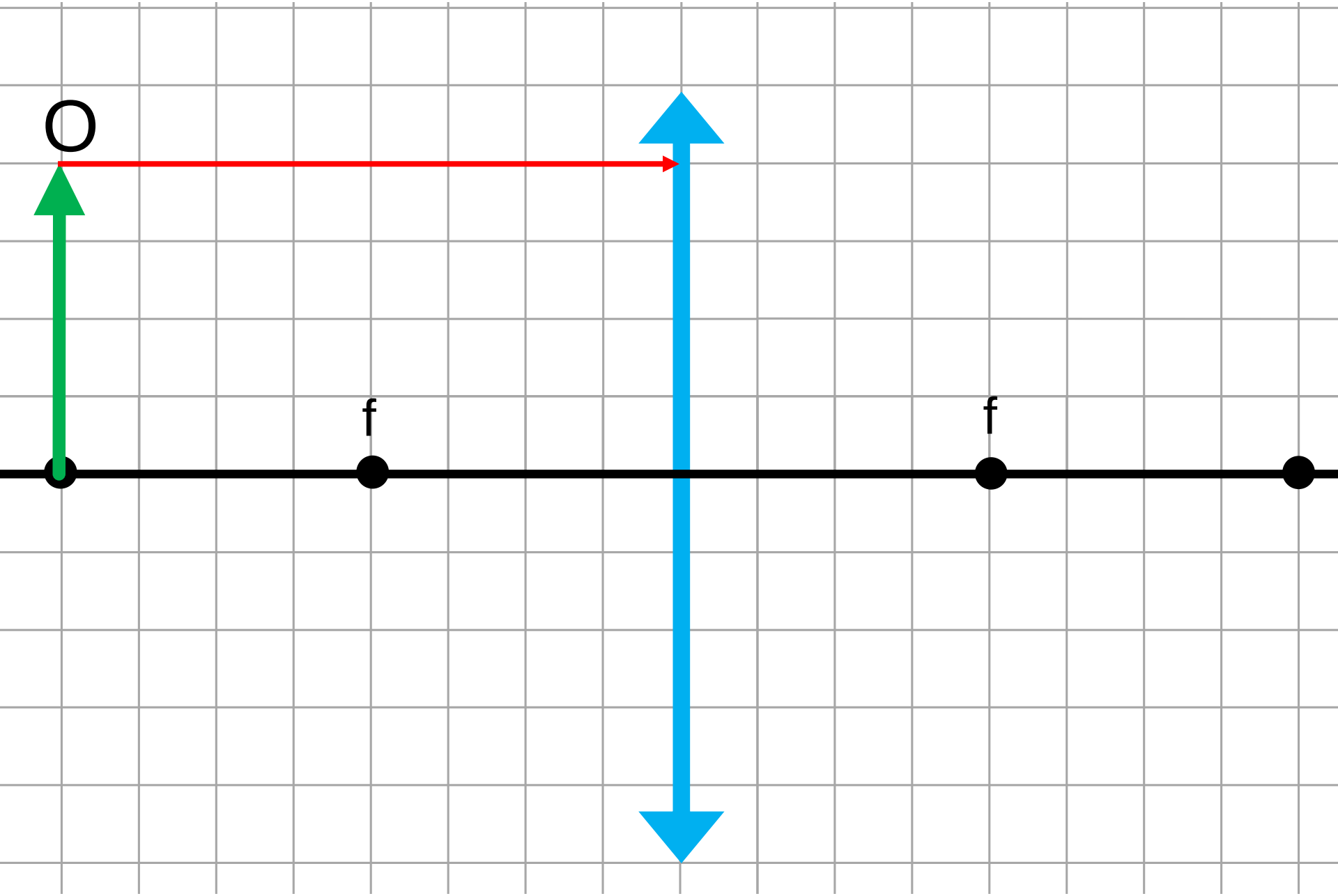
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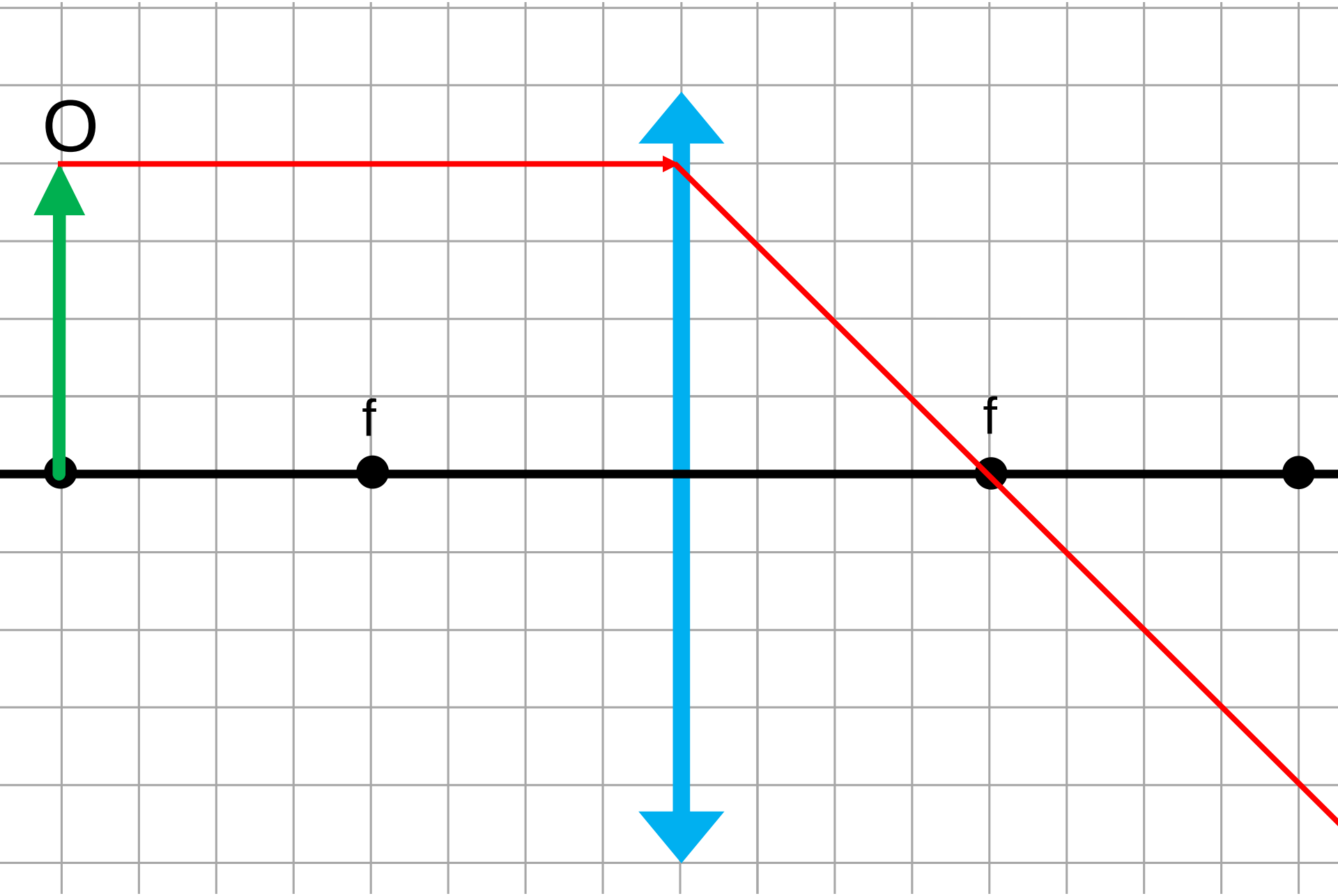
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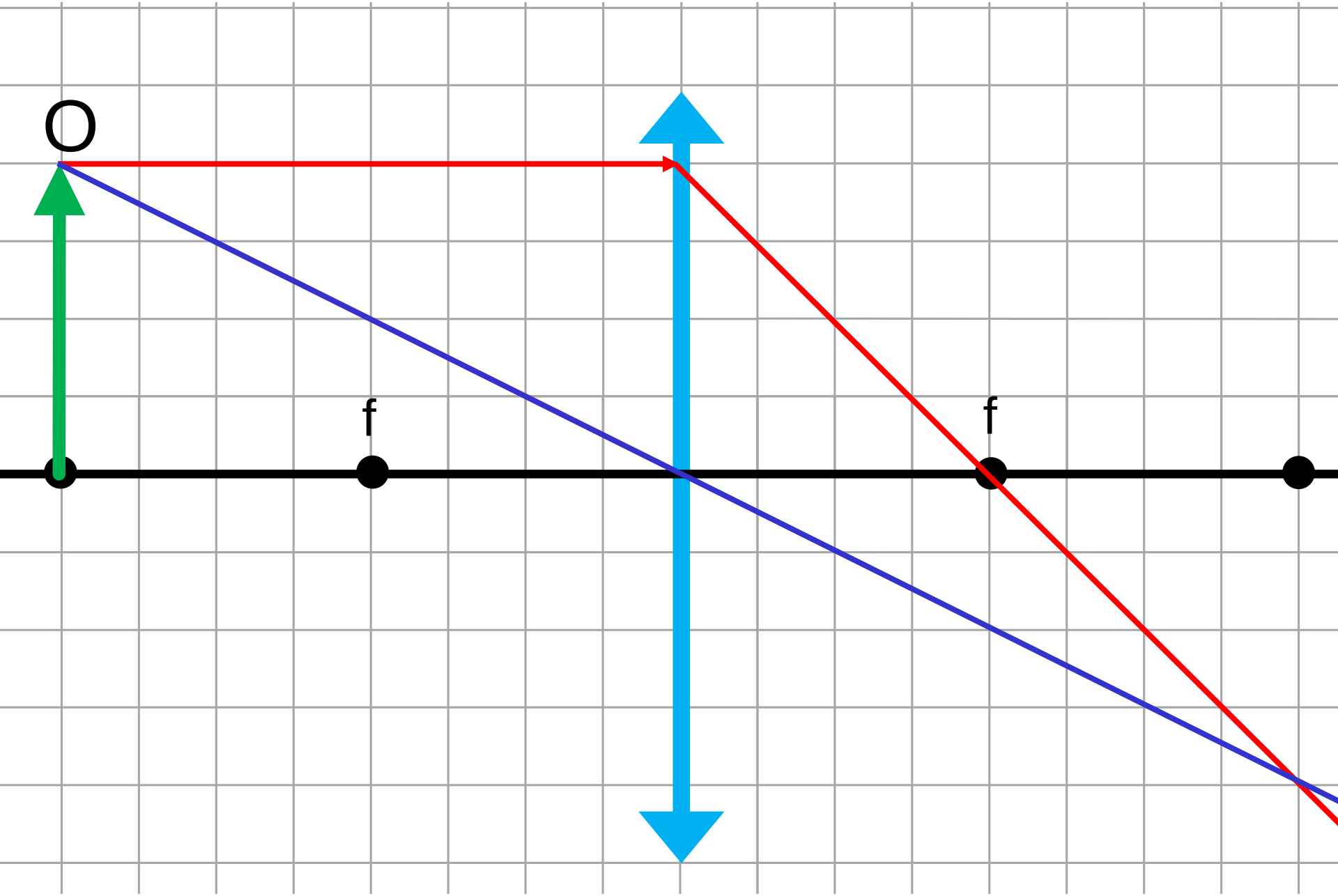
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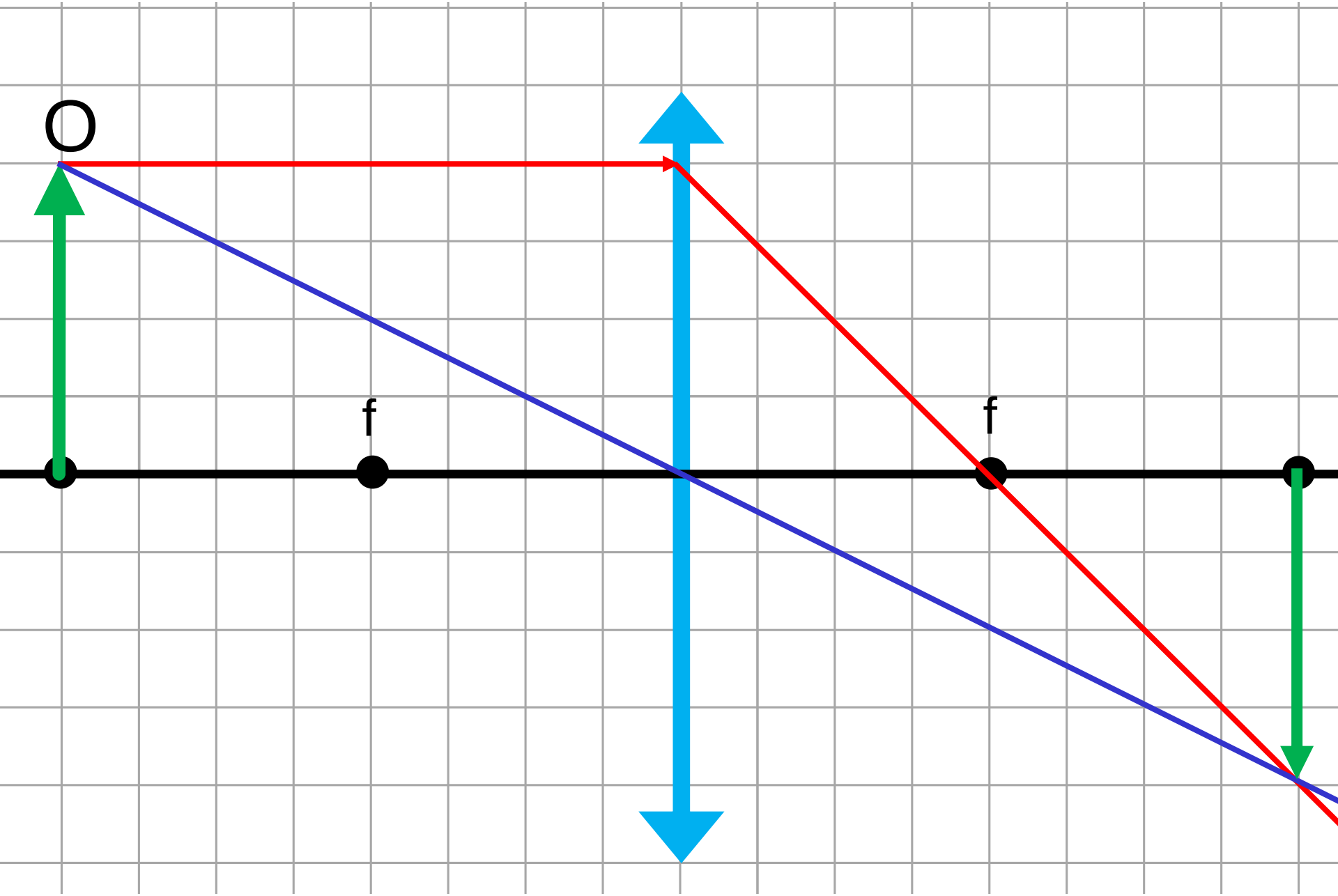
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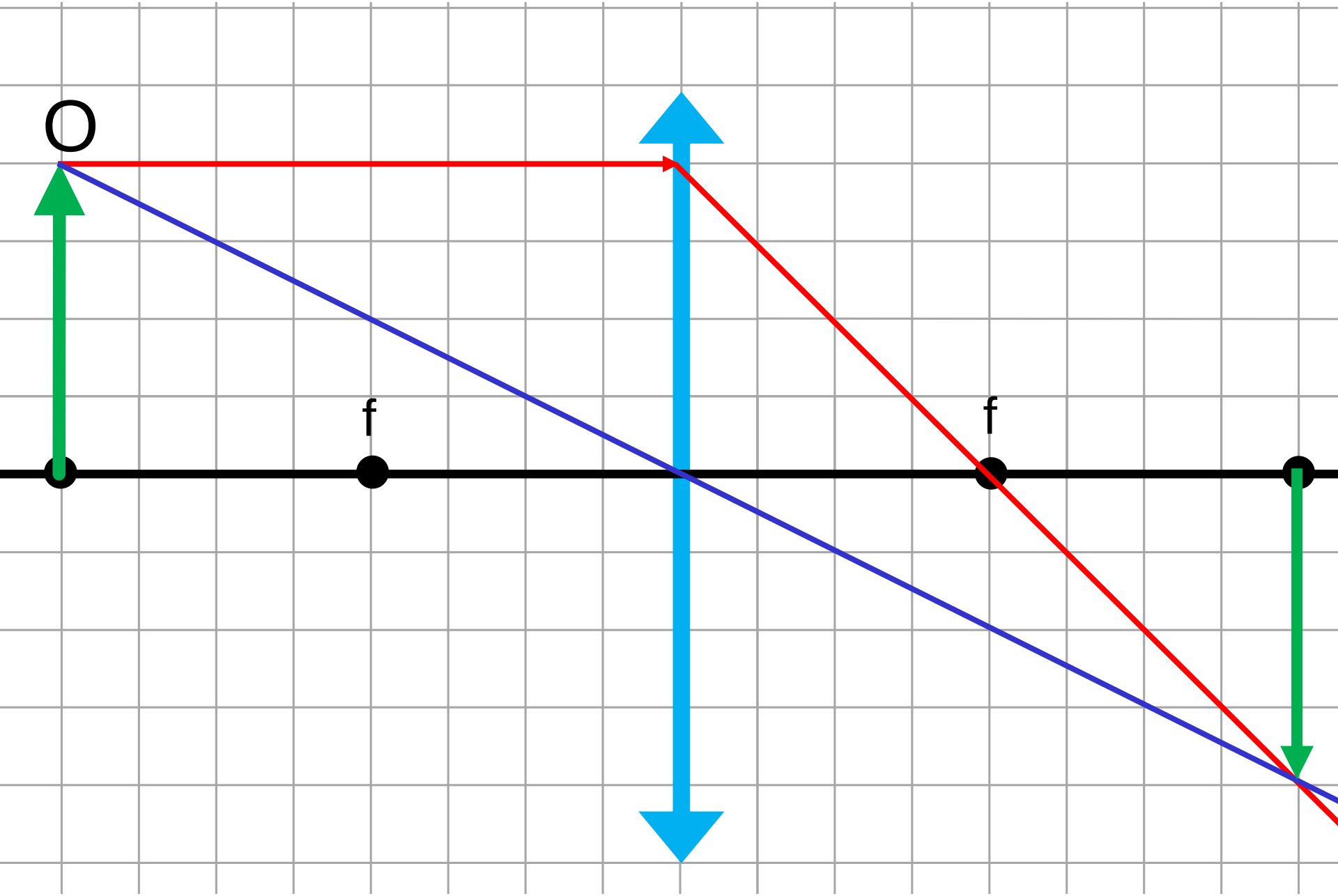
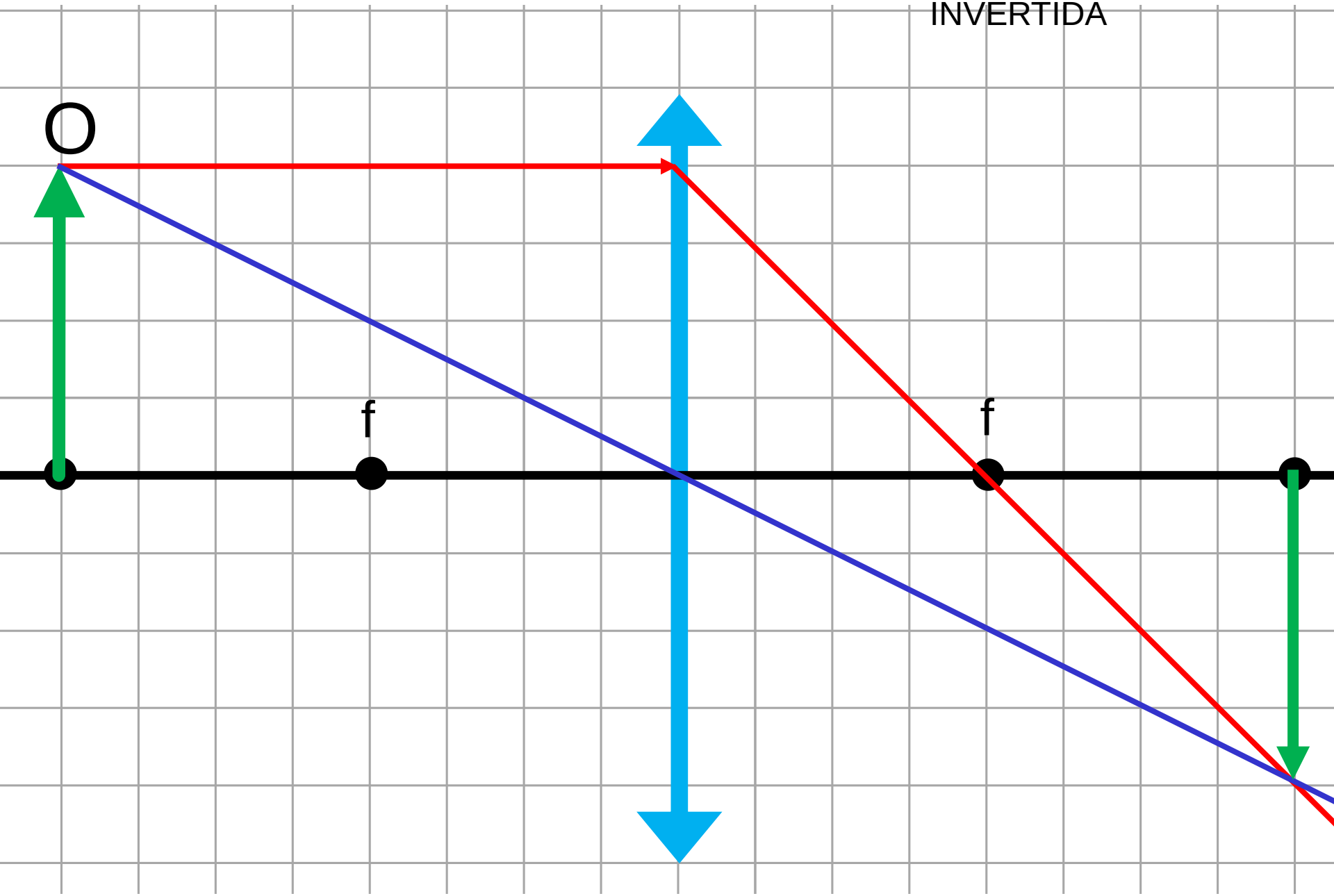
CLASSIFICAÇÃO: Imagem REAL



CLASSIFICAÇÃO: Imagem REAL INVERTIDA



CLASSIFICAÇÃO: Imagem REAL
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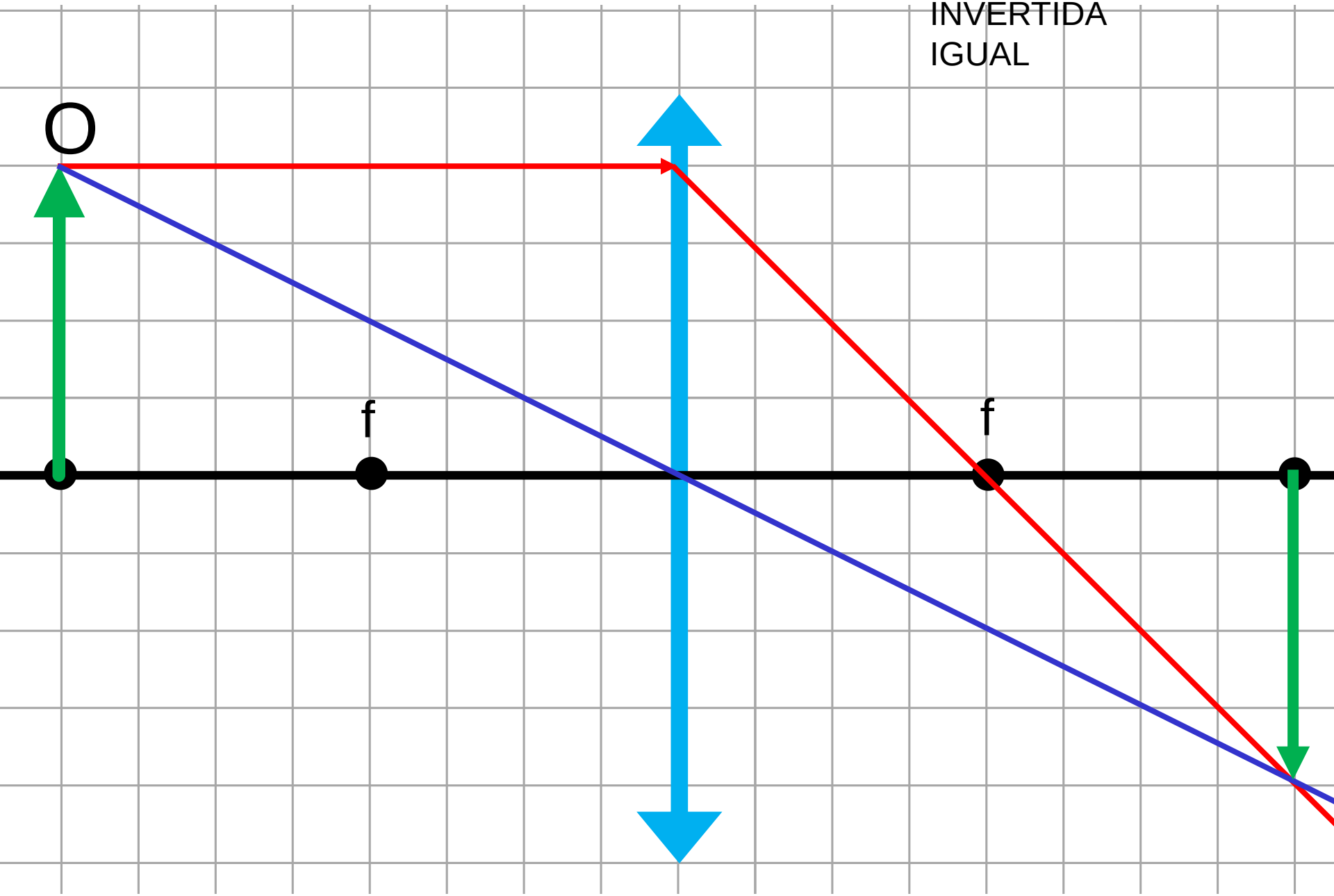
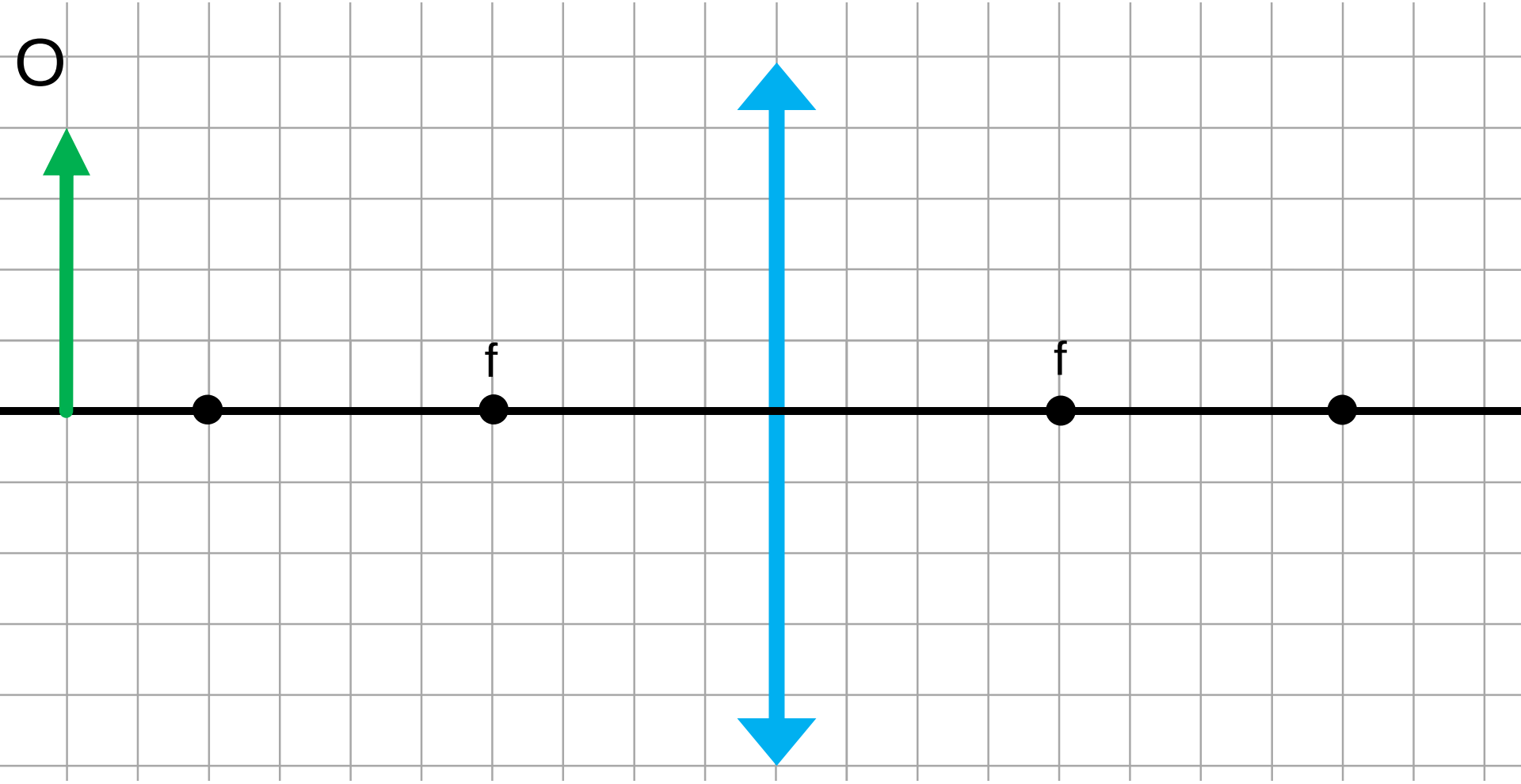


Quinto caso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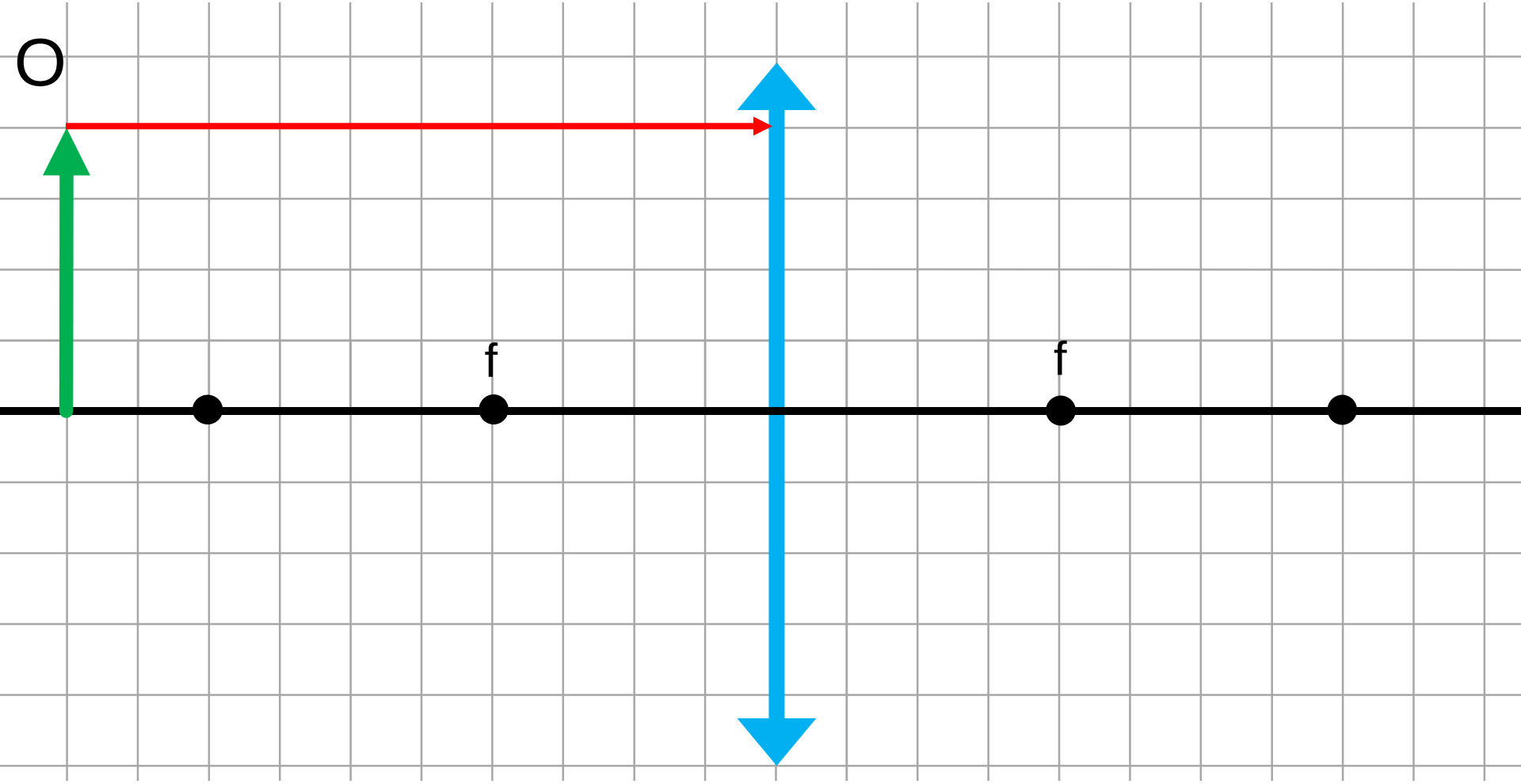
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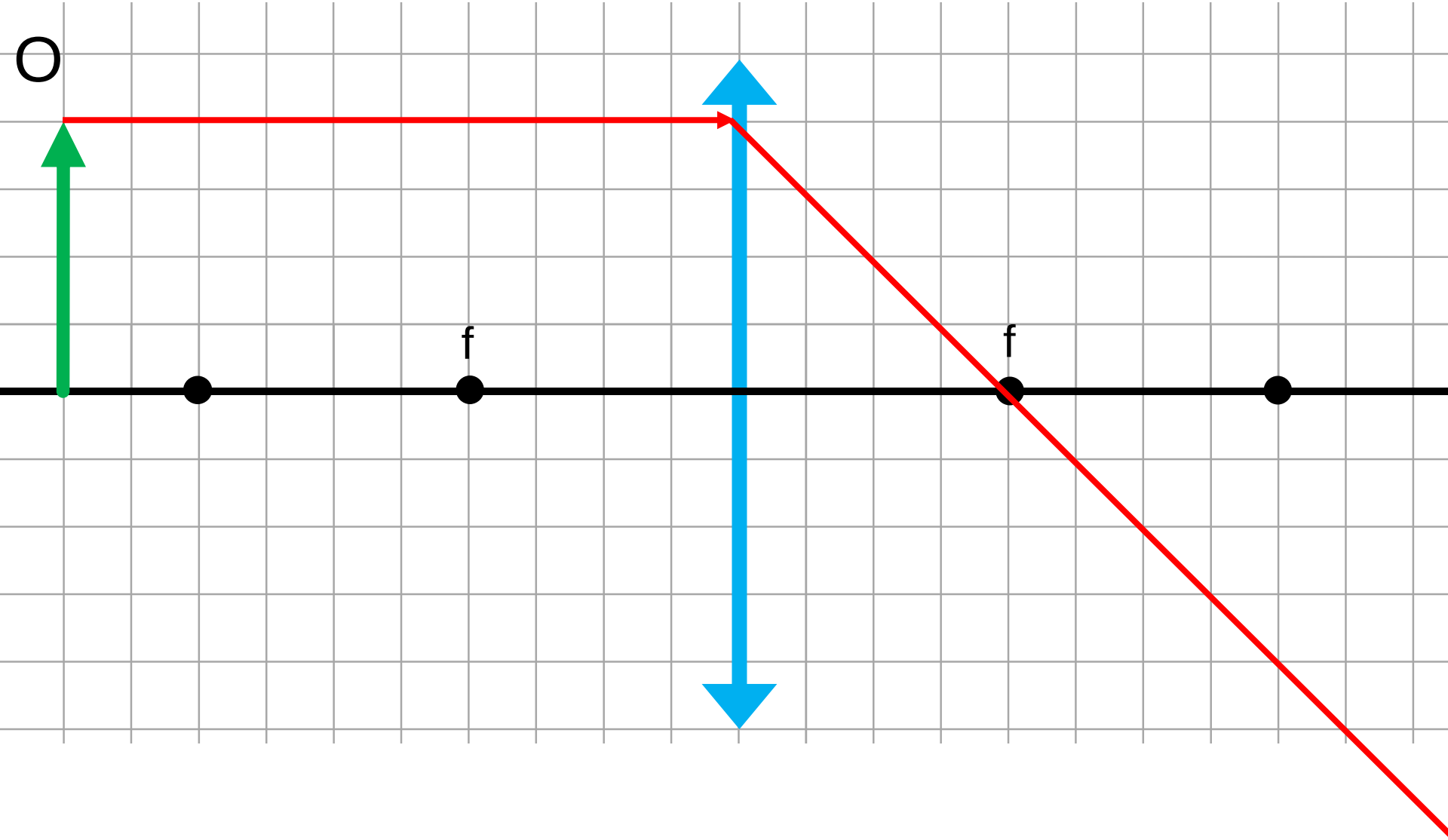
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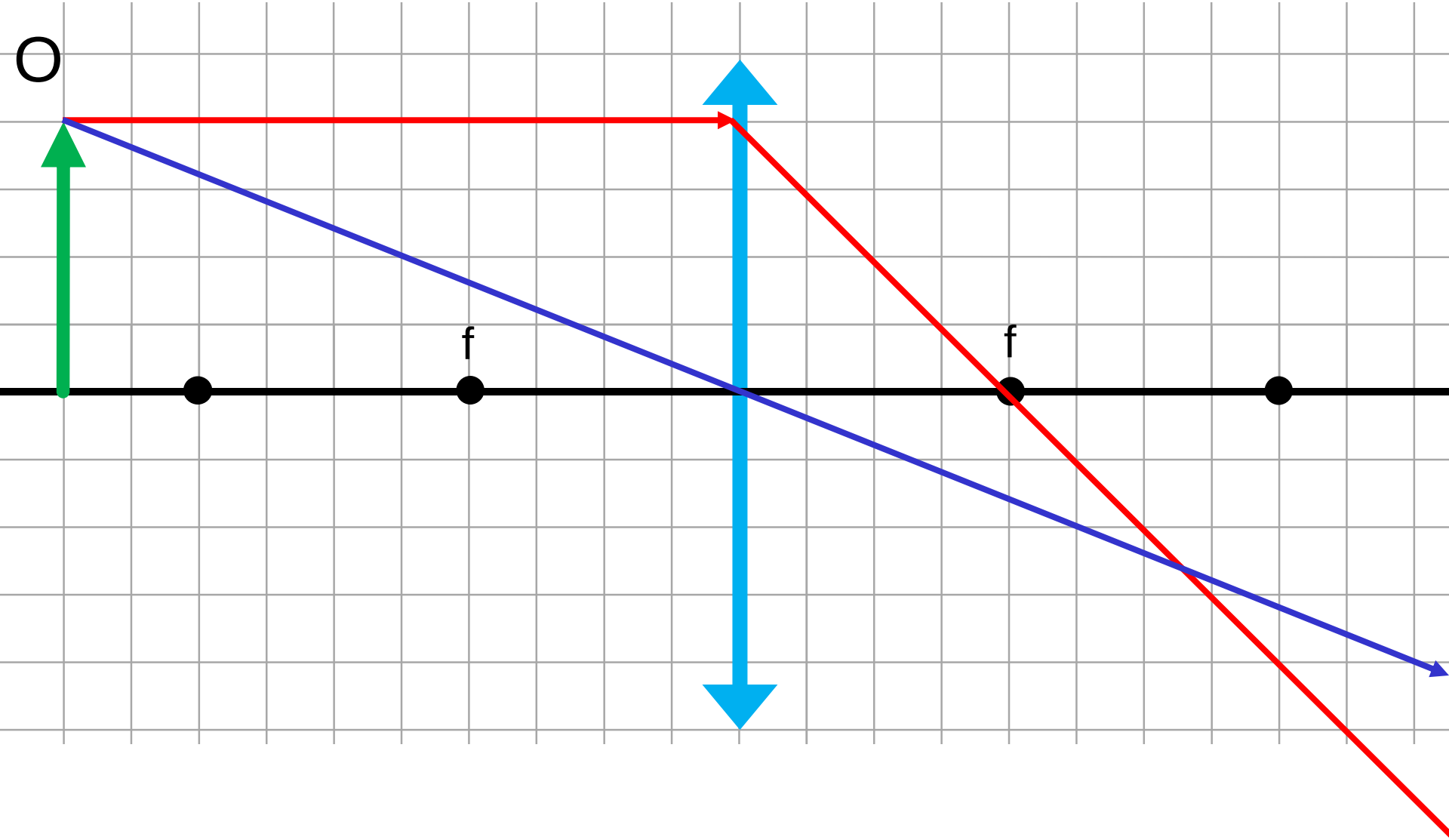
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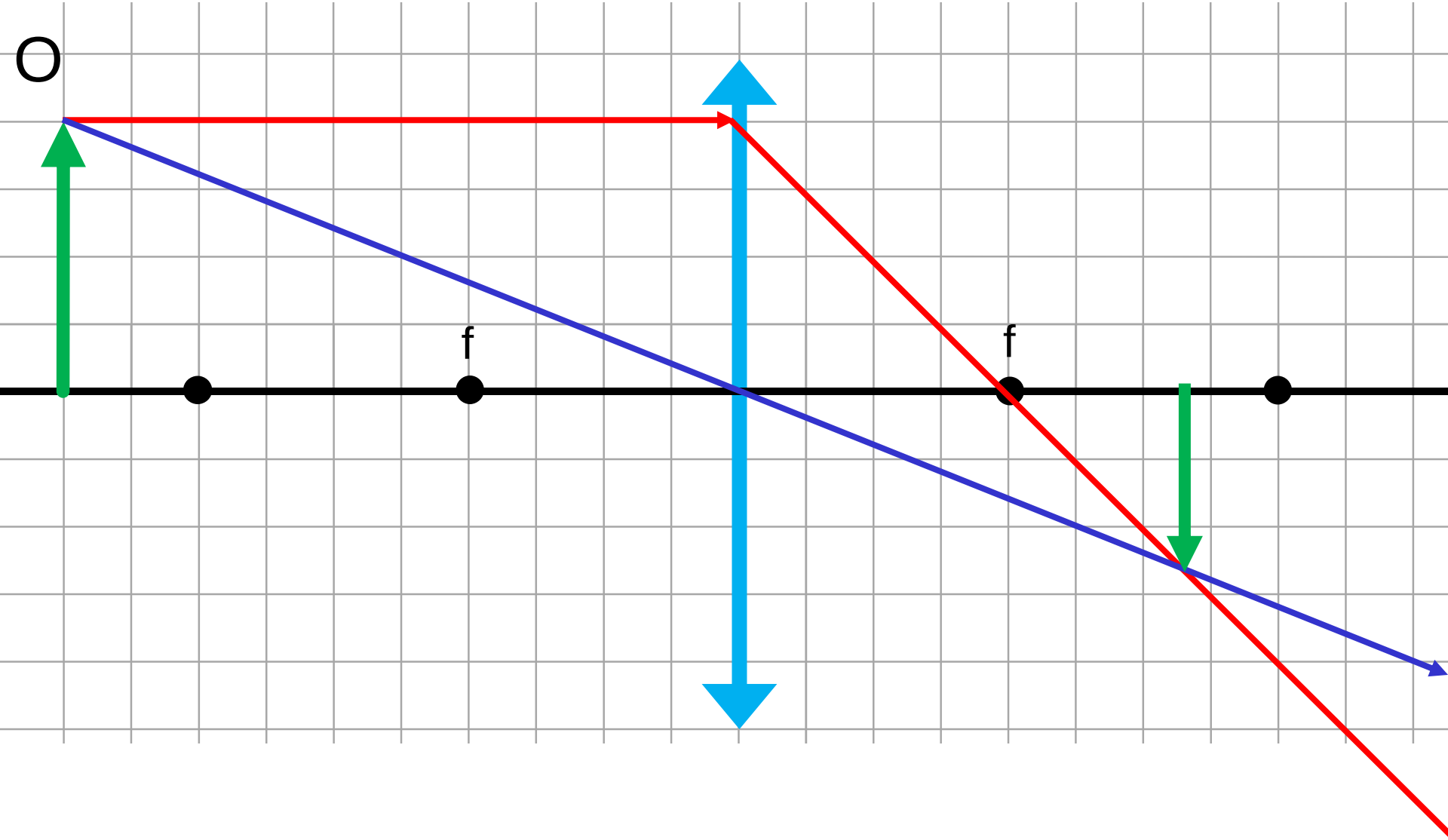
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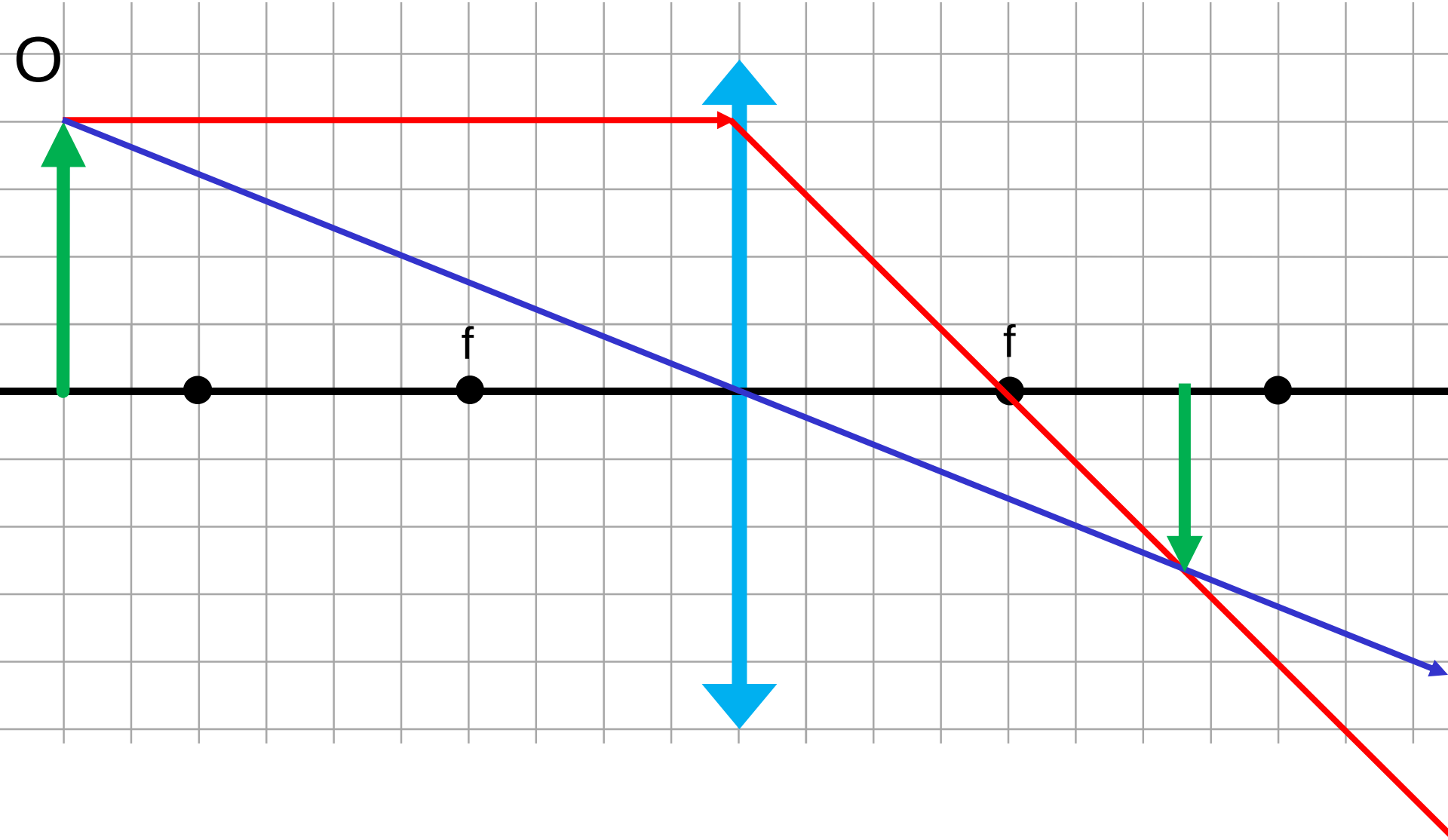
CLASSIFICAÇÃO: Imagem REAL



CLASSIFICAÇÃO: Imagem REAL
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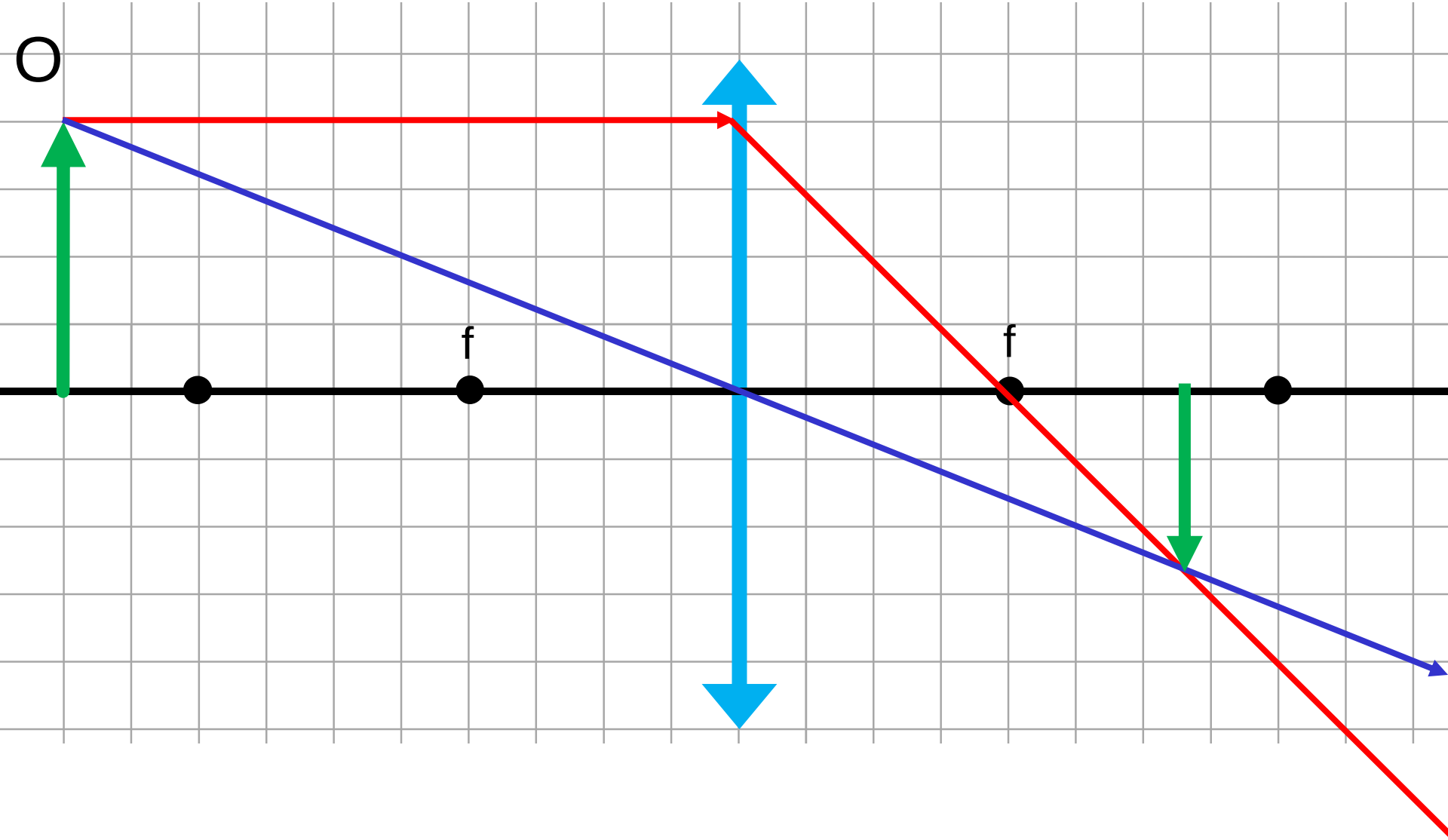
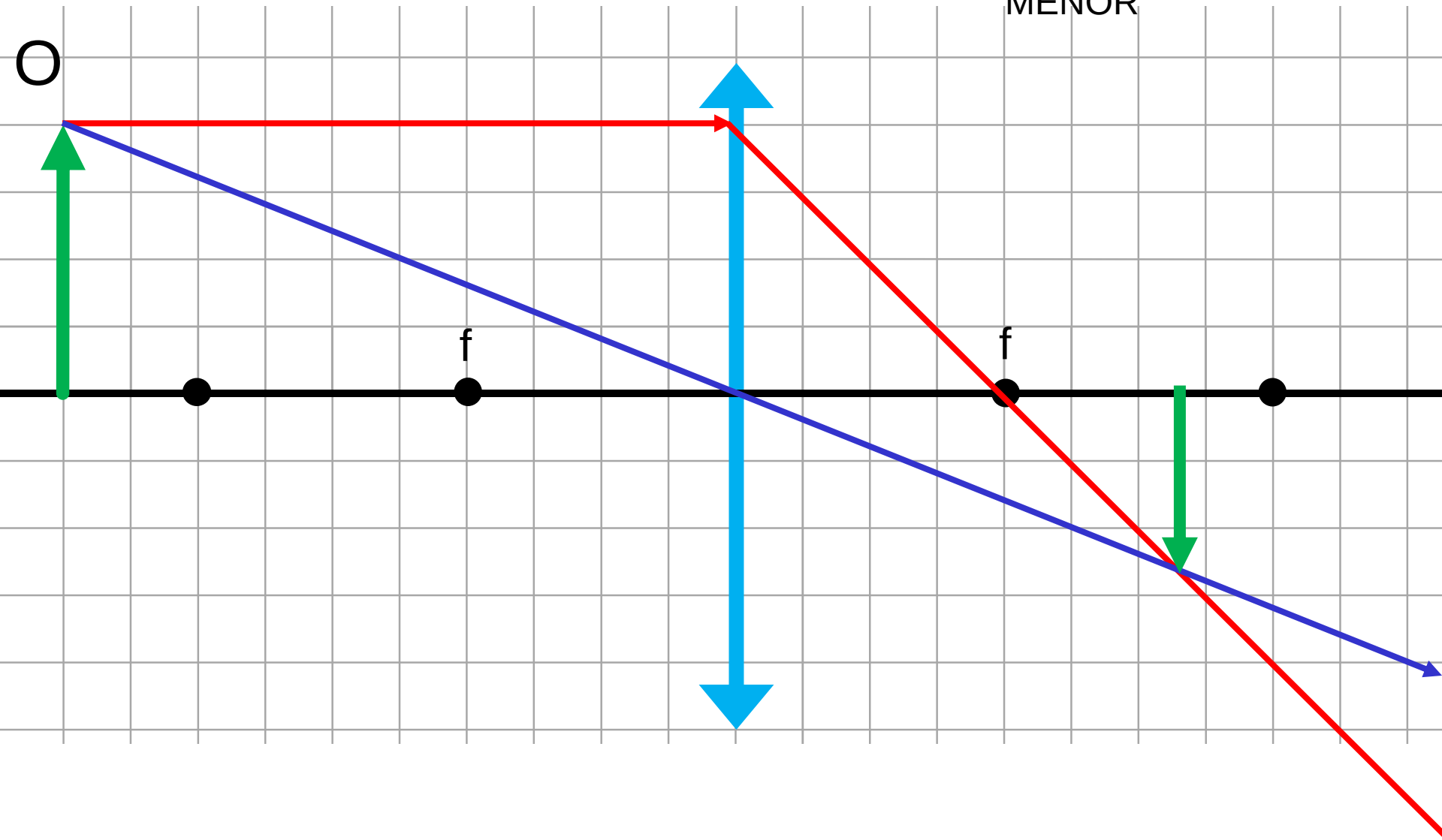
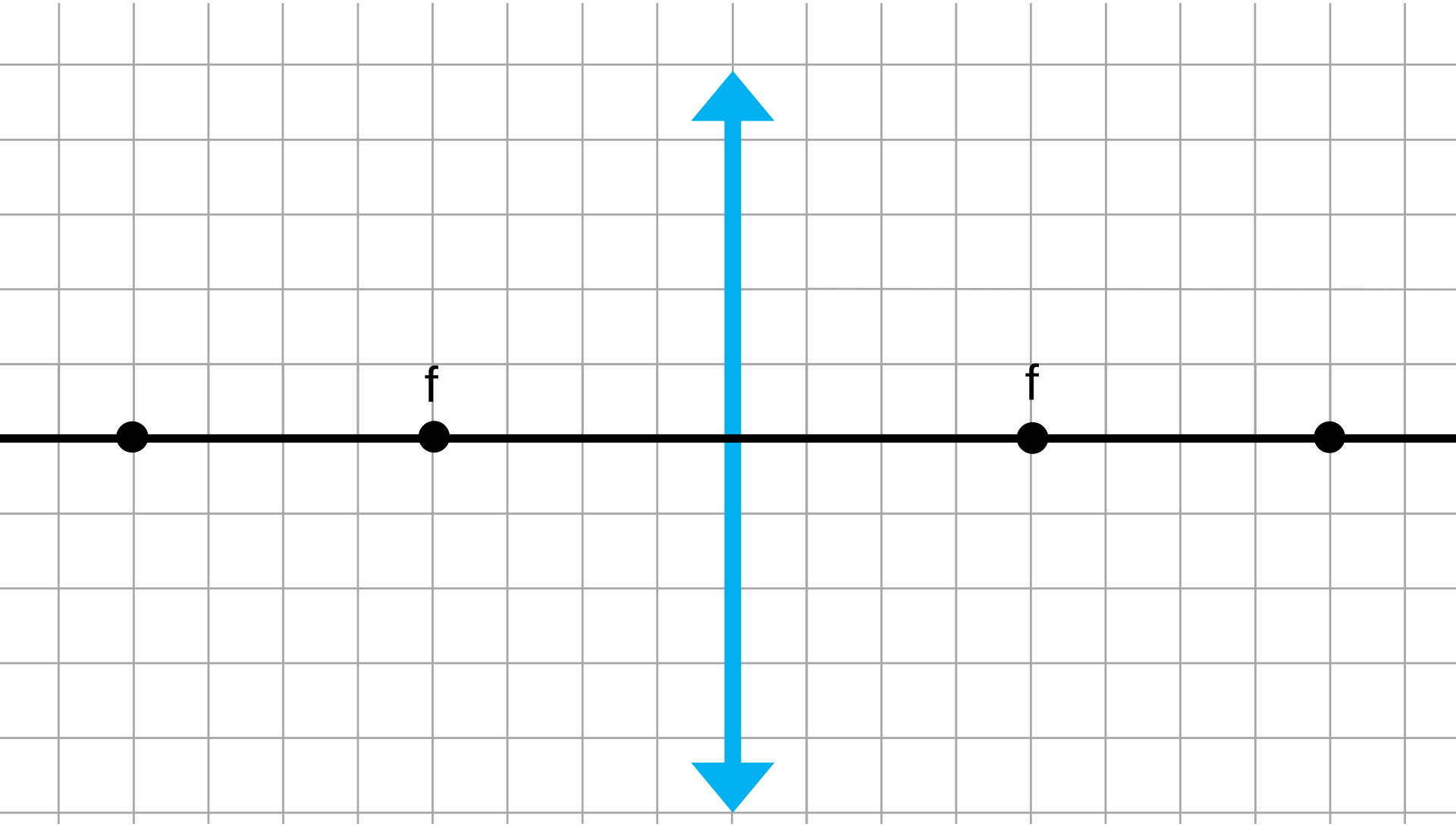


CLASSIFICAÇÃO: Imagem REAL
INVERTIDA
MENOR



Sexto Caso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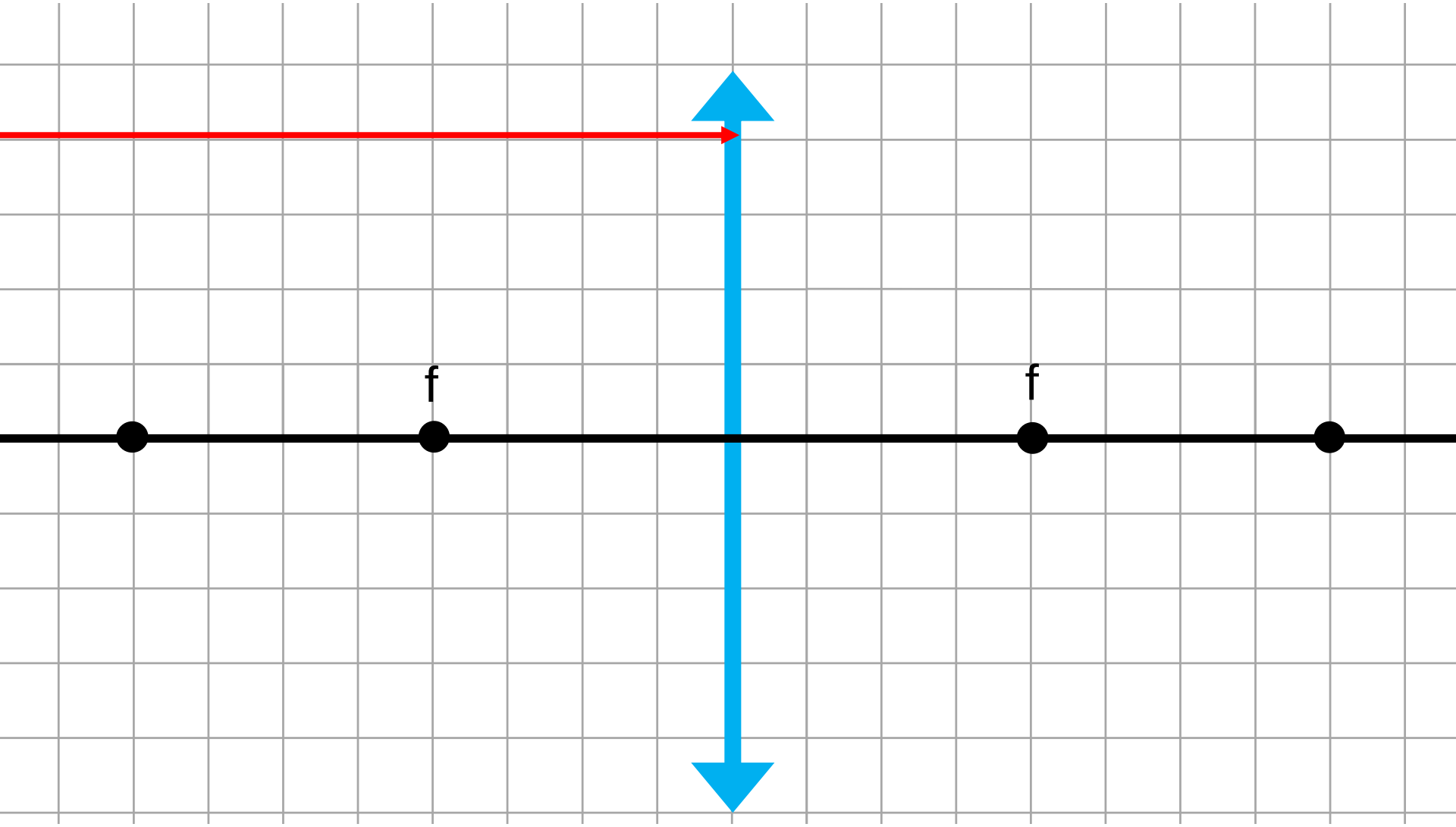
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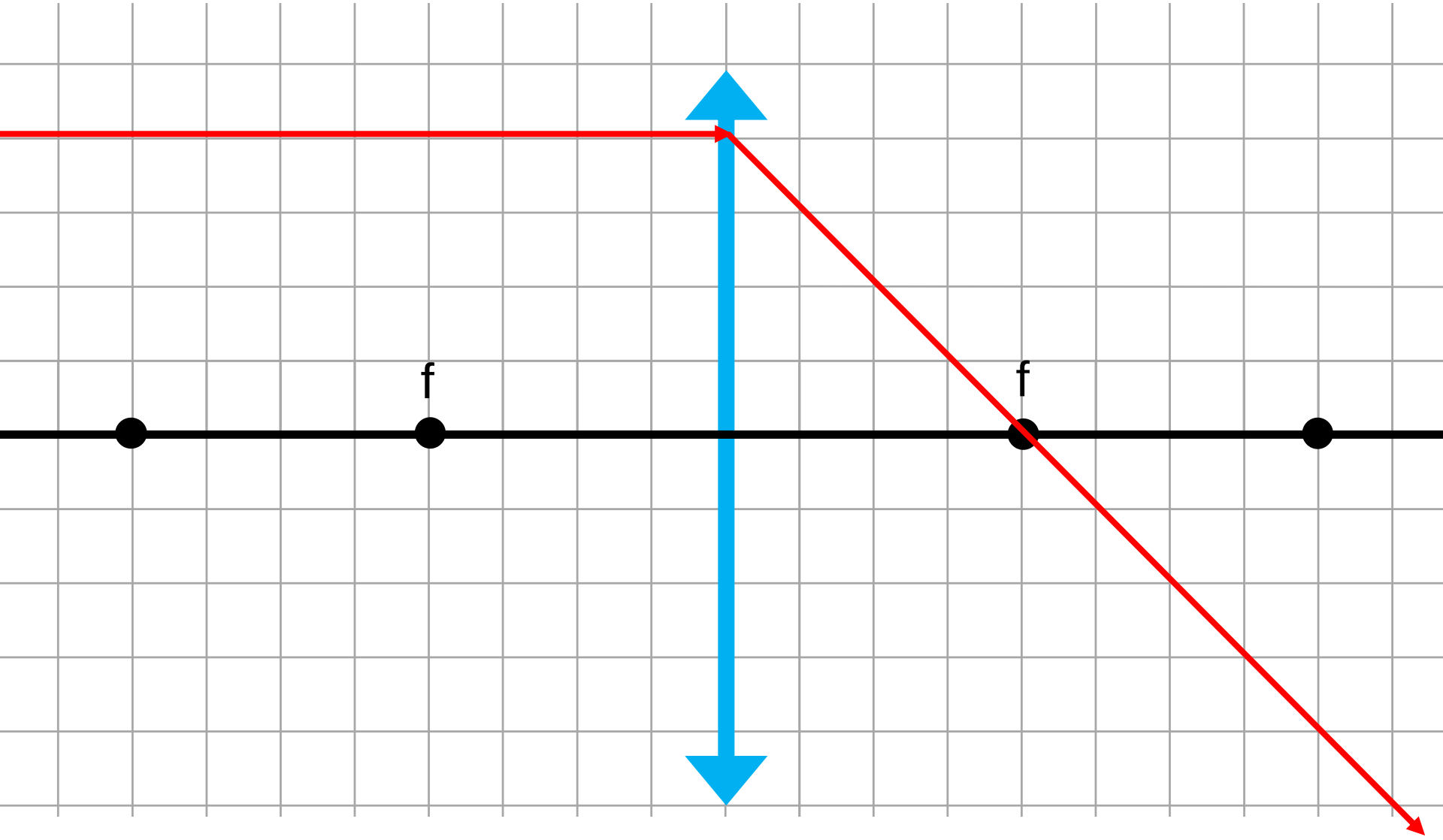
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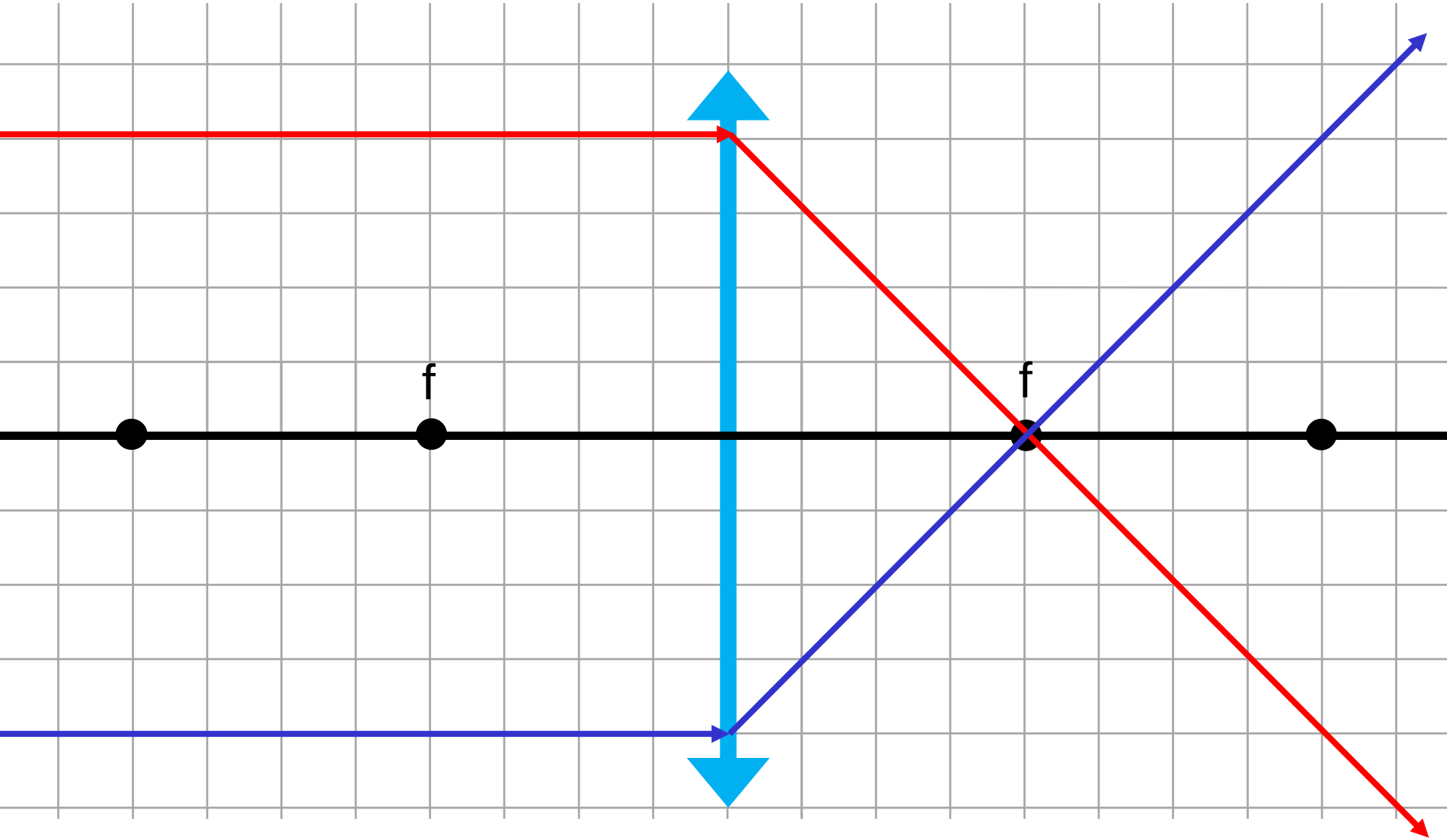
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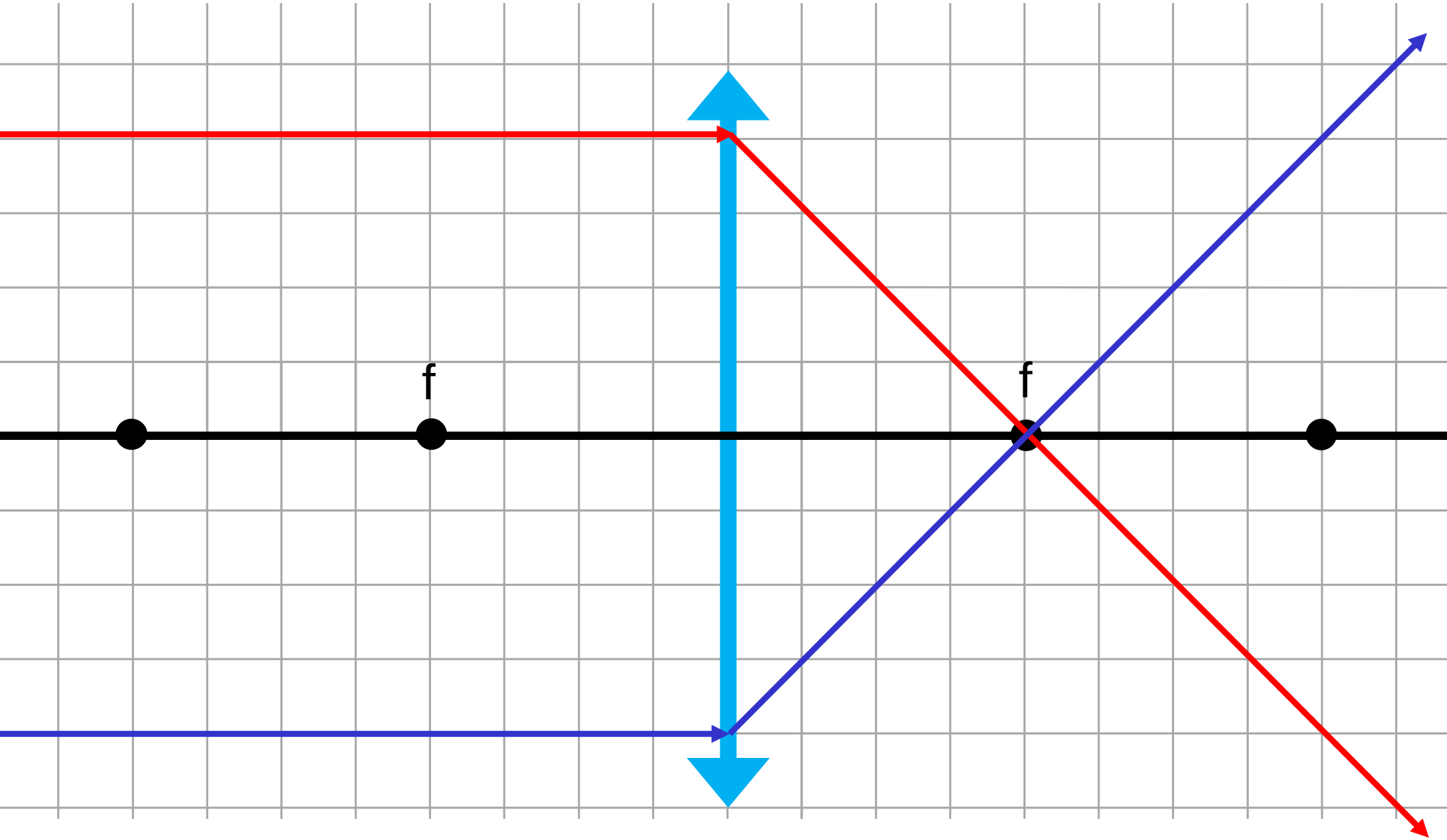
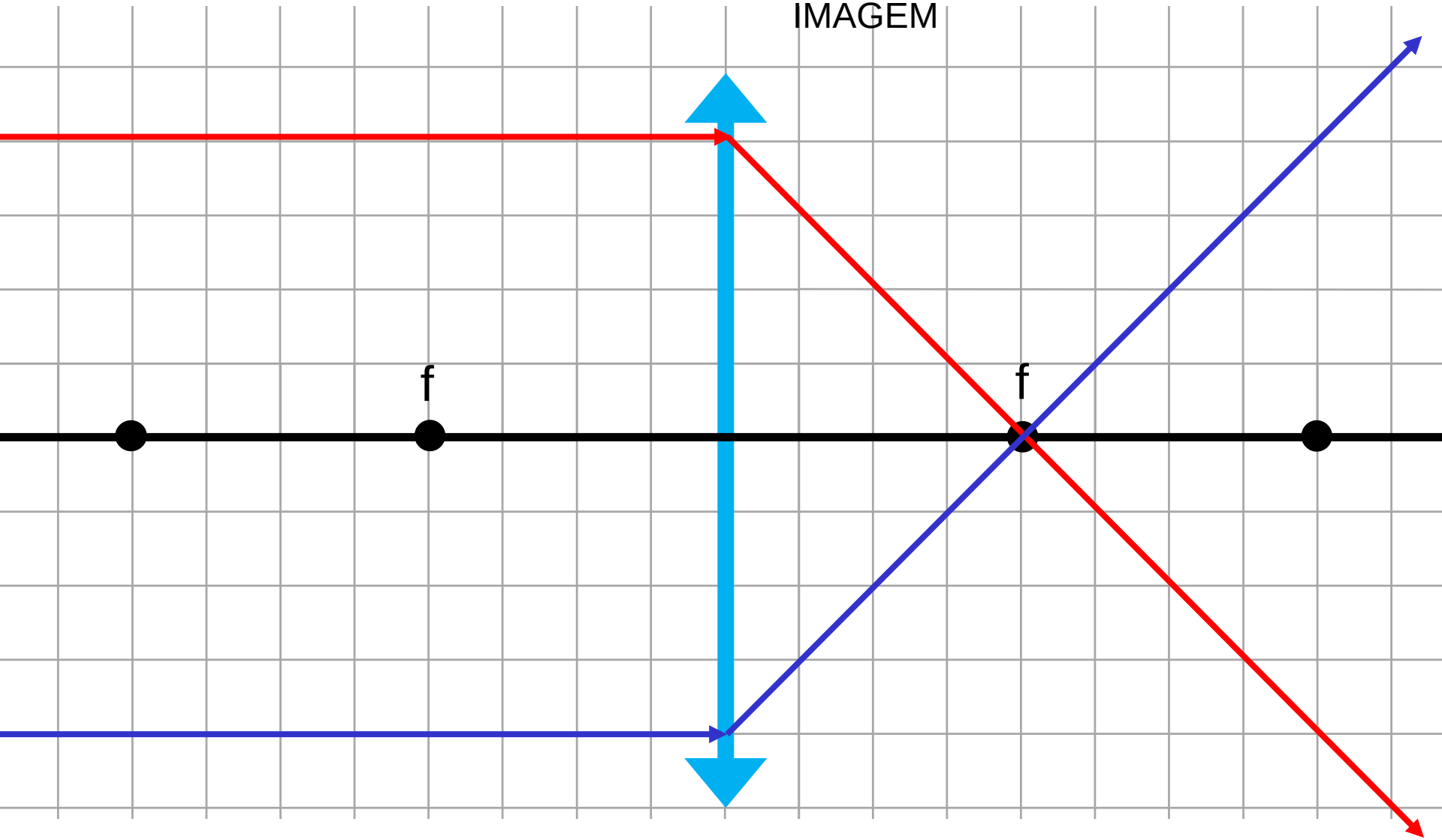
CLASSIFICAÇÃO: Imagem

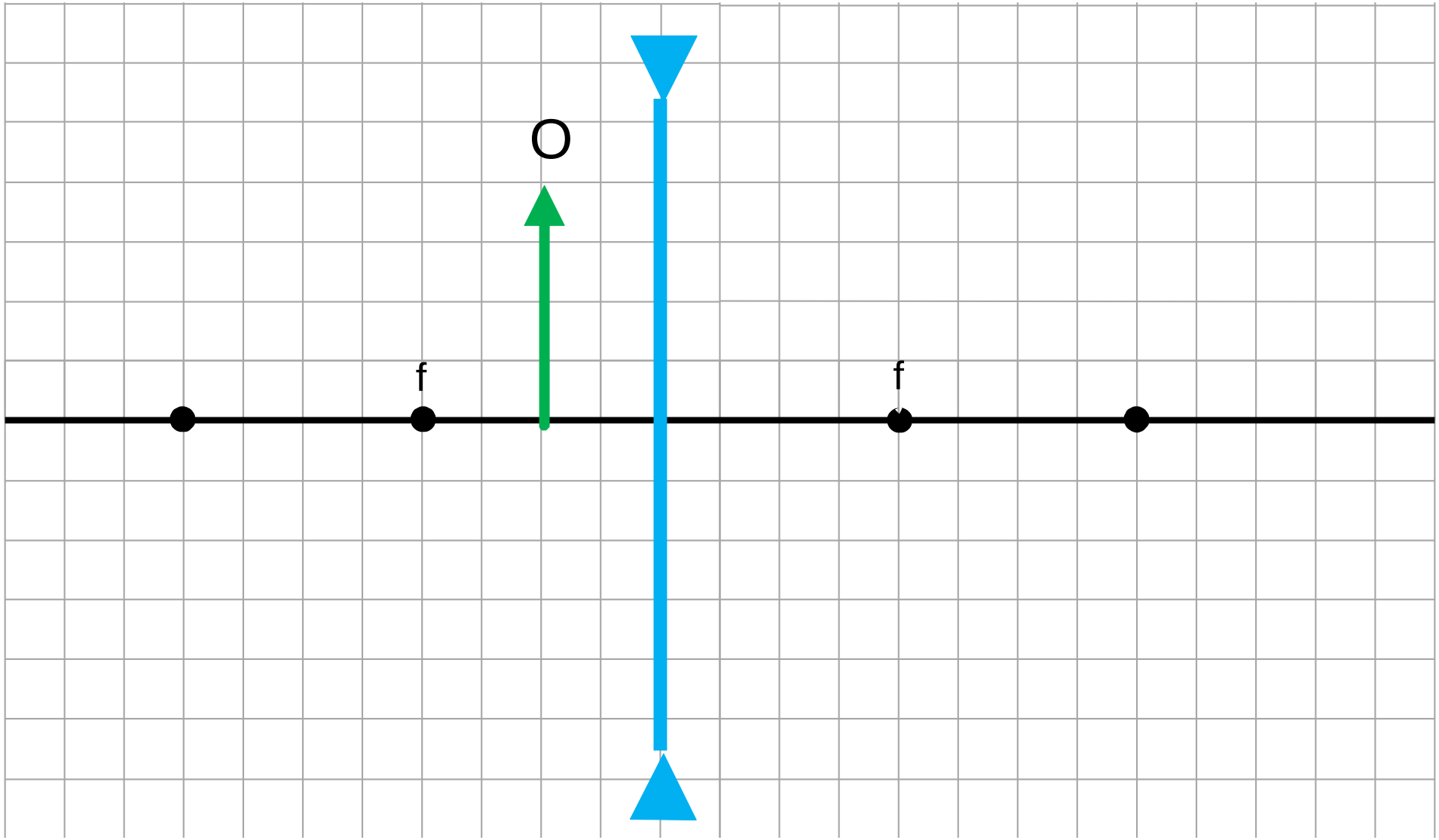


CLASSIFICAÇÃO: Imagem PONTUAL, REAL E LOCALIZADA NO FOCO IMAGEM



LENTES DIVERGENTES

Primeiro caso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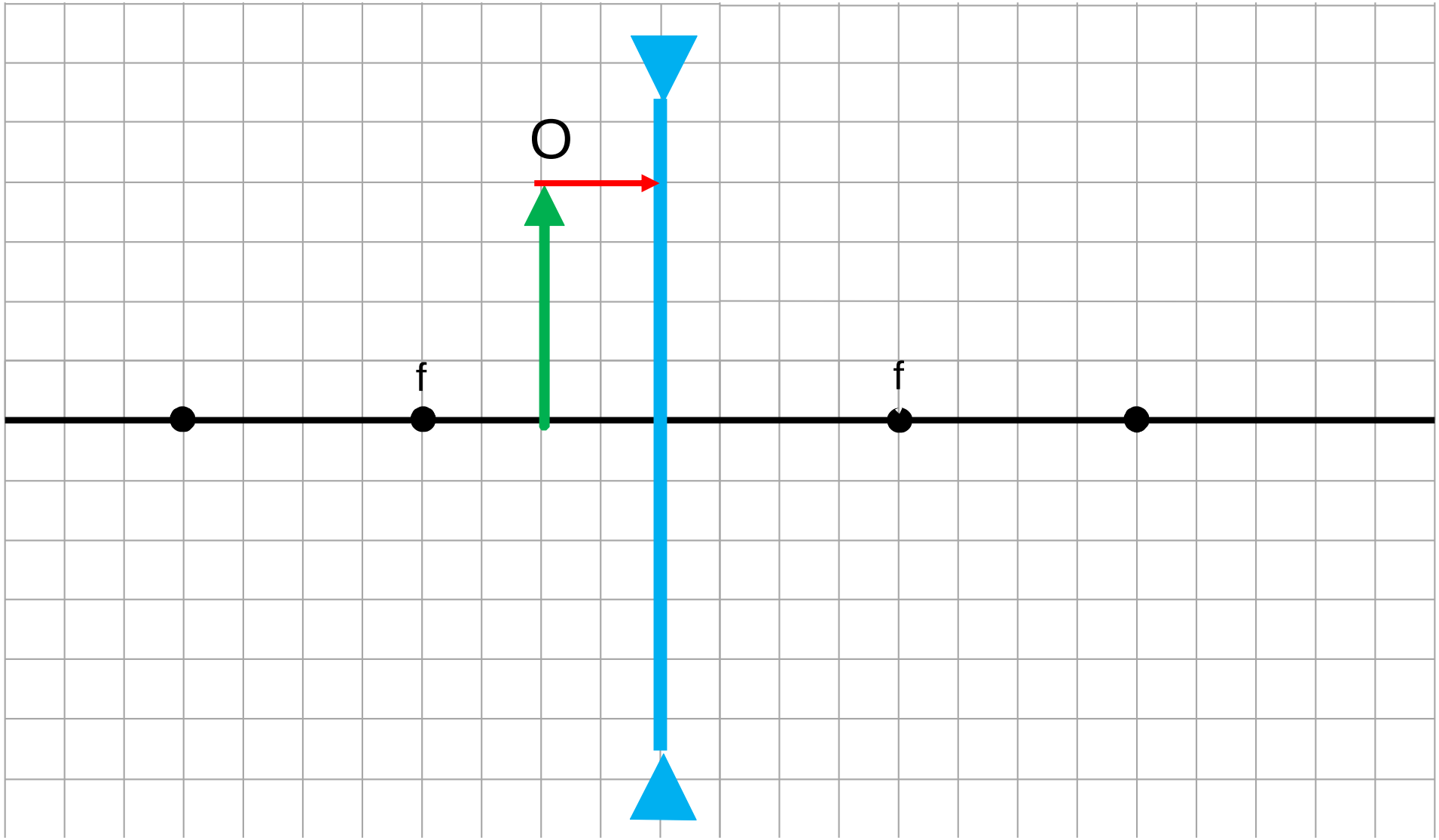
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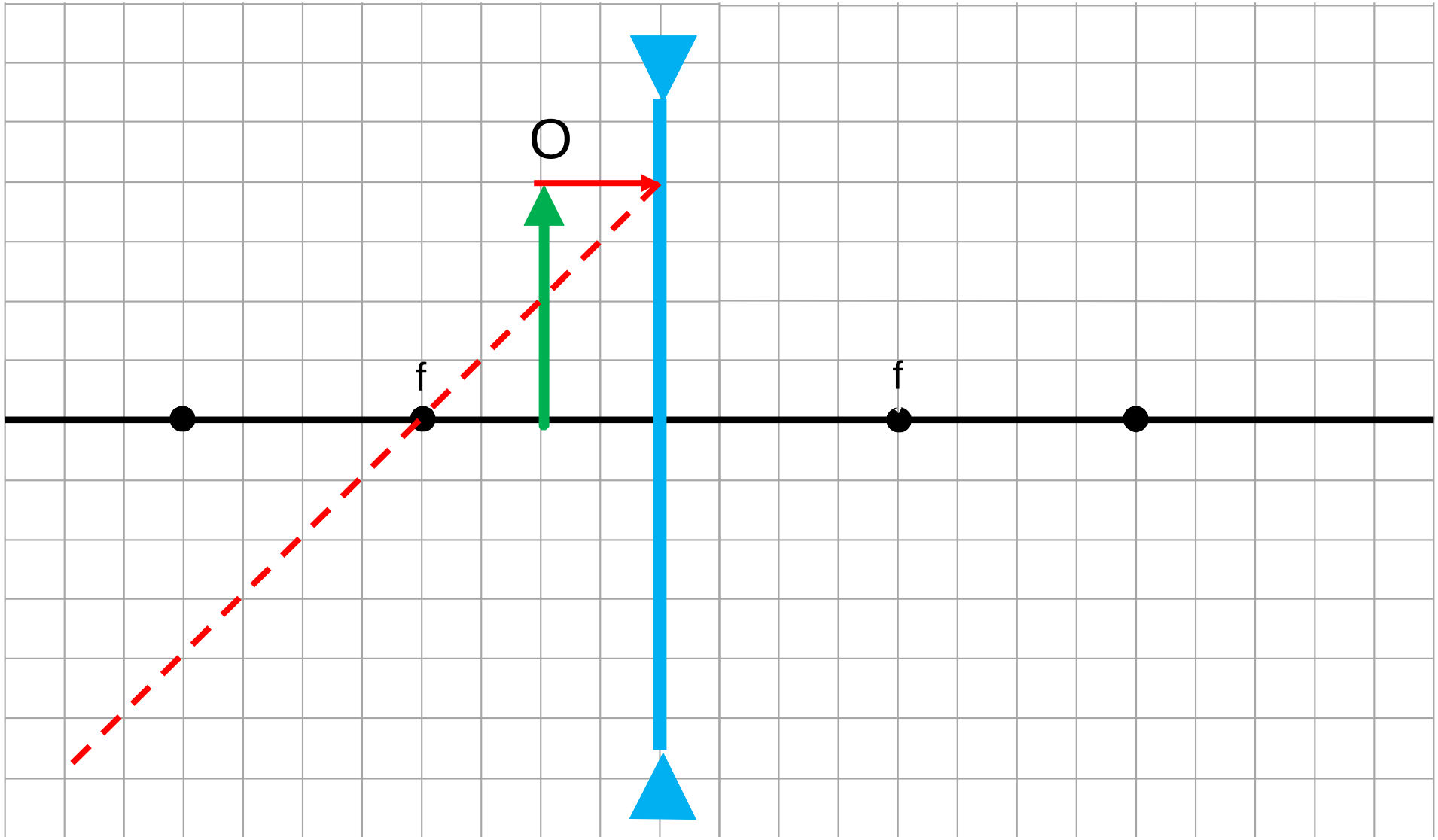
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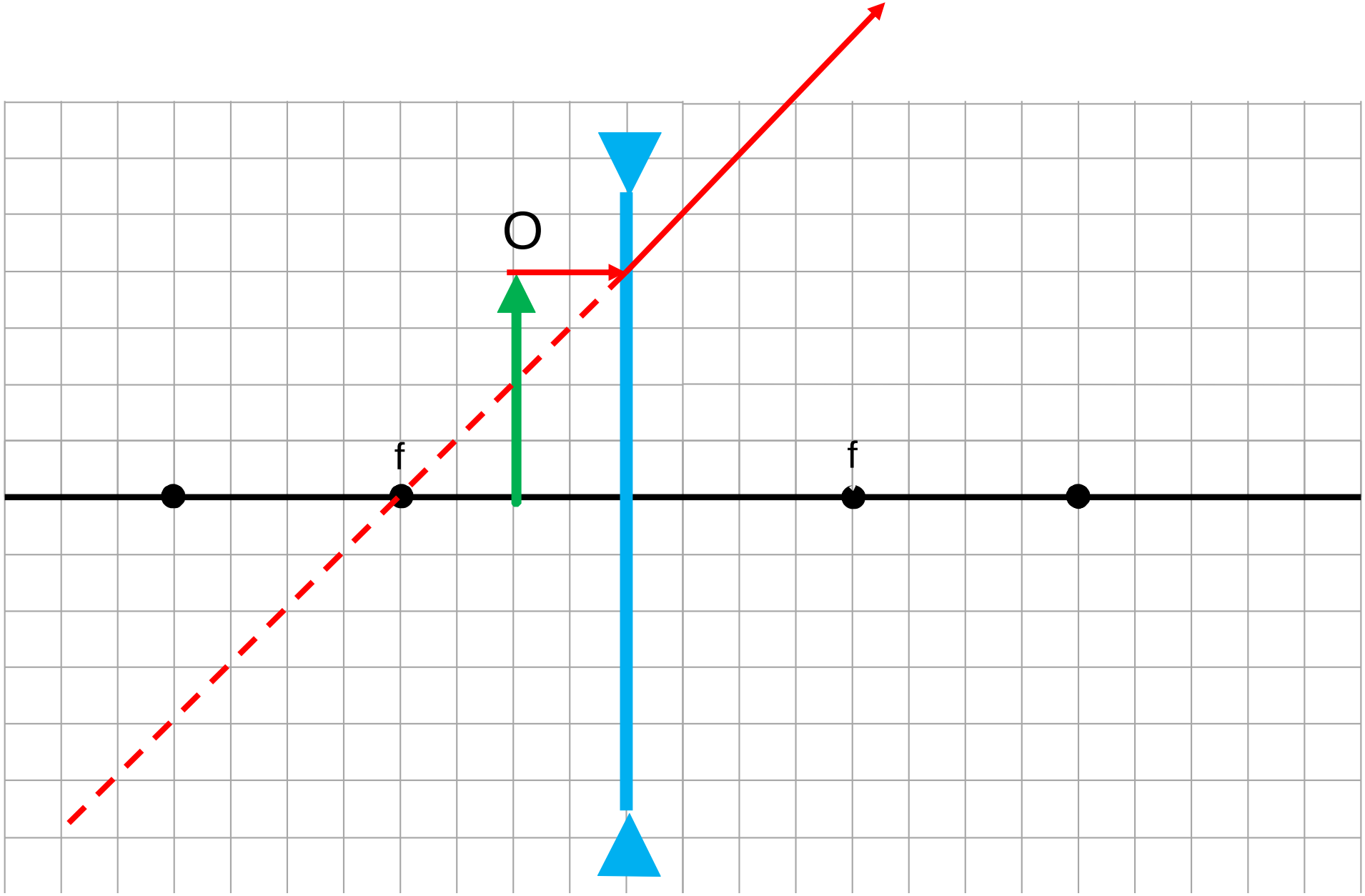
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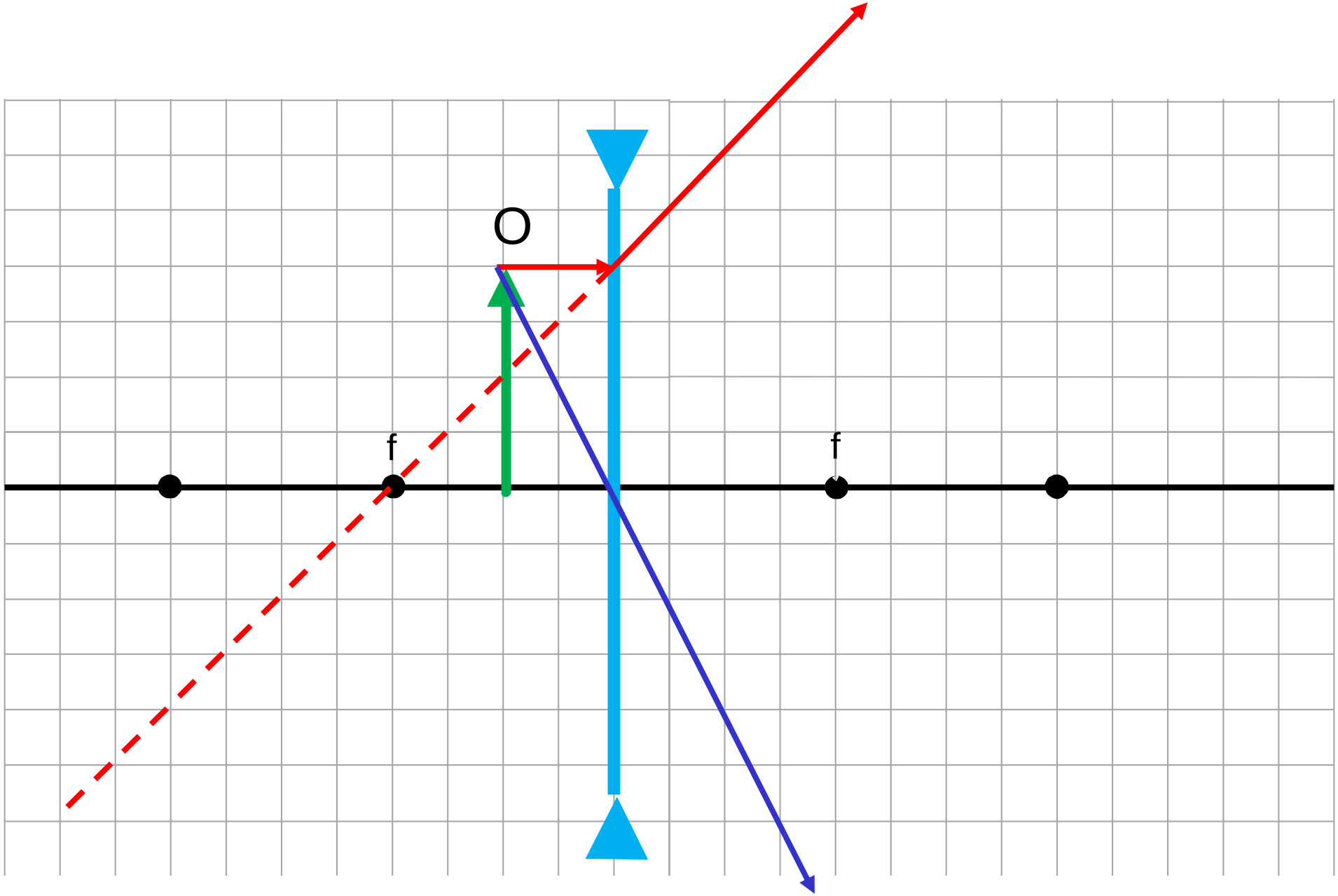
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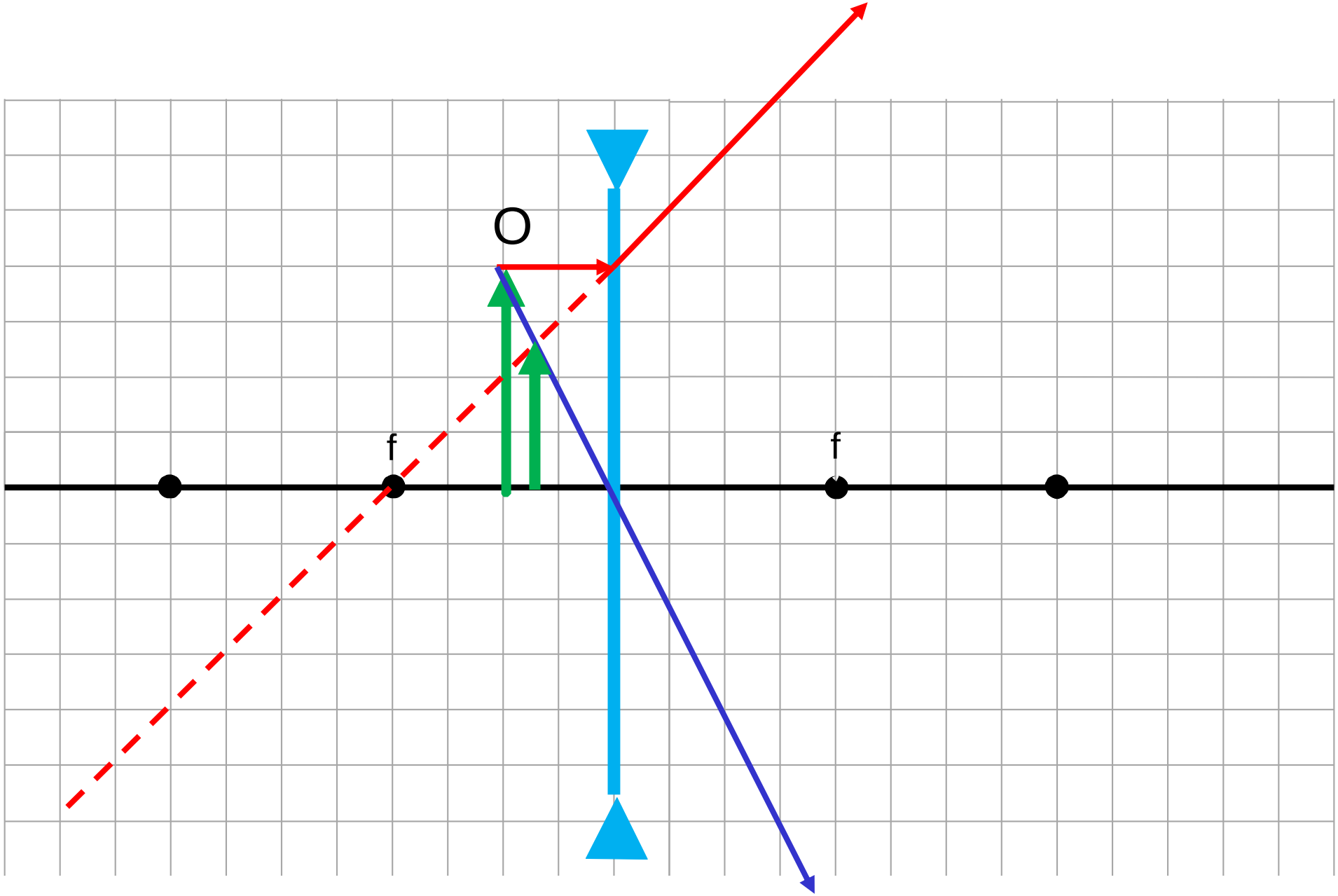
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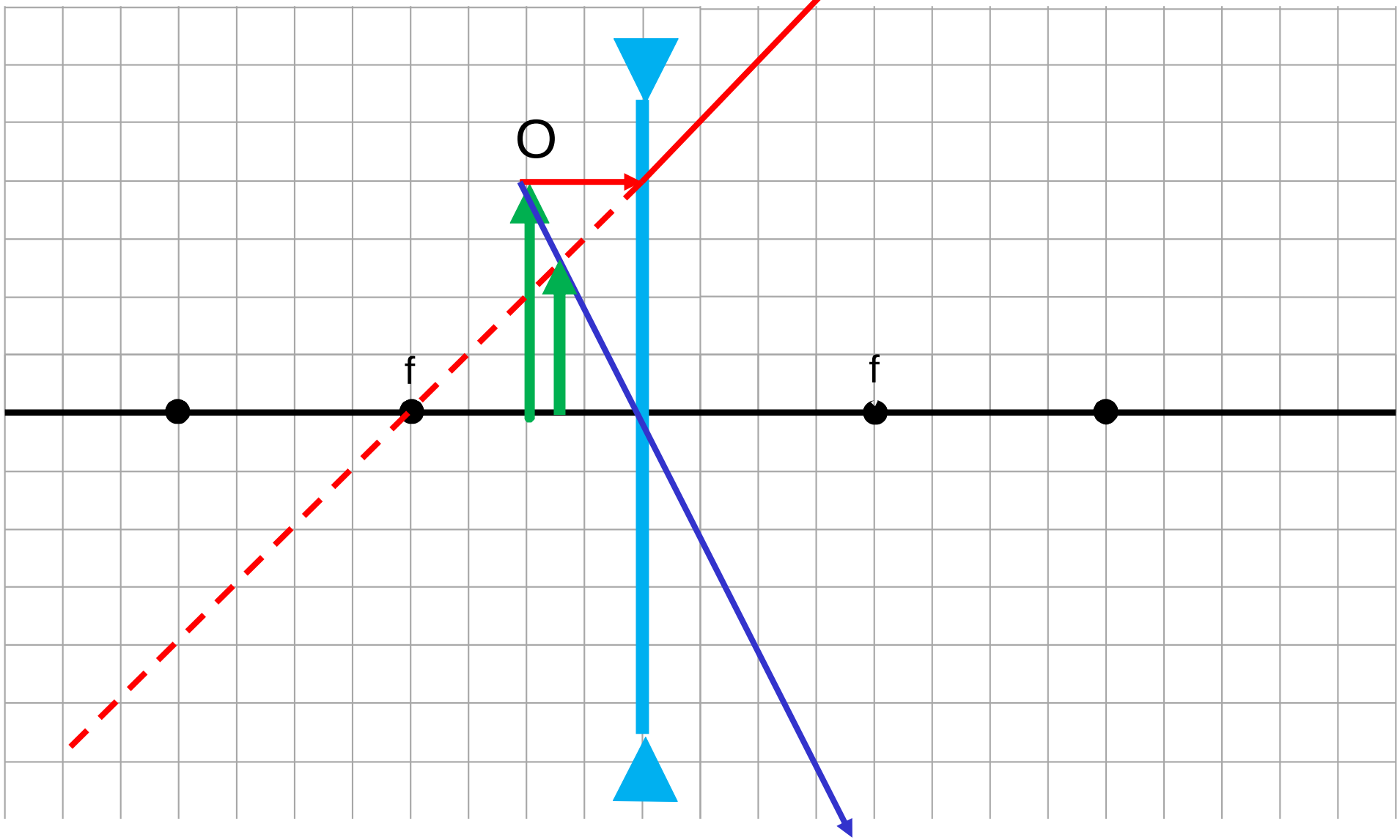
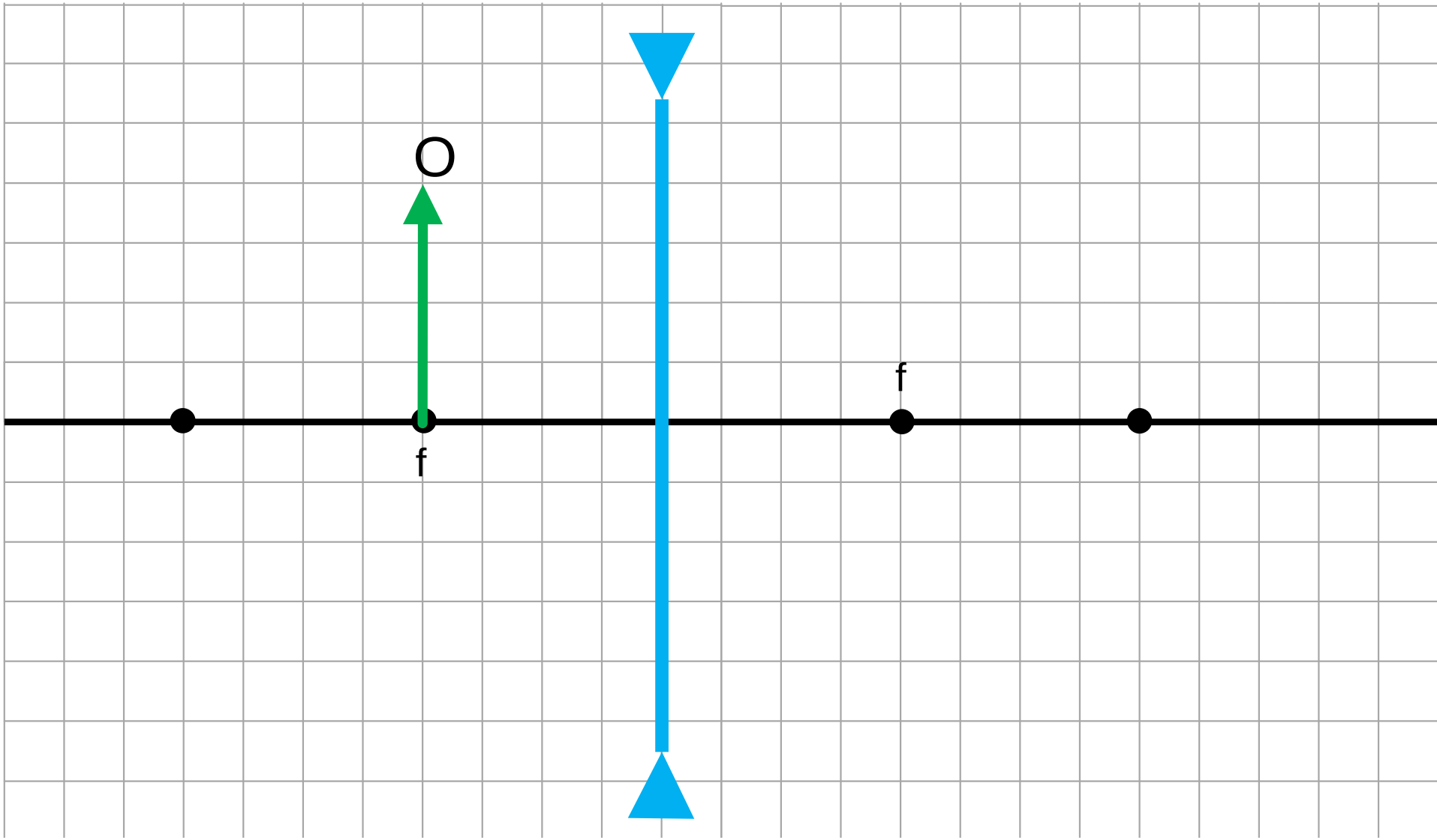
CLASSIFICAÇÃO: Imagem VIRTUAL
DIREITA
MENOR



Segundo caso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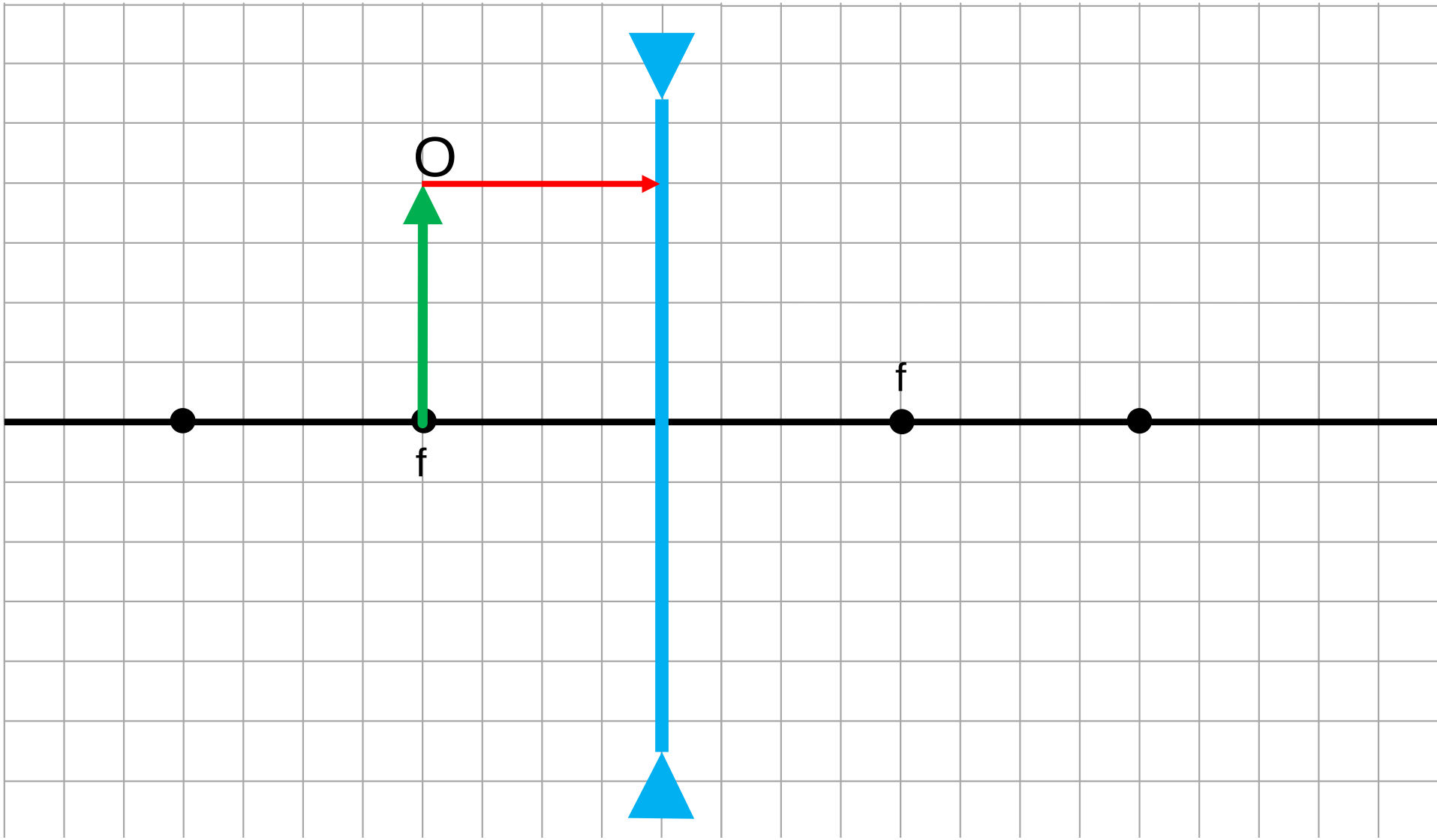
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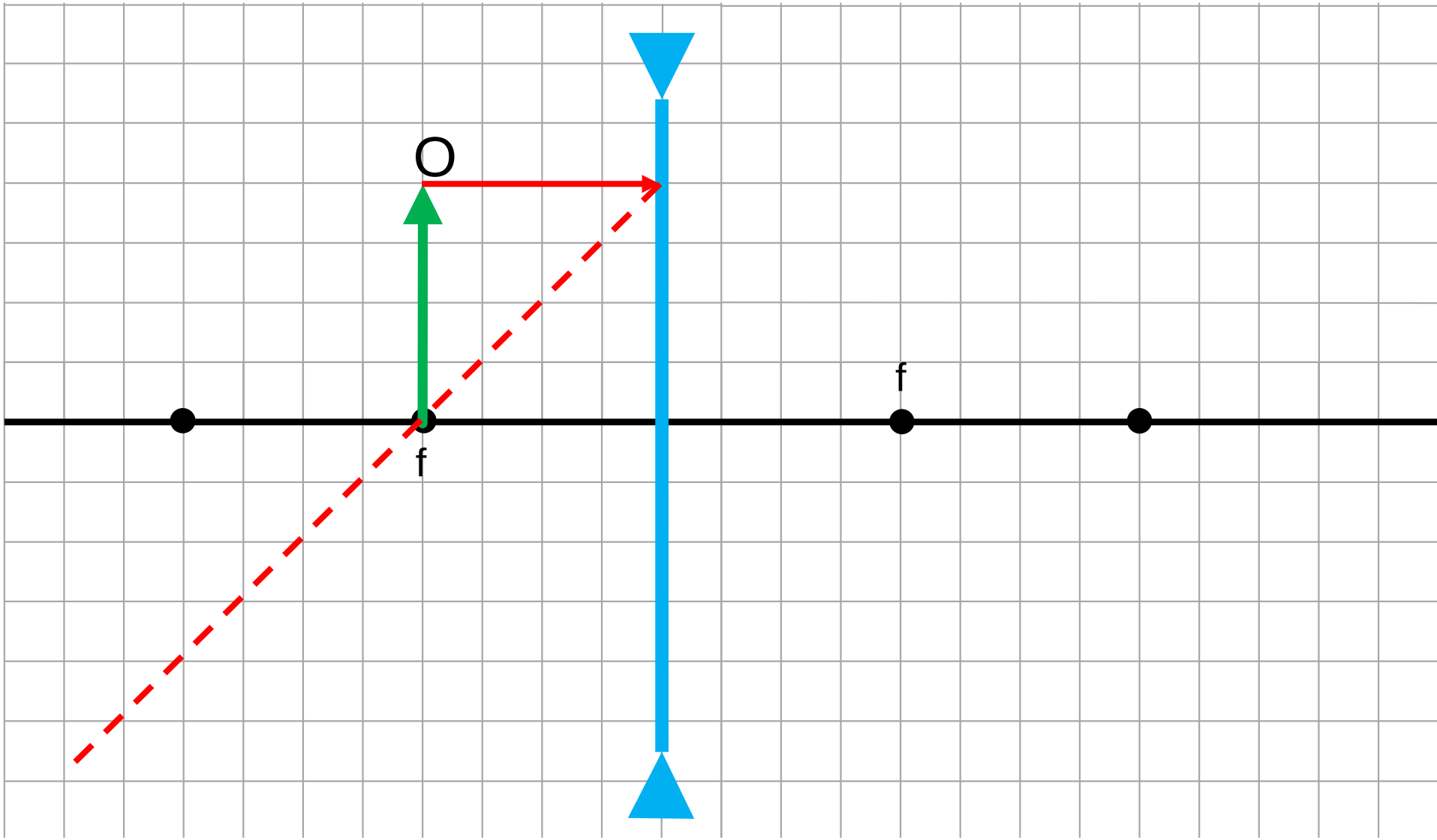
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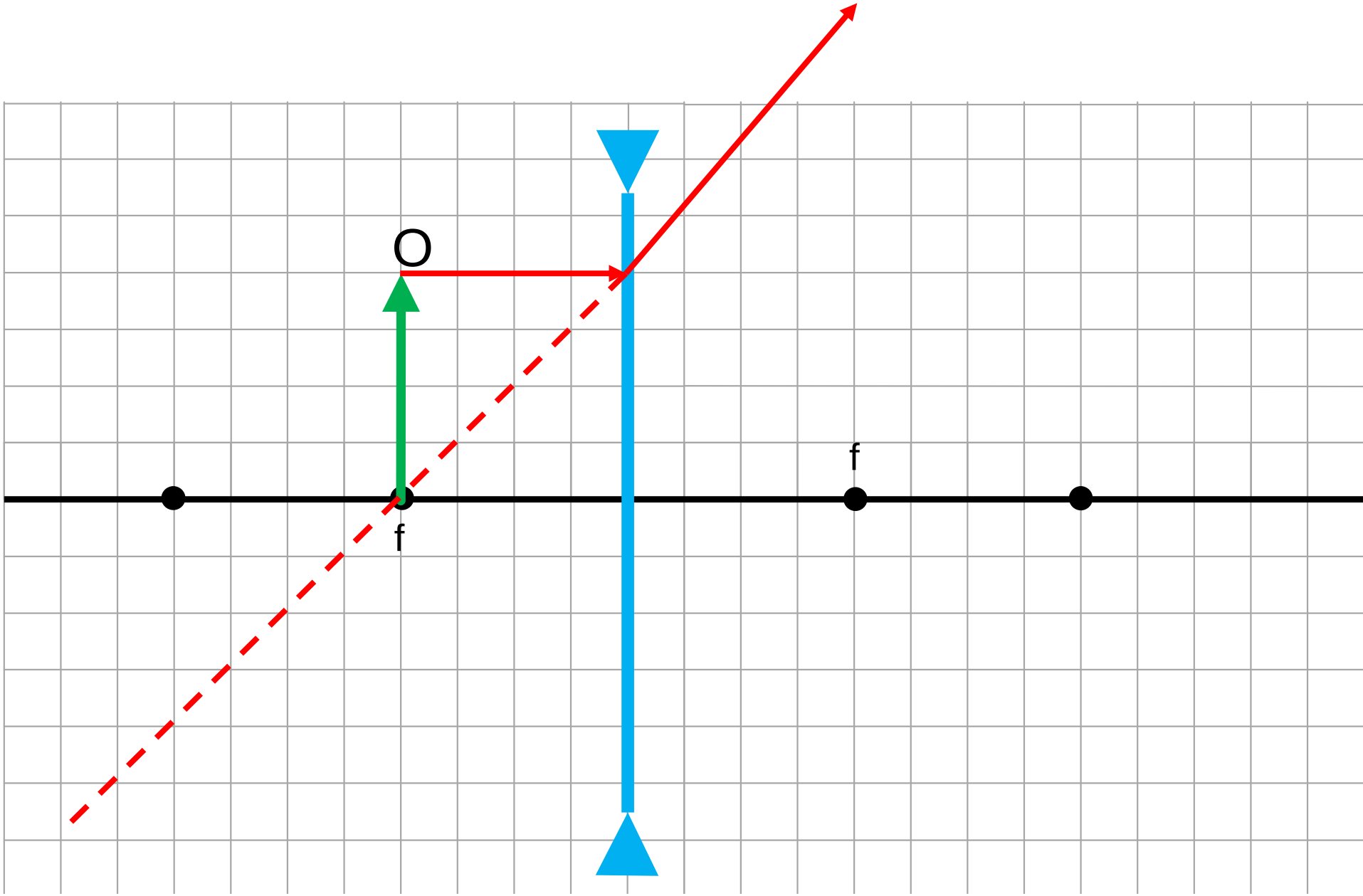
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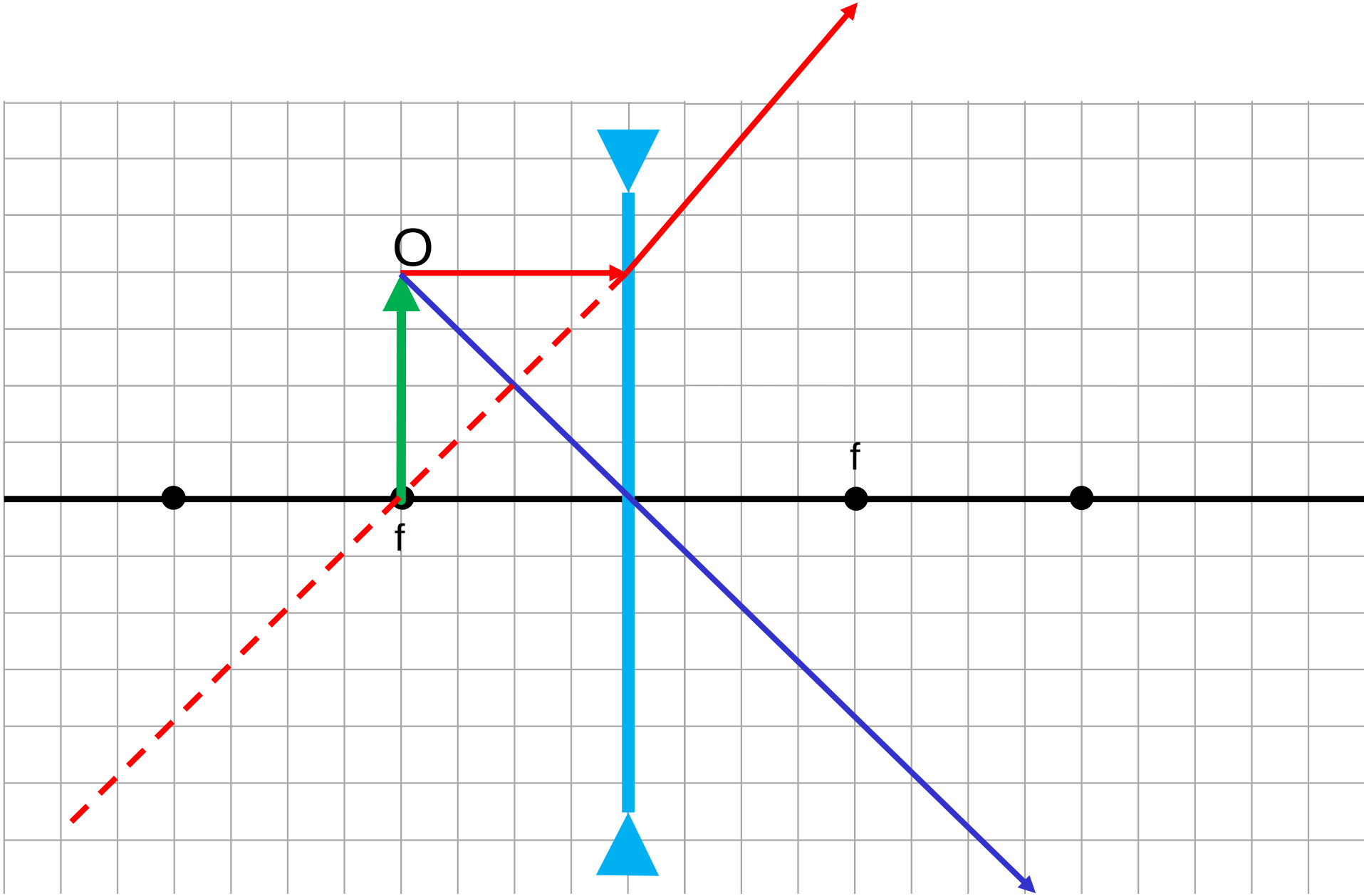
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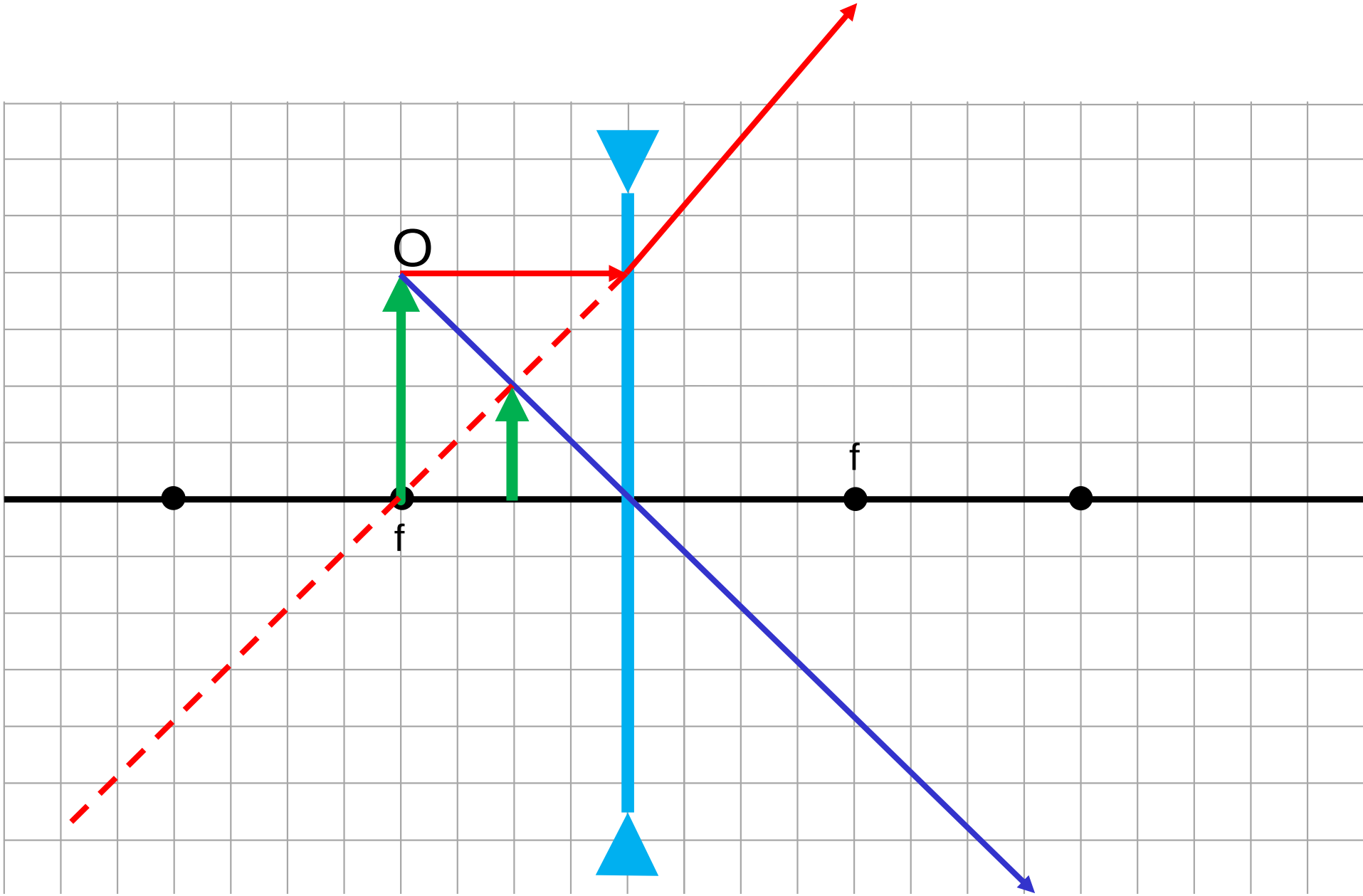
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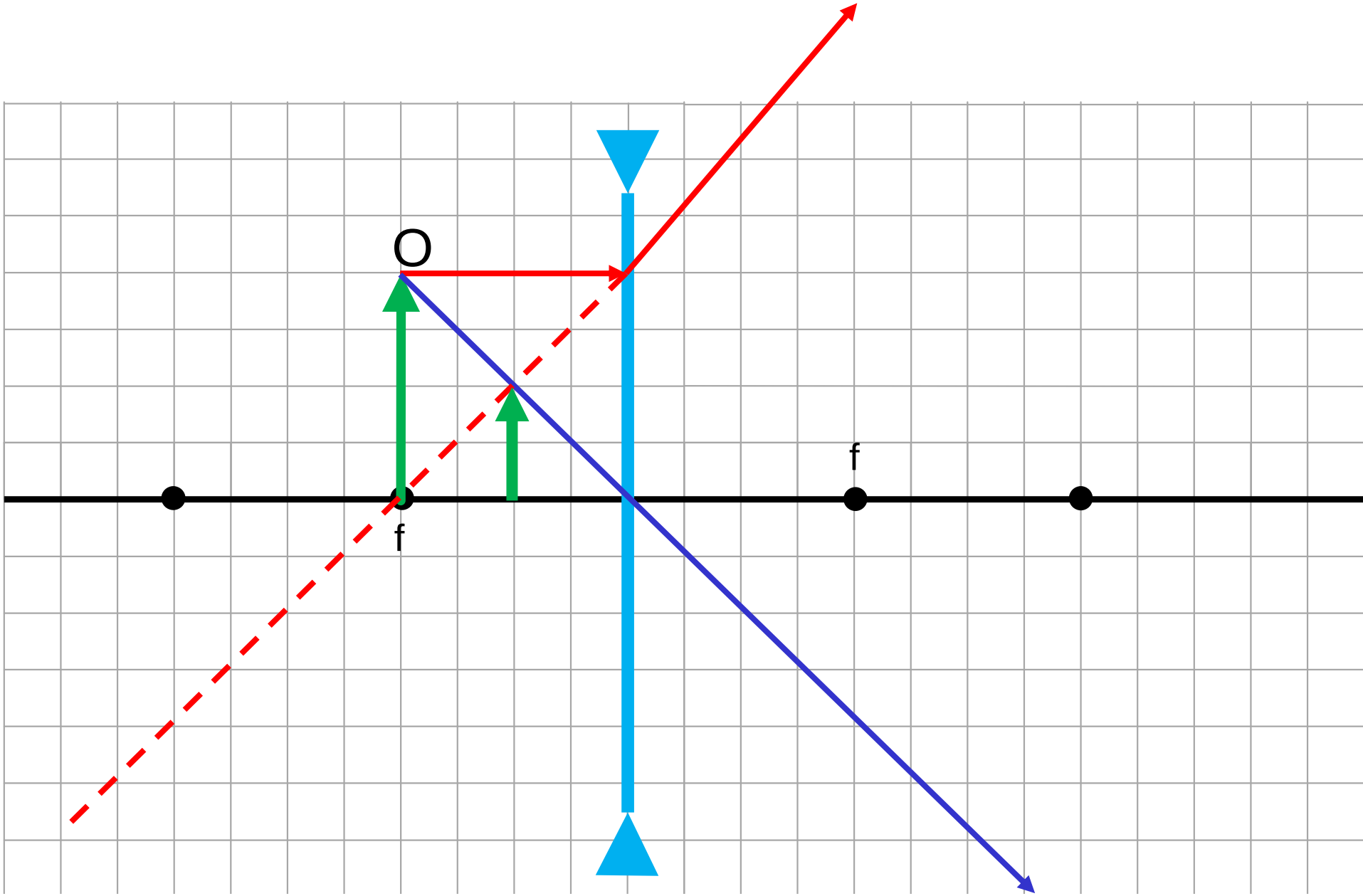
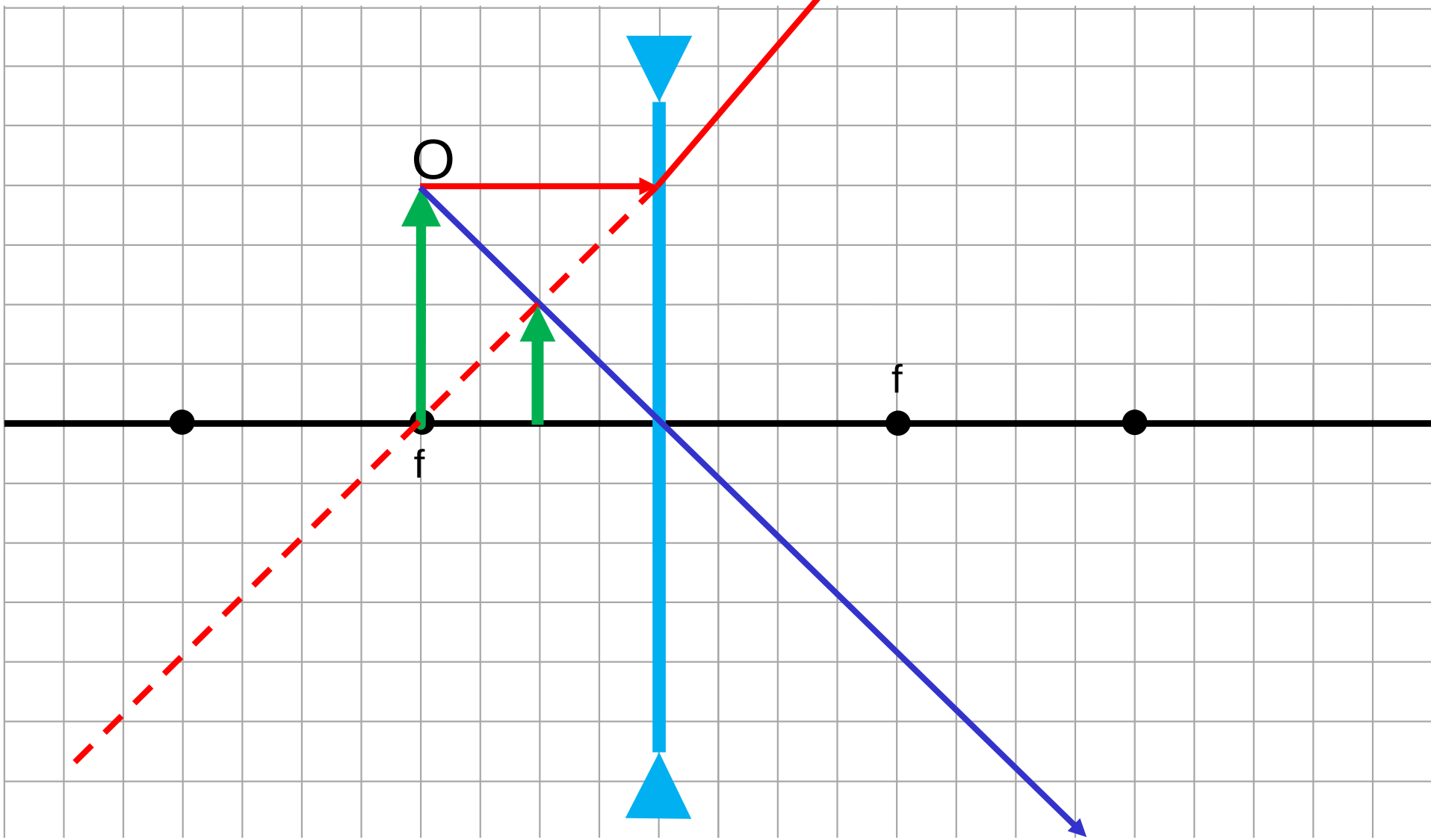
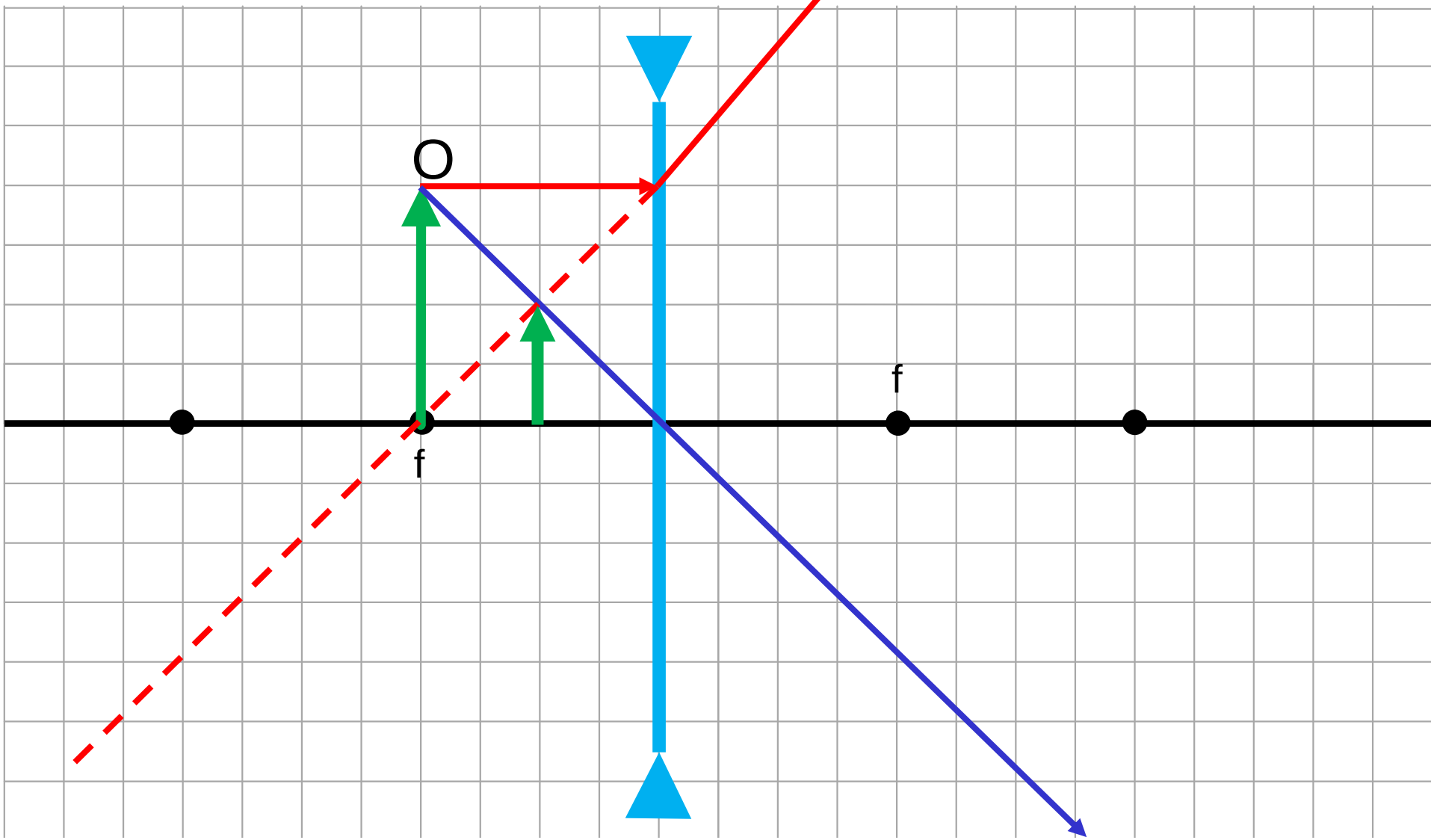
CLASSIFICAÇÃO: Imagem VIRTUAL



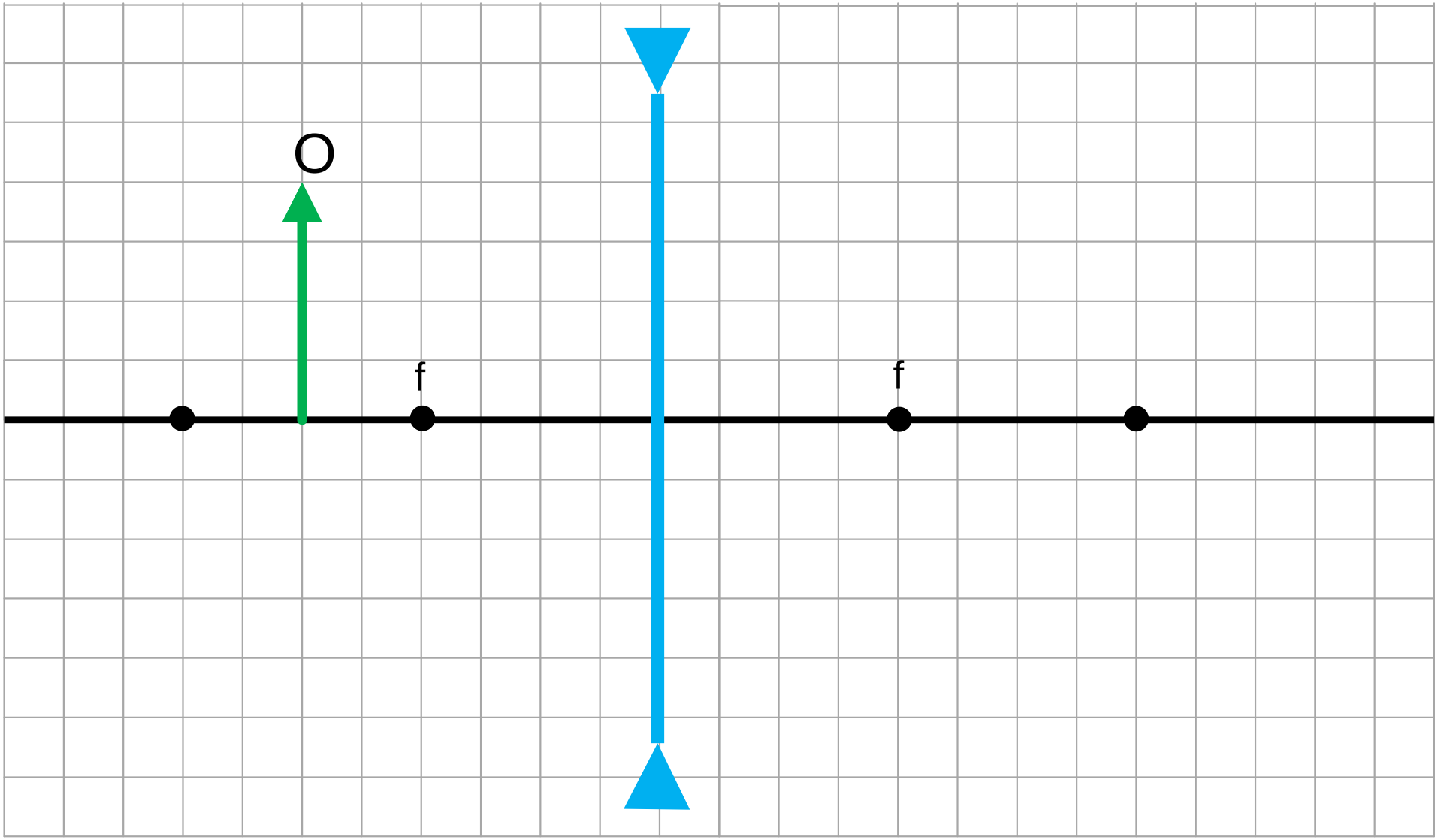
CLASSIFICAÇÃO: Imagem VIRTUAL DIREITA



CLASSIFICAÇÃO: Imagem VIRTUAL
DIREITA
MENOR



Terceiro caso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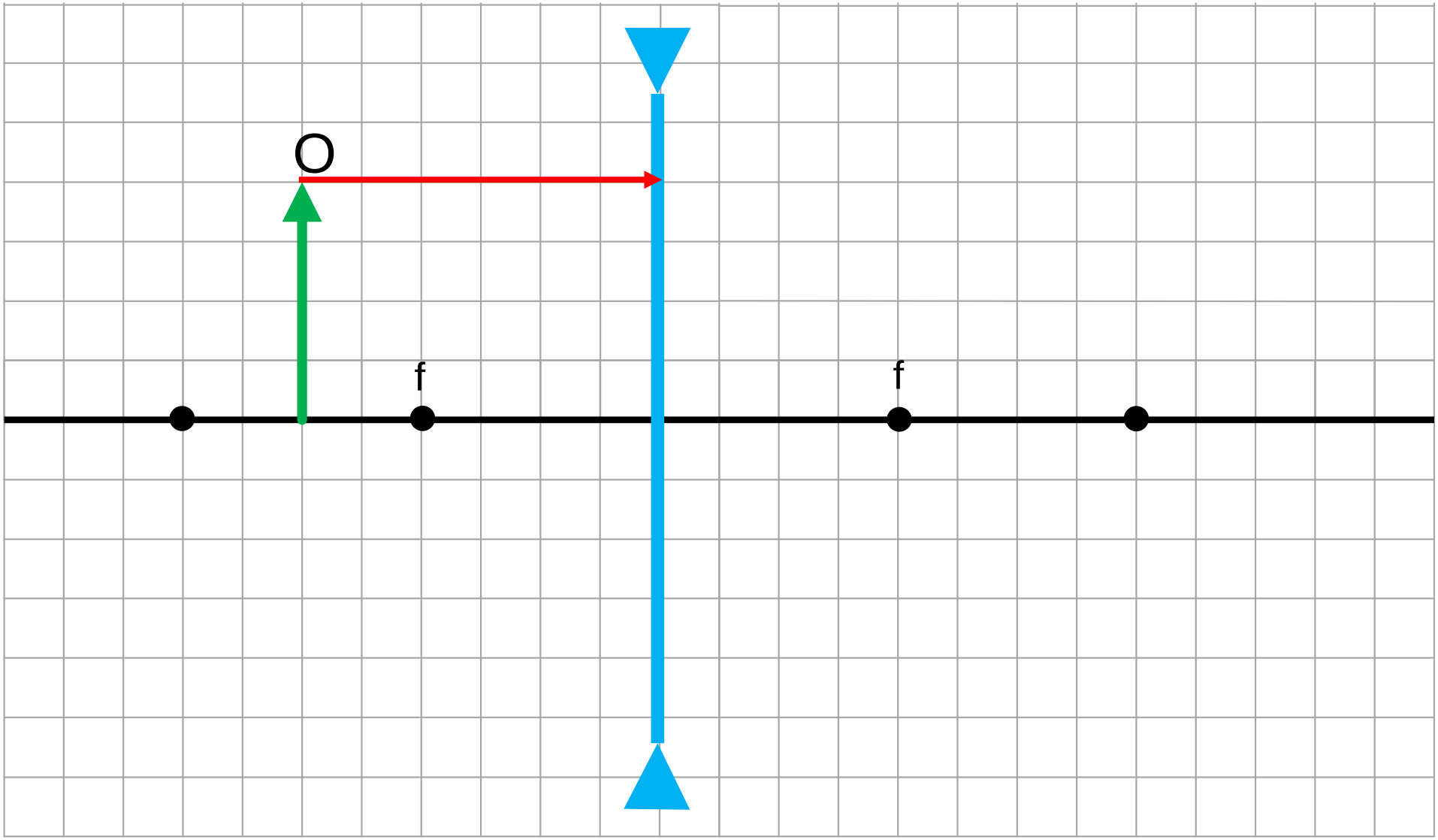
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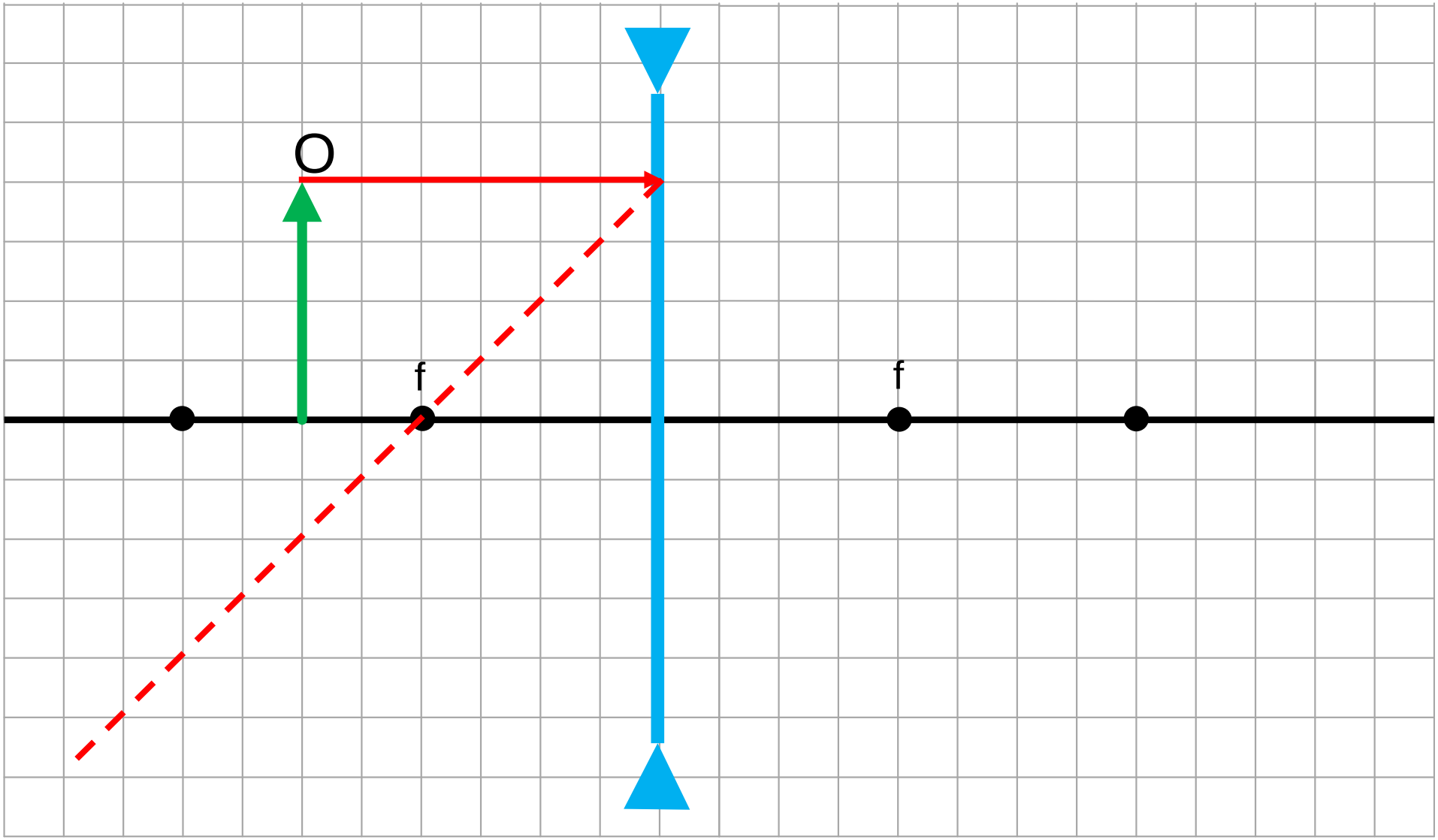
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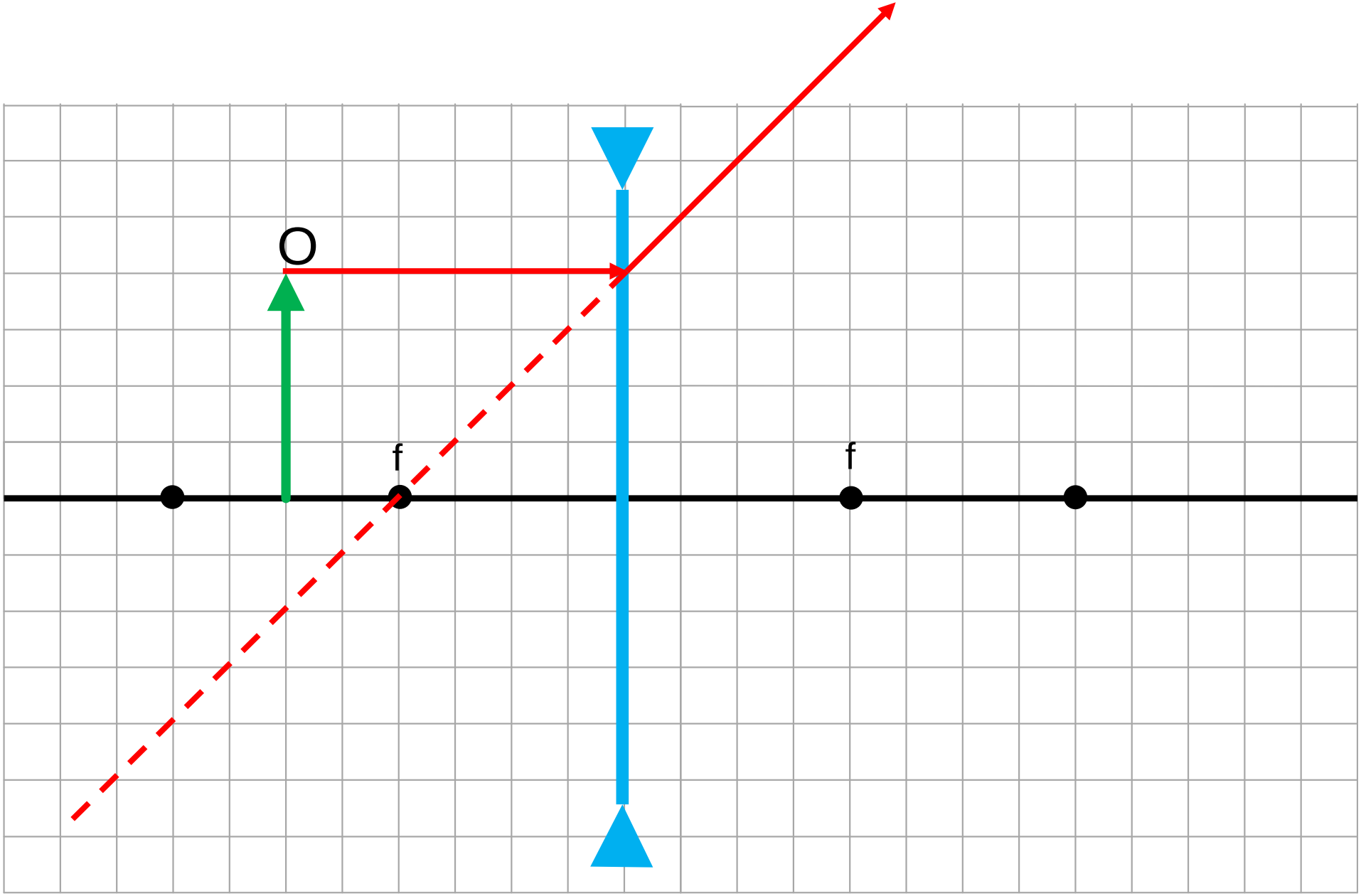
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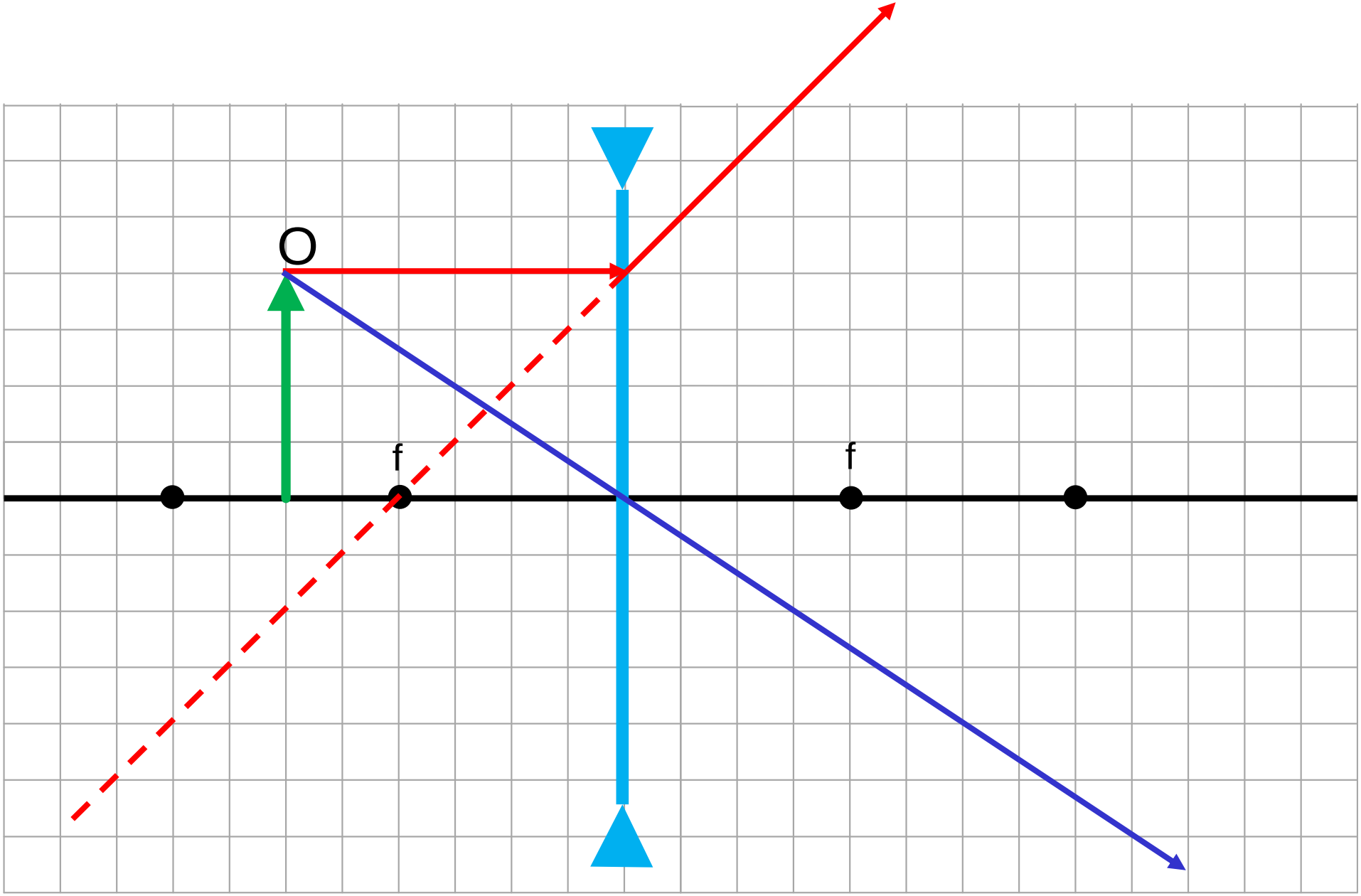
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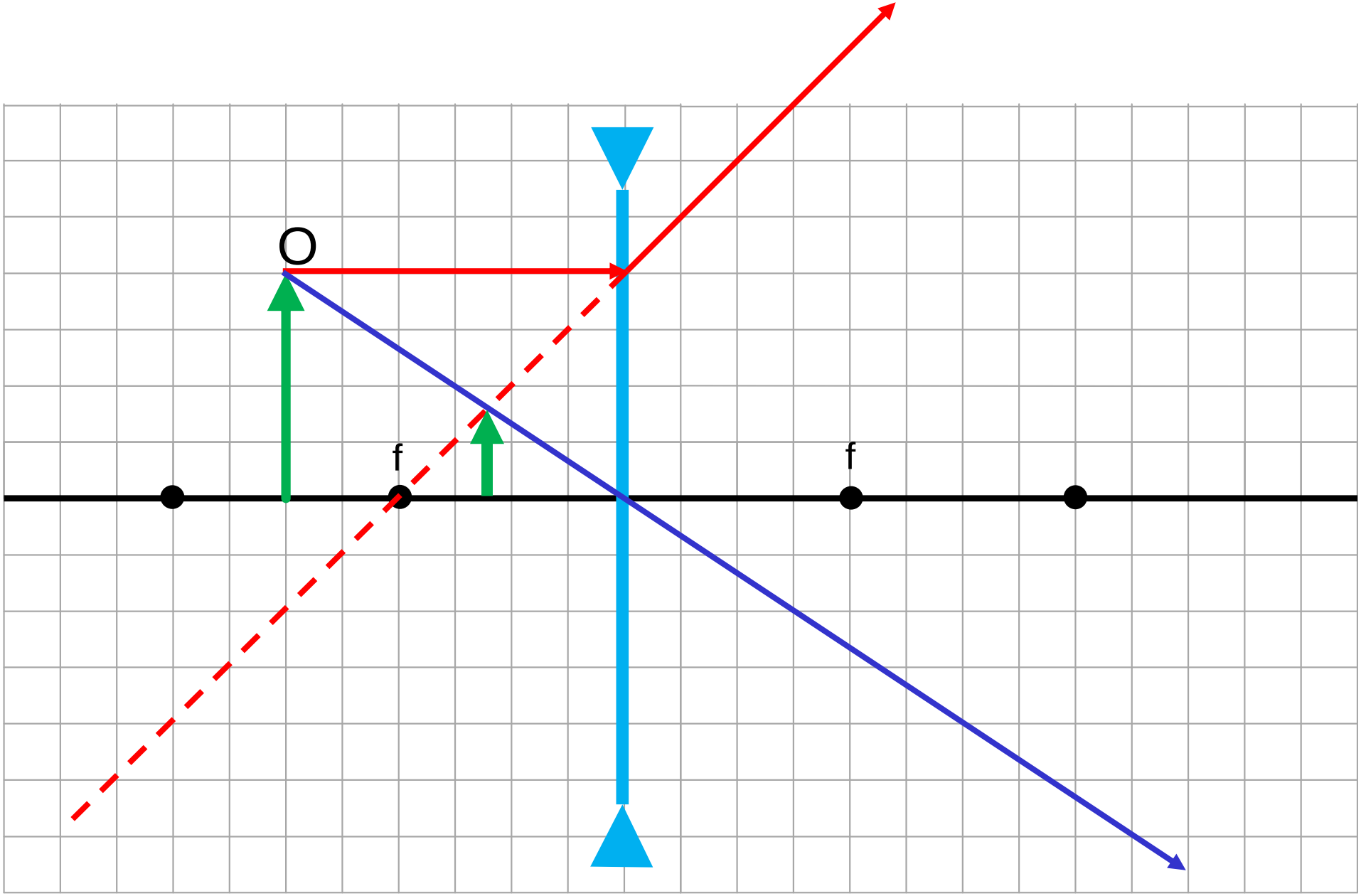
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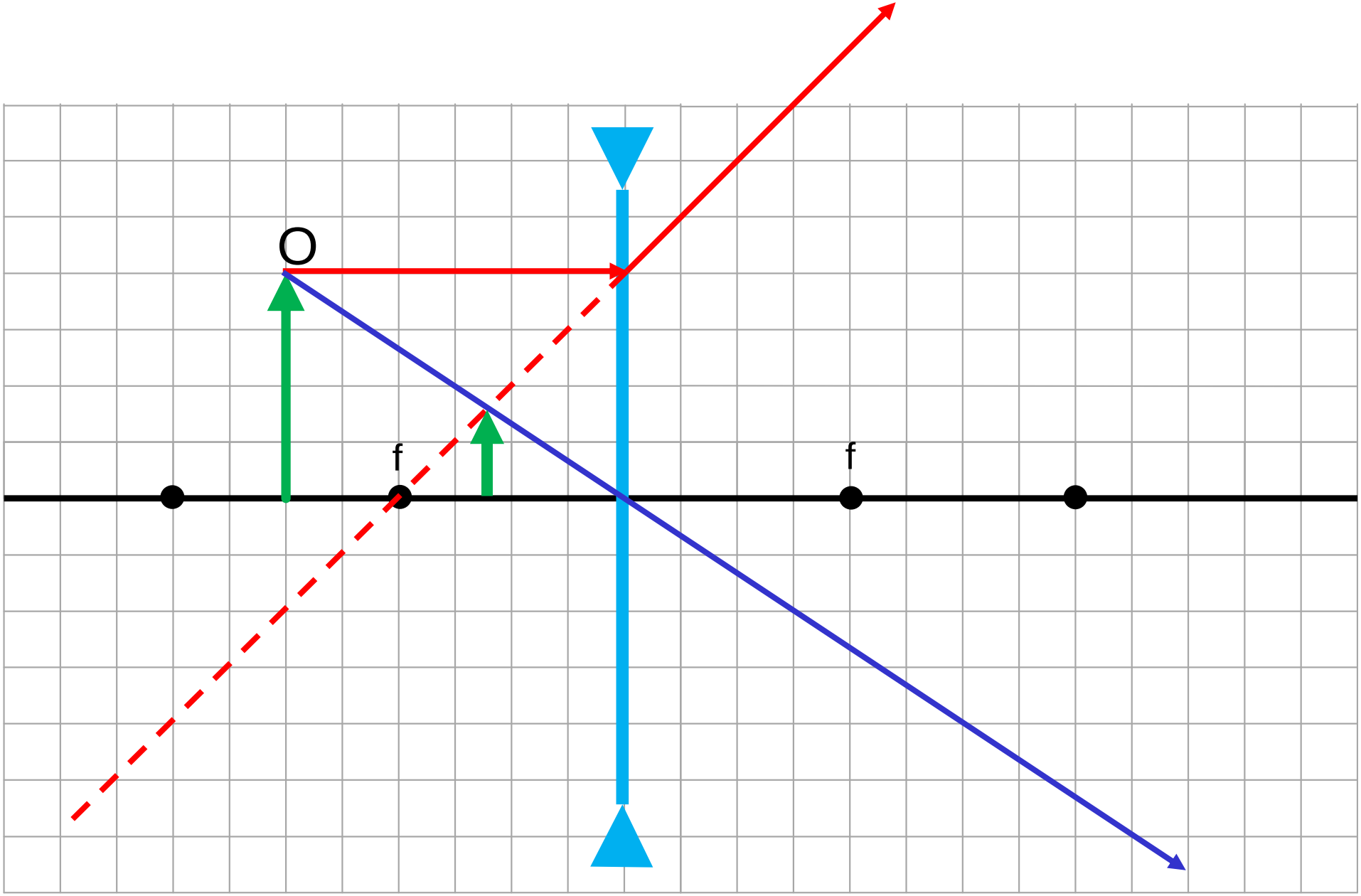
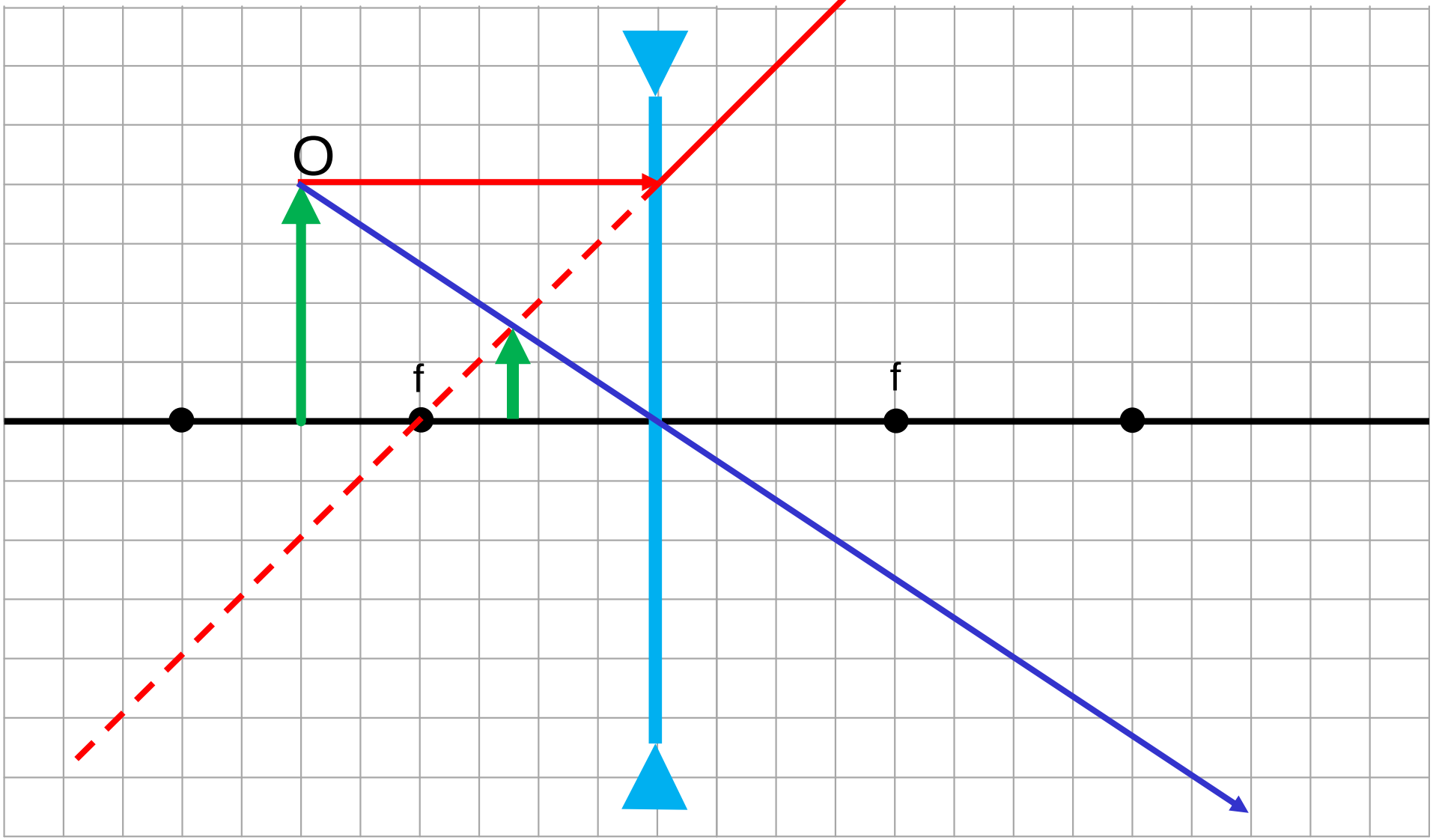
CLASSIFICAÇÃO: Imagem VIRTUAL



CLASSIFICAÇÃO: Imagem VIRTUAL DIREITA



CLASSIFICAÇÃO: Imagem VIRTUAL
DIREITA
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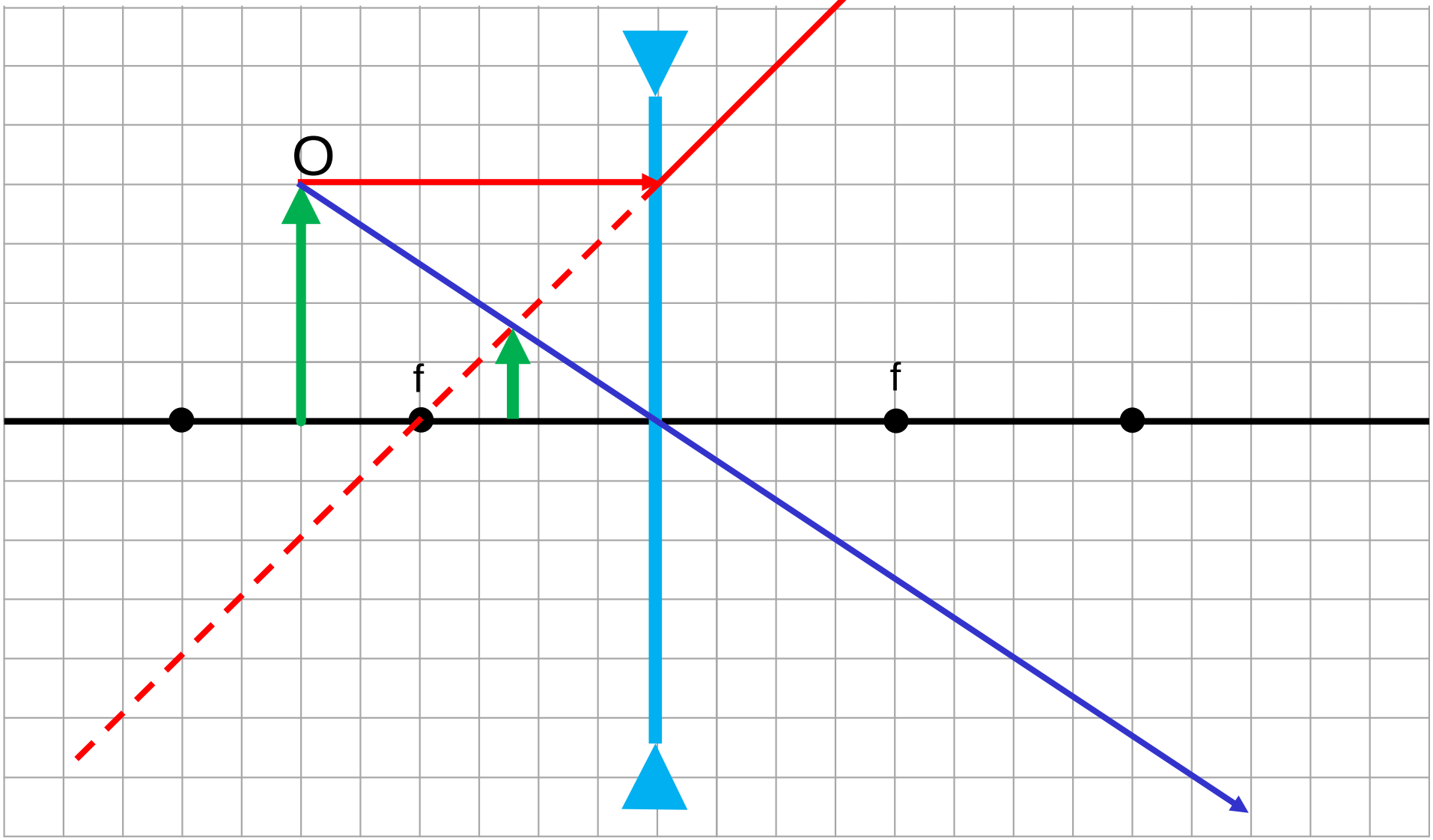
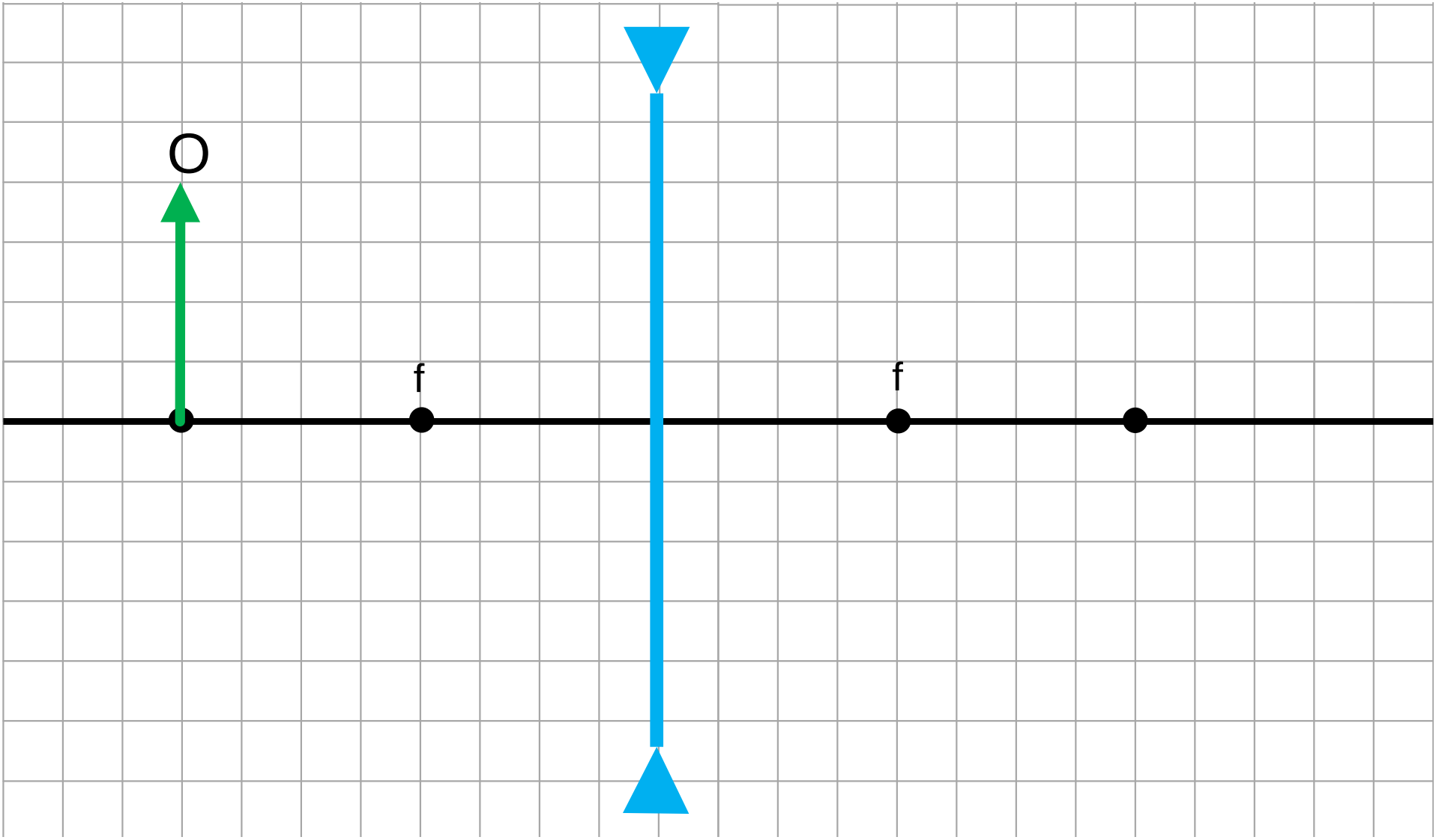


Quarto caso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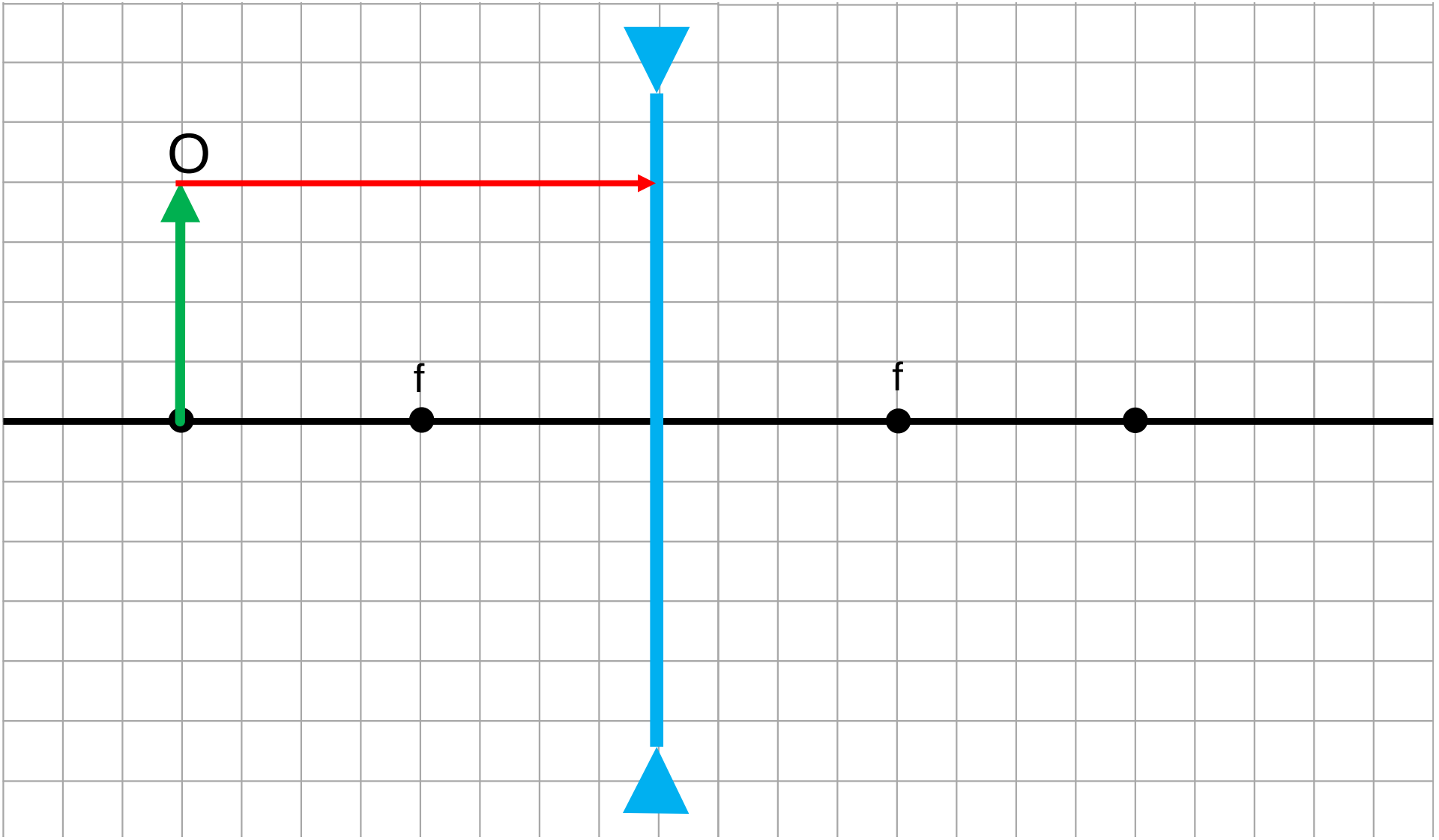
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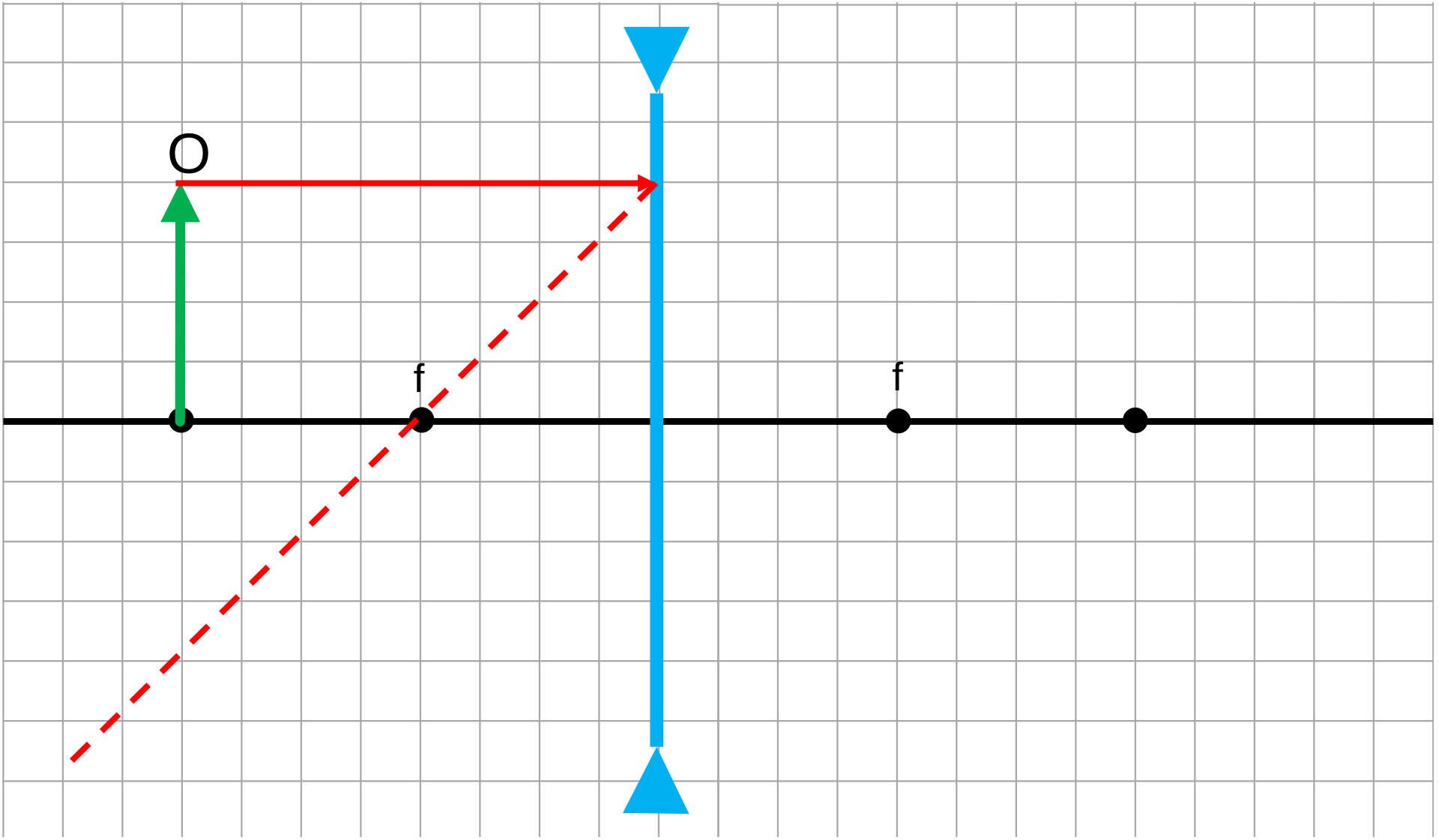
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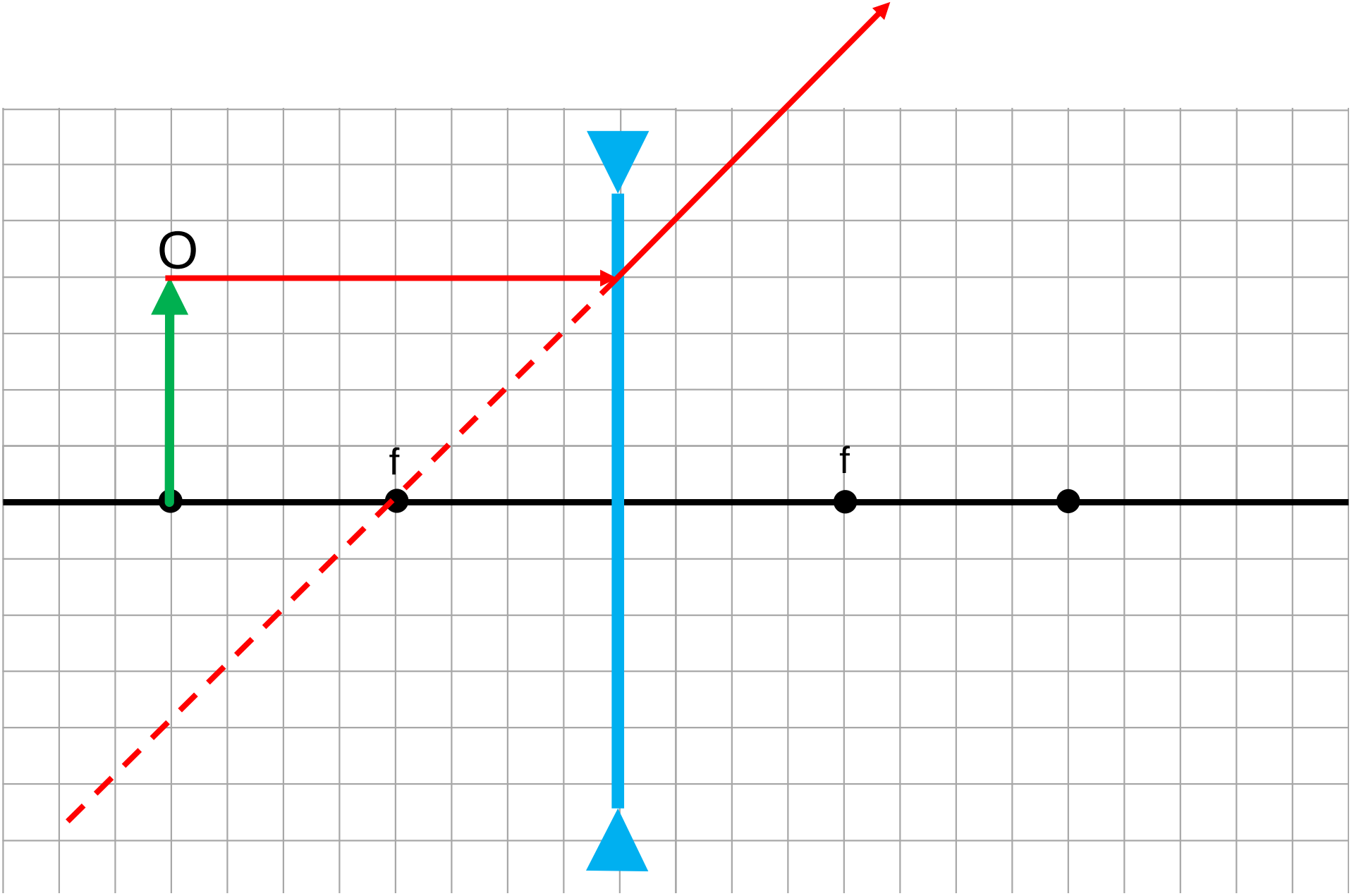
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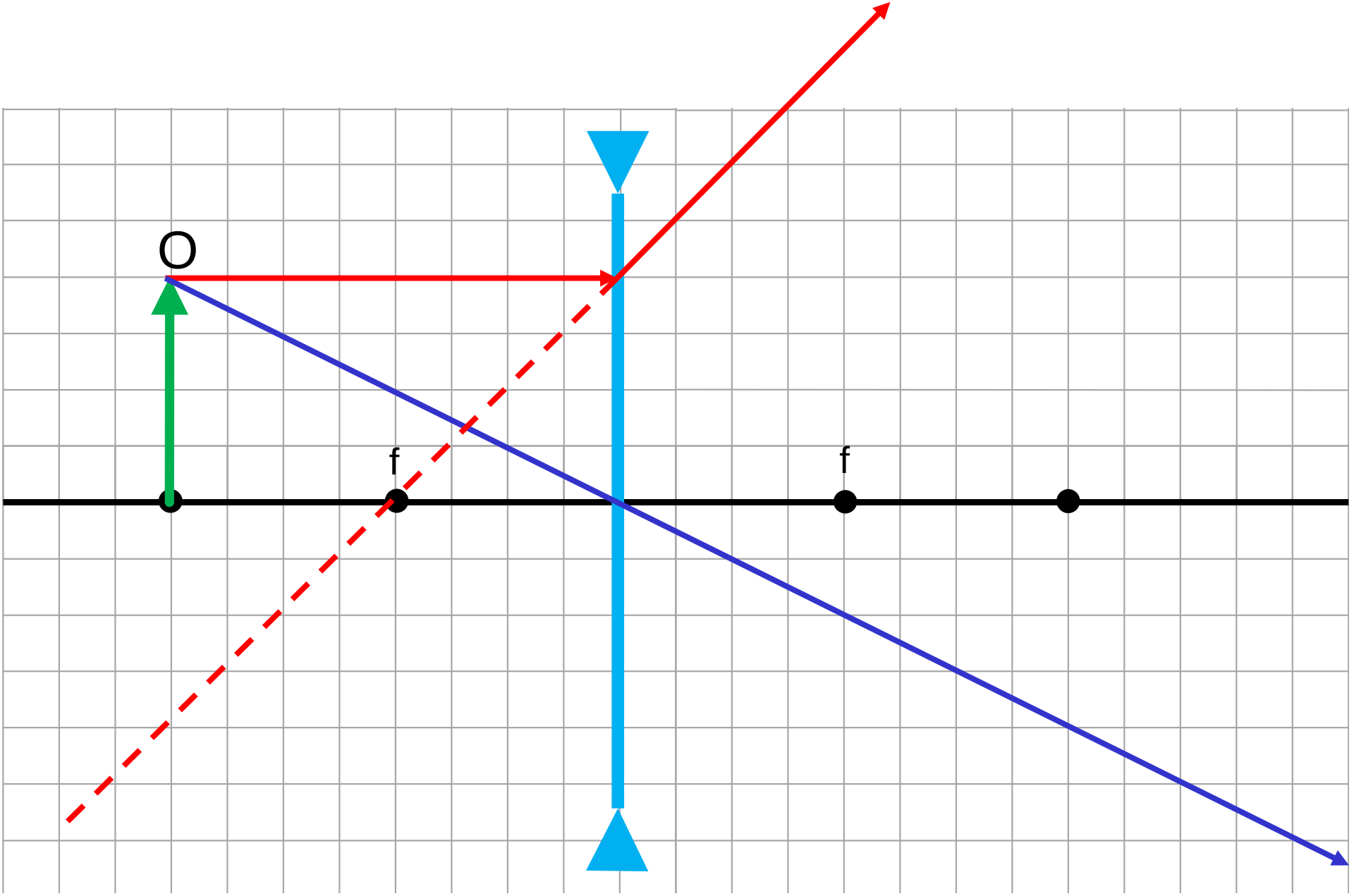
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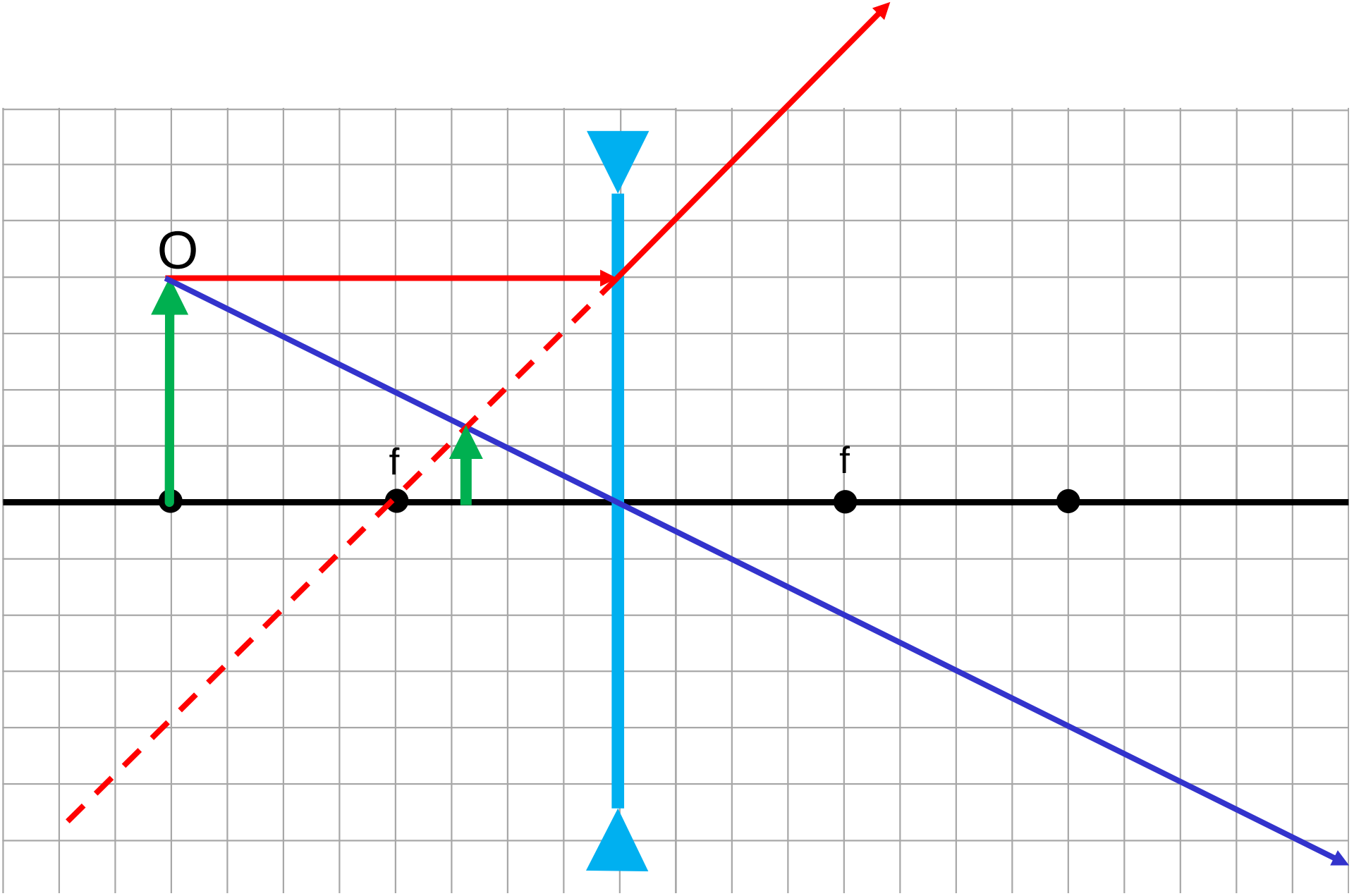
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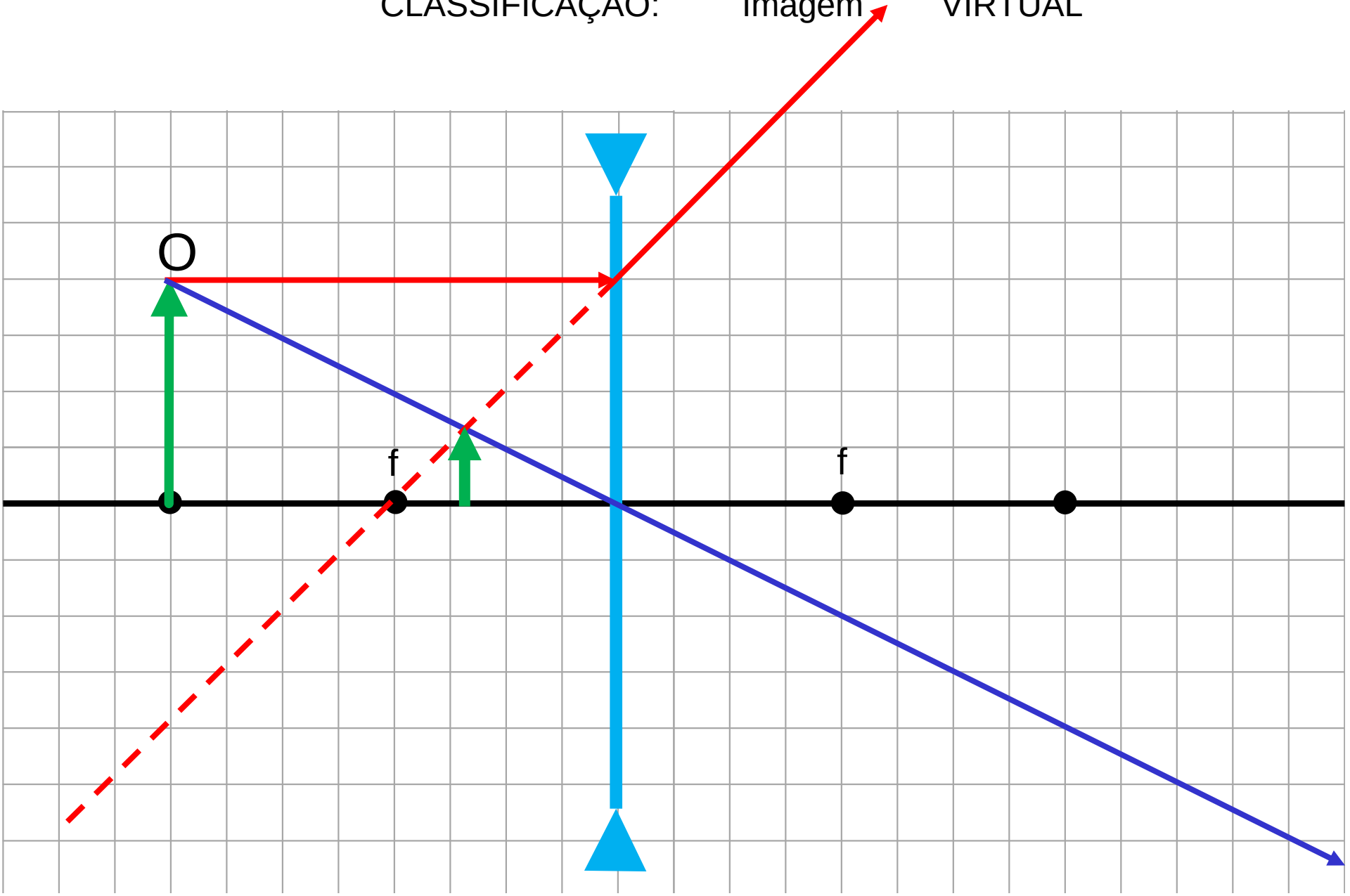
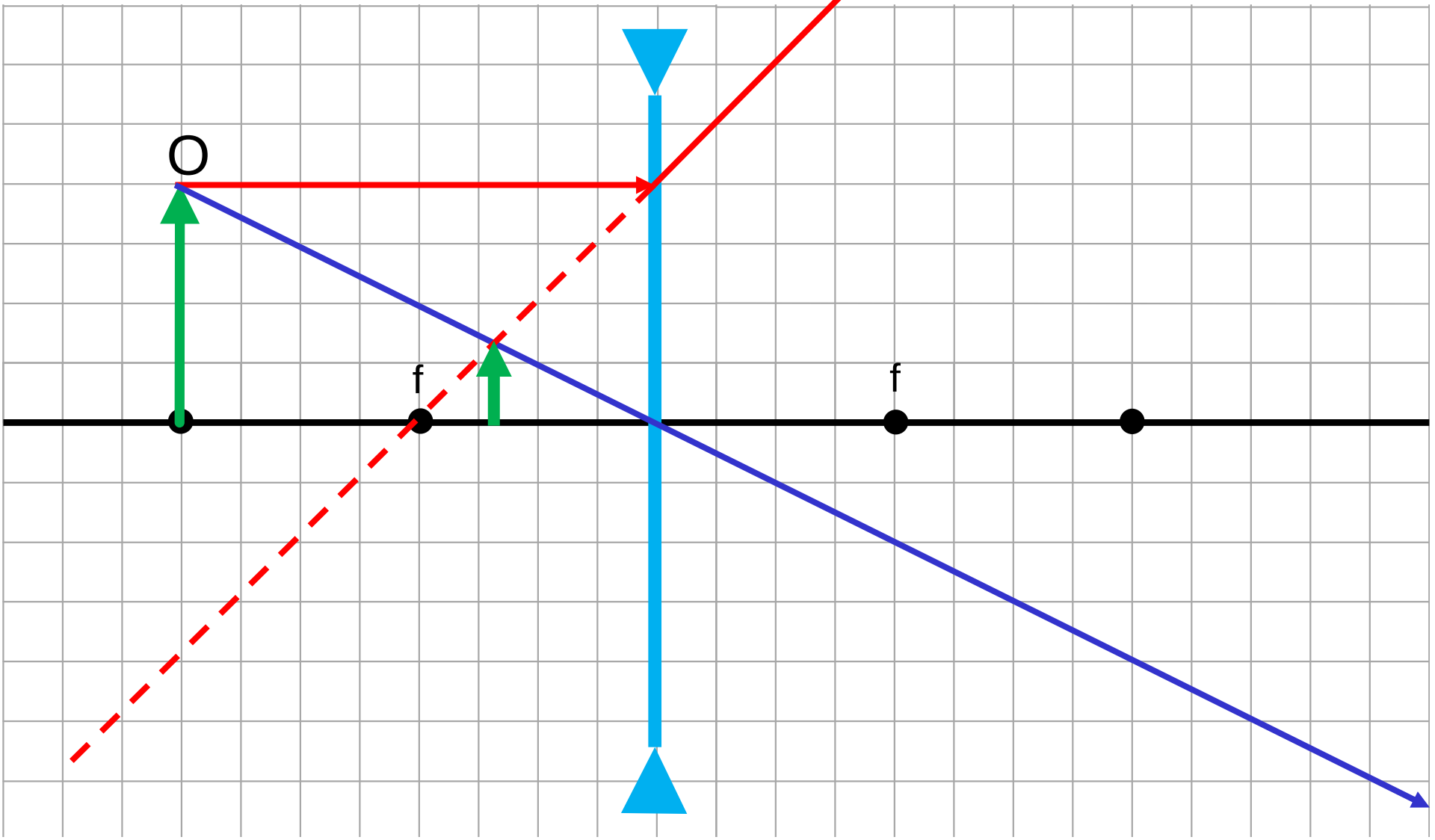
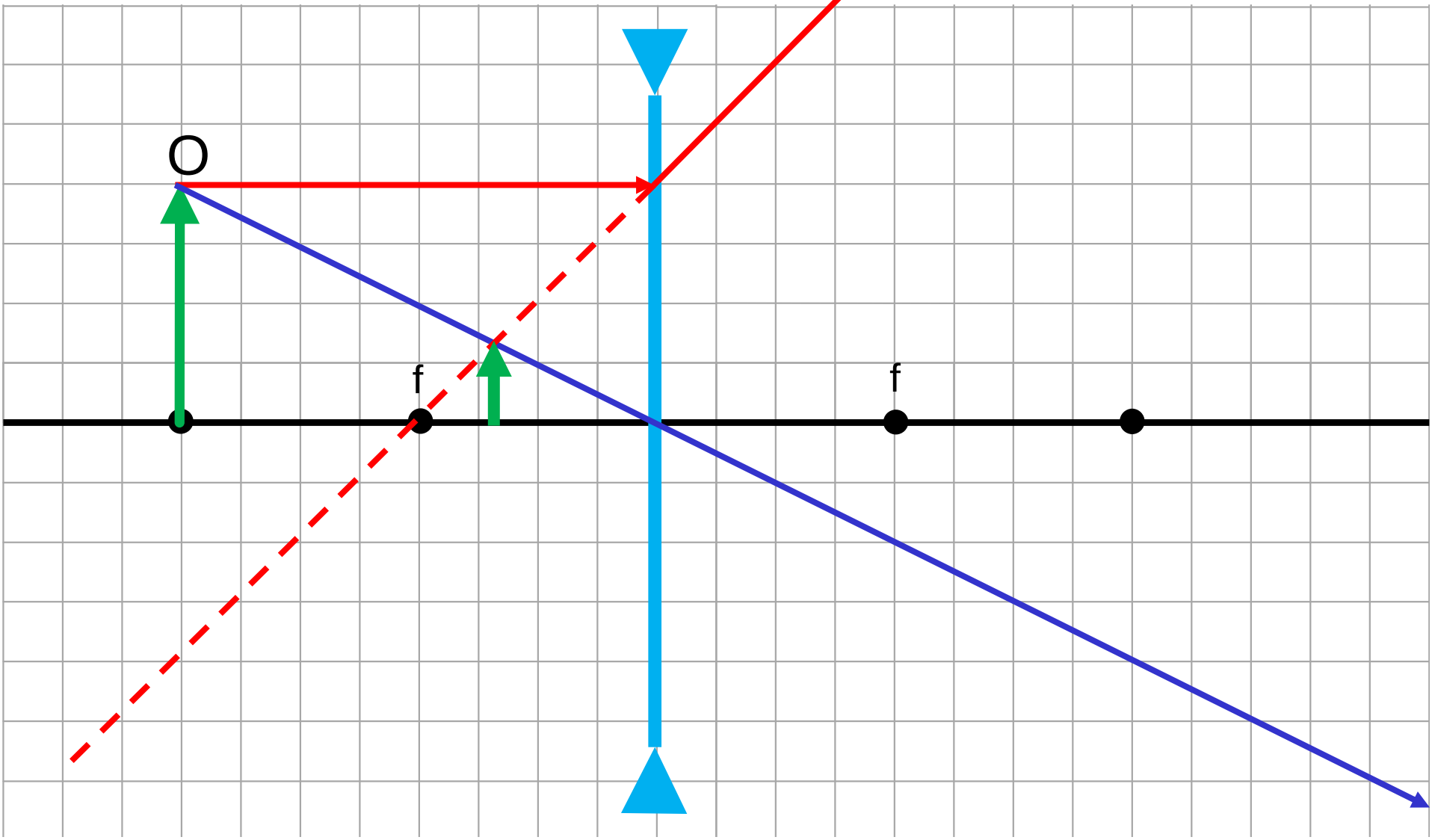
CLASSIFICAÇÃO: Imagem VIRTUAL



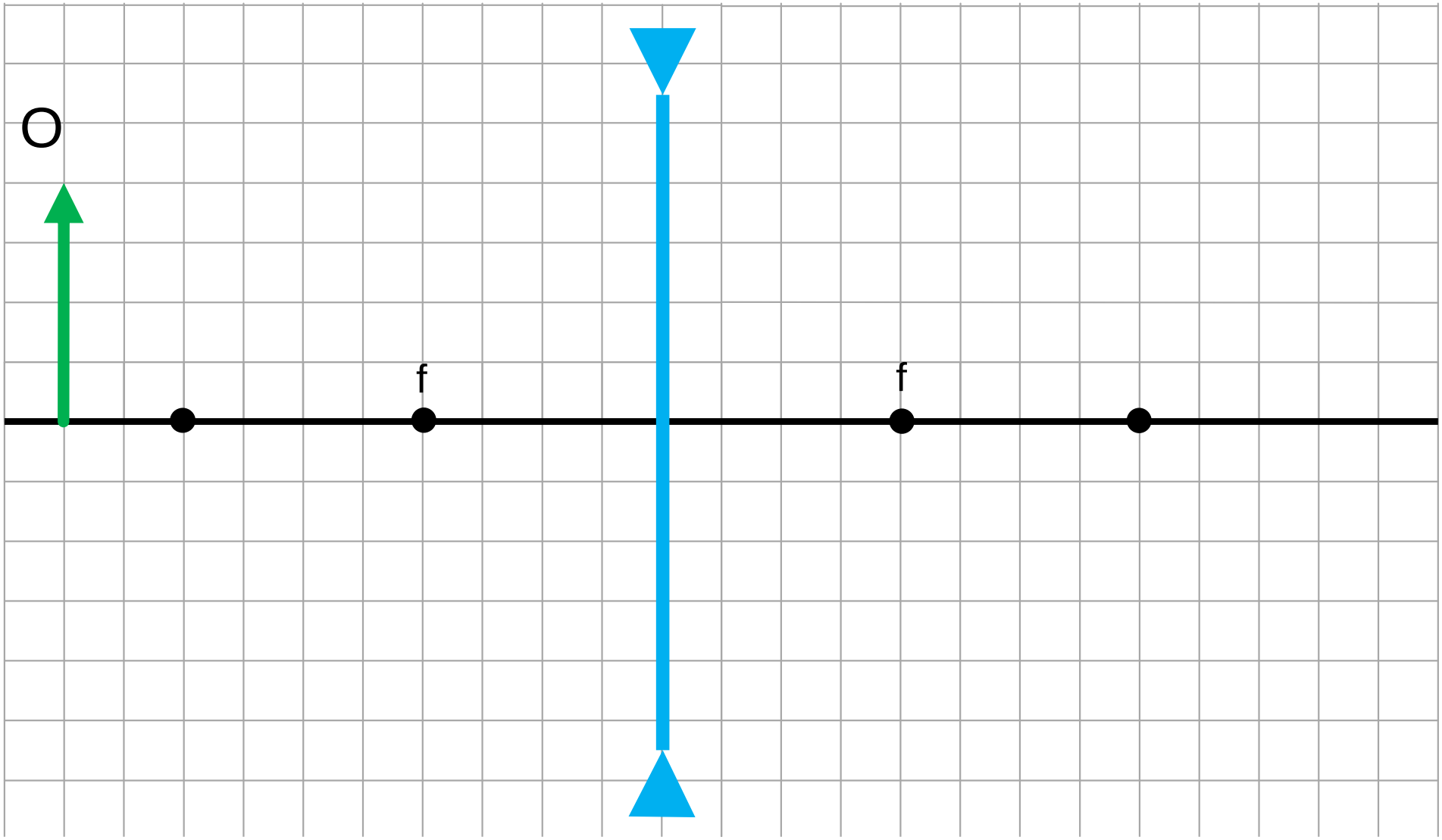
CLASSIFICAÇÃO: Imagem VIRTUAL DIREITA



CLASSIFICAÇÃO: Imagem VIRTUAL
DIREITA
MENOR



Quinto caso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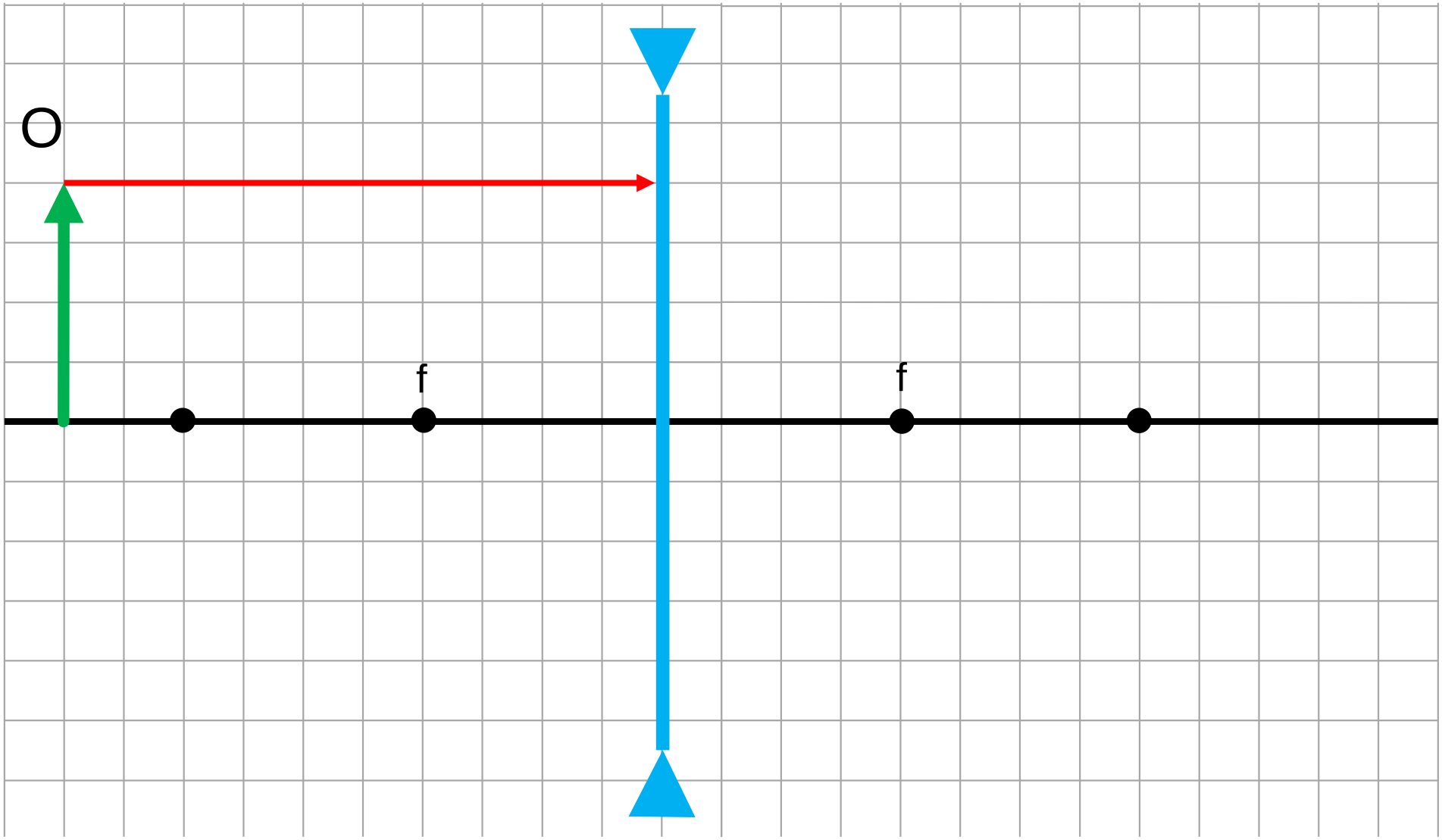
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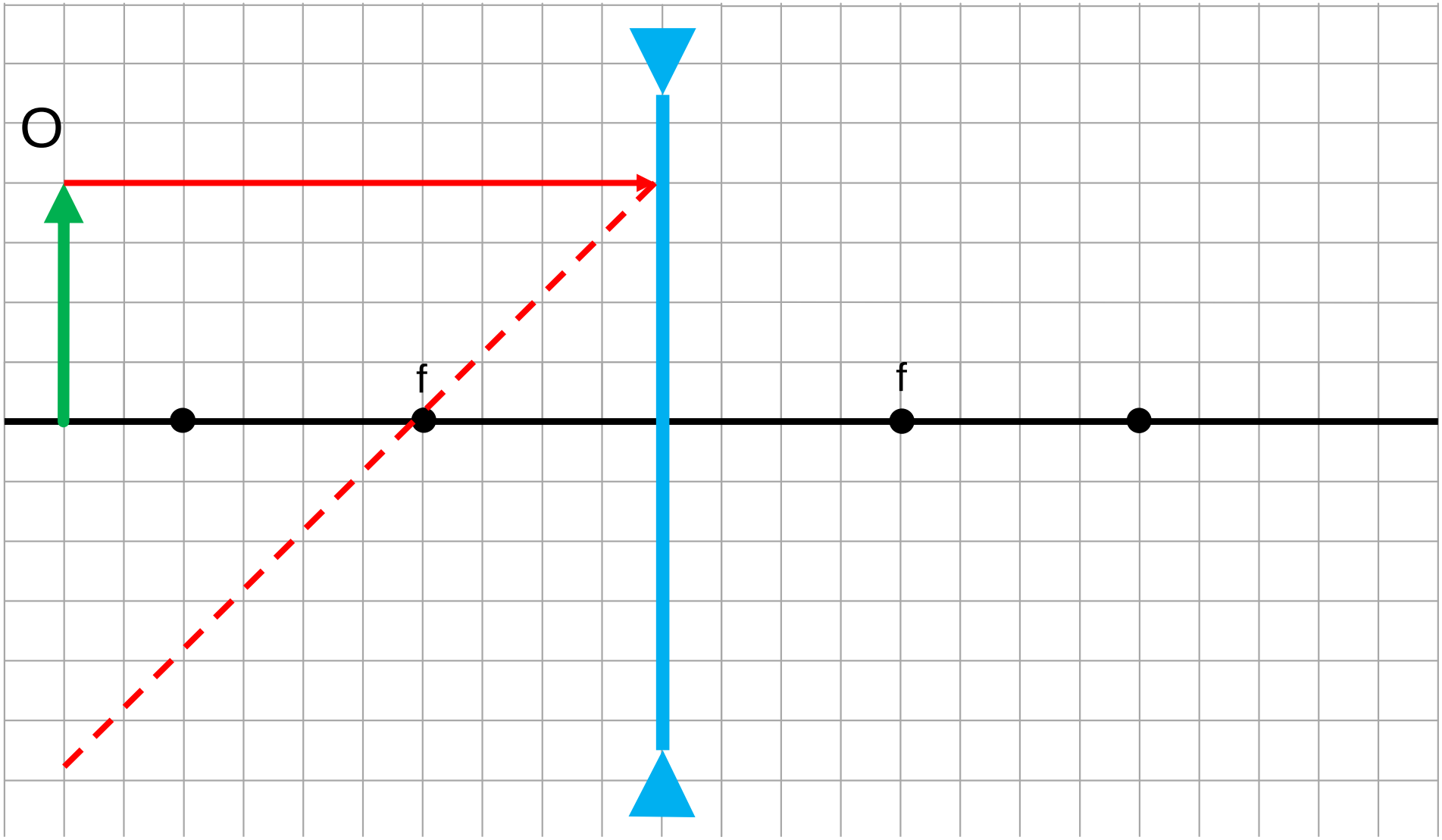
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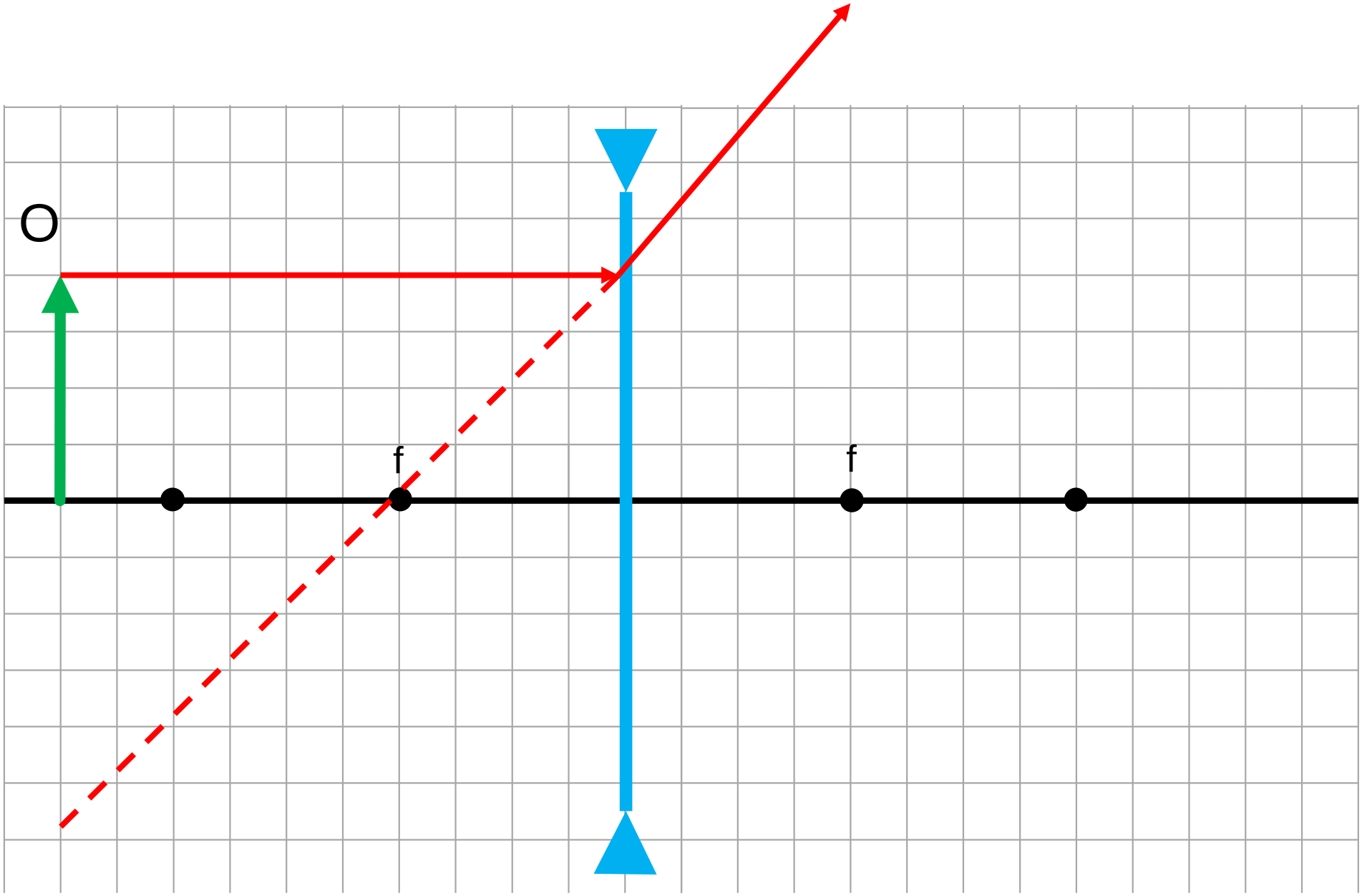
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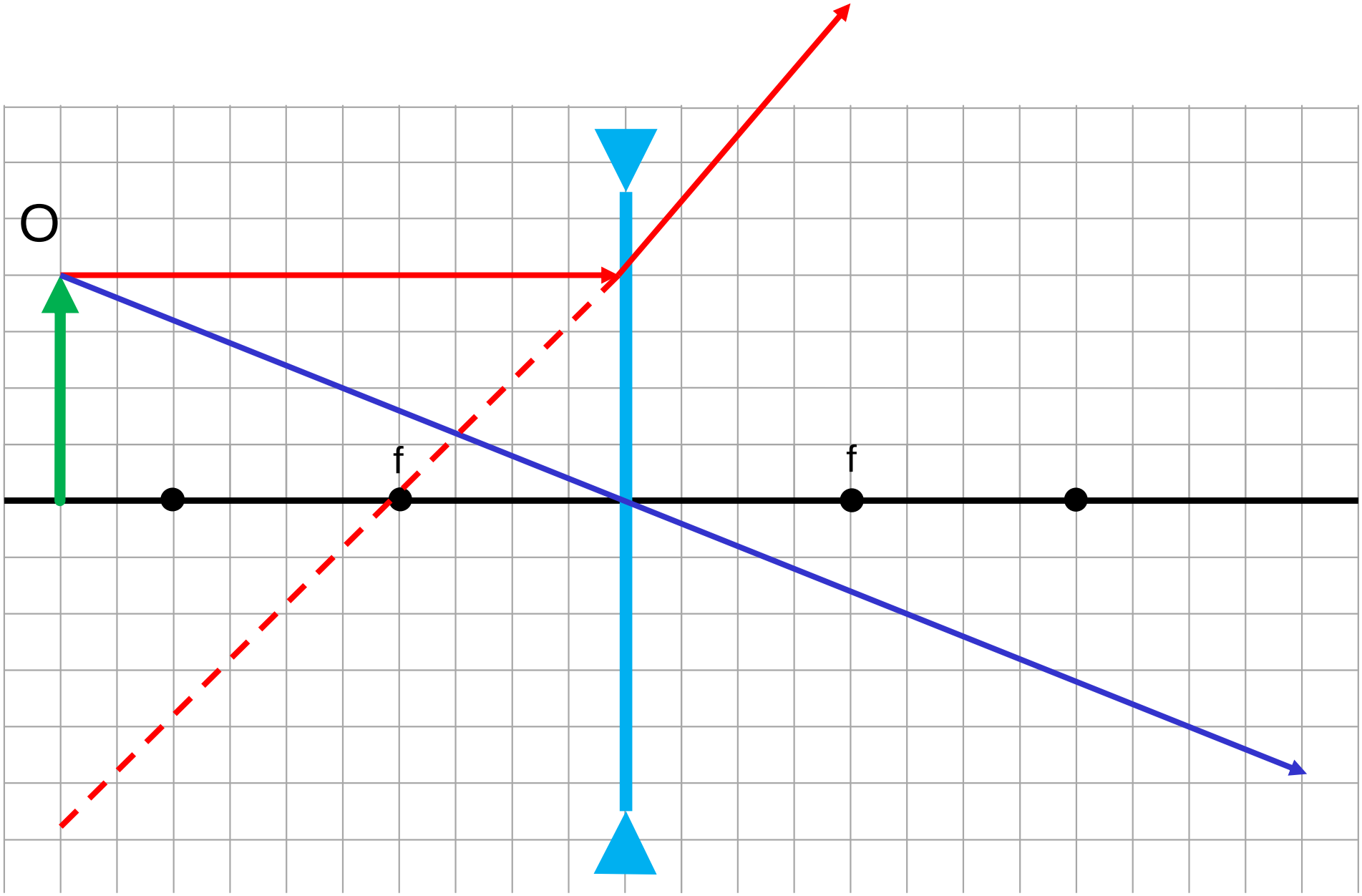
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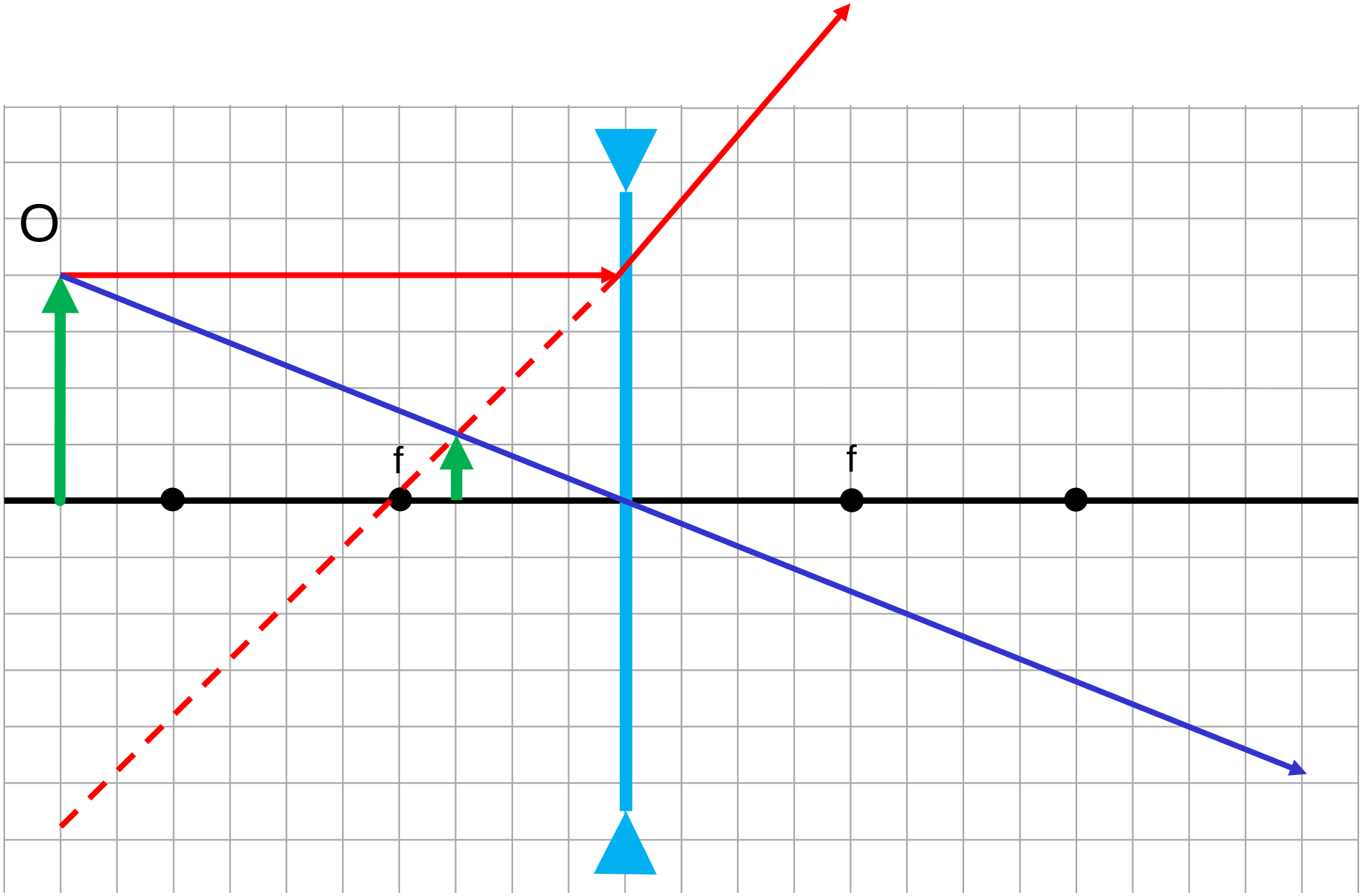
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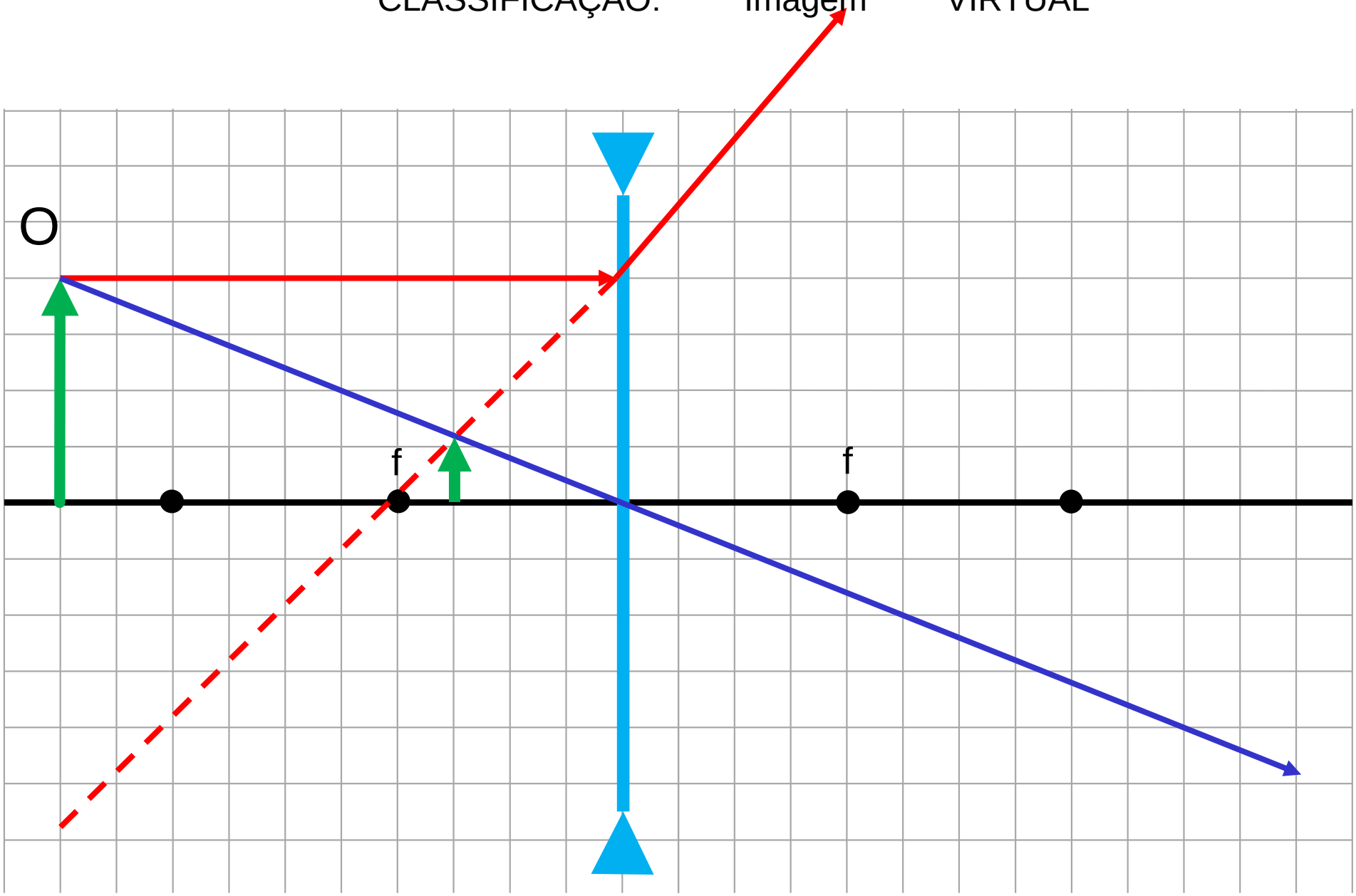
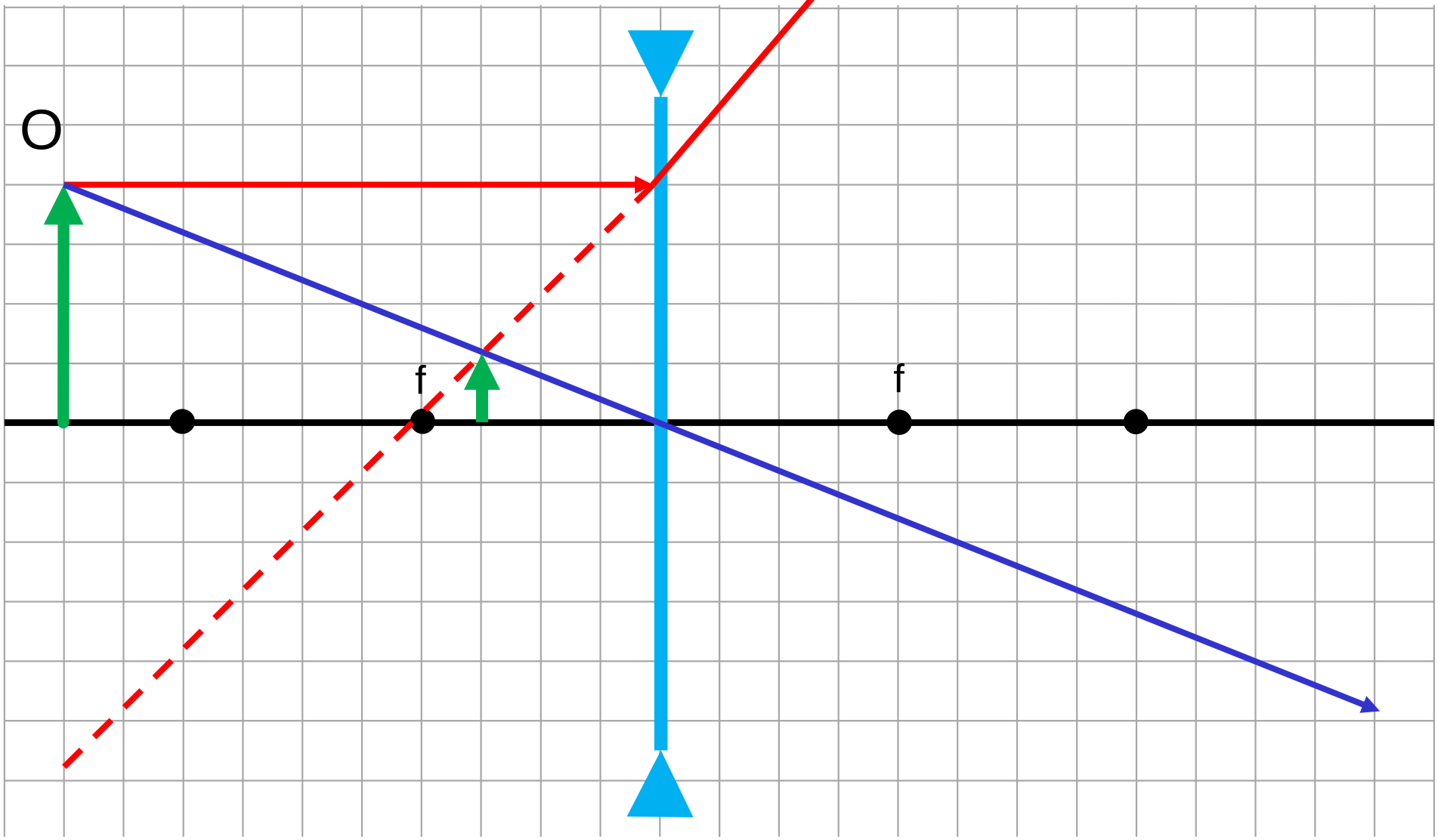
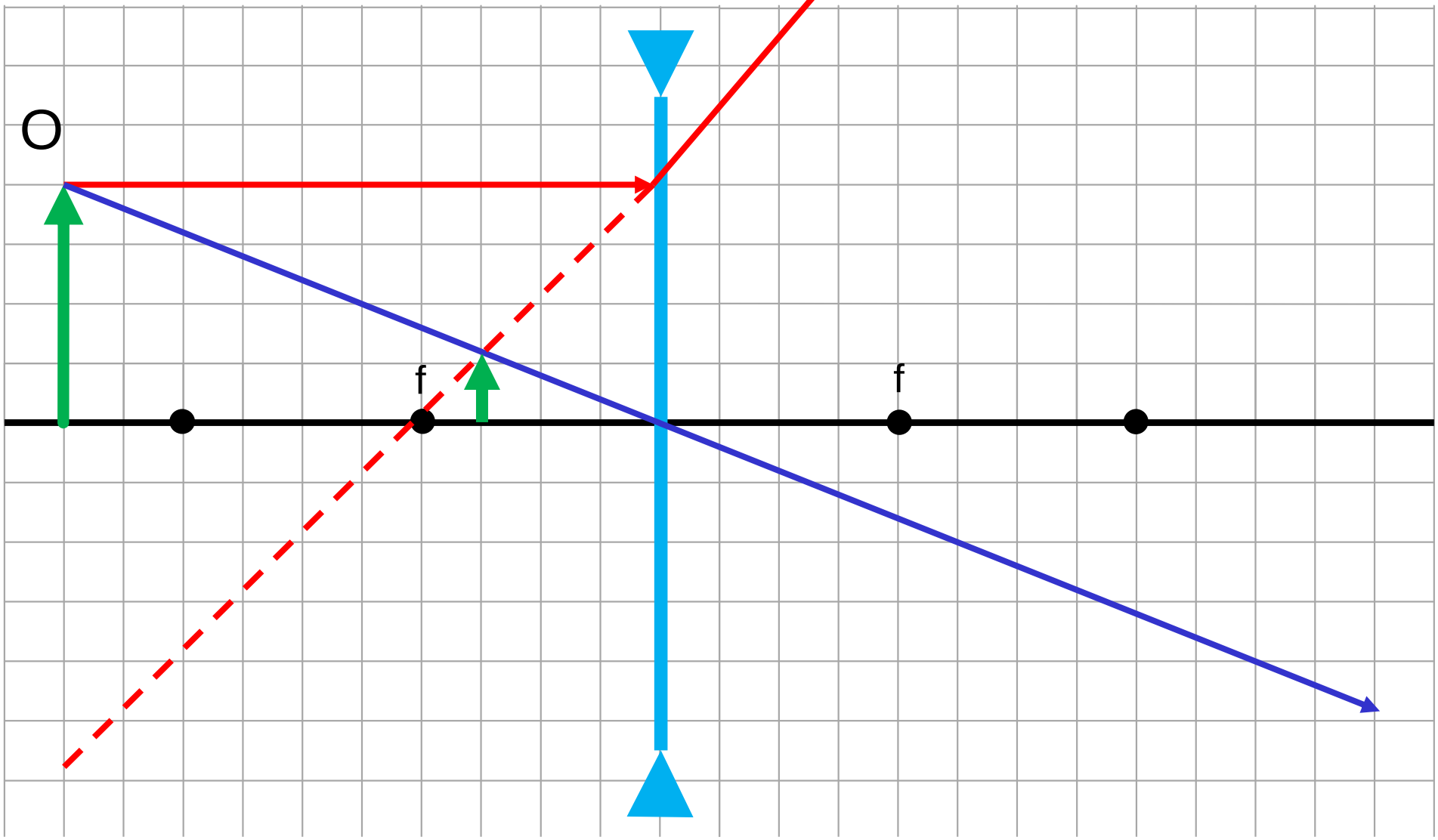
CLASSIFICAÇÃO: Imagem VIRTUAL



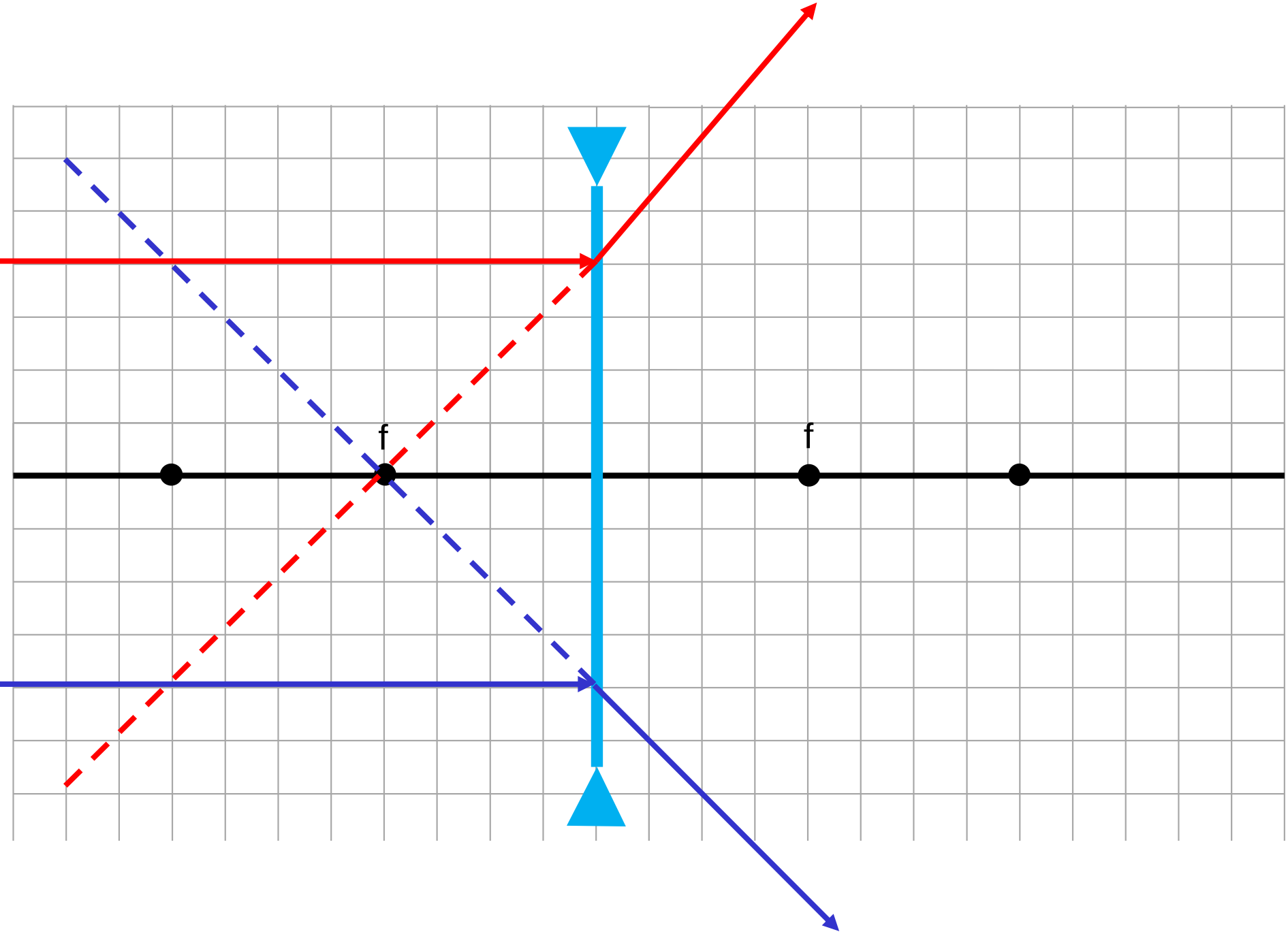
CLASSIFICAÇÃO: Imagem VIRTUAL DIREITA



CLASSIFICAÇÃO: Imagem VIRTUAL
DIREITA
MENOR



Sexto caso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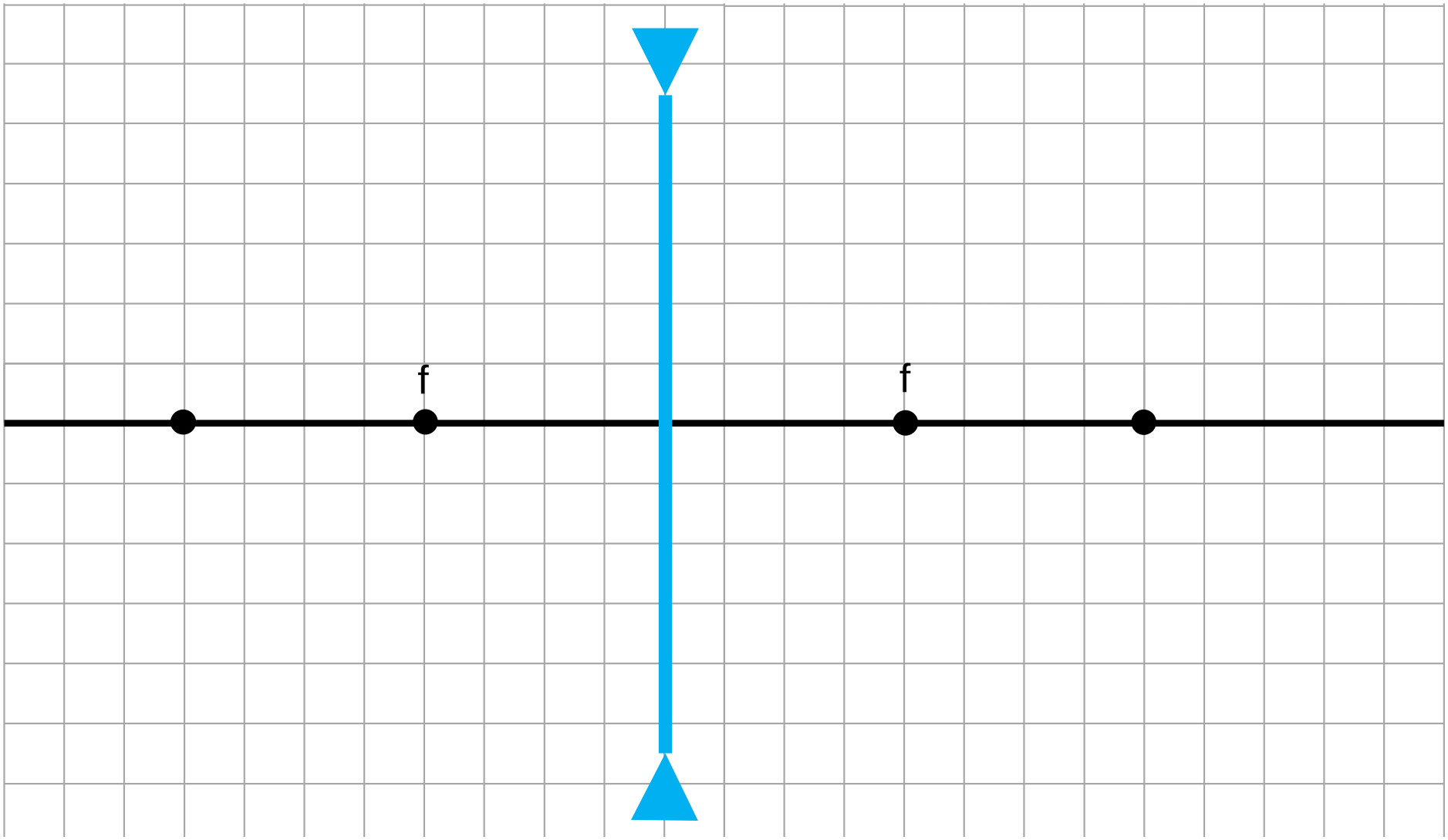
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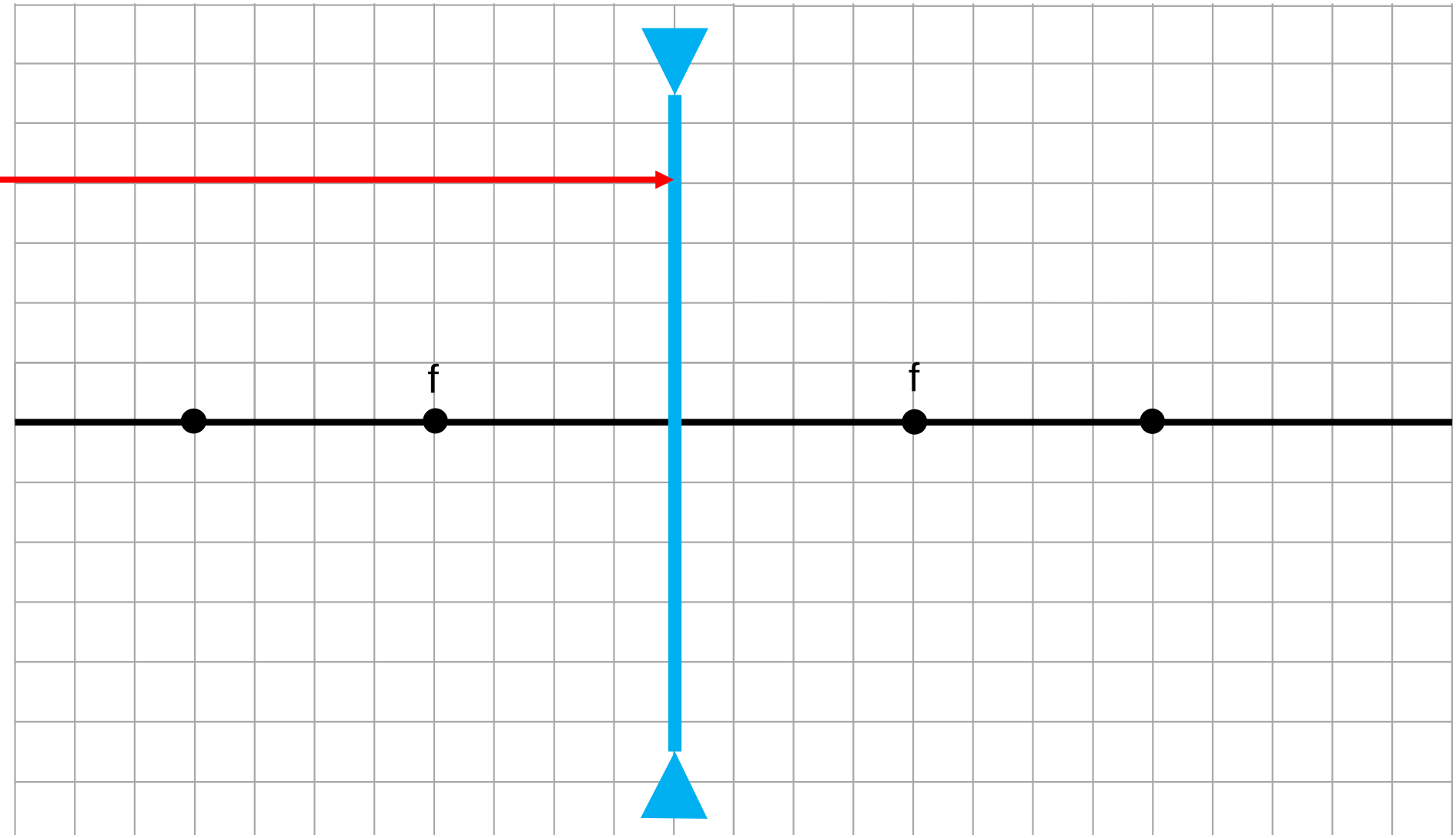
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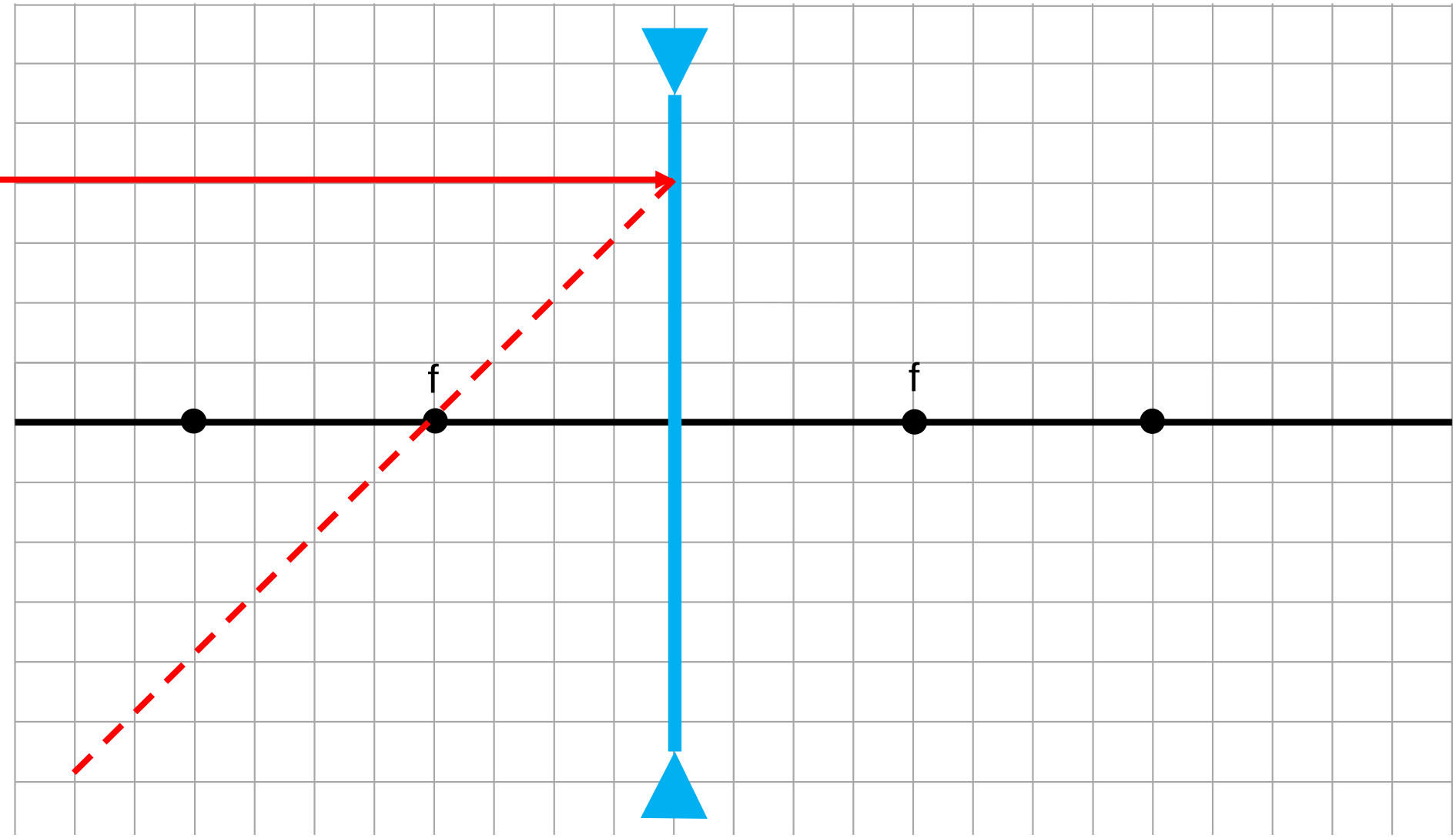
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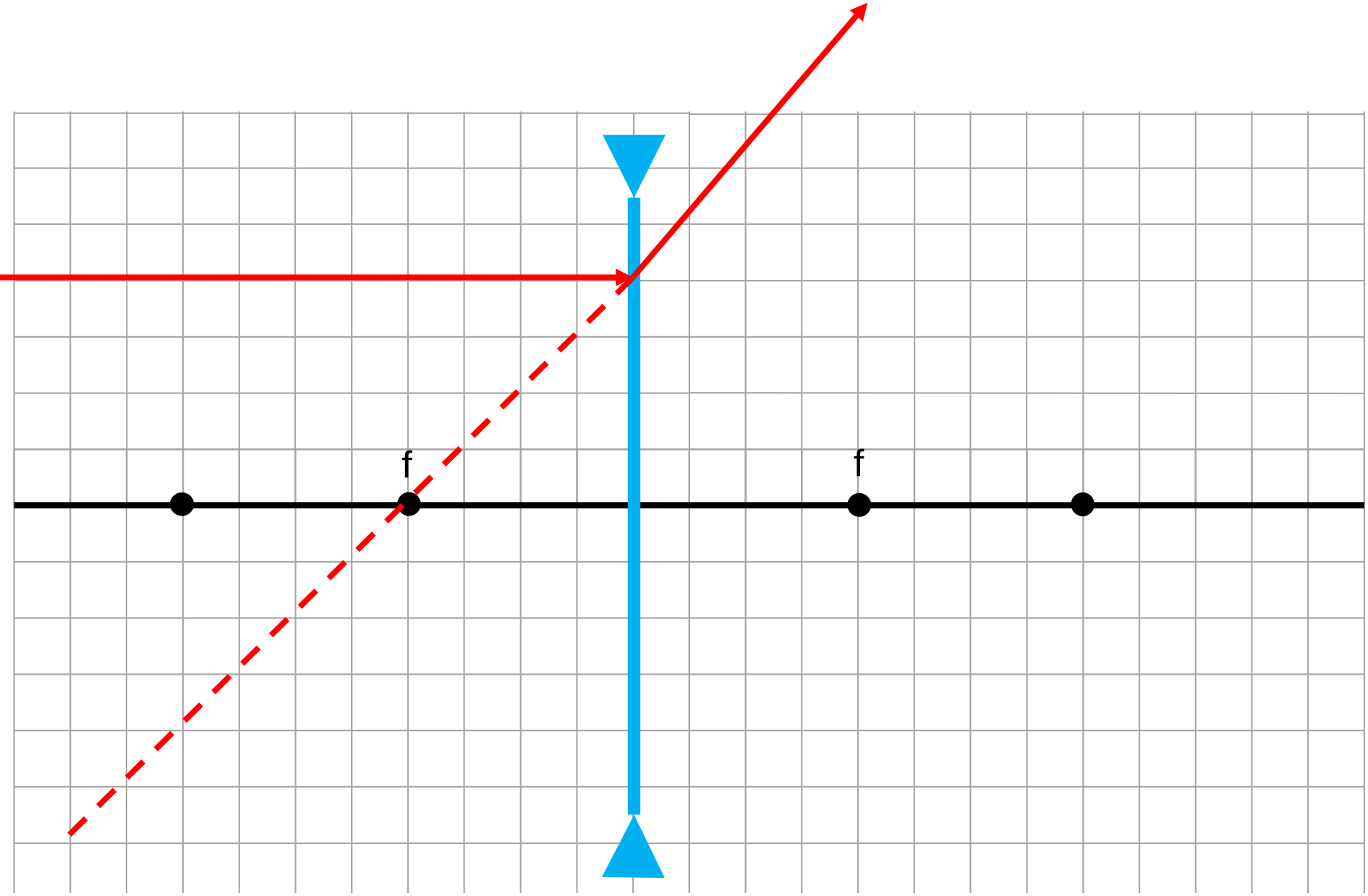
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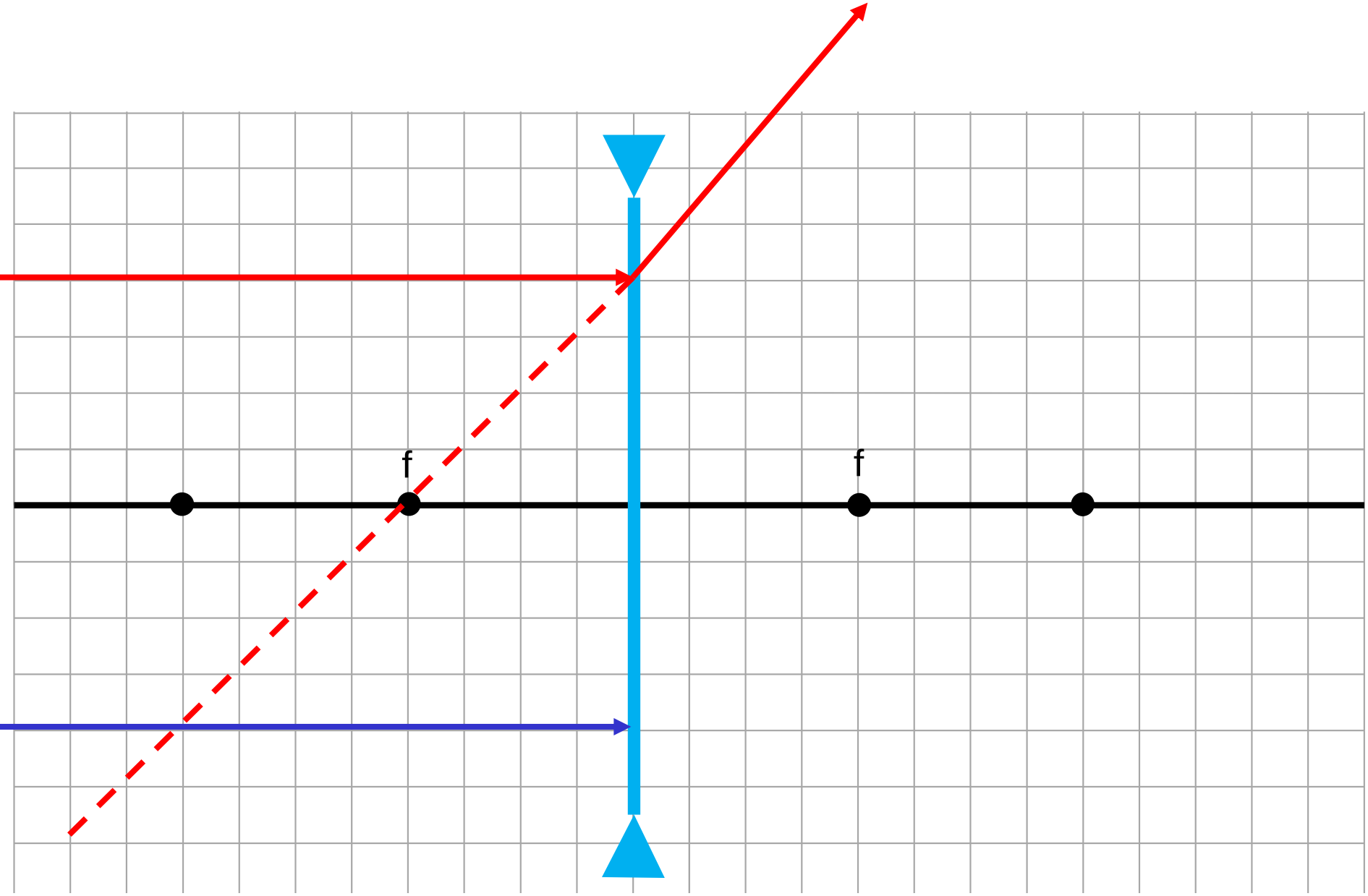
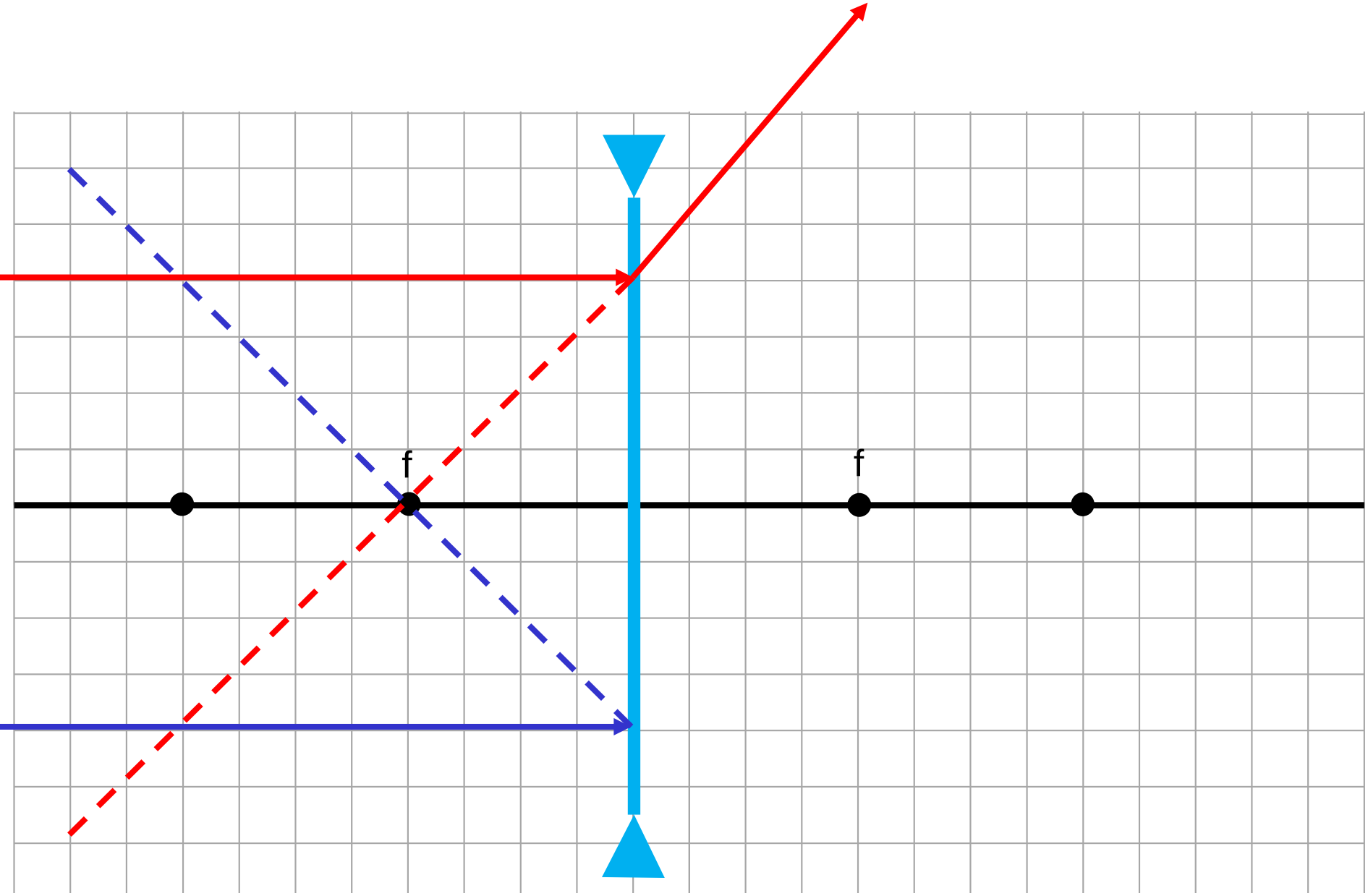
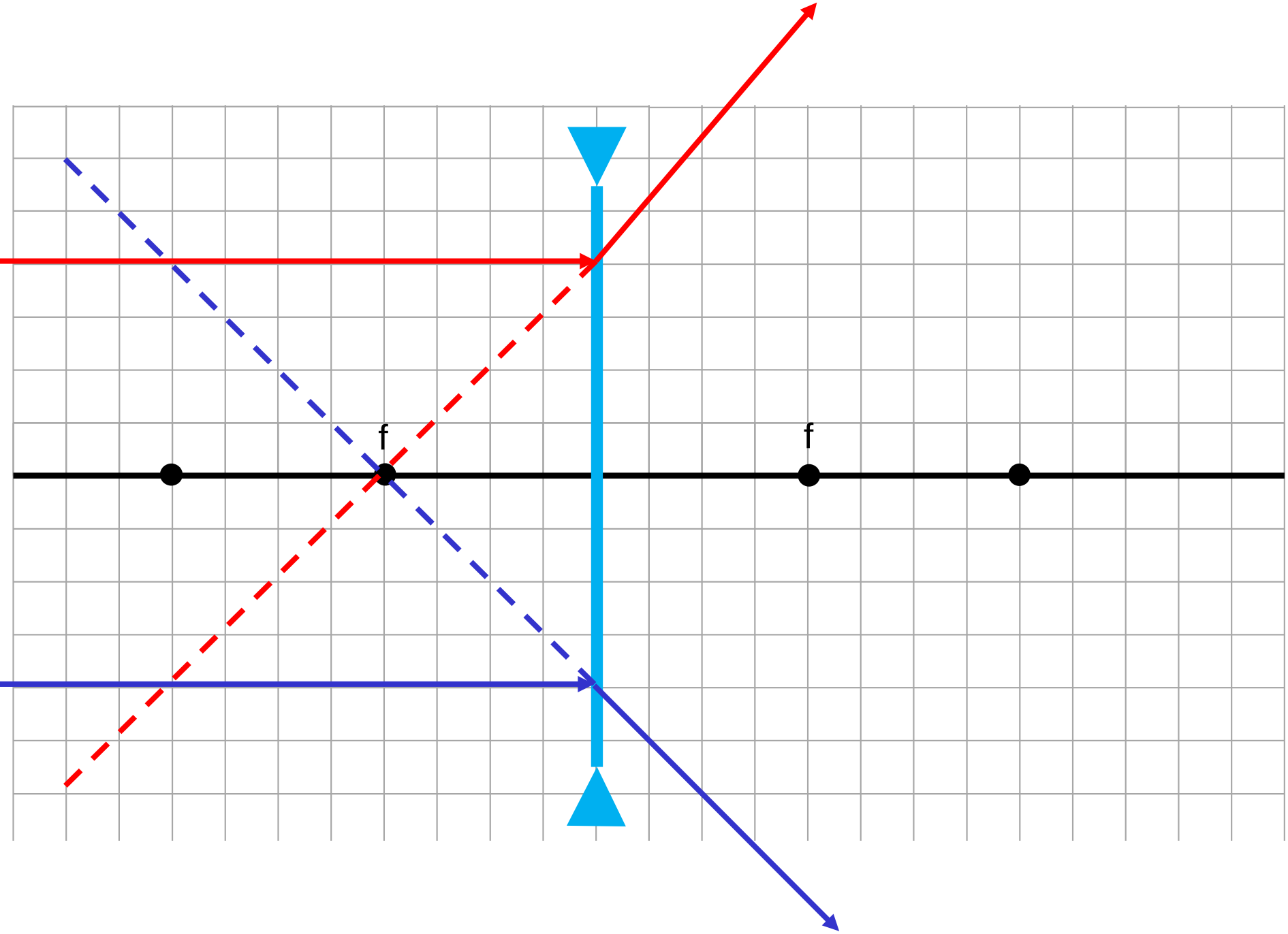
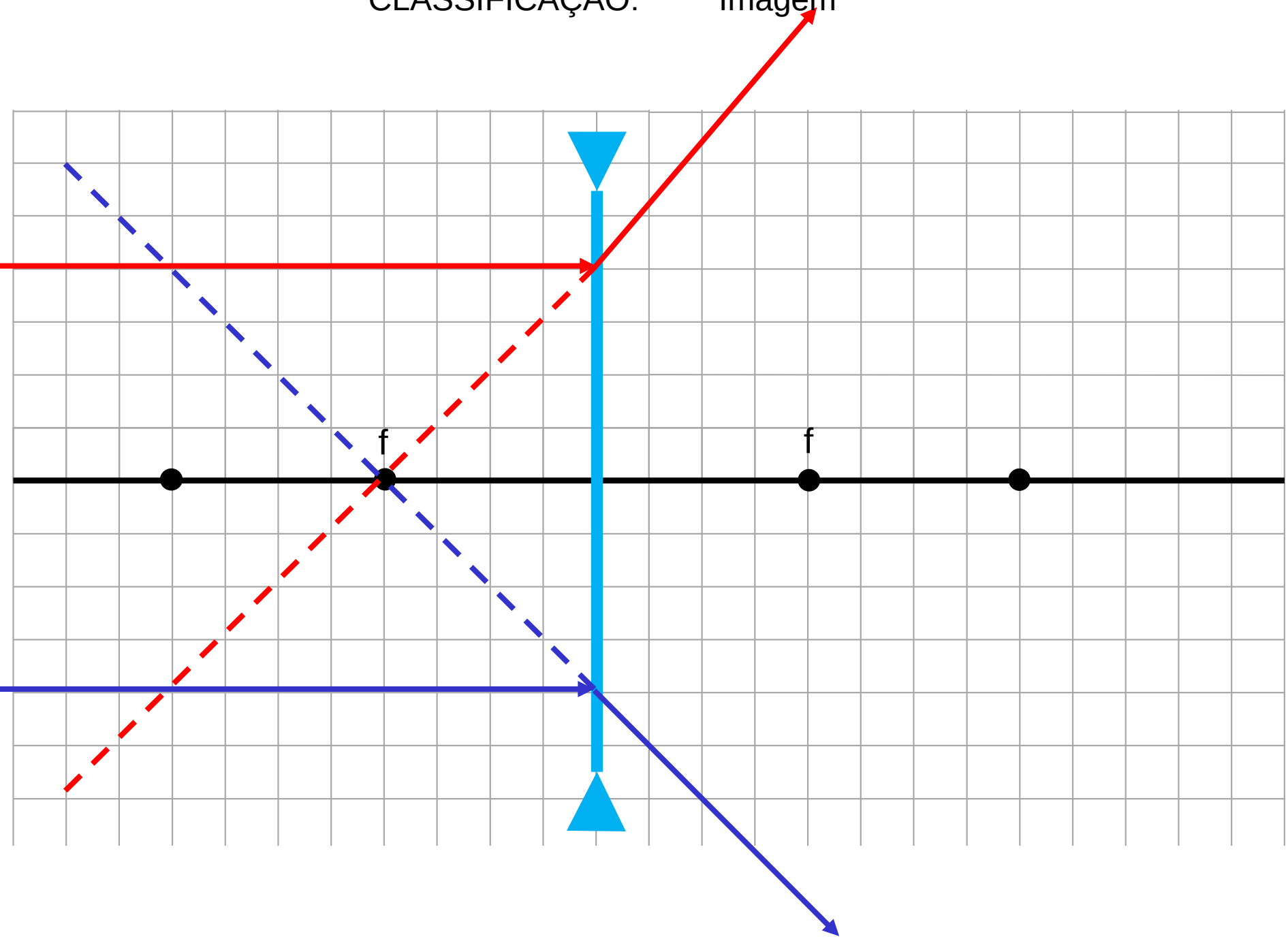

f
f

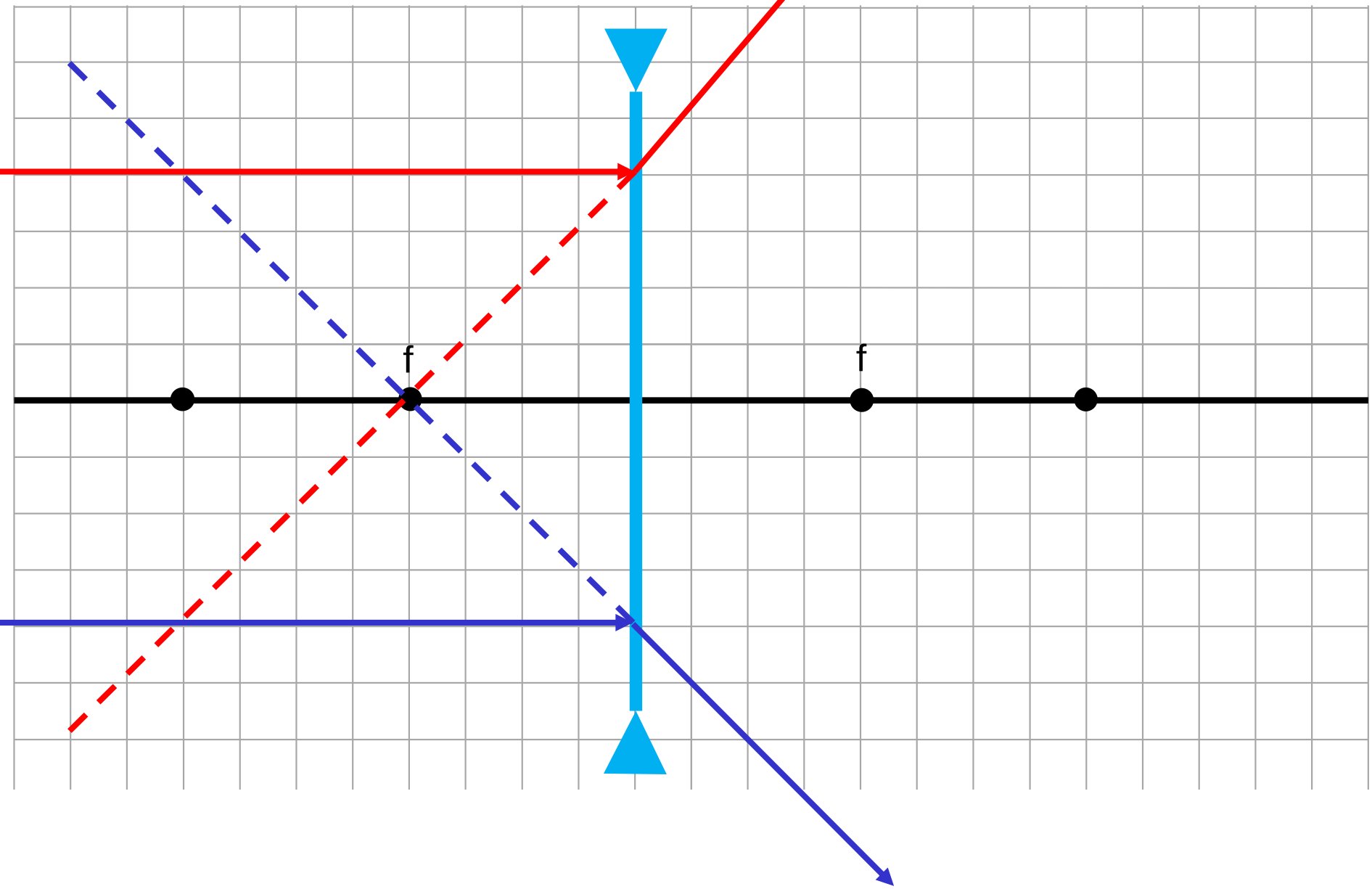

f
f


f
f

CLASSIFICAÇÃO: Imagem



CLASSIFICAÇÃO: Imagem PONTUAL E LOCALIZADA NO FOCO IMAGEM DA LENTE



ESTUDO ANALÍTICO

$$\frac{1}{f} = \frac{1}{p} + \frac{1}{p'}$$

ELEMENTOS

- *p* é a distância do objeto ao espelho
- *p'* é a distância entre a imagem e o espelho
- *f* é o foco do espelho

REFERENCIAL DE GAUSS

CONVENSÃO DE SINAIS

- $p > 0$: objeto real (do lado onde vem os raios de luz)
- $p < 0$: objeto virtual (caso pouco abordado; objeto é a imagem de outro elemento óptico)
- $p' > 0$: imagem real (do lado para onde vai os raios, que é o mesmo do objeto, e por isso pode-se projetar a imagem)
- $p' < 0$: imagem virtual (do lado oposto ao dos raios de luz que sai do espelho)

CONVENSÃO DE SINAIS

- $f > 0$: lente convergente
- $f < 0$: lente divergente

REFERENCIAL DE GAUSS

AUMENTO

$$A = \frac{i}{o}$$

AUMENTO

$$A = \frac{i}{o} = \frac{-p'}{p}$$

AUMENTO

$$A = \frac{i}{o} = \frac{-p'}{p} = \frac{f}{f-p}$$

AUMENTO

- Note que (considerando apenas $p > 0$):
  - se $A > 0$: imagem direita e virtual
  - se $A < 0$: imagem invertida e real

- Para qualquer caso:
  - $|A| > 1$: imagem ampliada
  - $|A| < 1$: imagem reduzida