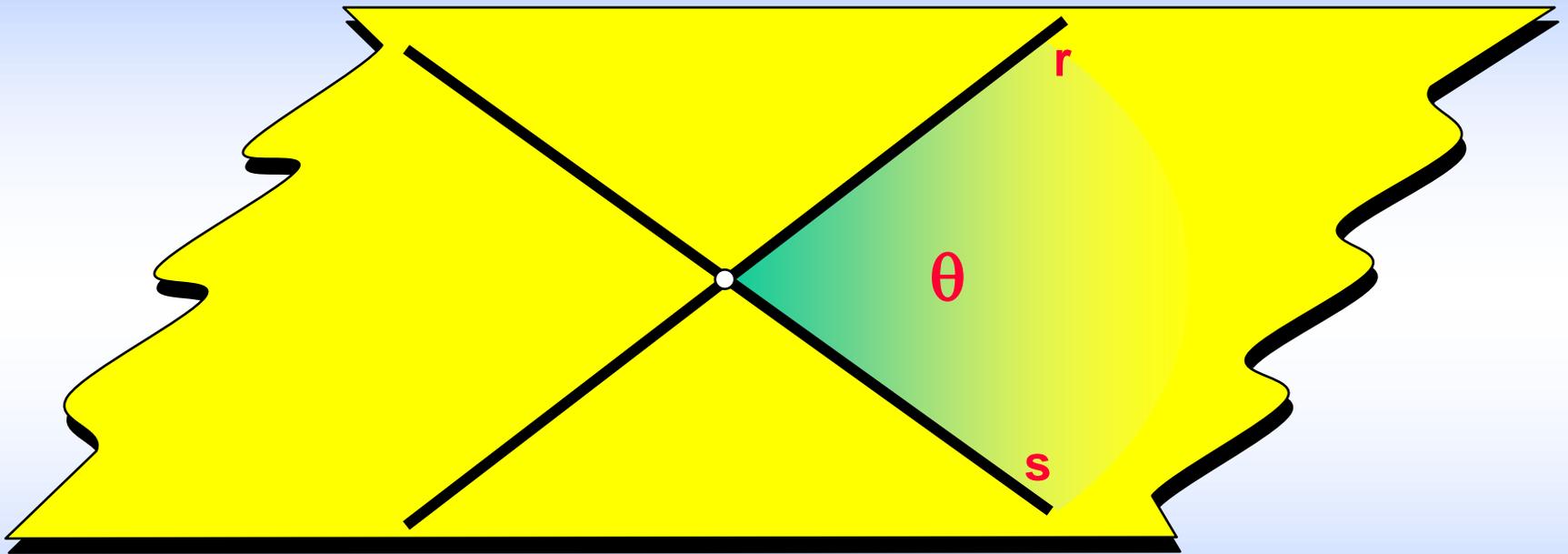


Trigonometria Plana

Ângulo plano

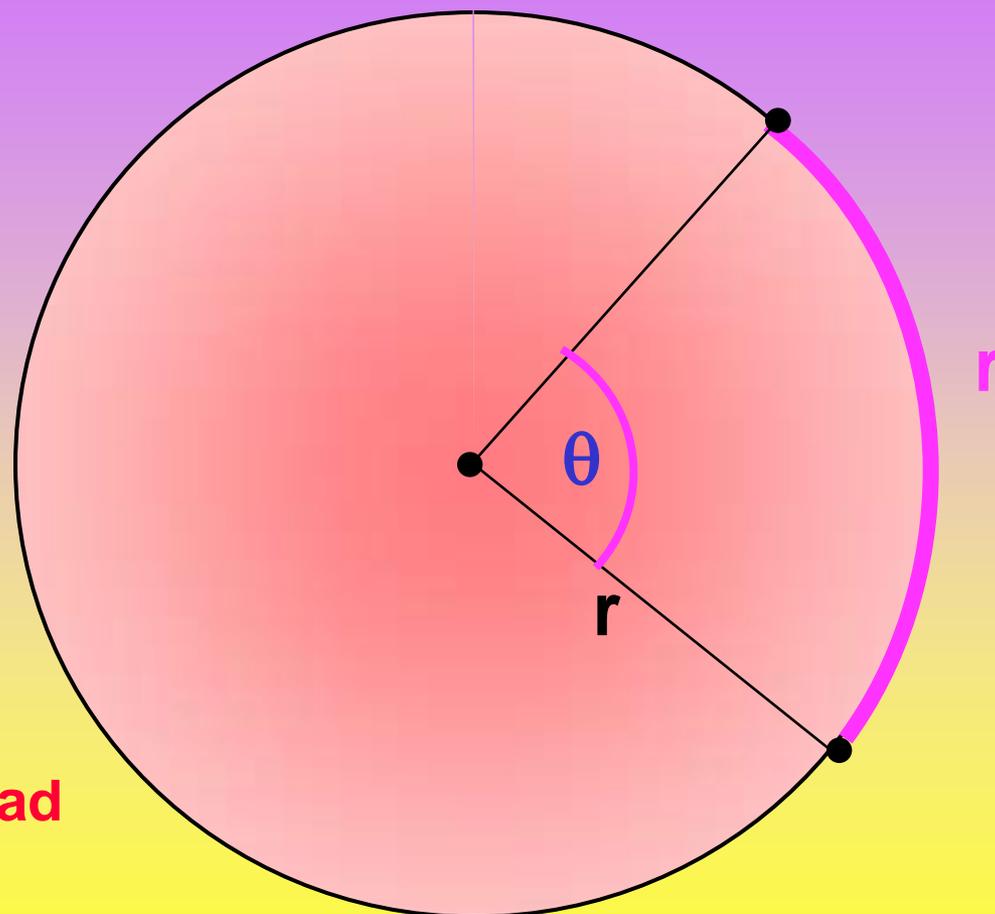


É a parte do plano compreendida entre duas semiretas concorrentes que definem o plano.

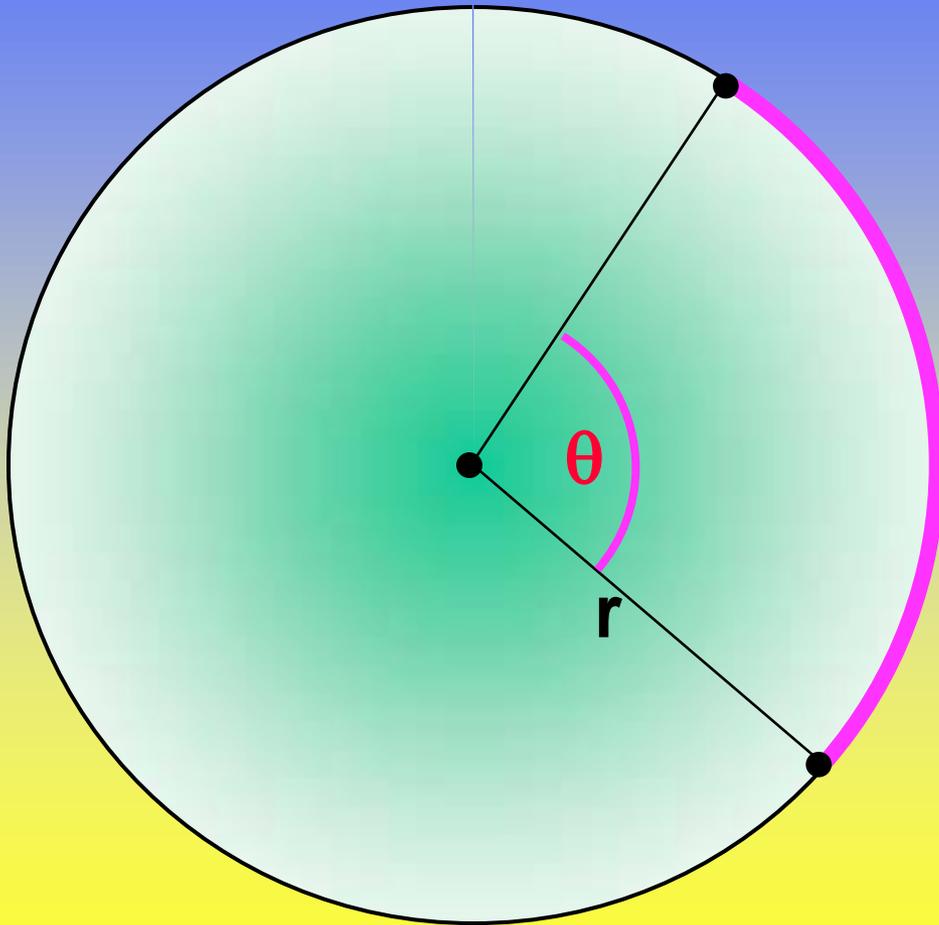
Definição de radiano

Um radiano (1^{rad}) é a medida θ do ângulo central que subtende um arco de comprimento igual ao raio da circunferência.

$$\theta \equiv 1 \text{ rad}$$



Ângulo em radianos

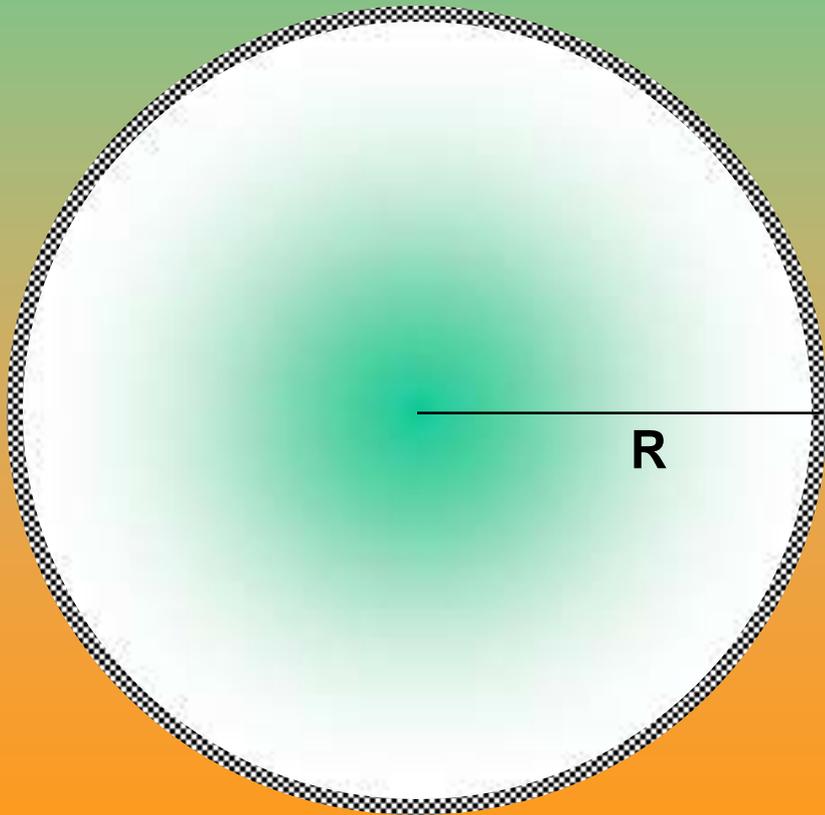


c

$$\theta^{\text{rad}} \equiv c / r$$

$$c = r \cdot \theta^{\text{rad}}$$

Perímetro de uma circunferência

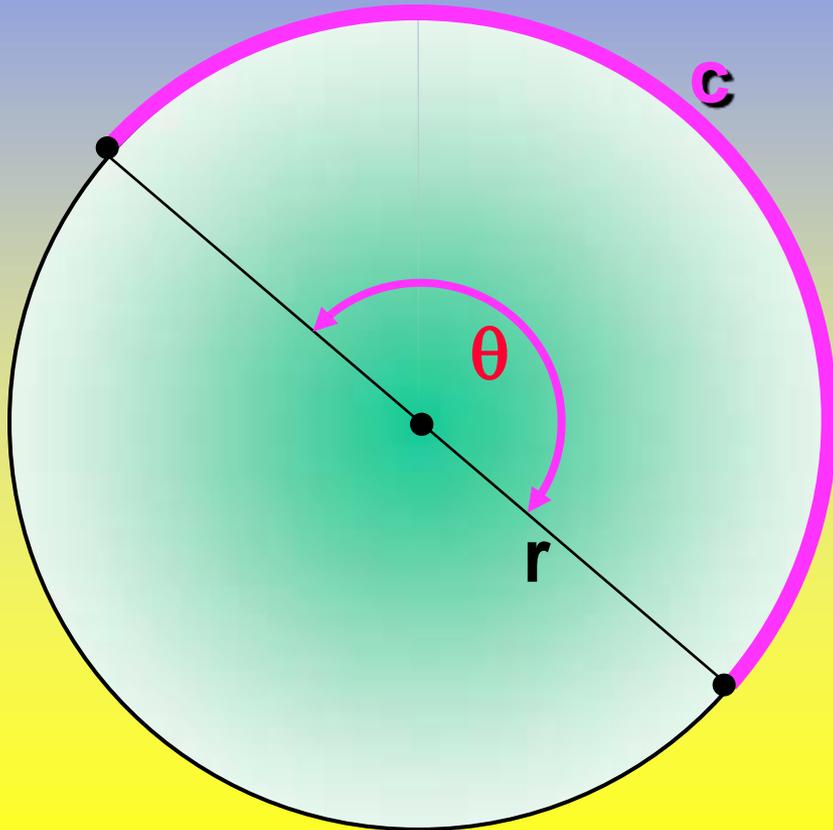


$$P = 2\pi R$$

Perímetro:
Comprimento da circunferência

Ângulo raso em radianos

$$P = 2\pi r$$



$$c = P / 2$$

$$c = 2\pi r / 2$$

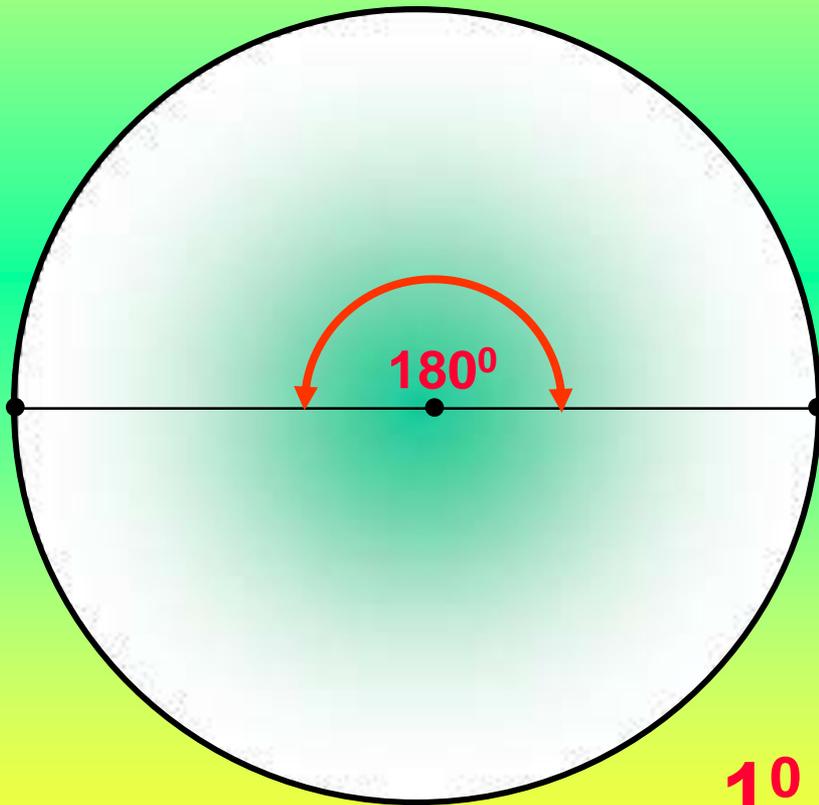
$$c = \pi r$$

$$\theta_{\text{raso}}^{\text{rad}} \equiv c / r$$

$$\theta_{\text{raso}}^{\text{rad}} = \pi r / r$$

$$\theta_{\text{raso}} = \pi^{\text{rad}}$$

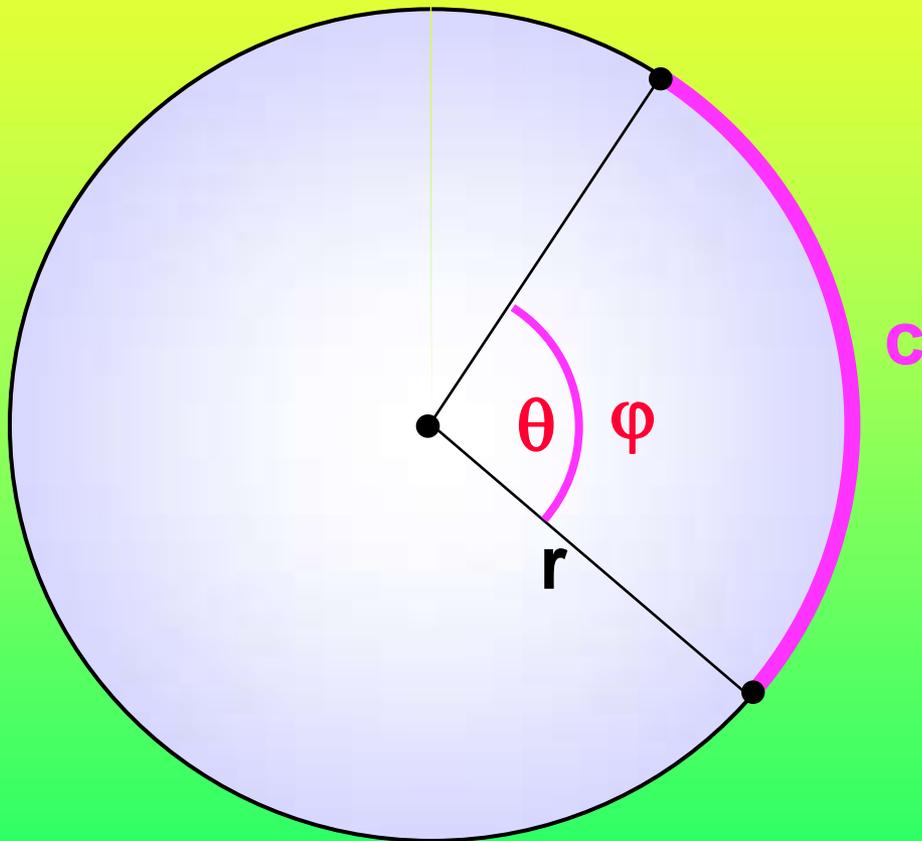
Definição de grau



**1 grau
(1°)
1 / 180 de
um ângulo
raso.**

$1^\circ \equiv 1/180$ do ângulo raso

Relacionar graus e radianos

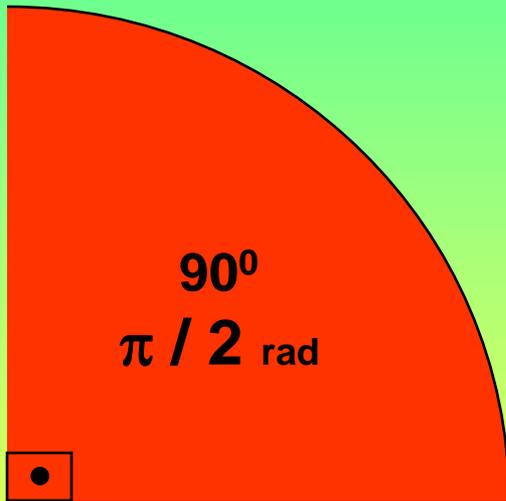


$$\begin{aligned} 360^\circ &\rightarrow 2\pi \text{ rad} \\ \varphi^\circ &\rightarrow \theta \text{ rad} \end{aligned}$$

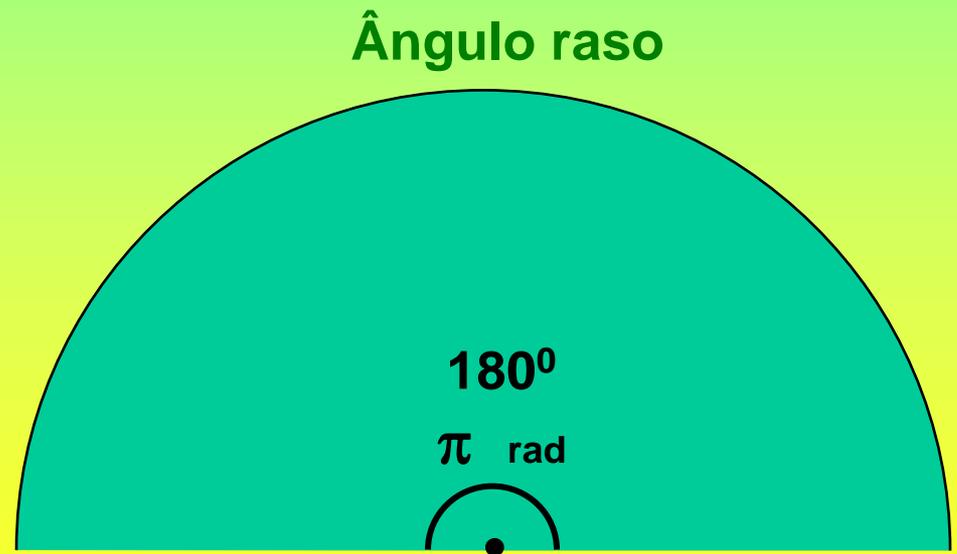
$$\varphi^\circ = \theta \text{ rad} \cdot 180 / \pi$$

$$\theta \text{ rad} = \varphi^\circ \cdot \pi / 180$$

Ângulos particulares



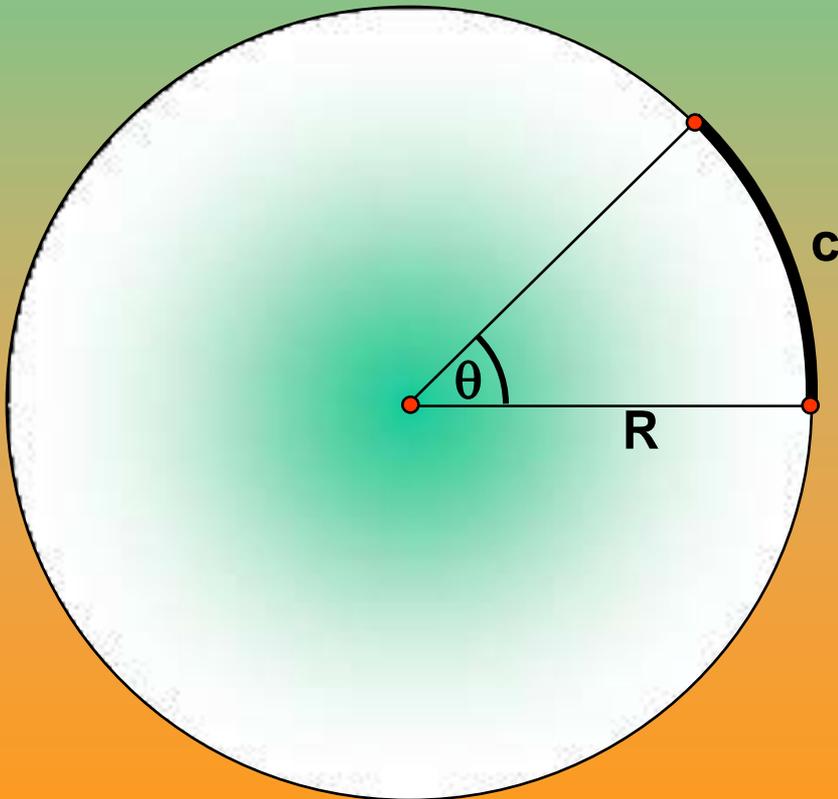
Ângulo reto



Ângulo raso

Comprimento de um arco de circunferência

Comprimento de um arco de circunferência



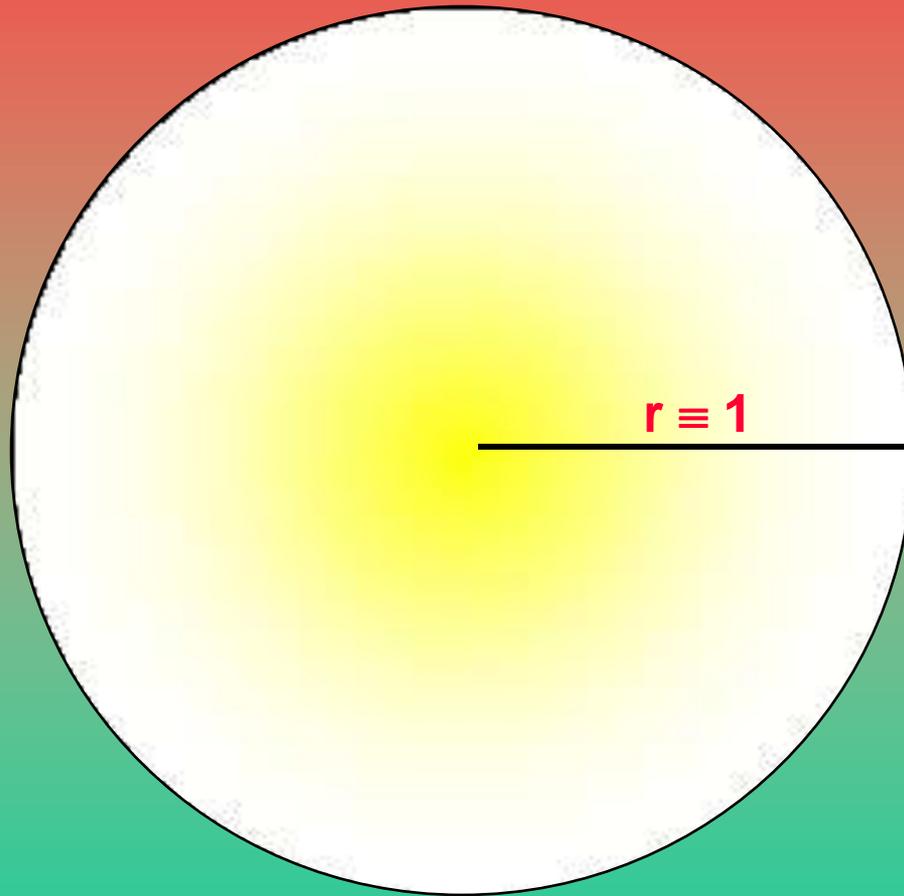
$$360^\circ \Rightarrow 2\pi R$$
$$\theta^\circ \Rightarrow c$$

$$c = 2\pi R \cdot \theta^\circ / 360^\circ$$

$$c = \pi R \cdot \theta^\circ / 180^\circ$$

Definição das Funções Trigonométricas

Círculo trigonométrico



Seno & Co-seno

$$\tan x \equiv \text{sen } x / \text{cos } x$$

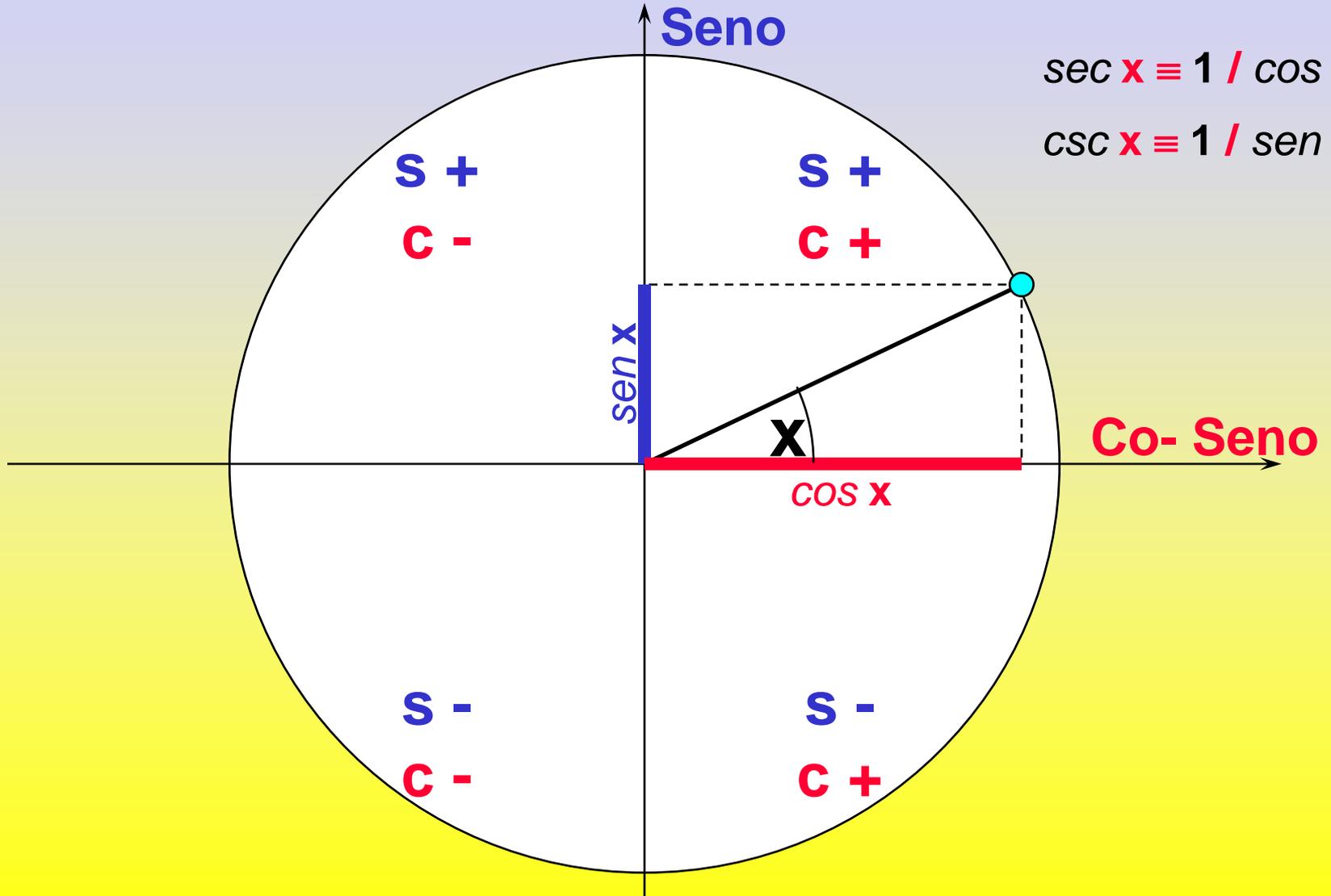
$$\cot x \equiv \text{cos } x / \text{sen } x$$

$$\sec x \equiv 1 / \text{cos } x$$

$$\csc x \equiv 1 / \text{sen } x$$

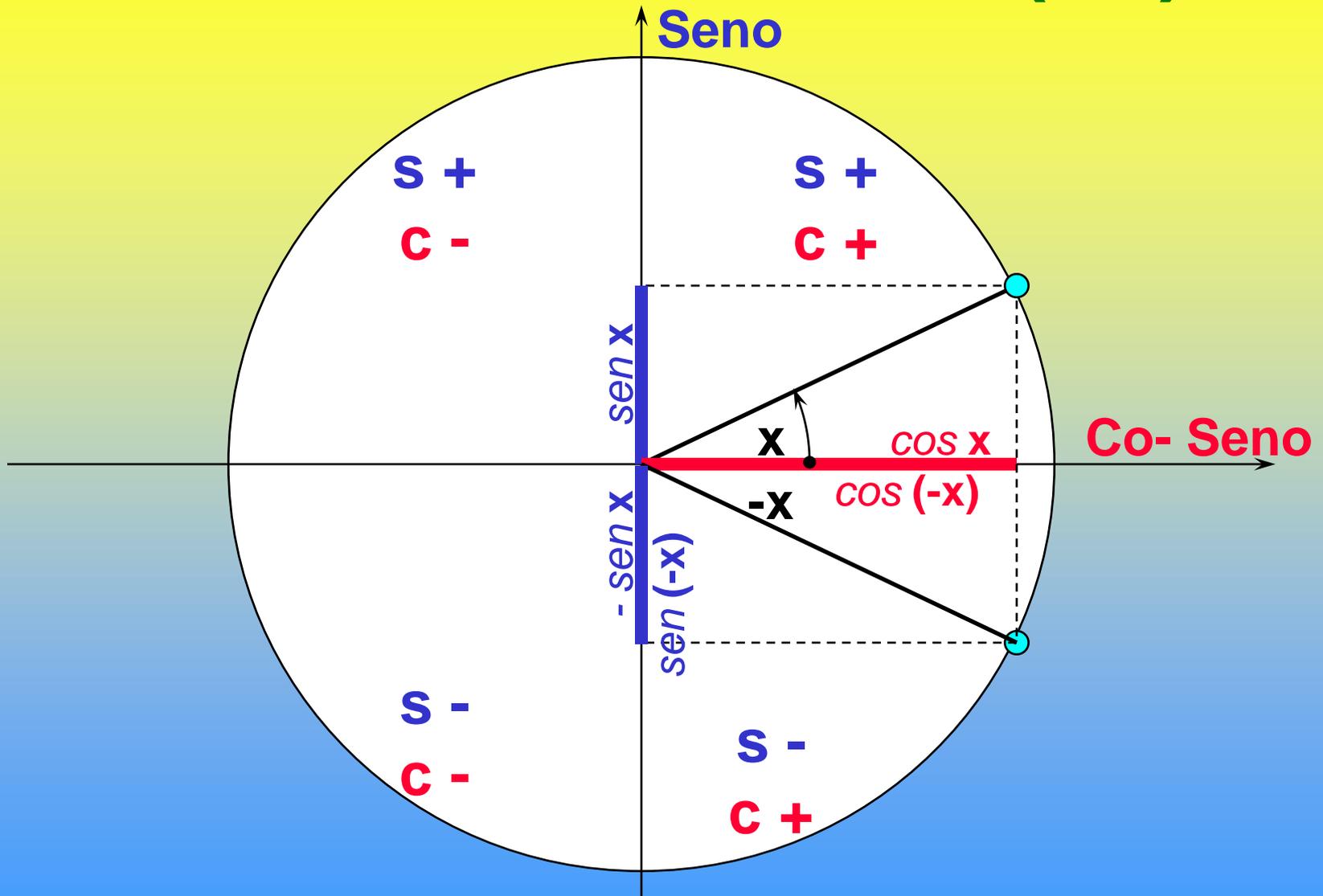
Seno x = cateto oposto / hipotenusa

Coseno x = cateto adyacente / hipotenusa



Relações entre funções trigonométricas

Seno & Co-seno de (- x)



$$\text{sen } (-x) = - \text{sen } x$$

$$\text{cos } (-x) = \text{cos } x$$

Funções de ângulos compostos

Funções com ângulos

$$\sin (a \pm b) = \sin a \cos b \pm \cos a \sin b$$

$$\circ = - +$$

$$\sin (2a) = 2 \sin a \cos a$$

$$\cos (a \pm b) = \cos a \cos b \circ \sin a \sin b$$

$$\cos (2a) = \cos^2 a - \sin^2 a$$

$$\tan (a \pm b) = [\tan a \pm \tan b] / [1 \circ \tan a \tan b]$$

$$\tan (2a) = [2 \tan a] / [1 - \tan^2 a]$$

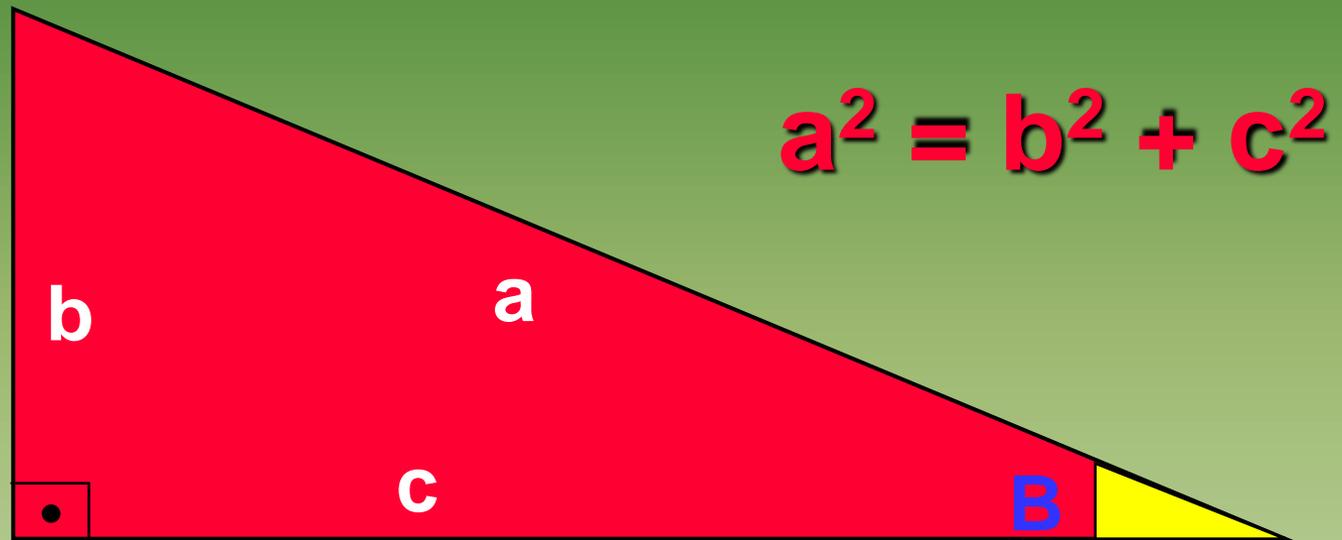
$$\sin a/2 = \sqrt{\{ [1 - \cos a] / 2 \}}$$

$$\cos a/2 = \sqrt{\{ [1 + \cos a] / 2 \}}$$

$$\tan a/2 = \sqrt{\{ [1 - \cos a] / [1 + \cos a] \}}$$

Trigonometria básica no triângulo retângulo

Trigonometria no triângulo retângulo



$\text{sen } B = \text{Cateto SEparado} / \text{Hipotenusa}$

$\text{cos } B = \text{Cateto COLado} / \text{Hipotenusa}$

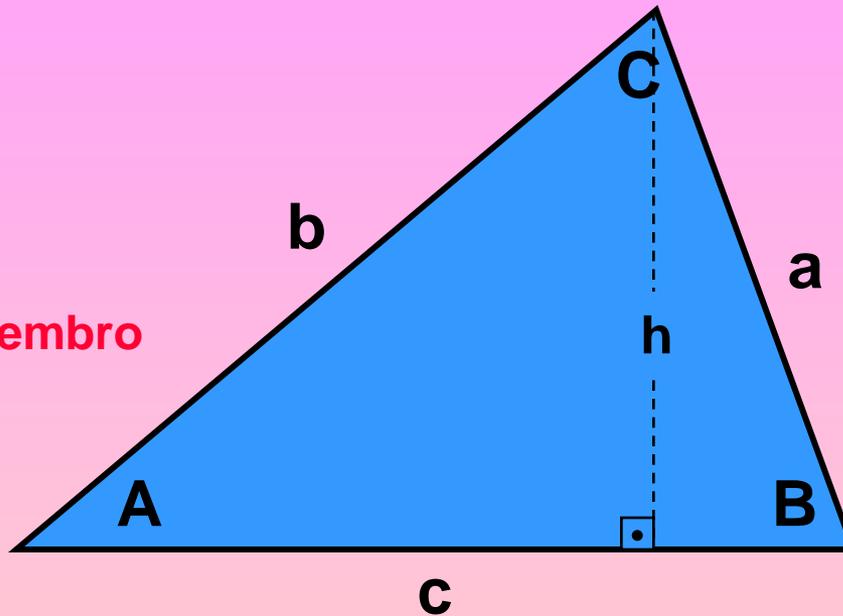
Trigonometria num triângulo qualquer

Fórmula do seno num triângulo qualquer

$$\text{sen } A = h / b$$

$$\text{sen } B = h / a$$

Dividir membro a membro

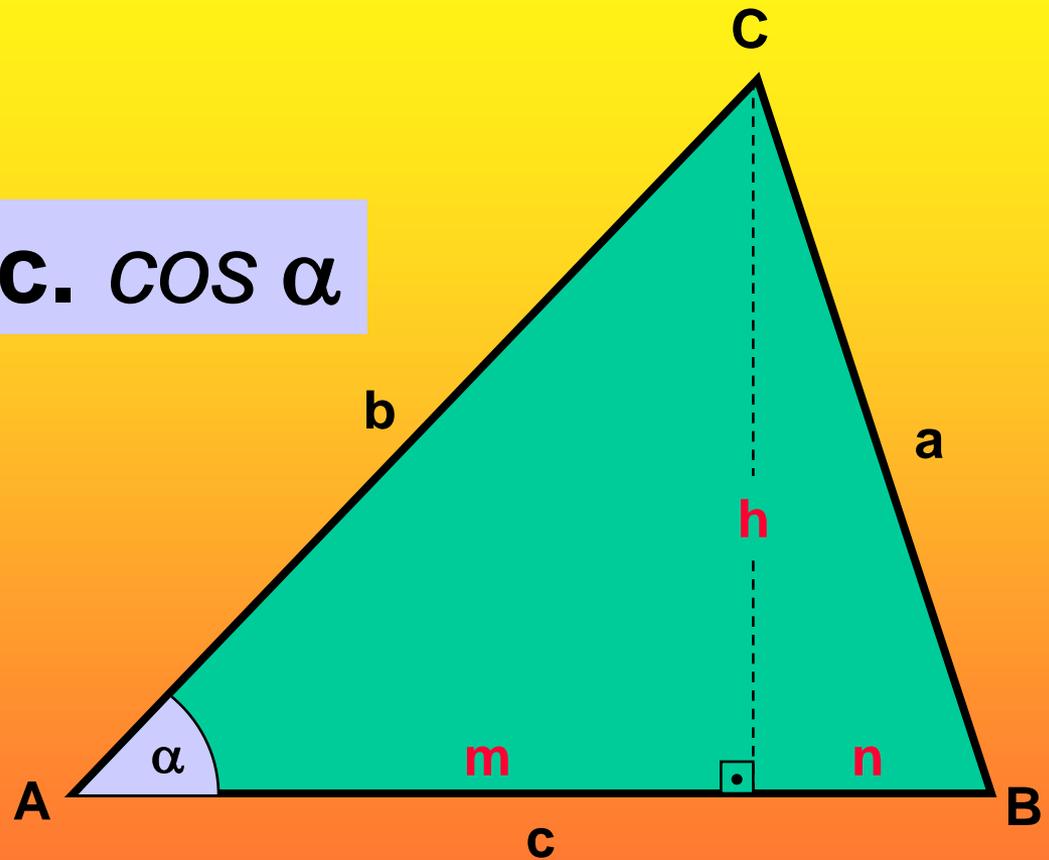


$$a / \text{sen } A = b / \text{sen } B = c / \text{sen } C$$

Fórmula do co-seno num triângulo qualquer

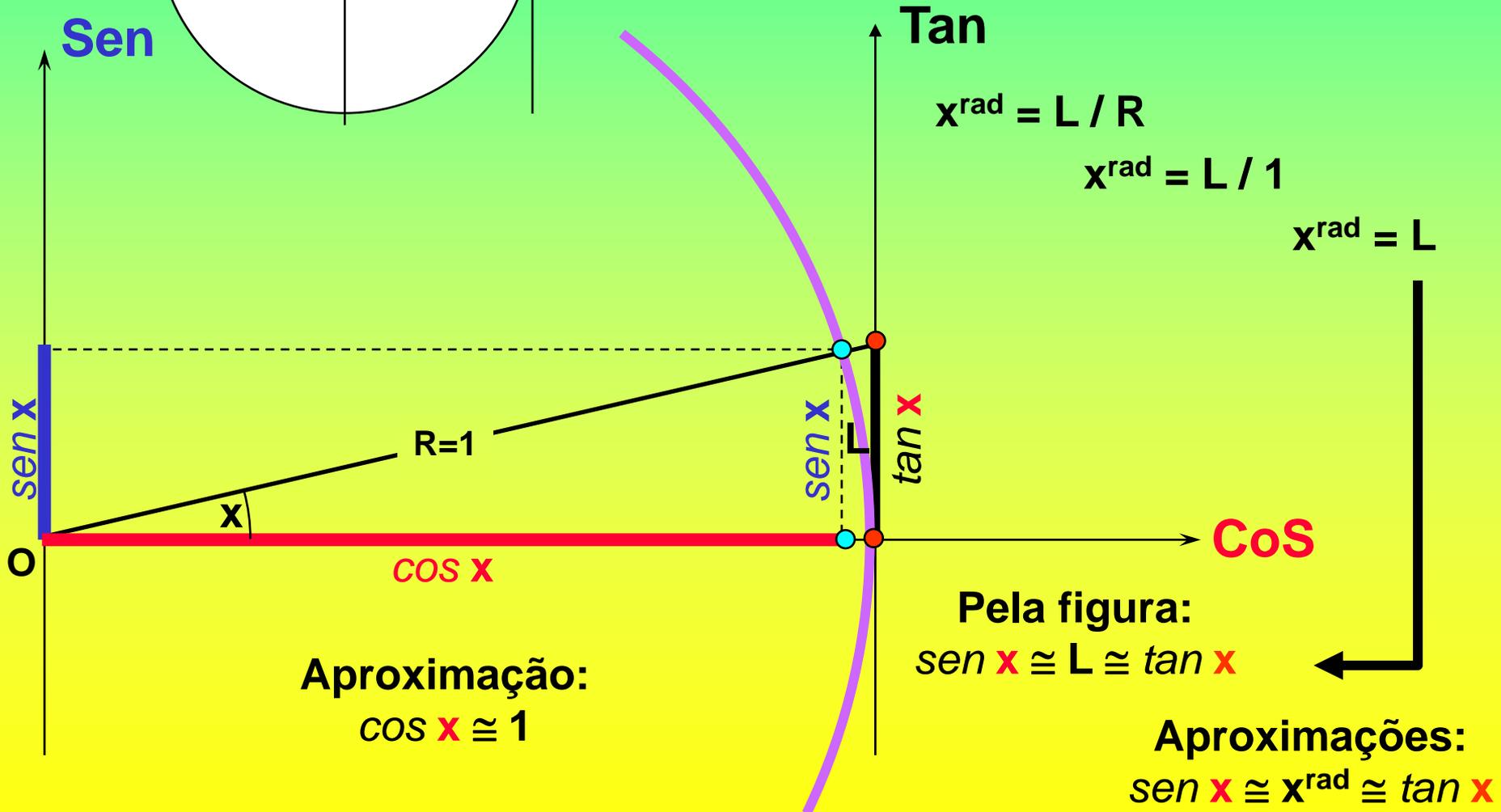
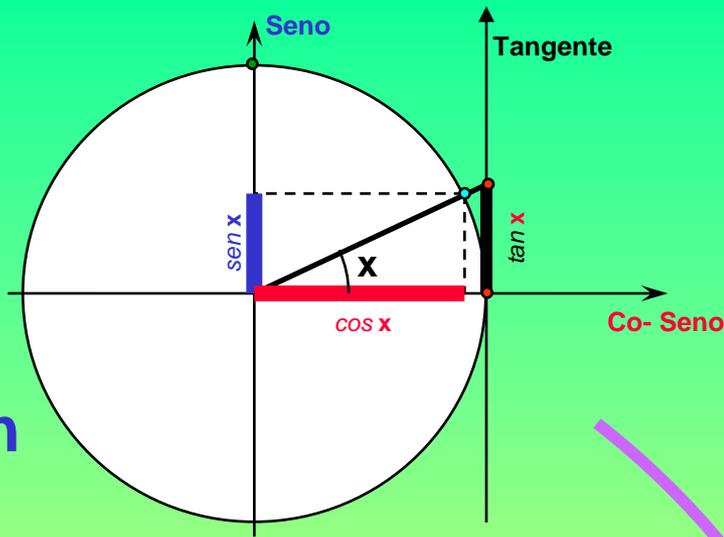
$$\cos \alpha = m / b$$

$$a^2 = b^2 + c^2 - 2 \cdot b \cdot c \cdot \cos \alpha$$



Algumas aproximações

Aproximações para pequenos ângulos



Film