

# Тригонометрические функции углового аргумента

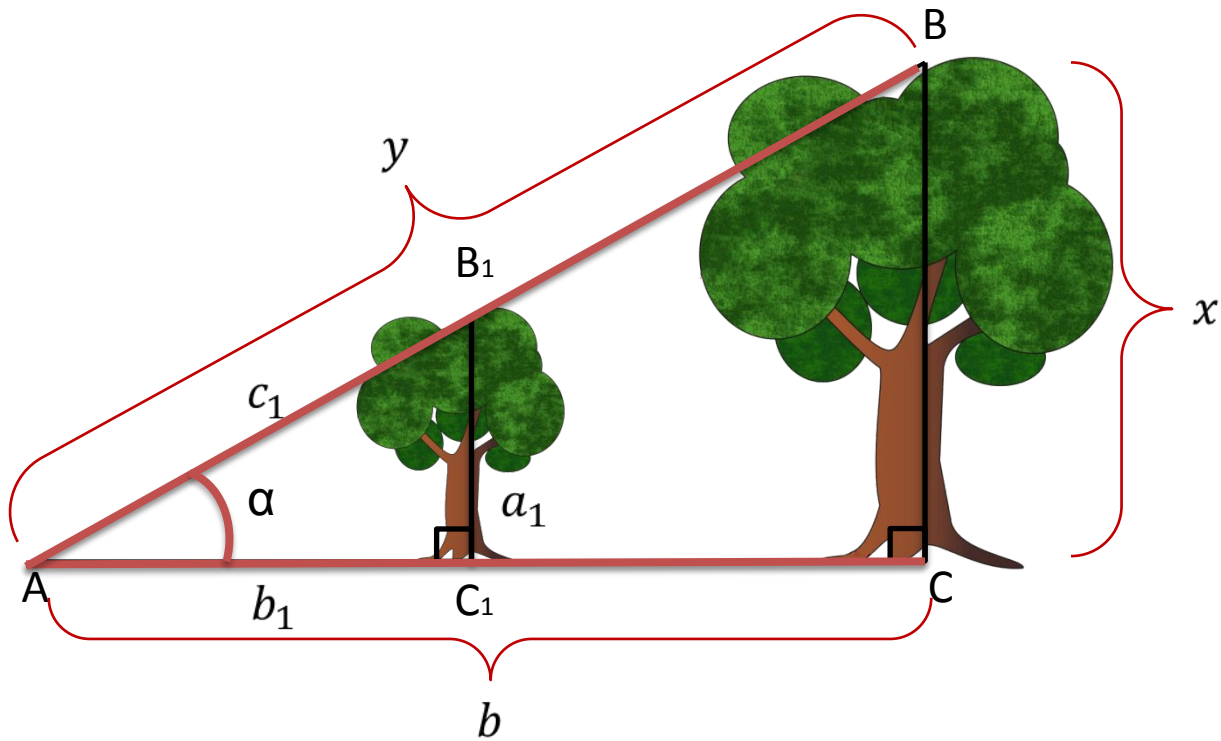
# Тригонометрические функции числового аргумента

$$y = \sin t$$

$$y = \cos t$$

$$y = \operatorname{tg} t$$

$$y = \operatorname{ctg} t$$



$$\triangle ABC \sim \triangle AB_1C_1$$

$$\frac{x}{a_1} = \frac{b}{b_1}$$

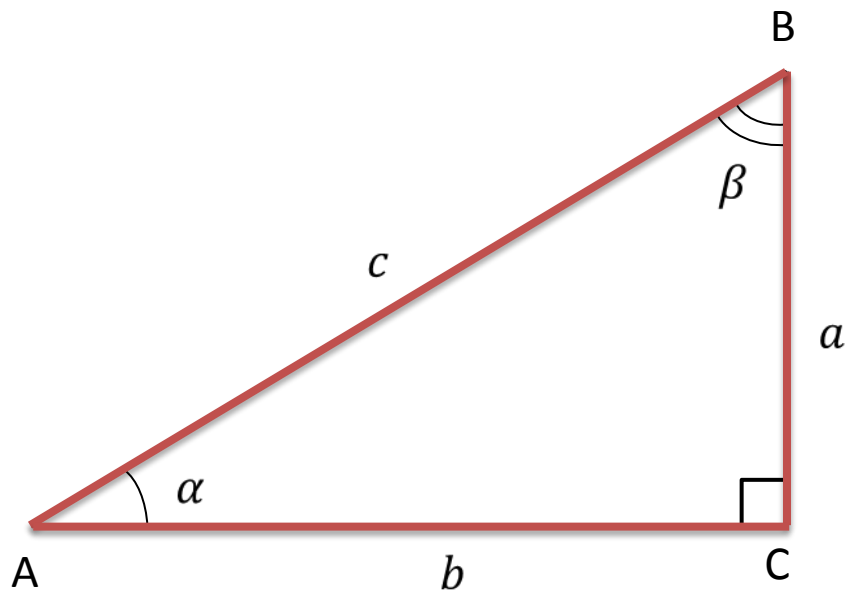
$$x = b \cdot \frac{a_1}{b_1}$$

$$\frac{a_1}{b_1} = \operatorname{tg} \alpha \quad x = b \cdot \operatorname{tg} \alpha$$

$$\frac{y}{c_1} = \frac{b}{b_1}$$

$$y = b \cdot \frac{c_1}{b_1} = \frac{b}{\frac{b_1}{c_1}}$$

$$\frac{b_1}{c_1} = \cos \alpha \quad y = \frac{b}{\cos \alpha}$$



$$\sin \alpha = \frac{a}{c}$$

$$\sin \beta = \frac{b}{c}$$

$$\cos \alpha = \frac{b}{c}$$

$$\cos \beta = \frac{a}{c}$$

$$\operatorname{tg} \alpha = \frac{a}{b}$$

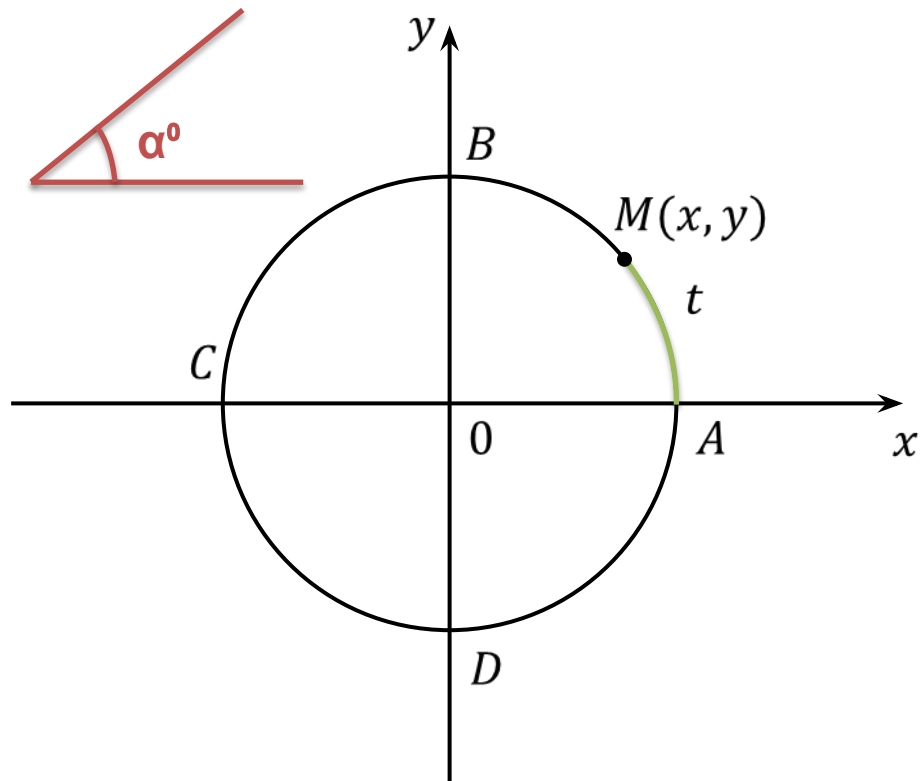
$$\operatorname{tg} \beta = \frac{b}{a}$$

$$\operatorname{ctg} \alpha = \frac{b}{a}$$

$$\operatorname{ctg} \beta = \frac{a}{b}$$

$$a = c \cdot \sin \alpha = c \cdot \cos \beta$$

$$a = b \cdot \operatorname{tg} \alpha = b \cdot \operatorname{ctg} \beta$$



$$x = \cos \alpha^\circ \quad y = \sin \alpha^\circ$$

$$\frac{\alpha^\circ}{360^\circ} = \frac{t}{2\pi}$$

$$t = \frac{2\pi\alpha^\circ}{360^\circ} = \frac{\pi\alpha^\circ}{180^\circ}$$

$$\sin \alpha^\circ = \sin t = \sin \frac{\pi\alpha^\circ}{180^\circ}$$

$$\cos \alpha^\circ = \cos t = \cos \frac{\pi\alpha^\circ}{180^\circ}$$

# Пример:

$$t = \frac{\pi \alpha^\circ}{180^\circ}$$

Найти а)  $\sin 30^\circ$ , б)  $\cos 60^\circ$ .

Решение:

градусная мера  
угла

радианная мера угла

$$\text{а) } \sin 30^\circ = \sin \frac{\pi \cdot 30^\circ}{180^\circ} = \sin \frac{\pi}{6} = \frac{1}{2}$$

$$\text{б) } \cos 60^\circ = \cos \frac{\pi \cdot 60^\circ}{180^\circ} = \cos \frac{\pi}{3} = \frac{1}{2}$$

$$\alpha^\circ = \frac{\pi \alpha^\circ}{180^\circ} \text{ рад}$$

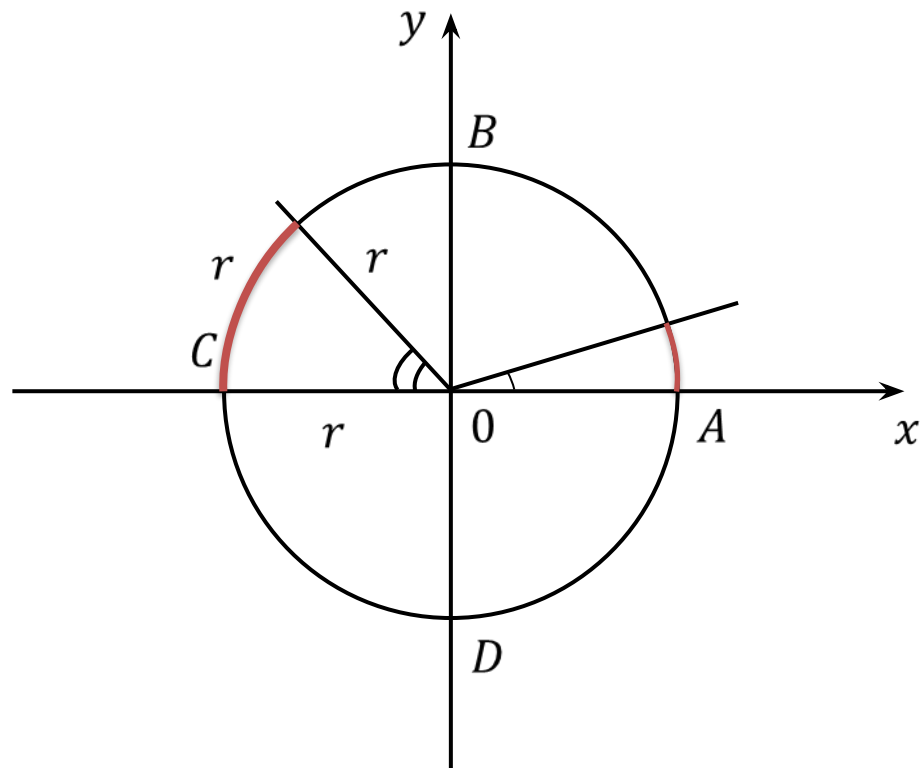
$$1^\circ = \frac{\pi}{180^\circ} \text{ рад}$$

$$1 \text{ рад} = \frac{180^\circ}{\pi}$$

$$65^\circ = \frac{\pi \cdot 65^\circ}{180^\circ} = \frac{13\pi}{36} \text{ рад}$$

$$\frac{4\pi}{3} = \frac{4\pi}{3} \cdot \frac{180^\circ}{\pi} = 4 \cdot 60^\circ = 240^\circ$$

$$\sin 45^\circ = \sin \frac{\pi \cdot 45^\circ}{180^\circ} = \sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$$



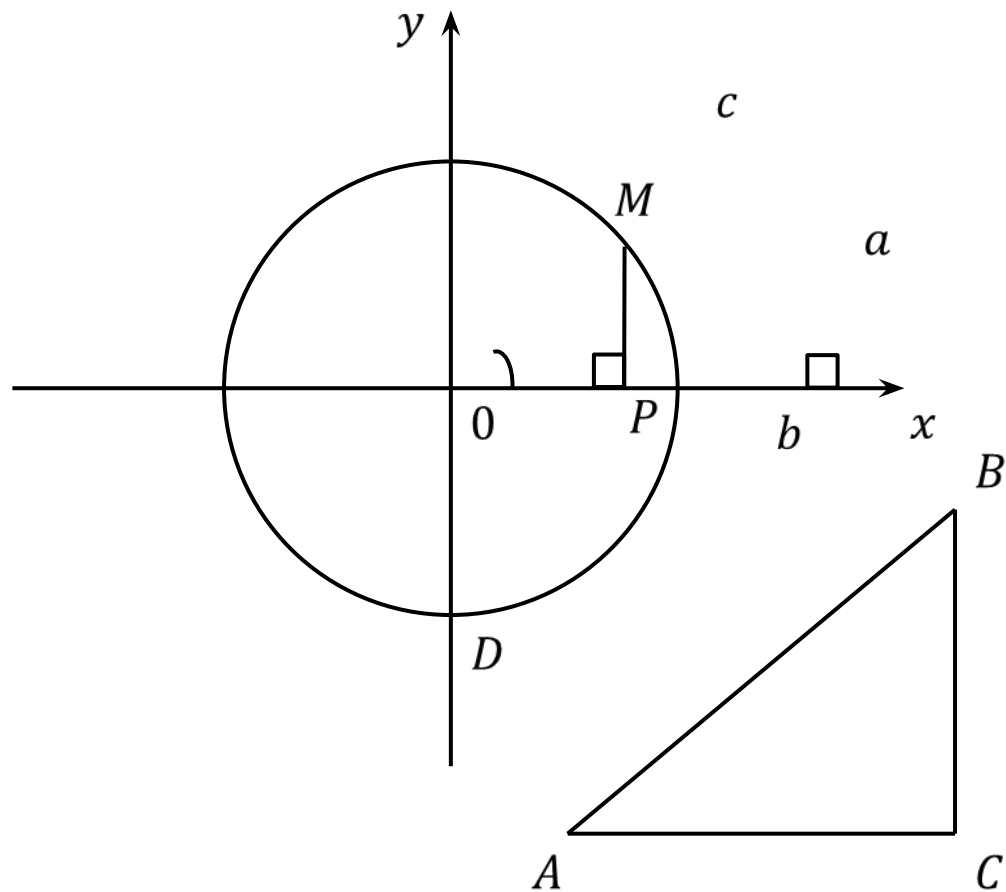
$$1^\circ \quad l = \frac{1}{360^\circ} \cdot C$$

$$1 \text{ рад} \quad l = r$$

$$1 \text{ рад} = \frac{180^\circ}{\pi}$$

$$1 \text{ рад} \approx 57,3^\circ$$





$$\Delta AMP \sim \Delta ABC$$

$$\frac{MP}{BC} = \frac{AM}{AB} = \frac{AP}{AC}$$

$$MP = \sin A, OP = \cos A$$

$$AM = 1, BC = a, AC = b$$

$$\frac{\sin A}{a} = \frac{1}{c} = \frac{\cos A}{b}$$

$$\frac{\sin A}{a} = \frac{1}{c} \Rightarrow \sin A = \frac{a}{c}$$

$$\frac{\cos A}{b} = \frac{1}{c} \Rightarrow \cos A = \frac{b}{c}$$

$$\operatorname{tg} A = \frac{a}{b} \quad \operatorname{ctg} A = \frac{b}{a}$$

# Упражнения:

1. Переведите из градусной меры в радианную:

а)  $150^\circ$ , б)  $330^\circ$ .

2. Переведите из радианной меры в градусную:

а)  $\frac{3\pi}{4}$ , б)  $\frac{7\pi}{12}$ .