Degree

Notations

Traditional name

The number of radians in one degree

Traditional notation

$\circ$

Mathematica StandardForm notation

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Degree
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Primary definition

02.04.02.0001.01

$$\circ = \frac{\pi}{180}$$

Degree ($\circ$) is the number ($\pi / 180$) of radians in one degree.

Different representations of $\circ$ can be derived from corresponding representations of π; see the page for π.

Specific values

02.04.03.0001.01

$$\circ = 0.0174532925199432957692369076848861271344287188854172545609719144017100911460344944368224156\ldots$$

Above approximate numerical value of $\circ$ shows 90 decimal digits.

General characteristics

The number of radians in one degree $\circ$ is a constant. It is irrational and transcendental over $\mathbb{Q}$ positive real number.

Complex characteristics

Real part

02.04.19.0001.01

$$\mathrm{Re}(\circ) = \circ$$

Imaginary part

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$$\text{Im}(\circ) = 0$$

Absolute value

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$$|\circ| = \circ$$

Argument

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$$\arg(\circ) = 0$$

Conjugate value

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$$\overline{\circ} = \circ$$

Signum value

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$$\text{sgn}(\circ) = 1$$

Differentiation

Low-order differentiation

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$$\frac{\partial \circ}{\partial z} = 0$$

Fractional integro-differentiation

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$$\frac{\partial^\alpha \circ}{\partial z^\alpha} = \frac{z^{-\alpha} \circ}{\Gamma(1-\alpha)}$$

Integration

Indefinite integration

02.04.21.0001.01

$$\int \circ \, dz = \circ \, z$$

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$$\int z^{\alpha-1} \circ \, dz = \frac{\circ \, z^\alpha}{\alpha}$$

Integral transforms

Fourier exp transforms

02.04.22.0001.01

$$\mathcal{F}_t[°](z) = ° \sqrt{2\pi}\ \delta(z)$$

Inverse Fourier exp transforms

02.04.22.0002.01

$$\mathcal{F}_t^{-1}[°](z) = ° \sqrt{2\pi}\ \delta(z)$$

Fourier cos transforms

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$$\mathcal{F}c_t[°](z) = ° \sqrt{\frac{\pi}{2}}\ \delta(z)$$

Fourier sin transforms

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$$\mathcal{F}s_t[°](z) = \frac{°}{z} \sqrt{\frac{\pi}{2}}$$

Laplace transforms

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$$\mathcal{L}_t[°](z) = \frac{°}{z}$$

Inverse Laplace transforms

02.04.22.0006.01

$$\mathcal{L}_t^{-1}[°](z) = °\ \delta(z)$$

Representations through more general functions

Through Meijer *G*

02.04.26.0001.01

$$° = °\ G_{0,1}^{1,0}(z \mid 0) + °\ G_{1,2}^{1,1}\left(z \,\middle|\, \begin{matrix} 1 \\ 1,\ 0 \end{matrix}\right)$$

Through other functions

02.04.26.0002.01

$$° = \frac{1}{45}\left(4\tan^{-1}\left(\frac{1}{5}\right) - \tan^{-1}\left(\frac{1}{239}\right)\right)$$

02.04.26.0003.01

$$\circ = \frac{1}{45}\left(\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right)\right)$$

02.04.26.0004.01

$$\circ = \frac{1}{45}\left(2\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right)\right)$$

02.04.26.0005.01

$$\circ = \frac{1}{45}\left(\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{8}\right)\right)$$

02.04.26.0006.01

$$\circ = \frac{1}{45}\left(6\tan^{-1}\left(\frac{1}{8}\right) + 2\tan^{-1}\left(\frac{1}{57}\right) + \tan^{-1}\left(\frac{1}{239}\right)\right)$$

02.04.26.0007.01

$$\circ = \frac{1}{45}\left(22\tan^{-1}\left(\frac{1}{28}\right) + 2\tan^{-1}\left(\frac{1}{443}\right) - 5\tan^{-1}\left(\frac{1}{1393}\right) - 10\tan^{-1}\left(\frac{1}{11\,018}\right)\right)$$

02.04.26.0008.01

$$\circ = \frac{1}{45}\left(12\tan^{-1}\left(\frac{1}{18}\right) + 3\tan^{-1}\left(\frac{1}{70}\right) + 5\tan^{-1}\left(\frac{1}{99}\right) + 8\tan^{-1}\left(\frac{1}{307}\right)\right)$$

02.04.26.0009.01

$$\circ = \frac{1}{45}\left(160\tan^{-1}\left(\frac{1}{200}\right) - \tan^{-1}\left(\frac{1}{239}\right) - 4\tan^{-1}\left(\frac{1}{515}\right) - 8\tan^{-1}\left(\frac{1}{4030}\right) - 16\tan^{-1}\left(\frac{1}{50\,105}\right) - 16\tan^{-1}\left(\frac{1}{62\,575}\right) - 32\tan^{-1}\left(\frac{1}{500\,150}\right) - 80\tan^{-1}\left(\frac{1}{4\,000\,300}\right)\right)$$

02.04.26.0010.01

$$\circ = \frac{1}{45}\left(\tan^{-1}\left(\frac{p}{q}\right) + \tan^{-1}\left(\frac{q-p}{p+q}\right)\right) /; p \in \mathbb{N}^+ \bigwedge q \in \mathbb{N}^+$$

02.04.26.0011.01

$$\circ = \frac{K(0)}{90}$$

02.04.26.0012.01

$$\circ = \frac{E(0)}{90}$$

02.04.26.0013.01

$$\circ = \frac{1}{180}\sqrt{6\,\mathrm{Li}_2(1)}$$

02.04.26.0014.01

$$\circ = \frac{1}{180}\,\Gamma\left(\frac{1}{2}\right)^2$$

Representations through equivalent functions

With related functions

02.04.27.0001.01

$$° = \frac{\pi}{180}$$

02.04.27.0002.01

$$° = -\frac{i}{180} \log(-1)$$

02.04.27.0003.01

$$° = \frac{1}{90} i \log\left(\frac{1-i}{1+i}\right)$$

02.04.27.0004.01

$$e^{180 ° i} = -1$$

identity due to L. Euler

02.04.27.0005.01

$$e^{360 ° i} = 1$$

02.04.27.0006.01

$$e^{180 ° i k} = (-1)^k \;/;\; k \in \mathbb{Z}$$

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$$e^{90 ° i k} = i^k \;/;\; k \in \mathbb{Z}$$

Inequalities

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$$\frac{1}{60} < ° < \frac{1}{57}$$

History

– Babylonians divided the circle into 360 degrees, probably because this was approximately the number of days in the year

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