



# **Wave Celerity Formulas**

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## **List of 12 Wave Celerity Formulas**

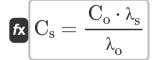
## Wave Celerity **@**

1) Celerity of Deepwater Wave

$$\left| \mathbf{C}_{\mathrm{o}} = \sqrt{rac{\left[ \mathrm{g} 
ight] \cdot \lambda_{\mathrm{o}}}{2 \cdot \pi}} 
ight|$$

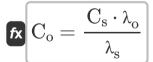
$$oxed{4.504453 ext{m/s}} = \sqrt{rac{[ ext{g}] \cdot 13 ext{m}}{2 \cdot \pi}}$$

## 2) Celerity of Wave given Deepwater Celerity and Wavelength

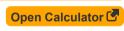


$$\mathbf{ex} \ 2.769231 \mathrm{m/s} = rac{4.5 \mathrm{m/s} \cdot 8 \mathrm{m}}{13 \mathrm{m}}$$

### 3) Deepwater Celerity for Deepwater wavelength



$$\boxed{4.55 \mathrm{m/s} = \frac{2.8 \mathrm{m/s} \cdot 13 \mathrm{m}}{8 \mathrm{m}}}$$



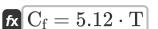
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#### 4) Deepwater Celerity given Units of Feet and Seconds



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 $| \mathbf{ex} | 50.3937 \mathrm{ft/s} = 5.12 \cdot 3 \mathrm{s} |$ 

#### 5) Deepwater Celerity given Wave Period

 $\mathbf{K} \mathbf{C}_{\mathrm{o}} = rac{[\mathrm{g}] \cdot \mathrm{T}}{2 \cdot \pi}$ 

Open Calculator

# 6) Deepwater Celerity when SI systems Units of Meters and Seconds is considered

fx  $C_{
m o} = 1.56 \cdot T$ 

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 $extbf{ex} 4.68 ext{m/s} = 1.56 \cdot 3 ext{s}$ 

### 7) Deepwater Wave Celerity

fx  $C_{
m o}=rac{\lambda_{
m o}}{T}$ 

Open Calculator 🗗

=  $4.333333 ext{m/s} = rac{13 ext{m}}{3 ext{s}}$ 



#### 8) Wave Celerity given Wave Period and Wavelength

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$$\mathbf{C}_{\mathrm{o}} = \left(\frac{[\mathrm{g}] \cdot \mathrm{T}}{2 \cdot \pi}\right) \cdot \mathrm{tanh}\left(\frac{2 \cdot \pi \cdot \mathrm{d}}{\lambda_{\mathrm{o}}}\right)$$

## 9) Wave Celerity given Wavelength and Water Depth

$$\mathbf{K} \mathbf{C}_{\mathrm{o}} = \sqrt{\left(rac{\lambda_{\mathrm{o}} \cdot [\mathrm{g}]}{2 \cdot \pi}
ight) \cdot anh\left(rac{2 \cdot \pi \cdot \mathrm{d}}{\lambda_{\mathrm{o}}}
ight)}$$

Open Calculator 🗗

$$\boxed{ 4.461154 \text{m/s} = \sqrt{\left(\frac{13\text{m} \cdot [\text{g}]}{2 \cdot \pi}\right) \cdot \tanh\left(\frac{2 \cdot \pi \cdot 4.8 \text{m}}{13\text{m}}\right) }$$

### 10) Wave Celerity given Wavelength and Wave Period

fx 
$$C_{
m o}=rac{\lambda_{
m o}}{T}$$
 ex  $4.333333{
m m/s}=rac{13{
m m}}{2{
m o}}$ 

Open Calculator 🚰

# 11) Wave Celerity when Relative Water Depth becomes Shallow

$$\left[ \mathbf{K} \right] \mathrm{C_s} = \sqrt{[\mathrm{g}] \cdot \mathrm{d_s}}$$

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$$= 2.80095 {
m m/s} = \sqrt{{
m [g]} \cdot 0.8 {
m m} }$$







## 12) Wave Period given Deepwater Celerity 🗲



Open Calculator

$$ag{T} = rac{\lambda_{
m o}}{
m C_{
m o}}$$

$$oxed{ex} 2.888889 \mathrm{s} = rac{13 \mathrm{m}}{4.5 \mathrm{m/s}}$$



#### Variables Used

- **C**<sub>f</sub> Celerity in FPS Unit (Foot per Second)
- Co Deepwater Wave Celerity (Meter per Second)
- C<sub>s</sub> Celerity for Shallow Depth (Meter per Second)
- **d** Water Depth (Meter)
- **d**<sub>S</sub> Shallow Depth (Meter)
- T Wave Period (Second)
- λ<sub>O</sub> DeepWater Wavelength (Meter)
- λ<sub>S</sub> Wavelength for Shallow Depth (Meter)





## Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288
   Archimedes' constant
- Constant: [g], 9.80665

  Gravitational acceleration on Earth
- Function: sqrt, sqrt(Number)

  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Function: tanh, tanh(Number)

  The hyperbolic tangent function (tanh) is a function that is defined as the ratio of the hyperbolic sine function (sinh) to the hyperbolic cosine function (cosh).
- Measurement: Length in Meter (m)
   Length Unit Conversion
- Measurement: Time in Second (s)

  Time Unit Conversion
- Measurement: Speed in Meter per Second (m/s), Foot per Second (ft/s)
   Speed Unit Conversion





#### Check other formula lists

- Cnoidal Wave Theory Formulas
- Horizontal and Vertical Semi-Axis Wave Period Distribution and of Ellipse Formulas
- Parametric Spectrum Models Formulas [4
- Wave Celerity Formulas
- Wave Energy Formulas

- Wave Parameters Formulas
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