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Wavelength Formulas

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List of 14 Wavelength Formulas

Wavelength

1) Deepwater Wavelength given Celerity of Deepwater Wave

Open Calculator

fx $$\lambda_o = \frac{C_o^2 \cdot 2 \cdot \pi}{[g]}$$

ex $$12.97431\text{m} = \frac{(4.5\text{m/s})^2 \cdot 2 \cdot \pi}{[g]}$$

2) Deepwater Wavelength given Deepwater Celerity

Open Calculator

fx $$\lambda_o = \frac{\lambda \cdot C_o}{C}$$

ex $$12.99857\text{m} = \frac{10.11\text{m} \cdot 4.5\text{m/s}}{3.5\text{m/s}}$$

3) Deepwater Wavelength given Units of Feet

Open Calculator

fx $$\lambda_{ft} = 5.12 \cdot T^2$$

ex $$151.1811\text{ft} = 5.12 \cdot (3\text{s})^2$$

4) Deepwater Wavelength given Wave Celerity

Open Calculator

fx $\lambda_o = C_o \cdot T$

ex $13.5\text{m} = 4.5\text{m/s} \cdot 3\text{s}$

5) Deepwater Wavelength when SI systems Units of meters is Considered

Open Calculator

fx $\lambda_o = 1.56 \cdot T^2$

ex $14.04\text{m} = 1.56 \cdot (3\text{s})^2$

6) Eckert's Equation for Wavelength

Open Calculator

fx $\lambda = \lambda_o \cdot \sqrt{\tanh\left(\frac{2 \cdot \pi \cdot d}{\lambda_o}\right)}$

ex $10.35637\text{m} = 13\text{m} \cdot \sqrt{\tanh\left(\frac{2 \cdot \pi \cdot 1.55\text{m}}{13\text{m}}\right)}$

7) Long Wave Simplification for Wavelength

Open Calculator

fx $\lambda = T \cdot \sqrt{[g] \cdot d}$

ex $11.69627\text{m} = 3\text{s} \cdot \sqrt{[g] \cdot 1.55\text{m}}$

8) Water Depth given Wave Celerity and Wavelength

Open Calculator

fx $$d = \frac{\lambda \cdot a\tanh\left(\frac{2\cdot\pi\cdot C}{[g]\cdot T}\right)}{2\cdot\pi}$$

ex $$1.556351\text{m} = \frac{10.11\text{m} \cdot a\tanh\left(\frac{2\cdot\pi\cdot 3.5\text{m/s}}{[g]\cdot 3\text{s}}\right)}{2\cdot\pi}$$

9) Wavelength as Function of Depth and Wave Period

Open Calculator

fx $$\lambda = \left(\frac{[g]\cdot T^2}{2\cdot\pi}\right)\cdot\tanh(k\cdot d)$$

ex $$14.04699\text{m} = \left(\frac{[g]\cdot(3\text{s})^2}{2\cdot\pi}\right)\cdot\tanh(5\cdot 1.55\text{m})$$

10) Wavelength as Function of Water Depth and Wave Period

Open Calculator

fx $$\lambda = \left(\frac{[g]\cdot T}{\omega}\right)\cdot\tanh(k\cdot d)$$

ex $$11.76798\text{m} = \left(\frac{[g]\cdot 3\text{s}}{2.5\text{rad/s}}\right)\cdot\tanh(5\cdot 1.55\text{m})$$

11) Wavelength given Deepwater Celerity and Deepwater Wavelength

Open Calculator

fx $$\lambda = \frac{\lambda_o \cdot C}{C_o}$$

ex $$10.11111\text{m} = \frac{13\text{m} \cdot 3.5\text{m/s}}{4.5\text{m/s}}$$

12) Wavelength given Deepwater Wavelength

Open Calculator

fx $$\lambda = \lambda_o \cdot \tanh(k \cdot d)$$

ex $$13\text{m} = 13\text{m} \cdot \tanh(5 \cdot 1.55\text{m})$$

13) Wavelength given Wave Celerity

Open Calculator

fx $$\lambda = C \cdot T$$

ex $$10.5\text{m} = 3.5\text{m/s} \cdot 3\text{s}$$

14) Wavelength given Wave Celerity and Wave Speed

Open Calculator

fx $$\lambda = \frac{2 \cdot \pi \cdot d}{a\tanh\left(\frac{2 \cdot C \cdot \pi}{[g] \cdot T}\right)}$$

ex $$10.06874\text{m} = \frac{2 \cdot \pi \cdot 1.55\text{m}}{a\tanh\left(\frac{2 \cdot 3.5\text{m/s} \cdot \pi}{[g] \cdot 3\text{s}}\right)}$$

Variables Used

- **C** Wave Celerity *(Meter per Second)*
- **C_o** Deepwater Wave Celerity *(Meter per Second)*
- **d** Water Depth *(Meter)*
- **k** Wave Number
- **T** Wave Period *(Second)*
- **λ** Wavelength *(Meter)*
- **$λ_{ft}$** DeepWater Wavelength in Feet *(Foot)*
- **$λ_o$** DeepWater Wavelength *(Meter)*
- **ω** Wave Angular Frequency *(Radian per Second)*

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Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Constant: **[g]**, 9.80665
  Gravitational acceleration on Earth
- Function: **atanh**, atanh(Number)
  The inverse hyperbolic tangent function returns the value whose hyperbolic tangent is a number.
- 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), Foot (ft)
  Length Unit Conversion
- Measurement: **Time** in Second (s)
  Time Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Angular Frequency** in Radian per Second (rad/s)
  Angular Frequency Unit Conversion

Check other formula lists

- Cnoidal Wave Theory Formulas
- Horizontal and Vertical Semi-Axis of Ellipse Formulas
- Parametric Spectrum Models Formulas
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