

Important Horizontal and Vertical Semi-Axis of Ellipse Formulas PDF



Formulas Examples with Units

List of 13 Important Horizontal and Vertical Semi-Axis of Ellipse Formulas

1) Major Horizontal Semi Axis for Deep Water Condition Formula ↻

Formula

$$A = \left(\frac{H_w}{2} \right) \cdot \exp \left(2 \cdot \pi \cdot \frac{Z}{L} \right)$$

Example with Units

$$7.4021 = \left(\frac{14_m}{2} \right) \cdot \exp \left(2 \cdot 3.1416 \cdot \frac{0.8}{90_m} \right)$$

Evaluate Formula ↻

2) Major Horizontal Semi Axis for Shallow Water Condition Formula ↻

Formula

$$A = \left(\frac{H_w}{2} \right) \cdot \left(\frac{L}{2 \cdot \pi \cdot d_s} \right)$$

Example with Units

$$7.4272 = \left(\frac{14_m}{2} \right) \cdot \left(\frac{90_m}{2 \cdot 3.1416 \cdot 13.5_m} \right)$$

Evaluate Formula ↻

3) Minor Vertical Semi Axis for Shallow Water Condition Formula ↻

Formula

$$B = \left(\frac{H_w}{2} \right) \cdot \left(1 + \frac{Z}{d_s} \right)$$

Example with Units

$$7.4148 = \left(\frac{14_m}{2} \right) \cdot \left(1 + \frac{0.8}{13.5_m} \right)$$

Evaluate Formula ↻

4) Minor Vertical Semi-Axis for Deep Water Condition Formula ↻

Formula

$$B = \left(\frac{H_w}{2} \right) \cdot \exp \left(2 \cdot \pi \cdot \frac{Z}{L} \right)$$

Example with Units

$$7.4021 = \left(\frac{14_m}{2} \right) \cdot \exp \left(2 \cdot 3.1416 \cdot \frac{0.8}{90_m} \right)$$

Evaluate Formula ↻



5) Phase Angle for Horizontal Fluid Particle Displacement Formula

Formula

Evaluate Formula 

$$\theta = \text{asin} \left(\left(\left(\frac{\varepsilon}{a} \right) \cdot \left(\frac{\sinh \left(2 \cdot \pi \cdot \frac{d}{\lambda} \right)}{\cosh \left(2 \cdot \pi \cdot \frac{y}{\lambda} \right)} \right) \right)^2 \right)^2$$

Example with Units

$$0.0001^\circ = \text{asin} \left(\left(\left(\frac{0.4\text{m}}{1.56\text{m}} \right) \cdot \left(\frac{\sinh \left(2 \cdot 3.1416 \cdot \frac{1.05\text{m}}{26.8\text{m}} \right)}{\cosh \left(2 \cdot 3.1416 \cdot \frac{4.92\text{m}}{26.8\text{m}} \right)} \right) \right)^2 \right)^2$$

6) Sea Bed Given Minor Vertical Semi-Axis for Shallow Water Condition Formula

Formula

Example with Units

Evaluate Formula 

$$Z = d_s \cdot \left(\left(\frac{B}{\frac{H_w}{2}} \right) - 1 \right)$$

$$0.8004 = 13.5\text{m} \cdot \left(\left(\frac{7.415}{\frac{14\text{m}}{2}} \right) - 1 \right)$$

7) Water Depth for Major Horizontal Semi-Axis for Shallow Water Condition Formula

Formula

Example with Units

Evaluate Formula 

$$d_s = \frac{H_w \cdot L}{4 \cdot \pi \cdot A}$$

$$13.5458\text{m} = \frac{14\text{m} \cdot 90\text{m}}{4 \cdot 3.1416 \cdot 7.4021}$$

8) Water Depth Given Minor Vertical Semi-Axis for Shallow Water Condition Formula

Formula

Example with Units

Evaluate Formula 

$$d_s = \frac{Z}{\left(\frac{B}{\frac{H_w}{2}} \right) - 1}$$

$$13.494\text{m} = \frac{0.8}{\left(\frac{7.415}{\frac{14\text{m}}{2}} \right) - 1}$$

9) Wave Height for Major Horizontal Semi-Axis Deep Water Condition Formula

Formula

Example with Units

Evaluate Formula 

$$H_w = \frac{2 \cdot A}{\exp \left(2 \cdot \pi \cdot \frac{Z}{L} \right)}$$

$$14\text{m} = \frac{2 \cdot 7.4021}{\exp \left(2 \cdot 3.1416 \cdot \frac{0.8}{90\text{m}} \right)}$$



10) Wave Height for Major Horizontal Semi-Axis for Shallow Water Condition Formula

Formula

$$H_w = \frac{4 \cdot A \cdot \pi \cdot d_s}{L}$$

Example with Units

$$13.9526_m = \frac{4 \cdot 7.4021 \cdot 3.1416 \cdot 13.5_m}{90_m}$$

Evaluate Formula 

11) Wave Height for Minor Vertical Semi-Axis Deep Water Condition Formula

Formula

$$H_w = \frac{2 \cdot B}{\exp\left(2 \cdot \pi \cdot \frac{z}{L}\right)}$$

Example with Units

$$14.0244_m = \frac{2 \cdot 7.415}{\exp\left(2 \cdot 3.1416 \cdot \frac{0.8}{90_m}\right)}$$

Evaluate Formula 

12) Wave Height Given Minor Vertical Semi-Axis for Shallow Water Condition Formula

Formula

$$H_w = \frac{2 \cdot B}{1 + \left(\frac{z}{d_s}\right)}$$

Example with Units

$$14.0003_m = \frac{2 \cdot 7.415}{1 + \left(\frac{0.8}{13.5_m}\right)}$$

Evaluate Formula 

13) Wavelength for Major Horizontal Semi-Axis for Shallow Water Condition Formula

Formula

$$L = \frac{4 \cdot \pi \cdot d_s \cdot A}{H_w}$$

Example with Units

$$89.6955_m = \frac{4 \cdot 3.1416 \cdot 13.5_m \cdot 7.4021}{14_m}$$

Evaluate Formula 



Variables used in list of Horizontal and Vertical Semi-Axis of Ellipse Formulas above

- **a** Wave Amplitude (Meter)
- **A** Horizontal Semi-axis of Water Particle
- **B** Vertical Semi-Axis
- **d** Water Depth (Meter)
- **d_s** Water Depth for Semi-Axis of Ellipse (Meter)
- **H_w** Height of the Wave (Meter)
- **L** Length of Water Wave (Meter)
- **y** Elevation above the Bottom (Meter)
- **Z** Sea Bed Elevation
- **ε** Fluid Particle Displacement (Meter)
- **θ** Phase Angle (Degree)
- **λ** Wavelength of Coast (Meter)

Constants, Functions, Measurements used in list of Horizontal and Vertical Semi-Axis of Ellipse Formulas above

- **constant(s):** π , 3.14159265358979323846264338327950288
Archimedes' constant
- **Functions:** **asin**, $\text{asin}(\text{Number})$
The inverse sine function, is a trigonometric function that takes a ratio of two sides of a right triangle and outputs the angle opposite the side with the given ratio.
- **Functions:** **cosh**, $\text{cosh}(\text{Number})$
The hyperbolic cosine function is a mathematical function that is defined as the ratio of the sum of the exponential functions of x and negative x to 2.
- **Functions:** **exp**, $\text{exp}(\text{Number})$
 e^n an exponential function, the value of the function changes by a constant factor for every unit change in the independent variable.
- **Functions:** **sin**, $\text{sin}(\text{Angle})$
Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- **Functions:** **sinh**, $\text{sinh}(\text{Number})$
The hyperbolic sine function, also known as the sinh function, is a mathematical function that is defined as the hyperbolic analogue of the sine function.
- **Measurement:** **Length** in Meter (m)
Length Unit Conversion 
- **Measurement:** **Angle** in Degree (°)
Angle Unit Conversion 



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