



# Doppler Effect and Wavelength Changes Formulas

Calculators!

Examples!

Conversions!

Bookmark <u>calculatoratoz.com</u>, <u>unitsconverters.com</u>

Widest Coverage of Calculators and Growing - 30,000+ Calculators!

Calculate With a Different Unit for Each Variable - In built Unit Conversion!

Widest Collection of Measurements and Units - 250+ Measurements!

Feel free to SHARE this document with your friends!

Please leave your feedback here...





## List of 15 Doppler Effect and Wavelength Changes Formulas

#### Doppler Effect and Wavelength Changes &

#### Doppler Effect G

1) Observed Frequency when Observer and Source Move Away from Each Other

$$\mathbf{F}_{\mathrm{o}} = \left(rac{\mathrm{f}_{\mathrm{W}}\cdot(\mathrm{c}-\mathrm{V}_{\mathrm{o}})}{\mathrm{c}+\mathrm{V}_{\mathrm{source}}}
ight)$$

Open Calculator

$$oxed{ex} 28.36879 ext{Hz} = \left(rac{200 ext{Hz} \cdot (343 ext{m/s} - 283 ext{m/s})}{343 ext{m/s} + 80 ext{m/s}}
ight)$$

2) Observed Frequency when Observer and Source Move towards Each Other

$$\mathbf{F}_{\mathrm{o}} = \left(rac{\mathrm{f}_{\mathrm{W}}\cdot(\mathrm{c}+\mathrm{V}_{\mathrm{o}})}{\mathrm{c}-\mathrm{V}_{\mathrm{source}}}
ight)$$

Open Calculator

$$\boxed{ 476.0456 \text{Hz} = \left( \frac{200 \text{Hz} \cdot (343 \text{m/s} + 283 \text{m/s})}{343 \text{m/s} - 80 \text{m/s}} \right) }$$



#### 3) Observed Frequency when Observer Moves Away from Source 🖸

$$\mathbf{F}_{\mathrm{o}} = \mathrm{f}_{\mathrm{W}} \cdot \left( rac{\mathrm{c} - \mathrm{V}_{\mathrm{o}}}{\mathrm{c}} 
ight)$$

Open Calculator

$$oxed{80} = 34.98542 ext{Hz} = 200 ext{Hz} \cdot \left(rac{343 ext{m/s} - 283 ext{m/s}}{343 ext{m/s}}
ight)$$

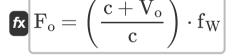
4) Observed Frequency when Observer Moves Away from Source using Wavelength

$$\mathbf{F}_{\mathrm{o}} = rac{\mathrm{c} - \mathrm{V}_{\mathrm{o}}}{\lambda}$$

Open Calculator 2

$$ext{ex} 150 ext{Hz} = rac{343 ext{m/s} - 283 ext{m/s}}{0.4 ext{m}}$$

5) Observed Frequency when Observer Moves towards Source C



Open Calculator

$$oxed{ex} 365.0146 ext{Hz} = \left(rac{343 ext{m/s} + 283 ext{m/s}}{343 ext{m/s}}
ight) \cdot 200 ext{Hz}$$



### 6) Observed Frequency when Observer Moves towards Source and Source Moves Away

 $\mathbf{F}_{\mathrm{o}} = \left(rac{\mathrm{c} + \mathrm{V}_{\mathrm{o}}}{\mathrm{c} + \mathrm{V}_{\mathrm{source}}}
ight) \cdot \mathrm{f}_{\mathrm{W}}$ 

Open Calculator

 $oxed{ex} 295.9811 ext{Hz} = \left(rac{343 ext{m/s} + 283 ext{m/s}}{343 ext{m/s} + 80 ext{m/s}}
ight) \cdot 200 ext{Hz}$ 

## 7) Observed Frequency when Observer Moves towards Source using Wavelength

 $\left|\mathbf{F}_{\mathrm{o}}=rac{\mathrm{c}+\mathrm{V}_{\mathrm{o}}}{\lambda}
ight|$ 

Open Calculator

=  $1565 ext{Hz} = rac{343 ext{m/s} + 283 ext{m/s}}{0.4 ext{m}}$ 

#### 8) Observed Frequency when Source Moves Away from Observer

 $\mathbf{F}_{\mathrm{o}} = f_{\mathrm{W}} \cdot rac{\mathrm{c}}{\mathrm{c} + \mathrm{V}_{\mathrm{source}}}$ 

Open Calculator

 $oxed{ex} 162.1749 ext{Hz} = 200 ext{Hz} \cdot rac{343 ext{m/s}}{343 ext{m/s} + 80 ext{m/s}}$ 



#### 9) Observed Frequency when Source Moves towards Observer

 $\mathbf{F}_{\mathrm{o}} = \mathrm{f}_{\mathrm{W}} \cdot rac{\mathrm{c}}{\mathrm{c} - \mathrm{V}_{\mathrm{source}}}$ 

Open Calculator 🚰

 $ext{ex} 260.8365 ext{Hz} = 200 ext{Hz} \cdot rac{343 ext{m/s}}{343 ext{m/s} - 80 ext{m/s}}$ 

10) Observed Frequency when Source Moves towards Observer and Observer Moves Away

 $\mathbf{F}_{\mathrm{o}} = \left(rac{\mathrm{f}_{\mathrm{W}}\cdot(\mathrm{c}-\mathrm{V}_{\mathrm{o}})}{\mathrm{c}-\mathrm{V}_{\mathrm{source}}}
ight)$ 

Open Calculator

ex 45.62738Hz =  $\left(\frac{200$ Hz · (343m/s -283m/s)}{343m/s -80m/s} $\right)$ 

Wavelength Changes &

11) Change in Wavelength due to Movement of Source 🖸

fx  $\lambda = V_{
m source} \cdot T_{
m W}$ 

Open Calculator

 $\boxed{\texttt{ex} \ 0.4 \text{m} = 80 \text{m/s} \cdot 0.005 \text{s}}$ 

12) Change in Wavelength given Angular Frequency

 $\lambda = 2 \cdot \pi \cdot V_{
m source} \cdot \omega_{
m f}$ 

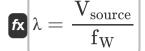
Open Calculator

 $0.402124 \mathrm{m} = 2 \cdot \pi \cdot 80 \mathrm{m/s} \cdot 0.0008 \mathrm{Hz}$ 





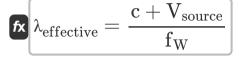
#### 13) Change in Wavelength given Frequency



Open Calculator

$$ex 0.4m = \frac{80m/s}{200Hz}$$

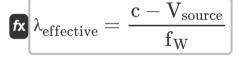
#### 14) Effective Wavelength when Source Moves Away from Observer



Open Calculator

$$=$$
  $2.115 \mathrm{m} = rac{343 \mathrm{m/s} + 80 \mathrm{m/s}}{200 \mathrm{Hz}}$ 

#### 15) Effective Wavelength when Source Moves towards Observer



Open Calculator

$$=$$
 1.315m  $=$   $\frac{343 \text{m/s} - 80 \text{m/s}}{200 \text{Hz}}$ 



#### Variables Used

- **c** Velocity of Sound (Meter per Second)
- F<sub>o</sub> Frequency Observed (Hertz)
- **f**<sub>W</sub> Wave Frequency (*Hertz*)
- Tw Time Period of Progressive Wave (Second)
- **V**<sub>0</sub> Velocity Observed (Meter per Second)
- **V**<sub>Source</sub> Velocity of Source (Meter per Second)
- **\( \lambda \)** Wavelength (Meter)
- λ<sub>effective</sub> Effective Wavelength (Meter)
- ω<sub>f</sub> Angular Frequency (Hertz)





#### Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288
   Archimedes' constant
- Measurement: Length in Meter (m)
   Length Unit Conversion
- Measurement: **Time** in Second (s)

  Time Unit Conversion
- Measurement: Speed in Meter per Second (m/s)
   Speed Unit Conversion
- Measurement: Frequency in Hertz (Hz)
   Frequency Unit Conversion





#### **Check other formula lists**

- Doppler Effect and Wavelength
   Changes Formulas
- Sound Propagation and Resonance Formulas
- Wave Properties and Equations Formulas

Feel free to SHARE this document with your friends!

#### PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

10/7/2024 | 6:56:34 AM UTC

Please leave your feedback here...



