Frequency, Wavelength and Period
Preliminaries

- Graph $y = \sin x$ and $y = \cos x$
- Amplitude
- Transformations of graphs (stretching vertically and horizontally).

Objectives

- Given an equation, find the period (wavelength) and frequency.
- Given a graph, find the period (wavelength) and frequency.
- Graph waves of the form $y = \pm A \sin(Bx)$ and $y = \pm A \cos(Bx)$. 
Amplitude = 5

\[ y = 5 \sin x \]
B changes the width of the graph

\[ y = \sin(Bx) \]
y = \sin x
Wavelength and Period

\[ y = \sin(2x) \]

Period \( \text{Period} = \frac{2\pi}{2} = \pi \)
Wavelength and Period

\[ y = \sin(2x) \]

Frequency \( = \frac{2}{2\pi} = \frac{1}{\pi} \)
Period and Frequency

\[ y = \sin 4x \]

Period

\[ \text{Period} = \frac{2\pi}{4} = \frac{\pi}{2} \]

Frequency

\[ \text{Frequency} = \frac{4}{2\pi} = \frac{2}{\pi} \]
General Formulas

Period = \frac{2\pi}{B}

Frequency = \frac{B}{2\pi}
Graphing a Wave Adjusted for Period

\[ y = \sin(5x) \]

Period \[ = \frac{2\pi}{5} \]

\[ Q = \frac{2\pi}{20} = \frac{\pi}{10} \]
Graphing a Wave Adjusted for Period and Amplitude

\[ y = -2 \cos 3x \]

Period \[ = \frac{2\pi}{3} \]

\[ Q = \frac{2\pi}{12} = \frac{\pi}{6} \]
Finding the Equation of a Wave from its Graph

Amplitude $= A = 3$

Period $= \frac{2\pi}{B} = 4\pi \Rightarrow B = \frac{2\pi}{4\pi} = \frac{1}{2}$
Finding the Equation of a Wave from its Graph

Amplitude \( A = 2 \)

Period \( B = \frac{2\pi}{3} \Rightarrow B = 2\pi \cdot \frac{3}{\pi} = 6 \)

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Frequency, Wavelength and Period
Recap

- Period (wavelength) is the $x$-distance between consecutive peaks of the wave graph.

$$\text{Period} = \frac{2\pi}{B}; \quad \text{Frequency} = \frac{B}{2\pi}$$

- Use amplitude to mark $y$-axis, use period and quarter marking to mark $x$-axis.