Periodic Functions

**Formula Sheet**

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| **Name** | **Definition** | **Formula** |
| Unit Circle | In trigonometry, the unit circle has a radius of 1 and is centered at the origin. It is used to find the values for sine and cosine of common angles.  The coordinates of each point are written . |  |
| Amplitude | The amplitude is determined by finding one-half of the difference between the maximum and minimum values of the graph. |  |
| Period | The period is the horizontal length of each cycle of a periodic function. | For functions in the form  or |
| Frequency | The number of periods of a periodic function in one unit on the x-axis. | or |
| Key Features of Sine and Cosine Functions |  | |
| Five Key Points of Sine and Cosine Graphs | **Sine Graph**    **Cosine Graph** | |
| Function Transformations |  | |
| Multiple Transformations | Any sine or cosine function can be written in the form and . Each parameter in the equation represents a specific transformation. | |
| Rewrite a Sine Function as a Cosine Function | When the sine function is expressed as a cosine function, it becomes , which is obtained by shifting the graph units to the right. | Steps to rewrite a sine function as a cosine function:   1. Find the period of the sine function. 2. Translate the graph of the cosine function by units to the right. 3. Apply other transformations if necessary. |
| Rewrite a Cosine Function as a Sine Function | When the sine function is expressed as a cosine function, it becomes , which is obtained by shifting the graph units to the left. | Steps to rewrite a cosine function as a sine function:   1. Find the period of the cosine function. 2. Translate the graph of the sine function by units to the left. 3. Apply other transformations if necessary. |