

MCR3U - Unit 4 Presentation
Sinusoidal Real-World Applications

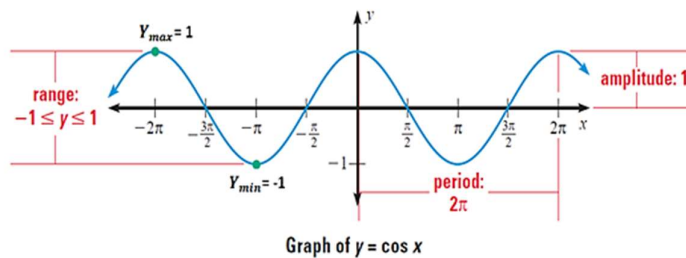
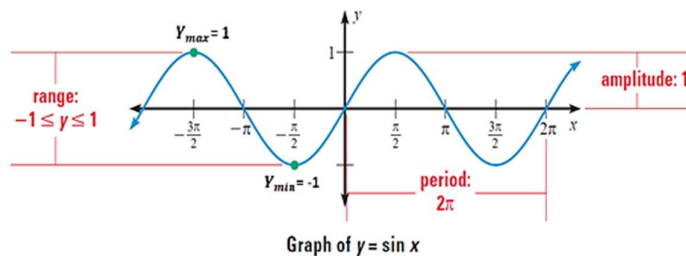
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Introduction:

Now that we have completed our study of sinusoidal functions (the sine and cosine functions), we can apply our knowledge to model some sinusoidal phenomena in real life, as **any variable that is cyclical, harmonic, oscillating, or periodic in nature can be modeled graphically by a sine or cosine wave.**



Presentation Structure (5-7 mins):

- [C] Introduction (1 min):
 - Give a real-life phenomenon that can be modeled by a sine function **OR** a cosine function;
 - Indicate the variable(s)/value(s) being investigated that its change follows the sine or cosine wave;
- [T] Analyze why this phenomenon can be modeled by a sinusoidal function (1-2 mins):
 - Define sinusoidal functions;
 - Discuss how your chosen phenomenon meets the definition of sinusoidal function;
- [K] Modelling (2 min):
 - Write an equation in the format of $y = a \sin[k(x-d)]+c$ or $y = a \cos[k(x-d)]+c$ to model your chosen phenomenon;
 - **A detailed mathematical procedure** about how you get this equation step by step must be displayed and explained;
 - Sketch and include its graph (by hand or by technology - graph calculator or 2D Grapher);

Note: 2D Grapher: <https://www.desmos.com/calculator>
- [A] Determine key properties of this sinusoidal (sine **OR** cosine) model (2 mins):
 - Indicate its period, amplitude, max/min value, domain, and range based on the equation/graph;
 - Interpret (make sense of) these properties in the context of your chosen real-life phenomenon;

Recommended Topics:

There are countless applications of sinusoidal modeling in real life. Some of these applications include:

- Changes in Temperature over time
- Hours of daylight over time
- Ocean wave heights (high/low tides) over time
- Sound waves
- Ferris wheels
- Earthquakes
- Swinging pendulum
- Bouncing spring

Submission Checklist:

- Slides that included all the required elements.
- Completed peer feedback for three peer classmates.