# Modeling Periodic Functions

Task Overview

**Final Project Phases**

**Phase 1**: Investigate how circular motion and periodic functions are connected (Ferris Wheel).

**Phase 2**: Investigate another periodic phenomenon in the world and propose a mathematical model that demonstrates the phenomenon.

**Phase 3**: Present findings from Phase 2 in a paper, poster, or in a power-point presentation.

**PHASE 1: Investigating Circular motion**

Instructions: Refer to Phase 1 Student handout.

1. In groups, **investigate** the heights of various Ferris Wheel cars off the ground.

2. In partners, **graph the heights** over time and develop a function that **models these heights** so we could find the height of a car at any given time.

3. Explore the situation of the Ferris wheel with a diagram, table, and graph and make sense of the data by formulating conclusions.

**PHASE 2: Investigation of another periodic phenomenon Proposal (*must be approved)***

Instructions (*may be useful to use Phase 1 Intro activity to guide your thinking)*

To prepare for your **final task,** you will **investigate** another periodic phenomenon in the world, **research** it, and prepare a proposal that you will submit for your teacher to review.

Your proposal must include:

* An explanation of the phenomenon that you chose to research (what is it, where does it occur, how is it measured?)
* The maximum and minimum values (should be based off of data)
* How long it takes the cycle to repeat itself
* How you know the phenomenon is periodic
* Anything you find interesting about the phenomenon

**PHASE 3: Final Performance Task Submission**

For your **final task,** create a depiction of the phenomenon from Phase 2, a graph of it, and a function that models it.

Your final submission must include:

* A poster, PowerPoint, or write-up detailing the periodic phenomenon that you investigated accompanied with a 5-6min oral presentation
  + Introductory paragraph must be included (Refer to Phase 2)
* Provide the key points for your periodic function. Key points must include all of the following:
  + A graph that models your periodic phenomenon
  + Independent and dependent variables
  + Period of the situation and what that means in your situation
  + Midline of the situation and what context
  + Amplitude and what this means in your situation
  + A graph of the function. If your situation has data points, include a scatterplot of points with the function graphed over it. Ideally, this will be completed on desmos.com or another computer graphing utility. The axes should be clearly labeled and scaled on a scale that makes sense.
* Summarize your findings. You must address the following questions:
  + Why is it important to be able to model your phenomenon with an equation and a graph? Why might someone use it?
  + Is your model perfect? If not, what are some limitations? Is there any way to reduce the limitations?
  + Are you confident that your model would work far out into the future? Forever? If not, why not?
  + How and why is your model is useful?