L6 – Trig Applications Part 2
MCR3U
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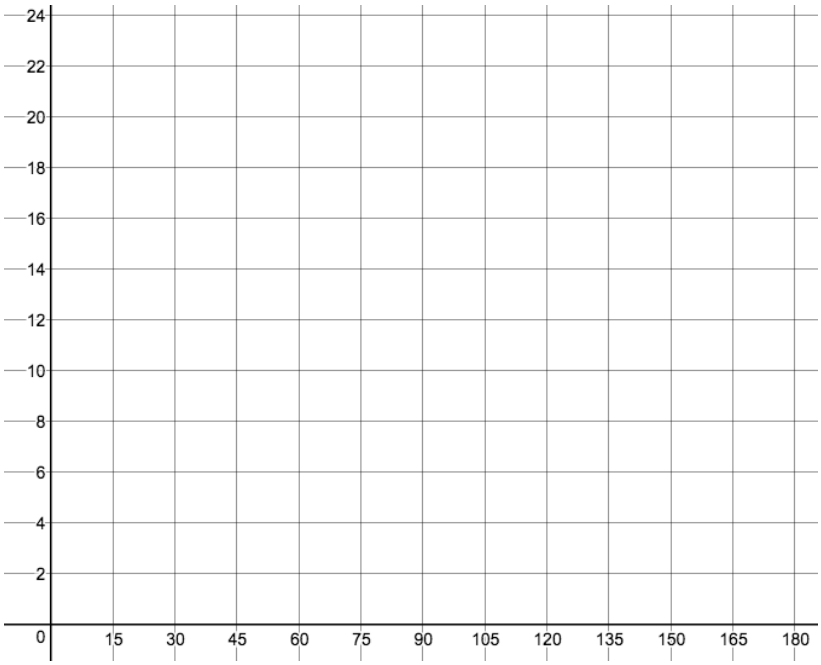
Example 1: The height, h, in meters, above the ground of a rider on a Ferris wheel after t seconds can be modelled by the sine function:

$$h(t) = 10\sin[3(t-30)] + 12$$

a) Graph the function using transformations



b) Determine the max height, min height, and time for one revolution.

c) Represent the function using the equation of a cosine function

d) What is the height of the rider after 35 seconds? Use both equations to verify your answer.

Example 2: Skyscrapers sway in high-wind conditions. In one case, at $t = 2$ seconds, the top floor of a building swayed 30 cm to the left (-30 cm) and at $t = 12$ seconds, the top floor swayed 30 cm to the right (+30 cm) of its starting position.

a) What is the equation of a cosine function that describes the motion of the building in terms of time?

b) What is the equation of a sine function that describes the motion of the building in terms of time?

Example 3: The height of the tide on a given day at $'t'$ hours after midnight is modelled by:

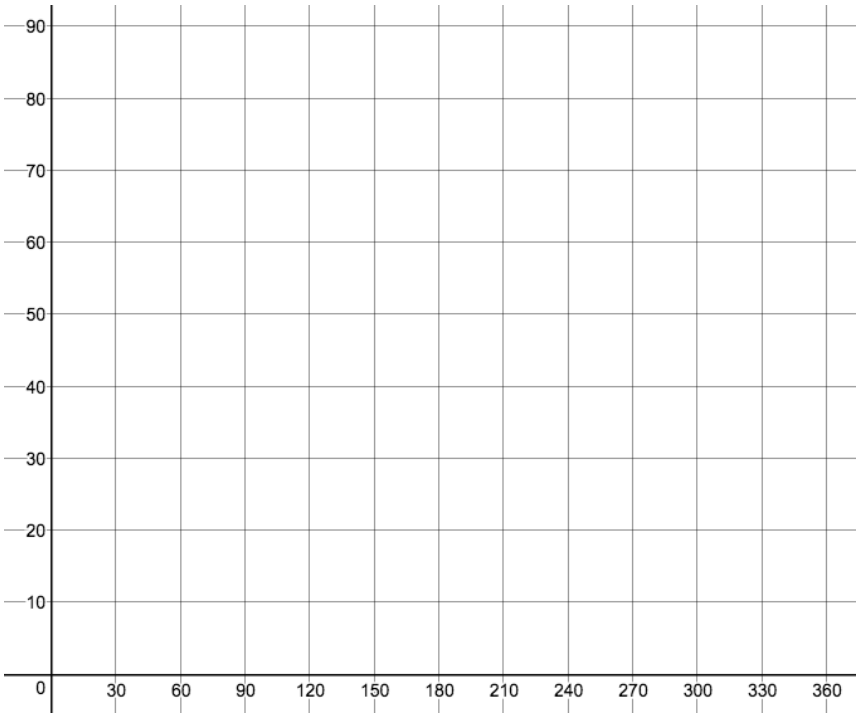
$$h(t) = 5\sin[30(t-5)] + 7$$

a) Find the max and min values for the height of the depth of the water

b) What time is hight tide? What time is low tide?

c) What is the depth of the water at 9 am?

Example 4a: A wind turbine has a height of 55m from the ground to the center of the turbine. Graph one cycle of the vertical displacement of a 10m blade turning counterclockwise. Assume the blade starts pointing straight down.



Example 4b: Model the rider's height above the ground versus angle using a transformed sine and cosine function.