



HW 4.6.1: Building a Roller Coaster

A model rollercoaster has been assigned to you in which the entrance starts at $(0, 12)$ and exits at $(12, 0)$. The rollercoaster has a local minimum at $(5, 1)$ and a local maximum at $(9, 6)$. The slope of the curve at the entrance and exit points must be zero in order to facilitate getting on and off the roller coaster car.




Create a piecewise function using the cosine function that creates a smooth model that satisfies the requirements above.

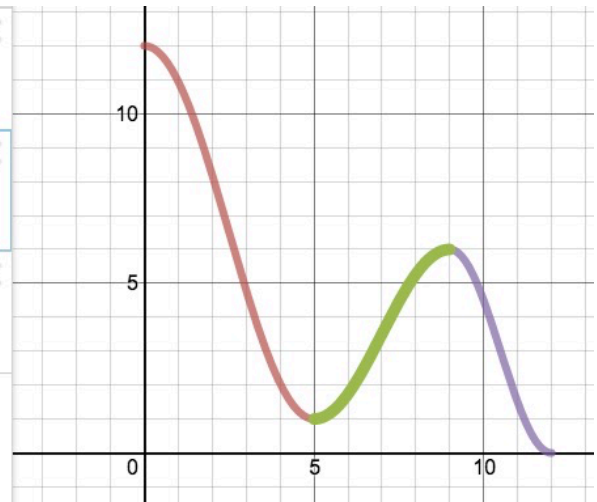
Create a piecewise function using the sine function that creates a smooth model that satisfies the requirements above.

[Challenge] Create a piecewise function using the quadratic or cubic function that creates a smooth model that satisfies the requirements above.




Teacher Note: To do the piecewise correctly the student will need to use Calculus

Partial Selected Answers using Desmos.com:
Cosine Piecewise (answers may vary)

1	 $y = 5.5 \cos\left(\frac{\pi}{5}(x)\right) + 6.5 \{0 < x < 5\}$	<input type="checkbox"/>
2	 $y = -2.5 \cos\left(\frac{\pi}{4}(x - 5)\right) + 3.5 \{5 < x < 9\}$	<input type="checkbox"/>
3	 $y = 3 \cos\left(\frac{\pi}{3}(x - 9)\right) + 3 \{9 < x < 12\}$	<input type="checkbox"/>
4		



Sines (answers may vary)

1	 $y = -5.5 \sin\left(\frac{\pi}{5}(x - 2.5)\right) + 6.5 \{0 < x < 5\}$	<input type="checkbox"/>
2	 $y = 2.5 \sin\left(\frac{\pi}{4}(x - 7)\right) + 3.5 \{5 < x < 9\}$	<input type="checkbox"/>
3	 $y = -3 \sin\left(\frac{\pi}{3}(x - 10.5)\right) + 3 \{9 < x < 12\}$	<input type="checkbox"/>
4		

