

Physics Invention Sequences Users' Guide: SHM

SIMPLE HARMONIC MOTION INVENTION SEQUENCE

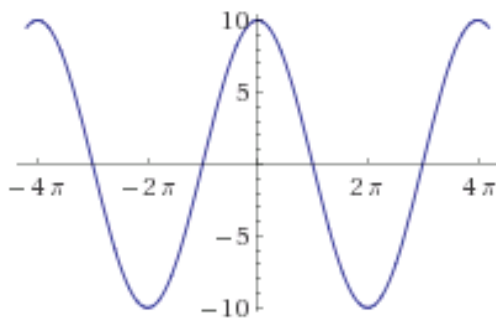
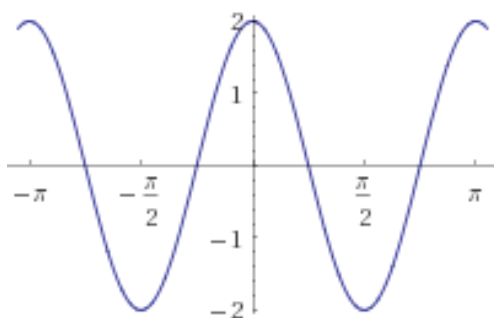
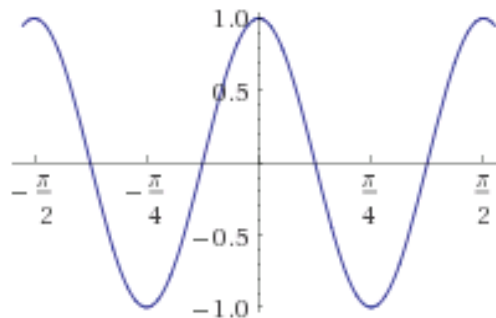
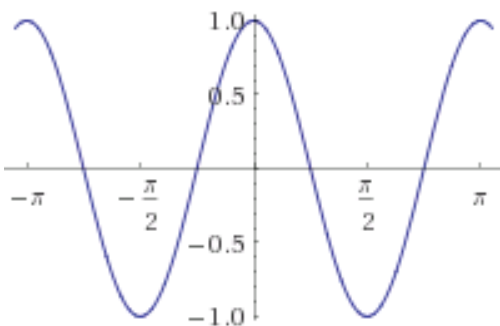
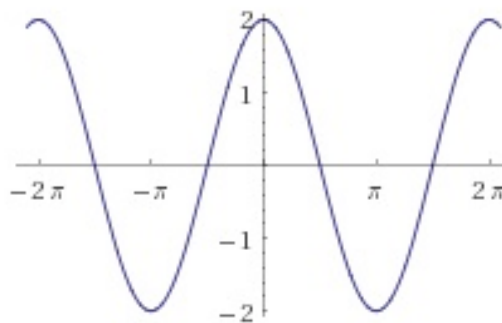
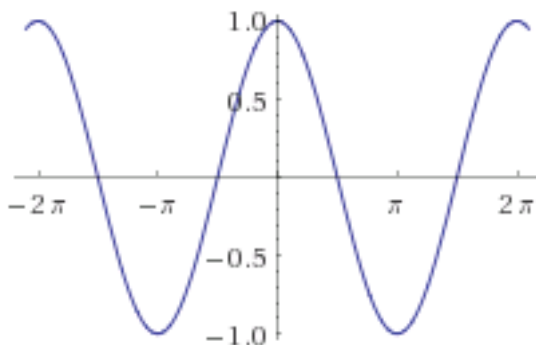
Includes: *periodic function (features of a sinusoidally varying position vs time), describing a SHO (creating a sinusoidal function that describes observations)*

Teacher Notes: This activity follows a discussion during which students decide that a sinusoidal wave describes what they see when they observe a mass oscillating on a spring, after rejecting a variety of other possible functions including a triangle wave, a square wave, a parabolic functions and others.

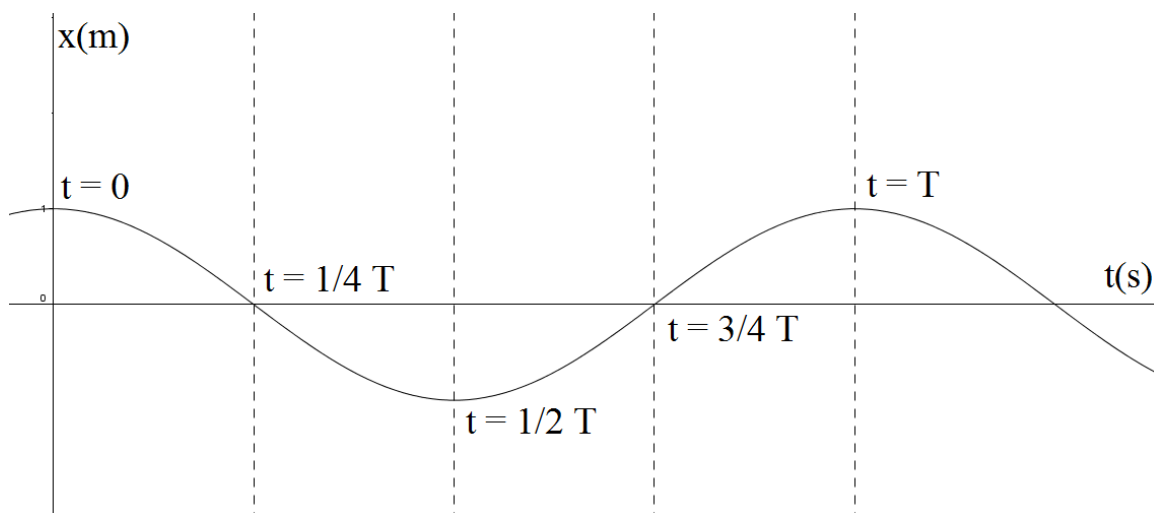
Levels: This sequence is most appropriate for all levels that treat a the position vs time of a SHO mathematically. Students must be comfortable with invention, as this is a challenging invention task on a subject where the equations are often not well understood.

Describing a periodic function

Where do relative maxima and minima occur? At what point does the y-value equal zero? How can you describe each graph below using a periodic function?



Describing a SHO



Where does the function above reach a maximum? Where is it a minimum? Where is the y-value equal to zero?

What general similarities do you notice between the function above and the functions you analyzed previously? What do the critical points you identified above correspond to physically?

Cosine functions are functions of θ , however we are seeking to model the position of the oscillator as a function of time, not some angle. Is there a possible way to relate the two?