

1. Complete the following table of properties for the graphs of $y = \sin x$ and $y = \cos x$.

Property	$y = \sin x$	$y = \cos x$
Maximum Value		
Minimum Value		
Amplitude		
Domain		
Range		
x-intercepts (in first cycle)		
y-intercepts (in first cycle)		
Intervals of increase (in first cycle)		
Intervals of decrease (in first cycle)		

2. You are in a car of a Ferris wheel. The wheel has a radius of 8 m and turns counter-clockwise. Let the origin be at the centre of the wheel. Begin each sketch in parts (a) and (b) when the radius from the centre of the wheel to your car is along the positive x-axis.

- a) Sketch the graph of your horizontal displacement versus the angle through which you turn for one rotation of the wheel. Which function models the horizontal displacement? Justify your choice.
- b) Sketch the graph of your vertical displacement versus the angle through which you turn for one rotation of the wheel. Which function models the vertical displacement? Justify your choice.

θ	x	y
0°	8	0
90°	0	8
180°		
270°		
360°		

3. Sounds can be modelled using sinusoidal functions. A simple instrument such as a flute produces a sound that can be modelled very closely using the function $y = \sin x$. As sounds become more complex, the model must become more complex. For example, the sound from a stringed instrument can be modelled closely using a more complex function such as $y = \sin x + \sin 2x$.
- a) Use Desmos to sketch the graphs of $y = \sin x$ and $y = \sin x + \sin 2x$.
- b) How do the graphs differ? How are they the same?
4. The hour hand on a clock has a length of 12 cm. Let the origin be at the centre of the clock.
- a) Sketch the graph of the vertical position of the tip of the hour hand versus the angle through which the hand turns for a time period of 72 hours. Begin your graph at 3:00
- b) Sketch the graph of the horizontal position of the tip of the hour hand versus the angle through which the hand turns for a time period of 72 hours. Begin your graph at 3:00
- c) How many cycles appear in the graph in part (a)?
- d) How many cycles will appear in the graph in part (a) if you use the minute hand rather than the hour hand? Explain your prediction.
5. Consider the function $y = \sin x + \cos x$.
- a) Predict the y-intercept of the function.
- b) Predict the x-intercept of the function.
- c) Use Desmos to check your answers to parts (a) and (b).