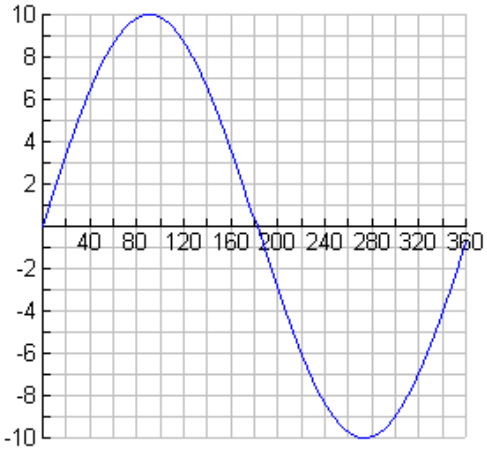
MCR3U Modeling Periodic Functions

Warm-Up – State the Characteristics of the following sinusoidal functions



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Axis _____
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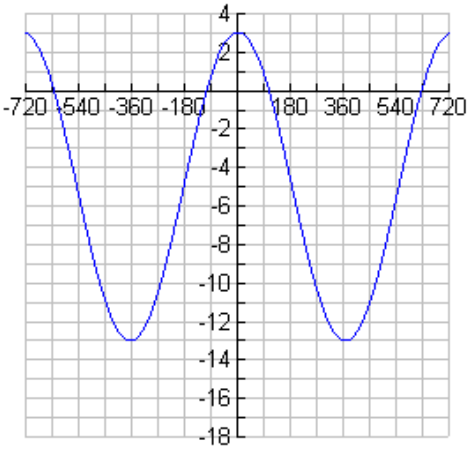

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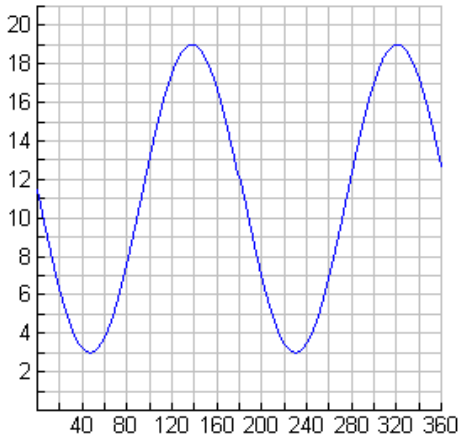

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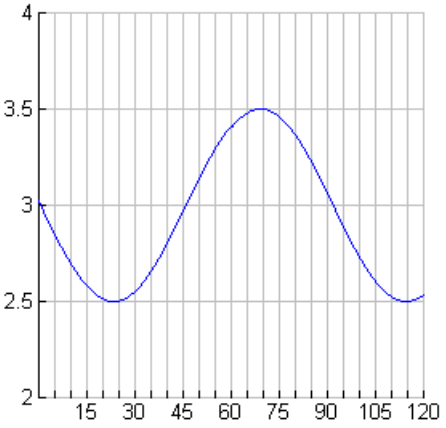

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Amplitude _____
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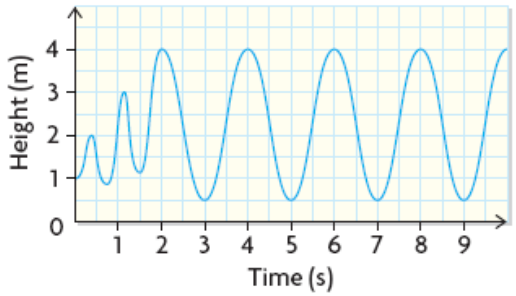
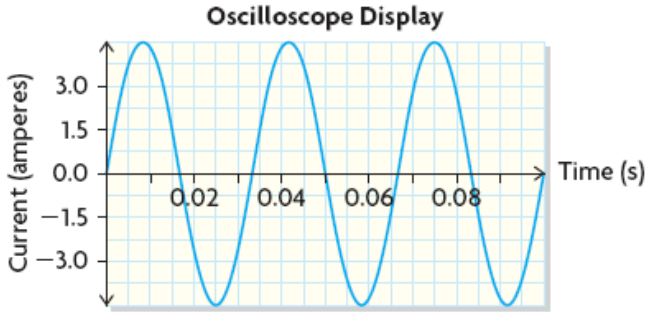
2. Nolan is jumping on a trampoline. The graph shows how high his feet are above the ground.



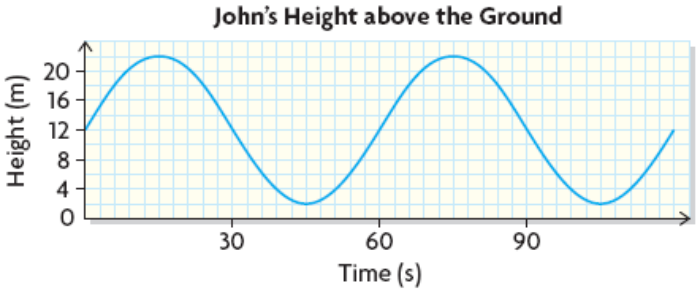
a) How long does it take for Nolan's jumping to become periodic? What is happening during these first few seconds?
b) What is the period of the curve? What does *period* mean in this context?
c) Write an equation for the axis of the periodic portion of the curve.
d) What is the amplitude of the sinusoidal portion of the curve? What does *amplitude* mean in this context?

4. An oscilloscope hooked up to an AC (alternating current) circuit shows a sine curve on its display:



a) What is the period of the function?
b) What is the equation of the axis of the function?
c) What is the amplitude of the function?
d) State the units of measure for each of your answers above.

9. The graph shows John's height above the ground as a function of time as he rides a Ferris wheel.



a) What is the diameter of the Ferris wheel?
b) What is John's initial height above the ground?
c) At what height did John board the Ferris wheel?
d) How high above the ground is the axle on the wheel?

6. Sketch a height-versus-time graph of the sinusoidal function that models each situation. Draw at least three cycles. Assume that the first point plotted on each graph is at the lowest possible height.

a) A Ferris wheel with a radius of 7 m, whose axle is 8 m above the ground, and that rotates once every 40 s

b) A water wheel with a radius of 3 m, whose centre is at water level, and that rotates once every 15 s

c) A bicycle tire with a radius of 40 cm and that rotates once every 2 s

d) A girl lying on an air mattress in a wave pool that is 3 m deep, with waves 0.5 m in height that occur at 7 s intervals