C_11 Creating a Sinusoidal Graph and Equation

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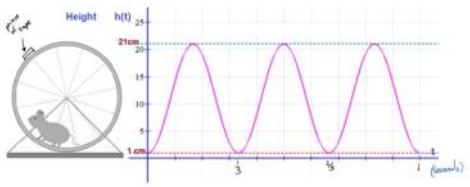
Think about what happens as a wheel rotates.

If there were a piece of tape stuck on the outside of the wheel, its height above the ground would change as the wheel turns. This picture shows how the height of the tape changes, assuming the mouse runs at a very steady rate.

1a) Can you figure out the equation of this graph?



b) Use the equation you have made to predict how high above the ground the tape is at $t = 0.75$ seconds.

c) Use the equation you have made to find the first time the piece of tape reaches a height of 10 cm above the ground?

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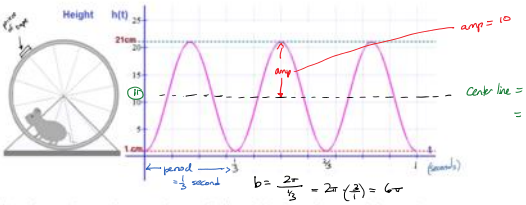
1a) Can you figure out the equation of this graph?

$h = -10\cos(6\pi t) + 11$



b) Use the equation you have made to predict how high above the ground the tape is at $t = 0.75$ seconds.

$h(0.75) = -10\cos(6\pi \cdot 0.75) + 11$

$= 11$ cm

c) Use the equation you have made to find the first time the piece of tape reaches a height of 10 cm above the ground?

algebraically

$10 = -10\cos(6\pi x) + 11$

$\frac{-1}{-10} = \frac{-10}{-10}\cos(6\pi x)$

$\cos(6\pi x) = \frac{1}{10}$

graphically

$Y_1 = -10\cos(6\pi x) + 11$

$Y_2 = 10$

Find this intersection.

$x = 0.07801\ldots \doteq 0.08$ seconds

$\theta_R = \cos^{-1}\left(\frac{1}{10}\right)$

$= 1.4706289\ldots$

Q_1 answer for $6\pi x = 1.4706\ldots \Rightarrow$

Only need the first solution

$x = \frac{1.4706\ldots}{6\pi} \doteq 0.08$ seconds