

Answer on Question #53033, Physics / Computational Physics

Task: High tide occurs at 8:00 AM and is 1 m above sea level. Six hours later, low tide is 1 m below sea level. After another 6 hours, high tide occurs again 1 m above sea level, then finally one last tide 6 hours later 1 m below sea level.

A) write a mathematical expression that would predict the level of the ocean at this beach at any time of the day.

B) find times in the day when the ocean level is exactly at sea level.

Answer:

A) Let's find a function in the form $y(t) = a \cos(\omega t - c) + b$, the amplitude is $a=1\text{m}$, the period $T=12\text{hours}$, horizontal shift $c=(4/3)\pi$, $b=0$. the function we want is $y(t) = \cos(\frac{\pi}{6}t - \frac{4}{3}\pi)$ where $t=0$ to 23:59 .

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B) times in the day when the ocean level is exactly at sea level is when $y(t)=0$, so $t=5, t=11, t=17, t=23$.

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