

Sinusoidal Modeling

State the modeling assumptions, identify amplitude, midline, period and phase, then answer the contextual query with units.

1. Use the displayed graph of water depth against time. Build a sine model on $2 \leq t \leq 9$ hours and interpret its amplitude, midline, period, and angular frequency.

Assumptions: The tide data are noiseless and exactly periodic on the bounded interval $2 \leq t \leq 9$ hours; no regression or extrapolation is intended.

2. Use the displayed graph of rider height against time. Build a cosine model on $0 \leq t \leq 6$ seconds and interpret its amplitude, midline, period, and angular frequency.

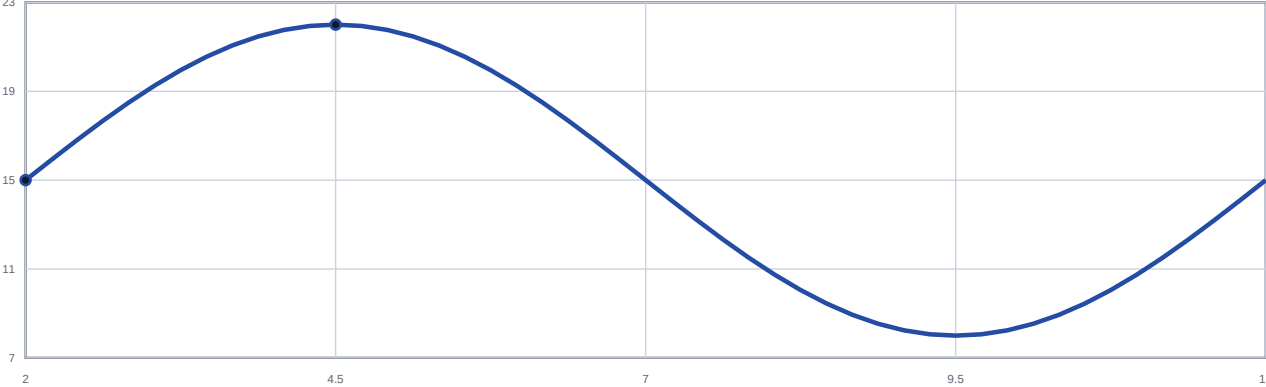
Assumptions: The circular motion data are noiseless and exactly periodic on the bounded interval $0 \leq t \leq 6$ seconds; no regression or extrapolation is intended.

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3. Use the displayed graph of rider height against time. Build a sine model on $2 \leq t \leq 12$ seconds and find the rider height at $t=4.5$ seconds.

Assumptions: The circular motion data are noiseless and exactly periodic on the bounded interval $2 \leq t \leq 12$ seconds; no regression or extrapolation is intended.



4. The rider height ranges from 5 to 17 meters, repeats every 6 seconds, and at $t=1$ crosses the midline while increasing. Build a sine model on $1 \leq t \leq 7$ seconds and find the first maximum with $t>1$.

Assumptions: The circular motion data are noiseless and exactly periodic on the bounded interval $1 \leq t \leq 7$ seconds; no regression or extrapolation is intended.

Math Sheet

Name _____ Score _____ Teacher _____ Date _____

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State the modeling assumptions, identify amplitude, midline, period and phase, then answer the contextual query with units.

5. The average temperature ranges from 3 to 11 degrees Celsius, repeats every 5 months, and at $t=0$ is at a maximum. Build a cosine model on $0 \leq t \leq 5$ months and find the average temperature at $t=1.25$ months.

Assumptions: The seasonal data are noiseless and exactly periodic on the bounded interval $0 \leq t \leq 5$ months; no regression or extrapolation is intended.

6. Use the displayed graph of average temperature against time. Build a cosine model on $2 \leq t \leq 7$ months and interpret its amplitude, midline, period, and angular frequency.

Assumptions: The seasonal data are noiseless and exactly periodic on the bounded interval $2 \leq t \leq 7$ months; no regression or extrapolation is intended.

