

Answer on Question #51540-Physics-Other

If s is distance and t is time, what must be the dimensions of a and b in the equation

$$s = a \sin(bt) ?$$

A. $[a] = [L]^{-1}, [b] = [L]^{-1}$ B. $[a] = [T]^{-1}, [b] = [L]$ C. $[a] = [L], [b] = [T]^{-1}$ D. $[a] = [L]^2, [b] = [T]^{-2}$

Solution

The expression $\sin(bt)$ must be dimensionless, so

$$[a] = [s] = [L]$$

and

$$[bt] = 1 \rightarrow [b] = \frac{1}{[t]} = [T]^{-1}.$$

Answer: C. $[a] = [L], [b] = [T]^{-1}$.