A traveling simple-harmonic-wave train is described by

$$y = A \sin(k\,x + \omega\,t)\,,$$

where the wave number $k = \dfrac{2\,\pi}{\lambda}$, and the angular frequency $\omega = 2\,\pi\,f$.

The traveling wave velocity v_{wave} is

A) $v_{wave} = \lambda\,f\,,$

B) $v_{wave} = -\,\lambda\,f\,,$

C) $v_{wave} = \dfrac{\lambda}{f}\,,$

D) $v_{wave} = -\,\dfrac{\lambda}{f}\,.$

Let the phase

$k\,x + \omega\,t =$ constant, then $\dfrac{d\,(k\,x + \omega\,t)}{d\,t} = 0\,,$

$$v_{wave} = \frac{d\,x}{d\,t} = -\frac{\omega}{k} = -\frac{2\,\pi\,f}{\dfrac{2\,\pi}{\lambda}} = -\,\lambda\,f\,.$$

Answer **B**.