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$$v = \frac{ds}{dt} = 16 \sin \frac{\pi t}{6}$$

$$\int_8^s ds = 16 \int_0^t \sin \frac{\pi t}{6} dt$$

$$s = 8 + 16 \cdot \frac{6}{\pi} \left( -\cos \frac{\pi t}{6} \right) \Big|_0^t = 8 + \frac{96}{\pi} \left[ 1 - \cos \frac{\pi t}{6} \right]$$

$$s = s_{\max} \text{ when } \cos \frac{\pi t}{6} = -1 \text{ or } t = 6 \text{ s}$$

$$s_{\max} = 8 + \frac{96}{\pi} [1 - (-1)] = \underline{69.1 \text{ mm}}$$

