98. We note that for a horizontal spring, the relaxed position is the equilibrium position (in a regular simple harmonic motion setting); thus, we infer that the given $v = 5.2$ m/s at $x = 0$ is the maximum value v_m (which equals ωx_m where $\omega = \sqrt{k/m} = 20$ rad/s).

(a) Since $\omega = 2\pi f$, we find $f = 3.2$ Hz.

(b) We have $v_m = 5.2 = (20)x_m$, which leads to $x_m = 0.26$ m.

(c) With meters, seconds and radians understood,

$$\begin{aligned} x &= 0.26\cos(20t + \phi) \\ v &= -5.2\sin(20t + \phi) \end{aligned}$$

The requirement that $x = 0$ at $t = 0$ implies (from the first equation above) that either $\phi = +\pi/2$ or $\phi = -\pi/2$. Only one of these choices meets the further requirement that $v > 0$ when $t = 0$; that choice is $\phi = -\pi/2$. Therefore,

$$x = 0.26\cos\left(20t - \frac{\pi}{2}\right) = 0.26\sin(20t) \ .$$