1. The equation is of the form $my''+\gamma y'+ky=\sin(t)$, where γ is the resistance-to-motion coefficient and k is the spring constant. We will use kilograms, meters, and seconds. The spring constant k is:
k = Newtons/meter, so $k = 0.1$ Newtons/0.1 meter = 1 Newton/meter.
Similarly, γ = Newtons/(meter/second), so $\gamma = 1/1 = 1$ Newton/(meter/second).
Thus, the initial value problem is:

$$\boxed{y''+y'+y=\sin(t),\ y(0)=0,\ y'(0)=0}.$$

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2. The characteristic equation is: $r^2+r+1=0$, giving $r = -\frac{1}{2}\pm\frac{\sqrt{1-4}}{2} = -\frac{1}{2}\pm\frac{\sqrt{3}}{2}i$.

This gives a general solution to the homogeneous equation of:

$$y_h(t) = C_1 e^{-\frac{1}{2}t}\cos\frac{\sqrt{3}}{2}t + C_2\left(\sin\frac{\sqrt{3}}{2}t\right)e^{-\frac{1}{2}t}.$$

We assume $y(t) = A\cos(t) + B\sin(t)$ for a particular solution to the non-homogeneous equation:

	A	B
y	$\cos(t)$	$\sin(t)$
y'	$-\sin(t)$	$\cos(t)$
y''	$-\cos(t)$	$-\sin(t)$

$$y''+y'+y = -A\sin(t) + B\cos(t) = \sin(t)$$

$$\Rightarrow A=-1,\ B=0 \Rightarrow y_p(t) = -\cos(t).$$

Thus, the general solution to the non-homogeneous equation is:

$$y(t) = e^{-\frac{1}{2}t}\left[C_1\cos\left(\frac{\sqrt{3}}{2}t\right)+C_2\sin\left(\frac{\sqrt{3}}{2}t\right)\right]-\cos(t)$$

$$y(0) = C_1 - 1 = 0 \Rightarrow \boxed{C_1 = 1}.$$

$$y'(t) = -\frac{1}{2}e^{-\frac{1}{2}t}\left[C_1\cos\frac{\sqrt{3}}{2}t + C_2\sin\frac{\sqrt{3}}{2}t\right] + e^{-\frac{1}{2}t}\left[-\frac{\sqrt{3}}{2}C_1\sin\frac{\sqrt{3}}{2}t + \frac{\sqrt{3}}{2}C_2\cos\left(\frac{\sqrt{3}}{2}t\right)\right] + \sin(t),$$

so

$$y'(0) = -\frac{1}{2}C_1 + \frac{\sqrt{3}}{2}C_2 = 0 \Rightarrow \frac{\sqrt{3}}{2}C_2 = \frac{1}{2} \Rightarrow \boxed{C_2 = \frac{1}{\sqrt{3}}}.$$

Thus,

$$\boxed{y(t) = e^{-\frac{1}{2}t}\cos\left(\frac{\sqrt{3}}{2}t\right) + \frac{1}{\sqrt{3}}e^{-\frac{1}{2}t}\sin\left(\frac{\sqrt{3}}{2}t\right) - \cos(t)}$$