47. (a) The period of the pendulum is given by $T = 2\pi\sqrt{I/mgd}$, where $I$ is its rotational inertia, $m$ is its mass, and $d$ is the distance from the center of mass to the pivot point. The rotational inertia of a rod pivoted at its center is $mL^2/12$ and, according to the parallel-axis theorem, its rotational inertia when it is pivoted a distance $d$ from the center is $I = mL^2/12 + md^2$. Thus

$$T = 2\pi\sqrt{\frac{m(L^2/12 + d^2)}{mgd}} = 2\pi\sqrt{\frac{L^2 + 12d^2}{12gd}} .$$

(b) $(L^2 + 12d^2)/12gd$, considered as a function of $d$, has a minimum at $d = L/\sqrt{12}$, so the period increases as $d$ decreases if $d < L/\sqrt{12}$ and decreases as $d$ decreases if $d > L/\sqrt{12}$.

(c) $L$ occurs only in the numerator of the expression for the period, so $T$ increases as $L$ increases.

(d) The period does not depend on the mass of the pendulum, so $T$ does not change when $m$ increases.