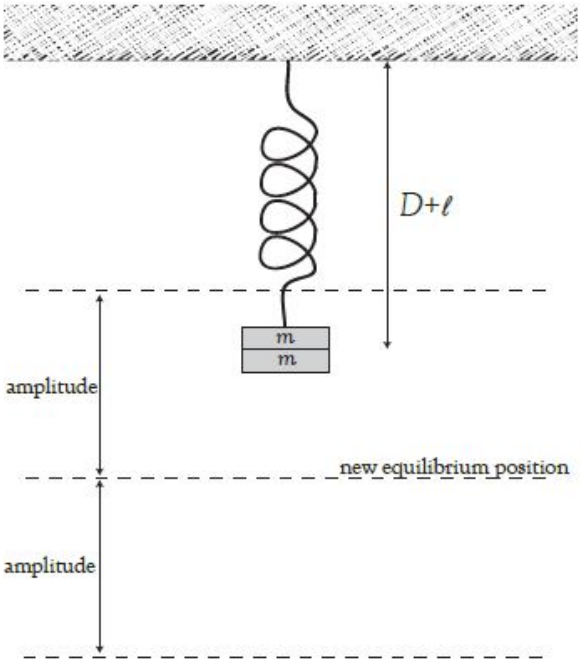
QP40

A linear spring has a free length D. When a mass m is hung on one end, the spring has an equilibrium length $D + \ell$. While it is hanging motionless with an attached mass m, a second mass m is dropped from a height ℓ onto the first one. The masses collide inelastically and stick together. The figure below shows the system at the time of the collision.



a) (1 point) What is the new equilibrium length of the spring?

b) (1 point) What is the period of the resulting motion?

c) (2 points) Find the amplitude of the motion. Express your answer in terms of ℓ.

d) (2 points) How long after the collision do the joined masses reach the lowest point of their oscillation? Express your answer in terms of ℓ and g.