Restoring force of elastic string

An elastic string of stiffness $k$ and negligible mass has length $\ell_0$ when relaxed. One end of the string is fixed to the fixed pivot $P$ and the other end to a block of mass $m$ that can slide without friction.

(a) along a straight line as shown on the left,
(b) along a circular line of radius $r$ as shown on the right.

In the rest position of the block the string is stretched to length $\ell = 3\ell_0/2$. Find the angular frequency $\omega$ of small-amplitude oscillations of the block about its rest position.

Solution: