The swing pictured above is free to pivot in all directions (left-right and front-back) at each circled joint. The bars are rigid, uniform, thin, with mass $M$ and length $L$ each.

(a) How many normal modes of small oscillations does this swing have?

(b) Indicate what each of the normal modes looks like by drawings showing snapshots of the velocity vectors of the two bottom pivots at some time when the velocities are non-zero as seen from above. Label the modes for use in part (c). One mode (A) is shown for you. No derivation or detailed calculation is necessary.

(c) Write an equation of motion for small amplitudes of each mode. Find the oscillation frequency for each mode, in terms of $L$, $M$, $g$.

(d) Repeat part (b) for the case when the bottom bar is much more massive than the side bars.