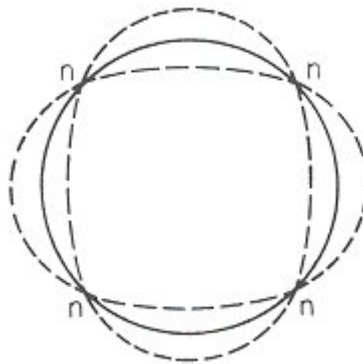


Answer #301

The answer is (b): the frequency of the tone will become lower, as can be heard on an mpeg video by clicking your mouse on the photograph below.



The sound that you hear is that corresponding to the rim of the glass vibrating in its lowest mode, seen in the drawing below. The solid curve represents the brim of the glass at rest, and the dashed curves represent the maximum deviation of the brim of the glass from its equilibrium position while it is oscillating. The letters "n" indicate nodal points in the standing wave that occurs around the brim of the glass.



Because the water is heavy, it weighs down the glass, causing it to vibrate at a lower frequency.

Notice that the frequency of the tone only begins to drop when the glass is about half full. This is because the actual oscillations only occur with a significant amplitude in the top half of the glass, so water in the bottom of the glass does not have any significant effect on that vibration.

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