**Integrated sound chapter 4**

**Harmonic convergence**

**p42-tie piece of string around center of rod and hit with another rod as it is hanging**

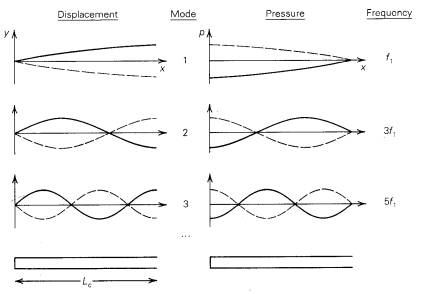
**p42-use several glasses and fill at different levels and hit with a spoon AND blow in them and look for the relationship between the amount of water in the bottle and the pitch you hear**

[](http://images.search.yahoo.com/images/view;_ylt=A0PDoYCh8GdPX2IA2eaJzbkF;_ylu=X3oDMTBlMTQ4cGxyBHNlYwNzcgRzbGsDaW1n?back=http%3A%2F%2Fimages.search.yahoo.com%2Fsearch%2Fimages%3Fp%3Dbottle%2Bblowing%2Bmusic%2Bpictures%26fr%3Dyfp-t-701-1%26fr2%3Dpiv-web%26tab%3Dorganic%26ri%3D3&w=500&h=375&imgurl=blog.playdation.com%2Fwp-content%2Fuploads%2F2011%2F06%2FBlowing-water-bottle.jpg&rurl=http%3A%2F%2Fblog.playdation.com%2Fcraft-a-kids-band-with-soda-bottle-instruments%2F&size=143.2+KB&name=Blowing+water+bottle&p=bottle+blowing+music+pictures&oid=60a583487766595a1e3b35efdf10cfe1&fr2=piv-web&fr=yfp-t-701-1&tt=Blowing%2Bwater%2Bbottle&b=0&ni=56&no=3&tab=organic&ts=&sigr=12ah0rj88&sigb=13ocl62qo&sigi=12792r6uj&.crumb=W6bKGNFDMaE)

**-p43 get empty toilet bottle tube and place, two balloons, a couple of rubber band, and some fine grained sand, scissors to cut balloon over tube-tap with sand on top**

**Rod music**

**Bottle music**

[](http://images.search.yahoo.com/r/_ylt=A0PDoS3V8WdPshIASSKjzbkF;_ylu=X3oDMTBpcGszamw0BHNlYwNmcC1pbWcEc2xrA2ltZw--/SIG=12aqdhsop/EXP=1332240981/**http%3a/www.physicsforums.com/showthread.php%3ft=491504)

**Banging the bottles with the spoon**

**Sand drum**

**Chladni figure-**

[](http://www.flickr.com/photos/physicsclassroom/5280335679/)

**p48-grab metal rod and hit it without hanging it while holding it at center-try it by grasping it at different places**

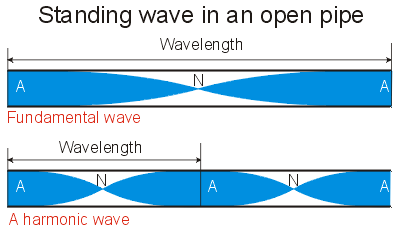
**more rod action**

**-rod won’t vibrate as one end is not free**

**-metal rod free at both ends vibrates with characteristic resonant frequencies that correspond to standing waves**

**Patterns of standing waves**

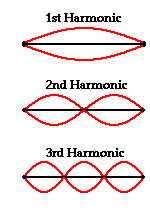
**1.Fundamental-**



**2.First harmonic**

**3.Second harmonic**

**4.Third harmonic**



**Overtones-**

**Damping-**

**p51 blow on a recorder**