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# Rockin' and Rollin' (Teacher Version)

## Music & Energy Transfer

Below are three examples of musical sources. Can you describe where the source of sound energy?



- Strumming the harp sends kinetic energy into the strings, causing them to vibrate and produce sound energy.*
- Blowing over the reed also gives the air kinetic energy, and it resonates in the body to give sound energy.*
- Singing requires the vocal chords to move (muscular kinetic energy) and produces sound energy.*
- Similar to the harp, except the hole in the guitar allows for resonance and a change in sound.*

## Let's Build a Roll Can!

### Materials:

- Can Opener
- Coffee Can
- Nail
- Ruler
- 2 Plastic Coffee Can lids
- Scissors
- Long Rubber Band
- Piece of String
- Bolt



### Instructions:

1. Remove both ends of the coffee can to get rid of sharp edges. Punch 2 holes about 7.5cm apart in the centre area of each coffee can lid.
2. Cut the rubber band and lace it through the 2 holes on one of the lids. Place this lid on the end of the can.
3. Cross the ends of the rubber band to form an X inside the can. Tie the bolt to the centre of this X using the string.
4. Thread the elastic through the 2<sup>nd</sup> lid, placing it on the other end of the can, and tie a knot on the outside of the can.

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## Follow-Up!

1. Roll the can away from you; What happens when the can rolls? *The can slows to a stop, then rolls back.*
2. What types of energy are involved here? *Kinetic and elastic.*
3. Are there internal or external forces at work? *The external push, and the internal elastic forces being applied due to the force of gravity on the bolt.*
4. Why did the can roll back to its starting position? *The elastic wound up as tight as it could in the one direction, so the only option it had was to unwind going back the other way.*



## Power Your Own Device!

The Chukka is a music player that requires the user to move different parts of it to make it work. The device consists of several freely moveable beads tied with a cable, allowing them to hit together or to swing like a pendulum when the user manipulates them. Fiddling with your mp3 player actually powers it!

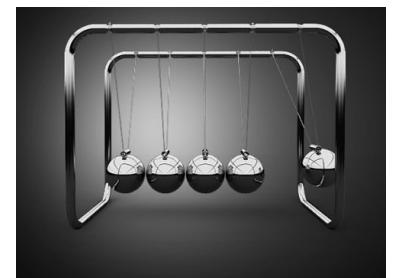


Can you think of other handheld devices that use energy transfer to generate electrical energy?

## Newton's Cradle

We've all seen Newton's Cradle before, but have you ever thought about how it works in terms of energy? Describe the energy transfer that you would see in a working Newton's Cradle:

*Gravitational potential energy in the outer balls converting to kinetic energy causes them to collide, in an alternating fashion, with the two middle balls, sending energy through the line and pushing the far ball up.*

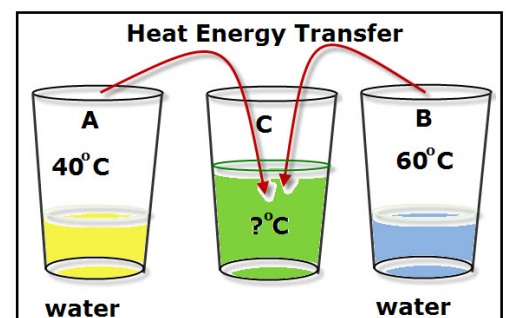


## Heat Transfer of Energy

When heat energy is transferred between substances, the energy moves from the hotter substance to the colder one.

What do you predict the final temperature of the green glass to be? Can you make an exact prediction? Try it!

*No, you can't make an exact prediction because we don't know if the yellow and blue amounts are exactly equal. We can guess that the green liquid will be cooler than the blue one.*



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## Image Sources:

### Music and Energy Transfer:

1. Flickr: [https://c2.staticflickr.com/6/5244/5343236121\\_63a192ee5e\\_z.jpg](https://c2.staticflickr.com/6/5244/5343236121_63a192ee5e_z.jpg)
2. Zachary Music: [http://www.zacharymusic.com/Zachary\\_Music/CicarePics.htm](http://www.zacharymusic.com/Zachary_Music/CicarePics.htm)
3. Brendan Neeson Crafts: <http://www.brendanneeson.com/harps.html>
4. Girl Singer: <http://www.girlsinger.org/2013/04/29/getting-creative-about-getting-paid-to-sing/>

### Let's Build a Roll Can:

1. IFood.tv: [http://www.ifood.tv/network/can\\_opener](http://www.ifood.tv/network/can_opener)
2. Petal Talk: <http://184.168.230.109/blog/floral-occasions-holidays/diy-4th-of-july-vase/>
3. Metal Nail: <http://metalnail.wiremeshinfo.com/productdetail/detail-3093-metal-connector-nails.html>
4. Backpacking Light: [http://www.backpackinglight.com/cgi-bin/backpackinglight/forums/thread\\_display.html?forum\\_thread\\_id=37560](http://www.backpackinglight.com/cgi-bin/backpackinglight/forums/thread_display.html?forum_thread_id=37560)
5. Clipart Pal: [http://www.clipartpal.com/clipart\\_pd/education/ruler\\_11183.html](http://www.clipartpal.com/clipart_pd/education/ruler_11183.html)
6. Clipart Best: <http://www.clipartbest.com/scissors-pictures>
7. Fitness Revolution: <http://www.chanhassenfitnessrevolution.com/resistance-band-training-for-weight-loss-fitness/#sthash.LIjxEPKZ.dpbs>
8. Second Law Media: <http://www.seconclawmedia.com/how-much-time-does-it-take-to-manage-a-ppc-campaign/>
9. The MG Experience: <http://www.mgexp.com/article/bolt-torque-specs.html>

### Follow-Up!

1. Education.com: <http://www.education.com/science-fair/article/build-toy-throw-ball-target/>

### Power Your Own Device!

1. Tuvie: <http://www.tuvie.com/chukka-kinetic-music-player-that-can-produce-electric-energy-by-any-kind-of-movement/>

### Newton's Cradle:

1. Pendulum Energy: <http://www.pendulumenergy.com>

### Heat Transfer of Energy:

1. Science Project Ideas For Kids: <http://scienceprojectideasforkids.com/2010/temperature-heat-energy-transfer>