

# Recorded music - From gramophone to MP3



Gramophone



Record player

**B**efore the first gramophones were invented the only way to hear music was as live entertainment. You read about Thomas Edison in the Energy Sources issue. He invented the first gramophone in 1878.

10 years later flat discs were invented. A needle picked up the sound from grooves in the rotating disc. The discs came in different sizes - LPs (long playing records) contained many songs. Smaller 45's, so called because they spin 45 times per minute, contained one song.

Bars and cafes often had a **jukebox**, a machine holding a collection of 45's. By putting money in a slot the listener could select a record.

These discs were easily scratched and needles had to be frequently changed. In the 1990s compact discs (CDs) began to replace them. These CDs were more hard wearing and the sound was of better quality because of modern technology.

MP3 players are the latest invention to give us musical entertainment. Now you don't need to carry around all your CDs when you want to listen to your favourite music away from home. This handy little computer fits in the palm of your hand. It can store as much as 72 hours of tunes. One company has even designed a pair of sunglasses with an MP3 player set in one of the arms! What will they think of next?



Juke box



CD Player



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# The Sound of Science



Caveman Rock!



U2 performing live

It's science week! The theme this year is "Science and Entertainment" and so this week's issue of Eureka is all about music, which is one kind of entertainment. But where does the science bit come in?

Many people think that science always happens in the laboratory with men and women in white coats pouring liquids into test tubes and mixing chemicals together. When you do science in school you might carry out experiments and investigations. You may measure things, draw, record and watch what happens... science is all these things and much much more. In fact science is part of nearly everything we do in our lives. Science helps us to do work more easily with the invention of machines like computers. Science has helped us to be better at sport with the development of better equipment and more comfortable kit. It has even invented new energy drinks that keep us going for longer! Science has helped us to enjoy our spare time with the invention of television, playstation, DVDs and CDs. Science and music also have been closely linked.

People have always made music. Of course the oldest instrument of all is the human voice. Early human beings made grunts to "talk" to each other and explored sounds by clapping! Let's travel back in time and see how musical instruments have developed.

Some of the earliest humans hit hollow tree trunks, stones or large animal bones to make sounds. Drums were made by stretching animal skins over some sort of frame and bones made rattles when they were jangled together. It was discovered

that by blowing into hollow bamboo stalks or hollow bones, musical notes could be produced. Gradually these instruments were improved. Today computers and electronic equipment can make almost any kind of sound.

## Activity

### Design and make a musical instrument

Now that you have read about different musical instruments, design and make one of your own.



**HERE ARE SOME MATERIALS YOU MIGHT FIND USEFUL:**

- Card • Rubber bands • Fabric • String • Empty containers • Sellotape • Scissors
- Cardboard tubes • Wooden rods • Rice or pasta • Ruler • Cardboard tubes / straws

**INSTRUCTIONS**

1. Decide whether you will hit, shake, pluck or blow your instrument.
2. Choose your materials.
3. Draw a picture of what your instrument will look like.
4. Make your instrument and try it out.

**FOR YOU TO DO**

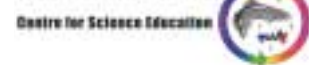
Use the instruments you made to put on some entertainment to celebrate science week.

### Solutions to last week's crossword

- Across:** 1. Bio 4. Solar 5. Fuel 9. Electricity 10. Hydro  
**Down:** 2. Oil 3. Fossil 6. Energy 7. Battery 8. Wind

## eureka

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**WRITTEN & RESEARCHED BY:**  
 Helena Jeffrey, Paula Kilfeather, Cliona Murphy & Janet Varley.

**EDITOR:** John Walshe  
**DESIGN:** Smart Design  
**WRITE TO US:**  
 Eureka,  
 Irish Independent,  
 27-32 Talbot Street,  
 Dublin 1.  
**TEL:** Debbie Brennan  
 at 01-7055131 or  
**EMAIL:**  
 eureka@unison.independent.ie

Have you filled in your entry form for the NASA trip?

Don't forget the closing date is 19th December 2005

# What is sound?

You read in the "noisy science" issue of Eureka that all sounds are produced by something vibrating, that is moving back and forth very quickly. Do you think it is possible to see vibrations? Try these activities and find out.



## Activity

- MATERIALS**
- Drum (or box covered with cling-film)
  - Salt / sugar

- INSTRUCTIONS**
1. Carefully place the salt or sugar on the drum.
  2. Make a very loud noise near to the drum (you could clap your hands or bang a tin box)
  3. What did you discover?
  4. Why do you think this happened?



## Activity

- MATERIALS**
- Tuning fork
  - Bowl
  - Water

- INSTRUCTIONS**
1. Hit a tuning fork off the table and listen to the note that is made.
  2. Hit the tuning fork again but, this time, feel the end of the tuning fork. Describe what you feel.
  3. Now fill a bowl with water.
  4. Hit the tuning fork off the table again and quickly put the two pronged ends in the water.
  5. What happens?
  6. Why do you think this happens?



Now that you have done these activities, do you think it is possible to see vibrations?



## Activity

### High and low sounds

- MATERIALS**
- Sound box e.g. margarine tub or small box without a lid
  - Different sized rubber bands (long, short, wide and narrow)

- INSTRUCTIONS**
1. Choose a long rubber band and stretch it across the box length ways
  2. Pluck it with your finger.
  3. Do this again, but this time use a pencil to tighten the rubber band (see diagram)
  4. How is the sound different from the first time?
  5. Now put a wide and a narrow band that are the same length, on your sound box.
  6. Pluck both of the bands. Which one makes the highest sound?



**Safety:** rubber bands can cause injury. Do not over tighten



## Activity

### Make a wind instrument

- INSTRUCTIONS**
1. Half fill a glass bottle with water.
  2. Blow across the top to make a sound.
  3. Now put different amounts of water into 2 more bottles.
  4. **Predict** which bottle will make the highest sound when you blow across the top.
  5. Blow across the neck of each bottle to test your prediction.
  6. What did you discover?
  7. Was your prediction correct?



**EXTRA ACTIVITY**  
Try filling 2 or 3 more bottles with different amounts of water. Blow across the tops of the bottles. Can you play a song?

**Safety:** Take care if using glass.



## Activity

### Straw Whistle

- MATERIALS**
- Paper drinking straws
  - Scissors

- INSTRUCTIONS**
1. Flatten one end of the straw and cut it in a '^' shape like the one in the diagram.
  2. Put the cut end of the straw between your lips.
  3. Practice blowing until you get a sound.
  4. Now cut off half of the straw and blow again, what happens to the sound?



# Musical Instrument Families

Musical instruments can be sorted by the way they make sounds. You read earlier that vibrations make sound. In each type of instrument the vibrations come from a different place.

### Percussion Instruments

Think of instruments you hit to make a sound. These are called **Percussion Instruments**. After the human voice percussion instruments are the oldest. When a drummer hits a drum the "skin" vibrates and makes the sound. Percussion instruments can also be rubbed or shaken.



Caroline Corr, drummer with The Corrs

### Stringed Instruments

**Stringed instruments** have strings of course! Music is made when these strings vibrate. Strings can be plucked like a guitar, bowed like a fiddle or hit with a hammer like those inside the piano. Strings can be tightened or loosened to make high and low sounds.



How many families of instruments can you see in the pictures above?



Cello and double bass



Matt Molloy of the Chieftains playing the flute

# Fascinating Facts



Bryan Adams



Bob Dylan

- Electronic Instruments make their sounds by turning electrical signals into vibrations. These vibrations are amplified (made louder) in a loud speaker.

- The didgeridoo is made from a tree trunk and hollowed out by small ant-like insects called termites



Aboriginal man playing a didgeridoo

- In a recording studio the electronic equipment records each instrument and voices separately on a number of tracks. The sound engineer mixes the parts together then checks that the sounds are balanced to produce a finished recording.



Brian McFadden in recording studio

- Bernice Molloy an Irish **archaeologist** and her team were checking a site in Greystones before builders arrived to build houses there. They were excavating (digging) a burnt mound or Fulacht Fiadh. They discovered 6 pipes of different lengths. The pipes were brought back to a laboratory and cleaned. It was discovered that they were over 4000 years old and were made of wood from a yew tree. They did not have holes like a tin whistle. It is thought that, originally, these pipes would have been joined together.



pipes

- A Japanese robot called WABOT-2 can play a keyboard much faster than any human can. WABOT-2 can read new music or play an old song it has stored in its memory. WABOT-2's head is like a camcorder. The camera films what it sees and stores it in its memory to play again.



WABOT-2