

## **A Podcast Guided Tour of the Shanghai Youth Science & Technology Exploration Museum**

Leave the traditional guided tours behind and strike out at your own pace with an audio guide. This bilingual podcast is presented by Shanghai Daily and supervised by the Shanghai Science and Technology Committee.

Visiting a museum usually means walking through rows of dusty exhibits, hoping to absorb the information on display. Well, don't expect this at the Shanghai Youth Science & Technology Exploration Museum! Since science develops through exploring and experimenting with the unknown, this unconventional museum is all about interactivity. Come prepared to participate in the many games, activities and experiments here.

**Fittingly situated on the ground floor of the Shanghai Youth Activity Centre, the museum is through the door on the right.**

The first exhibition hall is about how to observe the world scientifically, how to test your observations, and how to use scientific instruments.

Try the first experiment on your left. Ever wondered how honey bees communicate? We humans communicate with words and gestures, bees communicate with patterns of movement. Take the red flower and move it to a different position and watch how the animated bees on the table below try to get near it. The ones close to the flower will move in a circle, signaling it's nearby. On getting this signal, the ones further away will move in a figure of eight - this in turn signals the rest to follow. Thus eventually all of them end up near the flower.

Move forward and the next exhibit on the left looks at animal movement. The way an animal moves is related to their body structure, hunting needs

and self-protection. Press the buttons on the stand to see different animals moving onscreen. Press the button in the middle to take 9 consecutive snapshots.

Walk along to the next display - a 3D animation of how ants learn to cope with a fire. Press the buttons to see them in action, starting with the leftmost one. Insects, like ants, that live in groups have better memories than solitary ones. This allows them to learn from accumulated experience. You can see at first the ants panic. Now try the other buttons - each time they will learn to react better to the new threat. Experiments have shown that ants can eventually learn to extinguish a small fire - our animated ants can also do this by the third button.

Walk into the circular hall just ahead and look at the pillar on your left. Inside the glass compartments are scientific instruments used to explore afar. From the top compartment to the bottom, the instruments go from telescope to satellite – do you see the pattern here? They're instruments that can explore further and further away. Look at the pillar on the right, the pattern is repeated except this time it's instruments exploring things that is smaller and smaller. Now walk inside and have a look at the black screen on your left, it's a simulation of stars in the night sky. Can you spot any constellations? Press the buttons to light up some constellations.

Keep walking round to the green booths with earphones. Put one on and speak into the attached microphone to hear your voice. Now press one of the buttons and say something again. What do you hear? Each of the buttons will change your voice differently and it's achieved through changing the frequency of the sound waves you produced. Sound travels through a medium by vibrating its particles a certain number of times a second, this is the frequency and it's measured in Hertz (Hz). Changing

the frequency changes the tonality of your voice making it sound funny, no wonder this technique is often used when dubbing voices for cartoons.

Follow the wall until you get to a bicycle – go ahead and pedal on it. It may seem like electricity is magically delivered to your plug sockets at home, but did you know any movement can generate electricity? Energy cannot be created or destroyed; it can only be changed from one form to another. This is the “Law of Conservation of Energy” . Here the energy you spent pedaling can be transformed into electricity via the movement of the bike. This is also the principle behind windmills and hydroelectricity. Try to light up the arrows, try to get to the top one pointing to an air conditioner. In real life however a lot more energy is needed to operate those appliances than that produced by your pedaling here.

Go on to the next exhibit and try grabbing the cones from the table. What type of cone is easiest to take? What is the hardest? The answer is to do with friction. Sharper cones provide more friction with your hand than flatter ones so they’ re easier to grab. The angle at the top determines the sharpness of the cone, hence the name of the exhibit: ‘The Function of Angles’ .

Now walk towards middle of room, on the right is a large picture of a forest. Try finding the insects hiding in there. Insects and animals often have an external color or pattern designed for camouflage, allowing them to blend into their environment and hide from predators. How many did you find? There should be seven. Use the magnifying glass if you can’ t see them all.

**Let’ s stop and take a rest. When you’ re ready, ...walk through the doorway for the second exhibition room: Road of Exploration**

This section is about previous inventors and scientists and their famous experiments. Since ancient times, when man first made arrows and spears to hunt, humans have been experimenting and inventing. In the last 100 years scientific discoveries have revolutionized our lives. How much do you know about these discoveries? Go to the round table on the left to take the "Apple of Knowledge" test.

Now walk back out to the display in the centre of the room. Follow it round, and look at the second exhibit on the left. This explains the experiment by American scientist, Thomas Hunt Morgan. He established the chromosome theory of heredity by linking certain genes to certain chromosomes. In fruit flies the gene determining eye color was linked to the sex chromosomes, and this display shows patterns of inheritance for white and red eyes. For this work he won the Nobel Prize for Physiology or Medicine in 1933.

In humans, color-blindness is also a sex-linked disease and follows a similar pattern of inheritance. That's why it can jump generations. Try looking into the cone and test your own sensitivity to color; touch the round dial beside it to change the display. Can you see patterns in the colors?

Next, turn left and walk round until you get to the 4<sup>th</sup> display on the right. This book explains two landmark discoveries in human understanding of the earth and its position in the universe. The first is Copernicus' heliocentric model of the solar system. Published in 1516, this theory stated that the earth revolved around the sun and not the other way round. Not only was this theory revolutionary at the time, it is also believed to be one of the most important epiphanies in the history of science, and the starting point of modern astronomy.

The second important discovery is Magellan's circumnavigation of the earth. In September 1519, Spanish explorer Ferdinand Magellan set out from Spain with 5 ships and 200 sailors heading west into the Pacific Ocean. Three years later one of his ships returned to Spain from the East along the coast of Africa. Though Magellan himself died before the ship's return, this first successful circumnavigation of the globe proved the Earth was round. Other important legacies included the discovery of time differences around the world, leading to the establishment of the International Date Line, several new species and two new galaxies (the Magellan Clouds).

**Follow the section round and turn right to find the doorway to the next section. Have a rest here on one of the green benches. You might be surprised by the noises it makes!**

Now you know about some great past explorers it's time to do experiments of your own! See the third exhibit on your left; this is a simulation of what happens when certain chemicals is mixed with air. When the mixture reaches a certain air to chemical ratio an explosion will result. This is the critical point of blast. Try to find what this critical point is in this simulation by turning the red handles on the right. One releases H<sub>2</sub>, the other Oxygen. Then press the button to see what happens. Many explosions occur in factories and everyday life due to ignorance of the effect of mixing chemicals with air.

Keep walking down to the end of the section to a screen in front of you. Let water in and out of the submarine to move it up and down the screen, and shoot the mines. It may seem deceptively simple, but this is how real submarines change their depth in the ocean. By taking in more or less water submarines use Archimedes' Principle of Buoyancy to change the

buoyant force exerted on it by the surrounding water, thus raising or lowering its depth.

That' s it for our tour today. We hope you enjoyed your visit to the Youth Science & Technology Exploration Museum.

Museum address: 137 Jianguo Road W., near Shaanxi Road S.

Admission: Free

Opening times: During term time: 12:00–8:30pm weekdays, 9am – 8:30pm weekends; winter/summer holidays: 9am – 8:30pm everyday. Last admittance 8pm. Group visits by prior arrangement and a free tour guide will be arranged for you.

Transport: metro Shaanxi Road S metro station, line 1.

For more details contact the museum at: 5465-6808 or 5465-9866, or check out <http://www.hdzx.lwedu.sh.cn/thesecc.asp?classA=7>

### **Key Words:**

1. Sound Frequency (n). Is the measurement of the occurrences of sound waves per unit of time. Unit in Hertz. One Hertz = one oscillation per second.声音频率
2. Constellation (n). An arbitrary formation of stars perceived as a figure or design, especially one of 88 recognized groups named after characters from classical mythology and various common animals and objects.星座
3. Friction (n).Resistance encountered when one object moves relative to another object with which it is in contact.摩擦力

4. Gene (n). a unit composed of DNA forming part of a chromosome, by which inherited characteristics are transmitted from parent to offspring.基因

5. Heliocentric (adj).In astronomy, heliocentrism is the theory that the sun is at the centre of the Universe and/or the Solar System.太阳为行星旋转的中心，而不是地球

6. Submarine (n).A vessel that can operate at at the bottom of the sea.潜艇