

## Archimedes' Legacy (Room through the double doors)

Follow the instructions and experiment with **Galileo's Incline Planes 1 and 3**. What Archimedean device did Galileo use to develop his formula for velocity? (hint: #1)

### Archimedean Water Clock

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Read and follow the instructions on how to work Leonardo da Vinci's **Odometer**. If the circumference (distance around the outside) of your wheel is **15 inches** and you move your cart forward, **dropping 3 balls**.

How far have you moved your cart, in inches? (show work)

15 X 3 = 45 or 15+15+15= 45 (possible answers)

Read the information about **Perpetual Motion** machines. **Conclusion:** Can a machine be designed that doesn't need a constant supply of energy to keep it running?

YES

or

**NO**

★What was the most interesting thing you found in the "DID YOU KNOW?" sections?

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Answers will vary.

# Archimedes: Science and Innovations Hands-On Gallery Guide

Not every machine represented in these galleries is interactive but many are set up for you to have a **hands-on experience** and take you back to an age of discovery and innovation that still resonates today.

Read about the amazing machines reproduced here and use this guide to navigate through the galleries. **Explore this exhibition's four themes through the many machines you can experiment with for yourself.**

Before you enter don't miss the **Photo Opportunity** in the lobby. It will introduce the famous legend of **Archimedes' "Eureka!" moment** and explains **Archimedes' Principle**.

As you go through each gallery look for the interactive machines that will answer the questions in this guide. Be careful to respect the signs that say, **"Please Do Not Touch"** or **"For Guided Demonstration Only"**.

★While you are at it, keep an eye out for the question, **"Did you know?"** on most of the signs in the exhibit. These are like trivia or fun facts! **You will be asked at the end of the guide which was the most interesting to you!**

## Machines of the Ancient World (Downstairs galleries)

Head over to the full reproduction of a **Ballista** and read about how it works before moving to the **Interactive Ballista** to try out the half ballista for yourself. What kind of energy is stored in the twisted rope? (CIRCLE ONE)

WASTED

SOLAR

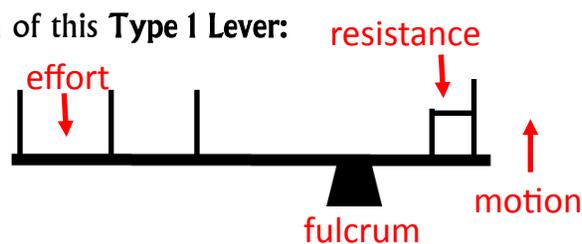
**TORSION**

Next to **The Lever** sign there is a *life-size* lever and fulcrum with a chair on one side. This interactive will allow you to easily lift someone that you maybe could not lift on your own.

Label the parts and direction of this **Type 1 Lever**:

motion fulcrum

effort resistance



As you move into the second part of the downstairs gallery you will come across a machine that uses a double lever: **The Herodotus Machine**. Follow the instructions and then fill in the blanks below using the **Observation** information.

“ Less energy is required to rock the stone than it would take to lift the stone.”

Find the **Gears of Archimedes** sign and read the amazing account of the building and launching of the *Syracusia*. Faced with the “huge challenge” of launching this *titanic* ship Archimedes employs two systems and a simple machine (incline plane) all working together. How do these two systems contribute to the success of the launch? **Observation:**

The gear helps pull the boat up the inclined plane

while the pulley system works to

reduce the weight of the boat.

## Energy Machines (Mezzanine gallery, left of the ramp)

This gallery has many examples of **Parabolic Mirrors** (discs). As you explore their uses with sound and sun, as well as the other machines in this gallery, be sure to partner up with a friend and try the two large parabolic mirrors facing each other. **What two modern antennas exploit these parabolic properties?**

Satellite televisions

Radio telescopes

**Diffused Sound in Theatres** explains the principle of how reflective sound propagates. Fill in the blanks below using the **Results** information on the sign.

“Soundwaves (like light rays) are reflected so that the angle of incidence equal the angle of reflection.”

Read the account of **Archimedes' Death**. What was the long period of time called that came at a time after his death and right before the Renaissance? (CIRCLE ONE)

**The Dark Ages**

Golden Age of Mathematics

Ming Dynasty

## Power of Shapes (Alcove at the top of the ramp)

As you try all the geometric interactives in this gallery be sure to read about Archimedes' **Ostomachion**. As you do the activities answer the questions below about this puzzle.

How many Quadrilaterals?

**2**

How many Triangles?

**11**

How many Pentagons?

**1**

How many Total Shapes?

**14**