The Astrolabe

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Resource Booklet

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The Astrolabe: A Journey Through Science & Arabic Heritage

For centuries, people have looked up at the stars to understand time, location, and direction. One of the most fascinating inventions that helped them was the **astrolabe**. This device was perfected by Arabic and Muslim scholars and became one of the most important scientific tools of the Islamic Golden Age. It was used for navigation, astronomy, and even calculating prayer times! Let's explore what an astrolabe is, how it works, and why it was so important.

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What is an Astrolabe?

An astrolabe is an ancient instrument that works like an early scientific computer used by astronomers, sailors, and scientists to calculate time, measure the height of objects, and find their location using the positions of the sun and stars. The word astrolabe comes from the Greek word '***Astrolabos***', which means 'star finder', but the Arabic word '***Asturlab***' was more commonly used by Islamic scientists.

The astrolabe was essential for travelers, sailors, and astronomers in history. Before GPS and modern maps, explorers used the astrolabe to navigate across vast deserts and oceans. An astrolabe is an ancient tool with spinning dials, and a ruler-like part to help make calculations.

📅 The Origins of the Astrolabe: Who invented the Astrolabe?

The astrolabe dates back to the ancient Greeks around Hijri ~200 BH (150 BCE). A famous Greek scientist, **Hipparchus**, came up with the idea of mapping the sky onto a flat surface. Later, Islamic scholars improved and perfected the astrolabe, making it more detailed and easier to use. One of the oldest surviving astrolabes was made in the 4th Century Hijri (10th century CE).

People have used astrolabes for over 2,500 years! They were especially useful before modern clocks and navigation systems. Here are some key dates:

🛡️ **Hijri 200 BH (150 BCE)** – The Greek astronomer **Hipparchus** developed the first ideas for the astrolabe, using a special projection method called **stereographic projection** to map the stars onto a flat surface.

📜 **Hijri 200-400 AH (2nd-5th Century CE)** – Greek and Roman scholars improved the design, but it was not yet widely used.

🌍 **Hijri 100-400 AH (8th-10th Century CE)** – The Islamic Golden Age saw the greatest advancements in astrolabe design. Islamic scientists such as Al-Farghani (9th Century CE) and Al-Zarqali (11th Century CE) refined the astrolabe, making it more accurate and useful.

⛵ **Hijri 800-1100 AH (15th-17th Century CE)** – Astrolabes were commonly used by Muslim navigators, European explorers, and scholars to study astronomy and guide ships across the sea.

🔭 How Was the Astrolabe Used?

Astrolabes were one of the most important tools from our past . They were used in different ways depending on who was using them.

✅ **Navigation** – Sailors used the astrolabe to find their latitude at sea. By measuring the height of the sun or a star above the horizon, they could determine their position on Earth.

✅ **Timekeeping** – Scholars used astrolabes to calculate the time of day or night by aligning it with the stars or the sun. This was especially useful before modern clocks were invented.

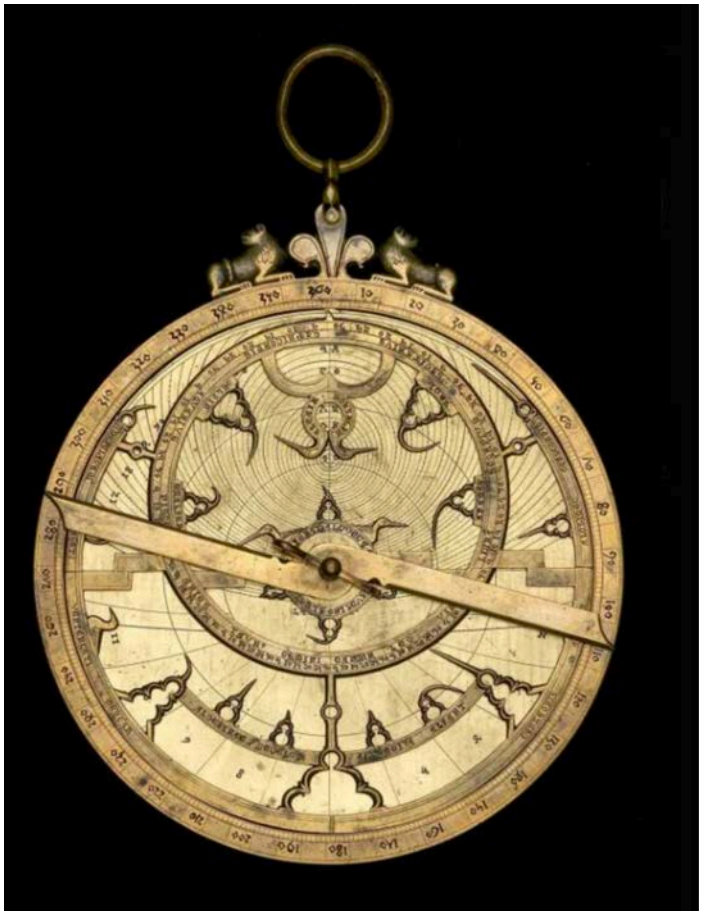
✅ **Islamic Prayer** – People used astrolabes to find the Qibla (direction of Mecca) and determine the exact times for prayer.

✅ **Astronomy** – Scientists used astrolabes to study the movement of planets and stars. They helped astronomers track celestial objects and create detailed star maps.

⚙️ The Key Parts of an Astrolabe

Astrolabes are made up of several parts, each with a special job. Understanding these parts helps us see how the astrolabe worked:

- **Mater** *(Main Body)* – The large circular frame that holds all the other parts.



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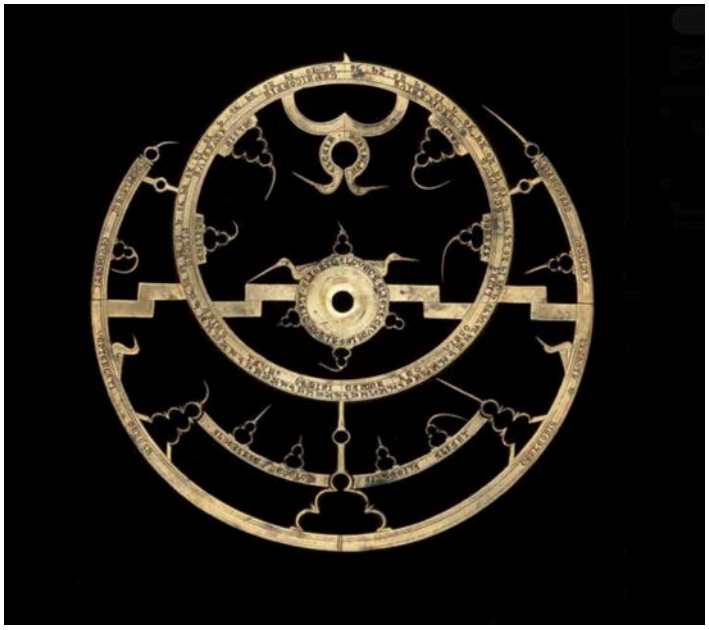
- **Rete** *(Star Map)* – A rotating metal framework with pointers for bright stars.



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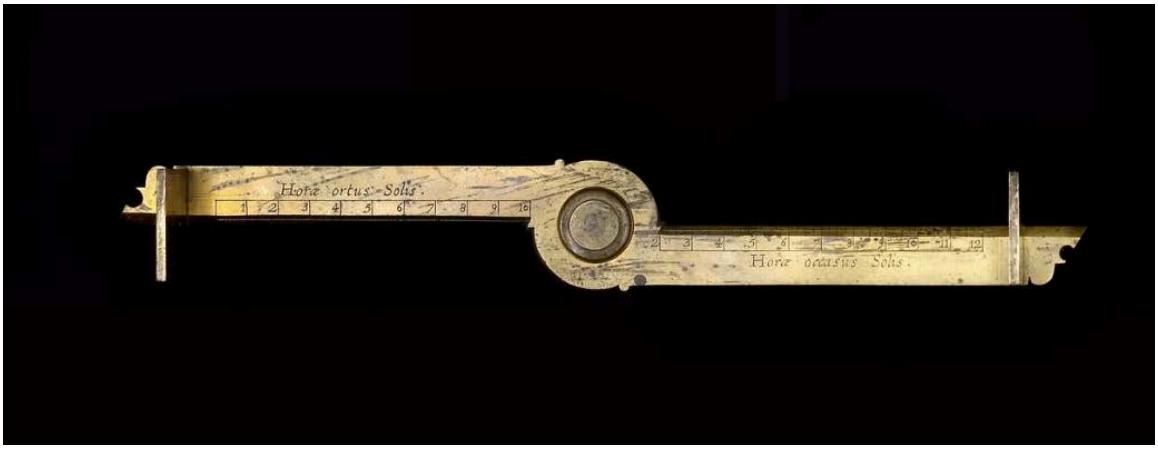
- **Alidade** *(Sighting Ruler)* – A movable arm used to measure angles of the sun and stars.



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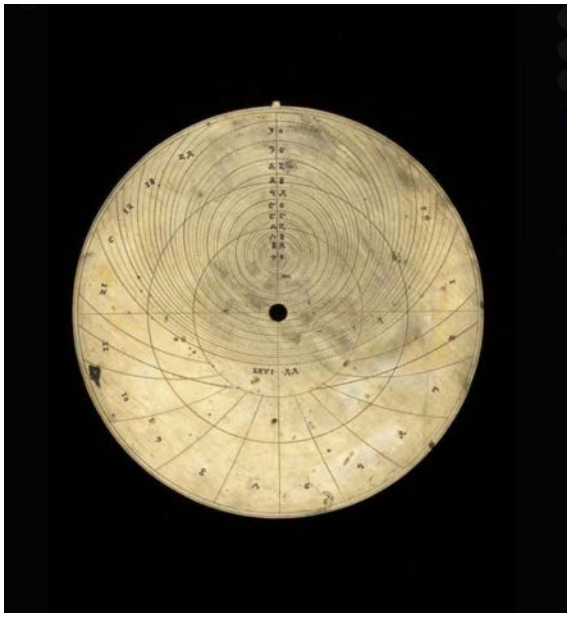
- **Plates** – Different plates were used for different latitudes, allowing the astrolabe to be accurate in different places.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- **Throne** – A small handle or ring at the top so the astrolabe could be held or hung up.


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🛠️ Types of Astrolabes

Over time, different types of astrolabes were created for different purposes. Some of the most well-known include:

1️⃣ **Planispheric Astrolabe** – The most common type, used for solving astronomical problems related to time and position.

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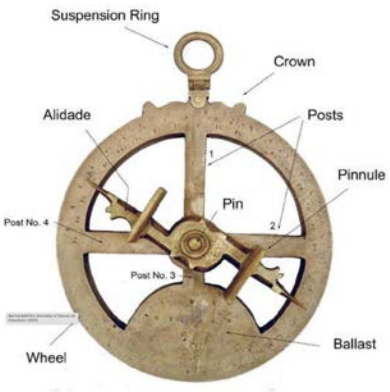
2️⃣ **Mariner's Astrolabe** – Designed for sailors to measure latitude while at sea.



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3️⃣ **Universal Astrolabe** – Developed in Muslim Spain (11th century), it could be used anywhere, unlike earlier astrolabes which required different latitude plates.


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4 **Spherical Astrolabe** – A rare form of the astrolabe that was three-dimensional.


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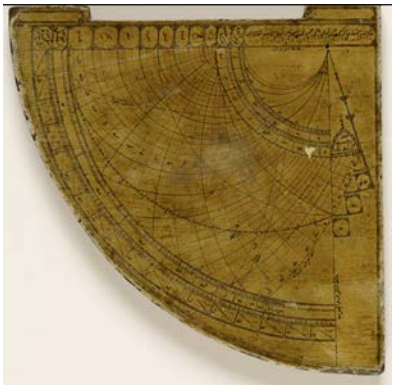
5 **Quadrant Astrolabe** – A simplified version used only a quarter of a circle.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🛠️ Makers of Astrolabes

Throughout history, many skilled artisans and craftsmen created **beautifully designed and highly functional astrolabes**. These instruments were often **engraved with Arabic calligraphy and intricate geometric patterns**, reflecting the artistic and scientific achievements of their makers.

🏺 Notable Makers of Astrolabes

📜 **Muhammad ibn Abi Bakr al-Farisi (7th Century AH / 13th Century CE)** – A Persian craftsman who made astrolabes with detailed celestial charts.

🛠️ **Ustadh Ali ibn Umar al-Attar (8th Century AH / 14th Century CE)** – A well-known astrolabe maker from Cairo, Egypt, who created intricate brass astrolabes for scholars and navigators.

🔭 **Ahmad ibn Muhammad al-Sarraj (9th Century AH / 15th Century CE)** – A famous astrolabe maker from the Islamic world, known for **his precise and highly decorative instruments**.

👩‍🔧 **Mariam Al-Ijliya (4th Century AH / 10th Century CE)** – One of the few known female astrolabe makers, who studied under her father in Aleppo and gained recognition for her expertise.

The **Islamic Golden Age** was a time of great scientific discoveries. Many Muslim scholars helped improve the astrolabe. Some of the most famous include. Many Muslim scholars and inventors played a key role in perfecting and using the astrolabe. Some of the most famous include:

📖 **Al-Farghani (3rd Century AH / 9th Century CE)** – Wrote about how astrolabes worked and improved their accuracy.

🛠️ **Al-Zarqali (5th Century AH / 11th Century CE)** – Created a **universal astrolabe** that could be used anywhere in the world.

📡 The Astrolabe and Modern Science

The astrolabe was one of the most advanced scientific tools of its time. It inspired many modern inventions that we use today, including:

📡 **GPS (Global Positioning System)** – Just like sailors used astrolabes for navigation, we now use GPS to find our location anywhere on Earth.

🕰️ **Clocks and Timekeeping –** The way the astrolabe calculated time helped develop the technology used in modern clocks.

🔭 **Telescopes and Astronomy** – The study of the stars with astrolabes helped scientists understand space, leading to the invention of telescopes.

🤩 Important Fact!

Did you know? Some astrolabes were as small as a pocket watch , while others were huge and hung in mosques and palaces to track time and stars. The largest astrolabes ever made were over 1 meter wide!

📚 Sources & Further Reading

The following resources provide more information on the history and science of astrolabes:

- King, David A. *In Synchrony with the Heavens: Studies in Astronomical Timekeeping and Instrumentation in Medieval Islamic Civilization* (2004).
- Saliba, George. *A History of Arabic Astronomy: Planetary Theories During the Golden Age of Islam* (1994).
- Hogendijk, Jan P., & Brentjes, Sonja. *Studies on the Transmission of Medieval Mathematical Astronomy* (2020).
- **Qatar National Library Archive:** QNL Online Astrolabe Resources
- **1001 Inventions:** History of Astrolabes