

SPACE[☆] awareness

Intercultural science education on the example of the Islam Heritage Kit



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Topics and questions addressed

- Which are the goals of intercultural science education?
- What are we doing when we bring science into other cultures?
- Which methods have been successfully implemented?
- Astronomy and space science education for Muslim (refugee) children on the example of the **The Islam Heritage Kit:**
Building a bridge between the Islamic culture and Europe.
- Literature

..from the very beginning...

Παντες ανθρωποι τον ειδεναι ορεγονται φυσει
— „All humans, by nature, desire to know“ -

Aristotle 400 BC

We explore the world **to make sense** of it,
understand it, adapt to it, live on it

There are many world-views that
make sense of the world

Different cultures developed different knowledge systems



**Non-western
cultures**

Cultural-dependent thinking

Believes and traditions are passed to new generations. Explanations that allow to make sense of the world are not questioned.

→ Explanations have local validity



Techniques

Trial and error



**Western
(science)
culture**

Rational scientific thinking

Explanations are questioned. Research and exploration continue as an opened endeavor.

→ Explanations are universal



Technology

Science-driven

Explanations The seasons

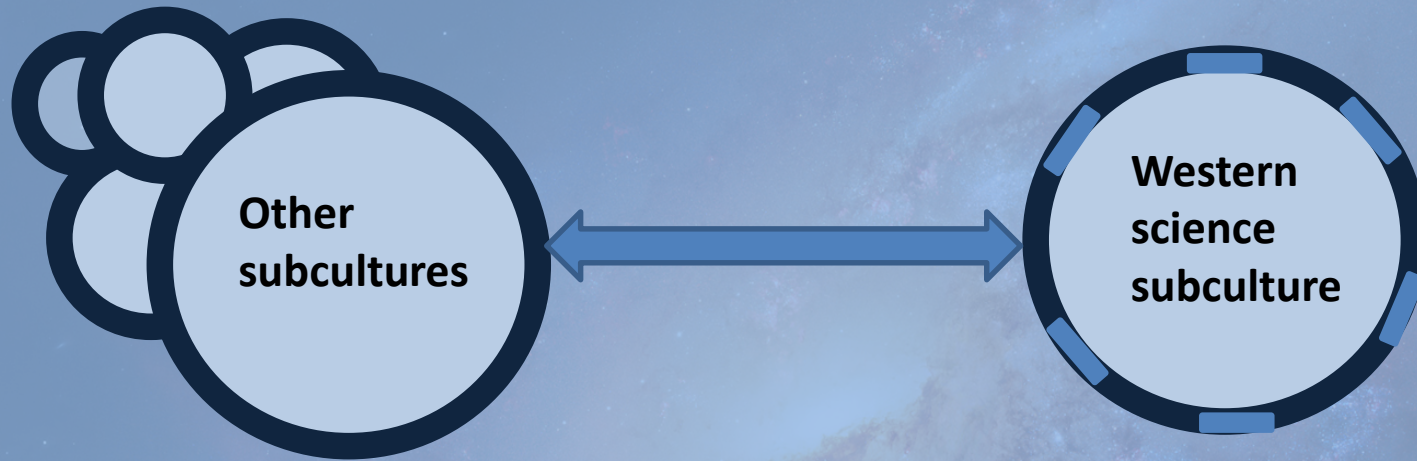
Mythical -
Religious

Western
Science



Scientific explanations require observations, experiments and tests, showing that they are not false or untrue (Popper)

Crossing the borders of subcultures (Aikenhead*)



But!

1. We also find difficulties in science education in Western countries! „Intuitive physics“ is cross-cultural
2. People of „other cultures“ are also hightech users.
They are blind users like most of the western people are.

* College of education, University of Saskatchewan, Canada

Science-technology have gone global!

SPACE
renewess



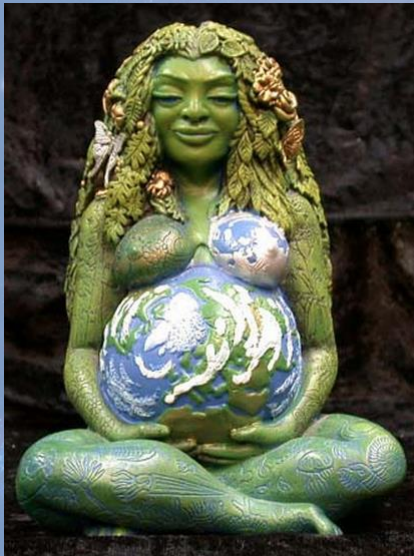
Because of a lack of electricity in Zimbabwe's rural areas, most people have to charge their mobile phones on solar-powered chargers.

Multicultural education II: Learning science in different cultural contexts

If we understand how students make sense of the world,
we can design a science curriculum so that sciences makes sense for the student.



**The challenge is not to destroy their self esteem
and what is valid, meanfull for them (senseful)**



Mother Earth and Wild Rice



Curriculum (Science-Technology-Society STS):

Earth ritual, planting seeds, collection of Wild Rice (techniques)

Water analysis (PH), science and technology of harvesting to industrial processing (technology)

Evaluation of nature damages: what destroys the natural equilibrium

Looking for a suitable context

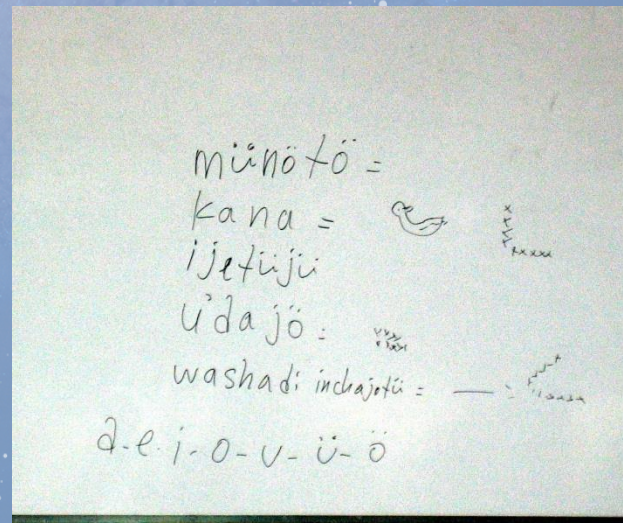


Teacher Elina Guerra.
Daughter Ayka

Confrontation:
Venus and the Sun

Suitable:

- The constellations - life rhythm
- Solar eclipses



EUROPE'S REFUGEE CRISIS

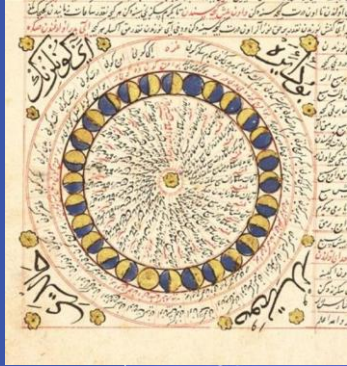


99% are Muslims!



Strengthen their self-esteem!

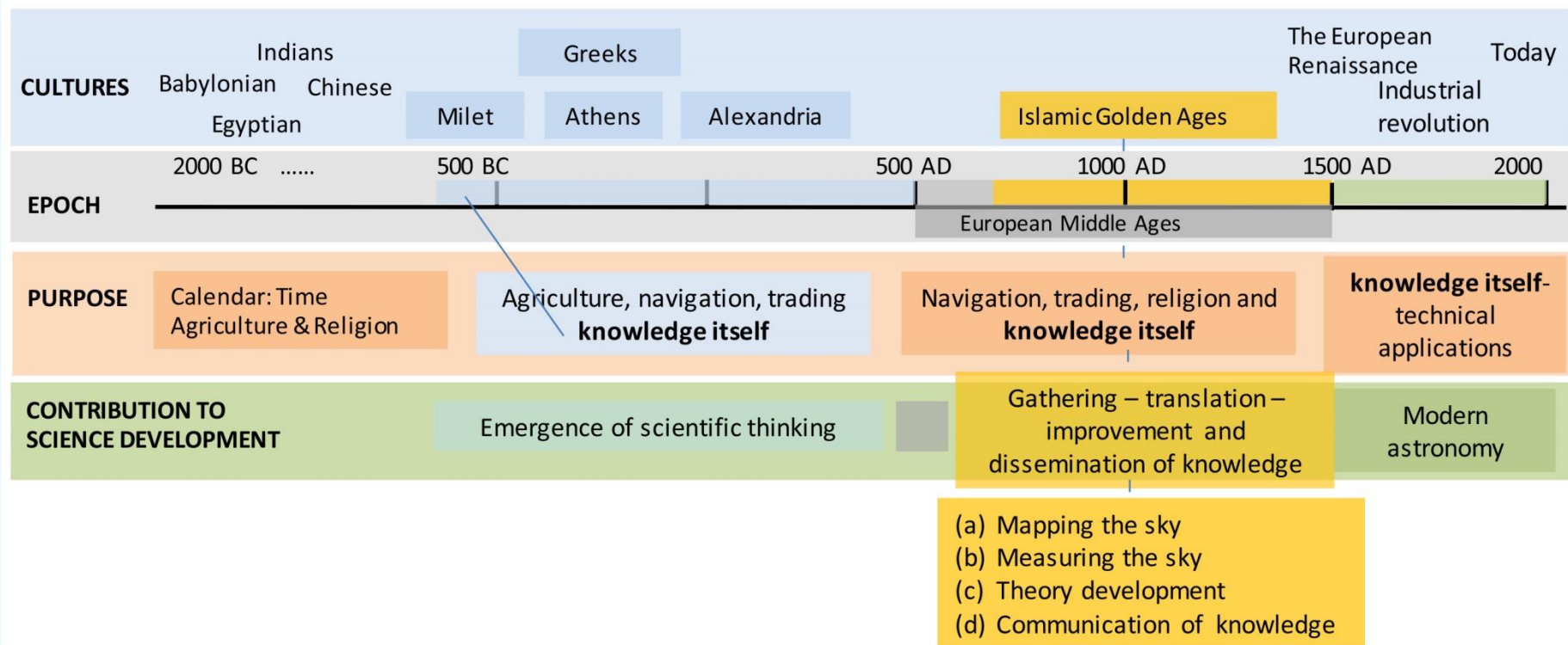
Islam Heritage Kit



Cecilia Scorza with contributions from Grom Matthies, Hassane Darhmaoui - Rajae Saudi

Key role of the islamic culture in the development of astronomy, medicine and other sciences

The journey of the astronomical ideas



(Scorza 2016)

- 1001 Inventions
- The Journey of the ideas

Astronomy and Space Sciences are part of their heritage and future!



European children: Awareness of the contribution of the Islamic Culture to the development of astronomy.

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Astronomy for religious and practical purposes
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7. One sky, one Earth: sharing and mastering challenges
together

1. Introduction: The journey of astronomical ideas

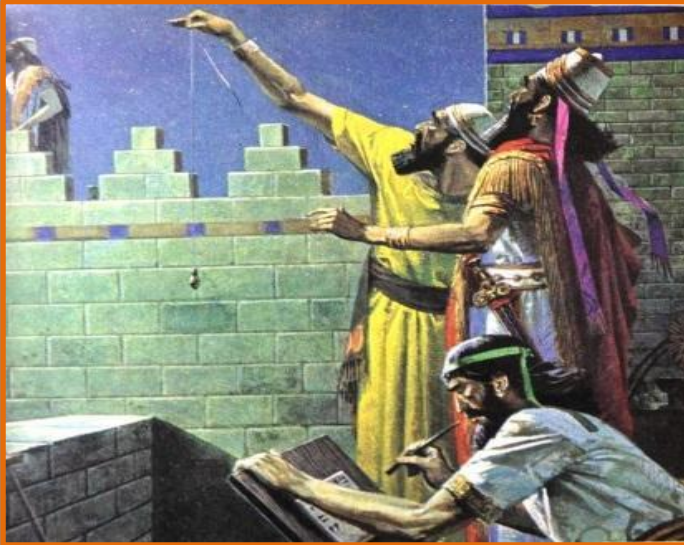
Activity Map „the journey of astronomical ideas“



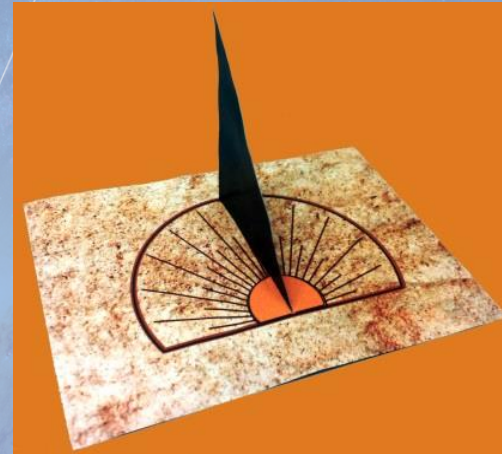
2. The birth of the astronomical ideas:

Astronomy for religious and practical use: Measuring time → Calendars

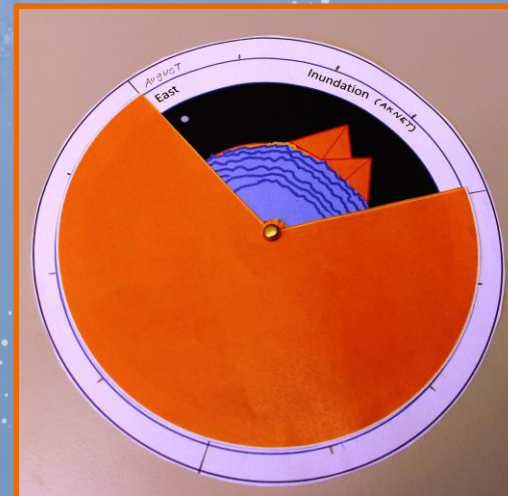
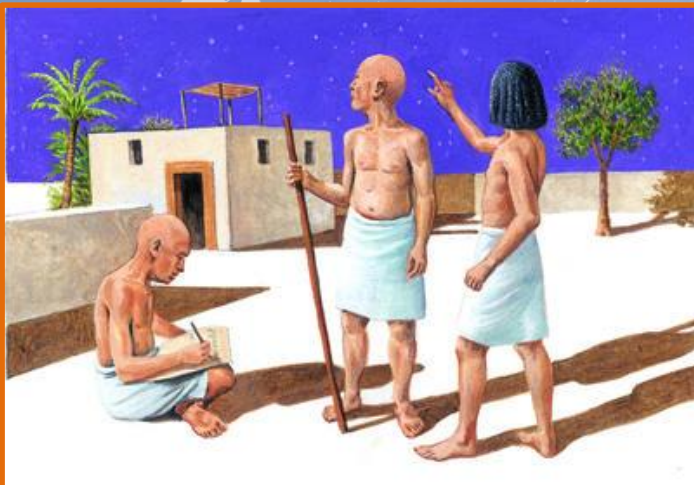
Babylonian astronomy



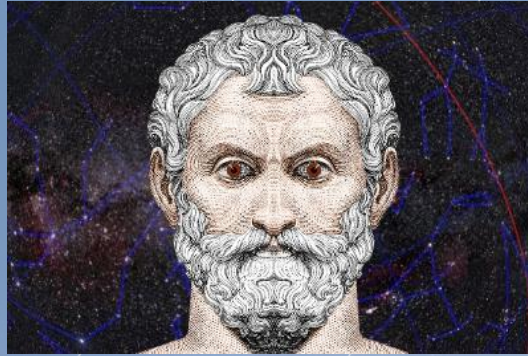
Activities



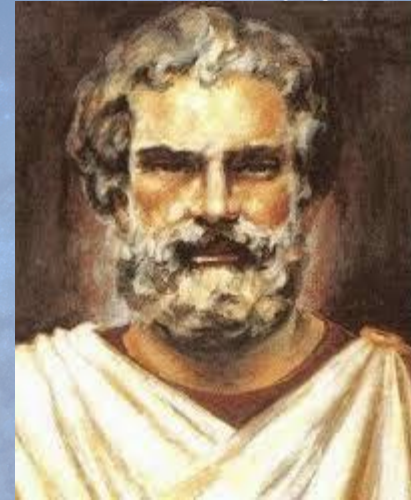
Egyptian astronomy



3. The rise of astronomy as science: Knowledge itself



Thales (600 BC)



Hipparchus 200 BC

Grom Matthies



Eratosthenes 200 BC

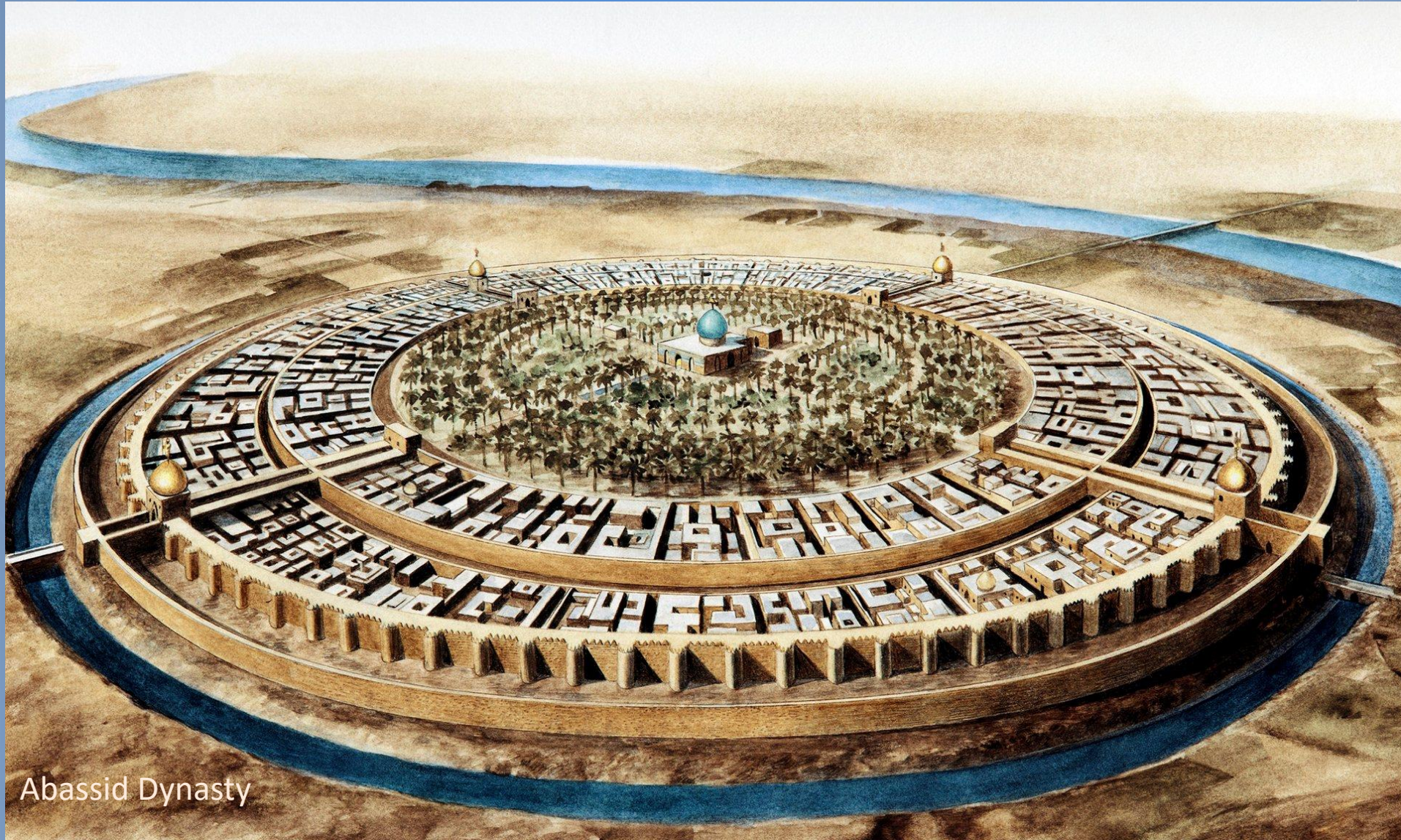


Planet UNAWE-Ball around simulated midday, shadows point north (south on southern hemisphere).



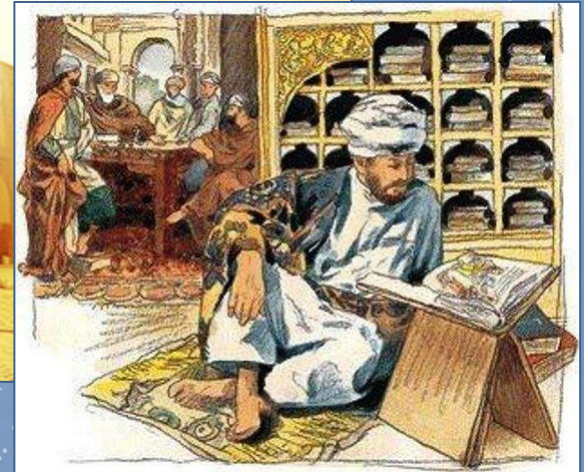
Hypatia (400 AD)

4. The long way to Baghdad: The Islamic Golden Ages

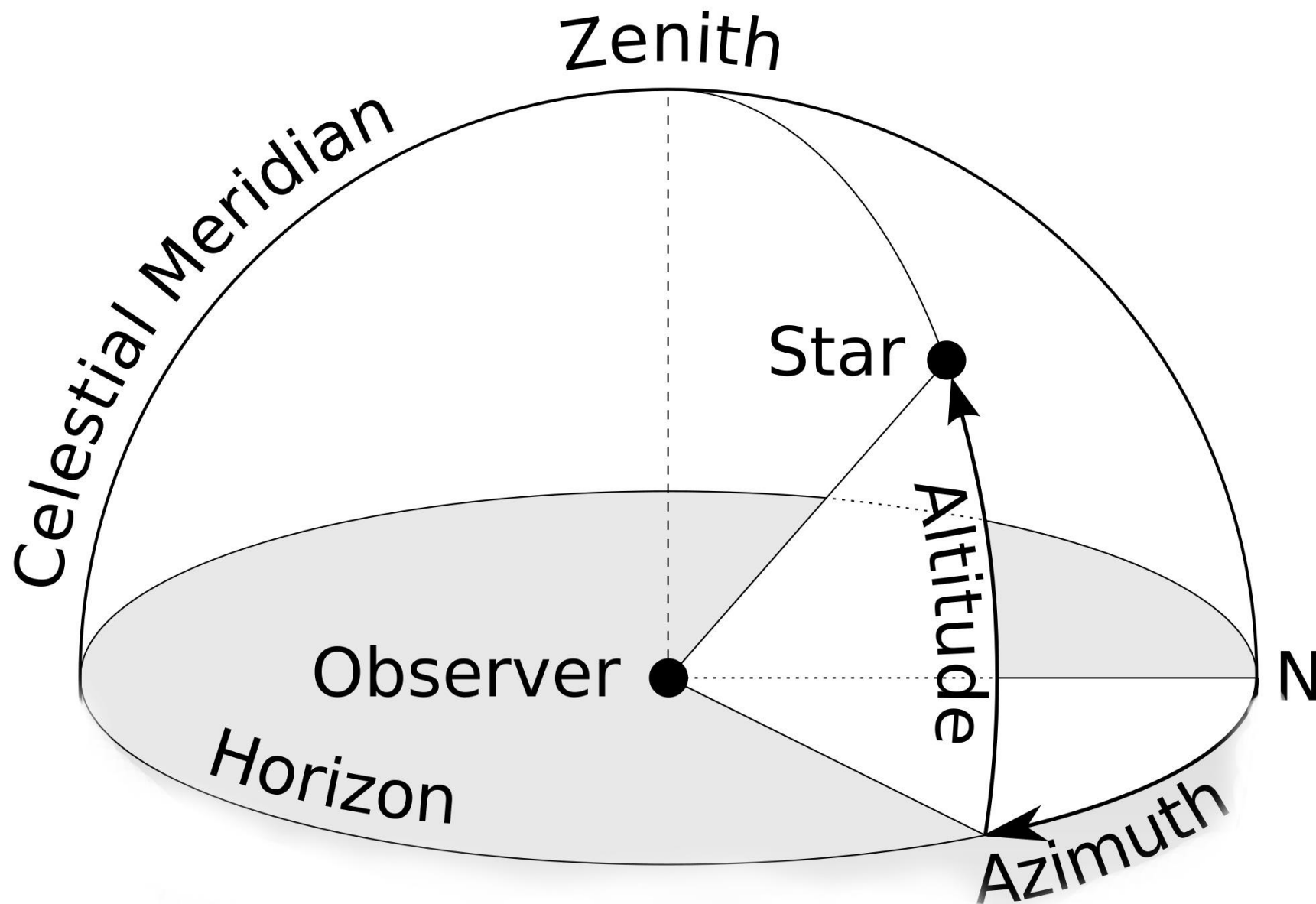


Abassid Dynasty

The spirit of the Islamic Golden Ages



- Incredibly opened and tolerant!
- Translation of Chinese, Indian, Persian and Greek text into Arabic
- Fostered exchange → Invitation of scholars to Baghdad
- **THE CULTURE OF AMBIGUITY!**



Women in the Golden Ages



Education: Women played an important role in the foundations of many Islamic educational institutions: Fatima al-Fihri founding of the University of al-Karaouin in 859 CE. This continued through to the Ayyubid dynasty in the 12th and 13th centuries: of 160 mosques and madrasas established in Damascus , **women funded 26** through the Charitable trust system. Half of all the patrons for these institutions were also women.

According to the scholar Ibn Asakir in the **12th century**, **there were opportunities for female education.** He wrote that girls and women could study, **earn academic degrees, and qualify as scholars and teachers.**

In the **15th century**, Al-Sakhawi devoted an entire volume of his 12-volume biographical dictionary to **female scholars, giving information on 1,075 of them!**

Under traditional interpretations of *sharia*, women had the right to keep their surnames upon marriage; inherit and bestow inheritance; independently manage their financial affairs; and contract marriages and divorce. In contrast, restrictions on the legal capacity of married women under French law were not removed until 1965.

5. Meet four Islamic scientists

Mapping the sky



Al-Sufi

Measuring the sky



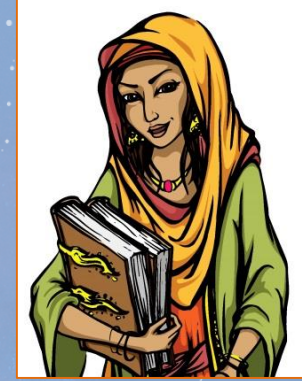
Mariam al-Astrolabiya

Theory development



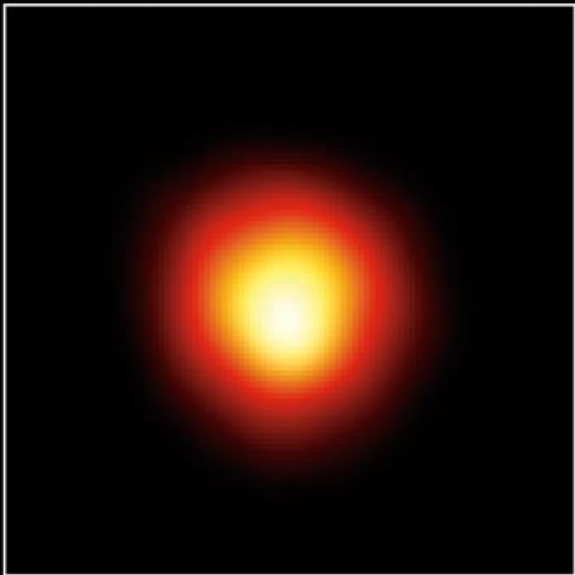
Al-Haytham

Communicating knowledge



Fatima al-Fihri

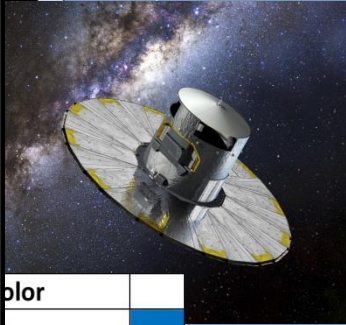
Dynasty	Period	Important regions / Cities	Important scholars
Umayyad	661 - 1031	Conquest of South Spain, Persia and Northwest India	First translation schools in Córdoba and Toledo, Averroes, al-Bitrudsch (Spain 1190)
Abbasid	750 - 1258	Opening of the House of Wisdom in Baghdad	Al-Sufi, Miriam Al-Astrolabiya
Fatimid	969 - 1171	Cairo (Egypt) as Caliph place	Al-Haytham
Ayyubid	1171 - 1250	Cairo (Egypt), conquest of Syria and Mesopotamy. Recovery of Jerusalem	Ibn asch-Schatir (astronomer of Damaskus).



Size of Star

Size of Earth's Orbit

Size of Jupiter's Orbit



Color	
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Atmosphere of Betelgeuse • Alpha Orionis

Hubble Space Telescope • Faint Object Camera

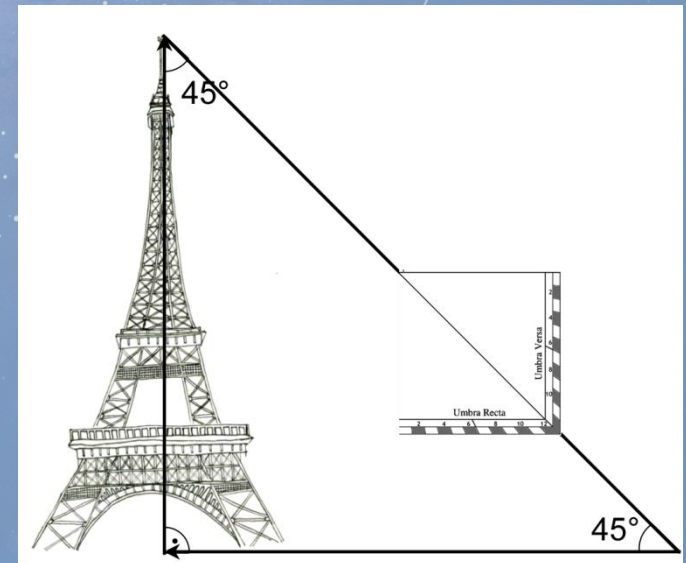
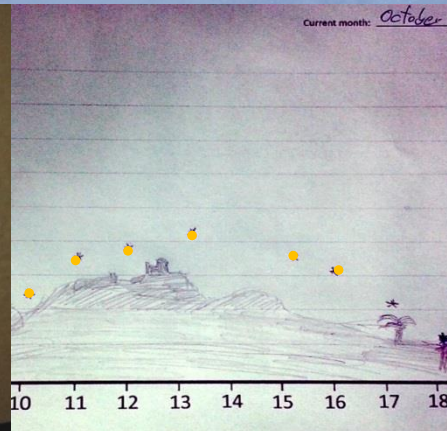
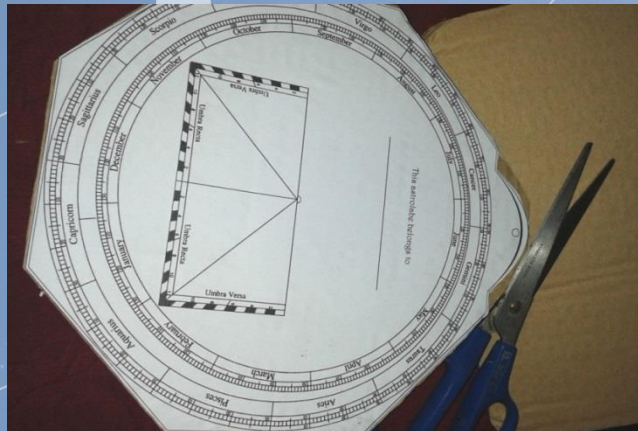
- Continued the work of Hipparchus and Hypatia
- She developed such a **large variety of hand-crafted intricate and innovative designs of astrolabes** that she was employed by the ruler of **Aleppo**, Sayf Al Dawla during the period from 944 AD to 967 AD.



Story (Rajae Saudi)



Grom Matthies

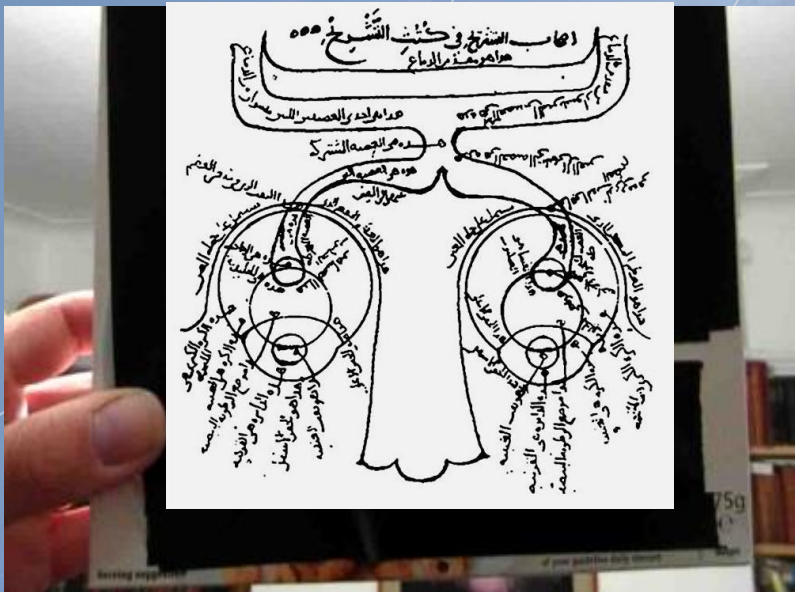


Ibn Al-Haytham's contributions to optics and the scientific method

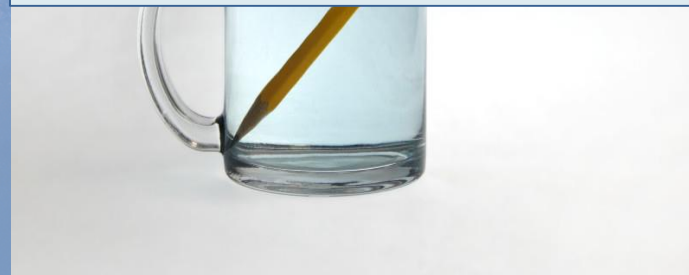
Euclid and Ptolemy stated that the eyes act both as emitters and receivers of some kind of rays. Aristotle: light exists independently of the human eye and paves its way from the objects in the eye via a medium.



Going beyond the speculative practice of the first natural philosophers, Al-Haytham performed experiments and built a model of the eye: the camera obscura.



His „book of Optics“ influenced Roger Bacon, Johannes Kepler, Galileo Galilei, Christiaan Huygens, Isaac Newton, Michelangelo, Leonardo da Vinci.



Communicating knowledge

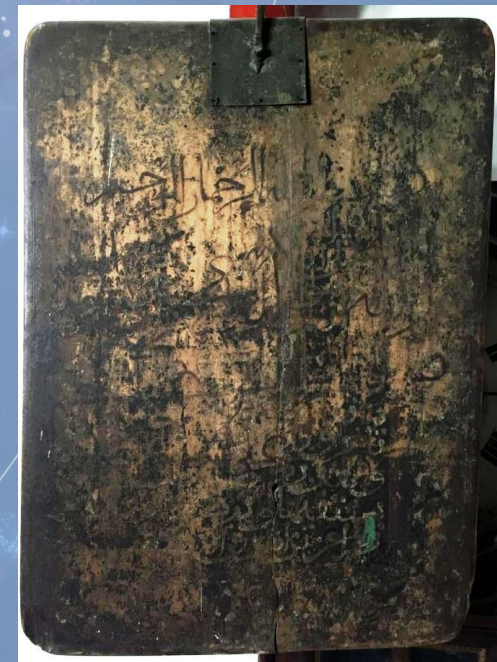
Fatima Al-Fihri founded 859 AD the Qayrawan university, the oldest existing, continually operating and the first degree awarding educational institution in the world according to UNESCO.

Subjects: Arabic, Astronomy, Mathematics, Medicine, Music and Islamic religion. Pope Sylvester II (1000 AD) studied there, and introduced in Europe Arab numbers, and sciences including mathematics and astronomy.

Fatima al-Fihri



Al-Fihri's diploma





Explore Science, (Science festival - Klaus-Tschira-Foundation)

SPACE[○] awareness

Astronomy is
connected to the
islamic culture

During the Golden
Ages women and
men worked
together

The islamic culture
helped to trigger the
European renaissance

Science is a
transcultural
endeavor.

Self esteem of
refugee children:
„We are part of this
endeavor“



Literature

1. John Freely, "Alladdin's Lamp", 2009 in Editorial Alfred A. Knopf, New York
2. Thomas Bauer, „Die Kultur der Ambiguität“, 2011, Verlag der Welt Religionen
3. George Bossong, 2011, „Al-Andaluz, a golden dream“, Zeit Middle Ages
4. George Saliba, 2011, Islamic Science and the Making of the European Renaissance, MIT Press
5. The journey of ideas, PDF-document of the Foundation for science technology and civilisation & 1001 inventions

***Ignorance leads to fear,
fear leads to hate,
and hate leads to violence***

Averroes (1126 – 1198) Cordoba



AMBIGUITY!