

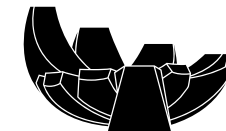
ARTSCIENCE MUSEUM™ PRESENTS

The Universe and Art

An Artistic Voyage Through Space

1 April - 30 July 2017

EDUCATOR'S RESOURCE



ArtScience
Museum
MARINA BAY SANDS

EDUCATOR'S RESOURCE

An information package for educators interested in the exhibition *The Universe and Art* and the various additional programmes developed by ArtScience Museum's Programmes Department.

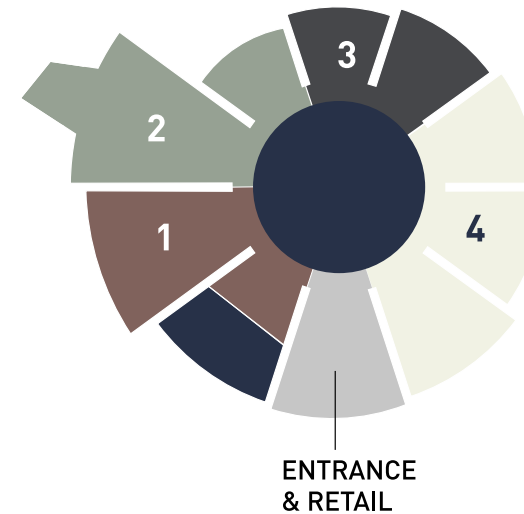
As the subject of dreams, mythologies and artistic explorations, the Universe has been studied by people around the world for millennia. Featuring over 120 artworks, scientific artefacts and manuscripts, this exhibition presents global views of the Universe through the centuries. It weaves a rich constellation of Eastern and Western philosophies, ancient and contemporary art, science and religion, to examine humanity's origins, presence and future in the Universe.

This Educators' Resource is intended to act as a guide prior and during your visit to ArtScience Museum. We hope this will help you plan your visit, and understand how a visit will fit into your teaching at the school. Whether you plan a visit with a guided tour by one of our trained facilitators or explore with a self-guided tour, this resource will hopefully help you anticipate the main themes and concepts, should you wish to explore them with your group prior to the visit.

EXHIBITION OVERVIEW

The Universe and Art has 4 sections. Each explores humankind's vision of the universe from a historical, cultural, philosophical and scientific perspective. At the same time, the exhibition endeavors to address the latest views of the cosmos made possible by the progress of sciences and their representation in contemporary art. Along the way, visitors will be able to look at how different ideas developed and influenced humanity in the past as well as the present, and how they possibly hold influence over the future. Throughout the experience, everyone is encouraged to question the meaning of life, as well as the possibility of life on other worlds, culminating in examples of space art which changes one's perception of the universe.

GALLERY MAP



SECTION 1

Our Vision Of The Universe

SECTION 2

The Universe As Space-Time

SECTION 3

A New View Of Life

SECTION 4

Space Art

CURRICULUM LINKS

Secondary History:

- To develop an interest in the past and the forces that shaped human activities, institutions and ideas over time.

Primary/Secondary Science:

- Provide students with experiences which build on their interest in and stimulate their curiosity about their environment

Primary School Art:

- Gather information from visuals and what they see
- Make informed links between the use of visual qualities and intentions of the artist.
- Develop an interest in looking at and creating art.

Secondary School Art:

- Identify various elements of art e.g. visual characteristics like Dot, Line, Shape, Form, Colour, Texture, Space, Tone
- Identify content and theme in artworks and convey experiences and ideas with the image.
- Recognise that art reflects, records and plays a role in history and science.

IB Primary Years Programme (3 to 12 years)

How We Express Ourselves:

- Inquire into the ways in which we discover and express ideas, feelings, nature, culture, beliefs and values
- Inquire into the ways in which we reflect on, extend and enjoy our creativity and our appreciation of the aesthetic.

How The World Works:

- Inquiry into the natural world and its laws.
- The interaction between the natural world (physical and biological) and human societies and how humans use their understanding of scientific principles.
- The impact of scientific and technological advances on society and on the environment.

IB Middle Years Programme (11 to 16 years)

- Encourage and enable to develop skills specific to the discipline and be engaged in a process of creative exploration and (self-) discovery.
- Encourage and enable to make purposeful connections between investigation and practice to understand the relationship between art and its contexts.

Science:

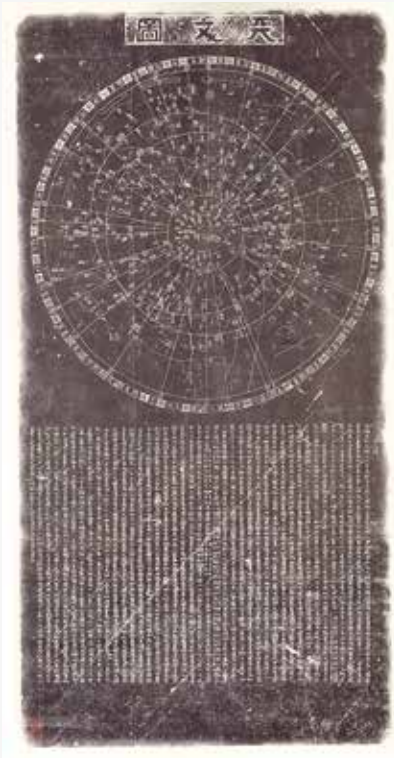
- Encourage and enable students to understand and appreciate science and its implications and consider science as a human endeavour with benefits and limitations.
- Cultivate analytical, inquiring and flexible minds that pose questions, solve problems, and construct explanations and judge arguments.

SECTION 1: OUR VISION OF THE UNIVERSE

The first part of the exhibition focuses on historical cosmologies from around the world. Religious art from the Buddhist, Hindu and Jain traditions shows how we conceived of the cosmos as multidimensional from the earliest of times. *The Tale of the Bamboo Cutter*, a story from ancient Japan about a princess from the Moon, shows us how myths have helped shape our perception of the heavens. The birth of astronomy as a modern science is charted through a remarkable collection of artefacts from east and west, including Japanese star-charts from the 7th Century to the Edo period, astronomical texts from ancient Persia and the Arab world, and first-edition masterpieces from the most renowned astronomers of the Renaissance, Galileo, Kepler, Newton and Copernicus.

Have A Closer Look:

Encourage students to notice the works in this section, and let them describe what they see. Many of the works, both in Eastern and Western traditions, have celestial or mythical motifs. Next, look at the astronomical tools and discuss how they further enhanced astral observations. Then in the manuscript room, study what the texts in there chart and reveal? Draw their attention to the major astronomical studies and scientific masterworks that paved the way to our understanding of the universe. Ask them if they had lived during those times, what would they have thought about these radical treatises?



Chunyou Star Chart

Wang Zhiyuan
Carved in 1247
Ink impression
Collection of Chiba City Folk Museum, Japan
Photo courtesy of Chiba City Folk Museum, Japan

The Chunyou Star Chart is a stone-engraved star chart found in the Confucius Mausoleum in Suzhou, China. It was created in 1247 based on the astronomical observations made from 1078–1085, during the Northern Song dynasty. It is thought to be the oldest surviving star chart in the world. It is common in China to depict a star chart as a circular drawing with the celestial North Pole at the center. The 28 lines running from the circumference to the central core are the meridians leading to the main stars of the 28 mansions of Chinese astronomy.

| Sec History | Pri/Sec Science | Pri Sch Art | Sec Sch Art | IB Pri Yrs Prog | IB Middle Yrs Prog |
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Taketori Monogatari (The Tale of the Bamboo Cutter)

17th century
Hand scroll
Collection of Kokugakuin University Library, Japan

The Tale of a Bamboo Cutter dates back to the mid-10th century and is considered to be Japan's oldest prose narrative about space. The scroll depicts an encounter with Princess Kaguya, whom people believed came from the moon. In that period the moon was considered as an object of awe and subject of fantasy. *The Tale of a Bamboo Cutter* represents a mythical tale about the universe's unknown worlds.

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Astrolabe

Abd al-A'immah
ca 1700CE
Isfahan, Iran
Brass
Collection of the Asian Civilisations Museum, Singapore
Copyright of the National Heritage Board, Singapore

Invented by the Greeks around 220 BCE, astrolabes represent the rotations of three-dimensional celestial spheres in two dimensions. Muslim scientists from the ninth century developed new features which can be observed on this example. They include shadow squares for solving trigonometry problems, a universal plate with markings for both equatorial and ecliptic coordinate systems, and a movable straight edge, called an alidade, used to measure the altitude of celestial objects, and so on.

An inscription on the back tells us that this astrolabe was made in the workshop of 'Abd al-A'imma (Slave of the Imams) in Isfahan, Iran. Over 30 instruments and three sundials, known for their accuracy and elegance, survive from this workshop.

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De Revolutionibus Orbium Coelestium (Latin for “On the Revolutions of the Heavenly Spheres”)

Nicolaus Copernicus | 1543

First Edition

Collection of Kanazawa Institute of Technology Library Center, Japan

This is one of the most important books in scientific history. In it, Polish astronomer, Nicolaus Copernicus (1473–1543) set out an alternative model of the universe to Claudius Ptolemy’s geocentric system, which had been widely accepted since ancient times. He placed the Sun at the centre of the universe and argued that the Earth moved across the heavens as one of the planets. Copernicus anticipated his ideas would be controversial and waited more than 30 years to publish this book. His ideas were indeed revolutionary. His ‘heliocentric model’ was later developed further by the discovery of elliptical orbits by Johannes Kepler and the law of universal gravitation by Isaac Newton.

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SECTION 2: THE UNIVERSE AS SPACE-TIME

In the second part of the exhibition, new thinking about the universe is represented through the work of contemporary artists. Thanks to extraordinary advances in technology, radical new theories, and vast international science endeavours, we are now living through a golden age of discovery in astronomy. Our understanding of the universe has expanded exponentially with scientists beginning to comprehend the immense scale of our universe and its origins. Yet despite this progress in our scientific understanding, much is still unknown. Scientists now believe that 95% of the universe is comprised of mysterious substances and forces, called dark matter and dark energy, which defy current explanation.

In this section of the exhibition, enigmatic cosmological phenomena such as black holes, dark matter and the ekpyrotic universe are contemplated by Björn Dahlem, Conrad Shawcross, Mariko Mori and others. Three of the world's leading contemporary photographers, Andreas Gursky, Trevor Paglen and Wolfgang Tillmans, show stunning depictions of cutting-edge new instruments designed to observe the universe. And artists such as Yukinori Maeda and Kisho Mwakaiyama explore alternative ideas about the cosmos, including concepts rooted in Eastern philosophy.

Have A Closer Look:

Ask the students to observe the sculptures and photographs in this gallery, and reflect on how they are different from what they saw in the first gallery. Here the works take a big leap in time in regards to a historical vs modern perspective of the mysterious universe. What words can be used to describe these works in comparison? Encourage the students to choose any one artwork and examine how it explores and encapsulates the scientific theory or investigative studies that inspired the artist.

Also, start a discussion with the students on if they were to create their own artwork based on this section's theme, what would their artwork be?



Ekpyrotic String II

Mariko Mori

2014

Fiberglass, paint

Collection of the artist

Courtesy: Sean Kelly, New York and SCAI THE BATHHOUSE, Tokyo

Photo: Jason Wyche, New York

Photo courtesy: Sean Kelly, New York and SCAI THE BATHHOUSE, Tokyo

This artwork, structured as a Möbius form, references an alternative theory of cosmology, which posits that the universe did not begin from one singular Big Bang. The Ekpyrotic Universe theory suggests that the universe is actually cyclical in nature, and our own universe was born out of the death of a previous universe. This theory has poetic parallels with Buddhist idea of reincarnation, suggesting that there is no such thing as death when it comes to cosmic energy.

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They Watch the Moon

Trevor Paglen

2010

C-print

Courtesy of Metro Pictures, New York

Photo courtesy: Metro Pictures, New York

American artist, Trevor Paglen describes himself as an 'experimental geographer. He uses the technology of astronomical photography to allow us to see phenomena that are ordinarily out of view. To shoot this photograph, Paglen adapted telescopes normally used to observe distant planets, to reveal a secret government surveillance station, located deep in the forests of West Virginia, USA. The facility is hidden in the heart of the National Radio Quiet Zone, where radio transmissions are prohibited, in order for radio astronomers to carry out sensitive measurements of radio waves from space.

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SECTION 3: A NEW VIEW OF LIFE

The potential for life in other parts of the universe has been a constant source of fascination for both scientists and artists alike. This part of the exhibition explores the origin of life in the cosmos and ponders whether we are alone. It features contemporary depictions of alien worlds by internationally revered artists, including Laurent Grasso, Pierre Huyghe and Hiroshi Sugimoto. Their works are shown alongside pop culture graphic art, which stirs our imagination about mysterious extra-terrestrial encounters. Work by Patricia Piccinini, Vincent Fournier and Hajime Sorayama suggests how new technology such as robotics, nanotechnology and genetic engineering might give rise to strange new life-forms somewhere in the universe.

Have A Closer Look:

Ask students if they believe that there may be other life forms beyond the periphery of our world? Why? If evolution continues to take place, how may life forms change 50 to 100 years' time? What feature or features would have altered or developed, and why?

Also, start a discussion with the students on what their first reaction would be should they discover evidence of extraterrestrial existence.



Utsuro-bune

Hollow Ship drifted to Kashima, Hotachi Province
Facsimile, original; 1844
Woodcut print
Collection of Funabashi Nishi Library, Japan

The Legend of *Utsuro-bune* (hollow ship) refers to an unknown object which allegedly washed ashore in 1803 in Hitachi province on the eastern coast of Japan. Accounts of the tale appear in three important historical texts, published in 1825, 1835 and 1844. According to the legend, a beautiful young woman arrived on a local beach aboard a "hollow ship" - similar to what people today might imagine as a UFO. The legend states that fishermen brought her inland to investigate further, but as the woman was unable to communicate, they returned her vessel to the sea, where it drifted away. Most historians consider the Legend of *Utsuro-bune* to be part of Japanese folklore, but some people believe that the story represents evidence for a close encounter of the third kind.

The three drawings of the *Utsuro-bune* on display in this gallery come from the Essays of Hirokata by Yahiro Hirokata from 1825, Hyoryu-ki-shu (Archives of Castaways), plus a woodcut print from 1840.

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The War of the Worlds

H. G. Wells
 Illustration by Frank R. Paul
Amazing Stories, August 1927
 Magazine
 Collection and text by Hiroshi Aramata, Japan
 Image used with the acknowledgement of the Frank R. Paul Estate

Amazing Stories was the first specialized science fiction magazine in the world. It was started by Hugo Gernsback in 1926 in the USA, and became a highly influential title within popular culture. In 1927, Frank R. Paul illustrated a scene from H. G. Wells' classic, *The War of the Worlds*, for the magazine's cover. A decade later, Orson Welles created broadcasting history with his radio drama, based on the same story. Broadcast on Halloween in 1938, in the style of a news documentary, Welles's *The War of the Worlds*, caused mass panic among citizens who thought the world was genuinely under attack from Martians.

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On the Origin of Species

Charles Robert Darwin
 1859
 Book
 First Edition
 Collection of Kanazawa Institute of Technology Library Center

Charles Darwin was a British naturalist, geologist and biologist, and one of the most important scientists of the 19th century. This rare first edition manuscript of his masterwork, *On the Origin of Species*, published in 1856, is considered to be the foundation of evolutionary biology. In it he introduced the scientific theory of evolution, which states that populations evolve over the course of generations, through a process of natural selection. The theory is supported by a body of evidence gathered by Darwin on the HMS Beagle expeditions, which visited South America, Polynesia and Australia, from 1831-1836. Often described as one of the most powerful books ever published, *On the Origin of Species* caused a sensation in the 19th century, and continues to be a touchstone within science today.

| Sec History | Pri/Sec Science | Pri Sch Art | Sec Sch Art | IB Pri Yrs Prog | IB Middle Yrs Prog |
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SECTION 4: SPACE ART

The final part of the exhibition presents artworks designed specifically for the environment of space. As the first space programmes were established in the 1950s and 1960s, a new age of exploring the universe began. Since Yuri Gagarin became the first man in space in 1961, 533 people have left Earth's orbit. Artists have been active within space programmes since the very beginning. Well-known artists including Andy Warhol and Robert Rauschenberg have drawings resting on the surface of the Moon. Sculptures have been designed by artists such as Arthur Woods and Osaka Takuro for space stations. Performing artists like Kitsou Dubois and Dragan Živadinov have devised choreography and theatre for space. Working collaboratively with space agencies, artists continue to shape our understanding of space as an environment for human habitation, into the future.



The Golden Record

Launched by NASA Through Voyager 1 and 2
1977
Print
Courtesy NASA / JPL - Caltech

In 1977, NASA launched Voyager 1 and 2 to explore our solar system and the interstellar space beyond. Alongside their scientific instruments, both Voyager space probes carried a very special piece of cargo - The Golden Record. It contains sounds and images selected to represent the richness and diversity of life and culture on Earth. The records were intended for any intelligent life form who may find them, whether that be extraterrestrials, or a future civilisation of human beings.

The contents of the record were selected for NASA by a committee chaired by the astronomer, Carl Sagan. They include 116 images, plus natural sounds, musical selections from different cultures, spoken greetings in 55 languages, and printed messages from world leaders. American President Jimmy Carter wrote, "This is a present from a small, distant world, a token of our sounds, our science, our images, our music, our thoughts and our feelings. We are attempting to survive our time so we may live into yours."

Thus, The Golden Record is akin to a bottle thrown into the cosmic ocean and serves as a time capsule. In its ambitious attempt to synthesise the quintessence of human culture, The Golden Record is a remarkable ethnographic artefact in its own right.

In August 2012, Voyager 1 left our solar system, becoming the first manmade object to enter interstellar space. It carries with it the essence of life on Earth.

Have A Closer Look:

Encourage students to explore the various types of creative artistry employed for the space artefacts showcased in this section. They range from artworks currently in space to music and dramatic arts. Reflect on the ingenuity and resourcefulness of the artists. How has "Space Art" contributed to our fascination with the universe? What if they were commissioned to create an artwork for space? What would it be, and why?

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Space Investors

Jules de Balincourt
 2015
 Oil on panel
 Courtesy of Galerie Thaddaeus Ropac Paris/Salzburg
 Photo: Philippe Servent
 Photo courtesy: Galerie Thaddaeus Ropac, Paris/Salzburg

In this painting, astronauts of different countries float in space, some holding hands. The title of the artwork implies these astronauts are investors sent into space by their respective nations to find new elements and minerals to exploit. As high-profile commercial companies work on ambitious plans to explore space, the artist invites us to reflect on space as a new frontier for economic exploits.

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The Afronauts

Cristina de Middel
 2012
 Photographs / Archive Documents
 Collection of the artist

The Afronauts documents a fascinating episode in space exploration history - the birth of a space agency in the African nation of Zambia. In the 1960s, in the midst of the space race between the USA and Russia, a number of smaller nations also founded their own space agencies. In 1964, a science teacher in Zambia decided to train the first African crew to travel to space. Cristina de Middel collected documents relating to this extraordinary experiment, and combined them with her own fictionalised account of the episode, to create *The Afronauts*.

| Sec History | Pri/Sec Science | Pri Sch Art | Sec Sch Art | IB Pri Yrs Prog | IB Middle Yrs Prog |
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ACTIVITIES

Guided Tour: One Hour

Guided by our trained facilitators, students can enjoy a tour of the exhibition which, through questioning, sharing and discussion, aims to introduce our place in the universe which is an issue of interest for many. They will explore the attempt to place humanity in the universe as space-time continuum since ancient times. Students will also be engaged to focus on the views on life and ethics in the space age. With the progresses of sciences and space travel, they will be encouraged to reconsider not only the possibility of extraterrestrial life forms, but also the development of genetic engineering, artificial intelligence, etc. In conclusion, students will be invited to consider the shape and form of modern civilization, and how it provides new perspectives on the universe and humanity that can orient us towards the future.

A printed resource will be provided for all students, which include engaging activities that present the intersection of art and science in our aim to understand the universe.

Drop-in Space: Free and Easy

Groups on a self-guided visit are welcome to visit the drop-in space to explore different activities that complement the exhibition experience. Constellation coasters are available for them to create their own constellation after which they use a touch to shine on the coaster to have a projected visual of their artwork onto a chalkboard wall, representing the night sky. Students may also draw in their own mythologies around the constellations as their imagination move beyond existing imageries to invent new stories and ideas. It is worthy to note that the story of the actual constellation is reflected on the reverse of the coaster.

Workshop: Make Your Own Cyanotype Universe (1 Hr)

As part of the educational offerings, the Education team is pleased to present a workshop to complement the exhibition which allows students to learn through an interactive hands-on experience. In “You’re your Own Cyanotype Universe”, one of the oldest printing techniques is used to create beautiful photographic blueprints of space. Students will learn how people made prints in the early days using a non-digital photographic method. In the process of producing a cyanotype an appreciation for this age old technique which encourages resourcefulness and creativity of the individual.