

## NASA'S MAVEN MARS MISSION LAUNCHES

The probe will have a 10-month cruise to the Red Planet. Maven is going to study Mars' high atmosphere, to try to understand the processes that have robbed the world of most of its air.

5 Evidence suggests the planet was once wrapped in a thick blanket of gases that supported the presence of liquid water at its surface. Today, the air pressure is so low that free water would instantly boil away. The present-day atmosphere of Mars, composed mostly of carbon dioxide, is extremely thin, with atmospheric pressure at the surface just 0.6% of the Earth's surface pressure. The Martian landscape, though, retains channels that were evidently cut by abundant, flowing water - proof that the planet had a much denser atmosphere in the past.  
10 Some of the air would certainly have reacted with, and been incorporated into, minerals at the surface. But the most likely explanation for its loss is that the solar wind - the great outflow of energetic particles from the Sun - has simply eroded it through time. This has been possible because, unlike Earth, the Red Planet lacks a protective global magnetic field, which is capable of deflecting the abrasive assault from our star.

15 Maven (the Mars Atmosphere and Volatile EvolutioN spacecraft) is equipped with eight instruments - some to understand the Sun's influence at Mars; others to investigate the composition and behaviour of the atmosphere. The intention is to measure the rates at which different air molecules are being lost today, distinguishing between the various processes responsible.

Jonathan Amos, BBC News, 2013-18-11



Credit : Lockheed Martin

To make your presentation, you may use the following suggestions

- ✓ Find explanations about the low amount of gases on Mars.
- ✓ Explain why Nasa intends to keep operating Maven long into the future as a data-relay platform for surface rovers like Curiosity.

## JOHN W. CORNFORTH, 96, NOBEL-WINNING CHEMIST, DIES

Dr. Cornforth was awarded the Nobel for deciphering a class of chemical reactions that are important in living organisms. His research, centering on the behavior of hydrogen atoms and molecules, helped reveal the chemical steps necessary for the body to produce a precursor to cholesterol and the role of enzymes in shepherding such reactions.

- 5 The brilliance and complexity of his research was underscored by the Nobel committee's news release announcing the prize in 1975 when it noted, "This subject is difficult to explain to the layman<sup>1</sup>, as it is a question of geometry in three dimensions."

- 10 Because hydrogen atoms on the various organic molecules involved in the reactions are identical, it was hard to figure out which ones took part in the reactions and which did not. He solved that complication by replacing some of the hydrogen atoms with heavier versions known as deuterium and tritium so that they were no longer identical to the others. He then followed where the deuterium and tritium atoms went during the molecular dance. The result was a three-dimensional model showing how the precursor is produced.

- 15 When he last lectured in Australia, in 1992, Dr. Cornforth told students: "When I was learning our chemistry here, chemistry was not really very difficult. There was not really all that much to know. Now I am sorry for you people, because there really is a lot to know."

Kenneth Chang, New York Times, 2013-19-12



Credit : United Press International

To make your presentation, you may use the following suggestions

- ✓ Discuss how identical elements can have different properties and/or behaviors in Nature.
- ✓ About his last lecture, how is his sentence a proof of humility ?

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<sup>1</sup> layman : a person who is not expert in some field

## FAMOUS SCIENTISTS THAT STARTED THEIR WORK AS YOUNG TEENS

Not all of history's most significant scientists were college graduates when they began their works. In fact, history is full of scientists who have shaped the world due to their work as teenagers.

In the 3rd Century BCE, Aristotle had made great contributions to nearly every subject of study. At the age of 18, he attended Plato's Academy where he studied nearly every subject offered at the time. For 20 years he remained at the Academy until eventually quitting. With his vast knowledge of subject material, Aristotle had completed encyclopedias of information opening the doors for many.

While at the University of Pisa studying for a medical degree at the age of 17, Galileo Galilei became enthralled<sup>1</sup> with how movements of air currents could cause a chandelier to sway in a rhythmic pattern. Setting up a set of differentiating pendulums, Galileo discovered that regardless of the size difference the pendulums kept time with each other. The young man changed his degree from medical sciences to mathematics after attending a lecture on geometry. At the age of 22, Galileo published a book on the design of a hydrostatic balance he had invented.

It goes to show that discouraging a child from using his or her imagination and exploring other possible answers to questions could have repercussions in the future of humanity. However, the argument can be made that if one person hadn't invented a particular theory or device, someone else would have.

Ken Myers, Scientific American, 2013-17-1



Credit : Univ. of Toronto photographic services.

1 : captivé, fasciné

To make your presentation, you may use the following suggestions

- ✓ If teenagers were disregarded simply because of their age, many things we take for granted today may not exist. Discuss it.
- ✓ Find arguments in favor of or against this quotation: "Wisdom, the highest product of the human mind, comes late; the young are rarely wise and are not expected to be." (Berrill, N.J. Man's Emerging Mind, 1951).

## IS SHERLOCK HOLMES THE ARCHETYPAL SCIENTIST?

More than 75 different actors have taken him on, making him the most portrayed character on film and television ever. We can't get enough of Sherlock Holmes. But why?

On paper, Holmes is an unlikely hero. He is callous, arrogant, bad-tempered, never has love affairs and avoids society. Countless reinventions have played with every aspect of Holmes's character and world – costume, setting, time period, gender, sexuality – but one thing never changes: he is a scientist. His character is a mashup<sup>1</sup> of every stereotype we have ever had about scientists – solitary, introverted, daring, reckless, slightly inhuman, cruel, obsessive, imaginative and brilliant.

The world he was originally created for was one obsessed with science. There is no personality involved, only the application of a method. "He was," says Watson, "the most perfect reasoning and observing machine that the world has seen." Holmes is also a reclusive, eccentric bohemian, relying on intuition and mysterious flashes of insight. That, perhaps, is at the heart of our fascination with Holmes, and with science.

We are comforted by the thought that, however baffling the mystery, there is a solution to be found, and someone capable of finding it. It is reassuring that Holmes uses nothing more than logic, imagination and the occasional street urchin<sup>2</sup> to solve problems, rather than implausible gadgets and superpowers. But our love of Holmes, like science, is tinged<sup>3</sup> with apprehension.

Sarah Day, The Guardian, 2014-1-1



**Credit : Warner Bros**

<sup>1</sup>Mashup : mélange

<sup>2</sup>Urchin : gamin

<sup>3</sup>tinged : teinté

To make your presentation, you may use the following suggestions

- ✓ Imagine the reasons why Watson was necessary to Holmes. And more generally discuss the interactions of a scientist with others.
- ✓ Discuss the qualities required to be a scientist.

**BACCALAURÉAT GÉNÉRAL ET TECHNOLOGIQUE  
SESSION 2014**

**ÉPREUVE SPÉCIFIQUE MENTION « SECTION EUROPÉENNE OU DE LANGUE ORIENTALE »**  
Académies de Paris-Créteil-Versailles

**Binôme : Anglais / Physique Chimie**

Sujet n° 31

**NATURAL PRODUCTS BECOMING DRUGS**

A **natural product** is a chemical compound or substance produced by a living organism - found in nature that usually has a pharmacological or biological activity for use in pharmaceutical drug discovery and drug design.

- 5 These small molecules provide the source of inspiration for the majority of authority-approved drugs and continue to be one of the major sources of inspiration for drug discovery. In particular, these compounds are important in the treatment of life-threatening conditions.



- 10 Natural products may be extracted from tissues of terrestrial plants, marine organisms or microorganism fermentation broths. A crude (untreated) extract from any one of these sources typically contains novel, structurally diverse chemical compounds, which the natural environment is a rich source of. The extraction process is called isolation that is generally followed by a purification step. When proved efficient, chemists focus on a partial or total synthesis of the molecule to provide with greater amount of the agent in order to conduct tests and eventually design a commercial pharmacological specialty.

- 15 Researchers travel around the world obtaining samples to analyze and evaluate their efficiency in treating a disease. This effort to search for natural products is known as bioprospection. This process is widely based on traditional people's medicine and ancient civilizations that depended greatly on local flora and fauna for their very survival.

From [http://en.wikipedia.org/wiki/Natural\\_product](http://en.wikipedia.org/wiki/Natural_product)

**To make your presentation, you may use the following suggestions**

- ✓ **List and comment on the different steps to obtain a pharmaceutical product before putting it on the market.**
- ✓ **Justify the idea that nature is an excellent source for new scientific discoveries.**

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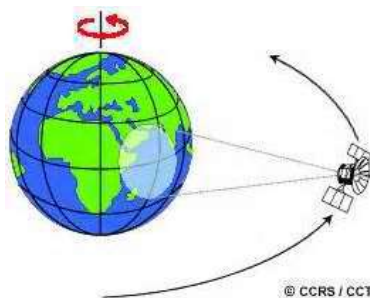
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Sujet n° 32

## SATELLITES

5 Communication satellites allow radio, television, and telephone transmissions to be sent live anywhere in the world. Before satellites, transmissions were difficult or impossible at long distances. The signals, which travel in straight lines, could not bend around the round Earth to reach a destination far away. Because satellites are in orbit, the signals can be sent instantaneously into space and then redirected to another satellite or directly to their destination.



10 The satellite can have a passive role in communications like bouncing signals from the Earth back to another location on the Earth; on the other hand, some satellites carry electronic devices called transponders for receiving, amplifying, and re-broadcasting signals to the Earth.

15 Communications satellites are often in geostationary orbit. At the high orbital altitude of 35,800 kilometers, a geostationary satellite orbits the Earth in the same amount of time it takes the Earth to revolve once. From Earth, therefore, the satellite appears to be stationary, always above the same area of the Earth. The area to which it can transmit is called a satellite's footprint. For example, many Canadian communications satellites have a footprint which covers most of Canada.

From [www.satellites.spacesim.org/english/function/communic/index.html](http://www.satellites.spacesim.org/english/function/communic/index.html)

**To make your presentation, you may use the following suggestions**

- ✓ **Give examples of the use of satellites in everyday life.**
- ✓ **Comment on the impact of new technologies on communication and their possible evolution.**

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Binôme : Anglais / Physique Chimie

Sujet n° 33

## HOW RELIABLE IS FORENSIC SCIENCE<sup>1</sup>



Exactly how reliable is forensic science? With all the television shows and movies that showcase forensic science as a foolproof method to uncover the hidden answers, it may be difficult to know the accuracy of this science. Forensic science is an area that continues to evolve and improve on its methods, and there is a lot of information that it cannot answer.  
5 Although forensic science has traveled a long way from its humble origins in 13th-century China, it is clear that human mistakes often plague this type of science.

Forensic science is when science is used to help solve a civil or criminal case. The word "forensic" means "to be used in court." Forensic science is a broad term that covers many subjects, including anthropology, toxicology and criminal investigation. A forensic scientist  
10 can study anything from a human's skeletal remains to the way that blood has spattered on a wall.

Forensic science is only as good as the scientist who is conducting the investigation. If the forensic scientist does not pay close attention to his work, it could provide inaccurate results with dire<sup>2</sup> consequences. Because forensic science relies heavily on human interpretation,  
15 the environment is contaminated by emotions, human error and unintentional bias<sup>3</sup>. Modern forensic classes educate students on being as objective as possible.

*Jacqueline Thomas, Life123, 2011*

<http://www.life123.com/career-money/careers/forensics/how-reliable-is-forensic-science.shtml>

<sup>1</sup>forensic science: *police scientifique*    <sup>2</sup>dire: *terrible*    <sup>3</sup>bias: *préjugé*

**To make your presentation, you may use the following suggestions**

- ✓ **Discuss the reliability of forensic science.**
- ✓ **Argue on the role played by forensic science in tribunals.**