**ROYAL CANADIAN AIR CADETS**

**PROFICIENCY LEVEL THREE**

**INSTRUCTIONAL GUIDE**

**SECTION 5**

**EO C340.03 – DISCUSS UNMANNED SPACE EXPLORATION**

Total Time: 60 min

## PREPARATION

### PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-803/PG-001, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Create slides of figures located at Annexes P to S.

Photocopy the handout of page 15Q-4 for each cadet.

Photocopy the *Moons* video worksheet located at page 15S-1.

Cue the video *Moons*.

### PRE-LESSON ASSIGNMENT

N/A.

### APPROACH

An interactive lecture was chosen for this lesson to orient the cadets to unmanned space exploration, generate interest, and emphasize the teaching points.

## INTRODUCTION

### REVIEW

N/A.

### OBJECTIVES

By the end of this lesson the cadet shall have discussed unmanned space exploration.

### IMPORTANCE

It is important for cadets to learn about unmanned space exploration because it will become increasingly significant as developing technologies and resource depletion move humanity's focus beyond Earth.



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

**Teaching point 1** **Describe the History of Earth Satellites**

Time: 15 min Method: Interactive Lecture

## DEVELOPMENT OF LAUNCH CAPABILITY

To achieve a low earth orbit an object must accelerate to 8 000 m/s. This was first done in 1957 by two liquid-propellant rockets: the Soviet R-7 and America's Jupiter-C.

In 1898, Konstantin Tsiolkovsky (1857–1935), proposed the idea of space exploration by rocket. In 1903, Tsiolkovsky suggested the use of liquid propellants for rockets in order to achieve greater range. For his ideas, careful research and great vision, Tsiolkovsky has been called the father of modern astronautics.

**Astronautics.** The science of space travel.

Early in the 20th century, an American, Robert Goddard (1882–1945), conducted practical experiments in rocketry with solid-propellant rockets.

In 1919, Goddard published a pamphlet, *A Method of Reaching Extreme Altitudes*. This was a mathematical analysis of what is today called the meteorological sounding rocket.

Goddard became convinced that a rocket could be better propelled by liquid fuel than by solid fuel. Fuel and oxygen tanks, turbines and combustion chambers would be needed. Goddard achieved the first successful flight with a liquid-propellant rocket on March 16, 1926. The rocket flew for only two and a half seconds, climbed 12.5 m and landed 56 m away in a cabbage patch. Goddard's gasoline rocket was the forerunner of modern rocketry.

Goddard's experiments in liquid-propellant rockets continued for many years. His rockets became bigger, flew higher and carried more cargo. For his achievements, Robert Goddard has been called the father of modern rocketry.




Show the cadets Figures 15P-1 and 15P-2. Point out the major components of the liquid-fuelled rocket in Figure 15P-1 corresponding to the parts listed in Figure 15P-2.

## SOVIET SPUTNIK MISSION

On October 4, 1957, just 12 years after Goddard's death, the world was stunned by the news of an Earth-orbiting artificial satellite launched by the Soviet Union. Sputnik-1 was the first successful entry in a race for space. Sputnik-1 was a very simple machine. Its mission was to orbit and send repetitive radio signals.




Show the cadets Figures 15P-3 and 15P-4.



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

The Soviet scientists and engineers launched Sputnik-1 into a low earth orbit by the use of a modified R-7 two-stage rocket. It was the first entirely successful R-7 flight. The R-7 was developed by the military as a means of delivering warhead payloads across vast distances. Such a vehicle was perceived to be necessary for national defence.




Show the cadets Figures 15P-5 and 15P-6.

**UNITED STATES' EXPLORER MISSION**

A few months after the launch of Sputnik-1 the United States followed with a satellite of its own, Explorer-1, designed and built by the Jet Propulsion Laboratory (JPL) of the California Institute of Technology. This satellite was launched into orbit by the US Army on January 31, 1958, using a Jupiter-C rocket, which was also developed with warheads in mind. In addition to a radio transmitter, Explorer-1 had a scientific instrumentation package designed and built by Dr. James Van Allen of the State University of Iowa. The instruments were designed to measure the intensity of cosmic radiation in space.

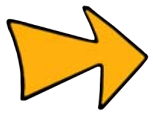


The discovery of the Van Allen Belts by the Explorer satellites was considered to be one of the outstanding discoveries of the International Geophysical Year (1958).

The Jupiter-C launcher was a three-stage rocket. Before the successful launch of Explorer-1, the Jupiter-C was used to loft payloads to various altitudes.




Show the cadets the flight history of Jupiter-C located at Annex P. Point out the work that preceded the successful launch of Explorer-1.



More Jupiter-C history can be found at website http://history.nasa.gov/sputnik/expinfo.html

The three-stage Jupiter-C, with Explorer-1 mounted on top, was over 21 m (71 feet) high.




Show the cadets Figures 15P-7 and 15P-8.



Nine months after the launch of Explorer-1, in October 1958, the United States formally organized its space program by creating the National Aeronautics and Space Administration (NASA). NASA became a civilian agency with the goal of peaceful exploration of space for the benefit of all humankind.



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

## CONFIRMATION OF TEACHING POINT 1

### QUESTIONS

Q1. Who has been called the father of modern astronautics?

Q2. Who has been called the father of modern rocketry?

Q3. When was NASA created?

### ANTICIPATED ANSWERS

A1. Konstantin Tsiolkovsky has been called the father of modern astronautics.

A2. Robert Goddard has been called the father of modern rocketry.

A3. October 1958.

**Teaching point 2** **Describe the Twin Voyager Spacecraft**

Time: 20 min Method: Interactive Lecture

### THE TWIN VOYAGER SPACECRAFT

The twin spacecraft Voyager-1 and Voyager-2 were launched by NASA in the summer of 1977 from Cape Canaveral, Florida. The Voyagers were to conduct close-up studies of Jupiter, Saturn, Saturn's rings and the larger moons of the two planets. To accomplish their two-planet mission, the spacecraft were built to last five years. As the mission went on, and with the successful achievement of all its objectives, the additional flybys of the two outermost giant planets, Uranus and Neptune, also proved possible.

#### The Planetary Voyage

As the spacecraft flew across the solar system their two-planet mission became four. Their five-year lifetimes stretched to 12 and then to 30 years.

The Voyager mission was designed to take advantage of a rare geometric arrangement of the outer planets in the late 1970s and the 1980s, which allowed for a four-planet tour with minimum propellant and time.

Eventually, Voyager-1 and Voyager-2 would explore all four outer planets of the solar system, 48 of their moons and the unique systems of rings and magnetic fields those planets possess. Had the Voyager mission ended after the Jupiter and Saturn flybys, it still would have provided the material to rewrite astronomy textbooks. Having doubled their itineraries, the Voyagers returned information over the years that has revolutionized the science of planetary astronomy, helping to resolve key questions while raising new ones about the origin and evolution of the planets in our solar system.




Show the cadets Figure 15Q-1.



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

The layout of Jupiter, Saturn, Uranus and Neptune shown in Figure 15Q-1, which occurs about every 175 years, allows a spacecraft to swing from one planet to the next without the need for large on-board propulsion systems. The flyby of each planet bends the spacecraft's flight path and increases its velocity enough to send it to the next destination. By using this "gravity assist" technique, first demonstrated with NASA's Mariner-10 Venus/Mercury mission in 1973–74, the flight time to Neptune was reduced from 30 years to 12.




Show the cadets Figure 15Q-2.

The original Voyager mission to Jupiter and Saturn sent Voyager-1 to Jupiter on March 5, 1979 and Saturn on November 12, 1980, followed by Voyager-2 to Jupiter on July 9, 1979, and Saturn on August 25, 1981. The two spacecraft's paths differed in that:

- Voyager-1's trajectory was designed to send the spacecraft close to Saturn's large moon, Titan, and behind Saturn's rings.
- Voyager-2 was aimed to fly by Saturn at a point that would automatically send the spacecraft in the direction of Uranus.

After Voyager-2's successful Saturn encounter, it was shown that the spacecraft would likely be able to fly to Uranus with all instruments operating. Subsequently, NASA also authorized the Neptune leg of the mission, which was renamed the Voyager Neptune Interstellar Mission. Voyager-2 encountered Uranus on January 24, 1986, returning detailed photos and other data about the planet, its moons, magnetic field and dark rings.

Voyager-1 continues outward, conducting studies in space beyond the outer planets. Eventually, its instruments may be the first of any spacecraft to sense the heliopause.

The heliopause is the boundary between the end of the Sun's magnetic influence and the beginning of interstellar space.

After Voyager-2's closest approach to Neptune on August 25, 1989, the spacecraft flew a course taking it into interstellar space. Reflecting the Voyagers' new destinations, the project is now known as the Voyager Interstellar Mission.

**The Voyager Interstellar Mission (VIM)**

The heliopause is the boundary between the solar and the interstellar winds. This is a definitive and unambiguous frontier that the Voyagers will approach and pass through.




Show the cadets Figure 15Q-3.

Voyager-1 crossed the solar wind termination shock in December 2004 and entered into the heliosheath, the turbulent region leading up to the heliopause. The Voyagers should cross the heliopause 10 to 20 years after



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

reaching the termination shock. In 2007, Voyager-2 was observing preshock phenomena, indicating that it was close to the termination shock.

The solar wind termination shock is where the 1 600 000 km/h solar wind slows to about 400 000 km/h on contact with the interstellar winds.

When the Voyagers cross the heliopause, hopefully while the spacecraft are still able to send science data to Earth, they will be in interstellar space. Once Voyager is in interstellar space, it will be immersed in matter that came from explosions of nearby stars.




Show the cadets Figure 15Q-4.

Both spacecraft will continue to study ultraviolet sources among the stars, and the fields and particles instruments aboard the Voyagers will continue to explore the boundary between the sun's influence and interstellar space. The Voyagers are expected to return valuable data for at least another decade. Communications will be maintained until the Voyagers' power sources can no longer supply enough electrical energy to power critical subsystems.

The Voyagers have enough electrical power and thruster fuel to operate until at least 2020. By that time, Voyager-1 will be 19.9 billion km (12.4 billion miles) from the sun and Voyager 2 will be 16.9 billion km (10.5 billion miles) away. The Voyagers are destined – perhaps eternally – to wander the Milky Way.

For current distances of the Voyagers, check mission weekly reports at NASA website http://voyager.jpl.nasa.gov/mission/weekly-reports/index.htm.

**The Golden Record**




Show the cadets Figure 15Q-5.

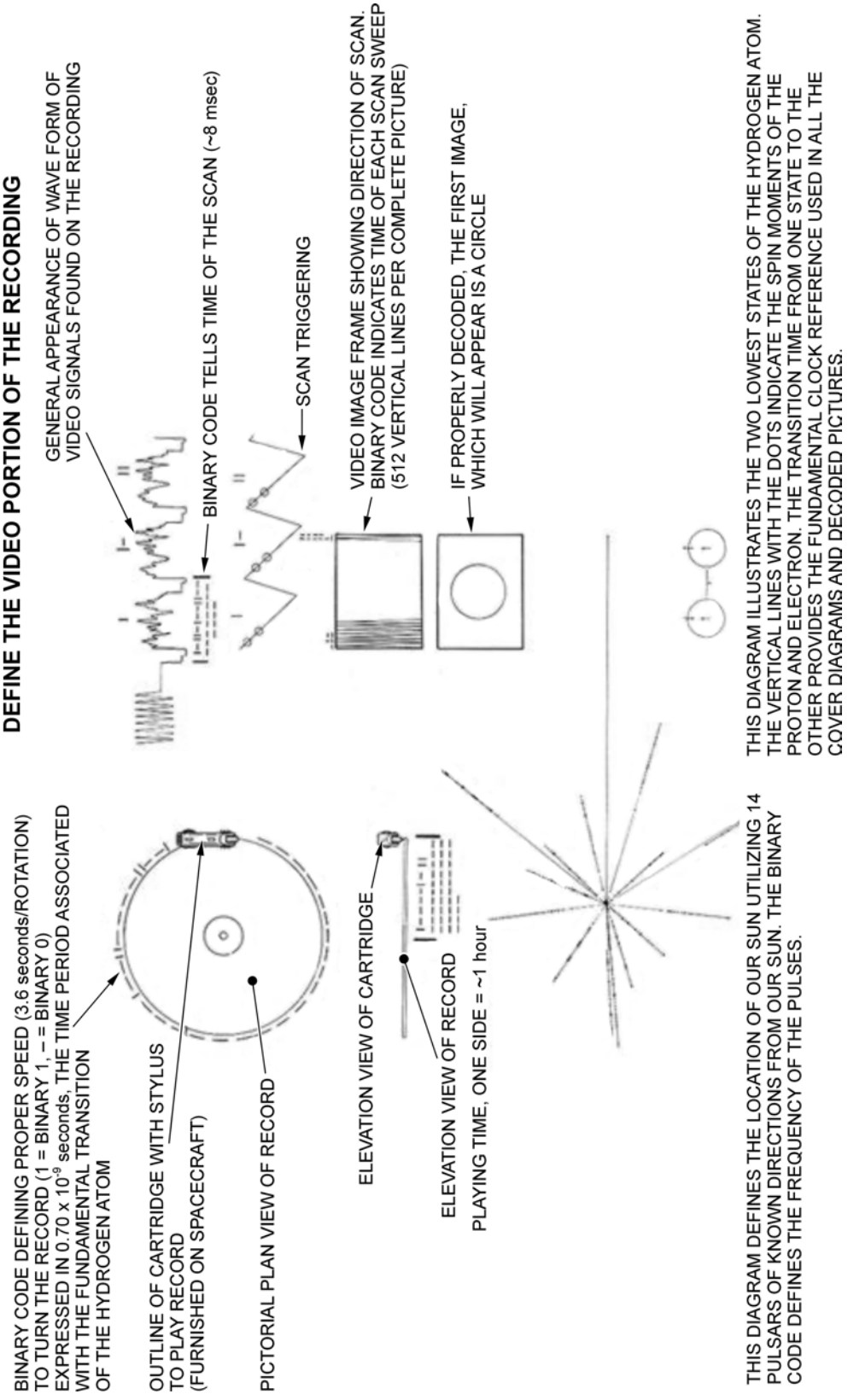
NASA placed a message on board Voyager-1 and -2 intended to communicate a story of our world to any extraterrestrials that find the spacecraft. A phonograph record – a 30 cm gold-plated copper disk containing sounds and images selected to portray the diversity of life and culture on Earth, carries the Voyager message. Instructions, in symbolic language, explain the origin of the spacecraft and indicate how the record is to be played. Once the Voyager spacecraft left the solar system (by 1990, both were already beyond the orbit of Pluto), they were in empty space with only the solar wind for company. It will be 40 000 years before they make a close approach to any other planetary system.




Explain symbols of the recording cover diagram as shown in Figure 15-5-1. This is information that extraterrestrials would need to understand the golden record.



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.




*"Voyager: The Interstellar Mission", by NASA, 2003, The Golden Record. Retrieved April 8, 2008, from http://voyager.jpl.nasa.gov/spacecraft/goldenrec1.html*

Figure 1 Key to the Golden Record



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

## CONFIRMATION OF TEACHING POINT 2

### QUESTIONS

Q1. In what year were the two Voyager spacecraft launched?

Q2. Which Voyager spacecraft visited Saturn?

Q3. For whom was the golden record prepared?

### ANTICIPATED ANSWERS

A1. 1977.

A2. Both of them: Voyager-1 in November 1980 and Voyager-2 in August 1981.

A3. Extraterrestrials.

**Teaching point 3** **Describe Unmanned Space Exploration**

Time: 20 min Method: Interactive Lecture

### MISSIONS TO PLANETS WITHIN THE SOLAR SYSTEM

Launched on March 2, 1972, Pioneer-10 was the first spacecraft to travel through the asteroid belt, make direct observations and obtain close-up images of Jupiter. During its Jupiter encounter, Pioneer-10 imaged the planet and its moons and took measurements of Jupiter's magnetic field, atmosphere and interior. These measurements of the environment near Jupiter were crucial in designing later spacecraft.

Pioneer-10 ended its successful mission on March 31,1997. Pioneer-10's weak signal continued to be tracked by the NASA's Deep Space Network as part of an advanced concept study of communication technology in support of NASA's future interstellar probe mission. The power source on Pioneer-10 finally failed in 2003. Pioneer-10 will continue into interstellar space, heading for the red star Aldebaran, which forms the eye of Taurus (The Bull). It will take Pioneer-10 over 2 million years to reach Aldebaran.

### THE PHOENIX MARS MISSION




Show the cadets Figure 15R-1.

The Phoenix Mars Lander is the first spacecraft designed to visit a polar region of Mars at ground level. Its mission is to explore the soil and atmosphere of the polar regions of Mars to determine if the environment could be hospitable to life.




Show the cadets Figures 15R-2, 15R-3 and 15R-4.

Phoenix was launched from the Kennedy Space Center on August 3, 2007, to land near the northern polar cap of Mars on May 25, 2008, in an area known as Vastitas Borealis. At 125 km (78 miles) above the surface,



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

Phoenix entered the thin Martian atmosphere. It slowed itself down by using atmospheric friction. A heat shield protected the lander from the extreme temperatures generated during entry.




Show the cadets Figures 15R-5, 15R-6 and 15R-7.

Antennas located on the back of the shell which encases the lander are used to communicate with one of three spacecraft currently orbiting Mars. These orbiters relay signals and landing info to Earth.

**Mission Characteristics**

In the continuing search for water on Mars, the polar regions are attractive because water ice has been found there. The Phoenix landing site was chosen farther north than previous missions, at a latitude equivalent to that of northern Canada, between 65 and 72 degrees north latitude.

To study Martian atmospheric processes, Phoenix was designed to scan the atmosphere up to 20 km (12.4 miles) in altitude, to obtain data about the formation, duration and movement of clouds, fog, and dust plumes. This capability includes temperature and pressure sensors.




Show the cadets Figure 15R-1. Point out the robotic arm.

Phoenix is equipped with a 2.35 m robotic arm to dig for clues about the history of water on Mars. Although the Phoenix mission will not be capable of moving about on Mars, the Phoenix Lander is designed to investigate by scooping up samples for analysis by its on-board chemistry set. This analysis includes whether the soil is salty, alkaline, and/or oxidizing, and then tests for complex organic molecules necessary for life.



Why would we search for water? Water is a key clue to the most critical scientific questions about Mars. Water is a precursor for life as we know it, a potential resource for human explorers and a major agent of climate and geology.

**Canada's Lidar Weather Station**

Canada's contribution to the Phoenix mission was a meteorological station that records the daily weather of the Martian northern plains using temperature, wind and pressure sensors, as well as a light detection and ranging (lidar) instrument. The weather station helps improve models of the Martian climate and predict future weather processes, paving the way for future exploration missions. Resembling a brilliant green laser, the lidar probes what is known as the "boundary layer" of the Martian atmosphere (the turbulent layer of the atmosphere about 7–10 km above the surface) and provides information about the structure, composition and optical properties of clouds, fog and dust in the lower atmosphere (up to 20 km above the landing site).

**THE CASSINI-HUYGENS MISSION TO SATURN**

Four NASA spacecraft have been sent to explore Saturn. Pioneer-11 was first to fly past Saturn in 1979. Voyager-1 flew past a year later, followed by its twin, Voyager-2, in 1981. The fourth spacecraft to visit Saturn was Cassini-Huygens.



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

**ACTIVITY**

Time: 10 min

**OBJECTIVE**

The objective of this activity is to have cadets learn an astrophysicist's perspective of the Cassini-Huygens mission.

**RESOURCES**

- Five-minute video *Moons* (Reference C3-251),
- Laptop computer,
- Multimedia projector, and
- Projection screen.

**ACTIVITY LAYOUT**

N/A.

**ACTIVITY INSTRUCTIONS**

1. Distribute the *Moons* video worksheet located at Annex S.
2. Have the cadets read all the questions before the video is started.
3. Have the cadets fill out the worksheet as they watch *Moons*.
4. Correct the answers on the worksheet using the answer key located at Annex T.

**SAFETY**

N/A.

**Mission Summary**

Cassini is the fourth spacecraft to explore Saturn, but the first to explore the Saturnian system of rings and moons from orbit. Cassini carried the Huygens probe to explore the atmosphere of Titan, one of Saturn's more than 60 moons.

Cassini-Huygens' journey to Saturn began on October 15, 1997. The spacecraft was sent to Venus for the first of four planetary gravity assists designed to boost Cassini-Huygens toward Saturn. The spacecraft entered orbit around Saturn on June 30, 2004 and immediately began sending back intriguing images and data.




Show the cadets Figure 15S-1. Point out the Saturnian moons in Figure 15S-1, with particular attention to Titan near the right side of the picture.

Saturn has the most extensive and complex ring system in our solar system. It is made up of billions of particles of ice and rock, ranging in size from grains of sugar to houses. The rings travel at varying speeds. There are



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

hundreds of individual rings, which are believed pieces of shattered moons, comets and asteroids. Each of the billions of ring particles orbit the planet on their own path.

**Huygens' Descent to Titan**

The Huygens probe was released from the Cassini probe and dove into the thick atmosphere of Titan in January 2005. The sophisticated instruments on both spacecraft provided scientists with data and images of this mysterious region of our solar system.




Show the cadets Figures 15S-2 and 15S-3.

It was discovered that Saturn's orange moon, Titan, has hundreds of times more liquid hydrocarbons than all the known oil and natural gas reserves on Earth. The hydrocarbons rain from the sky, collecting in vast deposits that form lakes and dunes. Individual lakes have more oil than the entire Earth.

**Cassini Orbiter Flybys**

Cassini-Huygens looped around the Sun twice. On the first orbit it flew close behind Venus in its solar orbit, where it received a gravity assist. The next orbit provided two gravity assists from a second flyby of Venus in June 1999 and of Earth in August 1999. With these three gravity assist boosts, Cassini-Huygens had enough orbital momentum to reach the outer Solar System. One last gravity assist manoeuvre from Jupiter on December 30, 2000 gave Cassini-Huygens the final thrust of energy it needed to reach Saturn. The mission arrived at Saturn in July 2004.

Cassini orbited Saturn for four years, sending back data to Earth. Cassini completed 75 orbits of the ringed planet, 44 close flybys of the mysterious moon Titan, and numerous flybys of Saturn's other icy moons. During a flyby of Saturn's moon Enceladus, it was discovered that there is so much liquid water under Enceladus' frozen surface that it erupts at 400 m per second in geysers that rise into space. Flying at 15 km per second, Cassini passed through the watery plumes at an altitude of 200 km.




Show the cadets Figures 15S-4 and 15S-5.

Whether these and other facts about the Saturnian system turn out to be useful to humans remains to be seen; the European Space Agency states that there is more work left to be done for future scientists.

**CONFIRMATION OF TEACHING POINT 3**

**QUESTIONS**

Q1. What is the mission of the Phoenix lander?

Q2. Will the Phoenix mission be capable of moving about on Mars?

Q3. Why would we search for water on Mars, Titan or Enceladus?

**ANTICIPATED ANSWERS**

A1. To explore the soil and atmosphere of the polar regions of Mars to determine if the environment could be hospitable to life.



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

A2. No.

A3. Water is a precursor for life as we know it, a potential resource for human explorers and a major agent of climate and geology.

## END OF LESSON CONFIRMATION

### QUESTIONS

Q1. What year was Sputnik-1 launched into space?

Q2. What outstanding discovery of the International Geophysical Year did Explorer provide?

Q3. What type of assist did Cassini-Huygens use four times to accelerate?

### ANTICIPATED ANSWERS

A1. 1957.

A2. The Van Allen Belts.

A3. Gravity assist.

## CONCLUSION

### HOMEWORK/READING/PRACTICE

N/A.

### METHOD OF EVALUATION

N/A.

### CLOSING STATEMENT

The half-century from the launch of Sputnik in late 1957 to Huygen's Titan descent in early 2005 saw remarkable accomplishments in space exploration. These were possible due to technological advances and a tenacious refusal to accept defeat despite setbacks.

### INSTRUCTOR NOTES/REMARKS

TP 2 must be updated each year to reflect current events.

Model kits of spacecraft may be purchased online as training aids.

## REFERENCES

C3-238 Canadian Space Agency. (2008). *Canadian Space Agency*. Retrieved February 9, 2008, from http://www.space.gc.ca/asc/eng/default.asp.

C3-239 NASA. (2008). *Voyager: The Interstellar Mission*. Retrieved February 9, 2008, from http://voyager.jpl.nasa.gov/index.html.

C3-240 NASA. (2007). *Sputnik: The Fiftieth Anniversary*. Retrieved February 9, 2008 from http://history.nasa.gov/sputnik/.



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

C3-241 European Space Agency. (2008). *Cassini-Huygens Homepage*. Retrieved February 9, 2008, from http://huygens.esa.int/science-e/www/area/index.cfm?fareaid=12.

C3-242 NASA. (2008). *NASA Cassini-Huygens Homepage*. Retrieved February 9, 2008, from http://saturn.jpl.nasa.gov/home/index.cfm.

C3-251 European Space Agency. (2008). ESA: Multimedia Gallery Videos. *Moons*. Retrieved April 5, 2008, from http://www.esa.int/esa-mmg/mmg.pl?mission=Cassini-Huygens&type=V.



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.

THIS PAGE INTENTIONALLY LEFT BLANK



Unofficial convenience copy of A-CR-CCP-803/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-803-PF-001/A-CR-CCP-803-PF-001.pdf.
Verify against the official publication.