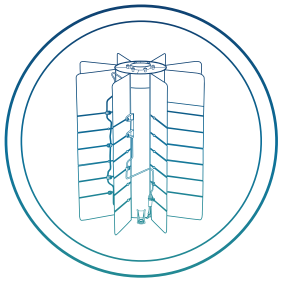


SCIENCE LESSON

LEARN ABOUT RPS SCAVENGER HUNT

It takes a special kind of power to explore the extremes of our solar system, and NASA wants to hear how it would energize your space exploration dreams! But before you plan a mission exploring the solar system – or further– you need to know exactly what RPS power can do and where it can go. Follow the trail and pick up all the know-how you need on this scavenger hunt to help you design a mission that will explore far beyond our own planet Earth. The hunt is on!

FOR THE CLASSROOM

POSSIBLE APPROACH FOR THE CLASSROOM

LESSON LENGTH
60-90 MINUTES

OBJECTIVE
LEARN ABOUT RADIOISOTOPE POWER SYSTEMS (RPS)

MATERIALS
SEE BELOW

VOCABULARY:

- Radioisotope Power Systems (RPS)
- Plutonium-238
- Nuclear Energy
- Solar Energy
- Power Systems
- Thermal Systems
- Thermocouple
- Mission
- Multi-Mission Radioisotope Thermoelectric Generator
- Flyby
- Orbit
- Land
- Rove

MATERIALS

- Power to Explore Slide Deck
- RPS Digital Scavenger Hunt Worksheet
- Device with Internet Access

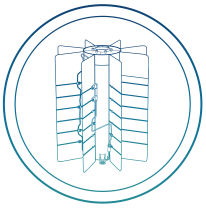
PROCEDURE

In this lesson your students will participate in a digital scavenger hunt to help them learn about NASA's Radioisotope Power Systems (RPS) and complete the Power to Explore Challenge.

Download Power to Explore Slide Deck. This slide deck is intended to give students an overview of the challenge and Radioisotope Power Systems (RPS). It will review the Power to Explore Challenge details, what RPS is, how it works, and why these systems are useful in space exploration. Feel free to customize it to suit your teaching needs.

The slide deck is divided into four sections.

1. Power to Explore Challenge
2. Radioisotope Power Systems (RPS)
3. Learn About RPS Scavenger Hunt
4. Scavenger Hunt Answers



SCIENCE LESSON

LEARN ABOUT RPS SCAVENGER HUNT

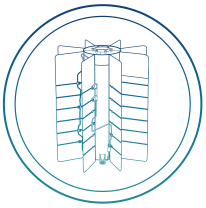
Procedure continued...

STUDENT ACTIVITY Learn About RPS Scavenger Hunt: students use their internet sleuthing skills to track down answers to various questions about RPS to give them the knowledge they need to help them design their RPS-powered mission for the Power to Explore Student Challenge.

1. Prep: Print or download the RPS Digital Scavenger Hunt Worksheet for each student. Your students will use this worksheet and clickable QR codes that link to NASA's RPS Website to complete the activity. .
2. Review sections 1-3 of the Power to Explore Slide Deck "Power to Explore Challenge," "Radioisotope Power Systems (RPS)," and "Scavenger Hunt Procedure" of the slide deck with your students.
3. Set up your student or group. Students can work alone, in pairs, or in small groups for the scavenger hunt. Each student/group will need a device with internet access.
4. Students will click or scan the QR codes provided in the worksheet to complete the scavenger hunt. The scavenger hunt questions are split into the following sections:

    - THE POWER TO EXPLORE CHALLENGE
    - RADIOISOTOPE POWER SYSTEMS (RPS)
    - PLUTONIUM-238
    - RPS MISSIONS AND MISSION GOALS
    - FUTURE EXPLORATION
    - BONUS QUESTION

    Each section (apart from the BONUS question) contains a clickable QR code following the heading. These QR codes will take the students to handy NASA website pages where they'll find the answers to the questions in that section. Keep in mind that some of the questions may have more than one possible answer. Even better, searching for the answers will supplement their knowledge about RPS missions to prepare them to come up with their challenge entry.
5. Give your students their worksheets, set a time limit, start a timer, and away they go!
6. At the end of the time limit, use section 4 of the slide deck "Scavenger Hunt Answers" to review the answers with your students.
7. Once they complete this activity, have your students check out the BRAINSTORM section of the challenge page to help your students home in on ideas for your entry.



SCIENCE LESSON

LEARN ABOUT RPS SCAVENGER HUNT

BACKGROUND INFORMATION

POWER

Power is the one thing a spacecraft cannot do without. Without the technology to reliably power space missions, our knowledge of the solar system would be only a fraction of what it is today. It might sound surprising, but there are currently only two practical options for providing a long-term source of electrical power for exploring space: the light of the sun or heat from a nuclear source such as a radioisotope.

WHAT IS RADIOISOTOPE POWER?

Radioisotope Power Systems (abbreviated RPS) – are a type of nuclear energy technology that uses heat to produce electric power for operating spacecraft systems and science instruments. That heat is produced by the natural radioactive decay of **plutonium-238**.

SOLAR ENERGY VS. NUCLEAR ENERGY

Spacecraft require power to travel, navigate, communicate and conduct the scientific work of the mission. Some spacecraft can utilize solar panels to generate energy when there is enough sunlight in their environment to power them. But what about spacecraft that encounter dusty environments that block out the sunlight? Or, what about spacecraft that travel such far distances that the sun's light is too weak to generate power for them?

When **solar energy** (energy from the sun) is not strong enough to power a spacecraft, the next option is **nuclear energy** (energy from the released nucleus of an atom).

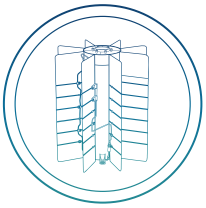
WHAT ARE THE ADVANTAGES OF USING RPS?

RPS can be used in dark environments.

No light, no problem! RPS does not need light to function. Because of this, spacecraft can go to faraway places like Saturn or Pluto. (Saturn's available sunlight is only one hundredth, or one percent, of what we receive at Earth, and Pluto's is only six-hundredths of a percent of the amount available at Earth), or in nearby deep craters on our moon with little available sunlight or that are in permanent darkness.

RPS can withstand dusty environments.

Dust storms are a regular occurrence on Mars and could cover solar panels decreasing their power generation. Fortunately, NASA's rovers PERSEVERANCE and CURIOSITY have RPS systems that can keep them going even when the environment gets dusty.



SCIENCE LESSON

LEARN ABOUT RPS SCAVENGER HUNT

Background Information continued...

RPS can be used for far-away missions.
RPS enables far away missions. Going the distance takes time. NASA's RPS-powered NASA's RPS-powered VOYAGER twin spacecraft launched over 45 years ago and are over 14.6 billion miles away, and they continue to return valuable data to scientists on Earth. Thanks to RPS the Voyager spacecraft have visited Jupiter, Saturn, Uranus, and Neptune and are currently exploring interstellar space.

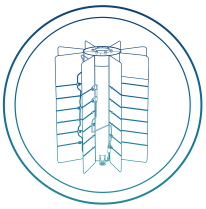
RPS offers longevity.
RPS offers the key advantage of operating continuously over long-duration space missions, largely independent of changes in sunlight, temperature, charged particle radiation, or surface conditions like thick clouds or dust. Because it uses the heat from the natural radioactive decay, it can keep producing power for decades!

RPS are rugged systems.
RPS are mighty! These systems are very rugged, which allows them to function in extreme environments. Check out the NASA missions they have helped power here. In the future, radioisotope power systems could continue to support missions to extreme environments in our solar system like Jupiter's moon Europa, the liquid lakes of Saturn's moon Titan or the rings and moons of the giant ice planet Uranus.

RPS are heat producing.
The excess heat produced by some radioisotope power systems can be used to enable spacecraft instruments and on-board systems to continue to operate effectively in extremely cold environments. In addition, small Radioisotope Heater Units (RHUs) can be used for additional thermal control, especially on solar-powered spacecraft, such as the Spirit and Opportunity rovers that explored Mars.

HOW DO RPS WORK?

Plutonium-238
The fuel in an RPS is plutonium-238 (Pu-238). It is not the type of plutonium used for nuclear weapons and would not work as fuel in a nuclear reactor. As it decays, plutonium-238 emits alpha particles which can be shielded by material as thin as a piece of paper. This decay happens because each atom of plutonium-238 has 144 neutrons but only 94 protons. Over time the atoms shed their extra neutrons to stabilize themselves, releasing heat. Delve deeper into the world of plutonium-238 by clicking NASA facts What is Plutonium-238?



SCIENCE LESSON

LEARN ABOUT RPS SCAVENGER HUNT

Background Information continued...

Radioisotope Thermoelectric Generators

An **RTG** provides electrical power for spacecraft by converting the heat generated by the decay of plutonium-238 fuel into electricity using devices called thermocouples. RTGs have no moving parts that can fail or wear out.

What is a Thermocouple?

Thermocouples are common in everyday items that must monitor or regulate their temperature, such as air conditioners, refrigerators, and medical thermometers.

The principle of a thermocouple involves two plates, each made of a different metal that conducts electricity. Joining these two plates to form a closed electrical circuit while keeping the two junctions at different temperatures produces an electric current.

In an RTG, the radioisotope fuel heats one of these junctions while the other junction remains unheated and is cooled by the space environment or a planetary atmosphere. An electrical current is produced between the hot end and the cold end of the thermocouple.

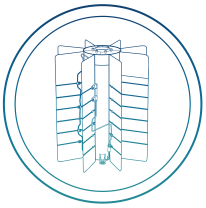
RPS MISSIONS

RPS have enabled NASA's exploration of the solar system since the Apollo-era of the late 1960s. They have been employed to power crafts that are moving through - and now beyond - our solar system, collecting data and samples, giving us valuable information that we've never been able to access before.

RPS are used in powering four different types of missions:

- Flyby – Flybys are used to get a quick glimpse of a planetary object. A flyby spacecraft will travel close to the object it is observing and collect data from it, like when VOYAGER 1 & 2 flew by Jupiter and discovered its rings and the volcano on its moon Io. Flybys can survey, take pictures, study magnetic fields, and much more!

- Orbit – Orbiters can study a planet for a long time, map it out, study its moons in detail, and detect changes over time, like weather patterns. A spacecraft that orbits will travel to a distant planet and then decelerate at the right moment to get captured in orbit and observe the planet while orbiting it. The CASSINI spacecraft that orbited Saturn for 13 years had a magnetometer, a spectrometer, a fields and particles instrument, and cameras that could see in infrared, ultraviolet, and visible light.



SCIENCE LESSON

LEARN ABOUT RPS SCAVENGER HUNT

Background Information continued...

- Land – A lander spacecraft makes physical contact with the surface of its destination, stays where it is, and does all its functions in the place where it lands. Landers can also include scientific equipment like cameras, robotic arms, sensors, and much more. Much of what we understand about the moon's interior comes from the Apollo Lunar Surface Experiments Package, a collection of scientific instruments powered by RPS that monitored the environment at each Apollo landing site.

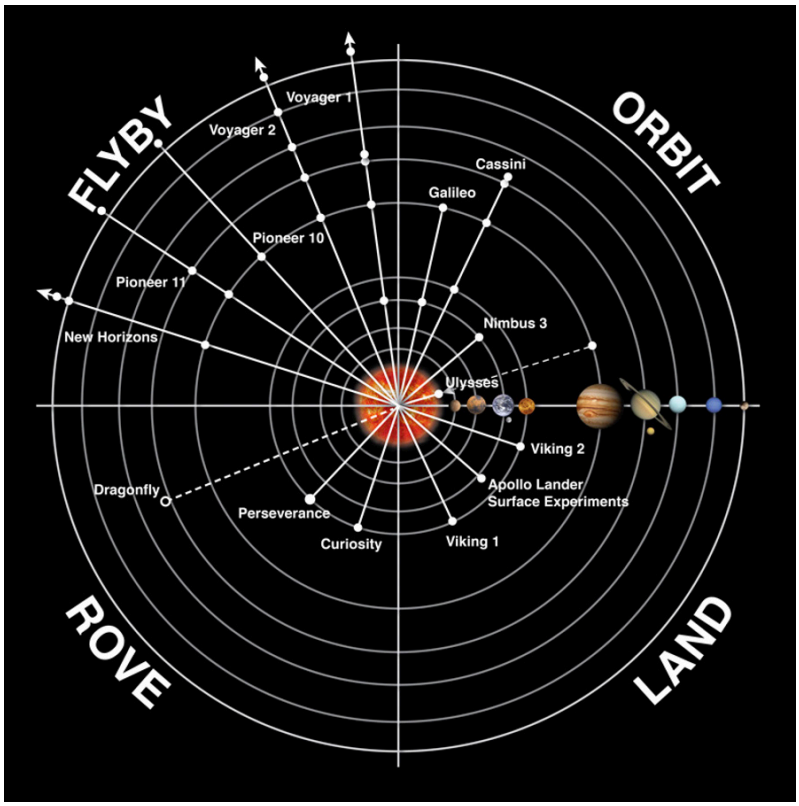
- Rove – A rover has the added value of letting you land somewhere safe and then travel somewhere more interesting! Rovers can move around, explore, collect samples, and transmit data back to Earth. PERSEVERANCE and CURIOSITY are currently exploring and collecting valuable information on Mars. NASA's Dragonfly mission will consist of a rotorcraft (multi-rotor vehicle) that will fly to dozens of locations on Saturn's moon, Titian searching for the building blocks of life.

SCIENCE LESSON

LEARN ABOUT RPS SCAVENGER HUNT

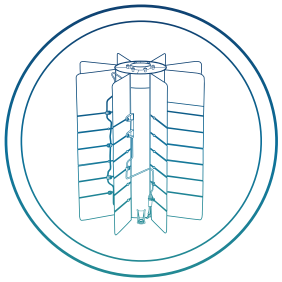
Background Information continued...

The handy infographic below shows you the names of different NASA RPS missions, the category they fall into, and their destinations.



There are currently five active missions. Perseverance, Curiosity, and the twin rovers Spirit and Opportunity are operating on Mars. The New Horizons spacecraft is exploring Pluto and the Kuiper Belt. Voyager 1 and Voyager 2, as you read this, are exploring the outer reaches of the solar system. They move through unfamiliar and unpredictable environments, not needing to refuel or turn around and come home. NASA is looking forward to launching its next exciting RPS powered mission, Dragonfly, an octocopter that would explore the surface of Saturn's moon, Titan.

Learn more about RPS-powered missions here.



SCIENCE LESSON WORKSHEET

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VOCABULARY:

- Radioisotope Power Systems (RPS)
- Plutonium-238
- Nuclear Energy
- Solar Energy
- Power Systems
- Thermal Systems
- Thermocouple
- Mission
- Multi-Mission Radioisotope Thermoelectric Generator
- Flyby
- Orbit
- Land
- Rove

SCAVENGER HUNT

You have been given this list of questions and tasks. Show the list who's boss by giving it a good long stare. You will notice that your scavenger missions are split into sections, and each section has a handy QR code after the introduction that you can use to navigate your way to the answers and see how much you can discover before time runs out!

THE POWER TO EXPLORE CHALLENGE

Knowledge is power! This scavenger hunt will lead you on a deep dive into the world of RPS and distant space exploration, which will, in turn, prepare you to submit an entry for the Power to Explore Challenge!

CLICK OR SCAN

1. Briefly explain what the Power to Explore Challenge wants you to do.

_____

_____

_____

2. What is the maximum number of words you can have in your challenge entry (not including the title)?

a. 200
b. 500
c. 750

RADIOISOTOPE POWER SYSTEMS

We've already learned that Radioisotope Power Systems (RPS) are a type of nuclear energy technology that uses heat to produce electrical power. Now let's dig a little deeper to give you a head start on planning a mission.

CLICK OR SCAN

3. Where does the heat for RPS come from?

4. Approximately how long has RPS technology been used in the U.S. space program?

a. Since 2011
b. Over 40 years
c. Since 1958
d. Over 60 years

5. How sharp are your eyes? Find these paragraphs and fill in the missing words.

RPS offer several important benefits. They are _____, rugged and provide reliable power in harsh environments where _____arrays are not practical. For example, Saturn is about ten times farther from the sun than Earth, and the available sunlight there is only one hundredth, or one percent, of what we receive at Earth. At_____, the available sunlight is only six hundredths of a percent of the amount available at Earth. The ability to utilize radioisotope power is important for missions to these and other incredibly distant destinations, as the size of solar arrays required at such distances is impractically large with current technology.

RPS offer the key advantage of operating _____over long-duration space missions, largely independent of changes in sunlight, temperature, charged particle radiation, or surface conditions like thick clouds or dust.

In addition, some of the excess _____produced by some radioisotope power systems can be used to enable spacecraft _____and on-board systems to continue to operate effectively in extremely cold environments.

In the future, radioisotope power systems could continue to support missions to some of the most extreme environments in the_____, probing the secrets of Jupiter's ocean moon Europa, floating in the _____of Saturn's moon Titan or touring the rings and moons of the ice giant planet _____. With this vital technological capability, the possibilities for exploration and discovery are limited only by our imaginations.

6. Match the acronym to the full name.

RTG	_____	Radioisotope Powered Systems
DOE	_____	Multi-Mission Radioisotope Thermoelectric Generator
MMRTG	_____	Radioisotope Heating Unit
RHU	_____	Radioisotope Thermoelectric Generator
RPS	_____	Department of Energy

PLUTONIUM-238

Plutonium-238 is the radioisotope of choice for RPS! It has proven to be a very dependable and safe heat source on more than two dozen U.S. space missions. Let's find out more about how it can help you in designing your mission.

CLICK OR SCAN

7. Take a screenshot or draw a picture of a pellet of plutonium-238.

8. To be suitable for space missions, a radioisotope must meet a list of specific criteria. Plutonium-238 meets all of them! Name two of these criteria.

Watch this video and see what sticks in your brain. (*Hint: For the answers to the questions below, start at minute 4:43.*

CLICK OR SCAN

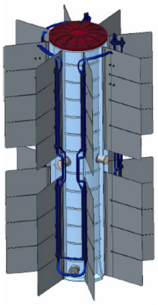
9. Radioisotopes are measured by the rate at which they decay. This is known as the half-life.

a. What is the half-life of plutonium-238? _____

b. Why is plutonium-238 ideal for long-lived space missions? _____

_____

10. Look at the pictures below and answers the questions that follow.



a. What are these devices called, and what is their abbreviation? *(Hint: One is a Next gen-* _____ *and the other is an Multi-Mission*_____*)*

_____

b. What do these devices do?

_____

_____

c. Unscramble this anagram of an unlikely superhero to reveal the device's name that converts heat into electricity. *(Hint: The name of the device is one word)*

HERO CLUMP TOE

_____

MISSIONS & MISSION GOALS

CLICK OR SCAN

One of the most important things we do is learn from the past, building on the expertise of scientists, engineers, and people at NASA that have powered previous missions. If we stand on the shoulders of the knowledge that already exists, we can see further into the future. Let's take a journey through past and current NASA missions to see what RPS are truly capable of.

11. RPS use spacecraft that are designed for flyby, orbit, land, or rove missions. You will need to decide what your mission will be and what your spacecraft will do. Use the RPS missions page and NASA image "Flyby, Orbit, Rove, and Land" to answer the multiple-choice questions below.

What kind of missions were Voyager 1 and Voyager 2?

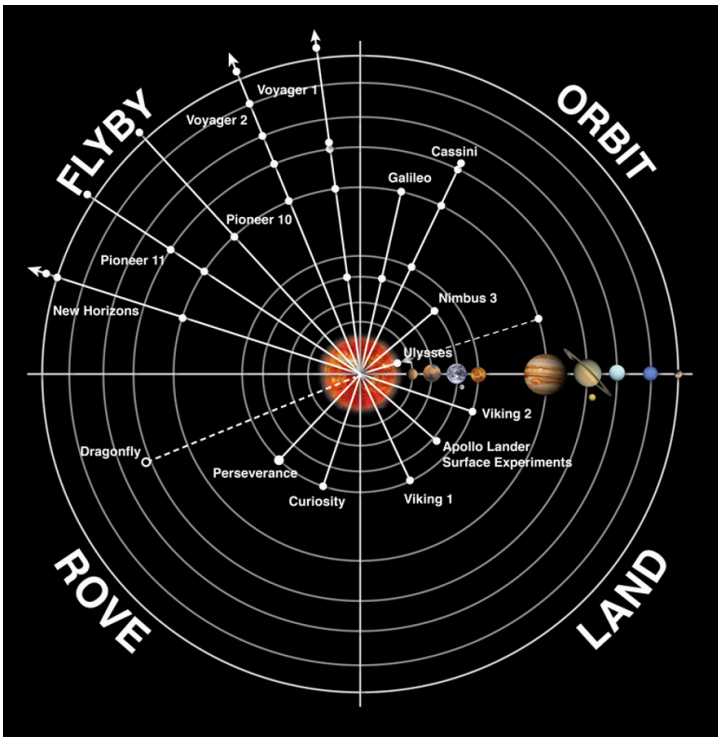
a. Flyby
b. Orbit
c. Land
d. Rove

Galileo was the first spacecraft to orbit and study what planet?

a. Mars
b. Jupiter
c. Neptune
d. The Moon

NASA's Viking mission to mars was composed of two pairs of spacecraft - Viking 1 and Viking 2 - each consisting of an orbiter and lander. This was the first mission to land on what planet?

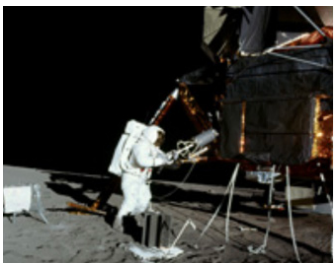
a. Mars
b. Jupiter
c. Neptune
d. The Moon



12. Use the picture below and the RPS Missions link to answer the following questions.
(Hint: On the mission page, click on "Past Missions.")

CLICK OR SCAN

a. Name this crewed mission (one with astronauts) that used RPS.



b. What did RPS power on this crewed mission?

13. RPS sounds like new technology, but we've been using it for over 60 years. Screenshot or quickly sketch the first space object to use an RPS. No points for artistic skills, but you do get unlimited glory if you can also name it and provide the date it launched.

Name of the first space object to use RPS: _____

Date Launched: _____

14. Which is the most recent piece of NASA technology to use an MMRTG?
(Hint, it launched in 2020. Click this link to find out where the MMRTG is located.)

CLICK OR SCAN

15. Ulysses is the spacecraft named after an intrepid adventurer from ancient times. Ulysses was launched in 1990 with very specific mission goals and ten instruments; what did those instruments measure?

16. Name the twin rovers that use both solar power and RPS.

17. Name the two longest-running active missions using RTGs and the dates they were launched.

18. This piece of text is located somewhere in the Missions pages. Use your hawk-sharp eyes to find it and fill in the blanks!

> The **Mars 2020** "Perseverance" rover is conducting geological assessments of its landing site on Mars; Perseverance is determining the _____ of the environment, searching for signs of_____, and assessing natural resources and _____for future_____.

19. Sometimes spacecraft carry a friendly hitchhiker. Can you name the orbiter that dropped off the European Huygens probe on one of Saturn's moons? And which moon was it?

FUTURE EXPLORATION

NASA is always looking to the future! Find out what's in store next for RPS.

CLICK OR SCAN

20. Dragonfly, which is set to launch in 2027, is the next mission with plans to use an MMRTG. Part of NASA's New Frontiers program, Dragonfly is an octocopter designed to do what?

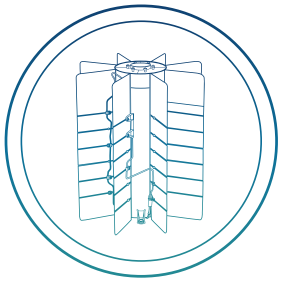
CLICK OR SCAN

Check out this video to find out how Dragonfly's pioneering mission is pushing the boundaries of human exploration.

BONUS QUESTION

Every NASA mission is a massive achievement, a unique testament to what humankind can accomplish with collaboration and an unquenchable thirst to discover what lies beyond our planet. NASA's groundbreaking work ignites a global passion for space exploration, generation after generation. We want to know what has inspired you.

21. What is your favorite NASA RPS-powered mission, and why?



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CLICK OR SCAN

1. Briefly explain what the Power to Explore Challenge wants you to do.

- Research radioisotope power systems, which is a type of nuclear "battery," and then dream up a new RPS-powered space mission. Please write about:
- Where you would go on your mission and describe your mission goal(s).
- Also, describe a special human power you have that will contribute to the success of your mission goal(s).

2. What is the maximum number of words you can have in your challenge entry (not including the title)?

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c. Since 1958
d. Over 60 years

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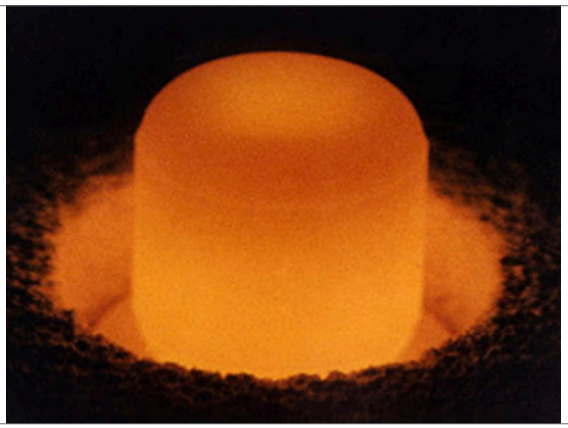


8. To be suitable for space missions, a radioisotope must meet a list of specific criteria. Plutonium-238 meets all of them! Name two of these criteria.

- Exist in an insoluble form and/or otherwise not be readily absorbed into the body in the unlikely event of a launch accident
- Exist in a form such that it presents no or minimal chemical toxicity when taken into the body
- Have relatively low neutron, beta, and gamma radiation emissions, so as to not adversely affect spacecraft instruments or require excessively massive shielding
- Be stable at high temperatures, so its characteristics remain essentially unchanged over many years
- Have a long enough half-life (at least 15 to 100 years), so that it can generate for many years sufficient heat for transformation into electricity
- Have a high-power density, so a small amount of it can generate a substantial amount of heat

Watch this video and see what sticks in your brain. (*Hint: For the answers to the questions below, start at minute 4:43.*

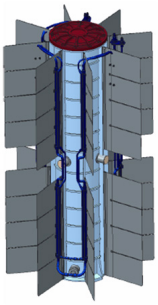
Click or Scan

9. Radioisotopes are measured by the rate at which they decay. This is known as the half-life.

a. What is the half-life of plutonium-238? 87-88 years

b. Why is plutonium-238 ideal for long-lived space missions? Because it is a long-lived source of heat that can be converted to power or electricity that can be used for the mission

10. Look at the pictures below and answers the questions that follow.



a. What are these devices called, and what is their abbreviation? *(Hint: One is a Next gen-_____ and the other is an Multi-Mission_____)*

Next Gen-RTG and Multi-Mission Radioisotope Thermoelectric Generator (MMRTG)
RTGs or RPS

b. What do these devices do?

They convert the natural decay heat of plutonium-238 into electricity.

c. Unscramble this anagram of an unlikely superhero to reveal the device's name that converts heat into electricity. *(Hint: The name of the device is one word)*

HERO CLUMP TOE

THERMOCOUPLE

MISSIONS & MISSION GOALS

CLICK OR SCAN

One of the most important things we do is learn from the past, building on the expertise of scientists, engineers, and people at NASA that have powered previous missions. If we stand on the shoulders of the knowledge that already exists, we can see further into the future. Let's take a journey through past and current NASA missions to see what RPS are truly capable of.

11. RPS use spacecraft that are designed for flyby, orbit, land, or rove missions. You will need to decide what your mission will be and what your spacecraft will do. Use the RPS missions page and NASA image "Flyby, Orbit, Rove, and Land" to answer the multiple-choice questions below.

What kind of missions were Voyager 1 and Voyager 2?

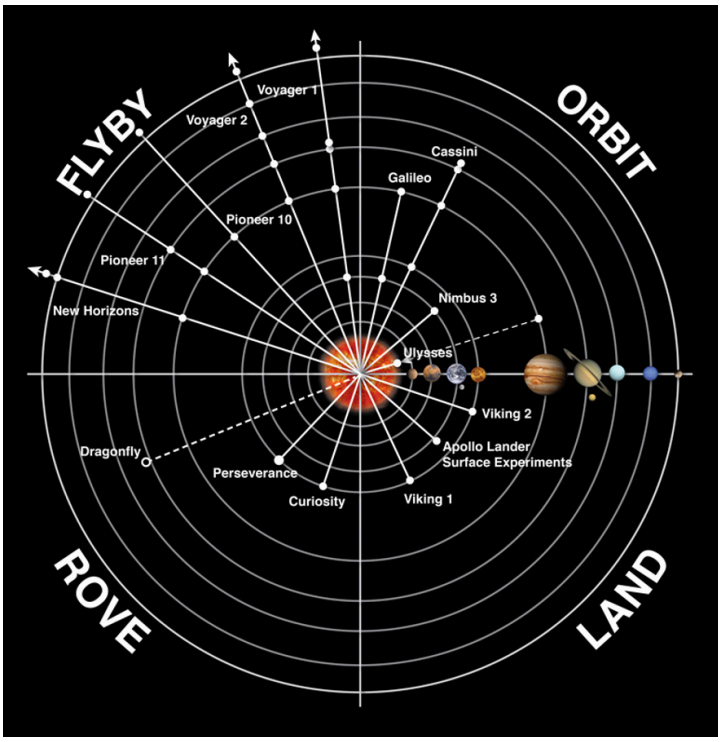
a. Flyby
b. Orbit
c. Land
d. Rove

Galileo was the first spacecraft to orbit and study what planet?

a. Mars
b. Jupiter
c. Neptune
d. The Moon

NASA's Viking mission to mars was composed of two pairs of spacecraft - Viking 1 and Viking 2 - each consisting of an orbiter and lander. This was the first mission to land on what planet?

a. Mars
b. Jupiter
c. Neptune
d. The Moon



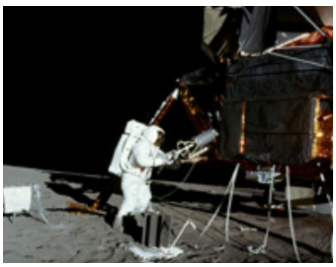
12. Use the picture below and the RPS Missions link to answer the following questions.

(Hint: On the mission page, click on "Past Missions.")

CLICK OR SCAN

a. Name this crewed mission (one with astronauts) that used RPS.

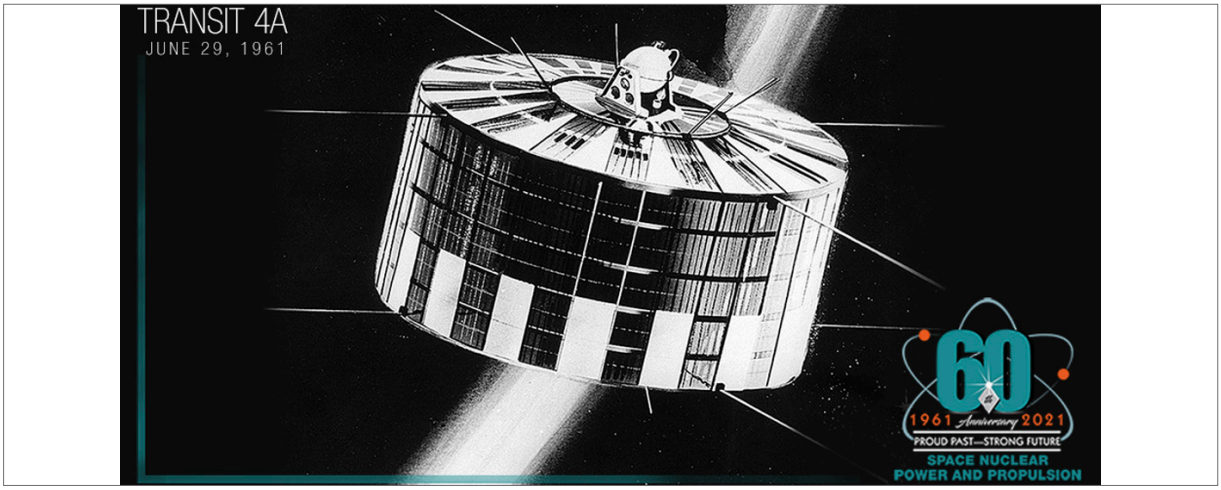
Apollo 12



b. What did RPS power on this crewed mission?

ALSEP (Apollo Lunar Surface Experiment Package), a collection of geophysical instruments designed to continue to monitor the environment of each Apollo landing site for a period of at least a year after the astronauts had departed. ASLEP ended up working for up to 8 years!

13. RPS sounds like new technology, but we've been using it for over 60 years. Screenshot or quickly sketch the first space object to use an RPS. No points for artistic skills, but you do get unlimited glory if you can also name it and provide the date it launched.



Name of the first space object to use RPS: TRANSIT IV-A

Date Launched: June 29, 1961

14. Which is the most recent piece of NASA technology to use an MMRTG?

(Hint, it launched in 2020. Click this link to find out where the MMRTG is located.)

CLICK OR SCAN

PERSEVERANCE

15. Ulysses is the spacecraft named after an intrepid adventurer from ancient times. Ulysses was launched in 1990 with very specific mission goals and ten instruments; what did those instruments measure?

The sun's fields and particles, and its ultraviolet, X-ray, and gamma radiation.

16. Name the twin rovers that use both solar power and RPS.

Spirit and Opportunity

17. Name the two longest-running active missions using RTGs and the dates they were launched.

Voyager 1 September 5, 1977
Voyager 2 August 20, 1977

18. This piece of text is located somewhere in the Missions pages. Use your hawk-sharp eyes to find it and fill in the blanks!

> The **Mars 2020** "Perseverance" rover is conducting geological assessments of its landing site on Mars; Perseverance is determining the habitability of the environment, searching for signs of ancient Martian life, and assessing natural resources and hazards for future human explorers.

19. Sometimes spacecraft carry a friendly hitchhiker. Can you name the orbiter that dropped off the European Huygens probe on one of Saturn's moons? And which moon was it?

Cassini. Titan.

FUTURE EXPLORATION

NASA is always looking to the future! Find out what's in store next for RPS.

CLICK OR SCAN

20. Dragonfly, which is set to launch in 2027, is the next mission with plans to use an MMRTG. Part of NASA's New Frontiers program, Dragonfly is an octocopter designed to do what?

Dragonfly is an octocopter designed to explore and collect samples on Saturn's largest moon, Titan, an ocean world with a dense, hazy atmosphere.

CLICK OR SCAN

Check out this video to find out how Dragonfly's pioneering mission is pushing the boundaries of human exploration.

BONUS QUESTION

Every NASA mission is a massive achievement, a unique testament to what humankind can accomplish with collaboration and an unquenchable thirst to discover what lies beyond our planet. NASA's groundbreaking work ignites a global passion for space exploration, generation after generation. We want to know what has inspired you.

21. What is your favorite NASA RPS-powered mission, and why?

Any answer referencing an RPS mission is correct.