Teacher Resource

Asteroid Mining

Focus Questions

Discuss the BTN story as a class and record the main points of the discussion. Students will then respond to the following:

1. What is an asteroid and where in the solar system are they usually found?
2. What type of asteroid is Psyche?
3. The asteroid has been estimated to be worth more than all the money on Earth. True or false?
4. Explain NASA's mission to explore the asteroid.
5. Create a T-chart showing the pros and cons of mining asteroids.

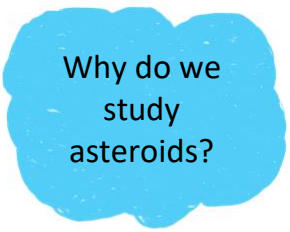
Activity: See, Think and Wonder?

After watching the BTN Asteroid Mining story, students will respond to the following questions:

- What did you SEE in this video?
- What did you LEARN from this story?
- What do you WONDER about this story?
- What QUESTIONS do you have about this story?

Activity: Q&A

Are you curious about asteroids? Students will make a list of questions they have about the BTN story and space exploration. Students will use the internet to find answers to their questions and share their findings with the class.



EPISODE 28
17th October 2023

KEY LEARNING
Students will learn more about asteroids and NASA's Psyche mission.

CURRICULUM
Science – Year 5
Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives.

The Earth is part of a system of planets orbiting around a star (the sun).

Science – Years 5 & 6
Scientific knowledge is used to solve problems and inform personal and community decisions.

Science – Year 6
The growth and survival of living things are affected by the physical conditions of their environment.

Science – Year 7
Predictable phenomena on Earth, including seasons and eclipses, are caused by the relative positions of the sun, Earth and the moon.

Scientific knowledge has changed peoples' understanding of the world and is refined as new evidence becomes available.

Activity: Glossary

Students will brainstorm a list of key words that relate to the BTN Asteroid Mining story. Here are some words to get them started.

ASTEROID	ORBIT	ASTEROID MINING
SOLAR SYSTEM	ASTEROID BELT	NASA

Ask students to write what they think is the meaning of each word (including unfamiliar words). They will swap definitions with a partner and ask them to add to or change the definition. Check these against the dictionary definition.

Further activities for students:

- What is the difference between an asteroid, meteoroid, and a comet? Include an illustration with your explanation.
- Use the following words to write a summary about the NASA Psyche Mission: Psyche, metal-rich asteroid, orbit, space exploration, Solar System, astronomer, and mission.
- Draw a diagram which illustrates the scale of the Psyche asteroid. Compare the size of the Psyche asteroid to other objects, for example Ceres the largest asteroid and Earth.
- Who explores asteroids? Learn more about the jobs involved with space exploration. Choose one job and investigate what the job involves and what you need to study to become one.

Activity: Research project

After watching and discussing the BTN Asteroid Mining story, what questions do students have and what are the gaps in their knowledge? The following KWLH organiser provides students with a framework to explore their knowledge on this topic and consider what they would like to know and learn.

What do I **know**?	What do I **want** to know?	What have I **learnt**?	**How** will I find out?

Students will start to think like scientists and develop their own question/s for inquiry, collecting and recording information from a wide variety of sources. Students may develop their own question for inquiry or select one or more of the questions below.

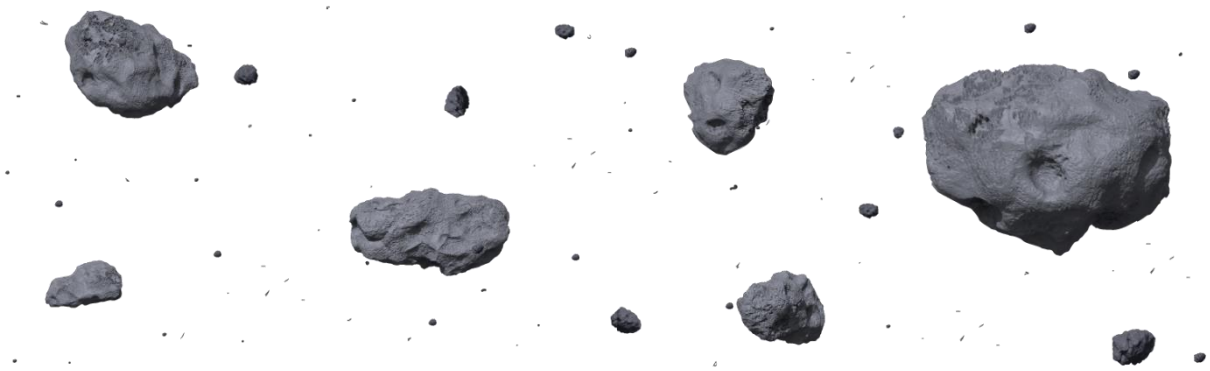
- What is an asteroid? Describe the characteristics of asteroids.
- When and how did asteroids form?
- Why do scientists study asteroids? What can we learn from asteroids?

- Why are scientists interested in mining asteroids? What are some scientific elements that can be found in asteroids?
- Will an asteroid ever hit Earth? Watch this NASA YouTube Video to learn more.
- What is the largest asteroid? Create a profile on the asteroid. Alternatively, create a profile about another famous asteroid. Visit NASA's Eyes on Asteroids to explore the 3D world of asteroids.
- What is the difference between asteroids, comets, meteoroids, meteors, and meteorites? Visit the NASA Science website to learn more.

Activity: Modelling Asteroids

Class discussion

Begin the lesson by asking the students what they know about asteroids and write their responses on the class whiteboard. The objective of this activity is to learn about the formation of asteroids, their composition, the location of asteroids and to create asteroid models. As a class look at images of asteroids. Ask students what they notice about their shape and their surface. Students will brainstorm in small groups and then share with the class.



Hands-on Activity

Use the following to help guide students' in creating their own asteroid. Encourage students to be creative but emphasise that their models should reflect their understanding of asteroids.

Step-by-step activity for students:

- Collect a range of materials that you can use to create your own asteroid model. For example, plasticine or clay, small rocks or pebbles, sand, beads, and aluminium foil.
- Make your asteroid using the materials you have collected. Add details like craters or other surface features.
- Give your asteroid a name! Write a report about your asteroid and include an explanation about why you chose the materials and design for your asteroid. Include the following in your report: origin of name, dimensions, mass, shape, composition, classification, distance from the Sun. Describe any interesting features about your asteroid.
- Present your asteroid model to the class. Present using Prezi or Canva.
- Hang your asteroid models in the classroom and create your own classroom asteroid belt. Consider adding the planets in the solar system to show where the asteroid belt is positioned in the Solar System.

Refer to this NASA Classroom Activity on Modelling an Asteroid.

Activity: Asteroid Quiz

1. What is an asteroid?

A. A small, rocky object

B. A type of comet

C. A type of star

2. When did asteroids form?

A. During the Ice Age

B. When the Solar System formed

C. When dinosaurs became extinct

3. Asteroids are mostly...

A. Gaseous

B. Rocky

4. What is the largest asteroid in our Solar System?

A. Ceres

B. Psyche

C. Vesta

5. Most asteroids can be found between Mars and Jupiter in the…

A. Asteroid Zone

B. Asteroid Band

C. Asteroid Belt

6. Asteroids orbit the sun.

A. True

B. False

7. How fast do asteroids travel?

A. 25 km/second

B. 25 km/minute

C. 25 km/hour

8. What is the name of the crater left behind by the asteroid that wiped out dinosaurs?

A. Vredefort crater, South Africa

B. Wolfe Creek crater, Australia

C. Chicxulub crater, Mexico

9. Asteroid comes from a Greek word meaning….

A. Rockstar

B. Destructor

C. Starlike

10. Asteroids can have moons.

A. True

B. False

Quiz Answers: 1A, 2B, 3B, 4A, 5C, 6A, 7A, 8C, 9C, 10A

Useful Websites

- Why NASA's Psyche probe is embarking on humanity's first journey to a metal asteroid – ABC News
- ABC News: Dr Karl discusses mining asteroids – ABC Education
- Psyche: Everything we know about Nasa's mission to the 'golden asteroid' – BBC Newsround
- NASA Dart Mission – BTN
- Asteroids – NASA
- Asteroid Psyche – NASA
- Eyes on Asteroids – NASA