



Overview

This article recounts how Pluto was discovered and named as a planet in 1930 but in 2006 had its status as a planet removed. It conveys information in a conversational tone to engage its readers. They will learn about the planets, asteroids, and stars as well as about the people involved in discovering Pluto and those who downgraded its status.

The text is supported with photographs, illustrations, and diagrams, which give students opportunities to deepen their understanding by using these visual language features.

Texts related by theme

“Speed Freaks” Connected 3 2009 | “Mission to Jupiter” Connected 3 2009 |

“First Light: The History of Telescopes” Connected 3 2003

Text characteristics from the year 5 reading standard

sentences that vary in length and in structure (for example, sentences that begin in different ways and different kinds of complex sentences with a number of subordinate clauses)

figurative and/or ambiguous language that the context helps students to understand

illustrations, photographs, text boxes, diagrams, maps, charts, and graphs that clarify or extend the text and may require some interpretation

Astronomers had always known that Pluto was different from the other eight planets. It's so far away from the Sun that it takes 248 Earth years to make one orbit. It circles the Sun in a strange path that takes it far above and then far below the other planets.

In size, Pluto is totally different from the other outer planets. Jupiter, Saturn, Uranus, and Neptune are huge. Jupiter is a thousand times bigger than Earth. Each of these four planets has a solid core with an enormous atmosphere of hydrogen or methane gas around it.

The relative sizes of the planets and Pluto

Pluto's size relative to the Moon and Earth

Pluto, however, is tiny - smaller than Earth's moon. It has hardly any atmosphere. Because it's mainly ice, it's very light - much lighter than our solar system's next-smallest planet, Mercury. But Pluto orbits the Sun. It has three moons. It's round. So it must be a planet... surely? As new telescopes began to see further into space, the problems with Pluto started. Astronomers found more objects like the ninth planet. Some were almost as big as Pluto. One, called Eris, was bigger. Some had moons. These objects are remnants of the huge dust and gas cloud from which our Sun and planets formed about 4.5 billion years ago. There are probably thousands of them slowly orbiting the Sun. Like Pluto, they share their orbit with many tiny asteroids* and other objects.

* objects that are made of rock and orbit the Sun

a significant amount of vocabulary that is unfamiliar to the students (including academic and content-specific words and phrases), which is generally explained in the text by words or illustrations

Possible curriculum contexts

SCIENCE (Planet Earth and Beyond)

LEVEL 3 – Astronomical systems: Investigate the components of the solar system, developing an appreciation of the distances between them.

ENGLISH (Reading)

LEVEL 3 – Structure: Show a developing understanding of text structures.

ENGLISH (Writing)

LEVEL 3 – Structure: Organise texts, using a range of appropriate structures.

Possible reading purposes

- To learn about the discovery of Pluto
- To explore why Pluto had its status as a planet revoked
- To identify the differences between planets, asteroids, and stars.

See [Instructional focus – Reading](#) for illustrations of some of these reading purposes.

Possible writing purposes

- To compare planets, asteroids, and stars
- To research and explain another astronomical discovery
- To explain why Pluto is no longer considered a planet.

See [Instructional focus – Writing](#) for illustrations of some of these writing purposes.

Text and language challenges

VOCABULARY:

- Possible unfamiliar or subject-specific words and phrases, including “astronomer”, “speck”, “position”, “planet”, “Roman myths”, “Roman god”, “underworld”, “blackness”, “Royal Astronomical Society in London”, “accepted”, “ninth”, “orbit”, “outer”, “compared”, “thousand”, “solid core”, “enormous”, “atmosphere”, “hydrogen”, “methane”, “a quarter”, “5 percent”, “weight”, “solar system’s”, “next-smallest”, “telescopes”, “objects”, “remnants”, “dust and gas cloud”, “formed”, “billion”, “asteroids”, “special”, “treatment”, “International Astronomical Union”, “qualities”, “gravity”, “dwarf planets”, “protested”, “funerals”, “observatories”, “models”, “coffins”, “discovery”, “officially”
- Names of planets and moons, including “Pluto”, “Jupiter”, “Saturn”, “Uranus”, “Neptune”, “Mercury”, “Venus”, “Mars”, “Eris”, “Dysnomia”.

Possible supporting strategies

Identify new vocabulary that the students should prioritise for learning. *The English Language Learning Progressions: Introduction*, pages 39–46, has useful information about learning vocabulary.

Give the students multiple opportunities to encounter the specialist words that are relevant to this topic before, during, and after reading and also with other topics and texts.

Introduce the text by linking to students’ prior knowledge of the solar system. Develop word webs of subject-specific vocabulary and add definitions as students find them in the text.

Use posters of the solar system to identify the planets and their orbits.

As the students read, have them fill in a graphic organiser with words describing what planets have (their characteristics) and what planets do.

Support students to recognise the root words and different endings to identified words – for example, astronomer, astronomical, and astronomy.

SPECIFIC KNOWLEDGE REQUIRED:

- Knowledge of the solar system and the planets
- Knowledge of astronomical terms
- Knowledge of reading factual texts.

Possible supporting strategies

Provide opportunities for students to explore the necessary background knowledge, facts, and information for this article. For example, they could read or reread related *School Journal* articles or posters, and/or they could watch DVDs or video clips about the solar system and the planets.

Provide opportunities for students who have a first language other than English to explore the topic in this language before reading.

Support the students to identify the respective characteristics of stars, planets, and asteroids as they read, and add this information to a graphic organiser.

TEXT FEATURES AND STRUCTURE:

- Factual report containing elements of a recount
- Photographs, illustrations, captions, labels, footnote
- Punctuation, including ellipses, brackets, quotation marks, dashes, italics, question marks, an exclamation mark
- Multiple time frames and an associated wide range of verb forms, for example, “was looking”, “had moved”, “meant”, “had been reading”, “knew”, “was”, “had happened”, “had known”, “takes”.

Possible supporting strategies

Preview the title and first page. Ask the students what kind of text they think this is and what features they expect to find. Encourage them to make links to other texts they know that have similar features or content. Tell them to compare the text with their predictions as they read.

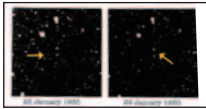
If necessary, help the students understand long, complex sentences by breaking them into separate clauses and identifying the main idea of each clause and how they are connected. Using who, what, where, when, how, and why as prompts, and breaking down the information together, can help students to identify the main ideas. Provide explicit instruction on punctuation features as required. Ask the students to consider how these features have helped them to read and understand the text.

Instructional focus – Reading

Science (Planet Earth and Beyond, level 3 – Astronomical systems: Investigate the components of the solar system, developing an appreciation of the distances between them.)

Text excerpts from “The Problem with Pluto”

On some of the photographs, a tiny speck of light had moved to a different position. This meant it wasn't a star.



She knew that the Roman god of the cold, dark underworld was Pluto. When she read in the newspaper about the new planet, far off in the icy blackness of space, she suggested that Pluto might be a good name for it.

Like Pluto, they share their orbit with many tiny asteroids and other objects.

3. *It must be big enough to clear most other objects (such as asteroids) out of the path of its orbit.*

Number three meant the end of Pluto the planet.

Pluto, however, is tiny – smaller than the Earth's moon.

The IAU decided that Pluto, Eris, and others like them would be called dwarf planets.

Students (what they might do)

*Students read the introductory text and look closely at the photos and captions on page 31. They **locate** the arrows and **infer** that these indicate the placement of the speck. They compare the two photos and identify the speck's different positions. They **integrate** these images with “This meant it wasn't a star” to **infer** that stars do not move in relation to other objects around them.*

*Students **integrate** information to **infer** that the reason Venetia Burney suggested Pluto as a name was because she was associating “the icy blackness of space” with the “cold, dark underworld” of Pluto, the Roman god.*

*Students **locate** and **integrate** information about Pluto's loss of planetary status. They **make connections** between “Number three” and the italicised text above it. They reread the third point and **make connections** to the prior information in the text about Pluto sharing its orbit with many tiny asteroids. They **integrate** this information to understand why Pluto could not be a planet.*

*Students **ask and answer questions** about why Pluto would be called a “dwarf planet”. They **make connections** to their prior knowledge of the word “dwarf” and its meaning, and to prior information in the text, to **infer** that Pluto is called a dwarf planet because it is very small.*

Teacher (possible deliberate acts of teaching)

ASK QUESTIONS to support the students to make inferences.

- Let's look closely at the photographs. Why do you think the arrows are there?
- Can you see the speck of light in different positions? What does that mean?
- When we think about the next sentence, what does “This” refer back to? What does “This meant” signal to us? (that what follows is the explanation).
- Why can't the speck be a star?
- So what have we just learnt about stars?

PROMPT the students to make connections close by in the text.

- Look for connections between those two sentences to figure out why Venetia Burney suggested Pluto as a name for the new planet.
- Talk to a partner. Tell them why you think she chose it. Was it a good choice? Tell your partner why or why not.

PROMPT the students to make connections across the text to understand how the third quality ruled Pluto out as a planet.

- This sentence tells us which criterion Pluto has not met. Let's reread number three and check we understand what it is saying.
- “Such as asteroids” is mentioned in the brackets. Have we read anything about Pluto having asteroids in its orbit? Let's scan back across the text to find any mention of asteroids.
- It says that Pluto shares its orbit with many tiny asteroids, so it can't clear them from its path. Therefore, I wonder if it is a planet or not?

Some students may find the complex connections between ideas and language in these examples very challenging and may need careful scaffolding. You could:

- write the last sentence on the whiteboard and ask the students what the verb “meant” can signal (a cause–effect relationship)
- have them identify the cause and the effect and label them
- ask the students to reread number three
- establish that the key words in number three are “asteroids” and “orbit” and ask the students to scan back in the text looking for these words
- discuss the last sentence on page 33 and establish that “Like Pluto” tells us that Pluto also does what the other remnants do – share their orbit
- compare “share their orbit” with “clear ... out of the path of its orbit.”

MODEL asking and answering questions.

- When I read this sentence, I asked myself why they picked “dwarf planet” to describe Pluto. I thought about what I know about the word “dwarf”. I know that it means small and that Pluto and Eris are much smaller than the other planets. So I think they called them “dwarf planets” because they are small.
- I also check my thinking by looking at the images on pages 32 and 33, which show the size of Pluto compared to the other planets in the solar system and compared to the Moon.

GIVE FEEDBACK

- You have been asking more questions about what you read. This is a good strategy to help you understand as you read. Keep doing this when you are reading by yourself.
- I notice you have been rereading and looking back in the text to help you put information together to get a clearer understanding.

METACOGNITION

- How did the photographs add to your understanding about the speck of light? How did you use them?
- When did you return to parts of the text you had already read? How did this help you?
- What information did you gain about asteroids? What was stated in the text, and what information did you infer? How did you do this?
- How is rereading the text to get a clearer understanding similar to what you do as a writer?

 Reading standard: by the end of year 5

 The Literacy Learning Progressions

 Assessment Resource Banks

Instructional focus – Writing

English (Level 3 – Structure: Organise texts, using a range of appropriate structures.)

Text excerpts from “The Problem with Pluto”

Examples of text characteristics

Teacher (possible deliberate acts of teaching)

Thousands of people wrote to the IAU and protested. “Funerals” were held outside some observatories, with cardboard models of Pluto in coffins. The governments of some American states passed laws (mostly as a joke) saying they were still going to call Tombaugh’s discovery a planet.

BRACKETS

Authors use brackets to add information without interrupting the flow of the text. The bracketed information is usually an extra explanation or a comment on the main text.

One afternoon in 1930, a young United States astronomer called Clyde Tombaugh was looking at photographs of the night sky.

SUBJECT-SPECIFIC VOCABULARY

Authors use subject-specific vocabulary to add precision to their writing. In this instance, its use also creates a scientific and factual tone to the writing.

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PARAGRAPHS

Authors organise related ideas into a paragraph. Paragraphs begin with a topic sentence, and the following sentences add supporting detail.

METACOGNITION

- How did planning help you to organise your writing in paragraphs? Would you do anything differently next time?
- When you added the information in brackets, what decisions did you need to make and why?
- What helped you to use subject-specific vocabulary appropriately in your writing?
- How does knowing about the importance of subject-specific vocabulary in writing help you when you are reading factual texts?

ASK QUESTIONS to support the students to identify the purpose of the bracketed information.

- What would the sentence be without the information inside the brackets?
- Why did the author put the information in the brackets? How does this help us as readers?
- How can we use this method in our writing to add information that will help our readers?
- Read through your writing to see if there is any information that could be included within brackets.

Modelling through shared writing could further support students.

EXPLAIN why subject-specific vocabulary is used. Model a sentence without subject-specific vocabulary, for example, “One afternoon in 1930, a young man called Clyde Tombaugh was looking at photographs of the night sky.”

- How do these sentences differ? One sounds clearer and more specific. When we write factual texts, our audience will expect to read words that are precise and are the correct words for the subject.
- As writers, we need to carefully select the language we use. We can look at our word webs to remind us of the subject-specific vocabulary we know. Have a look at your writing with a partner. Where could you introduce some subject-specific vocabulary to make your meaning clearer?

In order to understand and use new vocabulary, many students, especially English language learners, need:

- to read and hear the vocabulary many times, over time and in different contexts
- to practise using it in very controlled and scaffolded tasks (such as those with detailed writing or speaking frames or cloze sentences)
- to use it for genuine communication within guided tasks (such as retelling stories or sharing information from jigsaw reading)
- to experiment with using new vocabulary independently and to receive feedback.

PROMPT the students to recognise the structure of a paragraph and how this supports the reader.

- What does the first sentence tell us? What kind of sentence is it? (topic)
- How do the other sentences link to the first sentence? What do they tell us? How do they relate to the topic sentence?
- As readers, we expect the following, supporting sentences to tell us more about how the people protested and what happened.
- When we plan our writing, we need to think about the information we want to share with our readers. Our planning could include main points, which we could use to form topic sentences. Then we can elaborate on each topic sentence with extra detail or information. Have a look at your plan for your writing. Highlight key information that could become topic sentences for your paragraphs.

GIVE FEEDBACK

- Your paragraphs are well structured, with a clear topic sentence, and this really helps the reader to get a sense of the ideas and information you are conveying.
- Recrafting your vocabulary to make it more specific has really added to the quality and precision of your writing.

 Writing standard: by the end of year 5

 The Literacy Learning Progressions