



Teacher Resource

# Black Hole Discovery

## 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. Why can't we see black holes?
2. How do black holes usually form?
3. What is the centre of a black hole called?
  - a. Accretion disk
  - b. Event Horizon
  - c. The Singularity
4. What is the name of the black hole at the centre of the Milky Way galaxy?
5. What did you learn about the newly discovered black hole called J0529?

## Activity: Are you Curious about black holes?

Are your students curious about black holes? Black holes are among the most mysterious cosmic objects. They have been widely studied but are difficult to understand and prove they exist.

Students will make a list of questions they have about the BTN Black Holes Discovery story. For example:

- What does a black hole look like?
- Why is a black hole 'black'?
- Why is a black hole a 'hole'?
- If a black hole is invisible, then how do you see one?

Ask your students how they will find answers to their questions. NASA has answered [10 Questions You Might Have About Black Holes](#).

Students will use the internet to find answers to their questions and share their findings with the class.

How do black holes form?

What is at the centre of black holes?

### EPISODE 4

27th February 2024

### KEY LEARNING

Students will investigate the characteristics of black holes.

### CURRICULUM

#### Science – Year 5 & 6

Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions.

With guidance, pose clarifying questions and make predictions about scientific investigations.

Compare data with predictions and use as evidence in developing explanations.

#### 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: Vocabulary

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

Supermassive

Black Hole

Quasar

Galaxy

Light Years

Astrophysicist

Mass

Gravity

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:

- Students will add to their glossary by downloading the transcript for the BTN Black Hole Discovery story and highlight all the words that relate to the topic. For example, accretion disk, event horizon, the singularity, supernova and spaghettification.
- Who explores the universe? 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.
- Astronomers generally divide black holes into three categories. There are stellar mass black holes, supermassive black holes, and intermediate mass black holes. Do some research and then write a definition for each using your own words. Visit the [NASA website](#) to learn more.

## Activity: Guide to Black Holes

### NASA – Guide to Black Holes



Thinking about doing some black hole watching the next time you're on an intergalactic vacation, but you're not quite sure where to start? Well, look no further!

This [series](#) of animated NASA videos shows you everything you need to know. With topics ranging from basic black holes, to fancy black holes, to giant black holes and their companions. Watch this [NASA animation](#) to learn more about black holes.

### NASA – Inside a Black Hole



Don't let the name fool you: a black hole is anything but empty space. Black holes are some of the most extreme, bizarre and fascinating objects in the universe. Regina Caputo and Jeremy Schnittman describe what it might be like to go hunting for one. [NASA - Link to podcast](#)

## Activity: Life Cycle of a Star

Most black holes form from the remnants of a large star that dies in a supernova explosion. To help explain how black holes form it is useful to understand the life cycle of a star.

### Class Discussion

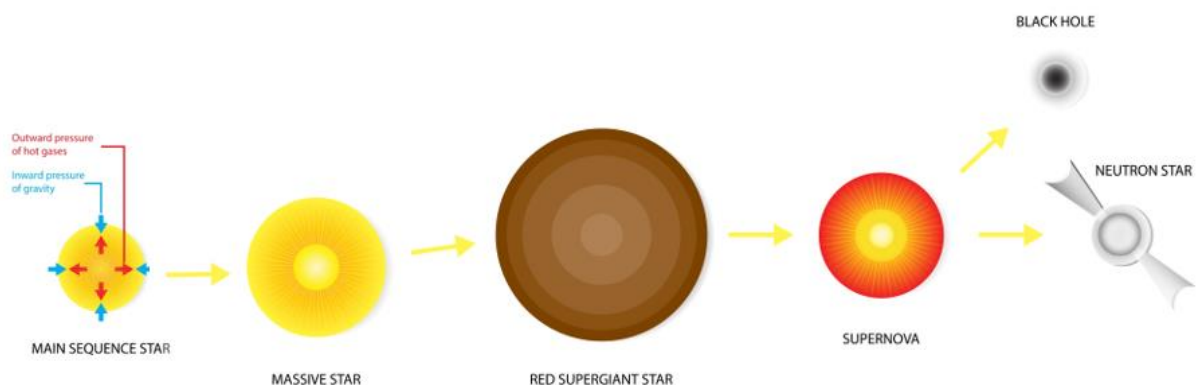
Begin with a brief discussion to find out what your students know about stars. Encourage them to share their ideas. Explain the following concepts to your students. You may want to refer to NASA's [Star Basics](#), which looks at the birth, life, and death of stars. As you explain new concepts to your students identify new words to add to your class glossary.

#### Facts about stars:

- Stars are the most basic building blocks of galaxies.
- Stars are giant balls of hot gas – mostly hydrogen, with some helium and small amounts of other elements.
- Stars are non-living, but they have a life cycle, similar to plants and animals.
- Stars can have different masses.
- Depending on the mass of the star, there are two possible outcomes.
  - Low and medium mass stars burn cool and last for billions of years.
  - For stars much larger and hotter than our Sun, high-mass stars, the ending will be a spectacular explosion called a supernova.
- After a high-mass star explodes, a black hole is formed.
- The 2 most common types of black holes are called stellar-mass and supermassive.
- It is likely that our Milky Way Galaxy contains around 10 million black holes, but we will probably only ever 'see' about 1,000 of these.

### Create

- Students will use neon paints to create their impression of a black hole. Display in your classroom or a room that can be darkened to highlight student's artworks.
- Students will find images of the different stages in the life cycle of a star. Use these images to display the life cycle of stars as a concept map. Students will include the following in their life cycle: massive star, red supergiant star, supernova, and a black hole.



## Activity: Science Investigation

### Modelling the formation of a black hole

This '[Science in School](#)' activity will demonstrate to students how a black hole is formed through the collapse of a massive star, once the core of the star is unable to support the weight of the outer layers of gas surrounding it. The materials required for this activity include a balloon, aluminium foil, and a pin.



## Activity: Black Hole Facts

In small groups, students will find out as much as they can about black holes and compile the information they find into a list of facts. Provide students with a list of suggested questions and/or topics to guide their research, for example:

- What is a black hole?
- How do black holes form?
- Characteristics of black holes
- Significant black holes in the universe

Facilitate a class discussion by asking each group to share one interesting fact they learned during their exploration. Record students' responses on the white board to create a collective list of facts about black holes.

Students will use the facts they have discovered about black holes to create a quiz and then test their classmates. Students will include a range of quiz styles, for example:

- Multiple choice
- True or false
- Fill in the blank
- Use photos or pictures
- When an answer is revealed, provide extra information to explain the answer.



Students can make their quizzes in [Kahoot](#) or [Quizizz](#). Make it fun, engaging, and educational!

## Useful Websites

- [Researchers discover fastest-growing black hole that consumes the mass of 'the Sun and all the planets' combined — every day](#) – ABC News
- [Black Hole Basics](#) – NASA
- [Black Hole Photo](#) – BTN
- [Black Holes](#) – National Geographic
- [Space and our Solar System](#) – ABC Education
- [What is a black hole? \(Grades 5-8\)](#) – NASA
- [A Field Guide to Black Holes](#) – NASA