



lingoda

What is a black hole?

SPEAKING

LEVEL
Advanced

NUMBER
C1_3034S_EN

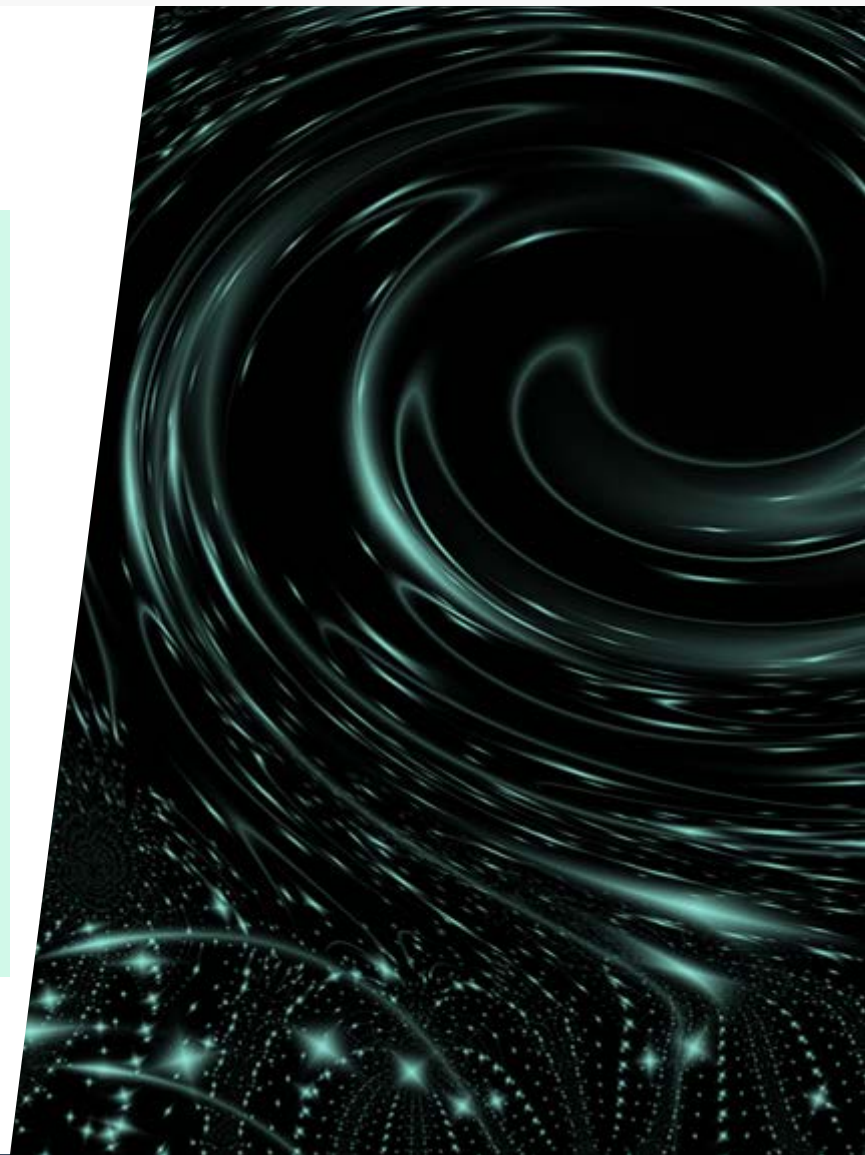
LANGUAGE
English

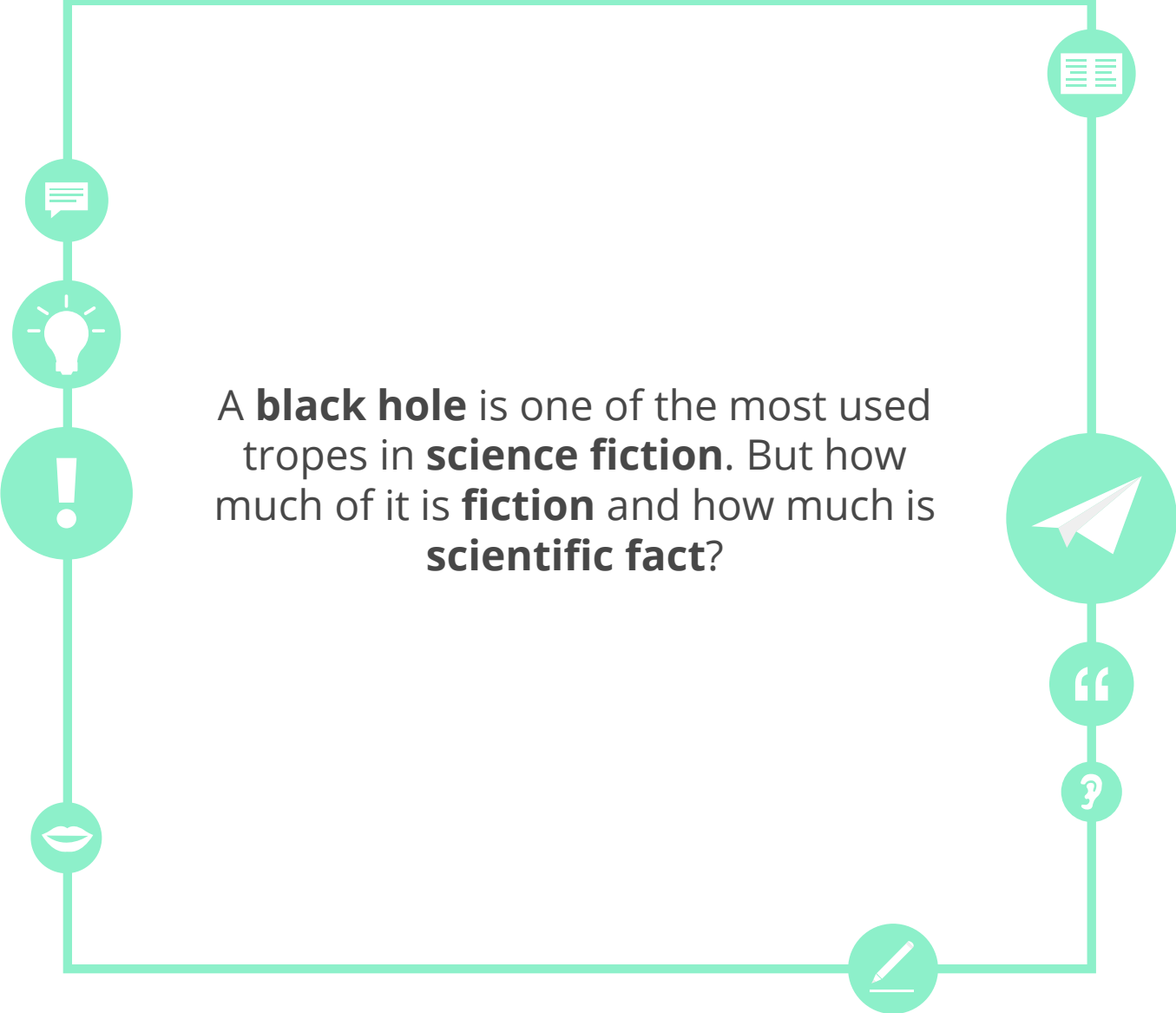




Goals

- Can read and understand a complex text on black holes.
- Can provide my own views in a challenging discussion on astrophysics and black holes.



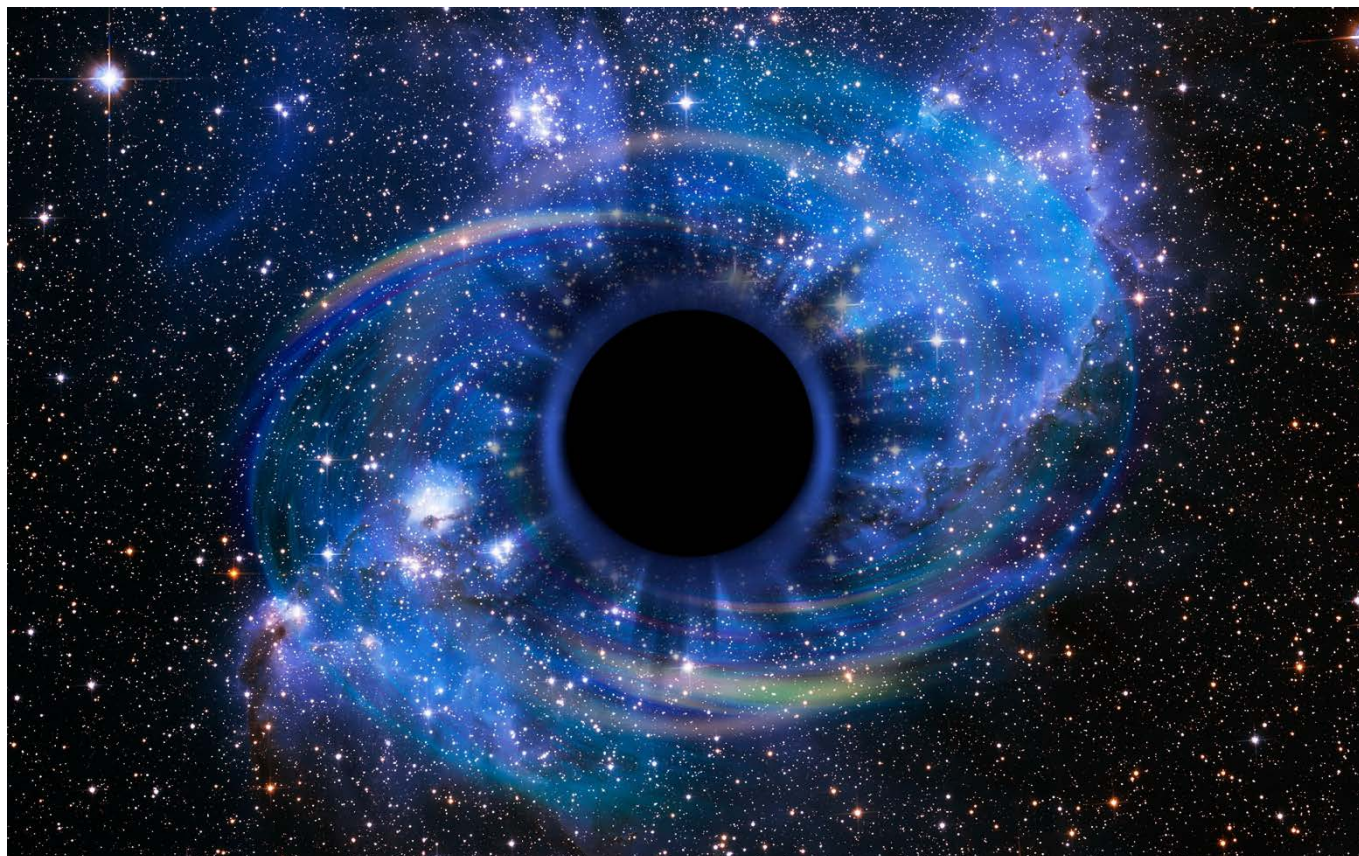


A **black hole** is one of the most used tropes in **science fiction**. But how much of it is **fiction** and how much is **scientific fact**?



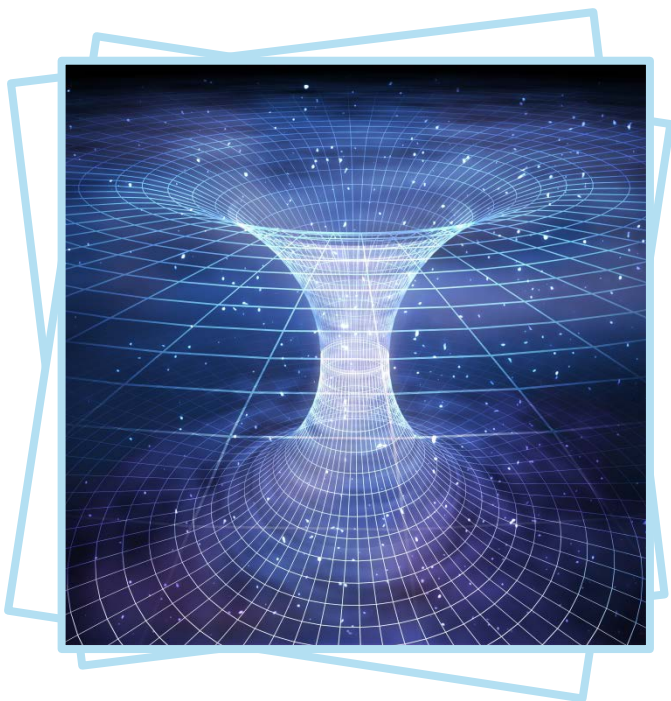
A black hole

How would you describe a black hole?





Black holes in science



Which branch of **science**
researches **black holes**?
Do you know of any **scientists**
whose **interests** lie in this area?



Physics

**Are you interested
in physics?**

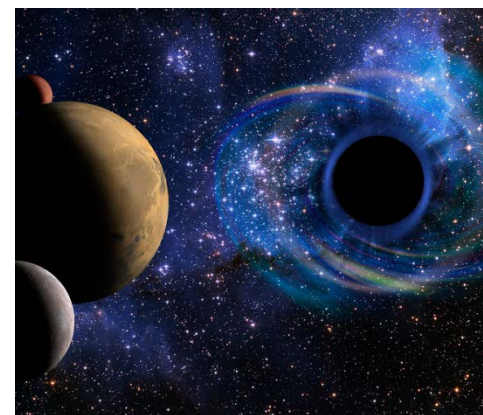


**Which different
branches of physics
do you know about?**



What is a black hole?

A black hole is traditionally thought of as a **void**, a place where objects are **irretrievably** lost. Whether we are talking about an actual black hole in our **galaxy** or beyond, or the metaphorical black hole which exists in many messy wardrobes, **conventional wisdom** states that what goes in doesn't come out.





What is a black hole?

Scientists have long believed that black holes are places where the **gravitational field** is so strong that it pulls everything in to it, and once in, no **particles**, not even light, can escape. There are two main types of black hole which differ in size. The first are **stellar black holes** which are caused by the **collapse** of a single star; these black holes are small but very **dense**. It is estimated that there are a few hundred million stellar black holes in our galaxy. The second type, the largest black holes, are called **supermassive black holes** and they are millions or even billions of times bigger than our sun. A **supermassive black hole** is at the centre of every **galaxy**, including our own, though scientists are currently unsure of how they are formed. Both of these types of black hole continue to grow as their **gravitational force** pulls in **dust** and gas **floating around** the universe.



Do you know what the vocabulary from the text means?

irretrievably

galaxy

conventional
wisdom

gravitational field

particles

collapse

dense

dust

floating around



Black hole

People often use the term black hole as a metaphor or idiom in English.
Look at the pictures below and describe the metaphor.
Do you use the same phrases in your language?





Speaking

Answer the questions with your teacher.



1

Do you have a place in your house or workplace which you regard as a black hole for your possessions?

2

Can you think of a time when conventional wisdom has been proved wrong?

3

Have you ever irretrievably damaged something important?



Black holes

**What do you imagine
is at the centre of a
black hole?**



Unanswered questions

There are many unanswered questions about black holes such as the ones below, which scientists are hoping to find the answers to. Would you be interested in finding out the answers to these questions?



How often do black holes merge with each other?

How many black holes are there?

Do they get mass by colliding with each other?

Do they ever die?



Get ready to listen



The next few pages will focus on your listening comprehension.



Vocabulary

Before you listen, check that you know the meaning of these words. Then, while you are listening, put the words into the order that you hear them.





What did you hear?

Now summarise what you just heard.
Use the words below to help you.



radiate

mounting
evidence

swallow

trapped

leak out

far-fetched

alternate
universe



What did you learn?

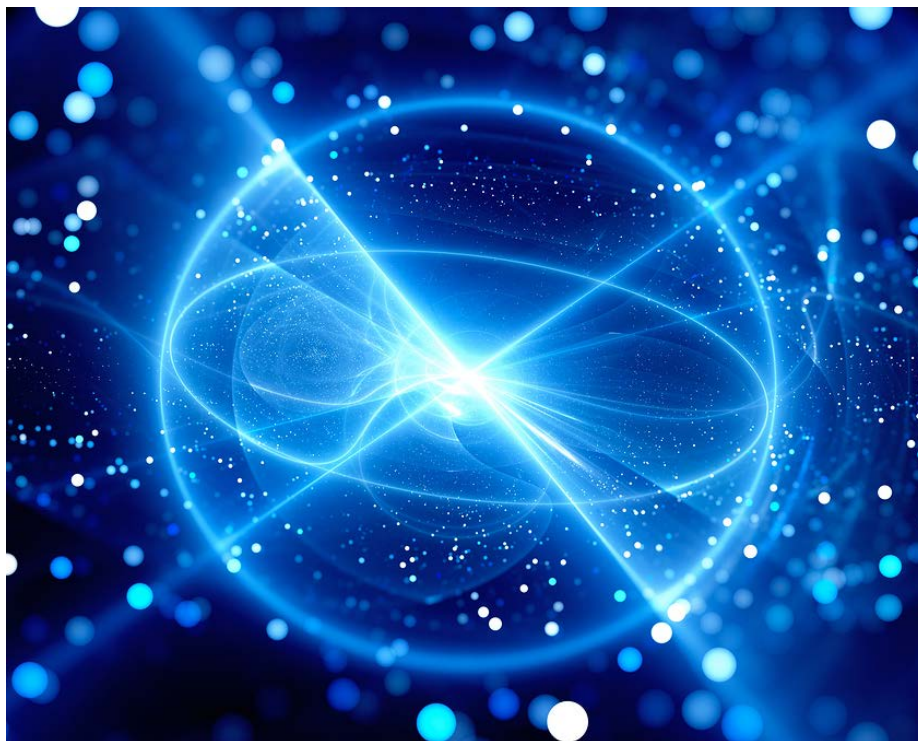
**Was there anything
that surprised you
from the listening?**



Escaping from a black hole

Discuss with your teacher what you think about the possibility that particles can escape from a black hole.

Do you think it is really possible or will it be proved wrong?





Books and films

Have you read any books or seen any films in which black holes are featured? What happens in them and what is the hypothesis of how a black hole works?





An alternate universe



Which films or books talk about
alternate universes?

If you could go to an **alternate universe** but could never come back, would you like to do it?
What do you think you would
discover there?



Time travel

Read the sentence below.

Do you think the theory will ever become reality? Would you like to travel forward in time if it were possible?

//

Because time passes more slowly the closer we get to a black hole, scientists believe we may one day be able to use black holes to travel forward in time, spending only a short time in a black hole while years have passed on Earth.

//





What is a black hole?

Think back to how you defined a black hole on p. 4. Would you like to change that definition now?

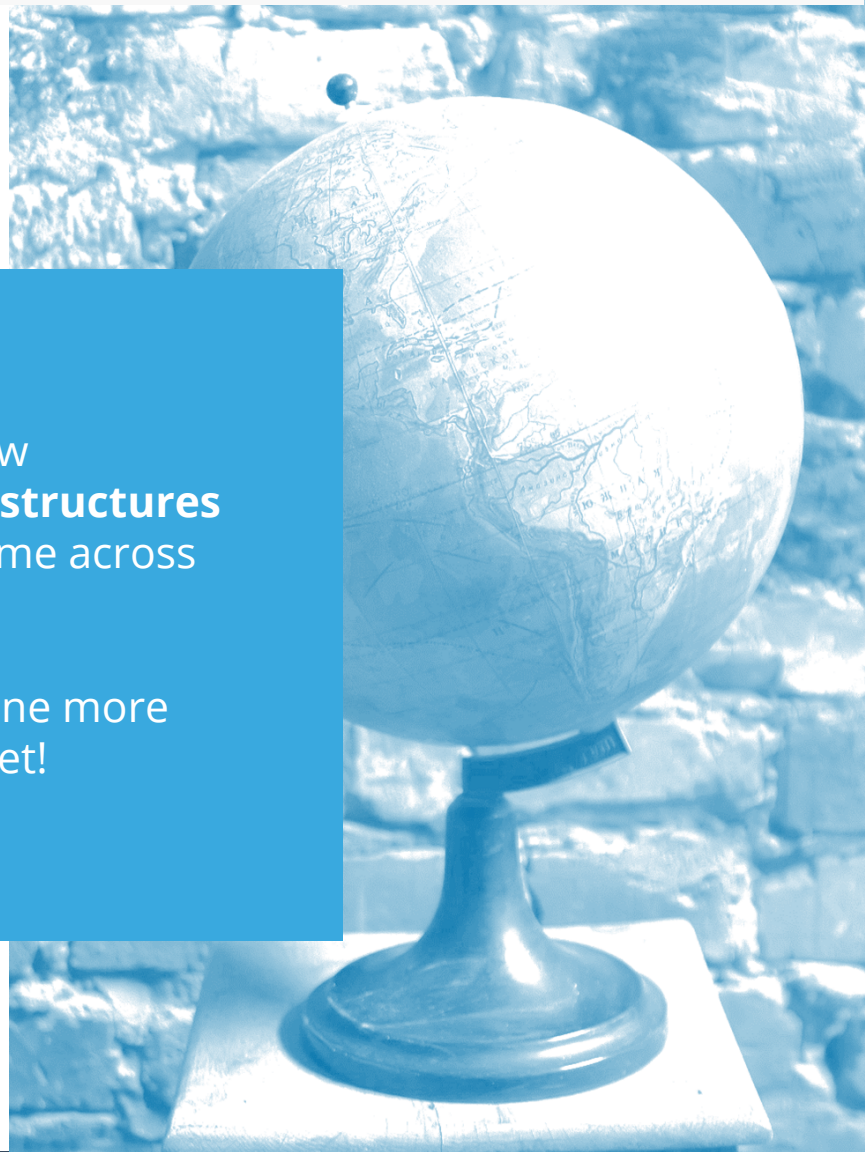




Reflect on this lesson

Take a moment to review any new **vocabulary, phrases, language structures** or **grammar points** you have come across for the first time in this lesson.

Review them with your teacher one more time to make sure you don't forget!

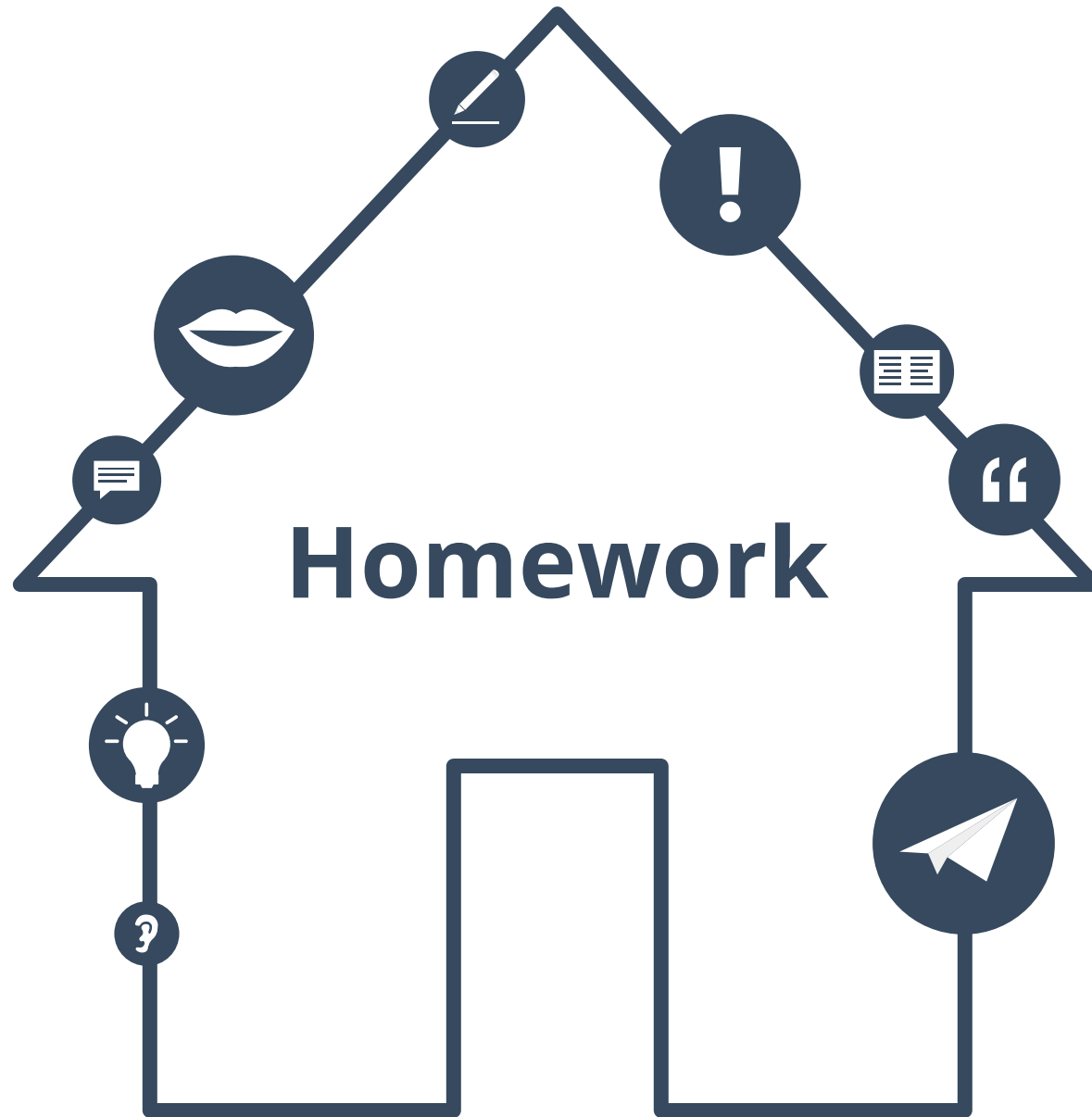




Transcription

p. 15

Science fiction writers have long been interested in black holes, and the so-called golden age for writing about black holes was from the 1960s to the 1990s, when scientists began to focus their research on these aspects of our galaxy. Writers often told tales of people becoming **trapped** in black holes, with the hole becoming a prison for the characters from which they would try to escape. There are also stories about characters falling through black holes and into **alternate universes**. While these stories might seem **far-fetched**, there is **mounting evidence** to suggest that black holes do not, as we once thought, **swallow** all life. Though it is true that a human entering a black hole would not survive, there is an increasing body of evidence which supports the idea that small particles might be able to **leak out** of a black hole. Certain scientists now believe that micro black holes, ones which are extremely small, **radiate** energy, which means that particles are escaping. The smaller the black hole, the faster it loses particles until the black hole disappears altogether. Scientists now also recognise the possibility that particles may be able to pass through the black hole and come out in another universe. However, the particles that come out are not the same as those which go in. So, while we might be able to enter a black hole and come out the other side, we would hardly be ourselves once we did.





Fill in the gaps

1. Micro black holes _____ energy, leaking particles back into the universe.
2. Science fiction writers often have their characters either _____ in black holes or use black holes to introduce an _____ universe.
3. Black holes can be formed by the _____ of a single star.
4. The gravitational field of a black hole pulls in _____ and gas from space.
5. Black holes can be small but are always _____ and hold a lot of particles.

alternate

dense

collapse

radiate

trapped

dust

[illegible]



Black hole as a metaphor

List three ways in which *black hole* can be used as a metaphor or idiom.

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Homework answer key

Exercise p. 26

1. radiate, 2. trapped, alternate, 3. collapse, 4. dust, 5. dense



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