

These come after relative pronouns *who / whom* for people, *which / that* for things, *whose* for possession. Relative clauses can refer to the subject of the sentence or the object. They behave in different ways. In object clauses, it is possible to leave out the relative pronoun *which / that*.

*Glaciers are rivers of ice **which** form in cold climates on mountains. The amount of fresh water **(that)** glaciers contain is greater than all other lakes and rivers on Earth.*

Subject: *which form in cold climates* This refers to **glaciers**, the subject of **form**.
Object: *that glaciers contain* This refers to **water**, the object of **contain**.

Note that in a subject clause there is never a subject pronoun after the relative pronoun.

*Glaciers are rivers of ice. **They** form in cold climates on mountains.*

*Glaciers are rivers of ice **which they** form in cold climates on mountains.*

subject: *who* or *that*

Use *who / that* to refer to people in subject relative clauses. When we refer to a named person we generally use *who*, and *that* in informal speech and writing.

*Charles Dickens was the novelist **who** wrote David Copperfield.*

*Louis Agassiz was the first scientist **who** argued that there had been an Ice Age in the past.*

subject: *which* or *that*

Use *which / that* to refer to things in subject relative clauses.

*Last week I bought a new computer **which** is much faster than the old one.*

*In 1840 Agassiz published Etudes sur les glaciers **which** was the first book to describe the movements of glaciers and the way they changed the landscape.*

subject: *whose*

Use *whose* to refer to things belonging to people.

*That was the man **whose** car was stolen.*

*Louis Agassiz had a son, Alexander, **whose** main interest was mining.*

omitting the relative pronoun

When you omit the relative pronoun in an object clause, you might also need to omit the verb after it.

*The photos **(which were)** used on the web site are fascinating.*

*The glaciers **(which were)** described in the book are in danger of melting.*

object: *who*, *that*, *whom* or zero

Use *who / whom / that* in an object relative clause when we refer to people.

Whom is used in formal language, or after a preposition.

*He is one of the scientists **who / whom / that** I admire most.*

It is possible to leave out the relative pronoun in this kind of sentence.

He is one of the scientists I admire most.

object: *which*, *that* or zero

Use *which / that* in an object relative clause when we refer to people.

*This is Pickwick Papers, one of the first books **which / that** Dickens wrote.*

It is possible to leave out the relative pronoun in this kind of sentence.

This is Pickwick Papers, one of the first books Dickens wrote.

object: *of which*

Use *of which* in an object relative clause when we refer to one thing belonging to another.

It is used in formal language.

*This is his third book, the publication **of which** made such an impression.*

It is possible to use *whose* in informal language. It is also possible to avoid this kind of construction.

*This is his third book, **whose** publication made such an impression.*

*This is his third book, **the one that** made such an impression when it was published.*

1 Tick the sentence if the words underlined can be left out, or write 'no' if it cannot.

- Charles Dickens was one of the first authors whose books reached a wide public. **No**
- This was partly because, with the first book that he wrote, he introduced a range of mainly London characters which people found interesting and amusing. ✓
- He invented people whose names often suggested what they were like.
- For example, David Copperfield has an unfeeling stepfather who is called Mr Murdstone.
- It was also a result of changes in publishing

which were introduced at around the time he began writing.

- Books became cheaper because of new methods of printing which used steam-powered machinery.
- His novels were published as serials, and people waited impatiently to read the next part that he produced.
- He was one of the first novelists who also worked as a magazine editor, journalist and social campaigner.
- The magazine that he edited, *Household Words*, was mainly his own writing.
- Dickens was also famous for the dramatic readings that he gave from his own novels.

2 Match the famous people a to h with information 1 to 8. Then complete sentences about them, including the relative pronoun *who*.

- Linnaeus was a botanist who worked out a method of naming plants and animals.
- Marie Curie
- Aristotle
- Mary Shelley
- André-Marie Ampère
- Sonja Henie
- Maria Montessori
- Marco Polo

- He was a physicist and made an instrument for measuring current and voltage.
- She was a physicist and the first woman to receive a Nobel Prize.
- She was a writer and wrote the novel *Frankenstein*.
- ~~He was a botanist and worked out a method of naming plants and animals.~~
- She was an ice-skater and took part in the Olympic Games at the age of 11.
- He was a merchant and visited China in the 13th century.
- He was a philosopher and taught Alexander the Great.
- She was a doctor and invented a new method of teaching young children.

3 Rewrite each pair of sentences as one sentence, using *whose*. Make any necessary changes.

- J S Bach had two sons. Their music was better known than his for many years.
J S Bach had two sons whose music was better known than his for many years.
- John F Kennedy had a brother Robert. His death was also a political assassination.
.....
- Lord Byron the poet had a daughter, Ada Lovelace. Her work in mathematics led to the development of the first computer.
.....
- Pablo Picasso had a daughter, Paloma. Her fashion designs have become famous worldwide.
.....
- John Lennon had a son, Julian. His music career has not been as successful as his father's.
.....

f The astronomer William Herschel had a sister, Caroline. Her research contributed to his discoveries.

g Paul McCartney has a daughter, Stella. Her career in fashion design has been very successful.

4 Rewrite each pair of sentences as one sentence, using *which*. Make any necessary changes.

a The word *cell* comes from the Latin *cella*. This means a *small room*.
The word cell comes from the Latin cella which means a small room.

b All cells have a **membrane** or skin. It covers the cell.

c Inside the cell is a substance called the *cytoplasm*. It contains a number of chemicals.

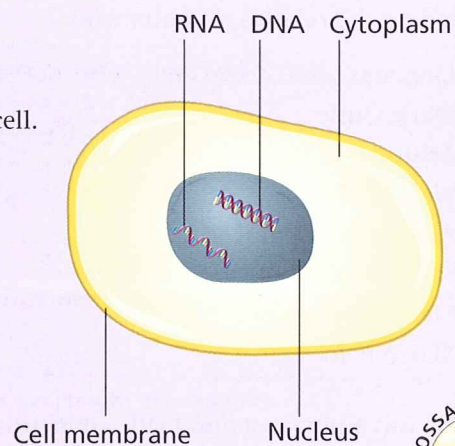
d All cells contain **DNA**. This holds **genetic** information.

e They also contain RNA. It includes the information the cells need to build **proteins**.

f All cells contain a nucleus. This controls the actions of the cell.

g Bacteria consist of only one cell. This can divide and make other new bacteria.

h One of the most complex structures is the human body. It contains over 100,000 billion cells.



5 Rewrite each pair of sentences as one sentence, containing the relative pronoun in capitals, or zero pronoun.

a Einstein is a scientist. I admire him. WHO
Einstein is a scientist who I admire.

b Shakespeare is a writer. I don't understand him. ZERO

c Marie Curie is a scientist. We are studying her. WHOM

d Newton is a physicist. We often discuss him. ZERO

e Homer is an ancient Greek writer. We study him in translation. WHO

f Leonardo is an artist. Everybody knows him. THAT

g Jane Austen is an author. Most people enjoy her. ZERO

h Beethoven is a composer. I like him. THAT

6 Rewrite the sentence, beginning as shown. Do not use a relative pronoun.

a I made this lamp in a craft lesson.
 This is *the lamp I made in a craft lesson.*

b We lost this ball in the park last week.
 This is

c I wrote this poem in my first year.
 This is

d She painted this portrait as part of her project.
 This is

e We used this computer to get the results.
 This is

f We found this dog in the playground.
 This is

g I borrowed this book from the library.
 This is

h Mr Smith took this photo of the basketball team.
 This is

geography

7 Complete the text with a suitable relative pronoun in each space (including *of which*). Leave the space blank if this is possible.

Antarctica is mainly known for the penguins and seals **a** *that* live there, but recently scientists have discovered the **remains** of two dinosaurs **b** lived there millions of years ago. These are not the first dinosaur fossils **c** have been discovered in Antarctica, and bring the total to eight. The first new discovery was a plant-eating dinosaur **d** was found by a mountain climber. Scientists **e** examined the fossils say it is a plant-eating dinosaur **f** is nearly 200 million years old. The parts of the animal **g** they examined suggest that it was nine metres long and two metres tall. Dinosaurs **h** have been found in other parts of the world are as long as 30 metres, however. So this specimen, the discovery **i** has excited researchers, is rather small. On the other side of Antarctica, dinosaur bones **j** were discovered by accident have also proved interesting. This second dinosaur was a meat-eater **k** stood about two metres tall. Scientists **l** were **sheltering** from bad weather found the bones near the sea. The dinosaur they discovered, **m** bones were next to fossils of sea life, probably died and was washed out to sea after its death. Dinosaurs are creatures **n** could not **survive** in cold conditions, but in their time, Antarctica was different. It didn't have the cold climate **o** it has today, but was warm and wet.



EXTENSION ACTIVITY

- Copy out five of the examples from page 180, and translate each one into your own language.
- Check that you have the correct answers to Exercise 6. Translate the sentences into your own language.

Need more practice? Go to the Review on page 192.

defining and non-defining relative clauses

In written language, defining clauses give important information about the subject or object, and are not separated by commas.

*Friction is the force **that resists** the movement of one object against another.*

In written language non-defining clauses give extra information, which we could leave out, and are separated by commas. We cannot use *that* as a relative pronoun.

*Wrapping an object in aluminium foil, **which reduces energy loss**, keeps food hot.*

object clauses with prepositions: *whom, who*

In object clauses when we refer to people and use a preposition, we use *whom* in formal language.

*Enter the address of the person **to whom** you want to forward the message.*

It is more usual informally to use *who* and put the preposition at the end.

*Enter the address of the person **(who)** you want to forward the message **to**.*

object clauses with prepositions: preposition + *which, whose*

Formal *This is the spacecraft **in which** the astronauts visited the Moon.*

*The tree **from which** this drug is obtained only grows in the rainforest.*

*The instrument **with which** we measure air pressure is called a barometer.*

*Dr Gibson, the scientist **on whose** research the article is based, agreed.*

Informal *This is the spacecraft **(which)** the astronauts visited the Moon **in**.*

(more usual) *The tree **(which)** this drug is obtained **from** only grows in the rain-forest.*

*The instrument **(which)** we measure air pressure **with** is called a barometer.*

*Dr Gibson, the scientist **whose** research the article is based **on**, agreed.*

reason: *why*

Clauses of reason use *why* or *the reason why*.

*I've just passed my driving test, and that's **why** I'm so happy.*

*When water finds a natural opening in the ground that is lower than the water table, a spring comes into existence. This is **the reason why** most springs are found in low places or valleys.*

time: *when*

Clauses of time use *when* or *the time / year etc when*. We can also use *the + time word + in which* in more formal language.

*1969 was **when** the first men went to the Moon.*

*It was also **the year in which** the Venera 5 space probe landed on Venus.*

place: *where*

Clauses of place use *where* or *the place where*.

*A habitat is **the place where** an animal or plant species lives.*

sentence relative: *which*

Use *which* to refer to the sentence or clause that comes before it, not just the word before it. There must be a comma before *which*.

*Tina got very good marks in the exam, **which** pleased all her teachers.*

1 Make a non-defining relative clause from the two sentences. Make any necessary changes.

a The polar bear is a large bear that lives in the Arctic. It is also known as the white bear.

The polar bear, which is also known as the white bear, is a large bear that lives in the Arctic.

b The polar bear is found all across the Arctic. It has a population of about 20,000.

c About 60% of the bears are found in Canada. They hunt well on land and in water.

d The polar bear may become extinct by the end of the century. It is threatened by global warming.

e The sea ice in the Arctic is beginning to melt. Bears use this as a platform when they hunt seals.

f The polar bear is the largest land predator. It is twice the weight of a lion or tiger.

g The males weigh between 400 kg and 600 kg. They are twice the size of the females.

h The bear cubs remain with their mothers for ten months. They are born helpless and blind.

i Adult bears live for as long as 30 years. They do not hibernate.

j Polar bears can often be seen in open water kilometres from land. They are excellent swimmers.

2 Rewrite the formal sentence as an informal sentence ending with a preposition. Leave out the relative pronoun.

a Alan Graham is the teacher from whom I've learnt most.

Alan Graham is the teacher I've learnt most from.

b He is someone for whom I have the greatest respect.

c We all admire people to whom we owe a lot.

d Especially if it is a person with whom we enjoy working.

e There are some people with whom you can easily form a relationship.

f But you don't always work with people for whom you feel admiration.

g And now here is the person for whom we have all been waiting.

h He is the man to whom I am pleased to present the Teacher of the Year Award.

3 Rewrite each pair of sentences as one new sentence, using the preposition underlined followed by *which*.

- a There are a number of trees and plants. Rubber is taken from them.
There are a number of trees and plants from which rubber is taken.
- b The Para rubber tree is the major commercial source. Rubber is extracted from it.
- c Brazil is the country. Rubber originates from there.
- d Ancient Central American cultures collected rubber. They made balls from it.
- e The Mayas made temporary shoes by using a rubber mixture. They dipped their feet into it.
- f The people in Brazil used a mixture of rubber. They made waterproof clothes from it.
- g In England people noticed it was a substance. You could rub out marks with it.
- h This was the origin of the name. English people called it by this name.

4 Underline the correct option.

Easter Island, a *which is / which it is* in the Pacific Ocean more than 3,000 km from the coast of South America, has a terrible lesson to teach the modern world. When the first Europeans visited it in 1722, they found an island short of food on b *which / which are* about 3,000 people were living in a *state* of constant war. The Europeans were surprised to find a large number of huge statues, c *which / which they* had been moved over great distances, and d *to which / which* clearly belonged to a great civilization. The people e *whose / -* they found on the island, however, were poor and backward. The Europeans supposed that these people could not have built such large statues, f *which / which it* meant that some other mysterious people must have done so. However, modern research has shown that the inhabitants of Easter Island were responsible for the terrible condition g *in which / -* the Europeans had found

them in. The inhabitants were divided into many family groups, h *which / which they* competed with each other. Their religion involved building huge statues, i *which / whose* consumed time and resources. Their home was a volcanic island on j *where / which* few trees grew, and k *which / which it* produced little food. To make matters worse, l *which / which it* caused soil erosion. By the middle of the 16th century, the population had reached about 7,000, m *which / which* was too great for the island to support. By this time there were no more trees, n *which / which they* the islanders needed to build boats. There was not enough food o *which / with which* to feed such a large population, and they were unable to leave, so the population fell. By the end of the 19th century, there were only a hundred or so inhabitants remaining.



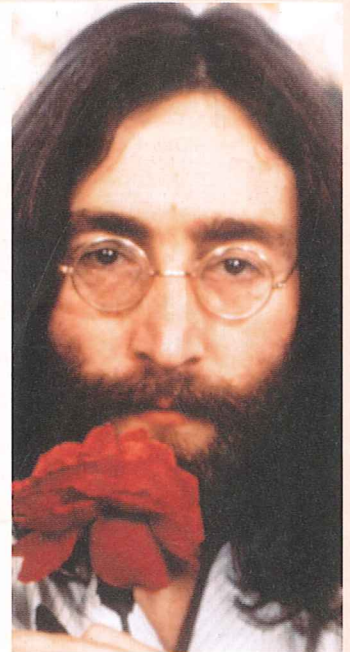
5 Complete the sentence using *why*, *when* or *where*.

- a Most of us at some time have wanted to know why leaves change colour and fall in autumn.
- b It is difficult to predict exactly when this will happen, as it depends on the autumn weather.
- c It also depends on where exactly the tree is growing, since some trees may receive more light than others.
- d The leaves start to change colour when the tree stops making chlorophyll, the substance which gives them a green colour.
- e The trees stop making chlorophyll when there is not enough light for the process of photosynthesis to work.
- f Other colours in the leaf are hidden by the chlorophyll, and this is why we only see these colours when the tree stops making chlorophyll.
- g Red colours in the leaves are made by food trapped in the leaves when the tree stops making food.
- h Deciduous trees have adapted to survive the winter without leaves, which is one reason why their leaves fall off in autumn.
- i They are less likely to be damaged when strong winds blow.
- j Many deciduous trees also produce flowers when they have no leaves, as this makes it easier for them to pollinate.

the arts

6 Complete the text with a relative pronoun in each space, or leave it blank if this is possible.

John Lennon, a *who* was born in 1940, was a member of the Beatles, the British rock group. He grew up in Liverpool, b *where* he performed in a number of groups, and met the other members of the Beatles. After studying at art college, c *where* he disliked as much as he had disliked school, Lennon spent his time learning to be a musician. In 1962, the Beatles had their first hit record, d *which* was soon followed by success in the USA. Lennon and Paul McCartney, another young musician e *whom* he had met in 1957, wrote most of the group's songs. The success of the Beatles, f *which* was worldwide, created problems for Lennon, g *who* often said exactly what he thought to the press and TV, and got into trouble. By the time the Beatles stopped working together, h *when* came about during the late 1960s, Lennon's songs had become both political and highly personal. His personal life, i *which* was made more difficult by his problems with drugs and alcohol, was also often in the news. He and his wife Cynthia were divorced, and he married Yoko Ono, with j *whom* he carried out political protests. They also made records together, and went to live in the USA, k *where* Lennon continued his solo career. In the mid 70s he took a break from music l *which* lasted for five years. In 1980 he started to record a new album, m *which* was still unfinished n *when* he was shot dead by Mark Chapman, a fan o *who* wanted to become famous, on 8 December 1980.



EXTENSION ACTIVITY

Copy out five of the examples from page 184, and translate each one into your own language.
Need more practice? Go to the Review on page 192.

a reward when you achieve your target, as this will make you feel good! h Give yourself a deadline, since you need to feel some pressure if you want to work well.

Ex 4

a However b while c while / even though
d While / Even though e although f However
g While h Even though

Ex 5

a Every living organism needs energy to maintain its body and also grow. b Omnivores are animals that eat plants and other animals too. c Decomposers are organisms that eat dead animals and dead plants, and enable other plants to feed off the dead material as well. d Producers are plants that use photosynthesis to convert the energy of the sun into food, and they are also the lowest layer of the food web. e Primary consumers are the animals that eat the producer layer, and are also called herbivores. f Secondary consumers eat the primary consumers and are carnivores, though some of them eat plants as well.

Ex 6

a Although b because / as c for example d
However e so f although g also h such as
i As / Since j instead k Although / While l While
/ Although m also n for example o Although

Unit 46

Ex 1

a No b ✓ c No d ✓ e ✓ f No g ✓ h No
i ✓ j ✓

Ex 2

a 4 Linnaeus was a botanist who worked out a method of naming plants and animals. b 2 Marie Curie was a physicist and the first woman who received a Nobel Prize. c 7 Aristotle was a philosopher who taught Alexander the Great. d 3 Mary Shelley was a writer who wrote the novel *Frankenstein*. e 1 André-Marie Ampère was a physicist who made an instrument for measuring current and voltage. f 5 Sonja Henie was an ice-skater who took part in the Olympic Games at the age of 11. g 8 Maria Montessori was a doctor who invented a new method of teaching young children. h 6 Marco Polo was a merchant who visited China in the 13th century.

Ex 3

a J S Bach had two sons whose music was better-known than his for many years. b John F Kennedy had a brother, Robert, whose death was also a

political assassination. c Lord Byron the poet had a daughter, Ada Lovelace, whose work in mathematics led to the development of the first computer. d Pablo Picasso had a daughter, Paloma, whose fashion designs have become famous worldwide. e John Lennon had a son, Julian, whose music career has not been as successful as his father's. f The astronomer William Herschel had a sister, Caroline, whose research contributed to his discoveries. g Paul McCartney has a daughter, Stella, whose career in fashion design has been very successful.

Ex 4

a The word cell comes from the Latin *cella* which means a *small room*. b All cells have a membrane or skin which covers the cell. c Inside the cell is a substance called the cytoplasm which contains a number of chemicals. d All cells contain DNA which holds genetic information. e They also contain RNA which includes the information the cells need to build proteins. f All cells contain a nucleus which controls the actions of the cell. g Bacteria consist of only one cell which can divide and make other new bacteria. h One of the most complex structures is the human body which contains over 100,000 billion cells.

Ex 5

a Einstein is a scientist who I admire.
b Shakespeare is a writer I don't understand.
c Marie Curie is a scientist whom we are studying.
d Newton is a physicist we often discuss.
e Homer is an ancient Greek writer who we study in translation. f Leonardo is an artist that everybody knows. g Jane Austen is an author most people enjoy. h Beethoven is a composer that I like.

Ex 6

a This is the lamp I made in a craft lesson. b This is the ball we lost in the park last week. c This is the poem I wrote in my first year. d This is the portrait she painted as part of her project. e This is the computer we used to get the results. f This is the dog we found in the playground. g This is the book I borrowed from the library. h This is the photo Mr Smith took of the basket-ball team.

Ex 7

a which / that b which / that c which / that
d which / that e who / that f which / that g -
h which / that i of which j which / that k which /
that l who / that m whose n which / that o -

Unit 47

Ex 1

a The polar bear, which is also known as the white bear, is a large bear that lives in the Arctic. b The polar bear, which has a population of about 20,000, is found all across the Arctic. c About 60 % of the bears, which hunt well on land and in water, are found in Canada. d The Polar Bear, which is threatened by global warming, may become extinct by the end of the century. e The sea ice in the Arctic, which bears use as a platform when they hunt seals, is beginning to melt. f The polar bear, which is twice the weight of a lion or tiger, is the largest land predator. g The males, which are twice the size of the females, weigh between 400kg and 600kg. h The bear cubs, which are born helpless and blind, remain with their mothers for ten months. i Adult bears, which do not hibernate, live for as long as 30 years. j Polar bears, which are excellent swimmers, can often be seen in open water kilometres from land.

Ex 2

a Alan Graham is the teacher I've learnt most from. b He is someone I have the greatest respect for. c We all admire people we owe a lot to. d Especially if it is a person we enjoy working with. e There are some people you can easily form a relationship with. f But you don't always work with people you feel admiration for. g And now here is the person we have all been waiting for. h He is the man I am pleased to present the Teacher of the Year Award to.

Ex 3

a There are a number of trees and plants from which rubber is taken.
b The Para rubber tree is the major commercial source from which rubber is extracted.
c Brazil is the country from which rubber originates.
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e The Mayas made temporary shoes by using a rubber mixture, into which they dipped their feet.
f The people in Brazil used a mixture of rubber, from which they made waterproof clothes.
g In England people noticed it was a substance with which you could rub out marks.
h This was the origin of the name by which English people called it.

Ex 4

a which is b which c which d which e - f which
g - h which i which j which k which l which
m which was n which o with which

Ex 5

a why b when c where d when e when
f why g when h why i when j when

Ex 6

a who b where c which d which e - f which
g who h which i which j whom k where l which
m which n when o who

Unit 48

Ex 1

a Roman slaves worked hard so that rich Romans could have a comfortable life. b When enemies shot arrows at Roman soldiers, they put their shields over their heads to protect themselves. c The Romans built a road system all over Europe so that their armies could move quickly from one place to another. d When the Romans wanted to catch mice, they used other animals to catch them. e The Romans used a pointed metal stylus to write on pieces of wood covered in wax. f The Romans buried their dead beside the road outside their town so that the ghosts couldn't return to their old homes.

Ex 2

a A barometer is used for measuring air pressure.
b A microscope is used for looking at things that are too small to see. c A microphone is used for making someone's voice louder. d A calculator is used for doing maths problems. e A thermometer is used for measuring temperature. f A hygrometer is used for measuring humidity. g A Bunsen burner is used for heating things in a lab. h A pipette is used for measuring and moving liquid.

Ex 3

a Some parts of the universe are too distant to visit.
b The atmosphere of Mars is too thin to breathe.
c Venus is too hot to land on. d For most people, a journey into space is too expensive to take. e Trips to most other planets are too dangerous to consider. f The universe is too large to explore completely. g Perhaps its meaning is too difficult to grasp.

Ex 4

a If all the blood vessels in the body formed one line, it long enough to reach more than twice round the Earth.
b Some metals, eg sodium, are light enough to float.
c A week after it is born, a baby gazelle is strong enough to run with adults. d The planet Pluto is not large enough to have a proper atmosphere. e The dinosaurs