10	Can only be collected under licence. Take a photo instead
9	↕
8	Should never ever be collected by school students. Take a photo instead
7	↕
6	Should not be collected by school students. Take a photo instead
5	↕
4	It depends on the situation; ask the field leader
3	↕
2	Could be collected by school students, if safe to do so
1	↕
0	Free to collect at any time by school students, if safe and legal

Take it or leave it? – the geoconservation debate

When is collecting wrong, and when is it right? – try to decide for yourself

Should you take geological specimens away from the site where they are found? This is a difficult question and it depends on where you are and who you are.

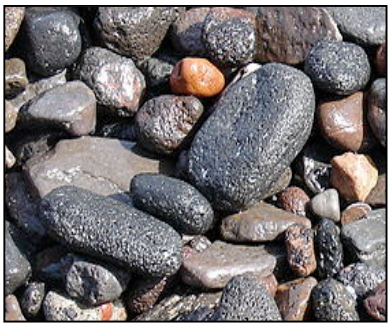
Lots of geologists became interested in geology when they began collecting minerals, rocks and fossils when they were children. So it is a good idea to build up your own collection – but only if this doesn't damage rock exposures and the environment and if it is legal for you to do so. But, if a specimen is on the beach and about to be washed away by the sea and broken up, or if you find it in the broken rocks at the bottom of a rock face, then by all means take it away, add it to your collection, and keep to show to your friends.

But removing a good specimen from a site is like removing a piece of evidence from a crime scene - it loses its context and vital clues can be lost; so, leave it where you found it. Many sites also have legal protection – so you would need to check their legal status before removing specimens.

Try 'thinking like a geoconservationist' by cutting out the cards on the third page, discussing them with your group, and putting them in the best place on the scale cut from the side of this page.

A plant fossil in a quarry – 'take it or leave it?'

Photo: Peter Kennett



A pebble of an igneous rock on a beach – 'take it or leave it?'

The back up

Title: Take it or leave it? – the geoconservation debate

Subtitle: When is collecting wrong, and when is it right? – try to decide for yourself

Topic: Asking pupils to discuss which minerals/ rocks/ fossils could be collected and which should be left for others to use or enjoy.

Age range of pupils: 11-18 years

Time needed to complete activity: 10 mins

Pupil learning outcomes: Pupils can:

- describe the criteria that should be used when deciding whether or not to collect a mineral/ rock/ fossil;
- explain how they would use these criteria for particular examples.
- decide whether to take a photo instead

Context:
Pupils are given ten cards of the type and situation of different mineral/ rock/ fossil specimens and are asked to discuss the best place for these on a scale of 'always take' to 'never take'. The 'answers' depend upon a range of circumstances, but possible 'answers' are:

Example	No.	Reason
Beach exposure of igneous rock	2	Rock being eroded by the sea.
Plant fossil in abandoned quarry	6	Although fairly common, would break if moved – evidence of ancient environment.
Fossils in a garden trench	0	When the trench is filled, these would be lost.
Fossil shells in an abandoned quarry face	5	Common and easily removed by hammer, but then lost to others.
Minerals in a mineral vein	7	Difficult to hammer out in one piece and then lost to others.
Dinosaur footprints in a specially made shelter	10	Protected so that they cannot be damaged.
Ammonite in quarry scree	1	Scree rocks with fossils would soon be lost.
Trilobite on wave-cut platform	1	Wave action would destroy fossil – better to take it.
KT boundary clay specimen	9	Of vital worldwide importance - taken with care only by researchers.
Dumped granite worktop fragment	0	Of no use to anyone – but good to add to a rock collection.

Legal protection for sites can be complex, for example in the UK, different types of site are recognised for geoconservation purposes to protect particular geodiversity features:

- **Exposure sites** which are extensive in area (e.g. a coastal cliff) have maintenance policies to maintain the feature;
- **Finite sites** which are limited in area (e.g. a mineral vein) have a protection policy to protect the feature;
- **Integrity sites** which are limited in extent or dynamically changing, or were formed when the Earth was different (e.g. an Ice Age feature like a drumlin, or a cave stalactite or a karst site like a limestone pavement) have protection policies to preserve the features.

The legal framework can be complicated, for example in the UK some sites are protected by UK law, e.g. Sites of Special Scientific Interest (SSSIs) or by European Legislation e.g. the Habitats Directive for limestone pavements, (Special Areas of Conservation - SACs). Other sites are protected under the planning system, e.g. Planning Policy Statement 9 (PPS9) for Regionally Important Geodiversity Sites (RIGS), Sites of Importance for Nature Conservation (SINCs) and Local Geodiversity Sites (LGS).

So the clear message is that, if there is any possibility that a site might be legally protected, this needs to be checked before any collecting takes place.

Take pictures, not specimens, if it is a legally protected site.

Following up the activity:
Try adding your own examples to this exercise, such as:

- a fossil *Gryphaea* shell in a mudslide (would be destroyed – so better to take it);
- a fossil in a stone wall (ask the land-owner if you can take it, if not cemented in and can be replaced by a similar stone);
- a dragonfly wing on a broken piece of mudstone below a rock face (collect it, because it would easily be lost or destroyed, but take it to an expert);
- ancient ripple marks in an old quarry (leave them for others to enjoy and interpret).

Encourage pupils to report significant finds to their parents or teachers, and to inform the local geoconservation group (e.g. museum).

Underlying principles:
Decisions on whether or not to collect mineral/ rock/ fossil specimens depend upon a range of circumstances, including: legal protection of the site; rarity of specimen; how important it is as evidence for how the rock originally formed; why it is being collected (ranging from *'to look good on a shelf'* to, '*to be used for research purposes'*); amount of damage caused by removing it; how quickly it would be destroyed by natural processes; how safe it is to collect; whether the owner of the site has given permission, etc.

Thinking skill development:
Cognitive conflict and metacognition are generated by discussion of issues like these. The principles derived can be applied to 'real world' circumstances using bridging skills.

Resource list:

- scissors, to cut out cards and scale

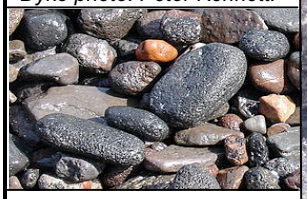
Useful links:
Type 'geoconservation',or 'geological conservation' [this has a slightly different meaning] into a search engine like Google to find out more about issues of geological conservation.

Source: Original idea by Cynthia Burek, Professor of Geoconservation at University of Chester, UK. Worked up into this form by Chris King of the Earthlearningidea Team.

Take it or leave it? – the geoconservation debate cards

A piece of igneous rock knocked off a dyke on a beach.

Dyke photo: Peter Kennett.



Pebbles – caption on p1.

Dinosaur footprints preserved in a building in Dinosaur State Park, Rocky Hill, Connecticut, USA.

Photos: GNU Free Documentation License, Version 1.2.- Daderot.

Lepidodendron plant fossil in an overgrown quarry.

Photos: Peter Kennett.

Ammonite fossil in loose rock fragments in a working quarry.

Photos: Peter Kennett

Turritella gastropod and shark's teeth fossils from a trench in the garden.

Photos: Peter Kennett.

Dalmanites trilobite on a wave-cut platform.

Photo: Creative Commons Attribution-ShareAlike 2.0 license - Ian Balcombe.

Trilobite photo: Peter Kennett.

Brachiopod shells in the rock face of an abandoned quarry.

Quarry photo: Peter Kennett.

Photo: I, Abyssal, release this work into the public domain.

Clay specimen from the KT boundary (Cretaceous/ Tertiary boundary, at the time when the dinosaurs became extinct).

Photo: Licensed by Creative Commons Attribution-Share Alike 2.5 Generic license - w:en:User:Nationalparks.

Minerals in a mineral vein in an abandoned quarry.

Vein photo: Peter Kennett.

Photo: Creative Commons Attribution-ShareAlike 2.0 license - Ashley Dace.

Discarded granite worktop.

Photo: Peter Kennett.