

Three Cliffs Bay Geotrail Worksheet



Swansea
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Abertawe



**To use this worksheet you
will need access to Google
MyMaps**

**Click here to go to the Three
Cliffs Bay Geotrail**

Introduction

This geotrail was inspired by the Scratching the Surface geology and landscape walks series by Dr Geraint Owen. It covers a broad range of geological concepts including sedimentary rocks, fossils, mountain building, folding and faults. This walk also begins to introduce geological mapping skills.

How to use this worksheet

The location of each stop is indicated on Google MyMaps. Each stop has an explanation with accompanying photographs showing key features of the site. This worksheet provides activities that can be done at each of the stops. Answers can be found at www.s4science.co.uk/geotrails/geologytrails/threecliffsbay.



Stop 1: Conglomerate and slickensides

Activity

Bedding

Try to identify the layering (bedding) in the conglomerate by studying the structure of the full outcrop. You might also find bands of different size pebbles within the larger beds.



Conglomerate outcrop at stop 1 showing thick (up to 1m) bedding at an angle of around 45 degrees



Limestone outcrop at stop 3 showing thin (less than 20cm) bedding at an angle of around 90 degrees

Q1. How many different types of pebbles can you find (look for different colours)? Which type is the most common and what is it?

Field Notes and Sketches

Q2. Describe the conglomerate.

Use the following prompts to help:

- What colour is the rock?
- What size are the clasts? Give a range.
- How rounded are the clasts? This is not how circular they are but how smooth the edges are. Use one of the following terms to describe their roundness: Well rounded, Rounded, Sub-rounded, Sub-angular, Angular, Very Angular
- What type of clasts are there? What is the most common?
- What is surrounding the clasts? Is it a mineral (known as cement) or finer sediment (known as matrix)?



Conglomerate



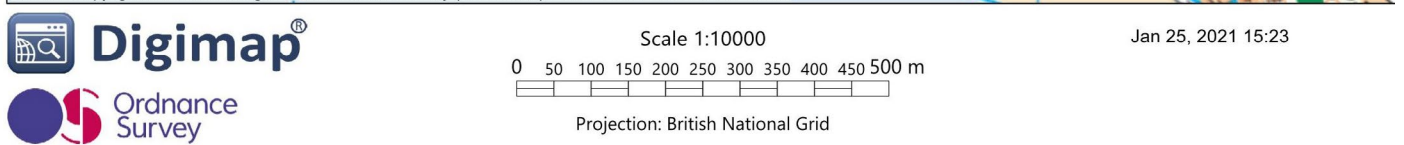
slickensides

Activity

Slickensides

Run your fingers along the slickensides, which direction does it feel smoothest? This is the direction the rocks were moving against each other.

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Stop 3: Limestone and fossils

**Identify the
fossils using the
identification
sheet**

Q1. How many different types of fossils can you find?
Draw the different species of fossil in the space below
and identify them using the photos provided on the identification page.

**Remember the fossils are 3D and could be cut in any
direction, meaning one species of fossil could create many
different shapes on a 2D rock surface.**

Remember to add a scale and label your sketch

Storm beds

Identify as many storm (fossil) beds as you can. How far apart are they?
This tells you how regular the storms were.



*Storm bed in the laminated
limestone at stop 3*

Field Notes and Sketches

Stop 4: Folds and faults

Activity

Mountain building

From which directions would pressure have been applied to create the fold here? Hint: try pushing two sides of a piece of paper to see how it folds, your hands are applying a compressional force as would have happened during the mountain building event that formed this fold.



Fold at stop 4

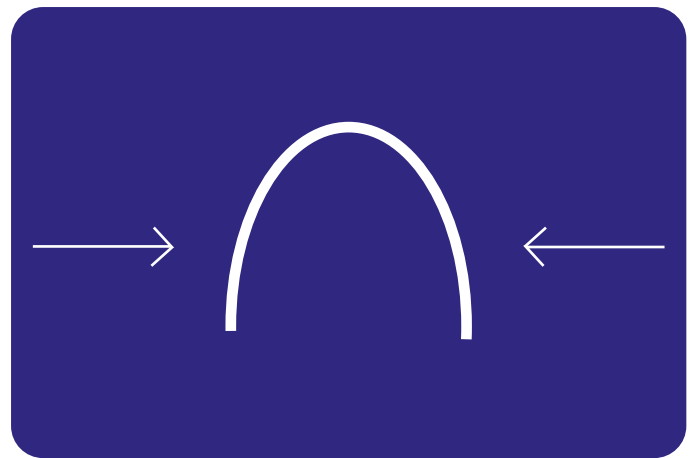


Diagram showing compressional stress needed to create a fold

Field Notes and Sketches

Stop 5: Caswell Bay Mudstone

Q1. Locate yourself on the map below. From your current location draw a straight line on the map in a NW-SE direction as far as the stream in the middle of the bay. This line represents the strike of the Caswell Bay Mudstone. Now look across the bay in the direction of strike, where would you expect the Caswell Bay Mudstone to be found?



*OS map of Three Cliffs Bay downloaded
from Digimap*

Use a pencil; you may need to rub parts of your line out at the next stop

Stop 6: Fault in the bay

Answer the following questions using the map from stop 5:

Q1. The strike of the Caswell Bay Mudstone here is very similar to that found at stop 5. Draw a line at this location towards the centre of the bay in the correct orientation to represent the strike of the Caswell Bay Mudstone on this side of the bay. Notice your two lines don't join. This is because the rocks have been displaced by the fault through the centre of the bay.

Q2. Draw the fault on the map. This will be a straight line through the centre of the bay. Think carefully about the most likely orientation of the fault. Add arrows either side of the line to indicate the direction of movement along the fault.

Q3. You can now extend the lines which represent the strike of the Caswell Bay Mudstone as far as the fault line. They do not cross the fault because the fault cuts through the rocks (This is where you may need to rub out some of the line you drew earlier).



Aerial view of Three Cliffs Bay

Stop 7: Glacial deposits

Q1. Describe the glacial head using the same check list as used to describe the conglomerate at stop 1.



Glacial head

Q2. Look at the dip of the bedding in the periglacial head, notice it is not horizontal. However, the deposit has not been deformed. How could this sediment have been deposited with bedding at an angle? Hint: The shape of the landscape during the deposition of this unit would have been similar to what it looks like today.



Try our other geotrails at
[www.s4science.co.uk/
geotrails/geologytrails](http://www.s4science.co.uk/geotrails/geologytrails)

Find the answers at [www.s4science.co.uk/
geologytrails/threecliffsbay](http://www.s4science.co.uk/geotrails/geologytrails/threecliffsbay)



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