Funded by Defra's Aggregates Levy Sustainability Fund, administered by English Nature.

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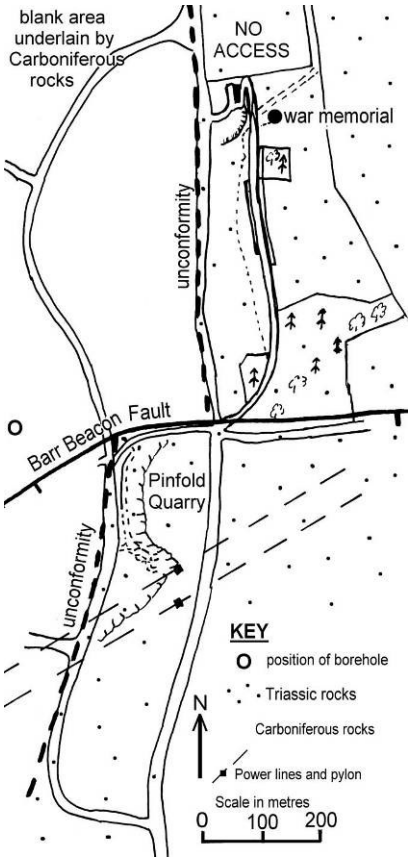
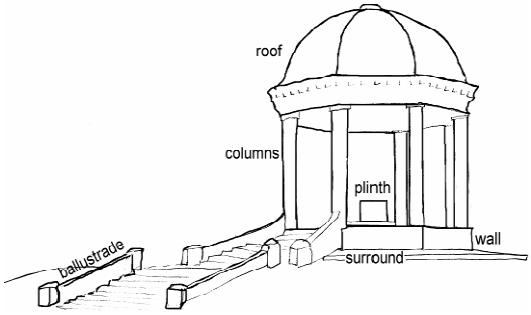
WORKSHEET 1 **Pupil Name .....**

Site 1: Investigating the Barr Beacon War Memorial.



1. Mark your location as "**site 1**" on the map to the left.
2. Mark each of the other sites on the map as you come to them.
3. Investigate the materials used to make the different parts of the memorial, and how they are being weathered. Record your observations in the tables below.
4. On the diagram mark on the SW and NE sides of the sketch. Draw an arrow to show the direction of main wind (and rain)



	Description of the material used	Reason it was used.
Roof		
Columns		
Plinth		
Wall		
Surround		
Ballustrade		

	Evidence of weathering	Weathering type
Roof		
Columns		
Surround		
Ballustrade & steps		

WORKSHEET 2 **Pupil Name .....**

Site 2: Curbs and Steps

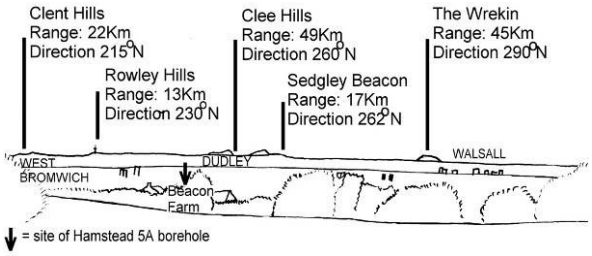
On each side of the road are curb stones and steps. Look closely at them and try to identify the materials they are made from.

THESE MATERIALS …	… ARE BEING USED FOR THESE MAN MADE STRUCTURES
Red brick	
Concrete slabs	
Rounded quartz pebbles	
Cement / mortar	
Angular dolerite pebbles	
Tarmacadam	

THESE MATERIALS …	… HAVE THESE PROPERTIES THAT MAKE THEM USEFUL HERE
Red brick	
Concrete slabs	
Rounded quartz pebbles	
Cement / mortar	
Angular dolerite pebbles	
Tarmacadam	

WORKSHEET 3 **Pupil Name .....**

Site 3: The viewpoint to the SW.



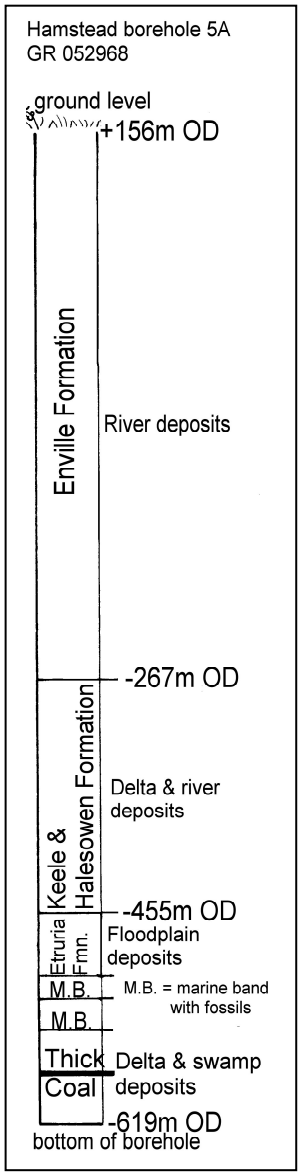
1. Estimate how far you can see today. _____Km

2. Why are the hills higher than their surroundings?

_____

_____

_____



3. Notice the buildings in Walsall in the distance. What natural materials might have been used to make:

Walls	
Roof	
Windows	
Heating oil	
Roads	
Electric wires	

4. Why do you think the Hamstead borehole (left) was drilled?

_____

_____

_____

5. How was the coal seam formed?

_____

_____

_____

6. During the time these beds were deposited, how many times was the area flooded by the sea?

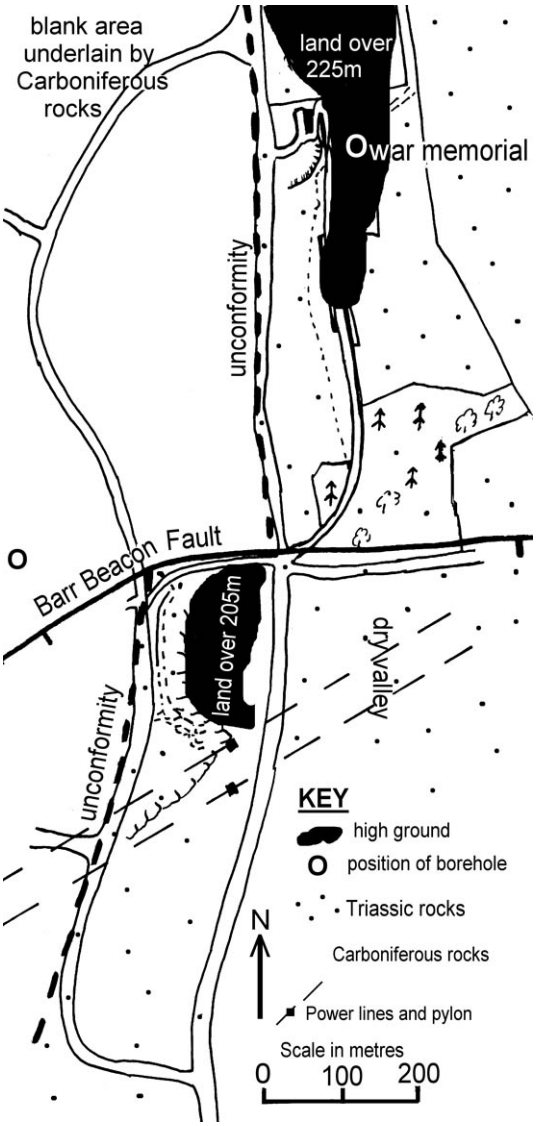
_____

_____

_____

WORKSHEET 4 **Pupil Name .....**

Site 4: The viewpoint to the South.



1. Mark your position, site 4 on the map.

2. What feature is marked on the map running from east to west near your position?

_____

3. You have been walking along the Barr Beacon Ridge, but in front of you is a valley. What has happened to the ridge? (Hint: Look at the dark areas on the map)

_____

_____

_____

4. Describe the valley in front of you.

_____

_____

5. Why is there no river in the bottom of this valley?

_____

6. Look at the soil you are standing on. Describe it.

_____

7. Can you suggest what differences there must have been either to the climate, or the permeability of the soil when the river cut this valley in the past?

_____

WORKSHEET 5 **Pupil Name .....**

Site 5: A study of the boundary wall

Inspect the dark blocks in the wall along the pavement near the Barr Beacon Nature Reserve entrance. Describe the rock that forms these blocks using the table below to help you.

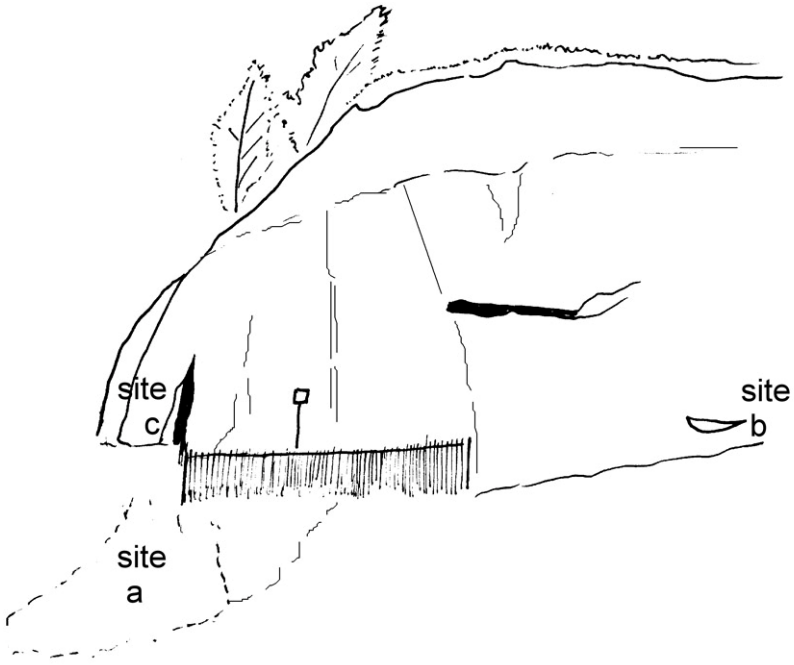
What colour are these blocks?
Do they show bedding planes?
Are they made up of interlocking crystals?
Is the rock coarse medium or fine grained?
What kind of rock is it?

Site 6: Field sketch of Pinfold Quarry

On the sketch label the following features.

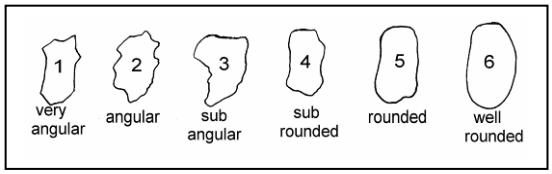
1. Joint plane
2. Bedding plane
3. Scree
4. oldest bed
5. youngest bed
6. soil & vegetation
7. conglomerate
8. sandstone

Draw in one or two bedding planes on the lower right side of the face.



WORKSHEET 6 **Pupil Name .....**

Site 6a: Pinfold Quarry pebble study.

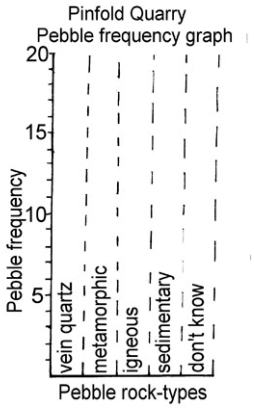


1. PEBBLE SHAPE INVESTIGATION.
Use the diagram on the right to help you describe the rounding of theses pebbles.

The shape of most of the pebbles is _____

2. PEBBLE-TYPE INVESTIGATION.
Drop a marker, such as a pen, on the scree and pick the 20 pebbles closest to it. Use the pebble sheet to help you identify them and record the frequency of pebble types below. Then graph your results on the right.

VEIN QUARTZ	IGNEOUS	META-MORPHIC	SEDIMENTARY	DON'T KNOW
Your results Total =	Total =	Total =	Total =	Total =
All results. Total =	Total =	Total =	Total =	Total =



3. TRIASSIC CURRENT VELOCITY INVESTIGATION
Find the **largest** unbroken pebble in your part of the scree and measure the long axis. Use the table below to work out the minimum speed of flowing water needed to transport that pebble. Summarise your conclusions on the right.

Diameter of Fragment in mm.	Approximate Minimum Flow Velocity to Deposit this Sized Fragment
Over 100 mm	400 cm per second (extremely high shooting flow)
Over 64mm	300 cm per second. (extremely high flow)
4mm to 64 mm	100 cm per second (very strong flow)
2mm to 4 mm	60cm per second (fast flowing stream)

The longest axis of the largest pebble is _____mm.

This means that a minimum flow speed of at least _____ cm. per. second would have been needed to deposit this fragment during Triassic times.

4. SUMMARY.
Most of these pebbles are _____ in shape. The two most common pebble types are _____ and _____. The largest pebble is _____mm across, and suggests a flow of _____ cm per second when it was deposited in the Triassic period.

WORKSHEET 7 **Pupil Name .....**

Site 5a: The Story of pebbles inside a pebble.

A pebble is formed when a rock is physically weathered into small lumps. This means that the formation of a pebble marks the beginning of a new Rock Cycle. How many Rock Cycles can you see evidence for in the conglomerate pebble?

Stage of Rock Cycle		Evidence seen or deduced in Pinfold Quarry
0 million years ago Deposition	THIRD CYCLE	
Erosion & Transportation		
Weathering		
Uplift		
245 million years ago Deposition	SECOND CYCLE	
Erosion & Transportation		
Weathering		
Uplift		
400 million years ago Deposition	FIRST CYCLE	
Erosion & Transportation		
Weathering		
Uplift		

WORKSHEET 8 **Pupil Name .....**

Site 6b: Measuring a rock sequence.

Measure a 1 metre thickness of rock, starting from the bottom of the face. Then look carefully at the beds from bottom to top and decide where the main changes happen: e.g. from sandy to pebbly; from flat bedded to cross bedded. There should be about 3 or 4 divisions depending on where you take the section.

1. Then measure the **thickness** of each and fill in the description in the table below.

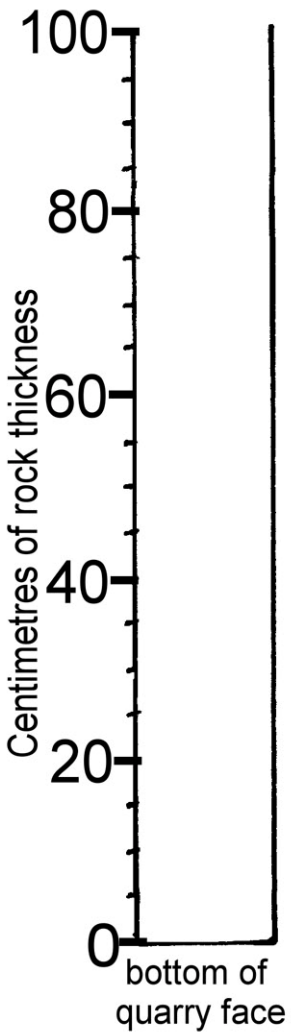
	Thickness in cm.	Description

2. Plot the thicknesses in order on the Graph on the right, from **bottom** to top.

3. Measure the direction of flow for any cross beds you can see

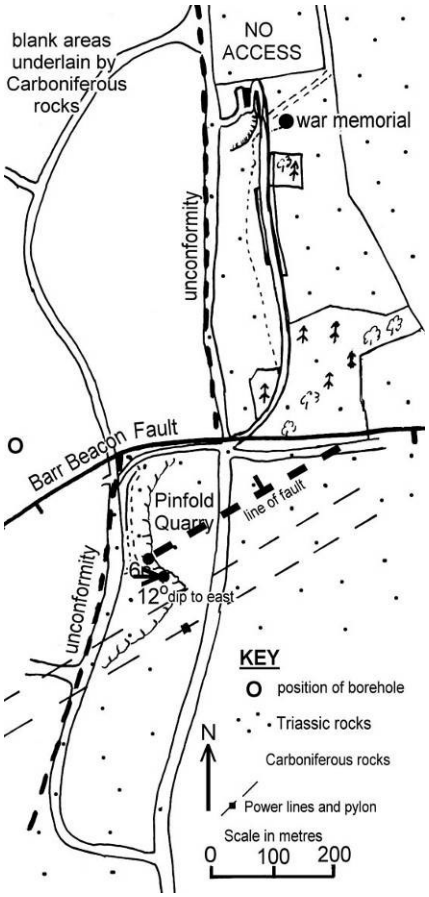
DIRECTION: _____

4. Sketch your section of rocks here.



WORKSHEET 9 **Pupil Name .....**

Site 6c: Investigating a break in the rocks.



1. Sketch the fault in the space below.
2. On your sketch mark on the following
   - **a:** bedding planes
   - **b:** fault plane
   - **c:** fault plane in filled with pebbles
   - **d:** down throw side and up throw side

3. Measure the **dip of the beds** and record the direction and amount of dip.

The direction: _____ and the Dip Amount: _____

4. Draw an arrow showing this direction on the map at site **6c**.

5. Use a compass to measure the direction of the fault. _____

6. Draw a line in this direction on the map to show the fault running into the hillside.

7. Did this fault occur **before** or **after** the deposition of the conglomerate beds which are on top of the sandstones?

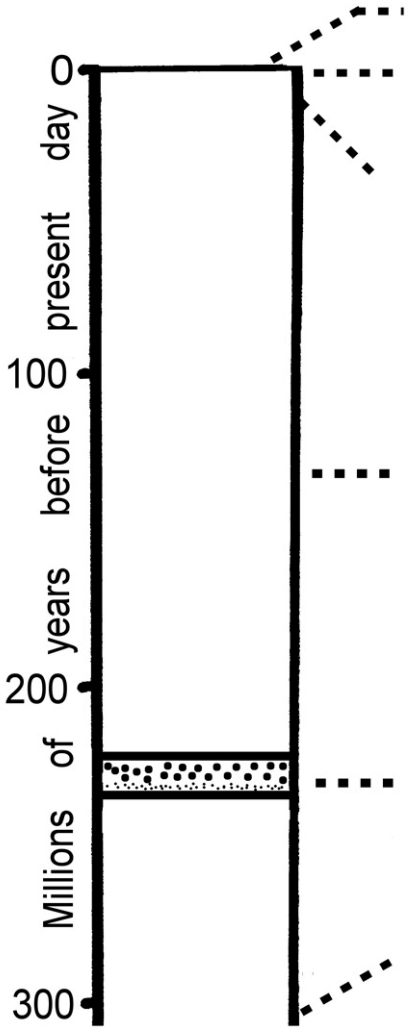
ANSWER: _____

8. How do you know?

_____

WORKSHEET 10 **Pupil Name .....**

Summary of events at Barr Beacon Nature Reserve.



Write each of the sentences below in the correct box in the summary column above:

1) A very long period when faulting, weathering and erosion occurred;
2) Deposition of the sandstone in a desert environment;
3) Transport & deposition of rounded pebbles to form conglomerates;
4) Quarrying of the rocks for aggregates (sand & gravel);
5) Erosion of pebbles to form scree in the quarry;
6) Erosion of dry valleys by rivers now dried up;
7) Deposition of coal and other rocks before the Triassic period began.

WORKSHEET 11 **Pupil Name .....**

PUPIL HOMEWORKSHEET: The two rock cycles at Barr Beacon.

FIRST CYCLE: deposition. What can you say about the deposition of the older beds you have seen [The Hopwas Breccia and Kidderminster Conglomerate]?
FIRST CYCLE: uplift and tilting. What can you say about the changes to the beds cause by plate tectonics? HINTS: tilting and faulting..
SECOND CYCLE: weathering and erosion. What evidence of present day weathering and erosion have you seen? HINTS: screes, vegetation etc.
SECOND CYCLE: sediment transport. How have you seen weathered sediments being transported?
Human Use Of Stone and Aggregate (sand and pebbles)