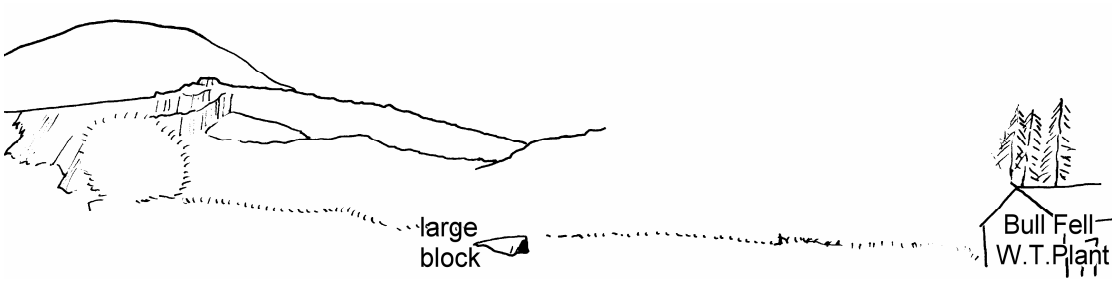
Funded by Defra's Aggregates Levy Sustainability Fund, administered by English Nature.

Contact: info@ukrigs.org.uk

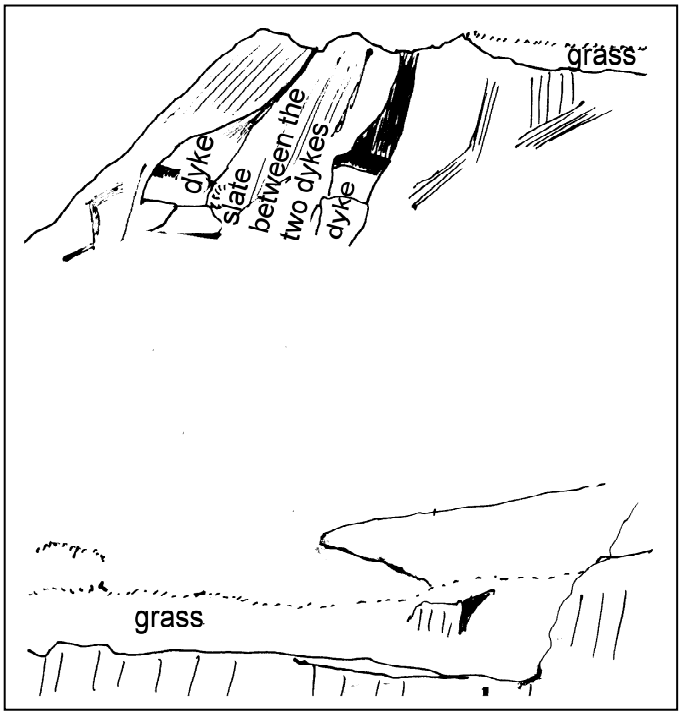
WORKSHEET 1 PUPIL NAME .....

School House Quarry. On the sketch below:

i) Label **the west and east ends** of the sketch, then
ii) Draw in the **dipping layers** beyond the trees on the left.
iii) **Complete the skyline** at the right side of the sketch, and then
iv) Label the following features you have observed at the quarry.
scree, marshy ground, folds, dykes, trees growing into the rock.



Field Sketch of Dykes. (looking west from behind BFWT Plant) Complete the lower part of the sketch and then label:
metamorphosed slates with cleavage; 2 dolerite dykes; cooling joints; slate between the dykes; and quartz veins cutting the dykes



YOUNGEST
OLDEST

Put these 3 events in order in the boxes, youngest at the top.

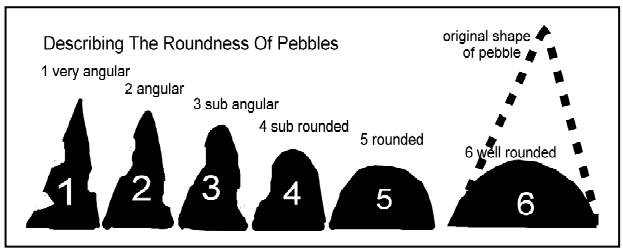
- Intrusion of dykes;
- slate formed by metamorphism;
- quartz veins formed

WORKSHEET 2 PUPIL NAME .....

Rounding / Angularity Study At Stone Ends Quarry.

Without disturbing the face, drop a marker (e.g. a pen) at random and then use the scale below to help you describe the rounding / angularity of the edges of the 20 pebbles closest to your marker. Also measure the longest axis of largest **rounded** fragment you study, and record it below.

INFORMATION:
The diagram to the right helps you to describe pebble rounding/angularity.
The table below gives the minimum speed of flow if the pebble was deposited by flowing water.



Diameter of Fragment in mm.	Minimum Stream Velocity to Deposit this Fragment
Over 100 mm (Cobble)	400 cm per second (extremely high shooting flow)
Over 64mm (Cobble)	300 cm per second. (extremely high flow)
4mm to 64 mm (Pebble)	100 cm per second (very strong flow)
2mm to 4 mm (Gravel)	60cm per second (very fast flowing stream)
2mm to 0.5 mm (Coarse sand)	12 to 15 cm per second (more normal stream flow)

Is it likely this material has been transported by flowing water?
(Circle your answer)

Yes / No

If so what can you say about the minimum speed of flow?

It was at least

_____per second

DATA COLLECTION:

Rounding (1 to 6)	Place a cross in this column for each of the 20 pebbles you describe.	Count the number of pebbles for each of the 6 categories.
Very Angular 1		
2		
3		
4		
5		
6 Well Rounded		

To help you compare this site with the next one, add up the number of angular pebbles (1, 2 & 3) and the number of rounded pebbles (4, 5 & 6). Add your results to the other group's results to get an even bigger sample to compare.

The longest axis of the fragments I measured is:
_____ mm

Is this deposit:
(Circle your answers)

sorted or un-sorted;

bedded or un-bedded;

made of more rounded or more angular fragments;

at the foot of a steep slope;

a ridge along the valley floor;

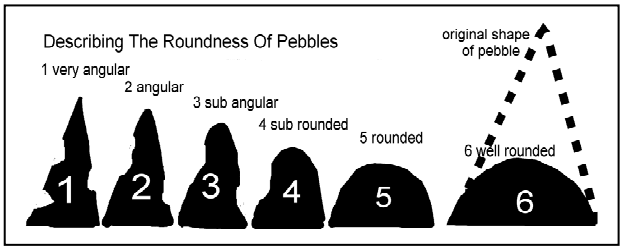
in a stream bed.

WORKSHEET 3 PUPIL NAME .....

Rounding / Angularity Study At Long Hill Quarry

Without disturbing the face, drop a marker (e.g. a pen) at random and then use the scale below to help you describe the rounding / angularity of the edges of the 20 pebbles closest to your marker. Also measure the longest axis of largest **rounded** fragment you study, and record it below.

INFORMATION:
The diagram to the right helps you to describe pebble rounding/angularity.
The table below gives the minimum speed of flow if the pebble was deposited by flowing water.



Diameter of Fragment in mm.	Minimum Stream Velocity to Deposit this Fragment
Over 100 mm (Cobble)	400 cm per second (extremely high shooting flow)
Over 64mm (Cobble)	300 cm per second. (extremely high flow)
4mm to 64 mm (Pebble)	100 cm per second (very strong flow)
2mm to 4 mm (Gravel)	60cm per second (very fast flowing stream)
2mm to 0.5 mm (Coarse sand)	12 to 15 cm per second (more normal stream flow)

Is it likely this material has been transported by flowing water?
(Circle your answer)

Yes / No

If so what can you say about the minimum speed of flow?

It was at least

_____per second

DATA COLLECTION:

Rounding (1 to 6)	Place a cross in this column for each of the 20 pebbles you describe.	Count the number of pebbles for each of the 6 categories.
Very Angular 1		
2		
3		
4		
5		
6 Well Rounded		

To help you compare this site with the next one, add up the number of angular pebbles (1, 2 & 3) and the number of rounded pebbles (4, 5 & 6). Add your results to the other group's results to get an even bigger sample to compare.

The longest axis of the fragments I measured is:
_____ mm

Is this deposit:
(Circle your answers)

sorted or un-sorted;

bedded or un-bedded;

made of more rounded or more angular fragments;

at the foot of a steep slope;

a ridge along the valley floor;

in a stream bed.

WORKSHEET 4 PUPIL NAME .....

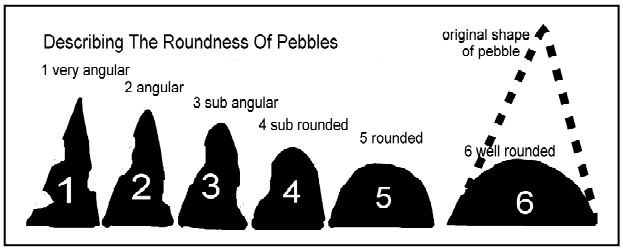
Rounding / Angularity Study At Carrock Beck Ford

Without disturbing the face, drop a marker (e.g. a pen) at random and then use the scale below to help you describe the rounding / angularity of the edges of the 20 pebbles closest to your marker. Also measure the longest axis of largest **rounded** fragment you study, and record it below.

INFORMATION:

The diagram to the right helps you to describe pebble rounding/angularity.

The table below gives the minimum speed of flow if the pebble was deposited by flowing water.



Diameter of Fragment in mm.	Minimum Stream Velocity to Deposit this Fragment
Over 100 mm (Cobble)	400 cm per second (extremely high shooting flow)
Over 64mm (Cobble)	300 cm per second. (extremely high flow)
4mm to 64 mm (Pebble)	100 cm per second (very strong flow)
2mm to 4 mm (Gravel)	60cm per second (very fast flowing stream)
2mm to 0.5 mm (Coarse sand)	12 to 15 cm per second (more normal stream flow)

DATA COLLECTION:

Rounding (1 to 6)	Place a cross in this column for each of the 20 pebbles you describe.	Count the number of pebbles for each of the 6 categories.
Very Angular 1		
2		
3		
4		
5		
6 Well Rounded		

To help you compare this site with the next one, add up the number of angular pebbles (1, 2 & 3) and the number of rounded pebbles (4, 5 & 6). Add your results to the other group's results to get an even bigger sample to compare.

The longest axis of the fragments I measured is: _____ mm

Is it likely this material has been transported by flowing water?
(Circle your answer)

Yes / No

If so what can you say about the minimum speed of flow?

It was at least

_____per second

Is this deposit:
(Circle your answers)

sorted or un-sorted;

bedded or un-bedded;

made of more rounded or more angular fragments;

at the foot of a steep slope;

a ridge along the valley floor;

in a stream bed.

Put the sediments at these three sites in order of the amount of rounding they show.
STONE ENDS; LONG HILL; CARROCK BECK

A (most rounding)**..... B..... C** (least rounding)**.....**

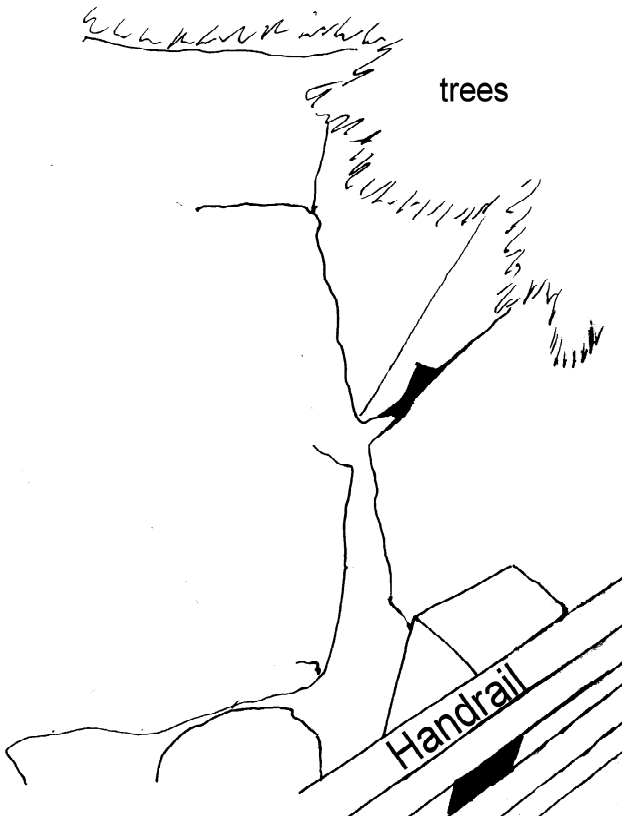
WORKSHEET 5 PUPIL NAME .....

Describing The Rocks At Howk Mill Gorge.

What is the colour of the rocks?	
Are they bedded?	
If so is the bedding horizontal or not?	
Are the beds jointed?	
Are they made of grains or interlocking crystals?	
Are the rocks porous?	
Do the rocks react with dilute HCl?	
What name do we give to this rock?	
Do they contain fossils?	
Were the fossils broken (washed around by currents)?	
In what kind of environment was this rock probably formed?	
No graptolites have been found in these rocks. Give a reason for this.	
What was the stone used for?	
The length of the gorge between Howk Mill and the footbridge is about 150 metres. Estimate the height and depth of the gorge and multiply the figures to get the volume of rock eroded to form it.	

WORKSHEET 5 PUPIL NAME .....

Field Sketches at Howk Gorge.



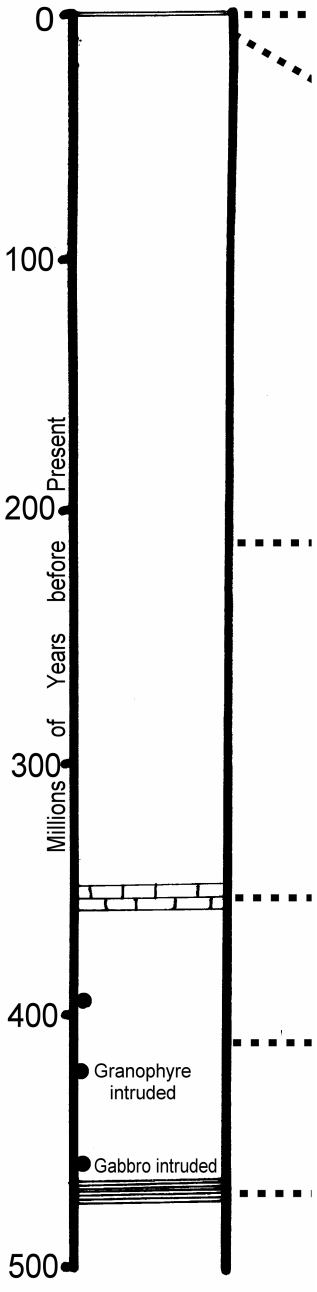
Complete the left hand side of the sketch of the gorge from the footbridge and label:

- an eroded joint;
- sharp bend in river, guided by joints.
- Draw in and label the fallen block and its bedding planes.

In the space here sketch the weathered joints in the river bed 500 metres above the bridge.

WORKSHEET 7 PUPIL NAME .....

Geological Event Summary Worksheet.



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

1) Deposition of limestone in warm shallow seas;
2) Deposition of mud with graptolites in deeper seas;
3) Metamorphism of shales to slate, with dyke intrusions, uplift, tilting, weathering and erosion;
4) Glacial erosion and deposition of moraines and meltwater deposits;
5) Present day weathering and river erosion;
6) Uplift, weathering and erosion. Evolution and extinction of dinosaurs; evolution of mammals.