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

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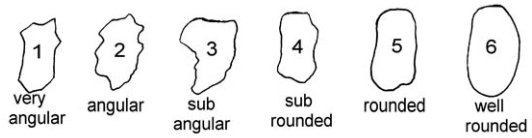
WORKSHEET 1 **Pupil Name .....**

Location 1: Rock Type Description Sheet.

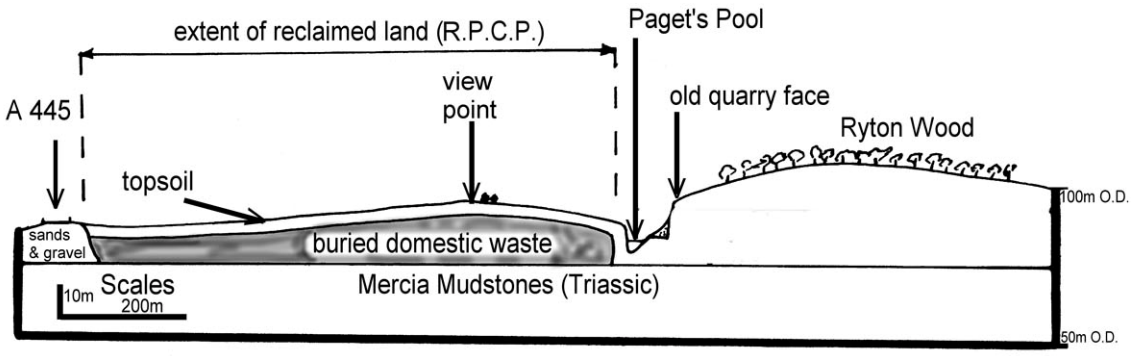
Rounding /angularity scale  	**DESCRIPTION OF ROCK AT LOCATION 1**
Is the material made of loose pieces or is it in a layer?	**It is made of loose pieces.**
Are the pieces in the rock mainly the same size, or are there different sizes?	**Roughly all the same size. Fragments this size are called "cobbles".**
Are the fragments mainly rounded or mainly angular?	**Mainly angular.**
Is the rock making up the fragments porous or not?	**No.**
Does it react with dilute HCl.?	**No.**
Is the rock made of interlocking crystals? If so how many different coloured ones can you see?	**No.**
Is the rock made up of fragments "stuck" together?	**Yes.** **2 red and black.**
What kind of rock is this Igneous, metamorphic or sedimentary?	**Igneous.**
In what environment was it probably formed?	**Coarse crystals mean the igneous rock cooled slowly deep underground.**

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

1) Mark on the sketch below the east and west ends of the section.

2) At the viewpoint, what lies below the topsoil? **_buried domestic waste_**

3) Approximately how far below the soil is it? _____**6 – 8** _____metres



4) Explain why you can't see the Mercia Mudstone outcropping in the middle of the Country Park.

It is buried below the domestic waste up to about 20 metres below the surface.

5) Explain why you can't see the sands and gravels in the middle of the Country Park.

They have been quarried away and used in the construction industry.

6) The Mercia Mudstones are non-porous. How do you think this affects the water level in Paget's Pool?

It prevents the water seeping away below the base of the sands and gravels. This keeps the water level in the lake higher than it would otherwise be.

Location 5: At the old quarry face draw in the horizontal bedding plane on the right hand side of the section between the sands and the till. (Dotted line where it is above ground, and solid line below ground)

Draw an arrow and label the slumped material (which is already marked on the sketch).

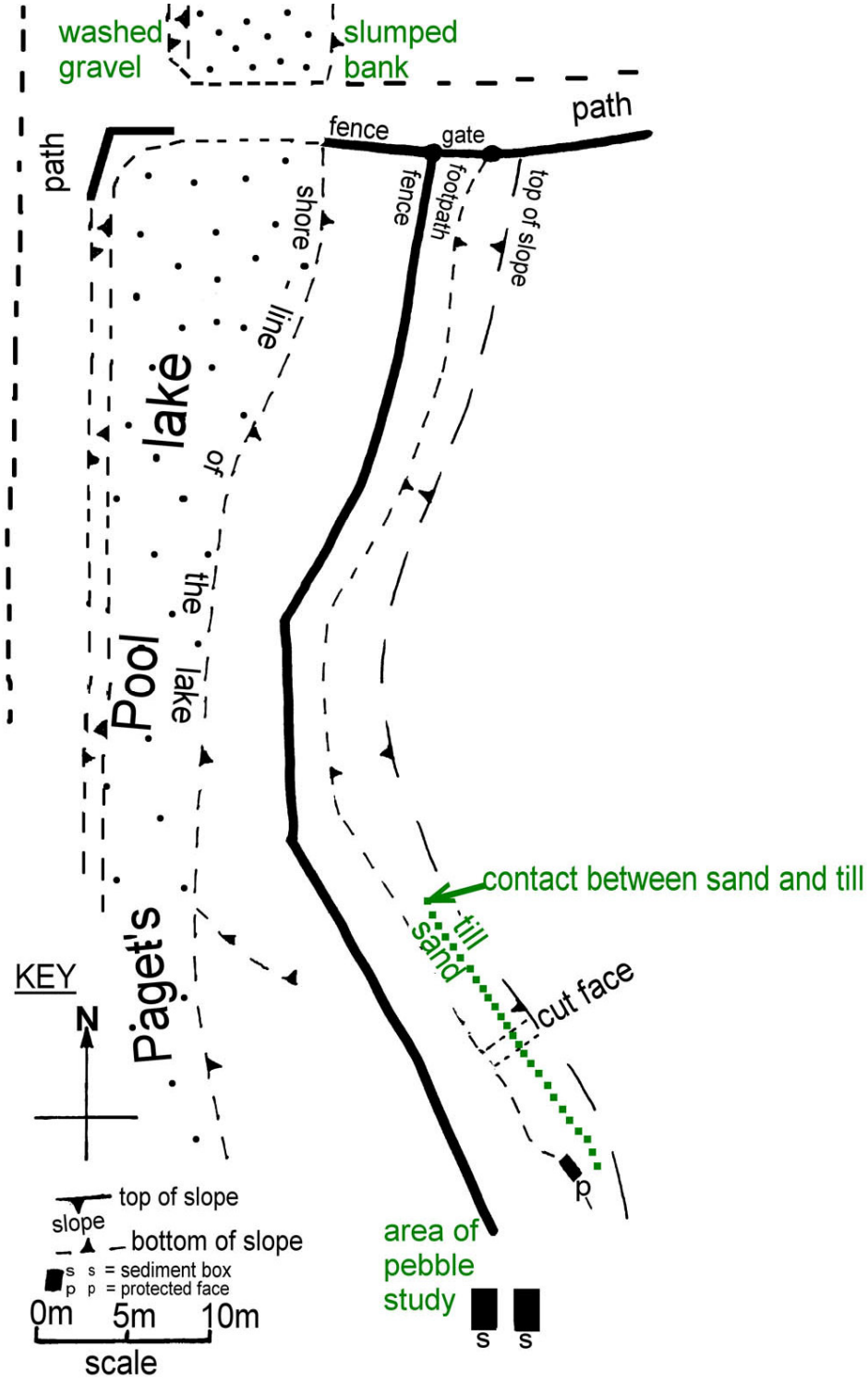
WORKSHEET 3 **Pupil Name .....**

Location 3: Old Landscapes Under Your Feet.
Use the information on the display board to help you answer the questions below.

What name was given to the river which flowed through here 500,000 years ago?	**Bytham River.**
What kinds of sediment did this river deposit?	**Gravels and sands.**
What animals lived by this river, died and had their bones buried in the gravel?	**Straight tusked elephants, horses and bison.**
What was the climate like 500,000 years ago?	**Rather like today: temperate.**
What human-made tools have been found and what were they made of?	**Hand axes made from volcanic igneous rocks probably from the Lake District.**
What did the humans eat?	**The animals that they hunted (plus fruits and other plants)**
What eventually happened to make the animals and humans move away from the area?	**The climate grew colder and the ice moved into the area from the north. This prevented plants from growing so the animals moved away and the hunters followed them.**

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

Locations 4 and 5: Base Map.
On your base map mark on the following:
1) The places where you saw the paths being eroded.
2) The place where you did your pebble survey.
3) The line of the bedding plane you saw between the till and the sand.

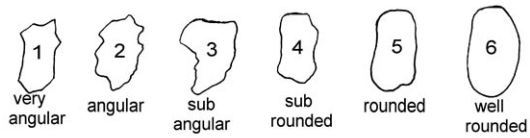


WORKSHEET 5 **Pupil Name .....**

Location 5: Describing the Pebbles.
Drop a marker (e.g. a pen) over your shoulder and pick the 50 pebbles closest to it. Put them into 4 groups (quartz, metamorphic, igneous & sedimentary) and write the numbers in each group in the table below. Add the results from another group.

	Vein quartz (White)	Metamorphic (brownish)	Igneous (interlocking crystals)	Sedimentary (cemented grains)
GROUP 1 (YOUR RESULTS)				
GROUP 2				
TOTAL (& %)	**about 20%**	**about 48%**	**about 16%**	**about 16%**

Describing rounding.
Use this scale to describe the roundness of your 25 pebbles. Mark a cross for each pebble.



	1 (very angular)	**2** (angular)	**3** (sub angular)	**4** (Sub rounded)	**5** (rounded)	**6** (Well rounded)
Number of pebbles					**Mainly rounded and well rounded.**	

Speed Of Current. Measure the long axis of the largest pebble and use the table below to estimate the speed of flow of the river which deposited it.

Diameter of Fragment in mm.	4mm to 64 mm (Pebble)	2mm to 4 mm (Gravel)	2mm to 0.5 mm (Coarse sand)
Minimum Velocity to Deposit this Fragment	100 cm per second (very strong flow)	60cm per second (very fast flow)	12 to 15 cm per second (normal stream flow)

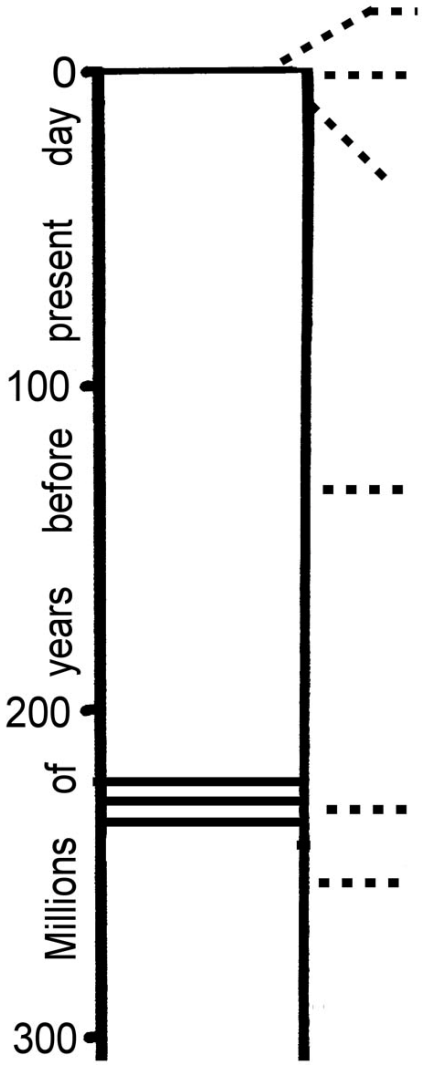
To deposit these pebbles the flow must have been at least_**100**_cm per second.

Now explain how you think this deposit was formed?
Remember to include observations about weathering, erosion, and transport (flow velocity), followed by deposition. How did these things happen? What is your evidence for these conclusions?

The sand and the pebbles must have been weathered and eroded from older rocks. Cross bedding in the gravels suggests the flow was from the SW. The main rock types of pebbles are quartzite and quartz, which were resistant enough to survive transport. The size of the pebbles suggests the minimum speed of flow was around 100 cm. p. second to deposit them.

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

Summary Worksheet.



Weathering and erosion of the till and sands and gravels begins after glaciation (Rock Cycle 3).

Deposition of till in a glacial environment. Ice moving from the north and north east.

Deposition of sand and gravel in a river flowing north eastwards (Rock Cycle 2). The climate is mild but getting colder.

A very long period of weathering and erosion.

Deposition of the Mercia Mudstone in a desert lake environment.

Transport & deposition of rounded pebbles to form Triassic rocks (Rock Cycle 1).

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

1) A very long period of weathering and erosion.
2) Deposition of the Mercia Mudstone in a desert lake environment.
3) Transport & deposition of rounded pebbles to form Triassic rocks. (Rock Cycle 1)
4) Deposition of till in a glacial environment. Ice moving from the north.
5) Weathering and erosion of the till and sands and gravels begins after glaciation. (Rock Cycle 3)
6) Deposition of sand and gravel in a river flowing northeastwards. (Rock cycle 2) The climate is mild, but gradually getting colder.

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

Pebbles and Rock Cycles at Ryton Pools

Present day – Pebbles in The Current Rock Cycle: What is happening to these pebbles today?. HINT: Why are some not still embedded in sand? What might happen to them if humans don't interfere?

Quarrying has exposed the sands and gravels to weathering and erosion. These processes have released the pebbles from the gravels. If humans don't interfere they will be transported by the River Avon to the River Severn and southwards to the Bristol Channel.

600,000 years ago: Pebbles in The Second Rock Cycle: What can you say about how these pebbles were brought to Ryton Pools? HINT: evidence for transport and deposition.

The cross bedding in the gravels show the current was flowing from the SW and the size of the pebbles indicate the flow must have been 100 cm per second as a minimum to deposit these pebbles.

The deposit is in a sheet and not in a channel suggesting the river was probably braided. The rocks to the southwest must have included pebbles of quartz and quartzite.

210,000,000 years ago: Pebbles in The Ancient Rock Cycle: The rounded quartz and quartzite pebbles came from rocks deposited in the Triassic period. What can you say about this rock cycle? HINT: Evidence of what kinds of rock must have been eroded to provide the pebbles? How much transport did they experience?

210 million years ago rounded pebbles of mainly quartz and quartzite were being deposited and becoming cemented into Triassic pebbly sandstone. These very resistant pebbles must have undergone a large amount of transport to become so well rounded.