Video question script: Will my gravestone last?

Video No:	Question/Activity	Likely response	Rationale
1	In teaching about the Earth we use field activities to explore Earth processes. This example explores the geology of gravestones through the Earthlearningidea 'Will my gravestone last? - Testing scientific ideas in a graveyard". This example uses Ecclesall Churchyard in Sheffield, representing an inland location in England.		Preparation for bridging from locally available rocks to wider Earth processes
1	General briefing on what we will be doing, to enable answers to the questions below	Some express concern about working in a graveyard. Must be sensitive to other visitors and to pupils' cultural traditions. Must seek permission to visit the graveyard and from the parents of the pupils to take them there.	Concrete preparation: familiarisation with the approach
1	What differences in the gravestones might we expect?	Different sizes, shapes, rock types, dates, facing directions, positions in the graveyard, inscriptions	Construction: applying previous knowledge to possible graveyard patterns
1	What do we need to take with us? Note that although we are using acid, it is dilute acid, little stronger than vinegar, but they should not get it in their eyes, mouth or a cut and wash it out with water if they do.	Plotting sheet; acid bottle; water bottle; compass; hand lens; tyre depth gauge; key to rock types; photos of some rock types; First Aid kit Point out that acid is often used to clean gravestones – so its use in a graveyard is not a problem	Concrete preparation: ensuring they are familiar with the equipment
1	What risks must we consider?	Suitable clothing; traffic en route; slippery grave slabs; leaning gravestones; getting lost	Concrete preparation: familiarity with potential risks
2	Briefing the group. We shall start at some recently installed gravestones – Why?	To see what the rock types are like when at their best.	Concrete preparation: ensuring familiarity with rock types
2	Ask, "Which rock would you choose for a headstone that would still look	Students' choice, faced with a range of rock types	Bridging: applying current understanding to a new

	good after 200 years?" You will be asked the same question at the end of the visit.		situation
3	Surveying. Ask, "When we split into groups, how should we survey the graves to record the range of rock types and their response to weathering?"	Systematically, so that we don't record the same information. To cover different environments within the churchyard.	Concrete preparation: determining the approach
3	Ask them to look around, then ask "What factors, in theory, might affect the rate at which gravestones respond to weathering?"	Rock type, tree cover; organic growth (lichens, mosses) aspect, in relation to north; whether vertical, horizontal, or sloping	Construction: beginning to apply their observations of the local area to detect patterns
4	Ask "How can we identify the rock types?"	Use the rock identification key; test with acid; hand lens for detail of mineral content and texture	Concrete preparation: use of the key and acid
4	Ask "How can we go into more detail?"	Use the ELI photo sheets of granites alongside the real thing.	Concrete preparation: use of more detail
5	Ask "What factors have actually affected weathering rates?"	Find some examples and search for variables.	Construction: applying prior experience to spot patterns Cognitive conflict: why are there differences in weathering rates of the same rock type?
5	Ask "Can we measure a rate of weathering quantitatively?"	Measure a weathered part against an un-weathered part on the same slab, e.g. tyre depth gauge to measure extent to which lead letters stand out on a marble grave.	Concrete preparation: use of new apparatus
6	Ask "Where do you expect to find the oldest gravestones?" Why?	Near the church, because most burials start near the church and only later spread out as more ground is needed.	Construction: looking for a pattern in the data
6	Ask "Why are ALL these old slabs made of sandstone in this churchyard?	It was cheapest. Why? It is found locally.	Cognitive conflict: explaining a data pattern in different ways

7	Summary – what have we found? Possibilities include: a) Graves near the church are sandstone, further away – more variety (Why?) b) Marbles weather more quickly than other rocks – particularly on the side not facing the wind/sun (Why?) c) Gravestones weather more quickly at the base than the top (Why?) d) Gravestones under trees weather more quickly (Why?) e) Inscriptions on igneous rocks/ slates stay sharper longer (Why?)	Answers to 'Why?' a) Changes in transportation, costs, taste b) Made of carbonate minerals which dissolve in acidic rainwater; facing wind and sun, dry more quickly c) Near the base they stay damper longer (capillary action), which enhances chemical weathering and possible freeze-thaw action d) Under trees – drip water more acidic, stay damper longer e) Crystalline rocks tougher than sedimentary (marble = chemical difference)	Confirming construction: confirming patterns Cognitive conflict: asking for reasons
8	Ask again "Which rock would you choose for a headstone that would still look good after 200 years? Is your answer the same as when you started?"	Students' own responses. Many will have found that white shining marble looks dull and has started to dissolve after just a few years: many sandstones are still in good condition and igneous rocks seldom show much sign of weathering.	Bridging: applying understanding to a new situation Metacognition: reflecting on previous thinking