Video question script: Spot that rock

Question/Activity		Likely response	Rationale
In teaching about identifying and naming rocks we need to go back to first principles to develop a strategy for this. The strategy uses a series of Earthlearningideas: *Rock detective – rocky clues to the past*, *Modelling for rocks: What's hidden inside and why* and *From 'rock detective' to 'Laying out the rock cycle'*			This is a strategy that anyone can use to describe and identify most rocks successfully
Activity 1. Rock clues	Follow the video by asking pupils to describe the two specimens in the ways outlined to spot patterns	The words bits, colour, heavy and rough/ smooth are often used	A construction pattern-seeking exercise
Activity 2. Grain clues	Follow the video to ask the question in the same way, but related to rock grains	The words, shape, size, colour and shininess are often used	Another construction pattern-seeking exercise
Activity 3. Predicting properties	Follow the video by studying the two rock specimens and predicting what will happen to their masses when they are put into water. There are three possibilities, each rock could: • stay the same weight; • get heavier; • become lighter. Write down the predictions and then explain this thinking in a further note	Most respond that: the grainy rock will increase in mass; the speckled rock mass will stay the same. They usually explain that: the grainy rock will become heavier because it absorbs water; the speckled rock won't absorb water and so stays the same	To respond to this question, you have to construct a scenario of what will happen to the rock and use this to make your prediction Differences of opinion cause cognitive conflict Explaining predictions involves metacognition
	Optional extra: If you have time and an electronic balance, weigh each rock and record its mass		
	Now put both rocks into one or two beakers half full of water at the same time and **watch very carefully**. After a timed 30 seconds, remove the rocks and dry them off		
	Optional extra: Reweigh each dried-off rock, record the results and calculate the change in mass		
	Use the video to discuss what happened to the masses of the rocks and why	The grainy rock increased in mass because it absorbed water; the speckled rock increased in mass very slightly because it was still wet when reweighed	This discussion involves constructing a picture of what actually happened to the rock when the activity was carried out Cognitive conflict may have been caused in those who thought the speckled rock would not increase in mass, when it did (slightly) due to still being wet

Activity 3. Predicting properties (continued)	When you were watching very carefully, what did you see?	Most will say that they saw a few small bubbles on the surface of the speckled rock, but that trains of bubbles flowed out of the grainy rock and rose to the surface	
	Did the bubbles from the grainy rock come from the bottom, middle or top of the rock?	In most rocks they come from the top (but sometimes, if the rock has a crack, they may come from the middle or bottom)	
	Why did the air come out in bubbles?	Air is less dense than water and so rises	Constructing a response based on density
	If air was coming out of the top of the grainy rock, what must have been happening at the bottom?	Water must have been flowing in to replace the air	Constructing a picture of how the fluids flowed
	What was pushing the water into the bottom?	Some people will realise that the pressure is caused by air (atmospheric) pressure (there is not enough depth of water for hydrostatic pressure to be important)	Application of previous knowledge or construction of a new knowledge picture
	Explain that the fluids were filling the pore spaces (porosity) and could flow through the rock because the pore spaces are interconnected and large enough for fluid flow – the rock is permeable. Conversely, the speckled rock is impermeable		Consolidate understanding by explaining the correct terms, porosity and permeability
Activity 4. Rocky modelling	Follow the 2D model video to produce two visual patterns	Pattens of rectangles and patterns of circles	A construction pattern-seeking exercise
	Go to 3D models. Follow the 'adding water' videos by pouring water from a measuring jug/cylinder into the beaker full of marbles to show how porous it is	This shows that the beaker of marbles has almost 50% porosity	Cognitive conflict – people usually underestimate the porosity
	Explain that the interlocking model is impermeable		
	Explain that the container of marbles is like the grainy rock, with rounded grain shapes and so has gaps between the grains, giving it porosity and permeability. The interlocking model is like the speckled rock, being made of interlocking grains or crystals, with no pores – it is impermeable		Pupils use the picture of porosity/ permeability they have constructed and bridge this to real rocks

Activity 4. Rocky modelling (continued)	Optional extra: use water from the measuring jug/ cylinder to measure the volume of the empty beaker and so calculate the percentage porosity of the marble-filled container – see video		Arithmetical skills
	Optional extra: use the Lego™ model to discuss how materials with spaces (porous) are impermeable if the pore spaces are not connected – see video		This further constructs the porosity/ permeability concepts
	Follow the 'tipping' video to pour the water from the container of marbles, then tip the container to show that the marbles fall off into your hand. Then tip the grainy rock to show that the grains don't fall off. Ask what is the difference?	The grainy rocks grains are glued together, the marbles are not	
	Explain that the grains in the grainy rock are cemented at their corners to make the rock solid, but the marbles are not cemented (The cement does not fill all the pore spaces because otherwise the rock would be non-porous and impermeable)		Construct the concept that when sediments are cemented they become rocks
Activity 5. Weak or strong?	Use a metal object to scrape each of the rocks in turn as in the video		
	Ask why one rock is stronger than the other	Grains which interlock make a rock strong but cement is weak, particularly when grains are only glued at the corners	Construct a picture of rock strength being caused by grain interrelationships
Activity 6. Rock sort 1 – two great groups	Follow the video to put the two specimens onto sorting cards 1 and 2	They put the grainy rock on the 'Sedimentary' card and the speckled rock on the 'Crystalline' card	A construction pattern-seeking exercise
Activity 7. Rock sort 2 – striped rock	Follow the video to test the striped rock by: • looking carefully at the rock • looking carefully at the grains using a hand lens/magnifier • putting the rock in water and observing the results • scraping the rock		
	Based on these observations ask whether the rock is sedimentary or crystalline	It is crystalline	Concepts constructed previously are bridged to a new rock
	Ask them to place the two crystalline specimens onto sorting cards 3 and 4	They put the speckled rock onto the 'igneous' card and the striped rock onto the 'metamorphic' card	A construction pattern-seeking exercise

To stop or to continue?	If the aim of your teaching is just to focus on the three great groups of rocks, you may want to stop this workshop here. However, if you want them to sort out and name a range of sedimentary, igneous and metamorphic rocks as well – then continue		Construction pattern-seeking exercises
Activity 8. Rock sort 3 – all rocks	Ask them to test the specimens of a selection of other rocks in the ways they have been shown, then put them onto sorting cards 5, 6 and 7 (having folded over the right-hand side of card 6)	Rocks are placed as: Sedimentary – conglomerate, sandstone (grainy), mudstone, limestone Metamorphic – gneiss (striped), schist, metaquartzite, marble Igneous – granite (speckled), gabbro, basalt	A construction pattern-seeking exercise Disagreements lead to cognitive conflict and metacognition
Activity 9. Sedimentary to metamorphic	Ask them to unfold the right-hand side of card 6 and then add three of the four sedimentary specimens	Sedimentary rocks are placed as: top – mudstone middle – sandstone bottom - limestone	A construction pattern-seeking exercise
Activity 10. Naming rocks	Ask them to remove the specimens from cards 5, 6 and 7 and place them in similar places on cards 8,9 and 10 to name the rocks	As in activity 8	Bridging of pattern to the rock name system