Video question script: Weathering 'Cracking apart'

Question/Activity	Likely response	Rationale
In teaching about the Earth we use practical activities to explore Earth processes. This example explores physical weathering and is called, 'Cracking apart'.		Preparation for bridging from the model to real Earth processes
Teach or remind your class about the difference between weathering and erosion. Weathering is the break up (into smaller pieces) and breakdown (chemical breakdown) of material at the Earth's surface due to the weather, without the removal of solid material; the removal of solid material is erosion		Concrete preparation = a reminder of the terms and their meanings
Ask two tough questions: • When acid rain falls on limestone and removes it, is that weathering or erosion? • When wind blasts sand at a desert cliff, and some breaks off, is that weathering or erosion?	• The dissolving of limestone is weathering, since the material is removed in solution • When solid material is removed from the cliff, this is erosion, even though it is being done by the weather	Bridging = application of learning to reality
For the 'Cracking apart' activity we will use a chip of granite, a gas burner set on the hottest blue flame, some tongs, safety glasses and a beaker of cold water		Concrete preparation = introducing the apparatus and materials
Give a class member the granite chip, ask him/her to describe it and try to break it with their fingers	They usually describe its rough surface, its different coloured and 'speckly' appearance. They will be unable to break it	Concrete preparation = introducing the granite
Explain that we are going to hold the granite in the flame for around half a minute, then plunge it into the water, and then repeat		
• When we hold a corner of the granite in the flame, what do you think will happen? • When we plunge the granite into the water, what do you think will happen?	• Most will say that the granite will become much hotter (you could ask how much hotter, the answer is some hundreds of degrees C, maybe 300°C). Some might predict that it will glow orange • Most will say that it will hiss as it is put into the water (When asked why, some will say that the water boils)	Construction = predictions based on their previous knowledge and understanding
Ask what the dangers could be here and what the safety glasses are for	The rocks will become very hot and should not be touched You could drop the hot rock Safety glasses are used to protect the eyes when using gas burners.	Cognitive conflict = what could go wrong
Do the activity	The corner of the chip usually will glow orange. When plunged into the water, it will hiss.	
Repeat the activity several (e.g. five) times. By this time it should be clear that bits are breaking off the granite and falling to the bottom of the beaker		

Leave the rock to cool		
Ask, where on Earth this might be happening on a large scale	• Some will describe a desert, becoming very hot during the day and below freezing at night • Some may suggest lava flowing into the sea, which is a good answer, except that the rock there is liquid rather than solid • Some may think the temperature difference being investigated here is that between summer and winter – this is not so – that change is much too slow to break rocks	Cognitive conflict = considering the different options Bridging = from the model to reality
Ask whether this would still happen if the rock were made of the same sort of minerals throughout (a monomineralic rock) like metaquartzite	Most will not know the answer to this question. The correct answer is that the granite breaks up because the different minerals expand and contract at different rates. Since this doesn't happen in the metaquartzite, it doesn't break up.	Cognitive conflict = a challenge if they do not understand the mechanism
Pick up the cool rock and show that you can break pieces off with your fingers.		