**Volcano animations**

**Lesson 3: Planning eruption animations**

**Introduction**

In this ‘unplugged’ lesson pupils are introduced to the planning of a volcanic eruption animation for the BBC micro:bit. They apply the skills they have developed in the previous lessons, by decomposing the process into several stages and creating a flowchart-based algorithm to represent the animation for each stage.

**Time:** @60 minutes

**Materials needed:** lesson presentation, printouts of slide 10 and slide 16, paper to write algorithms on, scissors and glue sticks, micro:bits (optional)

**Learning objectives**

* To decompose a process into stages
* To construct simple flowchart algorithms
* To use repetition in algorithms

**Lesson summary**

* Introduction: Recapping repeats (10 minutes)
* Decomposing volcanic eruptions (15 minutes)
* Planning volcanic eruption animation (25 minutes)
* Reviewing key concepts (10 minutes)

**Introduction: Recapping repeats (10 minutes)**

* Display, and/or give out, copies of **slide 3** and invite pupils to identify the block they were introduced to last lesson and the effect that it has on the program (repeat).
* Display **slide 4** and ask pupils to identify similarities and differences between the three programs and which one would finish first/last if they all started at the same time and why (**slide 4**). Ensure pupils give reasons for their answers to encourage logical reasoning (see slide 4 speaker notes for answers).
* If you have access to micro:bits, ask pupils how their predictions could be tested before transferring the programs to different micro:bits and testing them out.

**Decomposing volcanic eruptions (15 minutes)**

* Revisit the concept of decomposition and invite pupils to recall how they used it, and repetition, when creating their dance sequence animations (**slide 5**).
* Explain that pupils are going to make use of their knowledge and understanding of decomposition and repetition to make an animation of a volcanic eruption. Invite ideas on how these concepts might be used (**slide 6**).
* Display **slide 7** and ask pupils to discuss with their partner the stages that the process of a volcanic eruption could be decomposed into (magma circulating in the chamber, magma rising through the vent, the eruption, lava creeping and cooling). Record possibilities for pupils to refer to later in the lesson.

**Planning volcanic eruption animation (25 minutes)**

* Display **slide 8** and use the questions to explain that pupils are going to plan (in the form of a flowchart algorithm) and program a volcanic eruption on the micro:bit using the MakeCode editor.
* Using an example from the previous lesson, remind pupils how they constructed a flowchart algorithm that included repetition. Discuss the need to create an algorithm for each stage of the volcanic eruption they identified to decomposing the process.
* In pairs or small groups, give out large sheets of paper to pupils and give them time to create a flowchart algorithm to show each stage of the volcanic eruption animation (**slide 9**). Each algorithm should contain the images they plan to use, taken from the *LED planner*, a delay after each image and the number of times each sequence will be repeated.

**Reviewing key concepts (10 minutes)**

* Provide each pupil with a printout of **slide 10** and ask them to cut out the sheet in half twice so that the four word cards (abstraction, algorithms, decomposition and repetition) are created.
* Use **slides 11 - 14** to display definitions of concepts, pupils respond by selecting the term they think is being described.
* Repeat the exercise by inviting pupils to give their own definitions to the rest of the class who again select the appropriate card.

**Extension ideas:**

* Pupils could create a storyboard or poster based on their decomposition to explain what happens at each stage of the volcanic eruption process.

**Differentiation**

**Support:**

* Pupils’ task can be simplified be requiring them to construct algorithms for fewer (or just one) stage(s) of the process.

**Stretch & challenge:**

* Pupils could build on their knowledge from the digital flashcards unit by identifying opportunities to add numbers (steps) and/or words (key vocabulary) into their animation.

**Opportunities for assessment:**

* Informal observations of pupils’ understanding of decomposition and repetition.
* More formal assessment of pupils’ flowchart algorithms and responses to the final review activity.