OVERVIEW

Simulation

In the Dirt Decoders Classroom Adventure, students will be joining a mission to learn about weathering and erosion. A paleontologist, Alex Flores, in the American Southwest (Echo Bay, Nevada) calls in the student experts after he finds a fossil of a single Ground Sloth bone in an unexpected location. Because the Ground Sloth is an extinct species, the paleontologist wants help to figure out where the bone came from and find the rest of the bones to complete the skeleton.

After learning a little more about the role each will play during the Adventure, students will learn about relative dating of fossils. The paleontologist team will use relative dating to discover that the bone is 50,000 years old. The age of the fossil is their first clue, but students will need to find more evidence to locate the rest of the skeleton.

For the next phase of their search, the students will analyze a map. However, they must first come together as a class to decide the type of map they want to study. With four options – political, temperature, topographic, and physical – the students will engage in group collaboration to determine the physical map will give them the information they need.

From analyzing the map, the cartographer team will discover the fossil was found near the Colorado River. Students will follow the river in hopes they will find more bones. If they follow the river north, they will hit the Grand Canyon. There, in the Grand Canyon, the students will continue their research by focusing on weathering. During their research on weathering, the biologist team will discover a fossilized Yucca tree, which was a food source for the Ground Sloth.

Now that students know they are on the right track, they will continue their research by studying erosion. The geologist team will uncover a fossilized footprint and learn it belonged to a Ground Sloth while investigating how landscapes change over time due to wind, water, and glacial erosion. This, again, confirms that they are on the right track and should continue their search.

After learning how water, wind, and plant vegetation impact the rate of erosion, they will receive word from a dig leader nearby that one of her geologists is trapped in a flooded cave and needs their help. Students to the rescue! They must pause their research to work together on four tasks: mapping a route into the cave, mapping a route out of the cave, selecting rescue supplies, and coding a drone to deliver the rescue supplies. To thank them for successfully

saving the stranded geologist, the dig leader will share her knowledge of rocks in the area and deliver a key piece of information: she saw a rock similar to ones found on the fossilized bone in a tributary upstream.

The new information is just the scientific boost the students need to narrow down their next move. After classifying rock samples from four tributaries, they will be able to identify which tributary matches the sample on their bone. When the search moves to that tributary, they will discover that their decoding skills were right. The Dirt Decoders will find the rest of the Ground Sloth remains and reunite the skeleton!

Engineering Activity

Following the steps of the Engineering Design Cycle, students will be tasked with designing and building a model for a new raft that can be used in future rescues. Students will work in teams to first design their raft on paper. These teams do not have to be the same teams as the simulation. Then, students will build and test their design using materials commonly found in classrooms, such as paper, pipe cleaners, plastic bags, rubber bands, etc. As an additional challenge, their raft should be able to meet project design constraints. The suggested constraints for their raft are the following: must float, be a minimum of three inches long and two inches wide (7.5 cm long and 5 cm wide), and be a maximum of six inches long and four inches wide (15.25 cm long and 10 cm wide). The teacher may change the project design constraints in accordance with what works best for the classroom. If time allows, groups should present their design to the class to explain how it works and why certain elements were added

This activity is introduced in the software. A tool will introduce the task and shows the steps in the Engineering Design Cycle. This can be displayed as a 1:1 or projected for the whole class. After going over the Design Cycle, students spend the rest of the time designing, building, and testing their prototypes. Teachers are welcome to add additional constraints for their students during the Engineering Activity.

This activity can be done in 30 minutes to one hour or extended to longer timeframes if desired. It can be completed individually or collectively (whole class, small groups, centers, or stations) and customized with any time and space criteria that meet the needs of the instructor.

Nonfiction Science Writing Activity

In the Nonfiction Science Writing Activity, students will be introduced to three types of nonfiction writing: a news article, a journal entry, and a friendly letter. They will write about what they learned and their experience during the simulation using one of the three writing options. For example, students can write a news article about how the Ground Sloth skeleton was discovered. They can also write a journal entry about their search for Ground Sloth skeleton, or they can write a letter to a museum about how it was discovered and why it is important to study fossils. Additionally, the teacher or students may create their own prompts.

Similar to the Engineering Activity, the Writing Activity is introduced in the software. There are digital graphic organizers in the software that the students can reference. If preferred, those graphic organizers may also be printed from the Teacher Resources page. Once the students have chosen their Writing Activity, they have the rest of the time to plan and write. The students write their drafts on paper. Teachers are welcome to create additional criteria for the Writing Activity.

This activity can be done in 30 minutes to one hour, depending on schedules.