### 1. What is our purpose?

**To inquire into the following:**

- **Transdisciplinary theme**
  How the world works: An inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.

- **Central idea**
  Human survival is connected to understanding the continual changing nature of the Earth.

**Summative assessment task(s)**

What are the possible ways of assessing students’ understanding of the central idea? What evidence, including student-initiated actions, will we look for?

- Students write a reflection based on their understanding of the central idea (open-ended task).
- Assessment tool: rubric

Students work collaboratively in groups of three to create detailed posters on natural events. Each member of the group has a responsibility to develop and deliver one of three aspects in an oral presentation: the causes of, the effects of, and the human response to the natural event (performance assessment).

- Assessment tools: rubric, anecdotal records

**What will we look for?**

Evidence that shows students’ understanding of why the Earth changes, what it looks like, and how humans respond to it.

### 2. What do we want to learn?

**What are the key concepts (form, function, causation, change, connection, perspective, responsibility, reflection) to be emphasized within this inquiry?**

- **Key concepts:** causation, change, connection
- **Related concept:** erosion, geology, tectonic plates, movement

**What lines of inquiry will define the scope of the inquiry into the central idea?**

- How the different components of the Earth are interrelated
- How the Earth has changed and is continuing to change
- Why the Earth changes
- Human responses to the Earth’s changes

**What teacher questions/provocations will drive these inquiries?**

- What is the structure of the Earth?
- How are the components connected?
- What causes the Earth’s structure to change?
- What evidence is there that the Earth is changing?
- What role do humans play in the Earth’s changes?
- How do humans adapt to these changes?
- What role does technology play in looking at the changing nature of the Earth?

**Provocations**

- Exploration table
- Artifacts to stimulate thinking for discussion
- A planned earthquake drill followed by a discussion on the reasons for the drill, etc
3. How might we know what we have learned?

What are the possible ways of assessing students’ prior knowledge and skills?
What evidence will we look for?
- Observe students in a range of learning situations and record what they know or wonder about the changing Earth—exploration table.
- Students make a Mind Map® (drawings, words, phrases) relating to the central idea.
- Students view videos and/or a PowerPoint® presentation showing a variety of natural events (tsunami, earthquake, volcanoes, etc) and engage in a discussion, having the opportunity to pose questions.
- Teacher and students record on charts what the students know and/or wonder about the changing Earth: in particular conceptions and misconceptions.

What are the possible ways of assessing student learning in the context of the lines of inquiry? What evidence will we look for?
- Students’ understanding of the Earth’s components is evidenced by creating and explaining a scientific drawing or model.
- Fact and opinion chart: in conjunction with The Magic School Bus videos, students record facts during the video presentation and then reflect, stating opinion, connections, wonderings and new understandings.
- Students collect rocks and soil samples, identify and classify the types of rock and soil through investigations (sand, clay, humus, loam).
- Students create a book based on student-generated questions and wonderings, and produce a class chart to add information for each natural event that includes the following headings: Natural events, Rapid change, Slow change, Facts, and Opinions.

4. How best might we learn?

What are the learning experiences suggested by the teacher and/or students to encourage the students to engage with the inquiries and address the driving questions?
- Invite a guest speaker (a builder, the school nurse) to introduce and stimulate the inquiry about how humans adapt to the changing Earth. The visitor reads “The three little pigs” and talks about the types of materials that he uses when building and how appropriate they are to the environment. A discussion is held based on the question: If the wolf in the story is a natural disaster, what kind do you think he is and why?
- Students participate in a hands-on activity using an onion to develop an awareness of layering. Apply this understanding to a globe, asking students to predict and then find in resource books the layers that make up the Earth. Reconstruct the Earth’s layers using plasticine, and label the parts.
- Students take a field trip to a museum to view related artifacts and displays. Use teacher questions as a focus for the visit.
- View Magic School Bus Inside the Earth—elicit from students key ideas from the video. Students organize facts around the headings: Facts, Opinions, Connections, Wonderings, New understandings.
- Use a world map to locate tectonic plates. Discuss cause and effect relationships. Conduct simulation of how plates move using alternate layers of plasterine and wooden blocks, experiment with pushing and folding.

Leading and facilitating student inquiry
- Outdoor rock inquiry: Students bring rocks from their environment. Predict what may happen when they break the rocks apart. Students choose the type of investigation to carry out such as: weighing, testing for erosion with other materials (water, salt, sandpaper), using different tools to break up, investigating the properties of a rock. How might this rock be used? Other investigations could include soil investigations. Students use learning logs to reflect on investigations. Students give oral feedback on their investigations. Class could identify property headings in order to classify rocks being investigated.
- Students research into the natural events and their causes and effects (earthquakes, volcanoes, flooding, landslides, erosion, weathering, glaciers). Make connections to the components of the Earth identified in earlier sessions.
- Consider the impact of the nature of natural disasters and how we would build in the areas where these events take place. Using what we know, students sketch simple diagrams of buildings in relation to the changing Earth. Label the types of materials and other considerations when building. The builder is invited back to give feedback to the students on their designs.

5. What resources need to be gathered?

What people, places, audio-visual materials, related literature, music, art, computer software, etc, will be available?
- Exploration table: children’s books, samples of rocks and minerals, nails, safety glasses, vials, Petri dish, mock rock, toothpicks, coins, paperclips, 2.5 centimetre square tile
- Artifacts: water, mask, candle, shovel, rope, flashlight, canned goods
- Literature: The Magic School Bus Inside the Earth by Joanna Cole; Earthquakes, Mountains by Seymour Simon; Planet Earth Inside Out by Gail Gibbons; The Big Rock by Bruce Hiscock; A Pebble in My Pocket by Meredith Hooper; Natural Disasters (Dorling Kindersley Eyewitness Books); Everybody Needs a Rock by Byrd Baylor
- Art: paints, brushes, construction paper, bulletin board paper, modelling clay or plasticine, crayons, coloured pencils, markers, and assorted art materials
- Rock and mineral samples

How will the classroom environment, local environment and/or the community be used to facilitate the inquiry?
- Builder, sculptor, field trip to collect rock samples
6. To what extent did we achieve our purpose?

Assess the outcome of the inquiry by providing evidence of students’ understanding of the central idea. The reflections of all teachers involved in the planning and teaching of the inquiry should be included.

The central idea worked. It pushed the students’ thinking beyond their prior knowledge. We found that the students had previous knowledge of the Earth’s layers or components so we did not spend a great deal of time on this.

Throughout the unit, students completed research on environmental events. They also explored the Internet to discover organizations that provide emergency assistance. These experiences provided a wealth of information and led to significant development in the students’ understanding of the central idea. Students were able to synthesize this knowledge when working in their collaborative groups. They designed and presented a poster describing a natural event. Each student contributed to the oral presentation based on agreements made within the groups. The written and oral presentations described the human action taken.

How you could improve on the assessment task(s) so that you would have a more accurate picture of each student’s understanding of the central idea?

The summative assessment is a means to evaluate student understanding of the central idea and we believe this assessment demonstrated this understanding.

Looking back on the assessment, the students did not show what happens throughout the event. Rather, they showed the event and how it changed the Earth from their perspective. Maybe next time the criteria could include a chronology element. Certainly many events that have changed the Earth have happened over a longer period of time.

What was the evidence that connections were made between the central idea and the transdisciplinary theme?

The links the students made in their inquiries between the events and human responses to the events clearly showed a connection to the transdisciplinary theme. Having the builder come in as an expert really helped the students to make technology connections and students showed an interest in implications for building in areas prone to environmental change.

7. To what extent did we include the elements of the PYP?

What were the learning experiences that enabled students to:

• develop an understanding of the concepts identified in “What do we want to learn?”
• demonstrate the learning and application of particular transdisciplinary skills?
• develop particular attributes of the learner profile and/or attitudes?

In each case, explain your selection.

Key concepts
We noticed that during this unit our focus on “activities” diminished, and concept-based inquiries increased, allowing our students to be more focused during the inquiry.

Causation and change: Students’ conceptual understanding of causation and change were clearly represented in the examples and explanations of natural disasters and the impact on human response. Students realized there is a conflict between nature and humans and how the world works. The creation of the tectonic world map and the realization of why the Earth changes exemplified the concepts.

The teacher and student questions facilitated the learning and the students were engaged and motivated with each learning experience as described in box 6 and below.

Transdisciplinary skills
Thinking skills
Students moved from comprehension to analysis and evaluation during the inquiry point, “Human responses to the Earth’s changes”. Questions were posed relating to the occurrence of a natural event: “How would you respond?” “What would you do?” The responses were typical of 8 and 9 year olds (to evacuate, to move, to clean up). Through probing and enthusiastic discussions, students began to pose their own questions, e.g “Why do people live near fault lines or by the coast?” This in turn led to many discussions about choices, actions and how to stay safe if people live in areas that are subject to natural disasters.

Communication skills
Writing and presenting information were central to this unit of inquiry. Examples of how students organized their thinking through their writing included learning logs, lab sheets, reflections, journals, poetry writing and essay writing. Guest speakers (school nurse and a home builder) spoke to the students about having an emergency plan, first aid, evacuation drills, and building safe homes depending on the area in which you live. The information presented was technical at times, yet students realized its importance, listening carefully and asking questions. They shared their understandings with their families.

Research skills
Research was central to this unit. Students “dug” deep into the inquiry point, “Why the Earth has changed and continues to change”. Their prior knowledge of rapid changes, such as volcanoes and earthquakes, helped ignite this part of the inquiry. Questions flowed, which led to new understandings of why the Earth changes. As a whole group, we read about tectonic plates and placed yarn around a student-made world map to resemble the major tectonic plates. To further the students’ understanding, expert groups were formed to research slow and rapid changes (erosion, weathering, glaciers, landslides, volcanoes, earthquakes and flooding).

Learner profile and attitudes
Inquirers: The inquiry into why the Earth changes encouraged the students to develop their research skills and become decision makers for their own learning. The guest speaker (home builder) created more “curious minds” about the world in which they live. The student-initiated investigation into why humans build homes to adapt to and interact with the environment strengthened their global perspectives and understanding.

Thinkers: Students pushed their thinking in understanding the complexities of the Earth and its interconnectedness. They engaged in learning experiences that provoked them to think critically about the human factor and the positive and negative influences we have on our planet, e.g building safer homes, organizations that provide relief to victims of natural events, cutting trees down.

Communicators: Students shared knowledge, wonderings and insights through discussions, a variety of writing projects, sketches, illustrations and posters. Throughout this unit of inquiry, many visitors (parents and teachers) came to the classroom to observe and were overwhelmed with the level of confidence and articulation of the students as they shared what they were learning. Students used the PYP language to describe themselves as risk-taking, knowledgeable and committed learners.
8. What student-initiated inquiries arose from the learning?

Record a range of student-initiated inquiries and student questions and highlight any that were incorporated into the teaching and learning.

At this point, teachers should go back to box 2 “What do we want to learn?” and highlight the teacher questions/provocations that were most effective in driving the inquiries.

Student-initiated inquiry

- Students brought rock samples from their own rock collection and wanted to know what kind of rocks they were. This led to an inquiry into identifying types of rocks or minerals.
- Students were curious about the different colours of soil, which led to further inquiry into the types of soil.
- Students initially reacted to natural events with concern since they live in a hurricane zone. Their worry compounded upon learning about the tectonic plates as they realized their city is located on a fault line. This resulted in a student-initiated inquiry into ways we can be safe and protect ourselves.
- Following the presentation by the local builder, students inquired into how homes are constructed in other parts of the world. Collaborative groups chose from a range of different global regions and investigated how and why humans build homes to adapt to and interact with their environment. Teachers modelled the process with a case study, including concepts such as geographic location, climate, landscape, settlement and resources.

Student questions

- What is the Earth made of?
- How deep is the Earth?
- What is a rock?
- Why does a rock sparkle?
- What is inside a rock?
- Where do rocks come from?
- How do rocks change?
- Why are soils different colours?
- How are mountains formed?
- How does the Earth change?
- What do we do to be safe?
- How are homes built in other parts of the world?

What student-initiated actions arose from the learning?

Record student-initiated actions taken by individuals or groups showing their ability to reflect, to choose and to act.

- Students watched the Weather Channel on television and reported back to the classroom on recent flooding, earthquakes locally and around the world.
- Parent’s comment on his or her child’s interest on how their home was constructed.
- “Recess Rock Club” formed.
- Students started their own rock collection; they used reference books in the classroom to identify rocks and minerals.

9. Teacher notes

We worked closely with the media specialist to build our resources of non-fiction books related to this unit of inquiry.

There was an opportunity to make authentic connections to the arts, eg how rocks and minerals are used in the creation of monuments, memorials and sculptures around the world (the Great Wall of China, Mount Rushmore, Easter Island, Stonehenge and the Pyramids) and to the architect, Frank Lloyd Wright. Additionally, we played and moved to pieces of classical music and discussed the ways in which these pieces could reflect the changing Earth.

As a result of a gallery walk viewing collaborative posters, students made conclusions about the connections between events, eg glaciers cause floods; floods cause erosion; glaciers can cause erosion; hurricanes cause floods; landslides cause erosion; earthquakes can make mountains, etc.