FOUNDATIONS

1. Fossilization occurs when a dead organism (plant or animal) is buried by sediment. This usually happens very soon after death as scavengers, bacteria, and other decomposers will break down the organism, preventing it from fossilizing. There are many different types of fossils; each one is dependent on the conditions in which the organism is buried, and what conditions it experiences over time.

KINDS OF FOSSILS

Colour patterns: Some fossils can still have pigment showing patterns present on the organism during life (i.e., fossil seashells, insects, feathers, skin).

Skin impressions: Pattern left behind in the rock from the skin of an animal. They show the texture of the skin and arrangement of scales (i.e., dinosaur skin impressions).

Mold: a void left in the rock after the organism has dissolved/decayed.

Cast: a copy of the interior of an organism cause by sediment infilling (i.e., *Pleuroceras spinatum* shell).

Unaltered organic material: This type can be seen in areas were permafrost is common or where conditions are very dry. The organism is preserved by desiccation (the process of extreme drying) or freezing; exposure to atmospheric conditions can cause them to decay (i.e., plant shells, Siberian mammals).

Permineralization: The replacement of organic material by minerals. The minerals slowly fill the pores within the object being fossilized and the original organic material disappears leaving a three-dimensional copy. Unlike a cast fossil, detailed internal structures will remain (i.e., petrified wood, dinosaur bones, *Centrosaurus apertus* tibia).

Carbonization: When organic material is compressed, it can leave a film of carbon behind. This preservation often has excellent fine detail (i.e., plant fossils like *Ginkgo* sp.).

Trace fossils: These are fossils created by organisms rather than fossils of the organisms themselves (i.e., footprints, burrows, coprolites).

Replacement: When ground water dissolves part of an organism and minerals take its place as it is dissolved. The slower this occurs, the more detail is preserved (i.e., plant fossils like *Cunninghamia* sp.).

Amber: Tree resin that has been exposed to heat and pressure due to burial in sediments, which causes polymerization (a chemical reaction) and the hardening of the resin (i.e., insects like *Atriculicoides globosus*).

PREPARATION LAB

2. Answers vary throughout the year and are available on the screens in front of the Preparation Lab. Mark for completion.

GROUNDS FOR DISCOVERY

3. Wind power, urban development, ammonite mining, gravel pits, oil and gas, oil sands, coal mines, road construction.

INVASION OF LAND

4. As you move right to left in the diorama, the plants generally become larger, more diverse, and more complex.

   Silurian (444 – 419 million years ago): The first vascular plants are small stalks tipped with spore producing organs.

   Early Devonian (419 – 385 million years ago): Vascular plants are getting larger and more varied. Shrub-like plants start to appear.

   Late Devonian (385 – 359 million years ago): First tree-like plants and multispecies forests appear.

   Carboniferous (359 – 299 million years ago): Swampy coal producing forests are widespread. Ferns, lycophytes (club mosses), gymnosperms, seed ferns, and horsetails appear.

   Permian (299 – 252 million years ago): Climate is getting drier, cycads and ginkgo trees appear. No flowers at this time (flowering plants do not appear until the Cretaceous).

CRETACEOUS GARDEN

5. Alberta was warmer and more humid during the Cretaceous Period. Much of the Drumheller area would have been a swampy coastal warm-temperate forest with many large trees, ferns, shrubs, and mosses. The plants of the *Cretaceous Garden* were chosen based on the fossil record of plants, pollen, and spores found in the rocks of the Drumheller area. Alberta's current climate is drier than it was in the Cretaceous and ranges from dry semi-arid grasslands in the south, sub-arctic boreal forest in the north, and alpine to sub-alpine forests and tundra in the mountains. Although it would have been cool during winter months in the Cretaceous, the animals that lived here would not have seen as harsh a winter as we see today.

   Places with climates like the Garden may include British Columbia, Florida, coastal China, or similar.

DINOSAUR HALL and the BEARPAW SEA

6. Answers can include the following:

List of non-dinosaurs in *Dinosaur Hall*:

Arctica (clam)
Aspideretoides (soft-shelled turtle)
Baculites (ammonite)
Basilemys (turtle)
Champsosaurus (champsosaur)
Clidastes (mosasaur)
Cyclurus (fish)
Dicamptodon (salamander)
Gillicus (fish)
Judithemys (turtle)
Leidyosuchus (crocodile)
Lepisosteus (gar)
Myledaphus (guitarfish)
Placenticeras (ammonite)
Plesiobaena (turtle)
Quetzalcoatlus (pterosaur)
Thalassomedon (elasmosaur)
Trinacromerum (plesiosaur)
Tylosaurus (mosasaur)
Xiphactinus (fish)

A note on *Confusciusornis*:
Due to their anatomical similarities, many palaeontologists now classify all birds, living and extinct, as avian dinosaurs. *Confusciusornis*, in *Dinosaur Hall,* is a bird and may be written on either the dinosaur or non-dinosaur list. This could be a discussion point for teachers.

(continued)

List of dinosaurs in *Dinosaur Hall*:

Albertaceratops nesmoi
Allosaurus fragilis
Anchiceratops ornatus
Ankylosaurus magniventris
Brachylophosaurus canadensis
Camarasaurus supremus
Camptosaurus dispar
Centrosaurus apertus
Chasmosaurus belli
Chasmosaurus russelli
Coronosaurus brinkmani
Corythosaurus casuarius
Dromaeosaurus albertensis
Edmontonia rugosidens
Edmontosaurus annectens
Edmontosaurus regalis
Euoplocephalus tutus
Gorgosaurus libratus
Gryposaurus notabilis
Hypacrosaurus altispinus
Lambeosaurus clavinitialis
Lambeosaurus lambei
Lambeosaurus magnicristatus
Leptoceratops gracilis
Maiasaura peeblesorum
Montanaceratops cerorhynchus
Ornitholestes hermanni
Ornithomimus brevitertius
Ornithomimus edmontonicus
Pachyrhinosaurus lakustai
Prosaurolophus maximus
Psittacosaurus mongoliensis
Regaliceratops peterhewsi
Stegoceras validum
Stegosaurus armatus
Struthiomimus altus
Styracosaurus albertensis
Triceratops horridus
Tyrannosaurus rex

STRETCH YOUR SKETCHING MUSCLES

7. Mark for completion.