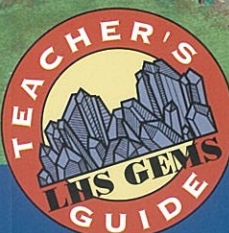


LIFE THROUGH TIME

EVOLUTIONARY ACTIVITIES FOR GRADES 5-8



WHAT YOU NEED FOR THE WHOLE UNIT

The quantities below are based on a class size of 32 students. Depending on the number of students in our class, you may, of course, need different amounts of materials.

This list gives you a concise “shopping list” for the entire unit. Please refer to the “What You Need” and “Getting Ready” sections for each session. They contain more specific information about the materials needed for the class and for each team of students.

Many photocopies are necessary for this unit. You may want to enlist a volunteer to do the copying. Also, the copying could be done as needed for each session, or all the necessary pages could be copied at one time. Further, the copied pages could be organized by using a distinct color paper for each session.

Nonconsumables

- 1 length of adding-machine tape to represent the whole unit’s **Class Time Line**; choose length from chart in “Getting Ready” of Session 1 (page 15)
- 8 copies of the **Students’ Tree of Life Cards** (page 26)
- 1 copy of **Fossils—Teacher’s Answer Sheets** (pages 64–68; 5 pages total)
- 1 copy of **“Guts”—Teacher’s Answer Sheet** (page 73)
- 1 copy each of **Most Representative Organism Script** for Sessions 2–6 (pages 69–70, 117–118, 152–153, 186–187, and 218)
- 1 copy of **title sign** for **Life through Time** wall chart (page 76)
- 1 copy each of these **headers** for **Life through Time** wall chart (page 77):
 - Ages
 - Aquarium
 - Terrarium
 - “Guts”
 - Continental Drift
- 1 copy each of **Tree of Life Organism Cards** for Sessions 2–5 (pages 79–81, 122–126, 158–159, 191–192) to add to the **Tree of Life** wall chart
- 1 copy each of **Major Evolutionary Events—Time Period #1–Time Period #5** (pages 82, 127, 160, 193, 223)

- 2 large cloths (such as sheets or large towels) to cover and conceal the aquarium and terrarium until you're ready to show them
- several containers to "house" organisms at the stations (Use whatever containers seem appropriate for the organism, such as an old food storage container for flatworms.)
- 2 or more natural bath sponges
- 1 water spray bottle, to keep earthworms moist

An overhead transparency of each of the following:

- Tree of Life Branch—Arthropods** (page 23)
- Sample Tree of Life Cards** (page 24)
- From Worm to Insect** (page 25)
- "Guts": Single-Celled Organism/Sponge/Jellyfish/Earthworm** (page 72)
- Early Life** (page 74)
- Other Early Invertebrates** (page 75)
- Moss Reproduction** (page 119)
- Early Land Plants** (page 120)
- Arthropods** (page 121)
- Conifer Reproduction** (page 154)
- Fish** (page 155)
- Amphibians** (page 156)
- Conifers** (page 157)
- Flowering Plant Reproduction** (page 188)
- Reptiles** (page 189)
- Flowering Plants** (page 190)
- Birds** (page 219)
- Mammals** (page 220)
- Skeletons through Time** (page 221)
- "Guts": Bird and Mammal** (page 222)
- (optional/recommended)* **Algae Reproduction** (page 71)

Two copies each of the following station sheets:

- Early Life** (page 74)
- Other Early Invertebrates** (page 75)
- "Guts": Single-Celled Organism/Sponge/Jellyfish/Earthworm** (page 72)
- Fossils—Time Period #1—Time Period #5** (pages 83, 128, 161, 194, 224)
- Algae Reproduction** (page 71)
- Early Land Plants** (page 120)

- Arthropods** (page 121)
- Fish** (page 155)
- Amphibians** (page 156)
- Conifers** (page 157)
- Reptiles** (page 189)
- Flowering Plants** (page 190)
- Birds** (page 219)
- Mammals** (page 220)

Three copies each of the following station sheets:

- Continental Drift—Time Period #1—Time Period #5**; two each for the stations and one each for the **Life through Time** wall chart (pages 84, 129, 162, 195, 225)
- “Guts”: Bird and Mammal** (page 222)

For the Time Travel Aquarium:

- 1 aquarium tank (Any size can work, but the larger the tank, the easier it will be to fit increasing numbers of plastic and real animals and plants as the unit progresses. We recommend no smaller than the classic five-and-a-half-gallon size. See the chart of tank dimensions on page 63.)
- aquarium gravel and/or sand (Coarse gardening sand, sandbox sand, or sand-blasting sand will all work fine. **Note: do not use coral sand or coral gravel**; these are only used for saltwater aquariums and can kill freshwater organisms. Do not use sand or gravel you have collected from an ocean beach, as it will be salty. If your sand or gravel is dusty, rinse it thoroughly before use.)
- 1 copy each of **Aquarium Background—Time Period #1—Time Period #5** (pages 92A, 136A, 160A, 200A, 224A) *See the chart of tank dimensions on page 63 for helpful information about sizing the background to your tank size.*
- 1 natural (not synthetic) bath sponge (You’ll need more for a separate station; see earlier in Nonconsumables.)
- 1 (or more) plastic jellyfish (To make your own, see sidebar on page 39.)
- freshwater snail(s) (Can be purchased in aquarium stores or found in freshwater ponds and streams.)
- aquatic insects (Can be caught with a net in a local pond or stream.)
- sea urchin shell(s)
- plastic sea star(s)

- plastic mollusk(s), or real shells such as clam or mussel shells
- artificial coral (do not collect coral from the wild)
- plastic sharks
- plastic bony fishes
- goldfish, mosquito fish, or whatever kind of live fish you have (Small fish can be caught in a local pond with a net. We do *not* recommend putting your student's pet fish in the Time Travel Aquarium. Please see note on page 21 about mosquito fish.)
- plastic crocodiles, turtles, and plastic prehistoric marine reptiles—pleisosaurs, ichthyosaurs, mososaurs, etc.
- plastic whales and other plastic marine mammals
- plastic sharks, including a large plastic great white shark (*Carcharodon carcharias*) model if you have one (to represent the giant *Carcharodon megalodon*, related to the present-day great white)

For the Time Travel Terrarium:

- 1 aquarium tank (Again, the larger the tank, the more diorama elements can be added. See the chart of tank dimensions on page 63.)
- enough lava dirt (preferable) or lava rock to make a 2- or 3-inch-deep layer in the terrarium (If you cannot find these, you can use other rocks. **Soil is a last resort—there was no soil on Earth in the period covered in Session 2.**)
- 1 copy each of **Terrarium Background—Time Period #1–Time Period #5** (pages 92B, 136B, 160B, 200B, 224B) *See page 63 for help in sizing the background to your tank size.*
- enough soil to make a 2- or 3-inch-deep layer in the terrarium
- at least one of the following early plants:
 - ___ moss (Can be obtained from yards, or purchased in bags from a nursery or hardware store.)
 - ___ liverwort (Can be obtained from a nursery or garden; it's an herb with broad heart-shaped leaves.)
 - ___ club moss (Ground pine or princess pine are examples of club mosses living today.)
 - ___ horsetail
 - ___ small ferns
 - ___ ginkgo (Popular urban ornamental tree in people's yards or on West Coast sidewalks.)
 - ___ cycad (Early plant resembling—but different from!—a palm or tree-fern.)

___ cones and needles, or just cones, from any type of cone-bearing tree (pine, redwood, fir, etc.) Ideally, get both male cones (they're the small ones) and female cones (larger) from a single type of tree.

- plastic scorpion(s)
- plastic millipede(s)
- live land snail(s) (*Note: If the land snails are kept in an open container, they may escape and eat nearby paper products...such as unlaminated background illustrations—yikes! They'll also eat your plants.*)
- plastic dragonfly
- plastic salamander
- any plastic dinosaurs and early terrestrial reptiles, including lizards, snakes, and tortoises
- one or two small flowering plants (such as sweet alyssum or any other easily available)
- beetles, ants, hissing cockroaches, or other real or plastic insects
- acorns
- plastic butterfly
- plastic or plush opossum
- any plastic early mammals (wooly mammoth, saber-toothed cat, etc.)
- any plastic modern mammals, birds, and other animals (but not domesticated animals such as dogs)
- more small flowering plants
- grasses

For the volcano options:

- 2–3 glass or plastic chemistry vials or tubes, plus one extra to use for adding vinegar during the activity (see “Resources,” page 307)
- 2–3 plastic or foam cups, each with a hole punched in its bottom, to place over the vials to create the slopes of the volcanoes
- enough brown clay for sticking pieces of volcanic rock to the rim of the vials or the sides of the cups, for a more realistic appearance
- 1 or more small red bicycle lights with a steady shining option, to make the volcanoes “glow” from within
- same number of sealable baggies, to protect the bicycle light(s) from rubble and moisture

Some or all of the following organisms for the stations:

- algae (Can be obtained from a local birdbath or pond; “scum” or film on the inside of a fish tank or other body of fresh water. May look fuzzy, or like green hair. Seaweed can also be used.)
- 5 or so earthworms (Can be obtained from the ground or compost pile. Can also be purchased at bait shops or biological supply houses; see “Resources.”)
- 2 or more flatworms (Also known as *Planaria*. Can sometimes be collected in freshwater streams and ponds, if you know what you’re looking for, or purchased from some aquarium stores or biological supply houses. See “Resources.”)
- a handful of tubifex worms (Also known as “blood worms.” Can be purchased from local aquarium store or biological supply houses; see “Resources.”)
- Triops* (tadpole shrimp) eggs, hatched into adults (It takes a few days to a week before they’re large enough to observe. See “Making It as Easy as Possible” on page 8, and “Resources.”)
- isopods—pill bugs (roly-polies) and sow bugs
- hermit crab*
- crayfish (“crawdad”)
- freshwater snails
- centipede
- millipede
- spider
- clam
- sea star*
- silverfish
- moss
- liverwort
- club moss (ground pine or princess pine are living examples of early land plants)
- invertebrate exoskeleton (shed!)
- trilobite fossil
- fish (goldfish, tetra, guppies, etc.)
- horsetail
- fern
- salamander*
- frog*
- cockroach
- fish skeleton
- dead fish, whole or partly dissected
- amphibian skeleton

- lizard
- snake
- turtle
- tortoise
- insects—especially those with complete, four-stage metamorphosis, such as ants, butterflies, and beetles
- flowering plants
- large flower(s) cuttings
- magnolia-tree flower or stem with leaves
- acorns
- cypress tree branch
- hickory nut
- reptile egg (do not collect viable eggs from the wild)
- shed reptile skin
- reptile skull or skeleton
- any safe mammal
- any safe bird
- bird skull
- mammal skull
- grasses

***These organisms in particular are delicate creatures and require careful handling and special care. In many states (including California) it is ILLEGAL to remove organisms from the wild.**

Additional materials for Option 1 in Session 7:

- 1 overhead transparency of **Standard Geologic Time Line** (page 253)
- 1 overhead transparency of **Time Line Comparison Chart** (page 254)
- 8 sets of **Period Information Sheets** (pages 255–268; 14 pages total per team)

Additional materials for Option 2 in Session 7:

- (optional/recommended)* 1 overhead transparency of **Standard Geologic Time Line** (page 253)
- (optional/recommended)* 1 overhead transparency of **Time Line Comparison Chart** (page 254)

Additional materials for Option 3 in Session 7:

- 1 copy of **Explaining Major Evolutionary Change** (page 269)
- (optional/recommended) 1 overhead transparency of **Standard Geologic Time Line** (page 253)
- (optional/recommended) 1 overhead transparency of **Time Line Comparison Chart** (page 254)

Additional materials for Option 4 in Session 7:

- 1 overhead transparency of **Standard Geologic Time Line** (page 253)
- 1 overhead transparency of **Time Line Comparison Chart** (page 254)
- 1 paper copy **Time Line Comparison Chart** (page 254) to hang in the classroom
- 11–16 copies of the **Period Information Sheet** for the period teams of students will be working on (pages 255–268)

Consumables

- 32 copies of the **Organism Key** (pages 29–34; 6 pages total)
- 32 copies of the **Life through Time Scavenger List for Parents** (pages 21–22), if needed
- 5 copies of **The Age of _____** sign (page 78); one each for Sessions 2–6 (*Note:* You may choose instead just to write this information on a blank 8 ½" x 11" sheet of paper—which would allow you to re-use the **Life through Time** wall chart for future classes—or directly on the chart after the election, to simplify.)
- 1 hard-shelled egg—a chicken egg will do (We recommend hard-boiled!)

For the Time Travel Journal:

- 32 **Time Travel Journal** cover pages (page 27)
- 32 journal pages labeled **First Life on Earth** (page 28)
- 32 sets each of **Time Travel Journal** pages labeled **Time Period #1, Time Period #2, Time Period #3, Time Period #4, and Time Period #5** (pages 85–93, 130–136, 163–170, 196–202, 226–232; 38 pages total) Don't copy these until you've added the session's organisms to the **Organism Adaptations** page; see "Getting Ready" for each session.

For the Time Travel Aquarium:

- enough dechlorinated water to fill and periodically top off the aquarium (You may use bottled spring water, but **do not use distilled water**, because it lacks beneficial minerals. You may also use tap water with dechlorinating liquid, which can be purchased at an aquarium store.)

For the Time Travel Terrarium volcano options:

- enough baking soda to fill two or three vials two-thirds full
- enough chocolate powder to add 1 tablespoon to each volcano eruption mixture, for better appearance
- enough red food coloring to add to the volcano eruption mix, for better appearance
- enough vinegar to occasionally add a few drops to each vial
- enough water to fill vials two-thirds full
- a few small pieces of dry ice to add to the water in the vials (see “Resources”)

Additional materials for Option 4 in Session 7:

- (*optional*) 11–16 shoeboxes or other small containers (plastic, if any of the dioramas will be aquatic!) to be used for the dioramas (Students can bring these containers in; see note on page 208– in Session 6.)

General Supplies

- an overhead projector and screen (or other white background)
- 1 meterstick
- 1 globe or world map
- 8 pairs of scissors
- 8 envelopes
- 1 sheet of butcher paper 7 ft. wide x 6 ft. tall for **Life through Time** wall chart
- 1 sheet of butcher paper 3 ft. wide x 5 ft. tall for **Tree of Life** wall chart
- paper towels, to provide cover for the earthworms at station
- either a large binder clip or a three-ring binder, for the **Time Travel Journal**
- chalkboard, chart paper, or a blank overhead transparency for listing questions and reminders for the class (see each “Getting Ready” in Session 7)

- 32 pieces of blank or lined paper on which to write the assignment in Session 7
- (optional)* laminator, if you wish to protect and reuse the wall chart signs and/or tank illustrations
- (optional)* three-hole punch, if you wish the students to keep their **Time Travel Journals** in a three-ring binder
- (optional)* mural paper and colored pens and pencils
- (optional)* chart paper for making signs

Additional materials for Option 4 in Session 7:

- additional materials with which to make the dioramas: poster paper, scissors, reference books, dirt, plants, plastic animals and plants from the Time Travel Aquarium and Terrarium