Answer Key

INSTRUCTIONS: Amount of points awarded is specified in each question. No partial credit is given unless specified in the question.

Station 1

1. A) Septastraea, B) Favosites, C) Hexagonaria (1 point each)
2. Rugosa, Tabulata, Scleractinia (2 points, 1 point if at least 2 correct)
   Rugosa: C, Tabulata: B, Scleractinia: A
   (1 point only if all correct)
3. Petoskey Stone; Michigan (1 point for each)
4. Corallites (1 point)
5. Septa and Tabulae (1 point for each)
6. Anthozoa (1 point)
7. Calice (1 point)
8. B, C, A (2 points, no partial)

Station 2

1. B) Hydnoceras, D)Astraeospongia (1 point each)
2. Spicules, Calcium Carbonate (1 point each)
3. None (2 points)
4. Cast OR Internal Mold (1 point)
5. Lophophore; Brachiopod (2 points)
6. Calcarea; Permian and Triassic (1 point each)
7. Ediacaran fossils (2 points)
8. Demospongia

Station 3

1. B) Lingula, C)Rhynconellida (1 point each)
2. Calcium phosphate (1 point)
3. B (1 point)
4. None (2 points)
5. Biconvex (2 points)
6. A, C, B (2 points)
7. Filter feeder (1 point)
8. Internal mold OR Lithification OR Actual Remains (1 point)
9. Brachial valve and pedicle valve (1 point), brachial has fold and pedicle has sulcus (1 point each)

Station 4

1. B, Turritella (1 point each)
2. Internal mold (1 point)
3. Agate (2 points)
4. Suture patterns (1 point),
   Goniatitic, Ceratitic, Ammonitic (1 point each)
5. Jurassic (1 point), Principle of Faunal Succession (2 points)
6. C and D (1 point); Baculites and Dactylioceras (1 point each)
7. D; Jurassic (2 points)
8. Phragmocone (1 point)
9. A, D, C, B (3 points)
10. Males were 1/3 to ½ the size of females OR Males had lighter ribbing of the surface of the shell (3 points for either one) *TB2

Station 5

1. A) Ichthyosuria, B) Plesiosauria (1 point each)
2. Right (1 point)
3. Mesozoic (1 point)
4. B (1 point), Permian Extinction (1 point)
5. Plesiosauromorph: long-necked and small headed
   Pliosauromorph: short-necked and large headed
   (1 point per type, 1 point per description)
6. Sclerotic ring (2 points)
7. Nevada (1 point)
8. Convergent Evolution (1 point)

Station 6

1. Arthropoda (1 point)
2. Enrolled; For defense (1 point each)
3. Marine (1 point), Sessile OR Filter-feeding (1 point)
4. Malacostraca (1 point)
5. Cryptolithus (1 point), Genal spines (1 point)
6. 0 (2 points)
7. Permian extinction (1 point), 252 million years ago (± 5 million years) (1 point)
8. Schizochroal eyes (1 point), calcite (1 point)
9. The Cambrian Explosion (1 point)
10. A (1 point)

Station 7

1. 50 billion years (1 point)
2. Rubidium-86 (1 point), Strontium-87 (1 point)
3. 82.3% (2 points)
4. Igneous (1 point)
5. Carbon-14 (1 point) , 5730 years (1 point)

6. Most rocks don't have carbon (1 point), relatively short half-life makes it reliable for only ~75,000 years (1 point)
7. Willard Libby (1 point)

Station 8

1. A) Batoidea/Ray, B) Salachii/Shark, C) Mosasauridae (1 point each)
2. Calcium phosphate (1 point)
3. Ichthyosuria and Plesiosauria (2 points)
4. A) Triassic, B) Silurian, C) Cretaceous (1 point each)
5. Crushing/grinding prey(1 point); ate shelled bottom-dwelling species, such as snails, clams, oysters, crustaceans, and some fish (2 points for general term OR 1 point per example)
6. North America and Europe (1 point each)
7. Maastricht Limestone Bed (2 points)
8. Cartilaginous skeleton (1 point)

Station 9

1. A) Stegosaurus, B) Coelophysis, C) Velociraptor, D) Iguanodon (1 point each)
2. Regulate temperature by radiating heat (2 points)
3. Carnivores: B, C (1 point)
   Herbivores: A, D (1 point)
4. Deinonychus (2 points)
5. They lived in different time periods (1 point)
6. On its nose (1 point)
7. B, A, D, C (2 points) *TB1
   A) 155 – 150 million years ago (± 10 million years) (1 point)
   B) 215 – 200 million years ago (± 15 million years) (1 point)
   C) 80 – 75 million years ago (± 5 million years) (1 point)
   D) 130 – 125 million years ago (± 5 million years) (1 point)

Station 10

1. Konzentrat-Lagerstatten: deposits with a particular "concentration" of organic hard parts; concentration of fossils
   Konservat-Lagerstatten: deposits with exceptional preservation of fossilized organisms or traces
   (1 point for each type, 1 point for each definition)
2. The Avalon Explosion (2 points) *TB6
3. Burgess Shale, Canadian Rockies of British Columbia
   Solnhofen Limestone, Germany
   (1 point for each lagerstatten, 1 point for each location)
4. It was the earliest known bird, and it is a transition fossil between feathered dinosaurs and modern birds (2 points)
5. Pennsylvanian/Carboniferous (1 point)
6. Feathered dinosaurs (1 point)
7. Has wide geographical distribution, is numerous, has short geological range, easy to recognize, can be found in various rock types, evolves rapidly
   (2 points if 3 present, 1 point if 2 present)

Station 11

1. Molars/Teeth (1 point)
2. B (1 point), Equus (1 point)
3. Eating/grazing (1 point)
4. Wrangel Island (2 points)
5. They are preserved in ice (1 point), they are relatively young (1 point)
6. Clovis hunters (2 points)
7. Georges Cuvier(1 point); He named it after the cone-shaped cusps of the teeth that resembled the shape of nipples (1 point)
8. Proof of extinction (1 point)
9. 1 digit (1 point)

Station 12

1. A) Parasaurolophus, B) Pterosuria, C)Triceratops, D)Apatosaurus, E) Plateosaurus, F) Allosaurus (1 point each)
2. B (1 point)
3. Saurischia, Ornithischia (1 point)
   The hip bone determines the distinction (1 point)
   Saurischia: D, E, F (1 point, all must be present)
   Ornithischia: A, C (1 point, all must be present)
4. The Bone Wars OR The Great Dinosaur Rush (1 point)
   Edward Drinker Cope, Othniel Charles Marsh (1 point for each name)
   Marsh won (1 point)
5. Male (1 point)
6. North America

7. Apatosaurus Ajax (1 point), Othniel Charles Marsh (1 point) *TB5
8. Morrison Formation (1 point)
9. Allosaurus and Apatosaurus; Jurassic Parasaurolophus and Triceratops, Cretaceous (1 point for each pair, 1 point for time period)

Station 13 *TB3

- Occurred ~66 million years ago ± 5 million years ago (1 point)
- Over 75% of species went extinct (1 point)
- 3rd most devastating extinction event (1 point)
- Mosasaurs, plesiosaurs, fish, sharks, mollusks, ammonites, plankton, non-avian dinosaurs, mammals, pterosaurs, birds, lizards, insects, plants (1 point for each of the above described in regards to extinction, up to 3 points)
- Main Theory: Massive comet/asteroid impact (1 point), 1 point for each of the following, up to 4 points
    - Proposed by team led by Luis Alvarez
    - Impact affected global environment, made photosynthesis for plants and plankton impossible
    - Caused megatsunamis and acid rain
    - Created dust cloud by injecting sulfuric acid aerosols into stratosphere
    - Chicxulub crater in Gulf of Mexico bolstered the theory
    - Thin layer of iridium in geological record at K-Pg boundary
    - Iridium is extremely rare, but abundant in most asteroids and comets
    - Shocked minerals at K-Pg boundary
    - Giant tsunami beds along Gulf Coast and the Caribbean
- 1 point for each of the following, up to 2 points
    - Deccan Traps flood basalts caused extinction
    - Evidence shows traps erupted over period of 800,000 years spanning K-Pg boundary
    - Linked to gradual extinction
    - Release of dust and sulfuric aerosols into air
    - Deccan Trap volcanism cause CO_2 emissions

Station 14

1. A) Crinoidea, B) Ophiuroidea, C) Echinoidea, D) Blastoidea (1 point each)
2. Theca (1 point)
3. Deltoid plates, radial plates, basal plates (1 point each)
4. A) Sea lily, B) Brittle Star, C) Sea Urchin (1 point each)
5. Holdfast (1 point), A (1 point)
6. Ambulacrals and Interambulacrals (1 point each)
7. Feather stars OR comatulids
8. C

Station 15

1. C, B, N, G, K, A, H, J, M, O, L, I, D, F, E, P (6 points, 4 points if 2 wrong, 2 points if 4 wrong)
2. Principle of Superposition (2 points)
3. Principle of Cross-cutting relationships (2 points)
4. Nicholas Steno (2 points)
5. Devonian (1 point)
6. C, N, I (2 points, 1 point if 2 right)
7. The bed was overturned (2 points)

Station 16

1. A) Sandstone, B) Shale, C) Chalk, D) Conglomerates (1 point each)
2. Foraminiferans (2 points)
3. A (1 point)
4. Floodplain stream OR Lake (2 points)
5. D (1 point)
6. B (1 point)
7. A (1 point)

Station 17

1. Seeds: B, E (1 point if all present)
   Spores: A, C, D, F (1 point if all present)
2. Dawn redwood (1 point)
3. Extant: B and E (1 point)
   Living fossil: E (1 point)
4. Cast OR Internal Mold (1 point)
5. A and D (1 point);
   A) Leaves, D) Trunk AND/OR Branches (1 point for each)
   Carboniferous (1 point)
6. F (1 point), Glossopteris (1 point)
7. Scale Tree (1 point), Carboniferous (1 point)
8. E, A, C, D, B (2 points)

Station 18

1. A) Tiktaalik, B) Dunkleosteus, C) Bothriolepis, D) Coelacanthiformes (1 point each)
2. Transitional Fossil (1 point)
   2004 (1 point), Ellesmere Island (1 point)
3. 0 (1 point)
4. David Dunkle (2 points)
5. "Hollow Spine (1 point)
   West Indian Ocean coelacanth (*Latimeria Chalumnae*) and Indonesian coelacanth (*Latimeria menadoensis*) (1 point each)
6. Benthic detritivore (1 point) *TB4
7. D, C, B, A (2 points)
   D) 409 million years ago, C) 387 million years ago, B) 380 million years ago, A) 375 million years ago (1 point each)

Station 19

1. A) Homo neanderthalensis, B) Smilodon (1 point each)
2. *Smilodon papulator, Smilodon fatalis, Smilodon gracilis* (1 point for order, 1 point for each species)
3. La Brea Tar Pits (1 point)
4. William King
5. (Five of the following, 1 point each)
   Cranial capacity larger, larger body size, larger browridge, larger nose, larger shoulder joint, wider rib cage, larger elbow joint, broader hips, shorter forearm, larger hip joint, larger patella, shorter tibia, larger ankle joint, reduced chin, possibly better eyesight.
6. Engis Caves (Belgium) (1 point), 1829 (1 point), Philippe-Charles Schemerling (1 point)
7. Hyoid bones (2 points)
8. Canine teeth used to slash the prey's throat, not to bite (2 points)
   Gape of 120 degrees (1 point)

Station 20

1 point each

A) Exogyra
B) Juresania
C) Heliophyllum
D) Populus
E) Agnatha
F) Isotelus
G) Leptaena
H) Platyceras
I) Gryphaea
J) Stromatolites
K) Lystrosaurus
L) Hyracotherium
M) Archaeopteryx
N) Belemnitella
O) Conus