



SCIENCE

TEACHER'S GUIDE

▶ **10th Grade**

SCIENCE 1000

Teacher's Guide

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INSTRUCTIONS FOR SCIENCE

The LIFEPAC curriculum from grades two through twelve is structured so that the daily instructional material is written directly into the LIFEPACs. The student is encouraged to read and follow this instructional material in order to develop independent study habits. The teacher should introduce the LIFEPAC to the student, set a required completion schedule, complete teacher checks, be available for questions regarding both content and procedures, administer and grade tests, and develop additional learning activities as desired. Teachers working with several students may schedule their time so that students are assigned to a quiet work activity when it is necessary to spend instructional time with one particular student.

The Teacher Notes section of the Teacher's Guide lists the required or suggested materials for the LIFEPACs and provides additional learning activities for the students. The materials section refers only to LIFEPAC materials and does not include materials which may be needed for the additional activities. Additional learning activities provide a change from the daily school routine, encourage the student's interest in learning and may be used as a reward for good study habits.

If you have limited facilities and are not able to perform all the experiments contained in the LIFEPAC curriculum, the Science Project List may be a useful tool for you. This list prioritizes experiments into three categories: those essential to perform, those which should be performed as time and facilities permit, and those not essential for mastery of LIFEPACs. Of course, for complete understanding of concepts and student participation in the curriculum, all experiments should be performed whenever practical. Materials for the experiments are shown in Teacher Notes — Materials Needed.

A suggested support item for this course is the 10th Grade Science Experiments video, SD1001. The video includes presentations of many of the experiments in this course. Several of the experiments that require special equipment or materials are demonstrated on these videos. They can either be used for answering the questions of the lab report or as a demonstration of the procedure prior to performing the experiment. A notice is included with each experiment in the LIFEPAC where the video is available.

SCIENCE 1001

Unit 1: Taxonomy

TEACHING NOTES

MATERIALS NEEDED FOR LIFE PAC

Required

- dictionary
- encyclopedia or online resources
- assorted fresh fruits
- ten assorted small objects from a hobby or collection
- ten fresh flowers
- dissection kit
- ten photos of animals that inhabit one area of the earth

ADDITIONAL LEARNING ACTIVITIES

Section 1: The History of Taxonomy

1. Try to go for one full day without using any names for any persons or items. Discuss the importance of names and the confusion that would result without them.
2. Write a report about either Aristotle or Linnaeus and his contributions to taxonomy.

Section 2: Binomial Nomenclature

1. Visit an aquarium shop or a greenhouse. Ask the owner in advance to give the students a tour and to tell how scientific names are used in his business.
2. Each person should bring in one plant or leaf that is identified by genus and species. House plants, flowers, trees, and shrubs could all be used. Make a display for the classroom.
3. Find the genus and species of ten organisms including humans and any pets owned by the family. Scientific names are often given in the encyclopedia.

Section 3: Plant and Animal Classification

1. Gather all of the Golden Press Nature Guides that are available from students or the library. Take hikes or gather specimens that can be identified using the guides you have located. Plan a field day and identify as many organisms as possible. Stress ecology; do not destroy any unusual specimens.
2. Collect and press common local flowers. Make attractive note cards with them and give as a gift to a shut-in.
3. Each person should collect and mount twenty common insects. Pool the findings and eliminate duplicates. Make one master. Display and identify as many insects as possible. Label the collection with scientific names, name of collector, and date and site of collection.
4. Write a 500-word report on a sea animal of your choice. Sea urchin, sea cucumbers, jellyfish, and nudibranchs are interesting animals to consider.

Section 4: Taxonomy and Origins

1. Invite a nurse to discuss the testing of donors for organ transplants and why only close relatives are typically the most suitable candidates.
2. Have the students prepare a key for class members that would always work. Explain that color of clothing and hair length are not good choices. Discuss the pros and cons of Social Security numbers as identification.
3. Prepare an attractive poster using pictures from seed catalogues. Choose one plant, such as a rose, iris, squash, or petunia, and show the vast variety of colors and sizes available.

ANSWER KEYS

SECTION 1

- 1.1 classification and organizing
- 1.2 Examples; any order:
a. botany
b. zoology (paleontology, microbiology)
- 1.3 Adam
- 1.4 Either order:
a. taxonomy
b. genetics
- 1.5 a. similarities
b. differences
- 1.6 the Holy Spirit
- 1.7 sort, group, or label anything
- 1.8 It is used in everyday life, to enjoy life around us, to enjoy God's handiwork.
- 1.9 taxonomy is the science that brings order and meaning to the puzzle of diversity
- 1.10 a group of organisms with many similarities (dogs are a kind of living thing)
- 1.11 the genetic principle of parents producing offspring like themselves.
- 1.12 true
- 1.13 false
- 1.14 false
- 1.15 true
- 1.16 true
- 1.17 false
- 1.18 true
- 1.19 true
- 1.20 three groups of plants (herbs, shrubs, trees) and two groups of animals (with and without red blood cells)
- 1.21 noting differences between flowering and nonflowering plants; placing plants into four groups
- 1.22 Aristotle grouped plants; herb, shrub, tree. Theophrastos grouped plants: herb, subshrub, tree, shrub.
- 1.23 drawings not correct myths added/guesses and untested information added
- 1.24 wrote about medical and agricultural uses of plants
- 1.25 firsthand observations
- 1.26 a. Carolus Linnaeus
b. "Father of Modern Taxonomy."
- 1.27 Either order:
a. binomial classification
b. extensive classifying of plants according to flower structures
- 1.28 Either order:
a. Species Plantarum
b. Systema Naturae
- 1.29 stamen number in flowers
- 1.30 Linnaeus's kinds were without variation. Today, we recognize that kinds do display variation. Example: all dogs are of one kind, but show wide variation in size, shape, color, habit.
- 1.31 He developed a system in which anyone could derive the same classification for the same organism. He used the talents God gave him for organizing and for perception with a willingness and delight in his work. God blessed his efforts.
- 1.32 Teacher check

SELF TEST 1

- 1.01 d
 1.02 f
 1.03 a
 1.04 e
 1.05 c
 1.06 classification
 1.07 Examples:
 a. usefulness
 b. harmful/food and poisonous
 1.08 Adam
 1.09 Aristotle
 1.010 horsetail
 1.011 doctrine of signatures
 1.012 added their own unproven ideas.
 1.013 Either order:
 a. reading books or printing books
 b. exploration/travel/navigation
 1.014 Linnaeus
 1.015 Either order:
 a. similar
 b. different
 1.016 false
 1.017 true
 1.018 false
 1.019 false
 1.020 true
 1.021 true
 1.022 e
 1.023 d
 1.024 f
 1.025 c
 1.026 i
 1.027 a
 1.028 k
 1.029 g
 1.030 b
 1.031 j
 1.032 binomial system, easier classifications, number of stamens per flower
 1.033 In Rome people were more concerned with power; they copied old ideas over again. Greeks were more original and more concerned with knowledge. (Answers may vary.)
 1.034 By causing Adam to name the animals (In "classifying" Creation into days)

SECTION 2

- 2.1 b
 2.2 a
 2.3 c
 2.4 International Code of Nomenclature
 2.5 Examples:
 a. Names mean different things to different people.
 b. Foreign names not understood, or: many names for same organism; no common name.
 2.6 Examples: problems of common names, unfamiliar plants and animals, confusing names, setting rules for naming, different standards of classifying.
 2.7 *Passer* is generic (genus) noun Latin for *sparrow*; *domesticus* is specific (species) adjective meaning "around the house."
 2.8 His name is abbreviated and follows name of an organism.
 2.9 a. kingdom
 b. phylum or division
 c. class
 d. order
 e. family
 f. genus
 g. species
 2.10 They are groups within groups. Smaller groups share many likenesses among themselves but they may share only a few within larger groups.
 2.11 a. Example: honey bee
 b. Example: *Apis mellifera* and teacher check
 2.12 The smallest group of the taxa contains very similar organisms (morphology almost the same), can only reproduce with others of the same group (reproductive isolation)
 2.13 a. Example: dogs
 b. Examples: St. Bernard, Collie, German Shepherd, Cocker Spaniel, Irish Setter, Husky, French Poodle
 2.14 varieties, races, subspecies
 2.15 No. Their offspring, the mule, cannot reproduce. Reproductive isolation due to genetic differences.
 2.16 subjective
 2.17 Any order:
 a. complexity of classifying
 b. limitation of knowledge
 c. limitations of personal experience
 d. lack of firsthand information
 2.18 computers or mathematics or statistics

SELF TEST 2

- 2.01 false
 2.02 true
 2.03 true
 2.04 false
 2.05 true
 2.06 a
 2.07 b
 2.08 d
 2.09 b
 2.010 a
 2.011 f
 2.012 g
 2.013 b
 2.014 e
 2.015 c
 2.016 h
 2.017 i
 2.018 a
 2.019 d
 2.020 variation or (subspecies, breeds, races and varieties)
 2.021 Either order:
 a. different
 b. similar
 2.022 a. noun
 b. genus
 2.023 morphology
 2.024 order
 2.025 species
 2.026 reproductive isolation
 2.027 subjective
 2.028 a. division
 b. phylum
 2.029 a. kingdom
 b. phylum or division
 c. class
 d. order
 e. family
 f. genus
 g. species
 2.030 Any two; either order:
 a. Complexity of classifying, limitations of knowledge
 b. limitations of personal experience, lack of firsthand information
 2.031 Their offspring, the mule, cannot reproduce.
 2.032 Genus name is first. It is capitalized and is a noun. Species name is second, lower case and functions as an adjective. Both are italicized or underlined.

SECTION 3

- 3.1 false
 3.2 true
 3.3 false
 3.4 true
 3.5 true
 3.6 Teacher check
 3.7 Teacher check
 3.8 Teacher check
 3.9 life
 3.10 Any five; any order:
 a. unicellular or multicellular
 b. saclike body
 c. segmented or nonsegmented
 d. digestive system
 e. appendages or symmetry, number of legs, exo- or endo-skeleton, teeth patterns
 3.11 Any order:
 a. protoplasm and cell(s)
 b. growth
 c. reproduction
 d. response to stimuli
 e. require food
 f. removal of waste
 g. respiration
 3.12 Any order:
 a. locomotion
 b. lack of cell wall in animal cells
 c. acquiring food
 d. manner of growth
 e. speed of reaction to stimuli
 3.13 Examples:
 big
 hairy
 four-legged
 spotted
 long teeth
 3.14 a. Plantae
 b. Anthophyta
 c. Monocotyledonae
 d. Poales
 e. Poaceae
 f. *Zea*
 g. *mays*
 3.15 a. Plantae
 b. Anthophyta
 c. Dicotyledonae
 d. Rosales
 e. Rosaceae
 f. *Malus*
 g. *sylvestris*
 3.16 Teacher check

- 3.17** a. Animalia
b. Chordata
c. Amphibia
d. Anura
e. Ranidae
f. *Rana*
g. *pipiens* or *Rana pipiens*
- 3.18** a. Animalia
b. Chordata
c. Mammalia
d. Carnivora
e. Felidae
f. *Felis*
g. *leo*
- 3.19** Teacher check
- 3.20** a. two (2)
b. six (6)
- 3.21** Example:
clear, consistent, not too complicated
- 3.22** Ginkophyta
- 3.23** Anthophyta
- 3.24** 260,000
- 3.25** Chordata
- 3.26** Arthropoda
- 3.27** about 1,000,000
- 3.28** more
- 3.29** Any two; either order:
a. Protoplasm cells
b. reproduction, respiration
- 3.30** Any two; either order:
a. no cell walls, no chlorophyll
b. different growth, locomotion
- 3.31** Any two; either order:
a. protoplasm, cells, growth
b. reproduction, respiration, food intake, locomotion
- 3.32** Any two; either order:
a. walk upright, sensitivity
b. intellect, reason, memory, speech
- 3.33** Yes — people produce people, many variations of people as a kind
- 3.34** Examples:
Animalia, Chordata, Mammalia
Primates, Hominidae, *Homo sapiens*

SELF TEST 3

- 3.01** e
- 3.02** d
- 3.03** i
- 3.04** g
- 3.05** b
- 3.06** l
- 3.07** m
- 3.08** a
- 3.09** f
- 3.010** k
- 3.011** true
- 3.012** true
- 3.013** true
- 3.014** true
- 3.015** true
- 3.016** d
- 3.017** c
- 3.018** c
- 3.019** a
- 3.020** a
- 3.021** key
- 3.022** dichotomous key
- 3.023** parallel
- 3.024** *Rana pipiens*
- 3.025** a. -aceae
b. -ae
- 3.026** a. division
b. phylum
- 3.027** fewer
- 3.028** Either order:
a. red-blooded
b. nonred-blooded
- 3.029** a. kingdom
b. phylum (division)
c. class
d. order
e. family
f. genus
g. species
- 3.030** First word is genus — underlined (italicized) and capitalized; noun. Second is species — underlined (italicized) and lower case; adjective
- 3.031** Any two; either order:
a. locomotion, food intake
b. cell walls, chlorophyll

SECTION 4

- 4.1** Objectivity reports on fact or measurable data only; subjective reports feeling and emotions and opinions.
- 4.2** Artificial systems just look at characteristics (selected at random or as outstanding) while natural systems look at relationships (whether real or implied).
- 4.3** new information and new descriptions, based on chemistry, physiology, ecology, genetics, and cytology
- 4.4** A way of grouping organisms by how they look alike.
- 4.5** A way of grouping organisms by relationships, by common ancestor, and by evolution.
- 4.6** Either order:
a. animal husbandry
b. plant breeding
- 4.7** one kind of organism into some other kind
- 4.8**
a. O
b. S
c. S
d. S
e. O
- 4.9** archaeology
- 4.10** look around us, to study the earth and life on it and to see and know that God made everything. Don't hide or protest this truth; discover it for yourself. Test its validity. Prove it for yourself.
- 4.11** The basic kinds of life God created have continued to reproduce their kinds within limits of variation to produce life as we see it today.
- 4.12** The one or few simple life forms developing by natural processes have produced new kinds of life forms which we see today.
- 4.13** Any order; any five:
a. method of formation
b. time to happen
c. continuity of life
d. order of appearance
e. purpose or taxonomy
- 4.14** Topics will vary.
- 4.15** Paragraphs will vary.
- 4.16** Project will vary.

SELF TEST 4

- 4.01** false
- 4.02** true
- 4.03** true
- 4.04** false
- 4.05** true
- 4.06** c
- 4.07** b
- 4.08** a
- 4.09** f
- 4.010** e
- 4.011** b
- 4.012** d
- 4.013** c
- 4.014** c
- 4.015** a forest
- 4.016** a tree
- 4.017** artificial
- 4.018** natural
- 4.019** speciation
- 4.020** creation
- 4.021** evolution
- 4.022** Objective is based on facts, subjective on feelings and emotions.
- 4.023** Greeks were original and interested in science. Romans less interested and copied material.
- 4.024** Either order:
a. Creation began thousands of years ago; evolution; billions
b. Creation; six days; evolution-millions of years for each step
- 4.025** second-largest in animal is phylum, in plant is division
- 4.026** Their offspring, the mule, cannot reproduce which is one criteria for species.
- 4.027** The ability to reproduce only within a species.

LIFEPAC TEST

1. f
2. a
3. c
4. g
5. h
6. i
7. e
8. j
9. b
10. d
11. true
12. false
13. false
14. false
15. true
16. d
17. b
18. a
19. a
20. a
21. b
22. a
23. c
24. d
25. d
26. classification
27. Linnaeus
28. Either order:
 - a. similarities
 - b. differences
29.
 - a. genus
 - b. noun
30.
 - a. species
 - b. adjective
31. kingdom
32. three
33. speciation
34. morphology
35. key
36. two-choice key
37. artificial

ALTERNATE LIFE PAC TEST

1. e
2. g
3. h
4. a
5. i
6. b
7. j
8. d
9. c
10. f
11. true
12. true
13. false
14. false
15. false
16. d
17. c
18. b
19. b
20. c
21. d
22. b
23. c
24. c
25. a
26. morphology
27. key
28. kingdom
29. classification
30. genus
31. species
32. Linnaeus
33. speciation
34. herbalist
35. population
36. dichotomy
37. evolution

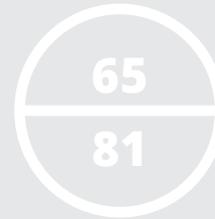
SCIENCE 1001

ALTERNATE LIFEPAC TEST

NAME _____

DATE _____

SCORE _____



Match these items (each answer, 2 points).

- | | |
|----------------------------|---|
| 1. _____ classification | a. development of new species from an ancestral species |
| 2. _____ artificial system | b. the beginning |
| 3. _____ variation | c. categories |
| 4. _____ speciation | d. form of an organism |
| 5. _____ kingdom | e. a system of distinguishing groups for purposes of identification |
| 6. _____ origin | f. a classification plan based on relationships of common ancestry |
| 7. _____ taxonomy | g. a classification plan based on grouping by features |
| 8. _____ morphology | h. differences among offspring of a particular species |
| 9. _____ taxon | i. the largest taxonomical category |
| 10. _____ natural system | j. science of classification of organisms |

Write true or false (each answer, 1 point).

11. _____ Creation took six days.
12. _____ A dictionary is an artificial system of classification.
13. _____ The largest phylum of plant species is chordata.
14. _____ Natural classification systems are based upon similarities in appearance.
15. _____ The biosphere is a region of the atmosphere.

Write the letter for the correct answer on each line (each answer, 2 points).

16. *Zea mays* is an example of _____ .
 a. herbal nomenclature
 b. useful taxonomy
 c. medical grouping
 d. binomial nomenclature
17. A scientist who classifies organisms is _____ .
 a. a physician
 b. a genus
 c. a taxonomist
 d. an agriculturalist
18. There are _____ plants than animals.
 a. more
 b. fewer
 c. the same number
 d. twice as many
19. The "Father of Zoology" was _____ .
 a. Pliny
 b. Aristotle
 c. Carolus
 d. Brunfels
20. The science of inheritance is _____ .
 a. biology
 b. botany
 c. genetics
 d. zoology
21. The language of taxonomy is _____ .
 a. Greek
 b. Swedish
 c. English
 d. Latin
22. The smallest taxon is _____ .
 a. class
 b. species
 c. division
 d. order
23. The name given to an organism that causes the least confusion and is the same worldwide is _____ .
 a. genus name
 b. common name
 c. scientific name
 d. none of these
24. A good example of an artificial system of classification is _____ .
 a. a photo album
 b. a family tree
 c. an encyclopedia
 d. a, b, and c
25. A tool used in classification is a _____ .
 a. key
 b. taxon
 c. morphology
 d. phylum

Complete these statements (each answer, 3 points).

26. The way a plant looks is its _____ .
27. The tool used to classify is called a _____ .
28. The largest taxon is _____ .
29. Taxonomy is the science of _____ .
30. The first word of the scientific name is the _____ .
31. The second word of the scientific name is the _____ .
32. The "Father of Modern Taxonomy" was _____ .
33. Variation that results in the evolution of one species to another is called _____ .
34. The "doctrine of signatures" was characteristic of the _____ .
35. The kind of organism living in an area is _____ .
36. The word that means *cut* or *split in two parts* is _____ .
37. The time required for _____ is millions of years for each step.



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