



SCIENCE

Teacher's Guide

► **4th Grade**

SCIENCE 400

Teacher's Guide

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STRUCTURE OF THE LIFEPAC CURRICULUM

The LIFEPAC curriculum is conveniently structured to provide one teacher handbook containing teacher support material with answer keys and ten student worktexts for each subject at grade levels two through twelve. The work-text format of the LIFEPACs allows the student to read the textual information and complete workbook activities all in the same booklet. The easy to follow LIFEPAC numbering system lists the grade as the first number(s) and the last two digits as the number of the series. For example, the Language Arts LIFEPAC at the 6th grade level, 5th book in the series would be LAN0605.

Each LIFEPAC is divided into 3 to 5 sections and begins with an introduction or overview of the booklet as well as a series of specific learning objectives to give a purpose to the study of the LIFEPAC. The introduction and objectives are followed by a vocabulary section which may be found at the beginning of each section at the lower levels, or in the glossary at the high school level. Vocabulary words are used to develop word recognition and should not be confused with the spelling words introduced later in the LIFEPAC. The student should learn all vocabulary words before working the LIFEPAC sections to improve comprehension, retention, and reading skills.

Each activity or written assignment has a number for easy identification, such as 1.1. The first number corresponds to the LIFEPAC section and the number to the right of the decimal is the number of the activity.

Teacher checkpoints, which are essential to maintain quality learning, are found at various

locations throughout the LIFEPAC. The teacher should check 1) neatness of work and penmanship, 2) quality of understanding (tested with a short oral quiz), 3) thoroughness of answers (complete sentences and paragraphs, correct spelling, etc.), 4) completion of activities (no blank spaces), and 5) accuracy of answers as compared to the answer key (all answers correct).

The self test questions are also number coded for easy reference. For example, 2.015 means that this is the 15th question in the self test of Section 2. The first number corresponds to the LIFEPAC section, the zero indicates that it is a self test question, and the number to the right of the zero is the question number.

The LIFEPAC test is packaged at the centerfold of each LIFEPAC. It should be removed and put aside before giving the booklet to the student for study.

Answer and test keys have the same numbering system as the LIFEPACs and appear throughout this handbook. The student may be given access to the answer keys (not the test keys) under teacher supervision so that he can score his own work.

A thorough study of the Curriculum Overview by the teacher before instruction begins is essential to the success of the student. The teacher should become familiar with expected skill mastery and understand how these grade-level skills fit into the overall skill development of the curriculum. The teacher should also preview the objectives that appear at the beginning of each LIFEPAC for additional preparation and planning.

TEST SCORING AND GRADING

Answer keys and test keys give examples of correct answers. They convey the idea, but the student may use many ways to express a correct answer. The teacher should check for the essence of the answer, not for the exact wording. Many questions are high level and require thinking and creativity on the part of the student. Each answer should be scored based on whether or not the main idea written by the student matches the model example. "Any Order" or "Either Order" in a key indicates that no particular order is necessary to be correct.

Most self tests and LIFEPAC tests at the lower elementary levels are scored at 1 point per answer; however, the upper levels may have a point system awarding 2 to 5 points for various answers or questions. Further, the total test points will vary; they may not always equal 100 points. They may be 78, 85, 100, 105, etc.

Example 1

58 72	SCORE _____	TEACHER _____	initials	date
----------	--------------------	----------------------	----------	------

Example 2

84 105	SCORE _____	TEACHER _____	initials	date
-----------	--------------------	----------------------	----------	------

A score box similar to ex.1 above is located at the end of each self test and on the front of the LIFEPAC test. The bottom score, 72, represents the total number of points possible on the test. The upper score, 58, represents the number of points your student will need to receive an 80% or passing grade. If you wish to establish the exact percentage that your student has achieved, find the total points of his correct answers and divide it by the bottom number (in this case 72) For example, if your student has a point total of 65, divide 65 by 72 for a grade of 90%. Referring to ex. 2, on a test with a total of 105 possible points, the student would have to receive a minimum of 84 correct points for an 80% or passing grade. If your student has received 93 points, simply divide the 93 by 105 for a percentage grade of 89%. Students who receive a score below 80% should review the LIFEPAC and retest using the appropriate Alternate Test found in the Teacher's Guide.

The following is a guideline to assign letter grades for completed LIFEPACs based on a maximum total score of 100 points.

Example:

LIFEPAC Test	=	60% of the Total Score (or percent grade)
Self Test	=	25% of the Total Score (average percent of self tests)
Reports	=	10% or 10* points per LIFEPAC
Oral Work	=	5% or 5* points per LIFEPAC

*Determined by the teacher's subjective evaluation of the student's daily work.

Example:

LIFEPAC Test Score	=	92%	$92 \times .60 = 55$	points
Self Test Average	=	90%	$90 \times .25 = 23$	points
Reports	=		8	points
Oral Work	=		4	points

TOTAL POINTS = 90 points

Grade Scale based on point system:

100 – 94	=	A
93 – 86	=	B
85 – 77	=	C
76 – 70	=	D
Below 70	=	F

TEACHER HINTS AND STUDYING TECHNIQUES

LIFEPAC activities are written to check the level of understanding of the preceding text. The student may look back to the text as necessary to complete these activities; however, a student should never attempt to do the activities without reading (studying) the text first. Self tests and LIFEPAC tests are never open book tests.

Language arts activities (skill integration) often appear within other subject curriculum. The purpose is to give the student an opportunity to test his skill mastery outside of the context in which it was presented.

Writing complete answers (paragraphs) to some questions is an integral part of the LIFEPAC curriculum in all subjects. This builds communication and organization skills, increases understanding and retention of ideas, and helps enforce good penmanship. Complete sentences should be encouraged for this type of activity. Obviously, single words or phrases do not meet the intent of the activity, since multiple lines are given for the response.

Review is essential to student success. Time invested in review where review is suggested will be time saved in correcting errors later. Self tests, unlike the section activities, are closed book. This procedure helps to identify weaknesses before they become too great to overcome. Certain objectives from self tests are cumulative and test previous sections; therefore, good preparation for a self test must include all material studied up to that testing point.

The following procedure checklist has been found to be successful in developing good study habits in the LIFEPAC curriculum.

1. Read the introduction and Table of Contents.
2. Read the objectives.
3. Recite and study the entire vocabulary (glossary) list.
4. Study each section as follows:
 - a. Read the introduction and study the section objectives.
 - b. Read all the text for the entire section, but answer none of the activities.
 - c. Return to the beginning of the section and memorize each vocabulary word and definition.
 - d. Reread the section, complete the activities, check the answers with the answer key, correct all errors, and have the Teacher check.
 - e. Read the self test but do not answer the questions.
 - f. Go to the beginning of the first section and reread the text and answers to the activities up to the self test you have not yet done.
 - g. Answer the questions to the self test without looking back.
 - h. Have the self test checked by the teacher.
 - i. Correct the self test and have the Teacher check the corrections.
 - j. Repeat steps a-i for each section.
5. Use the SQ3R method to prepare for the LIFEPAC test.
 - Scan** the whole LIFEPAC.
 - Question** yourself on the objectives.
 - Read** the whole LIFEPAC again.
 - Recite** through an oral examination.
 - Review** weak areas.
6. Take the LIFEPAC test as a closed book test.
7. LIFEPAC tests are administered and scored under direct teacher supervision. Students who receive scores below 80% should review the LIFEPAC using the SQ3R study method and take the Alternate Test located in the Teacher Handbook. The final test grade may be the grade on the Alternate Test or an average of the grades from the original LIFEPAC test and the Alternate Test.

GOAL SETTING AND SCHEDULES

Each school must develop its own schedule, because no single set of procedures will fit every situation. The following is an example of a daily schedule that includes the five LIFEPAC subjects as well as time slotted for special activities.

Possible Daily Schedule

8:15	-	8:25	Pledges, prayer, songs, devotions, etc.
8:25	-	9:10	Bible
9:10	-	9:55	Language Arts
9:55	-	10:15	Recess (juice break)
10:15	-	11:00	Math
11:00	-	11:45	History & Geography
11:45	-	12:30	Lunch, recess, quiet time
12:30	-	1:15	Science
1:15	-		Drill, remedial work, enrichment*

***Enrichment:** *Computer time, physical education, field trips, fun reading, games and puzzles, family business, hobbies, resource persons, guests, crafts, creative work, electives, music appreciation, projects.*

Basically, two factors need to be considered when assigning work to a student in the LIFEPAC curriculum.

The first is time. An average of 45 minutes should be devoted to each subject, each day. Remember, this is only an average. Because of extenuating circumstances a student may spend only 15 minutes on a subject one day and the next day spend 90 minutes on the same subject.

The second factor is the number of pages to be worked in each subject. A single LIFEPAC is designed to take 3 to 4 weeks to complete. Allowing about 3 to 4 days for LIFEPAC introduction, review, and tests, the student has approximately 15 days to complete the LIFEPAC pages. Simply take the number of pages in the LIFEPAC, divide it by 15 and you will have the number of pages that must be completed on a daily basis to keep the student on schedule. For example, a LIFEPAC containing 45 pages will require 3 completed pages per day. Again, this is only an average. While working a 45 page LIFEPAC, the student may complete only 1 page the first day if the text has a lot of activities or reports, but go on to complete 5 pages the next day.

Long-range planning requires some organization. Because the traditional school year originates in the early fall of one year and continues to late spring of the following year, a calendar should be devised that covers this period of time. Approximate beginning and completion dates can be noted on the calendar as well as special occasions such as holidays, vacations and birthdays. Since each LIFEPAC takes 3 to 4 weeks or eighteen days to complete, it should take about 180 school days to finish a set of ten LIFEPACs. Starting at the beginning school date, mark off eighteen school days on the calendar and that will become the targeted completion date for the first LIFEPAC. Continue marking the calendar until you have established dates for the remaining nine LIFEPACs making adjustments for previously noted holidays and vacations. If all five subjects are being used, the ten established target dates should be the same for the LIFEPACs in each subject.

SCIENCE PROJECTS LIST

Key

- (1) = Those essential to perform for basic understanding of scientific principles.
- (2) = Those which should be performed as time permits.
- (3) = Those not essential for mastery of LIFEPACs.
- S = Equipment needed for homeschool or Christian school lab.
- E = Explanation or demonstration by instructor may replace student class lab work.
- H = Suitable for homework or for homeschool students. (No lab equipment needed.)
- V = This experiment is available on the Science Experiments video.

Science 401

- 401.A (2) H
- 401.B (1) H & V

Science 402

None

Science 403

- 403.A (1) H, S & V (seasonal)
- 403.B (2) H
- 403.C (3) S

Science 404

- 404.A (1) H
- 404.B (1) H & V
- 404.C (3) H
- 404.D (1) S & V
- 404.E (1) S & V
- 404.F (3) H & V
- 404.G (1) S
- 404.H (3) S & V

Science 405

- 405.A (1) S
- 405.B (1) S & V
- 405.C (2) S
- 405.D (1) S & V
- 405.E (1) S & V
- 405.F (3) S & V
- 405.G (2) S & V
- 405.H (1) S & V

Science 406

- 406.A (1) H & V
- 406.B (1) H & V
- 406.C (2) S & V
- 406.D (1) H
- 406.E (2) H & V
- 406.F (1) H & V
- 406.G (1) S & V
- 406.H (3) H & V
- 406.I (3) H

Science 407

- 407.A (1) H & V
- 407.B (2) H
- 407.C (1) H & V

Science 408

- 408.A (1) H
- 408.B (3) H
- 408.C (2) H & V

Science 409

- 409.A (1) H & V
- 409.B (1) H & V
- 409.C (2) S & V

Science 410

None

INSTRUCTIONS FOR SCIENCE

The LIFEPAC curriculum for grades two through twelve was written with the daily instructional material written directly in the LIFEPACs. The student is encouraged to read and follow his own instructional material, thus developing 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 subject 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 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.

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 Teaching Notes—Materials Needed.

A suggested support item for this course is the 4th Grade Science Experiments video, SD0401. 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 401

Unit 1: Plants

TEACHING NOTES

MATERIALS NEEDED FOR LIFEPAC

Required

- none

Suggested

- fresh celery stalk (stem) with leaves on top
- a glass of water
- red ink or red food coloring
- a knife
- 4th Grade Science Experiments video

ADDITIONAL LEARNING ACTIVITIES

Section 1: Plant Life

1. Take a planned field trip to a supermarket. Divide into two groups. One group makes list of all vegetables; other group makes list of all fruits. Groups compare lists at school and discuss.
2. Small group working together makes list of all state flowers. Share list with class.
3. Memorize the first two verses of the hymn "How Great Thou Art." Write them from memory. Give what you have written to the teacher.
4. Draw a flower arrangement.
5. Using real or artificial flowers, make a floral arrangement and bring it to class.

Section 2: Plant Parts

1. Cut colored pictures of flowers and flower arrangements from magazines. Arrange bulletin board display.
2. Make leaf collection. Identify from reference books and share with class.
3. Bring seeds to class and classify them.
4. Plant some plants at home. Keep a diary of progress of the plants. Have one of your parents sign the report when you bring it to class.
5. Make a picture using various seeds.

ANSWER KEYS

SECTION 1

- 1.1** NL
1.2 NL
1.3 L
1.4 L
1.5 NL
1.6 NL
1.7 NL
1.8 L
1.9 NL
1.10 L
1.11 Teacher check
1.12 ___ RICK AND MARY TAKE A TRIP
1.13 ✓ RICK AND MARY LEARN ABOUT FOOD
1.14 ___ RICK AND MARY HAD FRUIT FOR DESSERT
1.15 living
1.16 stem
1.17 bulb
1.18 root
1.19 food
1.20 e
1.21 c
1.22 a
1.23 b
1.24 d
1.25 Choices will vary.
1.26 Choices will vary.
1.27 Choices will vary.
1.28 Choices will vary.
1.29 Paragraphs will vary.
1.30 grape
1.31 apple
1.32 berry
1.33 walnut
1.34 cherry
1.35 orange
1.36 lemon or melon
1.37 Lists will vary.
1.38 Lists will vary.
1.39 Any order:
 a. for food
 b. for shelter
 c. for enjoyment
 d. for state symbols
1.40 vitamin C
1.41 trees
1.42 roots
1.43 Lists will vary.
1.44 Answers will vary.
1.45 forget-me-not
1.46 hibiscus
1.47 Example:
 God loves us and wants us to have a beautiful world in which to live. God is good and would not have created a world less than beautiful.
1.48 Alaska
1.49 Choices will vary.

SELF TEST 1

- 1.01 water
- 1.02 grow
- 1.03 bulb
- 1.04 sugar
- 1.05 pepos
- 1.06 energy
- 1.07 pomes
- 1.08 vegetable
- 1.09 corn
- 1.010 South America
- 1.011 c. food
- 1.012 a. seeds
- 1.013 c. prune
- 1.014 c. leafy
- 1.015 b. bicycle
- 1.016 Any two of the following; Any order:
 - a. for food
 - b. for shelter
or for enjoyment
for state symbols
- 1.017 c
- 1.018 a
- 1.019 e
- 1.020 b
- 1.021 d
- 1.022 b
- 1.023 c
- 1.024 b

SECTION 2

- 2.1 flowers
- 2.2 leaves
- 2.3 roots
- 2.4 stems
- 2.5 below
- 2.6 seeds
- 2.7 flowers
- 2.8
 - a. flowers
 - b. leaves
 - c. stem
 - d. roots
- 2.9 Drawings will vary.
- 2.10 bark
- 2.11 bud
- 2.12 bud scales
- 2.13 future flower
- 2.14 future leaf
- 2.15 growing point
- 2.16 wood
- 2.17
 - a. Put red ink or coloring in a glass of water.
 - b. Set the celery stalk in the glass.
- 2.18 The red coloring should start to go up the celery stem.
- 2.19 Little tubes in the stem are red.
If the celery were examined under a microscope, the student could see little circles.
- 2.20
 - _____ a. The celery stem looked the same on the third day as it did on the first day.
 - b. The water went up through the tubes of the celery plant.
 - _____ c. The celery stalk dried up.
- 2.21 swollen stem
- 2.22 above
- 2.23 the tubes in the stalk
- 2.24 Drawings will vary.
- 2.25 Blade
- 2.26 Stem
- 2.27 Hint:
Drawings could show a leaf blowing off a tree. The leaf will be green. The leaf will blow to the ground, and it will be brown as it lies on the ground. The leaf is decaying.
- 2.28 work
- 2.29 together
- 2.30 decay cycle
- 2.31 leaf
- 2.32 minerals
- 2.33 rain
- 2.34 near
- 2.35 deep
- 2.36 paint

- 2.37** season
2.38 green
2.39 roots
2.40 wheat
2.41 feed
2.42 road
2.43 seeds
2.44 ain
2.45 ee
2.46 oat
2.47 ear
2.48 ead
2.49 oast
2.50 ail
2.51 suf / fer
2.52 car / toon
2.53 in / vent
2.54 slen / der
2.55 un / kind
2.56 bap / tize
2.57 b. photosynthesis
2.58 c. happy
2.59 a. flowers
2.60 c. over 250,000
2.61 a. receptacle
2.62 b. stem
2.63 a. sepal
2.64 b. pollen
2.65 a. three
2.66 a. pistil
2.67 a. God
2.68 Choices will vary.
2.69 Choices will vary.
2.70 Choices will vary.
2.71 Choices will vary.
2.72 seeds
2.73 pome
2.74 rind
2.75 fruit

SELF TEST 2

- 2.01** c. leafy
2.02 a. enjoyment
2.03 b. run-ning
2.04 d. factory
2.05 b. citrus
2.06 c. stem
2.07 d. seeds
2.08 a. pepos
2.09 b. nonliving
2.010 a. starch
2.011 d. wood
2.012 a. bulb
2.013 true
2.014 false
2.015 true
2.016 true
2.017 true
2.018 false
2.019 false
2.020 true
2.021 true
2.022 true
2.023 true
2.024 false
2.025 false
2.026 true
2.027 false
2.028 true
2.029 true
2.030 false
2.031 true
2.032 true
2.033 false
2.034 false
2.035 false
2.036 true
2.037 true
2.038 true
2.039 Any four; any order:
 bud future leaf
 wood future flower
 bud scales growing point
 bark
2.040 Any four; any order:
 root leaves
 flowers (blossoms) stems
2.041 Examples:
 fire, insects, disease, careless,
 cutting methods

LIFEPAC TEST

1. energy
2. bulb
3. nonliving
4. bud
5. berry
6. nut
7. citrus
8. minerals
9. flower
10. fire
11. d
12. f
13. e
14. a
15. c
16. b
17. true
18. false
19. false
20. true
21. false
22. true
23. true
24. Any order:
 - a. root (system)
 - b. stem
 - c. leaf
 - d. flower
25. honor
26. Lord's
27. decay

ALTERNATE LIFEPAC TEST

1. rind
2. root
3. oxygen
4. pollen
5. glory
6. enjoyment
7. d
8. h
9. g
10. e
11. b
12. f
13. c
14. i
15. a
16. true
17. false
18. true
19. false
20. true
21. false
22. true
23. true
24. true
25. true
26. Examples:
fire
over-cutting

SCIENCE 401

ALTERNATE LIFEPAC TEST

NAME _____

DATE _____

SCORE _____



From the list of words, choose the correct word and write it in the blank (each answer, 4 points).

glory	enjoyment	pollen
rind	oxygen	root

- Cucumbers are berries with a hard _____.
- A parsnip is a vegetable with a large _____.
- Plants give off _____ into the air.
- Bees pollinate flowers by carrying _____ from one flower to another.
- The Psalmist wrote, "Thou art worthy, O Lord, to receive _____ and honor and power."
- Trees give us _____ as well as shelter.

From the following list write the letter in each blank that makes the sentence correct (each answer, 4 points).

a. above ground	b. underground	c. flower
d. sugar	e. grow	f. stem
g. minerals	h. chlorophyll	i. leafy

- We get energy from eating plants which contain _____.
- The green coloring matter in plants that they use in making food is called _____.
- Soil contains _____ which plants use to make food.
- God has given us everything we need to _____.
- The white potato is a swollen stem which grows _____.
- The flower of a plant is attached to the _____.

13. The stem of a plant contains the future _____ .
14. Cabbage is a _____ vegetable.
15. Bean seeds and pea seeds grow _____ .

Write *true* or *false* (each answer, 3 points).

16. _____ The pioneers in America used corn for food.
17. _____ Spinach and cabbage are South American fruits.
18. _____ Each pistil of a flower is made up of three parts.
19. _____ The style of a flower is part of the pollen.
20. _____ Carbon dioxide is a gas.
21. _____ The celery stalk, which is eaten, grows underground.
22. _____ Herbs are plants whose stems and leaves are used in cooking.
23. _____ Apples and pears are fruit.
24. _____ A petal is a part of a flower.
25. _____ A melon is a fleshy fruit with a hard rind and many seeds.

Answer this question (each answer, 5 points).

26. Name two enemies of forests.

a. _____ b. _____



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