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ABSTRACT

This booklet, one of a series developed by the Frederick County Board of Education, Frederick, Maryland, provides an instruction module for an individualized or flexible approach to secondary science teaching. Subjects and activities in this series of booklets are designed to supplement a basic curriculum or to form a total curriculum, and relate to practical process oriented science instruction rather than theory or module building. Included in each booklet is a student section with an introduction, performance objectives, and science activities which can be performed individually or as a class, and a teacher section containing notes on the science activities, resource lists, and references. This booklet outlines activities for utilizing a cemetary to investigate population trends, life expectancy, and causes of death. The estimated time for completing the activities in this module is one week. (SL)

Human Ecology

AIDS TO INDIVIDUALIZE THE TEACHING OF SCIENCE

MINI-COURSE UNITS

BOARD OF EDUCATION OF FREDERICK COUNTY
1974

Marvin G. Spencer

GRAPHIC ARTS DEPARTMENT - F.H.S

A FIELD STUDY IN HUMAN ECOLOGY

Prepared by

Janet Owens

Estimated Time for Completion

1 week

Frederick County Board of Education

Mini Courses for

Physical Science, Biology, Science Survey,

Chemistry and Physics

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Dr. Alfred Thackston, Jr.
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Frederick, Maryland

1974

FOREWORD

The writing of these instructional units represents Phase II of our science curriculum mini-course development. In Phase I, modules were written that involved the junior high disciplines, life, earth and physical science. Phase II involves senior high physical science, biology, chemistry, physics and science survey.

The rationale used in the selection of topics was to identify instructional areas somewhat difficult to teach and where limited resources exist. Efforts were made by the writers of the mini-courses to relate their subject to the practical, real world rather than deal primarily in theory and model building.

It is anticipated that a teacher could use these modules as a supplement to a basic curriculum that has already been outlined, or they could almost be used to make up a total curriculum for the entire year in a couple of disciplines. It is expected that the approach used by teachers will vary from school to school. Some may wish to use them to individualize instruction, while others may prefer to use an even-front approach.

Primarily, I hope these courses will help facilitate more process (hands on) oriented science instruction. Science teachers have at their disposal many "props" in the form of equipment and materials to help them make their instructional program real and interesting. You would be remiss not to take advantage of these aids.

It probably should be noted that one of our courses formerly called senior high physical science, has been changed to science survey. The intent being to broaden the content base and use a multi-discipline approach that involves the life, earth and physical sciences. It is recommended that relevant topics be identified within this broad domain that will result in a meaningful, high interest course for the non-academic student.

ALFRED THACKSTON, JR.
Assistant Superintendent for Instruction

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CONTENTS

A FIELD STUDY IN HUMAN ECOLOGY

A cemetery provides many clues to the past of a community, including many ecological and population-related trends. A field study may offer information about trends in mortality, life expectancy, and causes of death. From your data, you should be able to discuss the reasons for these trends and the possible consequences of them.

OBJECTIVES

The student should be able to:

1. collect data in a local cemetery, by reading the information recorded on the headstones.
2. illustrate the total results by graphing the data.
3. analyze the collective data, explaining the possible reasons for any changes in mortality or life expectancy and possible consequences of them.
4. discuss the validity of the field study, compare assumptions to facts, and identify variables affecting the data.

ACTIVITIES

a. Preparation for Field Study

Instructions: Our trip to a local cemetery will permit us to collect data representing the local community from the years 1820-1970. Since we obviously cannot record data from all the headstones, random sampling is very important. Therefore, do not look for the oldest tombstone or the small ones for infants. Simply record data from every second or third stone you see. Only one member of a family, however, should be included, that being the first one to catch your eye.

It is also important for each team to stop at a different location within the cemetery and for each team member to cover different areas within that location. This prevents any overlapping of data so two people do not read the same headstone, thereby recording it twice.

The teacher will assign your group to a particular section of the cemetery before leaving on the trip, so that both old and new sections will be included. Approximately one hour will be spent collecting the data in the cemetery.

Look at Handout #1. This will be the paper you will use to collect your data. Data will be collected by recording the individual's age category when he died (1831-40, etc.) not the year in which he was born.

For each headstone, you will have to record or identify two facts:

1. how old the person was

2. year of death

Sample Exercise:

Here is a reading from a headstone:

James Linthicum
May 28, 1838
December 18, 1867

How old was the individual?

By subtracting 1867
-1838
29 years old

He was 29 years old. Look at Handout #1 and find the correct age category for him (21 - 30).

Now for the last fact: The year of death - 1867

Find the correct decade on the vertical axis: 1861 - 1870

*To record this individual data, start at the bottom of the chart, right there at the correct age category, 21-30. Move up that column until you reach the block directly across from the correct decade in which the individual died - 1861-1870. In that block, place one tally mark for this individual.

In your field study, you may have several tally marks in certain blocks since many individuals will probably be in the same age and decade categories.

Now see if you can successfully record the tally mark for this reading:

James Jones
Born June 6th, 1830
Died January 18th, 1879

Sometimes you will find readings that are easier like the following:

Elizabeth Jones
September 24, 1896
in the 73rd year of her age

The validity of this study depends on the accurate recording of the data, so take your time and use scrap paper for subtracting to find the individual's age. The total class data depends on you, the independent collector.

One final reminder: Bring the handout, pencil or pen, scrap paper, and a clipboard or something to write on for the field study.

b. Collection of Data: Field trip to nearby cemetery

c. Tabulation of Data:

Team Data: Today each member of the team will give his data to the team leader. You will use an easy, quick method of totalling your team data.

First, the team leader should obtain another Handout #1 from the teacher. He should then label the horizontal and vertical blocks to make it easier in tallying the number of marks in each block.

For instance, on the top of the handout, start lettering each block from A to K. (See the example on the blackboard) Then number the vertical blocks, starting at the top, 1 - 15. (Again, look at the example on the blackboard)

Now it will be easy to simply call out individual blocks by their letter-number combination For example, find the top left-corner block. This would be block "A-1". The block directly below it would be block "A-2", and so on.

The group should be sitting together, with each member having labeled his or her collecting handout in the same way. Once everyone has the correct labeling of letters and numbers, the group can assemble the data.

The team leader will call out block "A-1". Each member of the team, in turn, will tell the leader how many marks he has in that block. The number can simply be called out with each member taking his turn. The team leader will then add up the numbers and record the total in that block on his handout.

Continue using this same procedure with all the blocks until the entire handout is completed. Your group may be slow at first in adding the marks for each block, but you will speed up as you catch on to the procedure

Tabulating Class Data: All the team leaders, once the data from all the groups are tallied, will use the same procedure as with the smaller groups to add and record the class total. One person will record the data for each block, as the team leaders call out their individual group's data for it, and all the numbers are added up for each block.

The total class data will be given to each student to use as a reference for the graphs that he will make and the questions on the worksheet.

d. Graphing the Class Data

Instructions: First, take your handout of the class data and draw a line under the decade 1861-1870. Next, draw a line under the decade 1911-1920. You have now divided the 150-year period into three 50-year time periods:

1820 - 1870

1871 - 1920

1921 - 1970

You will make a graph, plotting the data for each time period. Thus, you will have three graphs:

Graph #1 - Time Period of 1820 - 1870

Graph #2 - Time Period of 1871 - 1920

Graph #3 - Time Period of 1921 - 1970

For each graph, you will use the same labeling for the horizontal and vertical lines. See the sample graph, showing the correct procedure for labeling the graphs. Use this procedure for each graph.

Graph #4 - Comparing the Three Time Periods

Instructions: Use the same labeling procedure for this graph and plot each of the three lines on it. You will have to color-code them so you can tell the time period of each line. Include a key showing the color matched to the time period.

e. Conclusions: Analyze the Data

Complete Worksheet #1, using your graphs before the class discussion.

Decade in which Individual Died

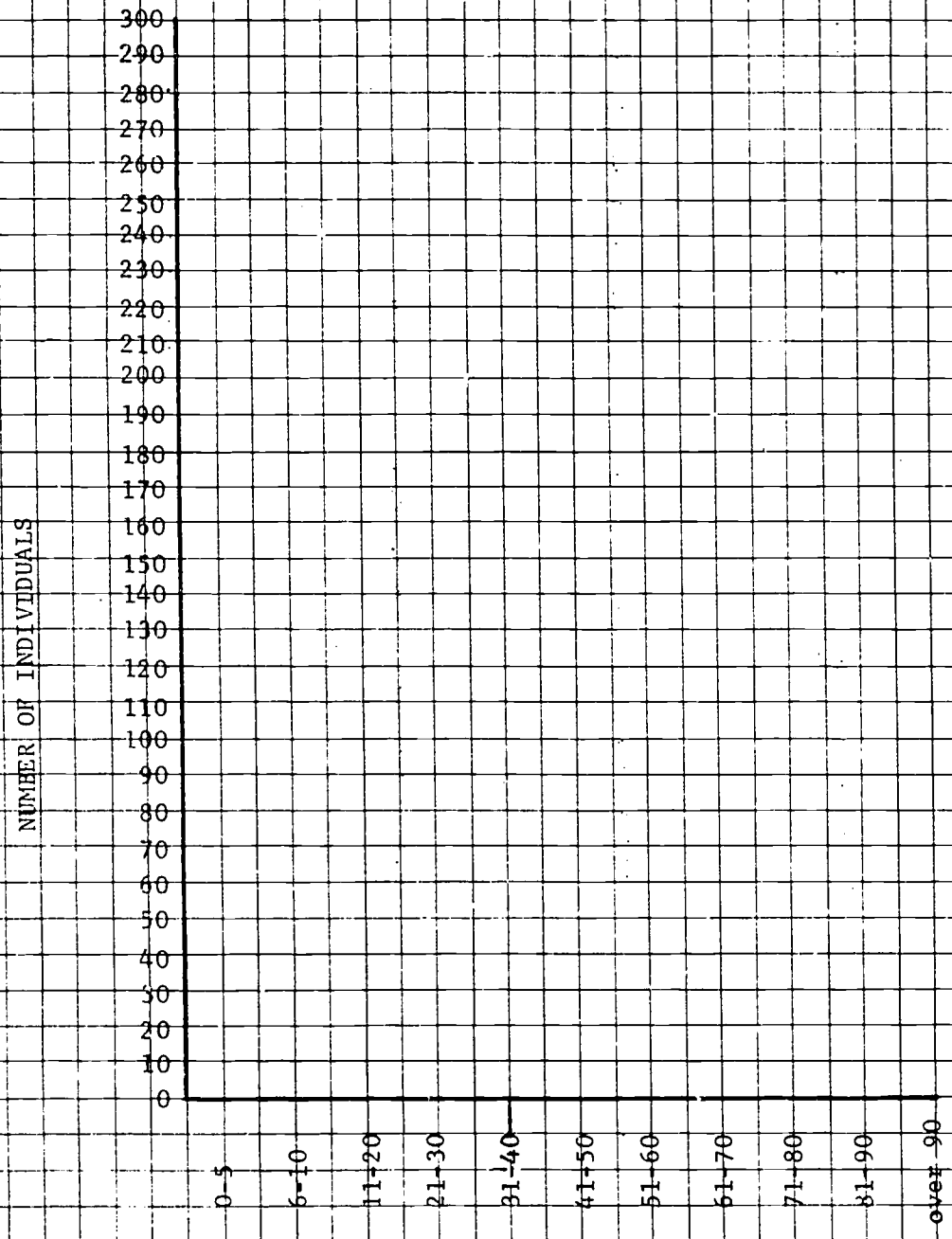
Data Collected from Frederick County

	0-5	6-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	over 90
1821-30											
1831-40											
1841-50											
1851-60											
1861-70											
1871-80											
1881-90											
1891-1900											
1901-10											
1911-20											
1921-30											
1931-40											
1941-50											
1951-60											
1961-70											

Age Category of Individual at Death

Sample for Correct Procedure for Labeling Graph

Graph # _____ Time Period of _____



Worksheet #1

FIELD STUDY ANALYSIS

Name _____ Period _____ Date _____

1. How does this field trip relate to the topic of population?

2. Compare the three lines on Graph #4.

3. What general trends, if any, are present relating to infant mortality and death control?

4. Could you identify causes of death in certain time spans?

5. What other conclusions can you draw from the data?

6. Where else could one obtain similar and perhaps more exact records?

7. List ways in which the data may be biased.

8. Are your conclusions, assumptions or facts?

TEACHER SECTION

Before the Field Study:

1. Select a cemetery with the following characteristics:

   a. large enough to collect sufficient data without any repetition (students should be able to spread out and thus, avoid any chance of reading the same tombstones)

   b. has old and new sections that range from the dates of the study, from 1820-1970.

   SUGGESTED CEMETERY: Mt. Olivet Cemetery in Frederick, Marvland meets the above requirements. Also, the lettered sections within the cemetery enable the teacher to organize the trip, by assigning teams to the lettered sections before arriving on the day of the study. This procedure eliminates any confusion on the student's part as to what area of the cemetery he will cover.

   In the past, student teams have been started at the outside sections of the cemetery and all groups then work their way back to the front of the cemetery where the bus usually waits. The teacher may, the day before the study, draw a map of the cemetery on the board, showing the roads and lettered sections; explaining the assigned areas, where they are, and how to work back to the meeting place at the end of the hour spent collecting data.

2. Visit the selected cemetery before the actual study to be sure that a high school group may use it for the purpose of the study. Also decide at that time, where the teams will be working and that both old and new sections will be covered.

3. Teams usually consist of four or five students, with a team leader being responsible for the group, and the tabulation of team data.

4. Mention to the students before going on the trip to be aware of other visitors in the cemetery and to avoid collecting data near them.

5. The day before the study, discuss the method of collecting data indicated in the student's section "a". Some students might be confused about how to use Handout #1.

6. They should bring the handout, clipboard, scrap paper, and pen or pencil with them on the field study.

During the Field Study:

1. The teacher should move around the cemetery, helping students with the data, and supervising. Also, students may become interested in just looking at the headstones, reading the epitaphs or studying the designs. You may need to remind them to continue their tallying of the individual age and decade of death.

Tabulation of Data:

1. Cover the instructions with the students as described in part "c".

   Included in this section are sample copies of the handouts used in tabulating team and class data. You will have to run off many copies of Handout #1 since each student will need one for collecting, each team will need for for tabulation of data, one is necessary for the total class data, and then each student should have a copy for writing down the class data for graphing.

   Illustrate on the board the correct method (see sample Handout #1, copy 2) of labeling their collection sheets for easy tabulation.

Graphing the Total Class Data:

1. Discuss all instructions with students and individuals may need assistance in graphing. Included in the student section is a sample graph showing the correct procedure for labeling and setting up their graphs. Notice for each 50-year period, the student must add up the total number of individuals who died in each age category.

2. Be sure that all students are using the correct procedures for the graphs. Graph #4 comparing the three 50-year periods is perhaps the most important for analyzing the data. Sample graphs from a previous study in Mt. Olivet Cemetery are included in this section for your reference. You may want to use these graphs for comparison with your results, attempting to explain any differences.

3. For class discussion, cover the questions on Worksheet #1 and you may want to make a transparency showing the results of graph #4.

Sample Copy #1

[illegible]

How to Use Handout - Tally Marks

Data Collected from Frederick County

	0-5	6-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	over 90
[illegible]											
1831-40	I										
1841-50											
1851-60											
1861-70											
1871-80											
1881-90											
1891-1900											
1901-10											
1911-20											
1921-30											
1931-40											
1941-50			I								
1951-60								II			
1961-70											

Age Category of Individual at Death

Sample Copy #2

Labeling Handout to Collect Team and Class Data

Data Collected from Frederick County

	A	B	C	D	E	F	G	H	I	J	K
[illegible]	1	0										
[illegible]	2	1										
[illegible]	3	0										
[illegible]	4	2										
[illegible]	5	5										
[illegible]	6	0										
1881-90	7	4										
[illegible]	8											
[illegible]	9											
[illegible]	10											
[illegible]	11											
[illegible]	12											
[illegible]	13											
[illegible]	14											
[illegible]	15											
		0-5	6-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	over 90

Age Category of Individual at Death

Sample Copy

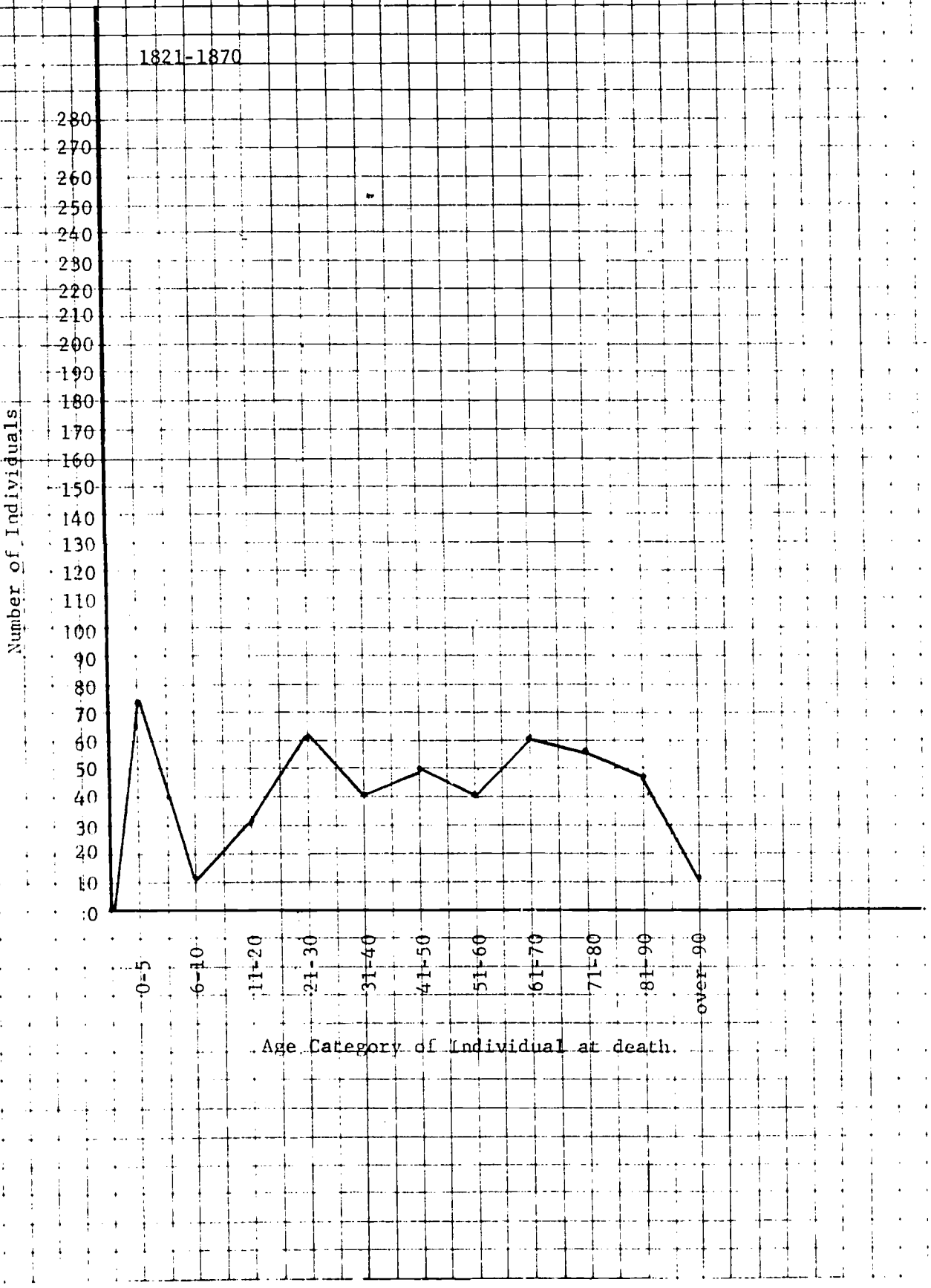
Total Class Data

Data Collected from Frederick County

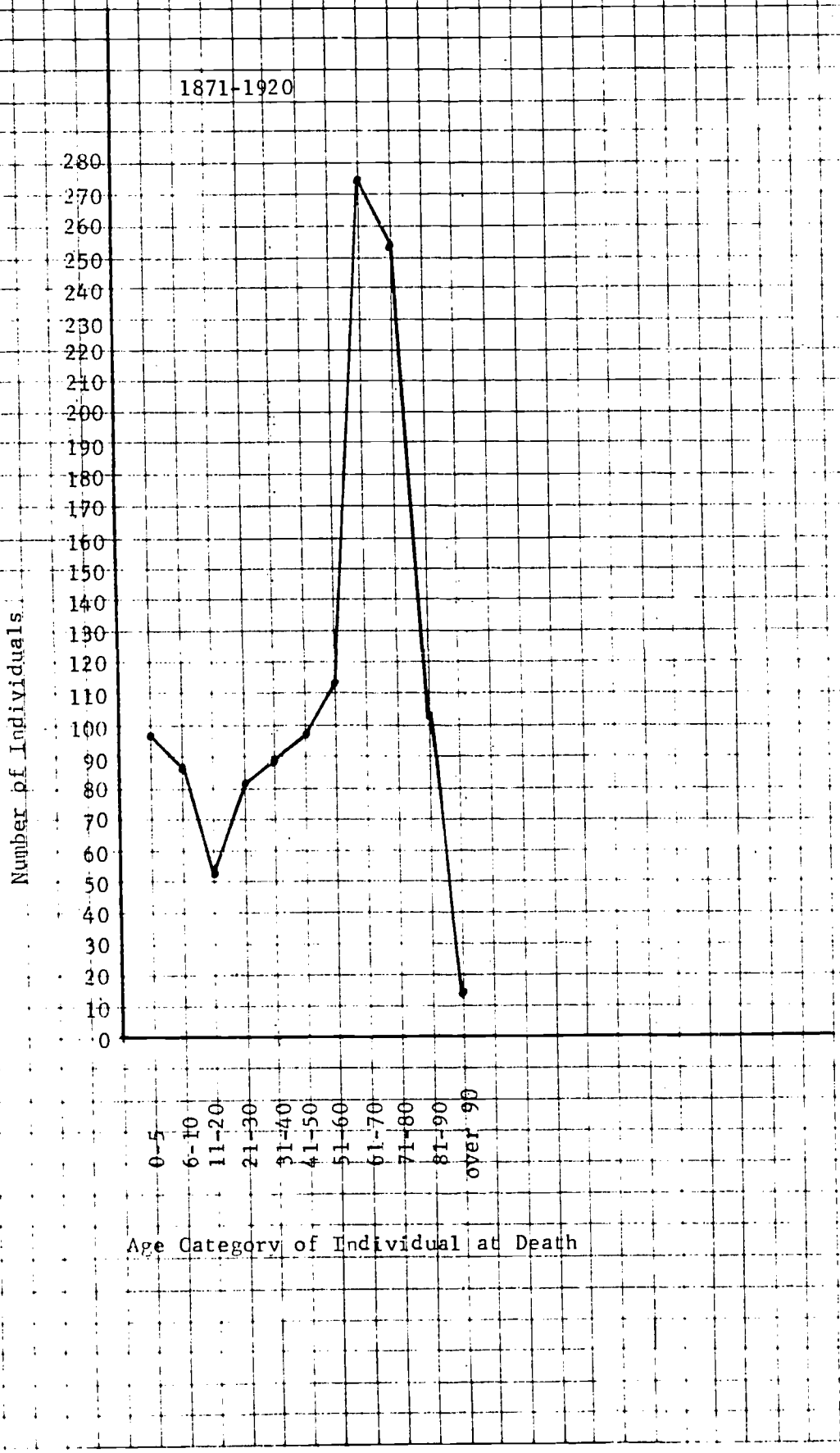
		A	B	C	D	E	F	G	H	I	J	K
[illegible]	1	5	0	2	6	2	1	5	3	4	2	1
[illegible]	2	14	3	3	9	9	5	8	4	6	2	1
[illegible]	3	4	1	4	9	5	10	11	7	6	2	0
[illegible]	4	18	4	14	14	14	17	17	15	15	14	5
[illegible]	5	31	4	10	24	10	17	11	33	25	26	3
1871-80	6	20	5	11	15	17	12	21	19	49	8	3
1881-90	7	27	8	12	15	16	34	27	45	51	20	5
[illegible]	8	18	3	12	16	19	17	25	27	45	22	2
1901-10	9	23	1	10	26	16	14	27	44	53	16	2
[illegible]	10	10	16	8	11	21	21	13	40	54	27	1
[illegible]	11	18	3	5	16	9	16	18	37	54	26	6
1931-40	12	8	6	4	9	3	9	22	38	50	17	7
[illegible]	13	8	0	4	4	15	15	24	35	57	29	6
[illegible]	14	2	0	0	0	2	10	26	26	42	30	10
1961-70	15	5	0	0	5	2	9	16	28	56	39	10
		1-5	6-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	over 90

Age Category of Individual at Death

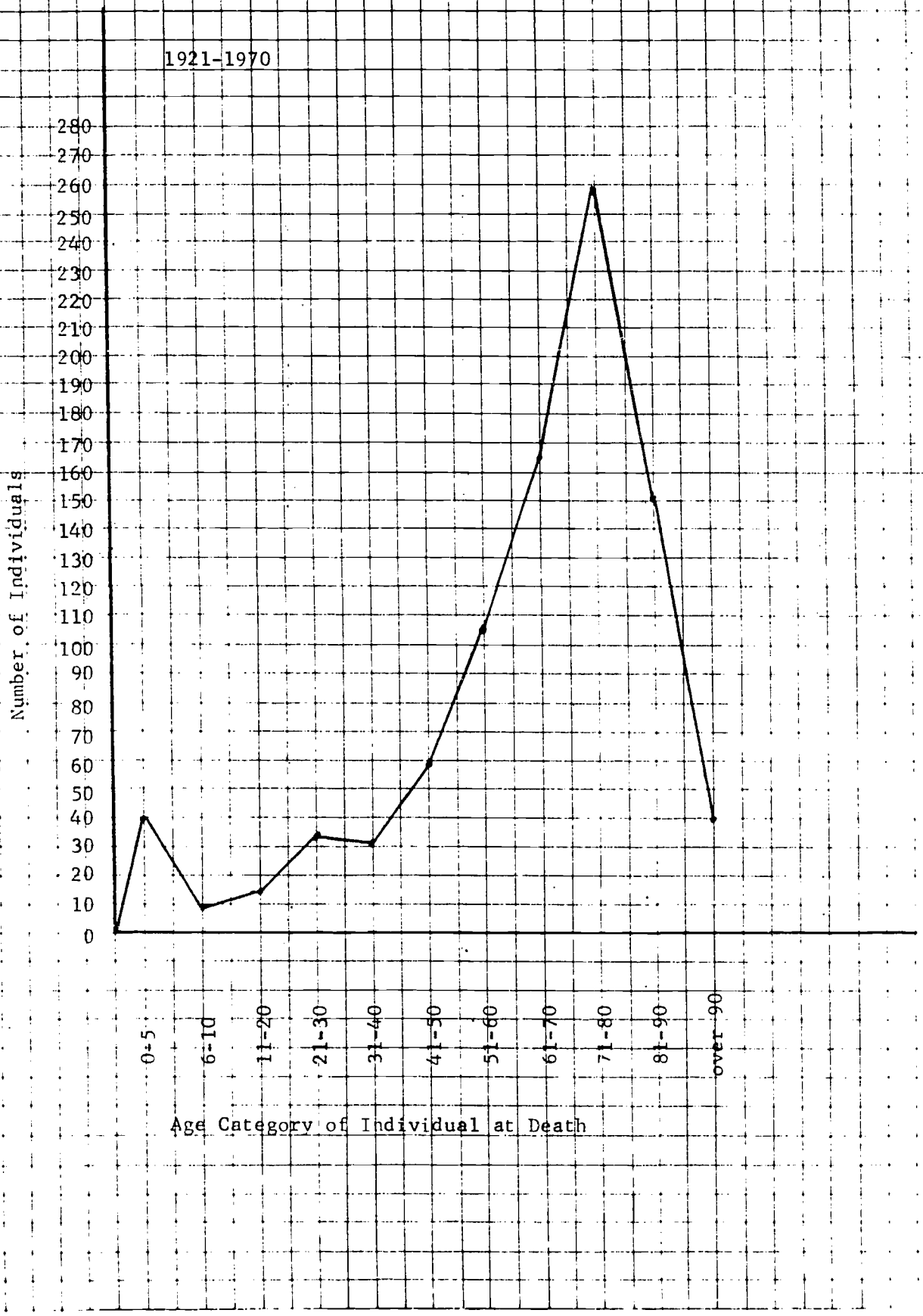
GRAPH #1


1821-1870
Number of Individuals
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0-5
6-10
11-20
21-30
31-40
41-50
51-60
61-70
71-80
81-90
over 90
Age Category of Individual at death.

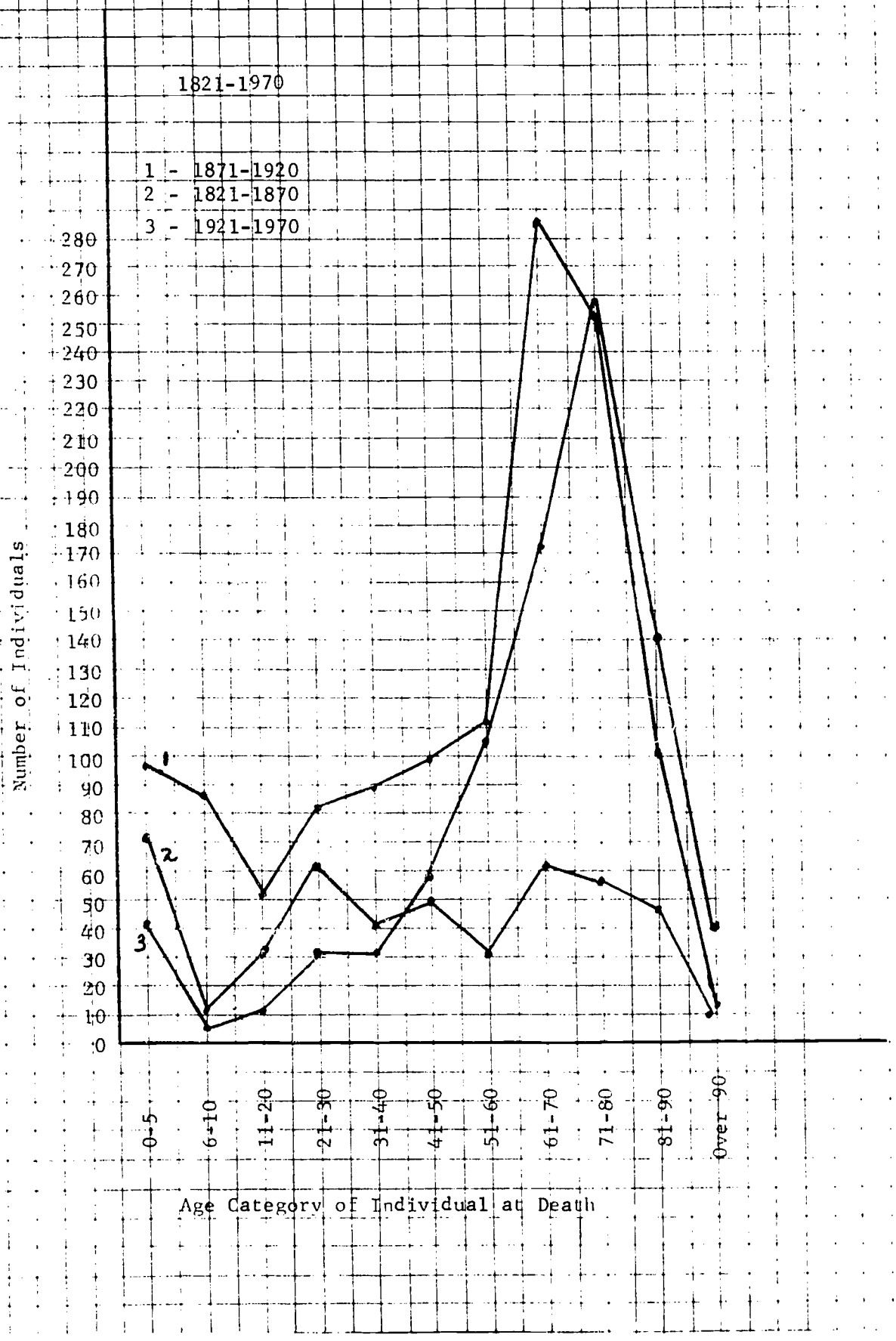
GRAPH #2


1871-1920
Number of Individuals
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0-5
6-10
11-20
21-30
31-40
41-50
51-60
61-70
71-80
81-90
over 90
Age Category of Individual at Death

GRAPH #3


1921-1970
Number of Individuals
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0-5
6-10
11-20
21-30
31-40
41-50
51-60
61-70
71-80
81-90
over 90
Age Category of Individual at Death

GRAPH #4


1821-1970
1 - 1871-1920
2 - 1821-1870
3 - 1921-1970
Number of Individuals
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1
2
3
0-5
6-10
11-20
21-30
31-40
41-50
51-60
61-70
71-80
81-90
Over 90
Age Category of Individual at Death

Evaluation Form for Teachers

Name of mini-course _____

Evaluation Questions	Yes	No	Comments
1. Did this unit accomplish its objectives with your students?			
2. Did you add any of your own activities? If so, please include with the return of this form.			
3. Did you add any films that other teachers would find useful? Please mention source.			
4. Were the student instructions clear?			
5. Was there enough information in the teacher's section?			
6. Do you plan to use this unit again?			

7. Which level of student used this unit? _____

8. How did you use this unit - class, small group, individual? _____

_____

PLEASE RETURN TO SCIENCE SUPERVISOR'S OFFICE AS SOON AS YOU COMPLETE THE COURSE.

SCIENCE MINI-COURSES

PHYSICAL SCIENCE	Prepared by
ELECTRICITY: Part 1 (Types of Generation of Electricity)	Marvin Blickenstaff
ELECTRICITY: Part 2 (The Control and Measurement of Electricity	Marvin Blickenstaff
ELECTRICITY: Part 3 (Applications for Electricity)	Marvin Blickenstaff
CAN YOU HEAR MY VIBES? (A Mini-course on Sound)	Charles Buffington
LENSES AND THEIR USES	Beverly Stonestreet
WHAT IS IT? Identification of an Unknown Chemical Substance	Jane Tritt
BIOLOGY	
A VERY COMPLEX MOLECULE: D.N.A. The Substance that Carries Heredity	Paul Cook
Controlling the CODE OF LIFE	Paul Cook
Paleo Biology – BONES: Clues to Mankind's Past	Janet Owens
A Field Study in HUMAN ECOLOGY	Janet Owens
Basic Principles of GENETICS	Sharon Sheffield
HUMAN GENETICS – Mendel's Laws Applied to You	Sharon Sheffield
SCIENCE SURVEY	
WEATHER Instruments	John Fradiska
TOPOGRAPHIC Maps	John Geist and John Fradiska
CHEMISTRY	
WATER	Ross Foltz
PHYSICS	
PHYSICAL OPTICS	Walt Brilhart