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ABSTRACT

This monograph presents an annotated index of auto-tutorial materials in science education available to middle and secondary schools in the Newark School District. Materials relevant to the study of the biological sciences enable the students to become more familiar with Biology Statistics, Cytology, Marine Field Trips, Use of Microscopes, Genetics, Ecology, Human Reproduction, Health and Drugs. Of interest to both mathematics and science students, exercises are suggested relating to understanding and use of the metric system. Minicourses, slides, films and student activities related to principles of physics and chemistry are included in this booklet. (EB)

INDEX OF A/T'S IN SCIENCE

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NEWARK SCHOOL DISTRICT

June 30, 1973

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AT
311
D
P.I

Measuring Populations - Part I
Harry Dillner

Student uses both a census and sampling technique to measure the density of a sample area of seeds on a laminated 8 x 10 card.

Time: 25 minutes High School
NSD, AT Workshop, 197.

BIOLOGY STATISTICS

AT
311
D
P.II

Measuring Populations - Part II
Harry Dillner

Sampling technique is used to measure the population of a test tube of yeast cells. Microscopic and volumetric density measurements are used. The student is asked to devise a technique to measure the total population of bacteria on the surface of the skin.

Time: 45 minutes High School
NSD, AT Workshop, 1971

BIOLOGY STATISTICS

AT
312.8
D

World Population Growth
Harry Dillner

Describe the growth of the world's population between 1 AD and 1973 AD and predict growth for year 2000. Discuss factors responsible for rapid increase. Describe environmental factors which limit human population. Assesses need for and obstacles to family planning.

Time: 30 minutes High School
NSD, 1973

BIOLOGY STATISTICS

AT
312.8
Dp

Parasites, Competition, and Predators
Harry Dillner

Describe how parasites, competition, and predators operate to regulate population size.

Time: 30 minutes High School
NSD, 1973

AT
312.8
Du

U. S. Population Growth
Harry Dillner

Gives the current population picture and predicts future population based upon two and three child families. Analyzes growth of the U. S. population between 1900 and 1970 in terms of:

birth rate
death rate
immigration
growth rate

Analyzes economic impact of zero population growth.

Time: 30 minutes High School
NSD, 1973

AT
371.33
A

How to Make an A-T
Sharon Allen

Time: 12 minutes Trainees
NSD, AT 1972

SCIENCE, MATHEMATICS, ETC.

AT
389.152
S

Metric System - Introduction History, Metric Conversions
Diane Sisk

Student learns to identify metric names of mass, volume and length units. Using metric prefixes the student should be able to write fractional and decimal forms and construct conversion tables.

Time: 18 minutes Middle School
NSD, AT Workshop, 1971

SCIENCE MATHEMATICS METRIC SYSTEM

AT
389.152
S1

Mass - Metric Weight
Diane Sisk

Using an equal arm balance the student learns to balance the scale and determine the mass of several small laboratory items. Slides show pictures of balances and how to read the scale. Student test included.

Time: 15 minutes & lab time
NSD, AT Workshop, 1972

SCIENCE, MATHEMATICS METRIC SYSTEM

AT
389.152
Sm

Meter - Metric Length
Diane Sisk

Student uses meter stick to measure specific samples. Comparison between yard stick and meter stick is done and the student measures a given sample by using both measuring devices.

Time: 14 minutes Middle School
NSD, AT Workshop, 1972

SCIENCE MATHEMATICS METRIC SYSTEM

AT
389.152
Sv

Liter - Metric Volume
Diane Sisk

Student reads meniscus of water and mercury. Volume measurement in a graduated cylinder. Water displacement method used in a laboratory exercise.

Time: 15 minutes & lab time Middle School
NSD, AT Workshop, 1972

SCIENCE MATHEMATICS METRIC SYSTEM

AT
510
C

Using A Protractor
Georgia Cressman

Time: 30 minutes Middle School
NSD, AT Workshop, 1971

MATHEMATICS PROTRACTORS

AT
522
R

Sky Study
R. P. Reeder

Using slides and a celestial globe the student learns prominent stars and constellations. How to use the globe and then working problems concerning the use of the globe. This is a lengthy unit and can be done in stages.

Time: 45 minutes Middle School, High School
NSD, AT Workshop, 1972

EARTH AND SCIENCE AND SPACE

AT
531.1
S

Part I - Introduction to Vectors
E. D. Stowell, Jr.

A knowledge of basic geometry is a prerequisite. A student should learn a vector's magnitude and directional quantities, be able to add two or more vectors graphically and determine the resultant vector graphically. Several problems are used and the answers are shown diagrammed on slides.

Time: 30 minutes Middle School, High School
NSD, AT Workshop, 1972

PHYSICS GENERAL SCIENCE

AT
531.23
R

Characteristics of Longitudinal & Transverse Waves
W. A. Reister

Using slides, rope and a wire or Slinkey, the student should be able to produce transverse and longitudinal waves and define wave length, frequency, amplitude, node, compression and rarefaction.

Time: 35-40 minutes Middle School
NSF, AT Workshop, 1972

AT
540.018
S

Observation - Chemistry

William Sokol

A student does a seemingly simple experiment with a candle that points out differences between observation and interpretation. Optional home experiment included.

Time: 40 minutes Middle School, High School
NSD, AT Workshop, 1972

CHEMISTRY CHEMSTUDY

AT
540.018
Sg

Graphing

William Sokol

Prerequisite Algebra I and AT 540.018 S Observation

From an experimental situation, the student learns to record data and then plot the data as described in the lesson.

Time: 3 hours High School
NSD, AT Workshop, 1972

CHEMISTRY CHEMSTUDY

AT
540.018
Si

Seeking A Regularity

William Sokol

The student performs an experiment, collects data and forms a regularity.

Time: 45 minutes High School
NSD, AT Workshop, 1972

CHEMISTRY CHEMSTUDY

AT
540.78
St

The Direct Relationship
William Sokol

Using data the student determines the slope of the straight line graph relating the variables. Using the value of this slope the student writes the equation for the given relationship.

Time: 35 minutes High School
NSD, AT Workshop, 1972

CHEMISTRY CHEMSTUDY

AT
542
B

Calibrating A Thermometer
R. C. Brubaker

Time: 50 minutes Middle School
NSD, AT Workshop, 1972

PHYSICAL SCIENCE

AT
546.24
H

"pH"
Paula Henderson

Using litmus and hydrion papers to record the pH of given substances to determine whether they are acid or base.

Time: 25-30 minutes High School
NSD, 1973

AT
551.3
A

Salinity, Density Densoclines & Density Currents
S. R. Allen

Before using this mini-lesson, a student should understand the principles of temperatures in oceans, thermoclines and thermal density currents. Students use laboratory materials in devising their own density layers and recognize a densocline.

Time: 30 minutes High School, Middle School
NSD, T Workshop, 1971

EARTH SCIENCE DENSOCLINES

AT
551.3
Aw

The Wherefores & Whys of Density Currents
S. R. Allen

Prerequisite - AT 551.3 on Salinity, Density Densoclines & Density Currents. The student taste tests salt solutions. Picture maps and slides are used in guiding the student to make graphs and conclusions about factors affecting density currents.

Time: 30 minutes Middle School, High School
NSD, AT Workshop, 1971

EARTH SCIENCE DENSITY CURRENTS

AT
574.87
H

Mitosis
Paula Henderson

The student should know structure of DNA and parts of the cell before using this AT. A series of 13 slides describes the 5 basic steps of mitosis. A short self-test matching pictures of the stages of mitosis and answers are included in the unit.

Time: 15 minutes High School, Middle School
NSD, AT Workshop, 1971

BIOLOGY CYOLOGY

AT
574.87
Hm

Meiosis
Paula Henderson

A set of slides shows "purple sneekers" going through duplication and reductional division. A series of schematic cell drawings explain stages of meiosis. Self quiz is included with answers on tape.

Time: 15 minutes High School, Middle School
NSD, AT Workshop, 1971

BIOLOGY CYTOLOGY

AT
547.92
S

An Imaginary Trip Through A Marsh
N. A. Sullivan

A 23 slide picture walk through a marsh showing vegetation and animal life. Students draw plant varieties. They can note animal varieties. Three test slides included to identify a marsh habitat.

Time: 30 minutes Middle School
NSD, AT Workshop, 1971

BIOLOGY-MARINE FIELD TRIPS - SCIENCE

AT
575.1
H

DNA Structure
Paula Henderson

A "color-keyed match stick DNA ladder" is used along with slides to show the chemical makeup of the DNA molecule.

Time: 12 minutes, High School
NSD, AT Workshop, 1972

BIOLOGY

AT
578
J

Light Microscopy, Basic Technique Introduction to the Bausch and Lomb Academic 25? Zoom Microscope
W. T. Johnstone. Jr.

Student learns parts and procedure as well as estimating magnification powers of the microscope.

Time: 15 minutes High School, Middle School
NSD, AT Workshop, 1971

BIOLOGY MICROSCOPES

AT
581.133
H

Photosynthesis - Part I
Paul Harding, (Paula Henderson)

The basic principles of plant food making are explained by using slides and microscope. The basic chemical reactions are explained in simple terms. An introduction to a study on photosynthesis.

Time: 15 minutes High School, Middle School
NSD, AT Workshop, 1971

BIOLOGY

AT
581.158
H

Monohybrid Cross
Paula Henderson

A student uses "pipe cleaner chromosomes" to learn about basic genetic crosses. Vocabulary is explained and 5 slides demonstrate meiosis and dominance. Punnett squares show the crosses described in the script.

Time: 20 minutes High School, Middle School
NSD, AT Workshop, 1971

BIOLOGY GENETICS

AT
581.5243
D

What Are The Effects of Ecology
Kent H. Darlington

A trip through a wooded area through the use of slides.

Time: 30 minutes Middle School
NSD, AT Workshop, 1971

ECOLOGY FIELD TRIPS SCIENCE

AT
581.5243
D

Succession - Charge in Communities
Harry Dillner

Describes the succession process in temperate deciduous forest ecosystems. Assesses the importance of species diversity to ecosystem stability.

Time: 30 minutes High School
NSD, 1973

BIOLOGY ECOLOGY

AT
583.1
D

The Beech Tree
Beatrice T. Derickson

A study of the beech tree - its bark, leaf and winter twig. Diagrams and slides.

Time: 40 minutes Middle School
NSD, 1971

AT
591.5
D

Testing Water for Bacterial Pollution
H. J. Dillner

Prerequisite - general knowledge of microbiology. The student collects water samples and uses the Millipore Environmental Microbiology Kit to test water for coloform bacteria. Slides, charts and research paper by author are included.

Time: 1 hour High School
NSD, AT Workshop, 1972

BIOLOGY, ECOLOGY

AT
591.51
J

Cycles
W. T. Johnstone, Jr.

The student learns to recognize a cycle and given a written or oral description can diagram a cycle. Slides and a unique musical cycle add to student interest.

Time: 20 minutes High School
NSD, AT Workshop, 1972

BIOLOGY

AT
591.53
H

Ecology - Energy Relationships
Paula Henderson

Through slides and commentary the student should learn the role of producer, consumer and decomposer in terms of an ecological cycle.

Time: 10 minutes High School, Middle School
NSD, AT Workshop, 1972

BIOLOGY

AT
593
S

Introduction to Classification of Living Things
Donald Stettler

History of taxonomy, basis of modern system and parts of classification system are shown by slides. Student groups objects and then pictures of animals. Scientific nomenclature is stressed.

Time: 40 minutes Middle School
NSD, AT Workshop, 1972

LIFE SCIENCE

AT
612.61
T

Male Reproductive System
B. A. Turkington

Using slides and a model of the male reproductive system, the student will learn to identify parts function. A series of written questions can used as a test or student self-test.

Time: 20 minutes High School
NSD, AT Workshop, 1972

HEALTH

AT
612.62
H

Female Reproductive System
N. J. Hodge

Using slides and a model of the female reproductive system, the student will learn to identify parts and functions. The menstrual cycle and relationship to reproduction is explained. Test questions included.

Time: 15 minutes High School
NSD, AT Workshop, 1972

HEALTH

AT
612.662
H

Menstruation
Paula Henderson

Seven slides and commentary describe the order of events of the menstrual cycle. Factors which may interfere with the normal events of the menstrual cycle are also discussed.

Time: 10 minutes High School, Middle School
NSD, AT Workshop, 1972

BIOLOGY HUMAN REPRODUCTION

AT
613.8
S

Drug Education
Raj K. Sardana

Drug identification and abuses

Time: 26 minutes Middle School

HEALTH DRUGS

AT
614.712
H

Air Pollution
Paula Henderson

Sources of air pollution, ways to reduce it.

Time: 20-25 minutes High School

BIOLOGY ECOLOGY

AT
614.772
H

Water Pollution
Paula Henderson

Sources of water pollution. Nature's way of cleaning steams.

Time: 20-25 minutes High School

BIOLOGY ECOLOGY

AT
616.07561
J

Blood Typing Technique
W. T. Johnstone, Jr.

Procedures are given for typing the students own blood. A series of black and white photos for display in the carrel show technique. Student also will be able to explain blood compatibility.

Time: 10 minutes High School, Middle School
NSD, AT Workshop, 1971

BIOLOGY BLOOD ANALYSIS

AT
628.445
H

Trash
Paula Henderson

Most trash comes from people rather than from industry. New ways for recycling solid waste are depicted.

Time: 15 minutes High School
NSD 1973

BIOLOGY ECOLOGY