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ABSTRACT

This course guide is designed to aid the biology instructor in teaching the skills and knowledge needed by those students planning to take anatomy and physiology in high school and is composed of 13 terminal performance objectives, with intermediate objectives and sample criterion measures. Suggestions for related laboratory activities, supplies, and equipment are also included. The suggested text to be used with this guide is Biology: Living Systems, by Oram, Hummer, and Smoot; Charles E. Merrill, 1973. This course is designed to be student-centered. (Author/EB)

PRE-TECH BIOLOGY

INTRODUCTION

This course guide in Pre-Tech Biology is designed to aid the instructor in teaching the skills and knowledges needed by those students planning to take Anatomy and Physiology in the high school.

It is composed of 13 Terminal Performance Objectives (T.P.O.'s) with Intermediate Objectives (I.P.O.'s) and sample criterion measures. Suggestions for related laboratory activities, supplies, and equipment are also included.

The I.P.O.'s included here represent only the minimum level of competency required of the student before successful performance in an Anatomy and Physiology course. Additional material may be covered at the discretion of the individual instructor and within the time limitations of the school year.

This guide was developed as a field test model to be piloted during the 1973-1974 school year. There will be an ongoing evaluation during the year and any recommendations by you will be welcomed.

The suggested text is Biology: Living Systems; Oram, Hummer, and Smoot; Charles E. Merrill, 1973.

CURRICULUM OBJECTIVE

To design, develop, implement, and validate a student-centered curriculum in Biology for that student planning on pursuing a post-secondary paramedical curriculum on the Junior College level. Upon completion of the course the student will demonstrate his knowledge and understanding, as evidenced by achieving not less than 70% proficiency on the performance test.

COURSE DESCRIPTION

Pre-Tech Biology GRADE LEVEL: 10, 11

Prerequisites: Exhibited interest in the paramedical field, grades of C or higher in all subjects the previous year, and have taken or are taking Algebra I.

This course is designed to provide the student with the skills and knowledge necessary for progression into an Anatomy-Physiology course at the secondary level and then into a paramedical curriculum at the post-secondary level. It includes 13 units of study: the microscope, the cell, microbiology, biochemistry, genetics, the life processes of digestion, circulation, assimilation and growth, respiration, excretion, movement and irritability, reproduction and development, and appropriate laboratory studies for each unit.

This course must be taught with laboratory facilities readily available and is designed for a 5-hour weekly, 180-day school year.

OUTLINE OF SUGGESTED LABS

1.0 and 2.0 Use of the Microscope/Study of Cells

1) Parts of the microscope and their function

2) Preparing a wet mount

3) Focusing and determining magnification

4) Image inversion

5) Care of the microscope

6) Determining diameter of field of view

7) Measuring living material viewed with a microscope

8) Staining technique (cheek cells, onion skin, etc.)

9) Drawing from prepared slides (cell types)

3.0 Microbiology: Bacteria and Their Characteristics

1) Aseptic technique

2) Streak plate preparation

3) Pour plate preparation

4) Microbial distribution
   a. in the air
   b. on common objects

5) Inhibition of bacteria (antiseptics, soaps, mouthwashes, and antibiotics)

6) Gram-staining technique

4.0 Biochemistry

1) Change in pH - comparison of results of adding acids and bases to biological buffers (eg. liver extract), chemical buffers ($NaHCO_3$) and distilled water

2) Determination of pH of various biological materials, eg. foods

3) Identifying carbohydrates, fats, and proteins in various foods using appropriate indicator tests

5.0 Genetics

1) Individual student construction of family tree from information collected on a human phenotype chart

2) Calculate Hardy-Weinberg equilibria for selected phenotypes

6.0 Digestion and Absorption

1) Diffusion of various molecules (starch, glucose, salt) through collodion tubing

2) Diffusion of mixtures (eg. starch and saliva) through collodion tubing to illustrate digestion's relationship to absorption

3) The effect of brine and distilled water on the cytoplasm of Elodea and blood cells

4) The effect of pH on enzyme (salivary amylase) activity

5) The effect of time on enzyme (salivary amylase) activity

6) The effect of temperature on enzyme (salivary amylase) activity

7) The effect of dilution on enzyme (salivary amylase) activity

(includes techniques of serial dilution and pipetting)

7.0 Circulation

1) Blood typing

2) Coagulating time

3) Wright's stain technique (identify major cell types)

4) Pulse rate

5) Heart beat

6) Blood pressure (use of sphygmomanometer)

8.0 Assimilation and Growth

1) Yeast population growth (cell counts at 12-hour intervals, interpretation of graphed data)

9.0 Respiration

1) The products of respiration (using indicators)

2) Compare breath-holding times at rest, after hyperventilation, and after exercise

3) Compare CO_2 concentration between inhaled and exhaled air

4) Manometer using germinating seeds or mouse: graph the use of O_2

10.0 Excretion

A. Urinalysis:

1) Albumin

2) Bile pigments

3) Glucose

4) Chloride

5) pH

B. Mapping sweat glands (before and after exercise)

11.0 Movement

1) Comparison of mechanical features of 1st, 2nd, and 3rd class levers.

2) Morphological identification of muscle types (prepared slides)

3) Muscle fatigue

4) The human skeleton

12.0 Irritability

1) Chemo-sensation
   a. Smell discrimination
   b. Taste-bud mapping
   c. Sweet vs. salt threshold

2) Reflex arc
   a. Pupillary reflex
   b. Patellar reflex

3) Skin receptors
   a. Distribution of touch receptors using the two-point sensitivity test
   b. Detection of change in temperature (heat and cold)

4) Influence of various chemicals on heartbeat of Daphnia

13.0 Reproduction and Development

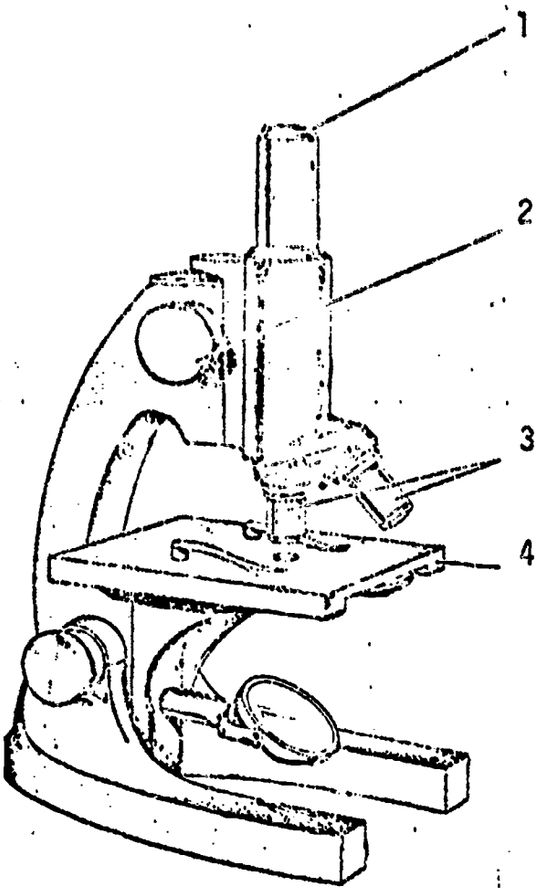
1) Presentation of slides and films on reproduction and embryonic development

PRE-TECH BIOLOGY

DIRECTIONS. This exam is in two parts. Use the answer sheet to indicate your answer. Blacken out the letter of your choice.

PART I - Questions 1 - 47

Match the lettered answers to the numbered questions. Each answer may be used any number of times; each question has only one answer.



A. stage

B. objectives

C. ocular

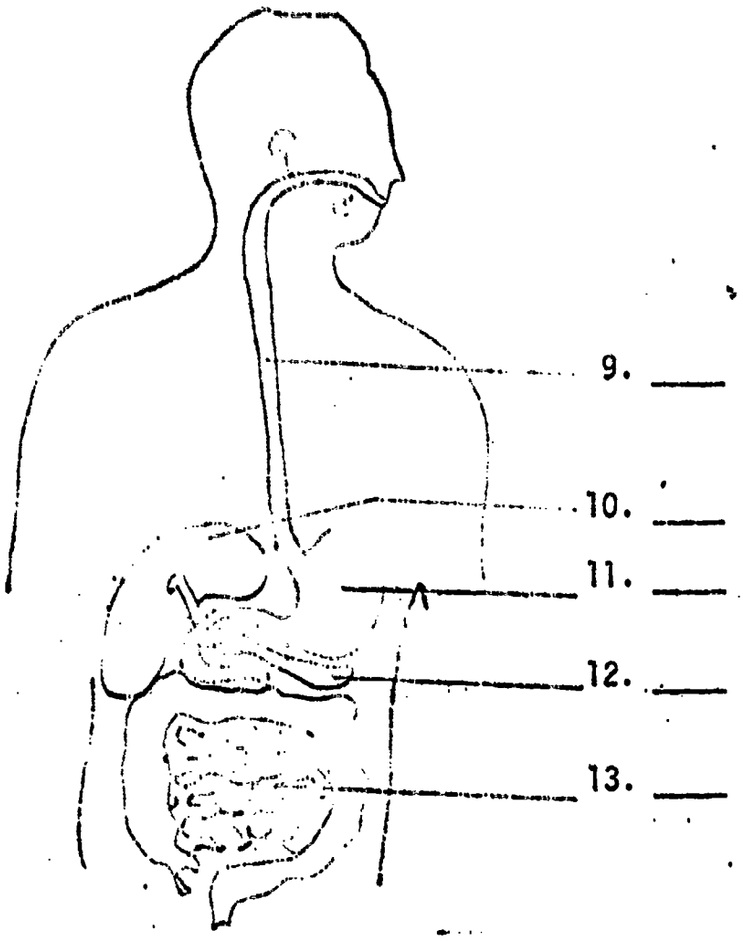
D. coarse adjustment

Use the key to indicate in which region of the human digestive tract the following processes occur.

KEY: A. Mouth
B. Esophagus
C. Stomach
D. Small intestine

5. ____ Absorption of all food types takes place.
6. ____ Physical breakdown of food begins.
7. ____ Has high acid content.
8. ____ Bile emulsifies fats

Match the names of the digestive system parts below with the appropriate number on the diagram.



9. ____
10. ____
11. ____
12. ____
13. ____

A. liver
B. stomach
C. esophagus
D. small intestine
E. pancreas

For the next items use the following key to identify the process described in each statement.

KEY: A. Respiration
B. Fermentation
C. Both of these

14. ____ Can occur in the absence of oxygen.

15. ____ Glucose is used.

16. ____ Energy is released in the presence of oxygen.

17. ____ Pyruvic acid is formed.

18. ____ Occurs as a series of reactions rather than as a single reaction.

19. ____ Enzymes are involved in the reaction.

20. ____ Synthesis of ATP is involved in the reaction.

21. ____ Carbon dioxide is produced.

Match the vitamin with the disease or condition caused by its deficiency.

_____ 22	Vitamin A	A.	scurvy
_____ 23	Vitamin C	B.	nightblindness
_____ 24	Vitamin D	C.	pellegra
_____ 25	Niacin	D.	rickets

Using the following key, identify each of the processes described below. Use each choice once where it best applies.

KEY: A. diffusion
B. osmosis
C. active transport
D. none of these

_____ 26 movement of water molecules across a membrane from a region of high concentration to a region of low concentration.

_____ 27 movement of dissolved materials across a membrane from a region of low concentration to a region of high concentration.

_____ 28 movement of dissolved materials across a membrane from a region of high concentration to a region of low concentration.

_____ 29 hydrolysis of large, complex molecules into smaller simple molecules.

Match the cell structures in Column I with the cell functions in Column II.

COLUMN I		COLUMN II	
_____ 30	lysosome	A.	intracellular digestion
_____ 31	cell membrane	B.	site of cellular respiration
_____ 32	nucleus	C.	location of chromosomes
_____ 33	mitochondrion	D.	selective permeability
_____ 34	ribosome	E.	lines endoplasmic reticulum

Using the following choices, (A) neutral, (B) positive, (C) negative, identify the electrical charge of these components of atoms.

_____ 35. an electron

_____ 36. a proton

_____ 37. a neutron

_____ 38. the nucleus of an atom

_____ 39. the shell of an atom

Match the following terms with the most appropriate description of their function.

_____ 40. measures blood pressure

_____ 41. differentiates between blood types

_____ 42. differentiates between types of blood cells

_____ 43. amplifies heart sounds

A. Wright stain

B. Sphygmomanometer

C. Stethoscope

D. Anti-sera

Use the key below for the next 4 questions.

KEY: A. a characteristic of bone only
B. a characteristic of muscle only
C. a characteristic of both bone and muscle
D. a characteristic of neither bone nor muscle

_____ 44. Living tissue

_____ 45. Provides rigid support for the body

_____ 46. Provides locomotion

_____ 47. Exhibits contractility

PART II - QUESTIONS 48-150

Multiple-Choice. Select the one best answer for each question below.

48. Microbes may be found:

A. in water
B. in food
C. in the air
D. all of the above

49. The study of the development of organisms is called:

A. biology
B. embryology
C. botany
D. evolution

50. The chemicals used in sterilization of glassware and equipment are called:

A. antiseptics
B. soaps
C. antibiotics
D. disinfectants

51. The rate of breathing is controlled by the:

A. deficiency of oxygen in the bloodstream
B. amount of surplus oxygen
C. amount of blood-borne carbon dioxide
D. amount of diaphragm and rib-muscle contraction

52. The steps for transferring bacteria to a sterile slant are listed. Select the answer that has them in the proper order.

a. Touch needle to fresh agar slant
b. Touch needle to surface of original colony
c. Reflame needle before laying down
d. Flame mouth of sterile slant
e. Flame innoculating needle to red heat

A. d, a, b, e, c
B. e, d, c, b, a
C. e, d, a, b, c
D. a, e, b, a, c
E. e, d, b, a, c

53. Under normal conditions which substance is completely reabsorbed and returned to the bloodstream by the normal human kidney?

A. urea
B. water
C. glucose
D. uric acid

54. Substances which are essential for the proper functioning of living organisms yet are not manufactured by them are:

A. carbohydrates
B. proteins
C. vitamins
D. fats

55. Population problems have increased because man has:

A. removed many natural controls on his population.
B. spread evenly over the lands of the world
C. learned to eat many new and artificial foods
D. created new energy sources that sustain life

56. The organs of excretion located in the skin are the:

A. sebaceous glands
B. oil glands
C. sense organs
D. sweat glands

57. Which of the following best describes the process of respiration?

A. the passage of oxygen into and carbon dioxide out of the lungs
B. the overall process by which living systems oxidize foodstuffs for energy and release carbon dioxide
C. the transport of oxygen throughout multicellular organisms
D. the process of releasing energy in the absence of oxygen

58. The effectors of the human body controlled by the nervous system are:

A. muscles and glands
B. endocrine glands only
C. body fluids
D. eyes, ears and similar sensory parts

59. The air sacs in the lungs in which gas exchange occurs are the:

A. valves
B. alveoli
C. nephrons
D. capillaries

60. A large mass of bacteria is properly called:

A. colony
B. a settlement
C. a group
D. a cluster

61. The regulatory mechanism which controls breathing rate is:

A. located in the brain
B. found in the lungs
C. responsible for positive feedback
D. the effector

62. Any biological substance that is produced by an organism and that retards the growth of microorganisms is a/an:

A. toxin
B. pathogen
C. antigen
D. antibiotic

63. The chemical process by which animals organize nonliving materials into substances which can be used for growth and maintenance is called:

A. assimilation
B. respiration
C. oxidation
D. regeneration

64. Which of the following is the correct sequence of structures through which urine passes?

A. Bowman's capsule, bladder, urethra, Henle's loop, ureter
B. ureter, Bowman's capsule, Henle's loop, urethra, bladder
C. urethra, bladder, Bowman's capsule, Henle's loop, ureter
D. Bowman's capsule, Henle's loop, ureter, bladder, urethra

65. Diseases caused by the lack of any particular vitamin in the diet are termed:

A. infectious diseases
B. genetic diseases
C. deficiency diseases
D. social diseases

66. The combination of an increase in cell number along with an increase in total volume results in:

A. growth
B. elongation
C. meiosis
D. mortality

67. A population increase will be slowed down if there is a/an:

A. increase in death rate and an increase in birth rate
B. decrease in death rate and an increase in birth rate
C. increase in death rate and a decrease in birth rate
D. decrease in death rate and a decrease in birth rate

68. The major excretory function of the lungs is removal of:

A. water
B. oxygen
C. urea
D. carbon dioxide

69. If two bottles of anti-A and anti-B blood-typing serums are unlabeled, which of the following choices of human blood types would be of most value in identifying the contents of each bottle?

A. A and B
B. B and O
C. O
D. O and AB

70. Lymph nodes and white blood cells are similar in function in that they both:

A. have multicellular nuclei
B. are blood cells
C. contain hemoglobin
D. remove harmful bacteria

71. Nervous coordination generally differs from endocrine coordination in that the nervous coordination is:

A. slower
B. less specific
C. faster
D. controlled by hormones

72. The red blood cells are primarily responsible for:

A. clotting
B. transporting food
C. transporting oxygen
D. killing invading bacteria

73. The term applied to those glands which produce hormones is:

A. excretory
B. endocrine
C. nervous
D. digestive

74. Vessels in the human body which carry blood from the body tissues to the heart are called:

A. veins
B. arteries
C. capillaries
D. lymphatics

75. When a chemical change occurs, the parts of atoms that are involved are the:

A. electrons
B. protons
C. neutrons
D. nuclei

76. Which of the following is the correct sequence of blood flowing through the human heart?

A. left ventricle, right ventricle, left atrium, right atrium
B. right atrium, right ventricle, left atrium, left ventricle
C. right atrium, left atrium, right ventricle, left ventricle
D. right ventricle, right atrium, left ventricle, left atrium

77. From the following blood types, determine to which parents this baby belongs:

The baby - Type O Mrs. X - Type O Mrs. Y - Type B, homozygous
Mr. W - Type AB Mr. Z - Type A

The baby belongs to:

A. Mrs. X and Mr. W
B. Mrs. X and Mr. Z
C. Mrs. Y and Mr. W
D. Mrs. Y and Mr. Z
E. None of these

78. In all conditions where the defective gene is on the X chromosome, transmission to a male can be:

A. only through his mother
B. only through his father
C. either through the mother or the father
D. by mutation only

79. Ovaries are to ova as testes are to:

A. embryos
B. zygotes
C. gametes
D. sperm

80. The major result of internal fertilization is:

A. a shorter life cycle
B. a greater number of offspring
C. protection and nourishment for the developing organism
D. sexual reproduction

81. The central nervous system is composed of the brain and:

A. muscles
B. sensory neurons
C. motor neurons
D. spinal cord

82. A sense organ is specialized to receive:

A. many types of stimuli
B. specific types of stimuli
C. most changes in the environment
D. coordinated stimuli

83. A characteristic of all respiratory systems is:

A. thin, moist membranes
B. lungs
C. cells
D. tracheal tubes

84. The fact that some people are more sensitive to pain than others depends primarily on their:

A. reflex arcs
B. connector neurons
C. effector neurons
D. threshold of stimulation

85. Food molecules absorbed from the intestine are carried throughout the body in:

A. white blood cells
B. plasma
C. red blood cells
D. hemoglobin

86. A boy of 14 reached a height of seven feet. This probably was caused by an oversecretion of the:

A. thyroid
B. adrenals
C. islets of Langerhans
D. pituitary

87. The only vessels in the circulatory system which allow molecules to diffuse across them readily are:

A. capillaries
B. veins
C. arteries
D. lymph vessels

88. Chemical substances that are secreted by particular cells and influence the behavior of other cells, are:

A. polypeptides
B. amino acids
C. enzymes
D. hormones

89. In the lungs, oxygen enters the blood as the result of:

A. diffusion
B. osmosis
C. active transport
D. circulation

90. Bacterial classification is, in part, based on:

I. cell size
II. staining properties
III. cell shape

A. I and II
B. I and III
C. II and III
D. I, II, and III

91. In guinea pigs, black is dominant to white and rough coat is dominant to smooth. A black, rough male is crossed with a white, smooth female. They produce several litters of which 1/4 were black, rough; 1/4 were black, smooth; 1/4 were white, rough; and 1/4 were white, smooth. The genotype of the parents is:

A. BbRR x BbRr
B. bbrr x BBRr
C. BBrr x BbRr
D. BbRr x bbrr
E. BBRR x bbrr

92. Essentially the word digestion means:

A. burning food for energy
B. building up proteins from amino acids
C. changing organic molecules into inorganic ones
D. breaking large molecules into smaller ones

93. From the point of view of evolution, what is the greatest advantage of sexual reproduction?

A. a greater variety of organisms
B. a consistency of traits generation after generation
C. continuance of the species
D. fewer eggs are fertilized

94. The kidneys perform two major functions:

A. They secrete the end products of metabolism and regulate elimination from the digestive tract.
B. They control the concentration of most constituents of the body fluids and excrete the end products of metabolism.
C. They excrete the end products of metabolism and the substances used in the digestive processes.
D. They excrete the end products of metabolism and regulate bile secretion.

95. The conversion of excess amino acids into urea occurs in the:

A. kidney
B. lung
C. intestine
D. liver

96. In the nephron, the major waste substance removed from the blood is:

A. water
B. glucose
C. urea
D. carbon dioxide

97. Each parent contributes one of the genes for a particular characteristic. Whether or not the genes are exactly alike, the gene pair is called:

A. chromosomes
B. DNA
C. alleles
D. gametes

98. The gene makeup of an organism for a particular trait is its:

A. genotype
B. phenotype
C. dominance
D. homozygote

99. Starch, the storage polysaccharide of plants, is important to animals because:

A. it is also the storage polysaccharide of animals
B. it is used as a source of glucose supplying energy for the animal
C. it is a structural component of plants
D. it is a structural component of animals

100. Nucleic acids are the units which are made into:

A. fats
B. proteins
C. DNA
D. carbohydrates
E. all of these

101. When a base becomes bonded to a sugar (ribose or deoxyribose), which in turn becomes bonded to a phosphate, the resulting molecule is called:

A. a nucleotide
B. an amino acid
C. a bacteria phage
D. an enzyme

102. To easily see structures of a cell under a microscope, there must be:

A. sufficient water
B. bright light
C. a differential stain
D. a preservative

103. A letter typed on a piece of thin paper was placed in the field of view of a compound microscope in this position:  How would the magnified image appear?

A.  B.  C.  D. 

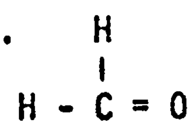
104. After differentiation, the cells of an embryo must also:

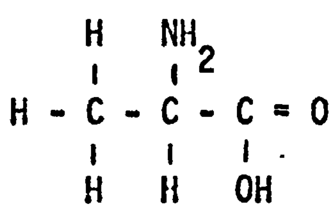
A. stop mitosis or an abnormal embryo will result
B. organize into various structures
C. change into special types of cells
D. reduce their chromosome number by half

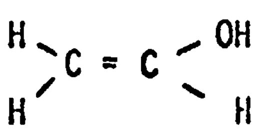
105. Which of the following groups of substances are composed of protein?

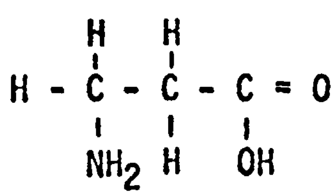
A. starch, cellulose, fat
B. hair, fat, skin
C. enzymes, starch, hemoglobin
D. hemoglobin, hair, enzymes

106. Which of the following compounds is an amino acid?

A.


C.


B.


D.


107. The advantage of a tube-type digestive system is that it:

A. stores large amounts of food
B. permits specialization of different regions of the tube
C. allows the food to pass through faster
D. insures complete absorption

108. Any observable characteristic of an organism is its:

A. allele
B. dominance
C. phenotype
D. genotype

109. Theoretically DNA is most important in understanding living things because DNA is a:

A. spiral shaped molecule made up of nucleotides
B. complex chemical which is necessary for life
C. carrier of genetic coding from parent to offspring
D. part of the nucleus of cells in all organisms

110. The change in pH from acid to alkaline conditions in the intestine is important to digestion because:

A. proteins will not break down in acid conditions
B. pepsin activity must be halted before intestinal enzymes can become active
C. intracellular digestion occurs
D. enzymes secreted into the intestine act best in an alkaline medium

111. If all bacteria suddenly disappeared from the surface of the earth:

A. all diseases would also disappear
B. viruses would increase in number
C. no major changes would be noted
D. organic refuse would increase

112. Which of the following molecular characteristics would not be shown by the formula, $C_6H_{12}O_6$?

A. number of atoms
B. kinds of atoms
C. position of atoms
D. numerical proportions of atoms

113. A microscope has a low power (10x) objective and a 10x ocular lens. How many times would the specimen be magnified?

A. 1 time
B. 10 times
C. 100 times
D. 1000 times

114. A simple sugar found inside living cells which acts as an energy source for the organism is called:

A. protein
B. glucose
C. starch
D. amino acid

115. The fertilized egg is a single cell containing:

A. two nuclei
B. chromosomes of only the female parent
C. chromosomes of both the sperm and the egg
D. one nucleus and a monoploid set of chromosomes

116. The term applied to any substance acted upon by an enzyme is:

A. villus
b. enzyme
C. substrate
D. vitamin

117. A man who carries a sex-linked gene on his Y chromosome will transmit this gene to:

A. 1/2 his male offspring
B. 1/2 his female offspring
C. all his female offspring
D. all his male offspring

118. If you wanted to separate a single species of bacteria in a culture mixed with 9 other species, the quickest and most useful method would be:

A. sorting under a high-power microscope
B. serial dilution into tubes of liquid medium
C. plating directly on solid nutrient medium
D. serial liquid selection cultures

119. The digestive tract can be made to absorb less water by the removal of the:

A. small intestine
B. stomach
C. large intestine
D. gall bladder

120. Genes which bear characteristics fatal to an organism are called:

A. lethal genes
B. recessive genes
C. dominant genes
D. alleles

121. Water is the best solvent known. This property is important in living systems because:

A. in water chemical substances become separate molecules or ions which enter chemical reactions more readily.
B. water ionizes readily forming many hydrogen and oxygen ions.
C. water molecules prevent diffusion.
D. water molecules increase their motion as temperatures rise.

122. The organism in which a pathogen lives is called a/an:

A. antibiotic
B. host
C. toxin
D. phagocyte

123. Which of the following statements about mutations is most correct?

A. Mutations are a source of variations in offspring.
B. Most mutations are beneficial.
C. Mutations cannot occur unless cells are exposed to X-rays.
D. Mutations occur only in fruit flies and molds.

124. The wave-like muscular contraction which moves food along the alimentary canal is:

A. oscillation
B. paralysis
C. hydrolysis
D. peristalsis

125. A disease-producing organism is known as a/an:

A. toxin
B. antibiotic
C. host
D. pathogen

126. Which of the following is most characteristic of a virus?

A. It has a cell membrane
B It reproduces by cell division
C. It has a DNA or RNA core
D. It is normally visible with our lab-scopes using oil immersion

127. The chemical properties of an atom of a given element depend mainly upon the:

A. number and arrangement of the protons in its nucleus
B. number and arrangement of the electrons in its shells
C. number of naturally occurring isotopes
D. absence of electrons in the L shell

128. Vessels in the human body which carry blood away from the heart are known as:

A. veins
B. arteries
C. capillaries
D. lymphatics

129. Isotopes have different weights because each isotope has a different number of:

A. electrons
B. protons
C. neutrons
D. shells

130. If an organism, upon being infected by a pathogen, reacts by producing a substance which kills the pathogen, that organism is said to have developed:

A. active immunity
B. passive immunity
C. antibiotics
D. phagocytic responses

131. The process by which different kinds of tissues are produced from a fertilized egg is:

A. metamorphosis
B. parthenogenesis
C. cleavage
D. differentiation

132. Brown eyes are dominant over blue. Sam has brown eyes, and wife Ethel has blue. They have 12 brown-eyed children and two blue-eyed children. What is Sam's genotype?

A. BB
B. Bb
C. bb
D. by
E. Cannot be determined from the offspring

133. A substance produced in your body to fight a particular foreign protein or substance is called an:

A. antibody
B. antigen
C. antibiotic
D. antiseptic

134. Mitosis is to growth as meiosis is to:

A. energy production
B. sexual reproduction
C. respiration
D. movement

135. All viruses are:

A. parasitic
B. visible with a compound microscope
C. dangerous to man
D. larger than most bacteria

136. The main respects in which RNA differs from DNA are:

A. RNA nucleotides contain a different sugar and the base uracil
B. RNA molecules contain the base adenine and are found outside the cell nucleus
C. RNA molecules contain the base guanine and are not present in the nucleus of the cell
D. RNA and DNA molecules differ only in the type of sugar molecule present in the "backbone" of the molecule

137. The chemical digestion of food becomes more effective when mechanical digestion:

A. increases the surface area of the food
B. increases the pH of the food
C. increases the volume of the food
D. decreases the pH of the food

138. A compound is made up of:

A. atoms of one element in chemical combination
B. two or more elements which are combined chemically
C. elements which are not combined chemically
D. atoms which are all alike

139. The four nucleotides in a DNA molecule differ from one another only in the:

A. kind of purine or pyrimidine bases they contain
B. basic atomic structure of their sugars
C. attachment of the phosphates to the sugar
D. position of the bases in the molecule

140. Which of the following genetic diseases can be detected by testing the urine of all newborn babies?

A. phenylketonuria (PKU)
B. hemophilia
C. sickle cell anemia
D. Down's disease

141. Which of the following pH numbers would indicate the strongest base?

A. 5.1
B. 6.3
C. 7.33
D. 11.4
E. 12.0

142. Carbon is a very important component of molecules in living cells because of its ability to:

A. ionize and react with water
B. dissolve easily and in a large quantity in water
C. remain stable and not undergo chemical change
D. bond with four other atoms and form long carbon chains

143. The most stable arrangement of an atom is one in which:

A. the nucleus has an equal number of protons and neutrons
B. the number of protons is equal to the number of electrons
C. there are eight electrons in the outer shell
D. the atomic mass is an even number

144. Mitosis is significant because:

A. the new cell is the same size as the old
B. the environment can change the species of individual formed
C. the daughter cells have the same genetic makeup as the original cell
D. chromosome numbers are reduced to half in each of the daughter cells

145. The process(es) of a sexual reproduction is/are:

A. meiosis
B. mitosis
C. A and B
D. none of these

146. The structure of a cell is most closely related to its:

A. age
B. size
C. function
D. movement

147. If three-quarters of the offspring from many experimental crosses showed only the dominant character, the parents were:

A. both pure dominant
B. both heterozygous
C. one pure dominant, one recessive
D. one heterozygous, one pure dominant

148. The synthesis or hydrolysis of compounds in living things is dependent on the:

A. presence of fats
B. absence of proteins
C. presence of enzymes
D. absence of carbohydrates

149. All the cells in an organism contain the same number of chromosomes except the egg and sperm cells which contain:

A. half the number
B. twice the number
C. three times the number
D. one fourth the number

150. A pH of 2.2 indicates that the solution is:

A. a strong acid
B. a weak acid
C. neutral
D. a strong base
E. a weak base

Answer Key

65. (a) (b) (c) (d) (e)

115. (a) (b) (c) (d) (e)

5. (a) (b) (c) (d) (e) 65. (a) (b) (c) (d) (e) 115. (a) (b) (c) (d) (e)

PRE-TECH BIOLOGY

T.P.O. 1.0
X-5.313
X-5.325

The student will demonstrate his knowledge, skills, and understanding of the use and care of the microscope, and laboratory techniques related to wet mount and staining procedures; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s, and teacher evaluation of laboratory experiences.

T.P.O. 2.0
X-5.312
X-5.322
X-5.323
X-5.324

The student will demonstrate his knowledge, skills, and understanding of the structure and function of the cell and of the reporductive processes of mitosis and meiosis; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O's and teacher evaluation of laboratory experiences.

T.P.O. 3.0
X-5.312
X-5.323
X-5.324
X-5.328
X-5.329

The student will demonstrate his knowledge, skills and understanding of the principles of microbiology as related to the structure, classification and techniques of study of bacteria and viruses; active and passive immunity; action of specific antibiotics and methods of sterilization; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s and teacher evaluation of laboratory experiences.

T.P.O. 4.0
X-5.312
X-5.315
X-5.316
X-5.318
X-5.319
X-5.320

The student will demonstrate his knowledge, skills, and understanding of biochemistry, including the basic properties of atoms and molecules, acids and bases, and the composition and function of organic compounds essential to living organisms (carbohydrates, proteins, lipids, nucleic acids); as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s and teacher evaluation of laboratory experiences.

T.P.O. 5.0
X-5.312
X-5.323
X-5.329

The student will demonstrate his knowledge, skills, and understanding of the principles of genetics as it applies to Mendelian and non-Mendelian inheritance, the Hardy Weinberg Theory, and the biochemistry of gene action; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s, and teacher evaluation of laboratory experiences.

T.P.O. 6.0
X-5.312
X-5.323

The student will demonstrate his knowledge, skills, and understanding of the human digestive system as it relates to processes of diffusion, osmosis, and active transport, the chemistry of digestion and enzyme sorption; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are included in the I.P.O.'s, and teacher evaluation of laboratory experiences.

T.P.O. 7.0
X-5.312
X-5.323

The student will demonstrate his knowledge, skills, and understanding of the circulatory system as it relates to structure and function of the heart and blood vessels, composition and action of the blood and function of the lymphatic system; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are excluded in the I.P.O.'s, and teacher evaluation of laboratory experiences.

T.P.O. 8.0
X-5.312
X-5.317
X-5.322
X-5.323

The student will demonstrate his knowledge, skills, and understanding of assimilation and growth as it relates to nutrients required for growth of an organism, especially the vitamin requirements of man and population growth characteristics, as evidenced by 90% of the students achieving not less than 70% on the criterion measures and teacher evaluation of laboratory experience.

T.P.O. 9.0
X-5.312
X-5.322
X-5.323

The student will demonstrate his knowledge, skills, and understanding of the biochemical process of respiration (glycolysis and the Kreb's Cycle) and the respiratory organs of man as related to compounds involved in cellular metabolism; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s and teacher evaluation of laboratory experiences.

T.P.O. 10.0
X-5.312
X-5.323

The student will demonstrate his knowledge, skills, and understanding of the structure and function of the excretory system; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are included in the I.P.O.'s and teacher evaluation of laborator- experiences.

T.P.O. 11.0
X-5.312
X-5.324
X-5.329

The student will demonstrate his knowledge, skills, and understanding of the structure and function of bones and muscles as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s and teacher evaluation of laboratory experiences.

T.P.O. 12.0
X-5.312
X-5.324

The student will demonstrate his knowledge, skills and understanding of the structure and function of the endocrine and nervous systems and their actions in responding to changes in the environment, as evidenced by achieving not less than 70% on the criterion measures that are covered in the I.P.O.'s and teacher evaluation of laboratory experiences.

T.P.O. 13.0
X-5.312

The student will demonstrate his knowledge and understanding of reproduction and development as it relates to the reproductive structures and functions and embryonic development of representative animals, especially man, as evidenced by 90% of the students achieving not less than 70% of the possible 100% on the criterion measures that are covered in the I.P.O.'s.

COURSE PRE-TECH BIOLOGY

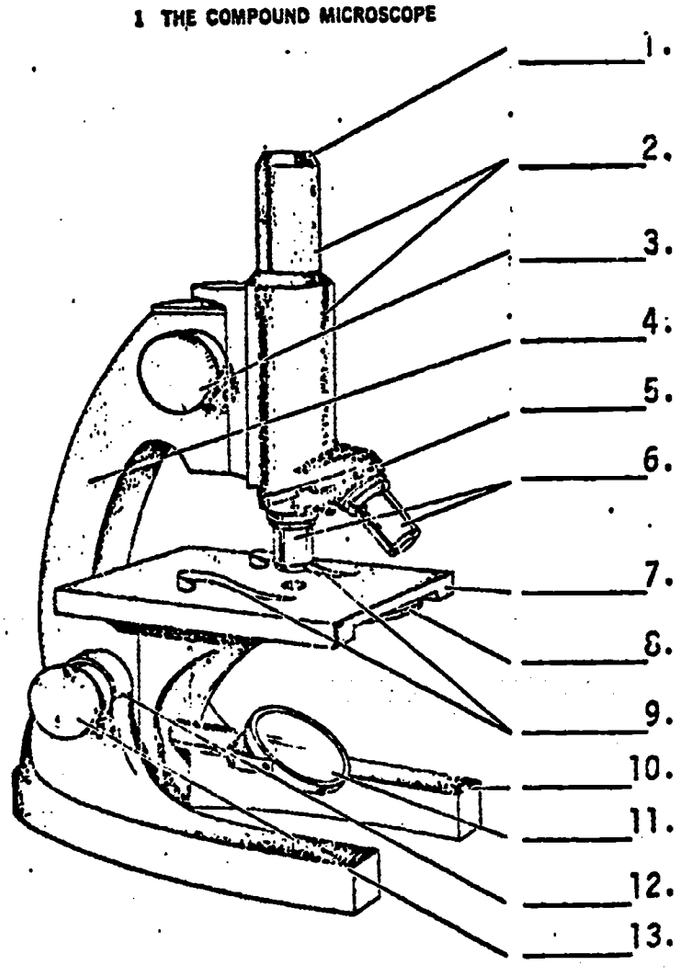
TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: The Microscope

T.P.O. The student will demonstrate his knowledge, skills, and understanding of the use and care of the microscope, and laboratory techniques related to wet mount and staining procedures; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s, and teacher evaluation of laboratory experiences.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.1	Given a list of terms and a picture of the microscope, the student will identify the appropriate term with the numbered part on the microscope.	1.1.1	Match the list of identifying terms with the appropriate numbered part on the microscope picture:

1 THE COMPOUND MICROSCOPE



COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: The Microscope

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.1	Cont'd	1.1.1	Cont'd a. stage clips b. objectives c. inclination joint d. ocular e. arm f. stage g. fine adjustment h. body tube i. diaphragm j. coarse adjustment k. mirror l. base m. nosepiece
1.2	Given four choices, the student will identify the most important step in preparing a wet mount.	1.2.1	The most important step in preparing a wet mount is: a. to use a large enough specimen b. to use enough water c. to drop a coverslip straight onto the slide d. to hold the coverslip at a 45° angle and then lower it onto the specimen
1.3	Given four choices, the student will identify the purpose of a coverslip on a wet mount.	1.3.1	The purpose of the coverslip on a wet mount is to: a. flatten the drop of water to prevent distortion b. hold the specimen still c. keep the specimen in the center of the slide d. magnify the image

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: The Microscope

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.4	Given a hypothetical situation and the 5 steps used in focusing the microscope in viewing a wet mount, the student will number the steps in their proper sequence.	1.4 .1	You have prepared a wet mount with the letter "e" cut from a piece of newspaper, and have placed the slide on the stage of the microscope under the low-power objective. Arrange the following steps that you would use to focus the microscope in their proper sequence, by numbering them 1-5. ____ Look through the ocular, consciously keeping both eyes open. ____ Center the letter "e" on the slide over the opening in the stage. ____ While looking through the ocular, slowly turn the coarse adjustment to raise the body tube until the printed letter comes into view. ____ While looking at the microscope from the side, use the coarse adjustment to lower the body tube until the low-power objective almost touches the cover glass. ____ Turn the fine adjustment to make the focus as sharp as possible.
1.5	Given four choices, the student will identify the correct position of the body tube and objective during storage of the microscope.	1.5 .1	For proper storage of the microscope, which of the following would be correct: a. body tube raised and on high power b. body tube lowered and on high power c. body tube raised and on low power d. body tube lowered and on low power

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: The Microscope

T.P.O.

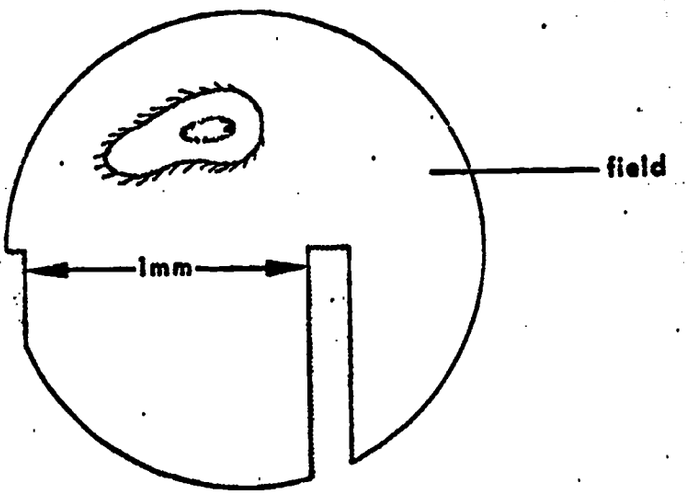
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.6	Given four choices, the student will identify the function of the diaphragm of the microscope.	1.6 .1	The function of the diaphragm of the microscope is to: a. focus the light b. magnify the object c. regulate the light d. act as a light source
1.7	Given four choices, the student will identify the term used to describe the area of vision in a microscope.	1.7 .1	The area of vision in a microscope is referred to as the: a. diameter b. light c. field d. cross section
1.8	Given four choices, the student will identify a characteristic of the parfocal microscope.	1.8 .1	If your microscope is parfocal, then: a. the low power objective has an automatic stop to keep it from crashing into the slide b. it is not necessary to raise the body tube before you change from low to high power c. you must use both low and high powers to focus the object d. the objective has 2 lenses
1.9	Given four choices, the student will identify the consequence(s) of moving the microscope from the low power objective to high power.	1.9 .1	When moving from the low power objective to high power, the: a. field of vision becomes smaller b. object appears larger c. brightness of the field becomes less d. all of the above

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO.
1.0

SKILL/KNOWLEDGE BASED ON:
The Microscope

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.10	Given the magnification power of the ocular and the objective, the student will identify from four choices the total magnification of the image through the microscope.	1.10 .1	A microscope has a low power (10x) objective and a 10x ocular lens. How many times would the specimen be magnified? a. 1 time b. 10 times c. 100 times d. 1000 times
1.11	Given a problem requiring conversion of measurement from mm. to microns, the student will correctly identify the calculated answer from four choices.	1.11 .1	A student observes a cell which fills the field when he is using the high power objective (45x) of his microscope. If the diameter of his field is 0.5 mm, the diameter of the cell is: a. 0.5 micron b. 22.5 microns c. 450 microns d. 500 microns
1.12	Given a diagram, the student will identify the correct calculation of the diameter of a high powered field, from four choices.	1.12 .1	

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: The Microscope

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.12	Cont'd	1.12 .1	Cont'd The diameter of the field in the diagram is approximately: a. 500 microns b. 1000 microns c. 1500 microns d. 2000 microns
1.13	Given a diagram, the student will estimate the size of an object in the field of view, from four choices.	1.13 .1	What is the approximate length of the organism in the field of view in the given diagram? a. 100 microns b. 500 microns c. 900 microns d. 1300 microns
1.14	Given four choices, the student will identify the movement of the image if the slide on the microscope stage is moved.	1.14 .1	If the slide on the microscope stage is moved away from you, the image moves: a. toward the right b. toward you c. toward the left d. in the same direction
1.15	Given an example of an inverted image, the student will identify from four choices the image as it would appear through the compound microscope.	1.15 .1	A letter typed on a piece of thin paper was placed in the field of view of a compound microscope in this position: ꓤ How would the magnified image appear? a. ᴚ c. R b. ʁ d. Я

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: The Microscope

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.16	Given four statements, the student will choose the one which best explains why living organisms under magnification move in and out of focus.	1.16 .1	Which of the following statements best explains why living organisms under magnification move in and out of focus. a. The source of light for the microscope is poor. b. The organisms move to different levels. c. The observer does not make careful and steady measurements. d. The microscope goes out of focus with time.
1.17	Given four different microscopic objective and ocular combinations, the student will identify: a. in which 2 microscopes will the microorganisms appear to move with the same degree of rapidity. b. with which microscope would you expect to observe the greatest number of microorganisms at any given instant. c. with which microscope would you expect to observe the fewest microorganisms.	1.17 .1	Four microscopes are set up in the laboratory as follows: Microscope # / Objective / Ocular 1 / 10X / 5X 2 / 20X / 10X 3 / 40X / 5X 4 / 40X / 10X If a slide showing microorganisms is examined with each of the microscopes, in which two microscopes will the microorganisms appear to move with the same degree of rapidity? a. 1 and 2 b. 1 and 4 c. 2 and 3 d. 3 and 4

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: The Microscope

T.P.O.

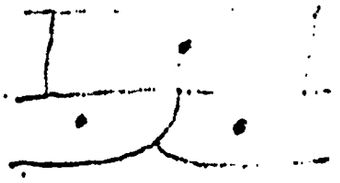
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.17	Cont'd	1.17 .2	With which microscope would you expect to observe the greatest number of microorganisms at any given instant? a. 1 b. 2 c. 3 d. 4
		1.17 .3	With which microscope would you expect to observe the fewest microorganisms? a. 1 b. 2 c. 3 d. 4
1.18	Given a description of an object viewed under the microscope, the student will identify the object from four choices.	1.18 .1	When viewing the unknown sample, a group of students noticed a stationary, spherical object with thick edges and a clear center. The object would most likely be: a. a piece of dirt b. a water molecule c. an air bubble d. a grease spot
1.19	Given four choices, the student will identify the necessary conditions for viewing structures of a cell under a microscope.	1.19 .1	To easily see structures of a cell under a microscope, there must be: a. sufficient water b. bright light c. a differential stain d. a preservative

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0

SKILL/KNOWLEDGE BASED ON: The Microscope

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
1.20	Given four choices, the student will identify the differential staining technique which is the most useful in classifying bacteria.	1.20 .1	Name the differential staining procedure most useful in classifying bacteria. a. negative or indirect stain b. Gram stain c. Wright's stain d. direct stain
1.21	Given a diagram of the microscopic view of onion skin cells, the student will identify the indicated part from four choices.	1.21 .1	 The dark, circular object in the center of each of these onion skin cells is the: a. nucleus b. cytoplasm c. mitochondria d. chloroplast

ANSWER KEY
PRE-TECH BIOLOGY
T.P.O. 1.0

1.1.1

1. d	8. i
2. h	9. a
3. j	10. l
4. e	11. k
5. m	12. c
6. b	13. g
7. f	

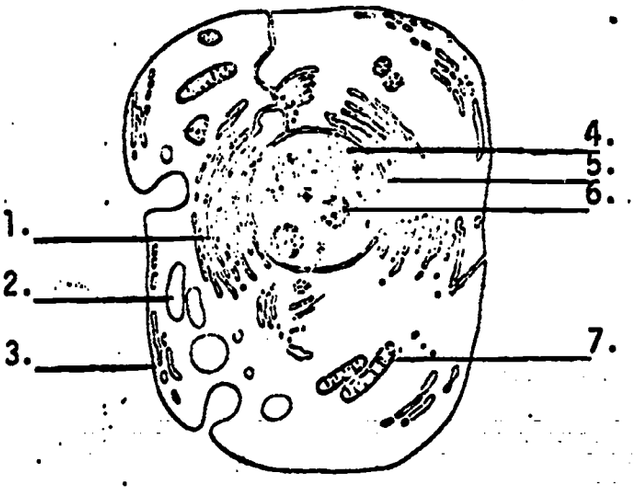
1.2.1 d
1.3.1 a
1.4.1 3, 1, 4. 2, 5
1.5.1 d
1.6.1 c
1.7.1 c
1.8.1 b
1.9.1 d
1.10.1 c
1.11.1 d
1.12.1 c
1.13.1 b
1.14.1 b
1.15.1 c
1.16.1 b
1.17.1 c
1.17.2 a
1.17.3 d
1.18.1 c
1.19.1 c
1.20.1 b
1.21.1 a

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: The Cell

T.P.O. The student will demonstrate his knowledge, skills, and understanding of the structure and function of the cell and of the reproductive processes of mitosis and meiosis; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s and teacher evaluation of laboratory experiences.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.1	Given four choices, the student will identify the cell characteristic most closely related to cell structure.	2.1 .1	The structure of the cell is most closely related to its: a. age b. size c. function d. movement
2.2	Given a diagram of a "typical" animal cell, the student will identify from the list of terms, the appropriate term for the numbered part.	2.2 .1	 Match the list of identifying terms with the appropriate numbered part on the "typical" animal cell diagram. a. nucleolus b. endoplasmic reticulum c. cell membrane d. chromosomes e. nuclear membrane f. vacuole g. mitochondria

COURSE. PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: The Cell

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.3	Given five sets of cell structure terms, the student will identify the set which is unique to plants.	2.3 .1	Which of the following lists contain structures found unique to plant cells? (a) mitochondria cell wall nucleus centriole ribosome (b) chloroplast cell wall nucleus vacuole ribosome (c) centriole nucleus ribosome vacuole mitochondria (d) mitochondria cell membrane centriole vacuole ribosome

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: The Cell

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.3	Cont'd	2.3 .1	Cont'd (e) cell wall nucleus vacuole chloroplast centriole
2.4	Given four choices, the student will identify the part of the cell generally associated with the transmission of heredity traits.	2.4 .1	The part of the cell generally associated with the transmission of heredity traits is the: a. mitochondria b. chromosome c. centrosome d. ribosome
2.5	Given four choices, the student will identify the cell structure which is primarily concerned with governing the activities of the cell.	2.5 .1	Which cell structure is primarily concerned with governing the activities of the cell? a. mitochondria b. cell membrane c. chloroplast d. chromosome e. ribosome
2.6	Given four choices, the student will identify the cell structure concerned with movement of materials within the cell.	2.6 .1	The cell structure concerned with movement of materials within the cell is: a. endoplasmic reticulum b. cell membrane c. ribosome d. nucleus e. cell wall

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: The Cell

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.7	Given four choices, the student will identify the cell structure which is primarily concerned with enzyme production and building cell parts.	2.7 .1	Which cell structure is primarily concerned with enzyme production and building cell parts? a. mitochondria b. ribosome c. lysosome d. chloroplast
2.8	Given a list of cell structures and another list of cell functions, the student will identify the appropriate function for each structure.	2.8 .1	Match the cell structures in Column #1 with the cell functions in Column #2. Column #1 ____ 1. centriole ____ 2. golgi complex ____ 3. lysosome ____ 4. cell membrane ____ 5. nucleus ____ 6. mitochondria ____ 7. nucleolus ____ 8. chloroplast ____ 9. ribosome ____10. flagella Column #2 a. intracellular digestion b. site of cellular respiration c. location of chromosomes d. organizes the spindle e. selective permeability f. locomotion g. lines endoplasmic reticulum h. packages secretory products i. carries on photosynthesis j. involved in nuclear-cytoplasmic interactions

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: The Cell

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.9	Given a list of factors which influence cell size and cell growth, the student will identify from four choices the one which determines the ultimate limitation on the maximum size to which a cell may grow.	2.9 .1	The ultimate limitation on the maximum size to which a cell may grow is/are: a. oxygen b. environment c. food d. membrane surface area
2.10	Given four choices, the student will identify the definition of a tissue.	2.10 .1	A group of similar cells carrying on the same function is called a(an): a. organ b. system c. tissue d. organ-system
2.11	Given four choices, the student will identify the cell structures that participate in reproduction.	2.11 .1	The cell structures that participate in reproduction are: a. mitochondria b. chromosomes c. golgi bodies d. nucleoli
2.12	Given four choices, the student will identify the process(es) of cell reproduction.	2.12 .1	The process(es) of cell reproduction is/are: a. meiosis b. mitosis c. a & b d. none of these

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: The Cell

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.13	Given four choices, the student will identify the significance of mitosis.	2.13 .1	Mitosis is significant because: a. the new cell is the same size as the old b. the environment can change the species of individual formed c. the daughter cells have the same genetic makeup as the original cell d. chromosome numbers are reduced by half in each of the daughter cells
2.14	Given four choices, the student will identify one of the first visible indications that mitosis is about to occur in a cell.	2.14 .1	One of the first visible indications that mitosis is about to occur in a cell is the: a. disappearance of the nuclear membrane b. formation of chromosomes c. duplication of DNA d. appearance of the centrioles
2.15	Given the four terms used to describe cell division, the student will identify from four choices the correct sequence of these phases.	2.15 .1	A. metaphase C. prophase B. telophase D. anaphase Which of the following has the above events in the proper sequence? a. A B D C b. A C B D c. C A D B d. C A B D

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: The Cell

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.16	Given five statements describing the events occurring in mitosis, the student will identify from four choices the correct sequence of these events.	2.16 .1	These events happen in mitosis: A. chromosomes line up at the equator B. chromosomes move toward the center of the cell C. chromosomes condense and the spindle forms D. chromosomes move to opposite ends of the cell E. cytoplasm divides Which of the following has these events in the proper sequence? a. A B E D C b. C B A D E c. C A B D E d. A D E C B
2.17	Given four choices, the student will identify the number of chromosomes in a daughter cell which is produced during mitosis.	2.17 .1	In mitosis an organism with 96 chromosomes will produce daughter cells each with: a. 48 chromosomes b. 23 chromosomes c. 96 chromosomes d. 192 chromosomes e. none of the above
2.18	Given four choices, the student will identify one important result of meiosis.	2.18 .1	One important result of meiosis is that it: a. revitalizes the organism b. doubles the chromosomes between generations c. produces a fertilized egg d. prevents increases of the chromosome number between generations

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: The Cell

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.19	Given four choices, the student will identify the number of chromosomes in a daughter cell which is produced during meiosis.	2.19 .1	During meiosis an organism with 160 chromosomes will produce daughter cells each with: a. 160 chromosomes b. 320 chromosomes c. 40 chromosomes d. 80 chromosomes e. 23 chromosomes
2.20	Given five statements describing the events occurring in meiosis, the student will identify from four choices, the correct sequence of these events.	2.20 .1	These events happen in meiosis: A. Members of homologous pairs are separated. B. Centromeres divide, separating chromatids. C. Division of the cytoplasm, reducing chromosome number. D. Cytoplasm divides forming a total of four cells E. Crossing-over occurs Which of the following has the above events in the proper sequence? a. E A C B D b. B C D A E c. C A B D E d. E D B A C
2.21	Given four choices, the student will identify the number of chromosomes found in the egg and sperm cell in comparison to the number contained in all the other cells of the organism.	2.21 .1	All the cells in an organism contain the same number of chromosomes except the egg and sperm cells which contain: a. half the number b. twice the number c. three times the number d. one fourth the number

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

SKILL/KNOWLEDGE BASED ON: The Cell

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.22	Given four choices, the student will identify the life function related to meiosis, as mitosis is related to growth.	2.22 .1	Mitosis is to growth as meiosis is to: a. energy production b. sexual reproduction c. respiration d. movement
2.23	Given four choices, the student will identify the event which occurs in meiosis, but not in mitosis.	2.23 .1	Which of the following events occurs in meiosis but not in mitosis? a. separation of chromatids b. pairing up of homologous chromosomes c. duplication of chromosomes before division d. separation of chromosomes into two cells

PRE-TECH BIOLOGY
ANSWER KEY
T.P.O. 2.0

2.1.1 c
2.2.1

1. b
2. f
3. c
4. d
5. e
6. a
7. g

2.3.1 b
2.4.1 b
2.5.1 d
2.6.1 a
2.7.1 b
2.8.1

1. d
2. h
3. a
4. e
5. c
6. b
7. j
8. i
9. g
10. f

2.9.1 d
2.10.1 c
2.11.1 b
2.12.1 c
2.13.1 c
2.14.1 a
2.15.1 c
2.16.1 b
2.17.1 c
2.18.1 d
2.19.1 d
2.20.1 a
2.21.1 a
2.22.1 b
2.23.1 b

COURSE : PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Microbiology

T.P.O. The student will demonstrate his knowledge, skills, and understanding of the principles of microbiology as related to the structure, classification and techniques of study of bacteria and viruses; active and passive immunity; action of specific antibiotics and methods of sterilization; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s and teacher evaluation of laboratory experiences.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.1	Given a drawing of a bacterial type, the student will select from four choices the term applied to that shape.	3.1 .1	Bacteria with the form ⟨ are: a. cocci b. viral c. bacillus d. spirillum
3.2	Given four choices, the student will identify the characteristic of bacterial classification in which the gram technique is used.	3.2 .1	The gram technique is used to classify bacteria according to: a. cell shape b. cell size c. staining characteristics d. colony formation
3.3	Given four choices, the student will identify the factors used to classify bacteria.	3.3 .1	Bacterial classification is, in part, based on: A. cell size B. staining properties C. cell shape a. A and B b. A and C c. B and C d. A, B, and C
3.4	Given four choices, the student will identify the factor which gives bacteria the ability to resist adverse living conditions for long periods of time.	3.4 .1	The ability of bacteria to resist adverse living conditions for long periods of time is due to the: a. reproductive rate b. endospores c. DNA replication d. cell wall

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Microbiology

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.5	Given four choices, the student will identify the proper term for a large mass of bacteria.	3.5 .1	A large mass of bacteria is properly called: a. a colony b. a settlement c. a group d. a cluster
3.6	Given four choices, the student will identify where microbes may be found.	3.6 .1	Microbes may be found: a. in water b. in food c. in the air d. all of the above
3.7	Given a hypothetical situation concerning the use of a sterile petri dish and a given time of exposure, the student will identify from four choices: a. the source of the bacterial growth b. the hypothesis relevant to the preceding	3.7 .1	The following two questions are based on this information: A sterile petri dish was prepared with sterile nutrient agar. The lid was removed for 5 minutes, then replaced. Twenty-four hours later 40 bacterial colonies were seen to develop. The source of bacterial growth was: a. contamination of the agar before the lid was removed b. spontaneous generation of bacteria from agar c. microbes carried by the air d. none of the above

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Microbiology

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.7	Cont'd	3.7 .2	A hypothesis relevant to the preceding is: a. 10 bacteria fell into the petri dish b. 5 bacteria fell into the petri dish per minute c. nutrient agar is a suitable medium for the growth of bacteria d. all of the above
3.8	Given four choices, the student will identify the term used to describe viruses which attack bacteria.	3.8 .1	Viruses which attack bacteria are called: a. lysogenic phage b. prophage c. virus d. bacteriophage
3.9	Given a list of bacterial and viral characteristics, the student will identify from four choices, the one which is directly related to viruses.	3.9 .1	All viruses are: a. parasitic b. visible with a compound microscope c. dangerous to man d. larger than most bacteria
3.10	Given a list of methods of reproduction, the learner will identify the process used by viruses.	3.10 .1	Virus particles reproduce by: a. a complex sequence similar to meiosis b. controlling the host's biochemical activities c. uniting of sperm and egg d. a complex sequence similar to mitosis

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Microbiology

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.11	Given four choices, the student will identify a factor which directly limits the growth and reproduction of a virus.	3.11 .1	A factor which directly limits the growth and reproduction of a virus is the availability of: a. food b. O_2 c. water d. hosts
3.12	Given a list of bacterial and viral characteristics, the student will identify from four choices that which is most characteristic of a virus.	3.12 .1	Which of the following is most characteristic of a virus? a. Has a cell membrane b. Reproduces by cell division c. It has a DNA or RNA core d. It is normally visible with our lab-scopes using oil immersion
3.13	Given four choices, the student will identify the characteristic of bacteria from a list containing characteristics of both bacteria and viruses.	3.13 .1	In comparing bacteria and viruses, which of the following is a bacterial characteristic? a. produce their own enzymes b. need electron microscope to see them c. composed of a nucleic acid core surrounded by protein sheath d. non-cellular structure
3.14	Given four choices, the student will identify the statement describing what would happen if all bacteria suddenly disappeared from the surface of the earth.	3.14 .1	If all bacteria suddenly disappeared from the surface of the earth: a. all diseases would also disappear b. viruses would increase in number c. no major changes would be noted d. organic refuse would increase

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Microbiology

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.15	Given four choices, the student will identify the term describing a disease-producing organism.	3.15	A disease-producing organism is known as a: a. toxin b. antibiotic c. host d. pathogen
3.16	Given four choices, the student will identify the term applied to an organism in which a pathogen lives.	3.16 .1	The organism in which a pathogen lives is called a: a. antibiotic b. host c. toxin d. phagocyte
3.17	Given four choices, the student will identify the term describing a substance produced in the body to fight a particular foreign protein or substance.	3.17 .1	A substance produced in your body to fight a particular foreign protein or substance is called a/an: a. antibody b. antigen c. antibiotic d. antiseptic
3.18	Given four choices, the student will identify the term describing a protein substance which causes blood to produce antibodies against it.	3.18 .1	A protein substance which causes your blood to produce antibodies against it is called a/an: a. antibiotic b. host c. colony d. antigen

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Microbiology

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.19	Given four choices, the student will identify the response of an organism to introduction of weakened virus, bacteria, or toxoid.	3.19 .1	If weakened virus, bacteria, or toxoid is introduced into an organism, the organism may: a. die b. produce antibodies c. produce antigens d. become ill
3.20	Given four choices, the student will identify the term describing the state of an organism to infection by a pathogen that results in the production of a substance that kills or inactivates the pathogen.	3.20 .1	If an organism, upon being infected by a pathogen, reacts by producing a substance which kills or inactivates the pathogen, that organism is said to possess: a. active immunity b. passive immunity c. antibiotics d. phagocytic responses
3.21	Given four choices, the student will identify the statement which explains the advantage of active immunity over passive immunity.	3.21 .1	The advantage of active immunity over passive immunity is that: a. it is less likely to produce a harmful reaction b. it provides immediate disease protection c. its immunity lasts for a longer period of time d. it does not require the body to make antibodies
3.22	Given four choices, the student will identify a poison produced by some bacteria.	3.22 .1	A poison produced by some bacteria is a: a. toxin b. host c. antibiotic d. pathogen

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Microbiology

T.P.O.

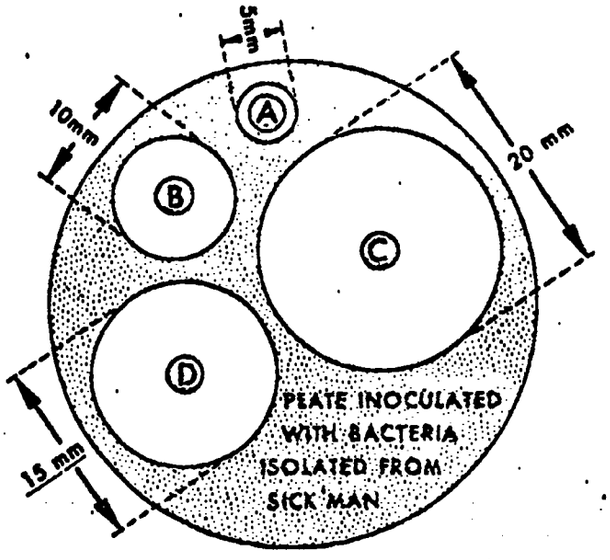
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.23	Given four choices, the student will identify the term for the substance in the blood which makes an animal immune to the poisons produced by some bacteria.	3.23 .1	A substance in the blood which makes an animal immune to the poisons produced by some bacteria is called a/an: a. antigen b. exotoxin c. toxin d. antitoxin
3.24	The student will identify the antiviral substances produced by many animal cells in response to viral infection.	3.24 .1	Antiviral substances produced by many animal cells are called: a. interferons b. antigens c. antibodies d. antitoxins
3.25	Given four choices, the student will identify the biological substance that is produced by an organism which retards the growth of microorganisms outside that organism.	3.25 .1	Any biological substance that is produced by an organism which retards the growth of microorganisms outside of that organism is a/an: a. toxin b. pathogen c. antigen d. antibiotic
3.26	Given the names of 2 substances, the student will identify from four choices their classification as antibiotics.	3.26 .1	Penicillin and streptomycin are: a. pathogens b. antigens c. antibiotics d. antibodies

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Microbiology

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.27	Given a diagram showing the effects of 4 different antibiotics on bacteria isolated from a sick man, the student will determine the most effective and least effective antibiotics, and a factor determining antibiotic effects on bacteria.	3.27 .1	The next 3 questions are based on the following diagram and information:  The culture plate above shows the effect of 4 different antibiotics on bacteria isolated from a sick man. The antibiotics used are as follows: KEY: a. Penicillin b. Aureomycin c. Terramycin d. Streptomycin
		3.27 .1	1. The antibiotic that appears least effective? _____
		3.27 .2	2. If this plate were all the information available, which drug would be preferable to initiate treatment? _____

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Microbiology

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.27	Continued	3.27 .3	In order to know for sure which antibiotic is most effective, you would need to know: a. the concentration of the antibiotic on each disk b. how long the man had been sick c. the results from a control plate with the organism growing on non-nutrient agar d. the number of hours the control plate had been incubated
3.28	Given the appropriate steps to light a Bunsen burner, the student will select from four choices the proper sequence of these steps	3.28 .1	The steps for lighting a Bunsen burner are listed. Select the answer that has them in the proper sequence. A. Hold the lighted match to the top of the burner B. Turn on gas at the outlet C. Adjust the air vents of the burner D. Adjust the flow of gas using the valve of the burner a) B, A, D, C b) C, B, D, A c) A, D, B, C d) D, C, A, B
3.29	Given the steps for transferring bacteria to a sterile slant, the student will identify from five choices the correct order of the steps.	3.29 .1	The steps for transferring bacteria to a sterile slant are listed. Select the answer that has them in the proper order.

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Microbiology

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.29	Cont'd	3.29 .1	Cont'd A. Touch needle to fresh agar sheet B. Touch needle to surface of original colony C. Reflame needle before laying down D. Flame mouth of sterile slant E. Flame innoculating needle to red-hot a) D, A, B, E, C b) E, D, C, B, A c) E, D, A, B. C d) E, D, B, A, C
3.30	Given a hypothetical situation, the student will identify from four choices the quickest, most useful method of isolating a single species of bacteria.	3.30 .1	If you wanted to separate a single species of bacteria in a culture mixed with 9 other species, the quickest, most useful method would be: a. sorting under a high-power microscope b. serial dilution into tubes of liquid medium c. plating directly on solid nutrient medium d. serial liquid selection cultures
3.31	Given four choices, the student will identify a procedure generally used to sterilize equipment used in bacteriology.	3.31 .1	Equipment used in bacteriology is generally sterilized: a. with soap b. in an autoclave c. by boiling d. with antibiotics

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0

SKILL/KNOWLEDGE BASED ON: Microbiology

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.32	Given four choices, the student will identify the type of chemicals used in sterilization of glassware and equipment.	3.32 .1	The chemicals used in sterilization of glassware and equipment are: a. antiseptics b. soaps c. antibiotics d. disinfectants
3.33	Given four choices, the student will identify why a refrigerator helps prevent food from spoiling.	3.33 .1	A refrigerator helps prevent food from spoiling because: a. the cold kills bacteria b. toxins produced by bacteria are made harmless c. bacteriological reproduction is slowed down d. bacteria cannot get into food in a refrigerator

ANSWER KEY 3.0

3.1.1 c

3.2.1 c

3.3.1 c

3.4.1 b

3.5.1 a

3.6.1 d

3.7.1 c

3.7.2 b

3.8.1 d

3.9.1 a

3.10.1 b

3.11.1 d

3.12.1 c

3.13.1 a

3.14.1 d

3.15.1 d

3.16.1 b

3.17.1 a

3.18.1 d

3.19.1 b

3.20.1 a

3.21.1 c

3.22.1 a

3.23.1 d

3.24.1 a

3.25.1 d

3.26.1 c

3.27.1 a

3.27.2 c

3.27.3 a

3.28.1 a

3.29.1 d

3.30.1 b

3.31.1 b

3.32.1 d

3.33.1 c

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Biochemistry

T.P.O. The student will demonstrate his knowledge, skills, and understanding of biochemistry, including the basic properties of atoms and molecules, acids and bases, and the composition and function of organic compounds essential to living organisms (carbohydrates, proteins, lipids, nucleic acids); as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s and teacher evaluation of laboratory experiences.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.1	Given four choices, the student will identify the basic unit of matter.	4.1 .1	The basic unit of matter is the: a. molecule b. compound c. cell d. atom
4.2	Given a list of components of atoms, the student will identify the electrical charge of that component, from a given key.	4.2 .1	Using the following choices: a) neutral, b) positive, c) negative, identify the electrical charge of these components of atoms: ____ 1. an electron ____ 2. a proton ____ 3. a neutron ____ 4. the nucleus of an atom ____ 5. the shell of an atom
4.3	Given a description of an ion, the student will identify the appropriate electrical charge from 5 choices.	4.3 .1	An atom which has gained two electrons will become an ion with the charge of: a. +1 b. -1 c. +2 d. -2 e. 0
4.4	Given four choices, the student will identify the one which describes the most stable arrangement of an atom.	4.4 .1	The most stable arrangement of an atom is one in which: a. the nucleus has an equal number of protons and neutrons b. the number of protons is equal to the number of electrons c. there are eight electrons in the outer shell d. the atomic mass is an even number

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Biochemistry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.5	Given a description of the composition of an atom, the student will select from five choices, its correct atomic mass.	4.5.1	An atom having 8 electrons, 8 protons, and 9 neutrons will have an atomic mass of: a. 8 b. 9 c. 16 d. 17 e. 25
4.6	Given the number of electrons in a specific atom, the student will identify from 4 choices, the number of electrons in its outermost shell.	4.6.1	A sodium atom has 11 electrons occupying its shells. Therefore, the number of electrons in its outermost shell is: a. 1 b. 11 c. 12 c. 23
4.7	Given four choices, the student will identify that part of an isotope of an element which causes it to have different weights.	4.7.1	Isotopes of an element have different weights because each isotope has a different number of: a. electrons b. protons c. neutrons d. shells
4.8	Given four choices, the student will identify the parts of the atom that are involved when a chemical change occurs.	4.8.1	When a chemical change occurs, the parts of atoms that are involved are: a. electrons b. protons c. neutrons d. nuclei

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Biochemistry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.9	Given four choices, the student will identify the factor upon which the chemical properties of an atom depend.	4.9 .1	The chemical properties of an atom of a given element depend mainly upon the: a. number and arrangement of the protons in its nucleus b. number and arrangement of the electrons in its shells c. number of naturally occurring isotopes d. absence of electrons in the L shell
4.10	Given four choices, the student will identify the composition of a compound.	4.10 .1	A compound is composed of: a. atoms of one element in chemical combination b. two or more elements which are combined chemically c. elements which are not combined chemically d. atoms which are all alike
4.11	Given four choices, the student will identify what is believed to happen in the formation of an ionic bond.	4.11 .1	An ionic bond is believed to be the result of: a. the actual sharing of electrons b. a release of energy c. the transfer of electrons d. a combination of fats and proteins
4.12	Given four choices, the student will identify the type of bond most often found in carbon compounds.	4.12 .1	The type of bond most often found in carbon compounds is the: a. metallic bond b. covalent bond c. ionic bond d. cohesive bond

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Biochemistry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.13	Given a molecular formula, the student will identify from four choices, which molecular characteristic is not shown.	4.13 .1	Which of the following molecular characteristics would not be shown by the formula $C_6H_{12}O_6$? a. number of atoms b. kinds of atoms c. position of atoms d. numerical proportions of atoms
4.14	Given four choices, the student will identify the definition of isomer.	4.14 .1	Compounds having the same molecular formula but different structural formulas are called: a. isotopes b. isomers c. ionic d. radioactive
4.15	Given four choices, the student will identify the relative ion concentration of an acid solution.	4.15 .1	If a substance in water is an acid, the solution contains: a. more hydrogen ions than hydroxyl ions b. fewer hydrogen ions than hydroxyl ions c. the same number of hydrogen ions as hydroxyl ions d. acid molecules
4.16	Given either a pH number or a descriptive term such as acid or base, the student will identify from five choices the appropriate descriptor or number.	4.16 .1	Which of the following pH numbers would indicate the strongest base? a. 12 b. 6.3 c. 5.1 d. 7.33 e. 11.4

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Biochemistry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.16	Cont'd	4.16 .2	A pH of 2.2 indicates that the solution is: a. a strong acid b. a weak acid c. neutral d. a strong base e. a weak base
4.17	Given four choices, the student will identify the compounds which are added to a solution to prevent sudden changes in pH.	4.17 .1	Compounds which are added to a solution to prevent sudden changes in pH are called: a. ionic b. indicators c. buffers d. precipitates
4.18	Given four choices, the student will identify the ionic nature of pure water.	4.18 .1	Pure water is: a. an acid because it contains a hydrogen ion b. a base because it contains a hydroxyl radical c. neutral because the hydrogen and hydroxyl ions are equal d. an ionic compound because all of the molecules ionize
4.19	Given four choices, the student will identify why the property of water (being the best solvent known) is important in living systems.	4.19 .1	Water is the best solvent known. This property is important to living systems because: a. in water, some chemical substances disperse and may enter chemical reactions more readily

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Biochemistry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.19	Cont'd	4.19	Cont'd b. water ionizes readily forming many hydrogen and oxygen ions c. water molecules prevent diffusion d. water molecules increase their motion as temperature rises.
4.20	Given four choices, the student will identify the event which occurs causing a molecule to become oxidized.	4.20 .1	A molecule becomes oxidized when it: a. dissolves in water b. gets broken down to smaller units by digestion c. gives off an oxygen atom d. loses electrons or hydrogen atoms
4.21	Given a list of elements, the student will identify the one(s) always contained in an organic molecule.	4.21 .1	Organic molecules always contain at least: a. carbon b. oxygen c. carbon and nitrogen d. hydrogen and nitrogen
4.22	Given four choices, the student will identify the characteristics of carbon which make it a very important component of molecules in living cells.	4.22 .1	Carbon is a very important component of molecules in living cells because of its ability to: a. ionize and react with water b. dissolve easily and in a large quantity in water c. remain stable and not undergo chemical change d. bond with four other atoms and form long carbon chains.

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Biochemistry

T.P.O.

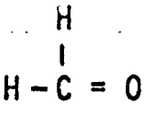
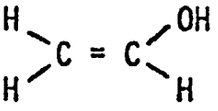
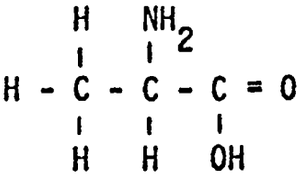
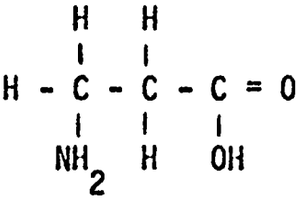
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.23	Given a characteristic ratio of atoms in a molecule, the student will identify from four choices the particular organic compound for which that ratio is characteristic.	4.23 .1	Substances found in cytoplasm that are made up of the elements carbon, hydrogen, and oxygen with a hydrogen to oxygen ratio of 2:1 are known as: a. nucleic acids b. proteins c. carbohydrates d. fats
4.24	Given four choices, the student will identify the name of the simple sugar found inside living cells which acts as an energy source for the organism.	4.24 .1	A simple sugar found inside living cells which acts as an energy source for the organism is called: a. protein b. glucose c. enzyme f. amino acid
4.25	Given four choices, the student will identify the molecular unit composing starch and cellulose.	4.25 .1	Starch and cellulose are compounds consisting of many units of: a. amino acid b. fatty acid c. protein d. glucose
4.26	Given four choices, the student will identify why starch is important to animals.	4.26 .1	Starch, the storage polysaccharide of plants, is important to animals because: a. it is also the storage polysaccharide of animals. b. it is used as a source of glucose supplying energy for the animal. c. it is a structural component of plants. d. it is a structural component of animals.

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Biochemistry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.27	Given four choices, the student will identify the composition of amino acids.	4.27 .1	Amino acids are composed of: a. hydroxide and amino groups b. carboxyl and amino groups c. glycerol and fatty acids d. glycerol and amino groups
4.28	Given four choices, the student will identify the organic compound in which nitrogen is always found.	4.28 .1	The element nitrogen is always found in: a. fats b. organic compounds c. glucose d. amino acids
4.29	Given four structural formulas, the student will identify the one which is an amino acid.	4.29 .1	Which of the following compounds are amino acids? a.  b.  c.  d. 

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Biochemistry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.30	Given four choices, the student will identify the particular kind of bond which links amino acids into proteins.	4.30 .1	The particular kind of bond which links amino acids into proteins is called the: a. oxygen bridge b. peptide bond c. double bond d. disulfide bond
4.31	Given four choices, the student will identify the name given to chains of amino acids which comprise proteins.	4.31 .1	Chains of amino acids which comprise proteins are called: a. lipids b. nucleotides c. enzymes d. polypeptides
4.32	Given four choices, the student will identify the group of substances, all of which are composed of proteins.	4.32 .1	Which of the following groups of substances are composed of protein? a. starch, cellulose, fat b. hair, fat, skin c. enzymes, starch, hemoglobin d. hemoglobin, hair, enzymes
4.33	Given five choices, the student will identify the one in which fatty acids and glycerol are found.	4.33 .1	Fatty acids and glycerol are found in: a. proteins b. fats c. carbohydrates d. DNA e. all of these

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Biochemistry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.34	Given four choices, the student will identify the circumstance under which fat is produced by animals.	4.34 .1	Fat is produced by animals when they: a. take in more food than is used for energy b. reproduce c. need an easily available source of energy d. develop a hereditary code
4.35	Given a particular bonding sequence, the student will identify the resulting molecule.	4.35 .1	When a base becomes bonded to a sugar (ribose or deoxyribose) which in turn becomes bonded to a phosphate, the resulting molecule is called: a. a nucleotide b. an amino acid c. a bacteria phage d. an enzyme
4.36	Given four choices, the student will identify the basic building units of nucleic acids.	4.36 .1	The basic building units of nucleic acids are: a. nucleotides b. amino acids c. monosaccharides d. fatty acids and glycerol
4.37	Given five choices, the student will identify an example of a substance composed of nucleic acids.	4.37 .1	Nucleic acids make up: a. fats b. proteins c. DNA d. carbohydrates e. all of these

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0

SKILL/KNOWLEDGE BASED ON: Biochemistry

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
4.38	Given four choices, the student will identify the nucleic acid responsible for the control of heredity.	4.38 .1	The nucleic acid responsible for control of heredity is: a. ATP b. STP c. DNA d. RNA
4.39	Given four choices, the student will identify the nucleic acid which carries out the instructions of the hereditary code.	4.39 .1	The nucleic acid which carries out the instructions of the hereditary code is: a. ATP b. STP c. DNA d. RNA

PRE-TECH BIOLOGY
ANSWER KEY
T.P.O. 4.0

4.1.1 d
4.2.1

1. c
2. b
3. a
4. b
5. c

4.3.1 d
4.4.1 c
4.5.1 d
4.6.1 a
4.7.1 c
4.8.1 a
4.9.1 b
4.10.1 b
4.11.1 c
4.12.1 b
4.13.1 c
4.14.1 b
4.15.1 a
4.16.1 a
4.16.2 a
4.17.1 c
4.18.1 c
4.19.1 a
4.20.1 d
4.21.1 a
4.22.1 d
4.23.1 c
4.24.1 b
4.25.1 d
4.26.1 b
4.27.1 b
4.28.1 d
4.29.1 c
4.30.1 b
4.31.1 d
4.32.1 d
4.33.1 b
4.34.1 a
4.35.1 a
4.36.1 a
4.37.1 c
4.38.1 c
4.39.1 d

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O. The student will demonstrate his knowledge, skills, and understanding of the principles of genetics as it applies to Mendelian and non-Mendelian inheritance, the Hardy Weinberg Theory, and the biochemistry of gene action; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s, and teacher evaluation of laboratory experiences.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.1	Given four choices, the student will identify the term defining the gene makeup of an organism.	5.1 .1	The gene makeup of an organism for a particular trait is its: a. genotype b. phenotype c. dominance d. homozygote
5.2	Given four choices, the student will identify the term defining a gene pair.	5.2 .1	Each parent contributes one of the genes for a particular characteristic. Whether or not the genes are exactly alike, these gene pairs are called: a. chromosomes b. DNA c. alleles d. gametes
5.3	Given four choices, the student will identify the nature of the trait which appears in all of the F_1 generation.	5.3 .1	If purebred red-flowered plants crossed with purebred white-flowered plants produced all red-flowered offspring (F_1 generation), the gene for red flowers must have been: a. not segregated b. recessive c. dominant d. mutated
5.4	Given four choices, the student will identify a description of a heterozygous genotype.	5.4 .1	If an individual has the genotype Gg for a particular trait, the individual is: a. homozygous for the trait b. heterozygous for the trait c. a dihybrid d. recessive

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.5	Given four choices, the student will identify the term defining the observable characteristics of an organism.	5.5 .1	The term used to define the observable characteristics of an organism is: a. allele b. dominance c. phenotype d. genotype
5.6	Given four choices, the student will identify the statement which identifies Mendel's Law of Segregation.	5.6 .1	Mendel's Law of Segregation states that: a. Gametes have half as many genes as the parents b. Gametes contain one of each kind of gene in the parent c. Offspring receive all their traits from the best parent d. The expression of one trait is independent of any other
5.7	Given four choices, the student will identify which of Mendel's Laws applies to the inheritance of individual traits.	5.7 .1	The law stating that traits are inherited individually is Mendel's Law of: a. Dominance b. Segregation and Recombination c. Blending d. Independent Assortment
5.8	Given four choices, the student will identify the tool used in the shorthand method of working genetic problems.	5.8 .1	A shorthand method of working genetic problems uses: a. a logarithmic table b. Pascal's Triangle c. Punnett Square d. a slide rule

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.9	Given four choices concerning experimental crosses with a 3:1 ratio of offspring, the student will identify the genotypes of the parents.	5.9 .1	If three-quarters of the offspring from many experimental crosses showed only the dominant character, the parents were: a. both pure dominant b. both heterozygous c. one pure dominant, one recessive d. one heterozygous, one pure dominant
5.10	Given a description of two parents and their offspring, the student will identify from five choices the genotype of one of the parents	5.10 .1	Brown eyes are dominant over blue. Sam has brown eyes, and wife Ethel has blue. They have 12 brown-eyed children and two blue-eyed children. What is Sam's genotype? a. BB b. Bb c. bb d. bY e. cannot be determined from the offspring
5.11	Given five choices, the student will identify the phenotypes and ratios expected in the offspring of a described monohybrid cross.	5.11 .1	In poultry, black is due to a dominant gene - B, and red is due to its recessive allele - b. A homozygous black chicken is crossed with a homozygous red chicken and all the chicks are black. At maturity, two of the F_1 chicks are crossed. What phenotype ratio would you expect?

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.11	Cont'd	5.11 .1	Cont'd a. 1 black to 3 red b. 1 black, 2 speckled red-black, 1 red c. all red d. 3 black to 1 red e. 2 black to 2 red
5.12	Given five choices, the student will identify the phenotypes and ratios expected in a described monohybrid test cross.	5.12 .1	In geese, red necks are dominant over blue necks. A heterozygous red-necked male is crossed with a blue-necked female. What ratio of offspring should they have? a. all red b. all blue c. 3 blue, 1 red d. 2 blue, 2 red e. 1 blue, 3 red
5.13	Given a probability problem, the student will identify from four choices the probability of 2 independent events occurring simultaneously.	5.13 .1	If two offspring result from the cross Aa x Aa, what is the probability that both offspring will have the genotype aa? a. 1/16 b. 1/8 c. 1/4 d. 1/2
5.14	Given a hypothetical problem involving two traits, the student will identify from four choices the phenotypes expected in the offspring of a dihybrid cross.	5.14 .1	In guinea pigs, black (B) is dominant to white (b) and rough (R) is dominant to smooth (r). If two hybrids (BbRr) are crossed, the resulting offspring will be:

COURSE: PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.14	Cont'd	5.14 .1	Cont'd a. all black and rough b. 1/2 black, rough and 1/2 white, smooth c. 9 black, rough to 3 black, smooth to 3 white, rough to 1 white, smooth d. 2 black, rough to 4 black, smooth to 4 white, rough to 2 white, smooth
5.15	Given a hypothetical problem involving 2 traits, the student will identify, from five choices, the genotype of the parents of offspring having equal numbers of four different phenotypes, i.e. of a dihybrid test cross.	5.15 .1	In guinea pigs, black is dominant to white and rough coat is dominant to smooth. A black, rough male is crossed with a white, smooth female. They produce several litters of which 1/4 were black, rough, 1/4 were black, smooth, 1/4 were white rough, and 1/4 were white, smooth. The genotype of the parents is: a. BbRR x BbRr b. bbrr x BBRr c. BBrr x BbRr d. BbRr x bbrr e. BBRR x bbrr
5.16	Given a hypothetical situation, the student will identify from four choices the appropriate genetic explanation, i.e. of incomplete dominance.	5.16 .1	A red elephant (RR) is crossed with a white elephant (WW) and the resulting elephants are pink (RW). This can be explained by: a. mutation and recombination b. independent sorting c. the principle of segregation d. the principle of dominance e. incomplete dominance

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.17	Given a hypothetical situation involving incomplete dominance, the student will identify: a. the genotype of the parents b. how to obtain a desired feature c. the possibility of producing a pure-breeding line and why	5.17 .1	The next 3 questions are based on the following information: In Dalmatian coach hounds the desired breed has small black spots. Assume that mating of these always produce some offspring with a solid coat, some with large black spots, and some with the desired small spots. 1. What cross would probably produce all Dalmatians with the desired small spots? a. SS x SS b. Ss x Ss c. ss x SS d. SS x Ss 2. Will it be possible to produce a pure-breeding line of Dalmatians and why? a. Yes, because all individuals with two genes for small spots will be spotted. b. Yes, because the genes for small spots are recessive. c. No, because small spots appear only in the heterozygote. d. No, because the homozygous small spotted condition appears in only 1/4 of the offspring.

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.17	Cont'd	5.17 .1	Cont'd 3. What is the probable genotype of the Dalmatians with small spots? a. ss b. Ss c. SS d. SSs
5.18	Given four choices, the student will identify ratio of offspring expected from a monohybrid cross involving incomplete dominance.	5.18 .1	Crosses between white and red elephants result in pink offspring. When these offspring are crossed, the ratio of elephants expected is: a. all pink b. all red c. 1 red: 1 white d. 1 white: 2 pink: 1 red
5.19	Given four choices, the student will identify who/what determines a child's sex.	5.19 .1	In human beings a child's sex is determined primarily by: a. its father b. its mother c. both parents d. certain pairs of genes that everyone possesses
5.20	Given a sex-linkage problem in humans, the student will identify from four choices the sex and number of offspring receiving a particular trait.	5.20 .1	A man who carries a sex-linked gene on his Y chromosome will transmit this gene to: a. 1/2 his male offspring b. 1/2 his female offspring c. all his female offspring d. all his male offspring

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.21	Given a hypothetical situation concerning sex chromosomes, the student will identify from four choices which parent(s) transmitted the specified gene.	5.21 .1	In all conditions where the defective gene is on the X chromosome, transmission to a male can be: a. only through his mother b. only through his father c. either through the mother or the father d. by mutation only
		5.21 .2	In all conditions where the defective gene is on the X chromosome, transmission to a female can be: a. only through his mother b. only through his father c. either through the mother or the father d. by mutation only
5.22	Given the blood types of two babies and four adults, the student will identify from four choices the probable parents for each baby.	5.22 .1	Two newborn babies were accidentally mixed up in a hospital. From the following blood types, determine which baby belongs to which parents. Baby 1 type O Mrs. X type O Baby 2 type A Mr. W type AB Mrs Y type B homozygous Mr. Z type A

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.22	Cont'd	5.22 .1	1. Baby 1 belongs to: a. Mrs. X and Mr. W b. Mrs. X and Mr. Z c. Mrs. Y and Mr. W d. Mrs. Y and Mr. Z e. none of these 2. Baby 2 belongs to: a. Mrs. Y and Mr. W b. Mrs. X and Mr. Z c. Mrs. Y and Mr. Z d. either of A or C
5.23	Given a situation involving a continuous range of phenotypes, the student will identify, from four choices, the genetic condition responsible.	5.23 .1	In skin color in humans we find a large number of shades between dark and light. We could assume from this that: a. one gene is completely dominant over the other b. all light people have more dominant genes than dark people c. there is more than one pair of genes for skin color d. the population contains large numbers of hidden dark genes
5.24	Given four choices, the student will identify the term used to describe a gene which bears a characteristic fatal to an organism.	5.24 .1	Genes which bear characteristics fatal to an organism are called: a. lethal genes b. recessive genes c. dominant genes d. alleles

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.25	Given four choices, the student will identify the genetic disease characterized by lack of a blood-clotting factor.	5.25 .1	The genetic disease which involves a lack of a gene necessary for blood clotting is: a. Down's Syndrome b. Sickle Cell Anemia c. PKU d. Hemophilia
5.26	Given four choices, the student will identify the disease condition which is detected by testing the urine of all newborn babies.	5.26 .1	Which of the following genetic diseases can be detected by testing the urine of all newborn babies? a. Phenylketonuria (PKU) b. Hemophilia c. Sickle Cell Anemia d. Down's Syndrome
5.27	Given five choices, the student will identify trait(s) related to Sickle Cell Anemia.	5.27 .1	Sickle Cell Anemia is: a. lethal when homozygous b. caused by a recessive allele c. an example of incomplete dominance d. both a and b e. both a and c
5.28	Given four choices, the student will identify the disease characterized by mental retardation, stubby stature, and characteristic eye fold.	5.28 .1	The sex-linked disease characterized by mental retardation, stubby stature, and characteristic eye folds is: a. Sickle Cell Anemia b. PKU c. Hemophilia d. Mongolism

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.29	Using the Hardy-Weinberg formula ($p^2 + 2pq + q^2 = 1$), the student will match gene frequencies and/or population percentages with their numerical descriptions.	5.29 .1	If 84% of a population shows the dominant phenotype: (a) .40 (b) .16 (c) .36 (d) .60 (e) .48 1. ____ percent showing the recessive phenotype 2. ____ percent homozygous dominant 3. ____ percent heterozygous 4. ____ frequency of the dominant allele 5. ____ frequency of the recessive allele
5.30	Given four choices, the student will identify the theoretical value of DNA in carrying the genetic code from parent to offspring.	5.30 .1	Theoretically DNA is most important in understanding living things because DNA is a: a. spiral shaped molecule made up of nucleotides. b. complex chemical which is necessary for life. c. carrier of genetic coding from parent to offspring. d. part of the nucleus of cells in all organisms.

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.31	Given four choices, the student will identify the experimenters who first suggested the double stranded ladder-like structure of DNA.	5.31 .1	The double stranded ladder-like structure of the DNA molecule was first suggested by: a. Watson and Crick b. Meselson and Stahl c. Beadle and Tatum d. Flemming
5.32	Given four choices, the student will identify the base that pairs with cytosine in a DNA molecule.	5.32 .1	In the DNA molecule, cytosine pairs only with: a. thymine b. guanine c. uracil d. cytosine
5.33	Given four choices, the student will identify the statement which describes how the four nucleotides in a DNA molecule differ from one another.	5.33 .1	The four nucleotides in a DNA molecule differ from one another only in the: a. kind of purine or pyrimidine bases they contain b. basic atomic structure of their sugars c. attachment of the phosphates to the sugar d. position of the bases in the molecule
5.34	Given four choices, the student will identify the process which is effected first when DNA replication is prevented.	5.34 .1	When DNA replication is prevented, the process that would be effected first is: a. energy production b. reproduction c. movement d. respiration

COURSE: PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.35	Given four choices, the student will identify the cause of mutation in a gene.	5.35 .1	A mutation may occur in a gene as a result of: a. crossing over b. inversion c. loss of a nucleotide d. nondisjunction
5.36	Given four statements, the student will identify the one which correctly describes mutations.	5.36 .1	Which one of the following statements about mutations is most correct? a. Mutations are a source of variations in offspring b. Most mutations are beneficial c. Mutations cannot occur unless cells are exposed to X-rays d. Mutations occur only in fruit flies and molds
5.37	Given four choices, the student will identify a result of mutation in a DNA molecule.	5.37 .1	If a mutation occurs in a segment of a DNA molecule, it is reasonable to conclude that: a. enzyme synthesis is not effected b. protein synthesis is unchanged c. the complementary RNA would also be altered d. the mutation is helpful to the organism.
5.38	Given four choices, the student will identify the base that is unique to RNA.	5.38 .1	Instead of thymine unique to molecules of DNA, RNA molecules contain: a. adenine b. guanine c. uracil d. cytosine

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.39	Given four choices, the student will identify the main respects in which DNA differs from RNA.	5.39 .1	The main respects in which RNA differs from DNA are: a. RNA nucleotides contain a different sugar and the base uracil b. RNA molecules contain the base adenine and are found outside the cell nucleus c. RNA molecules contain the base guanine and are not present in the nucleus of the cell d. RNA and DNA molecules differ only in the type of sugar molecule present in the "backbone" of the molecule.
5.40	Given characteristics of RNA, the student will identify each as characterizing either messenger or transfer RNA.	5.40 .1	Identify the statements below as characterizing either: a. messenger RNA or b. transfer RNA 1. ____ has the code A-A-A when the DNA code is A-A-A. 2. ____ has the code U-U-U when the DNA code is A-A-A. 3. ____ carries amino acids to the ribosome 4. ____ sets the sequence of amino acids made into a protein

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.41	Given five choices, the student will identify the number of letters necessary in genetic code words in order to code for 20 different amino acids.	5.41 .1	Twenty different amino acids may have individual code words if each word consists of: a. 2 letters b. 3 letters c. 4 letters d. 10 letters e. 20 letters
5.42	Given a list of events occurring in an algal cell, the student will identify from four choices, the correct cause-and-effect sequence.	5.42 .1	Five events occurred in an algal cell: P. An enzyme was manufactured in a ribosome. Q. Cellulose was deposited in a cell wall. R. Under the influence of DNA, a molecule of RNA was constructed. S. A carbohydrate was formed. T. A nucleic acid migrated from the nucleus to the cytoplasm. It is discovered that these five events constitute a cause-and-effect sequence. The order in which these events occurred is therefore: a. T-R-S-P-Q b. Q-P-S-T-R c. P-R-T-S-Q d. R-T-P-S-Q

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.24	Given four choices, the student will identify what is involved in differentiation of cells.	13.24 .1	Differentiation of cells involves: a. increase in size b. production of more cells c. modification of cells into different types d. movement of cells into new regions of the body
13.25	Given four choices, the student will identify the term that describes those tissues that influence embryonic differentiation because of their location.	13.25 .1	Tissues which influence further embryonic differentiation because of their location are termed: a. asexuals b. reproducers c. organizers d. controllers
13.26	Given four choices, the student will identify the process by which the development of one structure initiates the development of another.	13.26 .1	The process by which the development of one structure initiates the development of another, is termed: a. induction b. repetition c. reproduction d. regeneration
13.27	Given a hypothetical situation involving tissue differentiation, the student will recognize that mesoderm is necessary for differentiation of ectoderm.	13.27 .1	A piece of ectoderm grown in nutrient solution will not differentiate, but differentiation may take place if: a. a piece of mesoderm is added to the culture b. the culture is warmed c. the culture is frozen, then warmed d. more ectoderm is added to the culture

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

SKILL/KNOWLEDGE BASED ON: Genetics

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.43	Given four choices, the student will identify the phrase which best describes the one gene-one enzyme hypothesis.	5.43 .1	Which statement best describes the one gene-one enzyme hypothesis: a. Every gene requires an enzyme to be active. b. Enzymes and genes are chemically attached to each other. c. A single gene determines the formation of each enzyme. d. If an enzyme is removed from a cell, it inactivates a gene.

PRE-TECH BIOLOGY
ANSWER KEY
T.P.O. 5.0

5.1.1 a
5.2.1 c
5.3.1 c
5.4.1 b
5.5.1 c
5.6.1 b
5.7.1 d
5.8.1 c
5.9.1 b
5.10.1 b
5.11.1 d
5.12.1 d
5.13.1 a
5.14.1 c
5.15.1 d
5.16.1 e
5.17.1 c
5.17.2 c
5.17.3 b
5.18.1 d
5.19.1 a
5.20.1 d
5.21.1 a
5.21.2 c
5.22.1 (1) b (2) c
5.23.1 c
5.24.1 a
5.25.1 d
5.26.1 a
5.27.1 e
5.28.1 d
5.29.1 (1) b (2) c (3) e (4) d (5) a
5.30.1 c
5.31.1 a
5.32.1 b
5.33.1 b
5.34.1 b
5.35.1 c
5.36.1 a
5.37.1 c
5.38.1 c
5.39.1 a
5.40.1 (1) b (2) a (3) b (4) a
5.41.1 b
5.42.1 d
5.43.1 c

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: The Human Digestive System

T.P.O. The student will demonstrate his knowledge, skills, and understanding of the human digestive system as it relates to processes of diffusion, osmosis, and active transport, the chemistry of digestion and enzyme action, the digestive system of man (structures and functions) and absorption; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are included in the I.P.O.'s, and teacher evaluation of laboratory experiences.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.1	Given a list of digestive processes, the student will identify the appropriate structure in the human digestive tract in which they occur.	6.1 .1	Use the key to indicate in which region of the human digestive tract the following processes occur. KEY: a. Mouth b. Esophagus c. Stomach d. Small intestine 1. ____ Absorption of all food types takes place. 2. ____ Physical breakdown of food begins. 3. ____ Protein digestion begins. 4. ____ Digestion of fats begins. 5. ____ Has high acid content. 6. ____ Carbohydrates are hydrolized to simple sugars. 7. ____ Saliva moistens the food. 8. ____ Bile emulsifies fats.
6.2	Given a list of digestive structures, the student will identify them with their appropriate function.	6.2	Using the following key, identify the function(s) of the structures below. KEY: a. mechanical digestion b. chemical digestion c. absorption d. choices a an b e. choices b and c f. none of the above 1. ___ mouth 2. ___ esophagus 3. ___ stomach 4. ___ small intestine 5. ___ pancreas 6. ___ large intestine

COURSE: PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: Digestive System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.3	Given a list of digestive enzymes, the student will identify them with the appropriate chemical reaction that they cause to occur.	6.3 .1	Using the following key, identify the enzyme which governs each of the reactions below: KEY: a. amylase b. pepsin c. lipase d. trypson e. dipeptidase f. maltase 1. ___ maltose — glucose + glucose 2. ___ polypeptides — dipeptides 3. ___ starch — maltose 4. ___ protein — polypeptides 5. ___ fat — glycerol + fatty acids 6. ___ dipeptides — amino acids
6.4	Given a list of digestive structures, the student will correctly identify the digestive chemical produced by that structure.	6.4 .1	Using the following key, identify where each of the substances below is made: KEY: a. mouth b. stomach c. pancreas d. small intestine e. esophagus 1. ___ pepsin 2. ___ trypsin 3. ___ salivary amylase 4. ___ sodium bicarbonate 5. ___ lipase 6. ___ dipeptidase 7. ___ hydrochloric acid 8. ___ sucrase

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: The Digestive System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.5	Given a function of the liver, the student will identify the organ performing that function, from four choices.	6.5 .1	A structure that dispenses and stores carbohydrates is the: a. liver b. gall bladder c. pancreas d. salivary gland
6.6	Given four choices of regions of the digestive tract, the student will identify the one whose removal would make the digestive tract absorb less water.	6.6 .1	The digestive tract can be made to absorb less water by removal of the: a. small intestine b. stomach c. large intestine d. gall bladder
6.7	Given four choices, the student will identify a consequence of the removal of a large part of the small intestine.	6.7 .1	You would expect that the removal of a large part of the small intestine would reduce the ability to: a. absorb food b. absorb water c. absorb salt d. secrete gastric juice
6.8	Given four choices, the student will identify the factors which adapt the small intestine for efficient absorption of digested food.	6.8 .1	The small intestine is adapted for efficient absorption of digested food. It has: a. a good nerve supply b. short length c. muscular walls to move the food along d. folds and villi

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: The Digestive System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.9	Given four choices, the student will identify the importance to digestion of the change in pH from acid to alkaline conditions in the intestine.	6.9 .1	The change in pH from acid to alkaline conditions in the intestine is important to digestion because: a. proteins will not break down in acid conditions b. pepsin activity must be halted before intestinal enzymes can become active c. intracellular digestion occurs d. enzymes secreted into the intestine act best in an alkaline medium
6.10	Given four choices, the student will identify the chemical produced by the gall bladder.	6.10 .1	The surgical removal of the gall bladder would interrupt the normal flow of: a. cholesterol b. bile c. blood d. gastric juice
6.11	Given four choices, the student will identify the factor which stimulates secretion of the pancreas.	6.11 .1	The pancreas is stimulated to secrete by: a. food in mouth b. food in small intestine c. sight and smell of food d. nerve stimulation only

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: The Digestive System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.12	Given four choices, the student will identify the 3 secretions which mix with food in the small intestine.	6.12 .1	What three secretions mix with food in the small intestine? a. saliva, gastric juice, bile b. bile, gastric juice, pancreatic juice c. bile, pancreatic juice, intestinal juice d. pancreatic juice, intestinal juice, gastric juice
6.13	Given four choices, the student will identify a factor effecting the rate of digestion in the stomach.	6.13 .1	A piece of meat was placed in a sample of fluid taken from a man's stomach. It was incubated at body temperature (38° C.). Which would increase the rate of digestion of the meat? a. adding water b. shaking the sample c. increasing the temperature to 80° C. d. decreasing the temperature to 20° C.
6.14	Given four choices, the student will identify the food class that is digested in the somach.	6.14 .1	The removal of the stomach of a human would most directly effect the digestion of: a. proteins b. fats c. sugars d. starches

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: The Digestive System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.15	Given four choices, the student will identify the chemical controlling pH of the stomach.	6.15 .1	The low pH of gastric juice in the stomach is due to the presence of: a. bile b. sodium chloride c. pyruvic acid d. hydrochloric acid
6.16	Given four choices, the student will identify the approximate pH of the stomach secretion.	6.16 .1	The pH of the stomach secretion is about: a. 3. b. 7. c. 9. d. 14.
6.17	Given four choices, the student will identify the term describing the wave-like muscular contractions which move food along the alimentary canal.	6.17 .1	The wave-like muscular contraction which moves food along the alimentary canal is: a. oscillation b. paralysis c. hydrolysis d. peristalysis
6.18	Given four choices, the student will name the part of the alimentary canal which does not secrete a digestive juice.	6.18 .1	The part of the alimentary canal in which a digestive juice is not secreted is the: a. mouth b. esophagus c. stomach d. small intestine

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: The Digestive System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.19	Given functions of teeth, the student will identify from four choices the type of teeth associated with that function.	6.19 .1	Teeth that are adapted to cut food are the: a. molars b. premolars c. incisors d. canines
		6.19 .2	Teeth that are adapted to grind and crush food are the: a. canines b. molars c. incisors d. cuspids
6.20	Given four choices, the student will identify the relationship between mechanical and chemical digestion.	6.20 .1	The chemical digestion of food becomes more effective when mechanical digestion: a. increases the surface area of the food b. increases the pH of the food c. increases the volume of the food d. decreases the pH of the food
6.21	Given four choices, the student will identify the advantage of a tube-type digestive system.	6.21 .1	The advantage of a tube-type digestive system is that it: a. stores large amounts of food b. permits specialization of different regions of the tube c. allows the food to pass through faster d. insures complete absorption

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: The Digestive System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.22	Given a list of digestive systems, the student will correctly identify them with their appropriate conditions.	6.22 .1	For the next 5 items use the following key to identify the digestive system described. KEY: a. Extracellular digestion b. Intracellular digestion c. Not an example of digestion 1. ___ Glucose is converted to glycogen in the liver. 2. ___ A flagellate in the digestive tract of a termite converts cellulose to sugar. 3. ___ A type of food is converted to sugar in the mouth. 4. ___ Glycogen stored in the liver is converted to glucose. 5. ___ Food particles within the food vacuole of an amoeba are digested.
6.23	Given a description of a series of enzyme dilutions mixed with starch solutions, the student will identify from five choices the solution containing the enzyme dilution in which digestion will first be indicated.	6.23 .1	Four tubes containing starch were placed in a 37° C. water bath. To tube #1 was added salivary amylase diluted 1:10; to tube #2 the enzyme diluted 1:100; and to tube #3 the enzyme diluted 1:1000. No enzyme was added to tube #4. In which tube would you first see the effects of digestion? a. tube #1 b. tube #2 c. tube #3 d. tube #4 e. there would be no difference

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: The Digestive System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.24	Given four choices, the student will correctly identify the term for any substance acted upon by an enzyme.	6.24 .1	The term applied to any substance acted upon by an enzyme is: a. villus b. enzyme c. substrate d. vitamin
6.25	Given four choices, the student will identify the presence of enzymes as necessary for synthesis and hydrolysis in living things.	6.25 .1	The synthesis or hydrolysis of compounds in living things is dependent on the: a. presence of fats b. absence of proteins c. presence of enzymes d. absence of carbohydrates
6.26	Given four choices, the student will identify the characteristics shared by molecules that are end products of digestion.	6.26 .1	Some characteristics are shared by the molecules that are the end products of digestion. They: a. are water soluble and small enough to pass through cell membranes. b. have long chains of amino acids c. all contain atoms of C, H, O, and N d. all are a result of dehydration synthesis.
6.27	Given four choices, the student will identify the chemical reaction by which the digestive process is accomplished.	6.27 .1	Breaking down large molecules into simpler smaller ones is accomplished in the digestive process by a chemical reaction known as: a. dehydration synthesis b. hydrolysis c. diffusion d. analysis

COURSE: PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: The Digestive System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.28	Given four choices, the student will identify a definition of the term "digestion".	6.28 .1	Essentially the word digestion means: a. burning food for energy b. building up proteins from amino acids c. changing organic molecules d. breaking large molecules into smaller ones
6.29	Given four choices, the student will identify the term for the process by which large molecules are broken down into small molecules.	6.29 .1	The breakdown of complex food particles into simpler, soluble particles is termed: a. ingestion b. digestion c. egestion d. assimilation e. oxidation
6.30	Given four processes occurring in the cell, the student will identify the statement describing the occurrence.	6.30 .1	Using the following key, identify each of the processes described below. Use each choice once where it best applies. KEY: a. diffusion c. active transport b. osmosis d. none of these 1. ___ movement of water molecules across a membrane from a region of high concentration to a region of low concentration. 2. ___ movement of dissolved materials across a membrane from a region of low concentration to a region of high concentration.

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON:
- The Digestive System

T.P.O.

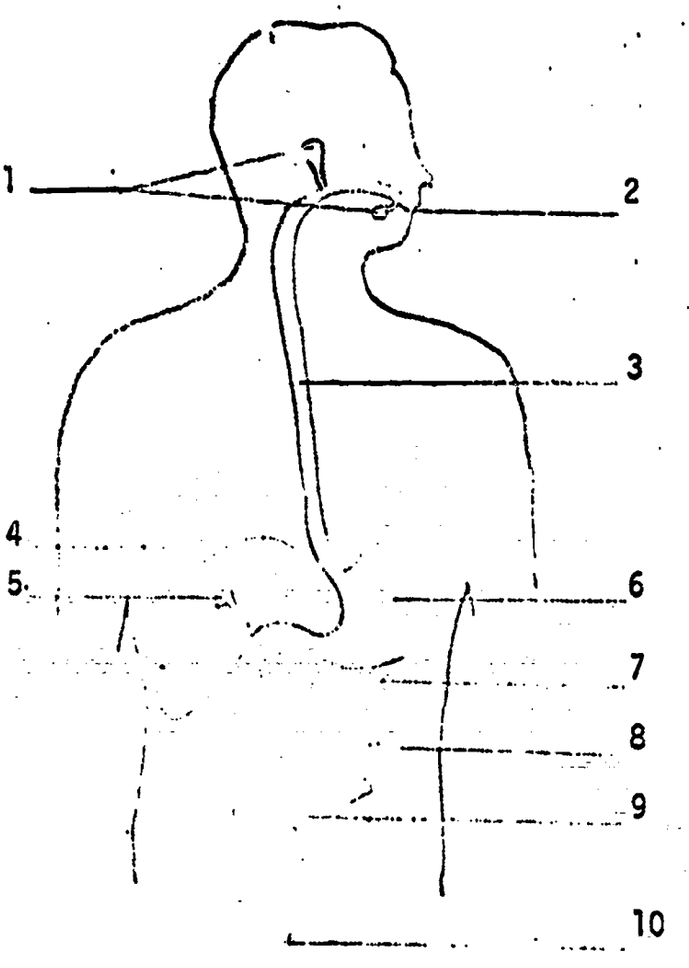
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.30	Cont'd	6.30 .1	3. ___ movement of dissolved materials across a membrane from a region of high concentration to a region of low concentration. 4. ___ hydrolysis of large, complex molecules into smaller simple molecules.

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 6.0

SKILL/KNOWLEDGE BASED ON: The Digestive System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
6.31	Given a diagram of the human digestive system, the student will identify the labeled parts from a given list.	6.31 .1	Match the labeled parts on the following diagram with their correct name from the list below: a. liver b. stomach c. mouth d. large intestine e. esophagus f. gall bladder g. small intestine h. salivary glands i. pancreas anus 

PRE-TECH BIOLOGY
ANSWER KEY
T.P.O. 6.0

6.1.1

1. d
2. a
3. c
4. d
5. c
6. d
7. a
8. d

6.2.1

1. d
2. f
3. d
4. e
5. b
6. c

6.3.1

1. f
2. d
3. a
4. b
5. c
6. e

6.4.1

1. b
2. c
3. a
4. c
5. c
6. d
7. b
8. d

6.5.1 a
6.6.1 c
6.7.1 a
6.8.1 d
6.9.1 d
6.10.1 b
6.11.1 b
6.12.1 c
6.13.1 b
6.14.1 a
6.15.1 d
6.16.1 a
6.17.1 d
6.18.1 b
6.19.1 c
6.19.2 b
6.20.1 b
6.21.1 b

6.22.1

1. c
2. a
3. a
4. b
5. b

6.23.1 a
6.24.1 c
6.25.1 c
6.26.1 a
6.27.1 b
6.28.1 d
6.29.1 b

6.30.1

1. b
2. c
3. a
4. d

6.31.1

1. h
2. c
3. e
4. a
5. f
6. b
7. i
8. d
9. g
10. j

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: The Circulatory System

T.P.O. The student will demonstrate his knowledge, skills, and understanding of the circulatory system as it relates to structure and function of the heart and blood vessels, composition and action of the blood and function of the lymphatic system; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are excluded in the I.P.O.'s, and teacher evaluation of laboratory experiences.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.1	Given four choices, the student will identify a characteristic common to all circulatory systems.	7.1.1	A characteristic common to all circulatory systems is: a. vessels that will permit fluids to move across their walls b. diffusion of molecules from regions of greater to those of lesser concentration. c. movement of fluids throughout a system of interconnecting tubes or spaces d. molecules which will loosely combine with certain other molecules
7.2	Given five statements, the student will correctly identify those that are functions of fluids and tissues in the human circulatory system.	7.2.1	Below are listed several bodily functions, some of which are carried out by blood fluids and tissues in humans. In the space provided to the left of each statement, place an X in front of each statement which correctly describes or identifies a function of the blood system. ____ a. supplies the body organs with oxygen ____ b. transports hormones through the body ____ c. secretes enzymes for muscular coordination ____ d. destroys bacteria which enter the body ____ e. cleanses itself of waste material

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: The Circulatory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.3	Given four choices, the student will identify the factor which establishes the basic rhythm of the heart.	7.3.1	The basic rhythm of the heart is established by the: a. pacemaker b. coronary system c. prothrombin d. valves
7.4	Given four choices, the student will identify the reason for the enlargement of the left ventricle.	7.4.1	In humans, the wall of the left ventricle is thicker than that of the right ventricle. This is an adaptation due to the fact that the left ventricle: a. is smaller than the right ventricle b. receives only blood low in oxygen content c. pumps blood to the lungs d. pumps blood to all the extremities of the body
7.5	Given four choices, the student will identify the proper sequence of blood flow through the heart.	7.5.1	Which of the following is the correct sequence of blood flowing through the human heart? a. left ventricle, right ventricle, left atrium, right atrium b. right atrium, right ventricle, left atrium, left ventricle c. right atrium, left atrium, right ventricle, left ventricle d. right ventricle, right atrium, left ventricle, left atrium

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: The Circulatory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.6	Given four choices, the student will identify the cause of heart murmurs.	7.6.1	Heart murmurs are sounds caused by leaky: a. atria b. ventricles c. valves d. coronary arteries
7.7	Given four types of vessels, the student will identify the one which carries blood away from the heart.	7.7.1	Vessels in the human body which carry blood away from the heart are known as: a. veins b. arteries c. capillaries d. lymphatics
7.8	Given five statements, the student will correctly identify those that are characteristics of an artery in the human circulatory system.	7.8.1	Place an X in the space provided to the left of each statement below which correctly identifies a characteristic of a typical artery in the human circulatory system. ____ a. carries blood away from the heart ____ b. maintains blood pressure in the circulatory system ____ c. functions in the exchange of nutrients to the body tissues ____ d. has thick, muscular walls surrounded by an elastic covering ____ e. prevents the back-flow of blood to the body tissues

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: The Circulatory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.9	Given four choices, the student will identify the advantage of muscular elasticity in artery walls.	7.9 .1	Artery walls are more elastic and muscular than the walls of veins. This allows them to: a. withstand the blood pressure created by the heart's pumping b. equalize the pressure throughout the arterial system c. insure no loss of blood plasma by diffusion d. keep white blood cells from escaping
7.10	Given four choices, the student will identify the type of blood vessel which carries blood toward the heart.	7.10 .1	Vessels in the human body which carry blood from the body tissues to the heart are called: a. veins b. arteries c. capillaries d. lymphatics
7.11	Given four statements, the student will correctly identify those that are characteristics of a vein in the human circulatory system.	7.11 .1	Place an X in the space provided to the left of each statement below which correctly identifies a characteristic of a vein in the human circulatory system. ___ a. secretes enzymes which govern the heart rate ___ b. has numerous one-way valves along its length ___ c. is composed of a single layer of endothelial cells ___ d. is surrounded by comparatively few muscle fibers

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: The Circulatory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.12	Given four choices, the student will identify the purpose of valves in veins.	7.12 .1	The purpose of the valves in the veins is to: a. decrease blood pressure b. stop back-flow of the blood c. make the flow of the blood steadier d. slow flow of blood
7.13	Given four choices, the student will identify the type of blood vessel that allows molecules to readily diffuse across them.	7.13 .1	The only vessels in the circulatory system which will allow molecules to diffuse across them readily are: a. capillaries b. veins c. arteries d. lymph vessels
7.14	Given four statements, the student will correctly identify those that are characteristics of a capillary in the human circulatory system.	7.14 .1	Place an X in the space provided to the left of each statement below which correctly identifies a characteristic of a capillary in the human circulatory system. ___ a. directly supplies individual cells with necessary nutrients ___ b. has numerous one-way valves along its length ___ c. is surrounded by a thick layer of muscle fibers ___ d. is composed of a single layer of endothelial cells

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: The Circulatory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.15	Given four choices, the student will identify a primary responsibility of red blood cells.	7.15 .1	The red blood cells are primarily responsible for: a. clotting b. transporting food c. transporting oxygen d. killing invading bacteria
7.16	Given four choices, the student will identify the material which carries oxygen and gives red blood cells their color.	7.16 .1	The material which carries oxygen and gives red blood cells their color is called: a. plasma b. hemoglobin c. anemia d. blood
7.17	Given four choices, the student will identify the name given to the process by which white blood cells engulf bacteria.	7.17 .1	White blood cells engulf bacteria by a process called: a. serum b. endotoxins c. phagocytosis d. antigen
7.18	Given four choices, the student will identify a disease characterized by a high white blood cell count.	7.18 .1	If the white blood cell count is much above normal, a patient may be suffering from: a. scurvy b. leukemia c. hemophilia d. rickets

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: The Circulatory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.19	Given four choices, the student will identify the blood constituent which is responsible for carrying food molecules absorbed from the intestine.	7.19 .1	Food molecules absorbed from the intestine are carried throughout the body in: a. white blood cells b. plasma c. red blood cells d. hemoglobin
7.20	Given four choices, the student will identify the name given plasma that has passed through the capillary walls.	7.20 .1	The name given plasma that has passed through the capillary walls is: a. hemoglobin b. lymph c. platelets d. pus
7.21	Given four choices, the student will identify the function in which lymph nodes and white blood cells are similar.	7.21 .1	Lymph nodes and white blood cells are similar in function in that they both: a. have multi-cellular nuclei b. are blood cells c. contain hemoglobin d. remove harmful bacteria
7.22	Given four choices, the student will identify a function of the lymphatic system.	7.22 .1	A function of the lymphatic system is to: a. carry away waste products b. carry oxygen to the cells c. transport some harmful substances to lymph nodes d. destroy harmful organisms by engulfing them

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: The Circulatory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.23	Given four choices, the student will identify the means by which fluids are returned to the blood system.	7.23 .1	Fluids in the circulatory system which are lost as the blood passes through the capillaries return to the circulatory system by way of which of the following: a. several large blood veins b. the lymphatic system c. the two major portal systems d. osmotic pressure draws most of the fluid back into the capillaries before it leaves the tissue
7.24	Given four choices, the student will identify the antigen-antibody reaction that results in the clumping of red blood cells.	7.24 .1	An antigen-antibody reaction that results in the clumping of red blood cells is called: a. coagulation b. phagocytosis c. agglutination d. hemocytosis
7.25	Given a hypothetical situation concerning bottles of blood-typing sera, the student will identify from four choices the types of blood of most value in identifying the sera.	7.25 .1	If two bottles of anti-A and anti-B blood-typing serums are unlabeled, which of the following choices of human blood types would be of most value in identifying the contents of each bottle? a. A and B b. B and O c. O d. O and AB

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 7.0

SKILL/KNOWLEDGE BASED ON: The Circulatory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
7.26	Given four choices, the student will identify a chemical element active in coagulation.	7.26 .1	In the coagulation of blood, prothrombin will change to thrombin if the plasma contains ions of: a. sodium b. potassium c. calcium d. iron
7.27	Given four choices, the student will select the terms most closely related to the measurement of blood pressure.	7.27 .1	Terms most closely related to measurement of blood pressure are: a. beats/minute b. cycles/second c. systolic/diastolic d. seconds/cycle
7.28	Given the names of five blood laboratory materials, the student will correctly match them with their appropriate function.	7.28 .1	Match the following laboratory materials with the most appropriate description of their function. Place the letter of the term in the blank opposite the matching number. a. Wright stain b. Sphygmomanometer c. stethoscope d. lancet e. anti-sera ___ 1. measures blood pressure ___ 2. punctures skin to obtain blood ___ 3. differentiates between blood types ___ 4. differentiates between types of blood cells ___ 5. amplifies heart sounds

ANSWER KEY
PRE-TECH BIOLOGY
T.P.O. 7.0

7.1.1 c
7.2.1 a, b, & d
7.3.1 a
7.4.1 d
7.5.1 b
7.6.1 c
7.7.1 b
7.8.1 a, b, & d
7.9.1 a
7.10.1 a
7.11.1 b, c
7.12.1 b
7.13.1 a
7.14.1 a, d
7.15.1 c
7.16.1 b
7.17.1 c
7.18.1 b
7.19.1 b
7.20.1 b
7.21.1 d
7.22.1 c
7.23.1 b
7.24.1 c
7.25.1 b
7.26.1 c
7.27.1 c
7.28.1

1. b
2. d
3. e
4. a
5. c

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

SKILL/KNOWLEDGE BASED ON: Assimilation and Growth

T.P.O. The student will demonstrate his knowledge, skills, and understanding of assimilation and growth as it relates to nutrients required for growth of an organism, especially the vitamin requirements of man and population growth characteristics, as evidenced by 90% of the students achieving not less than 70% on the criterion measures and teacher evaluation of laboratory experience.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.1	Given four choices, the student will identify the chemical process by which animals organize non-living materials into substances which can be used for growth and maintenance.	8.1 .1	The chemical process by which animals organize nonliving materials into substances which can be used for growth and maintenance is called: a. assimilation b. respiration c. oxidation d. regeneration
8.2	Given a list of statements, the student will identify the one(s) describing growth in animals.	8.2 .1	Which of the following statements(s) describe growth in animals. a. there is an increase in cell size b. there is an increase in cell number c. nonliving materials accumulate in intercellular spaces d. nonliving materials are incorporated into living cells e. energy is required
8.3	Given four choices, the student will identify substances essential for proper functioning of living things, yet not manufactured by them in sufficient quantities.	8.3 .1	Substances which are essential for the proper functioning of living organisms yet are not manufactured in sufficient quantities are: a. carbohydrates b. proteins c. vitamins d. fats

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

SKILL/KNOWLEDGE BASED ON: Assimilation and Growth

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.4	Given four choices, the student will identify the type of disease caused by the lack of any particular vitamin.	8.4 .1	Diseases caused by the lack of any particular vitamin in the diet are termed: a. infectious diseases b. genetic diseases c. deficiency diseases d. social diseases
8.5	Given a set of vitamins and a set of deficiency diseases or conditions, the student will match each vitamin with the disease or condition resulting from its deficiency	8.5 .1	Match the vitamin with the disease or condition caused by its deficiency. ___1. Vitamin A ___2. Vitamin B_{12} ___3. Vitamin C ___4. Vitamin D ___5. Vitamin K ___6. Riboflavin ___7. Niacin a. slow blood clotting b. scurvy c. sores of skin, especially mouth d. nightblindness e. pellegra f. anemia g. rickets
8.6	Given four choices, the student will identify the vitamin necessary for the body to obtain an adequate supply of calcium and phosphate.	8.6 .1	In order to provide the skeleton with a supply of calcium and phosphate salts, the diet should contain adequate amounts of vitamin: a. A b. B c. C d. D

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

SKILL/KNOWLEDGE BASED ON: Assimilation and Growth

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.7	Given four choices, the student will identify the mineral necessary for production of hemoglobin.	8.7 .1	The mineral necessary for production of hemoglobin is: a. calcium b. phosphorus c. iron d. sodium.
8.8	Given four choices, the student will identify the mineral necessary for prevention of anemia.	8.8 .1	The mineral necessary for production of vitamin B_{12} and thus prevents anemia is: a. sodium b. calcium c. cobalt d. iron
8.9	Given four choices, the student will identify the food substance lacking in a diet of corn and wheat.	8.9 .1	A person on a diet of corn and wheat would most likely suffer from a lack of: a. carbohydrates b. proteins c. fats d. minerals
8.10	Given four choices, the student will identify a dietary problem resulting from living on an exclusive diet of plant products.	8.10 .1	A problem with living on an exclusive diet of plant products is that: a. they do not supply enough calories b. they are low in vitamins c. large quantities from many sources are needed to supply essential amino acids d. they take too much land area for cultivation

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO.
8.0

SKILL/KNOWLEDGE BASED ON:
Assimilation and growth

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.11	Given a list of terms related to embryonic development, the student will identify the result of an increase in cell number and an increase in volume of cells.	8.11 .1	The combination of an increase in cell number along with an increase in total volume results in: a. growth b. elongation c. meiosis d. mortality
8.12	Given 4 choices involving the variables, birth rate, and death rate, the student will identify the combination of variables resulting in a slowing of a population increase.	8.12 .1	A population increase will be slowed down if there is a/an: a. increase in death rate and an increase in birth rate b. decrease in death rate and an increase in birth rate c. increase in death rate and a decrease in birth rate d. decrease in death rate and a decrease in birth rate
8.13	Given the birth rate and death rate of a population, the student will determine from 4 choices, the increase in number of individuals in that particular population in a given ime.	8.13 .1	In an Asian province, the approximate natality rate is 325 per day and the mortality rate is 150 per day. At the end of a month, the population will probably be: a. increased 5250 b. decreased 5250 c. decreased 175 d. increased 175

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

SKILL/KNOWLEDGE BASED ON: Assimilation and growth

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.14	Given four choices, the student will identify the reason for the rapid increase in world population in the 17th and 18th centuries.	8.14 .1	The rapid increase in world population in the 17th and 18th centuries was due to a/an: a. decrease in food supply b. decrease in number of births c. increase in numbers of deaths d. increase in numbers of births
8.15	Given four choices, the student will identify one of the reasons for the increase in world population in the 20th Century.	8.15 .1	A large part of the increase in world population in the 20th Century has been due to the: a. decrease in birth rate b. increase in birth rate c. decrease in death rate d. increase in death rate
8.16	Given four choices, the student will identify the factor on which the practice of medicine in the past 100 years has had the most direct effect	8.16 .1	The practice of medicine in the past 100 years has had the most direct effect on the: a. human evolution b. extension of life span c. length of community food chains d. reduction in population pressures
8.17	Given four choices, the student will identify factors effecting human population increase.	8.17 .1	Human populations have increased because man has: a. removed many natural controls on his population b. spread evenly over the lands of the world

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 8.0

SKILL/KNOWLEDGE BASED ON: Assimilation and growth

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
8.17	Continued	8.17 .1	Continued c. learned to eat many new and artificial foods d. created new energy sources that sustain life
		8.17 .2	The reason human populations are increasing so rapidly is their: a. high reproductive potential b. ability to adjust their environment c. use of technology to produce consumer goods d. low death rate

ANSWER KEY 8.0

8.1.1 a

8.2.1 a,b,d,e

8.3.1 c

8.4.1 c

8.5.1

1. d
2. f
3. b
4. g
5. a
6. c
7. e

8.6.1 d

8.7.1 c

8.8.1 d

8.9.1 b

8.10.1 c

8.11.1 a

8.12.1 c

8.13.1 a

8.14.1 c

8.15.1 c

8.16.1 b

8.17.1 a

8.17.2 b

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: Respiration and the Respiratory System

T.P.O. The student will demonstrate his knowledge, skills, and understanding of the biochemical process of respiration (glycolysis and the Kreb's Cycle) and the respiratory organs of man as related to compounds involved in cellular metabolism; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s and teacher evaluation of laboratory experiences.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.1	Given 16 statements describing cellular processes, the student will correctly identify those processes which are examples of: a. respiration b. fermentation c. both of these	9.1.1	For the next items use the following key to identify the process described in each statement. KEY: A. Respiration B. Fermentation C. Both of these 1. ___ Can occur in the absence of oxygen. 2. ___ Oxygen is used. 3. ___ Glucose is used. 4. ___ Energy is released in the absence of oxygen. 5. ___ Energy is released in the presence of oxygen. 6. ___ May produce alcohol. 7. ___ Oxygen is the acceptor of electrons. 8. ___ Occurs in mitochondria. 9. ___ ATP is used as an energy carrier. 10. ___ Pyruvic acid is formed. 11. ___ Occurs as a series of reactions rather than as a single reaction. 12. ___ Phosphates are involved in the reaction. 13. ___ Enzymes are involved in the reaction. 14. ___ Synthesis of ATP is involved in the reaction. 15. ___ Carbon dioxide is produced. 16. ___ Energy is released.

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: The Respiratory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.2	Given four choices, the student will identify the statement that best describes the process of respiration.	9.2.1	Which of the following best describes the process of respiration? a. The passage of oxygen into and carbon dioxide out of the lungs. b. the overall process by which living systems oxidize food-stuffs for energy and release carbon dioxide. c. the transport of oxygen throughout multicellular organisms. d. the process of releasing energy in the absence of oxygen.
9.3	Given four choices, the student will correctly identify a characteristic of all respiratory systems.	9.3.1	A characteristic of all respiratory systems is: a. thin, moist membranes b. lungs c. cells d. tracheal tubes
9.4	Given four choices, the student will identify the structures in the lungs in which gas exchange occurs in the lungs.	9.4.1	The air sacs in the lungs in which gas exchange occurs are the: a. valves b. alveoli c. nephrons d. capillaries

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: The Respiratory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.5	Given four choices, the student will identify the process in the lungs which allows oxygen to enter the blood.	9.5.1	In the lungs, oxygen enters the blood as the result of: a. diffusion b. osmosis c. active transport d. circulation
9.6	Given four choices, the student will correctly identify the physical factor which increases the amount of diffusion in respiratory systems.	9.6.1	To increase the amount of diffusion, respiratory systems have: a. low oxygen tension b. large surface areas c. rapid osmosis d. low surface/volume ratios
9.7	Given 4 choices, the student will identify the biochemical basis of death by carbon monoxide poisoning.	9.7.1	The hemoglobin molecule has a greater affinity for carbon monoxide than for oxygen. People often die of carbon monoxide poisoning because the: a. oxygen carrying capacity of the blood is decreased b. oxygen carrying capacity of the blood is increased c. CO_2 carrying capacity of the blood is decreased d. CO_2 carrying capacity of the blood is increased.

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: The Respiratory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.8	Given four choices, the student will identify the process which has the same relationship to respiration as eating has to digestion.	9.8.1	Eating is to digestion as: a. breathing is to respiration b. enzymes are to hydrolysis c. digestion is to respiration d. digestion is to excretion
9.9	Given four choices, the student will identify the systems of the human directly responsible for breathing.	9.9.1	Breathing is a mechanical process which provides air for respiration. What systems of the human are directly responsible for breathing? a. nervous system and digestive system b. endocrine system and skeletal system c. muscular system and skeletal system d. muscular system and excretory system
9.10	Given four choices, the student will identify the location of the center that regulates breathing rate.	9.10 .1	The center which regulates breathing rate is located in the: a. brain b. lungs c. diaphragm d. heart
9.11	Given four choices, the student will identify the chemical factor which controls the rate of breathing	9.11 .1	The rate of breathing is controlled by the: a. deficiency of oxygen in the bloodstream b. amount of surplus oxygen c. amount of blood-borne carbon dioxide d. amount of diaphragm and rib-muscle contraction

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON: The Respiratory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.12	Given four choices, the student will identify how two people of the same weight can produce different quantities of CO_2 in the same amount of time.	9.12 .1	Two persons weighing the same produce different quantities of CO_2 in the same span of time. The best explanation of this is that one: a. smokes an occasional cigarette b. is a woman c. is more active than the other d. has not eaten for some time
9.13	Given four choices, the student will identify the factor which prevents one from committing suicide by holding his breath.	9.13 .1	It is impossible to commit suicide by holding one's breath. As soon as one becomes unconscious, breathing starts again. This is due to: a. the reserve supply of oxygen in the lungs b. oxygen reserves in the tissues c. the alkalinity of the blood d. excess CO_2 in the blood which stimulates breathing
9.14	Given four choices, the student will identify the consequence of lack of contraction of chest muscles and diaphragm.	9.14 .1	If human chest muscles and the diaphragm could no longer contract: a. no change would occur in breathing patterns b. the lungs would continue to expand and contract c. the hemoglobin content of the blood would increase d. breathing would cease unless artificial means were used.

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON:

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.15	Given a situation involving an iron lung, the student will identify from four choices: a. the part of the human body the iron lung replaces b. the mechanism by which air enters the lungs c. the purpose of the whole body not being placed in the lung	9.15 .1	The next three questions are based on the following description. An iron lung consists of a cylinder in which the pressure alternates from higher than atmospheric pressure to lower than atmospheric pressure. A human who has had polio may be put in an iron lung, but his head must be outside the cylinder with an air-tight seal around his neck. 1. From the description above, the iron lung must replace which of the following in the human? a. lungs b. bronchial tube c. diaphragm and rib muscles d. floor of mouth 2. In the iron lung described above, the force which would push air into the human lungs would be provided by: a. atmospheric pressure b. the lungs c. the iron lung d. the diaphragm 3. The person's body could not be put entirely inside the cylinder because: a. there would be no difference in air pressure inside or outside the body

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 9.0

SKILL/KNOWLEDGE BASED ON:

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.15	Cont'd	9.15 .1	Cont'd b. there would be too great a pressure difference between lungs and nose and mouth c. the effect would be bad psychologically d. interior lighting would release too much heat
9.16	Given four choices, the student will correctly identify a characteristic of lung diseases.	9.16 .1	Lung diseases are generally characterized by: a. shortness of breath and fluid accumulation b. high white blood cell count c. extra chromosomes in cells d. high blood pressure

ANSWER KEY
T.P.O. 9.0

9.1.1

1. B
2. A
3. C
4. B
5. A
6. B
7. A
8. A
9. C
10. C
11. C
12. C
13. C
14. C
15. C
16. C

9.2.1 b
9.3.1 a
9.4.1 b
9.5.1 a
9.6.1 b
9.7.1 a
9.8.1 a
9.9.1 c
9.10.1 a
9.11.1 c
9.12.1 c
9.13.1 d
9.14.1 d
9.15.1

1. c
2. a
3. a

9.16.1 a

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: The Excretory System

T.P.O. The student will demonstrate his knowledge, skills, and understanding of the structure and function of the excretory system; as evidenced by 90% of the students achieving at least 70% on the criterion measures that are included in the I.P.O.'s and teacher evaluation of laboratory experiences.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.1	Given a definition, the student will identify it from four choices, as excretion.	10.1 .1	The process by which the body eliminates nitrogenous wastes and excess water and carbon dioxide is called: a. digestion b. reproduction c. circulation d. excretion
10.2	Given four choices, the student will identify the major excretory product of the lungs.	10.2 .1	The major excretory function of the lungs is removal of: a. water b. oxygen c. urea d. carbon dioxide
10.3	Given four choices, the student will identify the organs of excretion located in the skin.	10.3 .1	The organs of excretion located in the skin are the: a. sebaceous glands b. oil glands c. sense organs d. sweat glands
10.4	Given four choices, the student will identify the two major functions of the kidneys.	10.4 .1	The kidneys perform two major functions: a. They secrete the end products of metabolism and regulate elimination from the digestive tract. b. They control the concentration of most constituents of the body fluids and excrete the end products of metabolism.

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: The Excretory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.4	Cont'd	10.4 .1	Cont'd c. They excrete the end products of metabolism and the substances used in the digestive processes. d. They excrete the end products of metabolism and regulate bile secretion.
10.5	Given four choices, the student will identify nitrogen as the main chemical component of urea.	10.5 .1	Urea is a waste product produced by the body; its main chemical component is: a. carbon dioxide b. nitrogen c. oxygen d. glucose
10.6	Given four choices, the student will identify the organ which converts excess amino acids into urea.	10.6 .1	The conversion of excess amino acids into urea occurs in the: a. kidneys b. lungs c. intestines d. liver
10.7	Given four choices, the student will identify a body product that is similar in composition to urine	10.7 .1	A body product that is similar in composition to urine is: a. saliva b. bile c. pancreatic juice d. sweat

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: The Excretory System

T.P.O.

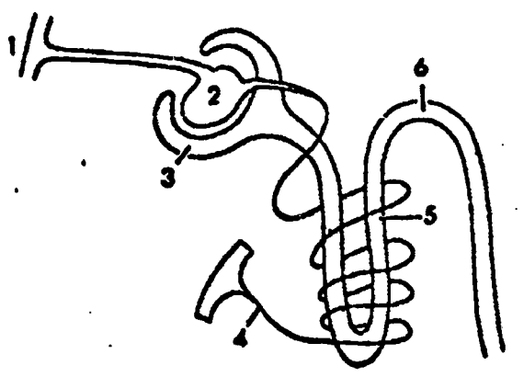
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.8	Given four choices, the student will identify the basic unit of structure of the kidney.	10.8 .1	The basic unit of structure in the kidney is the: a. bladder b. ureter c. nephron d. urethra
10.9	Given four choices, the student will identify the most likely cause of death of a person who suffered failure of both kidneys.	10.9 .1	What would be the most likely cause of death of a person who suffered failure of both kidneys? If: a. no urea was produced b. no urea was excreted c. increased water entered the blood d. too much water was removed
10.10	Given four choices, the student will identify the substances which under normal conditions, is completely reabsorbed and returned to the bloodstream by the human kidney.	10. 10.1	Under normal conditions, which substance is completely reabsorbed and returned to the bloodstream by the human kidney? a. urea b. water c. glucose d. uric acid
10.11	Given four choices, the student will identify a substance in urine which would indicate a pathologic condition.	10. 11.1	An abnormal or pathologic condition would be indicated if a urinalysis showed which one of the following to be contained in urine? a. salt b. urea c. albumin d. water

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: The Excretory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.12	Given a diagram, the student will identify from four choices the various features common to the nephron.	10.12 .1	The next seven questions are based on the following diagram of a human excretory unit.  1. The structure into which the filtrate first passes: a. 1 b. 2 c. 3 d. 5 2. The structure containing blood with the lowest concentration of urea: a. 1 b. 2 c. 4 d. 5

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: The Excretory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.12	Cont'd	10.12 .1	3. The structure which carries urine toward a ureter: a. 1 b. 2 c. 4 d. 6 4. The area from which water is reabsorbed? a. 2 b. 3 c. 5 d. 6 5. Which substance can be found in 1, but not usually found in 3? a. blood proteins b. water c. carbonic acid d. mineral salts 6. The unit shown is a part of the human: a. liver b. kidney c. lung d. spleen

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

SKILL/KNOWLEDGE BASED ON: The Excretory System

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.12	Cont'd	10.12 .1	7. In order for glucose molecules to pass from 5 to 4: a. the glucose must first be hydrolyzed. b. energy must be used. c. ionization must occur. d. 3 must receive a stimulus from the brain

ANSWER KEY
T.P.O. 10.0

10.1.1 d
10.2.1 d
10.3.1 d
10.4.1 b
10.5.1 b
10.6.1 d
10.7.1 d
10.8.1 c
10.9.1 b
10.10.1 b
10.11.1 c
10.12.1

1. c
2. c
3. d
4. c
5. a
6. b
7. b

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Bones and muscles

T.P.O. The student will demonstrate his knowledge, skills, and understanding of the structure and function of bones and muscles as evidenced by 90% of the students achieving at least 70% on the criterion measures that are covered in the I.P.O.'s and teacher evaluation of laboratory experiences.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.1	Given four choices, the student will correctly identify the mechanical function of a bone.	11.1 .1	When moved by muscles, the bones of a jointed skeleton function as: a. valves b. fixed joints c. connections d. levers
11.2	Given four choices, the student will correctly identify the point at which bones connect.	11.2 .1	The point at which bones connect with one another is called a: a. wedge b. joint c. lever d. block
11.3	Given five types of joints, the student will correctly match it with a given joint of the same type.	11.3 .1	Match the type of joint to the part of the body where it is found. a. Ball and socket b. hinge c. pivot d. gliding e. fixed ___1. vertebral column ___2. shoulder ___3. elbow ___4. cranium ___5. wrist
11.4	Given four choices, the student will correctly identify the connective tissue holding many types of bone together.	11.4 .1	Connective tissue which holds many types of bones together is: a. ligament b. tendon c. marrow d. skin

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Bones and muscles

T.P.O.

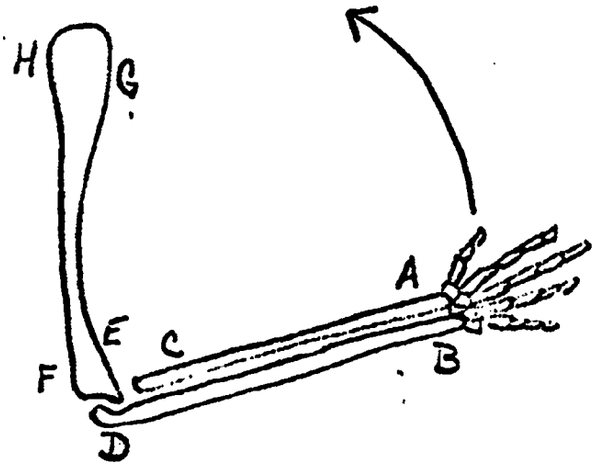
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.5	Given four statements, the student will correctly identify those that are characteristics of bone tissues.	11.5 .1	In the space provided to the left of each statement below, place an X in front of each statement which correctly describes a characteristic of bone tissue. ___ a. As a person reaches maturity, and his growth stops, his bone cells die and are completely replaced by mineral deposits. ___ b. Bones consist of living cells surrounded by a hard mineral deposit secreted by the bone cells. ___ c. Bones often serve as a reservoir of calcium for the body. ___ d. Bone tissue is constantly being built up from the inside by the bone marrow.
11.6	Given four choices, the student will correctly identify the connective tissue attaching muscle to bone.	11.6 .1	The tough, elastic connective tissue which attaches muscle to bone is: a. ligament b. tendon c. skin d. marrow
11.7	Given four choices, the student will correctly identify the most common place of attachment for striated muscle.	11.7 .1	Where is the most common place of attachment for human striated muscles? a. skin b. bones c. heart d. digestive tract

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Bones and muscles

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.8	Given four choices, the student will identify the most probable site of attachment for a muscle that would enable the arm to move in a direction as illustrated in a diagram.	11.8 .1	 The diagram above represents the bone structure of a typical human arm. Which of the following points indicate the most probable site of attachment for the muscle which would enable the arm to move in the direction indicated by the arrow? a. A to C b. C to G c. D to E d. H to D
11.9	Given 14 statements about the function of muscles, the student will correctly identify the type of muscle performing each function.	11.9 .1	The next 14 questions are based on the following statements. Use the key to answer each question. KEY: A. Smooth muscles B. Striated muscles C. Cardiac muscles D. All three types of muscles

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Bones and muscles

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.9	Cont'd	11.9 .1	Cont'd 1. ____ Under control of the nervous system 2. ____ Contract very slowly 3. ____ Fatigue rapidly 4. ____ Made up of clearly defined cells with a single nucleus per cell 5. ____ Energy for contraction supplied by ATP 6. ____ Under voluntary control 7. ____ Food is the original source of energy 8. ____ Respiration occurs in these 9. ____ Lactic acid accumulates in the muscle during a prolonged series of contraction 10. ____ Found in digestive tract 11. ____ Skeletal muscles 12. ____ Line walls of blood vessels 13. ____ Rhythmic contraction characteristic 14. ____ Inhibited by acetylcholine
11.10	Given four choices, the student will identify the condition in a fatigued muscle.	11. 10.1	When a muscle becomes fatigued, which of the following would best represent its condition? There is: a. little or no ATP, little glycogen, and much lactic acid b. much lactic acid, much ATP, and much glycogen c. little lactic acid, little ATP, and much glycogen d. no glycogen, little lactic acid, and much ATP

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0

SKILL/KNOWLEDGE BASED ON: Bones and muscles

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.11	Given four choices, the student will identify the processes accompanying the contraction of a skeletal muscle.	11. 11.1	Which of the following processes accompanies the contraction of a voluntary skeletal muscle? a. ATP is converted into ADP. b. Mitochondria are used up. c. The temperature inside the muscle drops. d. The muscle fibers lengthen.
11.12	Given 12 statements of characteristics of various tissues, the student will correctly identify those that are: a. characteristic of bone only b. characteristics of muscle only c. characteristics of bone and muscle, and d. characteristics of neither bone or muscle	11. 12.1	Use the key below for the next twelve questions: KEY: A. A characteristic of bone only B. A characteristic of muscle only C. A characteristic of both bone and muscle D. A characteristic of neither bone nor muscle 1. ____ living tissue 2. ____ provides support for the body 3. ____ produces most of the body heat 4. ____ aids in locomotion 5. ____ movement is at joints 6. ____ exhibits contractility 7. ____ stores energy as creatine phosphate 8. ____ under close hemeostatic control 9. ____ main calcium store of body 10. ____ does not require ATP 11. ____ not influenced by hormones

ANSWER KEY
T.P.O. 11.0

11.1.1 d
11.2.1 b
11.3.1

1. d
2. a
3. b
4. e
5. c

11.4.1 a
11.5.1 b, c
11.6.1 b
11.7.1 b
11.8.1 b
11.9.1

1. D
2. A
3. B
4. A
5. D
6. B
7. D
8. D
9. B
10. A
11. B
12. B
13. C
14. D

11.10.1 a
11.11.1 a
11.12.1

1. C
2. A
3. B
4. C
5. A
6. B
7. B
8. C
9. A
10. D
11. D

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: The endocrine and nervous systems

T.P.O. The student will demonstrate his knowledge, skills and understanding of the structure and function of the endocrine and nervous systems and their actions in responding to changes in the environment, as evidenced by achieving not less than 70% on the criterion measures that are covered in the I.P.O.'s and teacher evaluation of laboratory experiences.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.1	Given four choices, the student will identify the chemical substances which are secreted by some cells and influence the behavior of other cells.	12.1 .1	Chemical substances that are secreted by particular cells and influence the behavior of other cells, are: a. polypeptides b. amino acids c. enzymes d. hormones
12.2	Given four choices, the student will identify the type of gland which produces hormones.	12.2 .1	The term applied to those glands which produce hormones is: a. excretory b. endocrine c. nervous d. digestive
12.3	Given a list of hormones and a list of endocrine glands, the student will correctly match the proper hormone and endocrine gland.	12.3 .1	Match the hormone to its endocrine gland. a. sex hormone b. thyroxin c. ACTH d. insulin e. adrenalin f. cortisone g. vasopressin ___1. posterior pituitary ___2. adrenal cortex ___3. gonad ___4. adrenal medulla ___5. anterior pituitary ___6. pancreas ___7. thyroid

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: The endocrine and nervous systems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.4	Given six hormonal functions, the student will identify from five choices, the endocrine gland responsible for each.	12.4 .1	Fill in the blank next to each of the six statements below, using the following key listing endocrine glands. KEY: a. Adrenal gland b. Islets of Langerhans c. Parathyroid d. Pituitary e. Thyroid ____ 1. Produces a hormone functioning in calcium metabolism. ____ 2. Produces a hormone regulating the rate of cellular metabolism. ____ 3. May cause diabetes through abnormal functioning. ____ 4. Produces growth hormone. ____ 5. Regulates blood circulation and carbohydrate metabolism. ____ 6. Controls secretion of thyroxin and activity of adrenal cortex.
12.5	Given four choices, the student will identify the gland whose over secretion will produce a height of 7 ft. in a 14-year-old boy.	12.5 .1	A boy of 14 reached a height of seven feet. This probably was caused by an over-secretion of the: a. thyroid b. adrenals c. Islets of Langerhans d. pituitary

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: The endocrine and nervous systems

T.P.O.

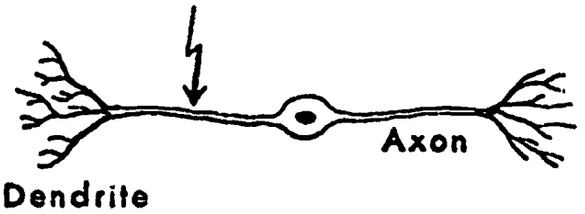
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.6	Given five choices, the student will identify the element whose deficiency causes goiter.	12.6 .1	An enlarged thyroid, or goiter, is due to a diet deficiency in the element: a. iron b. phosphorus c. copper d. iodine e. calcium
12.7	Given four choices, the student will identify the assumption that correctly fits a situation involving a heart placed in a solution in which other hearts have been placed.	12.7 .1	If the heartbeat slows when the heart is placed in a solution in which other hearts were slowed by nerve stimulation, it is reasonable to assume that the heartbeat: a. is independent of nerve control b. is influenced chemically c. increases in acetylcholine solutions d. slows in adrenalin solutions
12.8	Given four choices, the student will identify the most reasonable conclusion derived from an experiment in which a nerve to an isolated heart is stimulated and the heartbeat slows.	12.8 .1	If a nerve to an isolated heart is stimulated and the heartbeat slows, it is reasonable to conclude that the heart: a. responds to nerve control b. requires nerve stimulation to speed it up c. is controlled by nerve stimulation only d. responds differently outside the body than in it

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: The endocrine and nervous systems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.9	Given four choices, the student will identify how nervous coordination generally differs from endocrine coordination.	12.9 .1	Nervous coordination generally differs from endocrine coordination in that the nervous coordination is: a. slower b. less specific c. faster d. controlled by hormones
12.10	Given four choices, the student will identify the explanation for why some people are more sensitive to pain than are others.	12.10 .1	The fact that some people are more sensitive to pain than others depends primarily on their: a. reflex arcs b. connector neurons c. effector neurons d. threshold of stimulation
12.11	Given four choices, the student will identify the direction an impulse would travel if a neuron were stimulated as illustrated by a diagram.	12.11 .1	In higher animals if a neuron were stimulated as shown,  the impulse would: a. move to the left b. move to the right c. not be initiated d. move in both directions

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: The endocrine and nervous systems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.12	Given four choices, the student will identify the point at which the impulse passes from one neuron to another.	12.12 .1	The point at which an impulse passes from one neuron to another is the: a. axon b. synapse c. nucleus d. dendrite
12.13	Given four choices, the student will identify the course traveled by impulses going outward from connectors to effector neurons.	12.13 .1	After passing from connector to effector neurons, the impulse would travel outward by way of a(an): a. ganglion to an axon b. axon to dendrite c. dendrite to an axon d. hormone
12.14	Given four choices, the student will identify the function of sensory nerves.	12.14 .1	In humans, sensory nerves: a. carry nerve impulses from receptors to the central nervous system b. carry nerve impulses from the central nervous system to the effectors c. move the muscles of the body d. have more than one cell body
12.15	Given four choices, the student will identify the function of association neurons.	12.15 .1	Association neurons carry nerve impulses from: a. motor neurons to sensory neurons b. sensory neurons to muscles c. sensory receptors to the brain d. sensory neurons to motor neurons

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: The endocrine and nervous systems

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.16	Given four choices, the student will identify the effectors of the body controlled by the nervous system.	12.16 .1	The effectors of the human body controlled by the nervous system are: a. muscles and glands b. endocrine glands only c. body fluids d. eyes, ears and similar sensory parts
12.17	Given a situation describing a "hot foot", the student will correctly identify: a. the point at which an external stimulus is first received by the nervous system b. where the stimulus is carried after reception c. a consequence of a stronger stimulus d. how a stronger response could be elicited e. the sensation occurring if the nerves had been connected to the back of the cerebrum f. the events requiring a motor neuron g. the events requiring a functioning brain h. that event that is a result of a basic reflex arc	12. 17.1	The next 8 items are based on the following information: A "hot foot" results when a match is stuck in a shoe and lit. Very soon the one receiving the "hot foot" (1) jerks his leg, (2) feels the pain, and (3) grabs his foot. 1. The first change in the nervous system would be at the: a. sensory nerve b. receptor c. motor nerve d. muscle 2. After the stimulus is received, it is carried first to the: a. sensory neuron b. spinal cord c. brain d. motor neuron

COURSE: PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: The endocrine and nervous system

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.17	Cont'd	12.17.1	Cont'd 3. If a hotter match had been used, the: a. impulse would have traveled faster b. leg would have jerked more quickly c. boy would have yelled louder d. initial impulse would have been no stronger 4. A stronger response might have occurred if: a. threshold stimulus had occurred b. a synapse had been crossed c. more impulses had been transmitted d. unmyelinated nerves had been involved 5. If the nerves carrying this impulse had been connected to the back part of the cerebrum, the boy would have experienced: a. a feeling of heat in the head b. the same as under normal circumstances c. no sensation at all d. visual sensations

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: The endocrine and nervous system

I.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.7	Cont'd	12.17.1	Cont'd 6. Which of the events require a motor neuron? a. 1 only b. 1 and 2 only c. 1 and 3 only d. 1, 2, and 3 7. Which of the events requires a functioning brain? a. 1 only b. 1 and 2 only c. 2 and 3 only d. 1, 2, and 3 8. Which of the events is a result of a basic reflex arc? a. 1 b. 2 c. 3 d. none of the three
12.18	Given four choices, the student will correctly identify the function of a sense organ.	12.18.1	A sense organ is specialized to receive: a. many types of stimuli b. specific types of stimuli c. most changes in the environment d. coordinated stimuli

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

SKILL/KNOWLEDGE BASED ON: The endocrine and nervous system

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
12.19	Given a list of sense organs, the student will match to each the stimulus to which it is sensitive.	12.19.1	Match the sense organ with the stimulus to which it is sensitive. a. skin receptor 1.___sound b. organ of Corte 2.___light c. retina 3.___touch d. taste bud 4.___chemicals e. semicircular canal 5.___balance
12.20	Given four choices, the student will identify the structure, which along with the brain, composes the central nervous system.	12.20.1	The central nervous system is composed of the brain and: a. muscles b. sensory neurons c. motor neurons d. spinal cord

ANSWER KEY
T.P.O. 12.0

12.1 d
12.2 b
12.3

1. g
2. f
3. a
4. e
5. c
6. d
7. b

12.4

1. c
2. e
3. b
4. d
5. a
6. d

12.5 d
12.6 d
12.7 b
12.8 a
12.9 c
12.10 d
12.11 b
12.12 b
12.13 c
12.14 a
12.15 d
12.16 a
12.17

1. b
2. b
3. b
4. c
5. d
6. c
7. c
8. a

12.18.1 b
12.19.1

1. b
2. c
3. a
4. d
5. e

12.20.1 d

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O. The student will demonstrate his knowledge and understanding of reproduction and development as it relates to the reproductive structures and functions and embryonic development of representative animals, especially man, as evidenced by 90% of the students achieving not less than 70% of the possible 100% on the criterion measures that are covered in the I.P.O.'s.

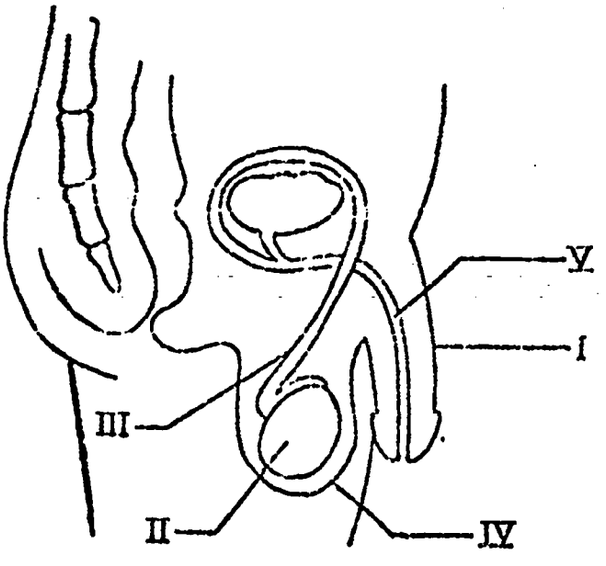
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.1	Given four choices, the student will identify the case in which reproduction is not necessary for survival.	13.1 .1	Reproduction in the broadest sense is least necessary for the survival of: a. the individual b. the species c. continuation of life d. formation of new species
13.2	Given four choices, the student will identify the greatest evolutionary advantage of sexual reproduction.	13.2 .1	From the point of view of evolution, what is the greatest advantage of sexual reproduction: a. a great variety of organisms b. a consistency of traits generation after generation c. continuance of the species d. fewer eggs are fertilized
13.3	Given four choices, the student will identify the major advantage of internal fertilization.	13.3 .1	The major advantage of internal fertilization is: a. a shorter life cycle b. a greater number of offspring c. protection and nourishment for the developing organism d. sexual reproduction
13.4	Given a comparison of ovaries to ova, the student will identify the cell having that same relationship to testes.	13.4 .1	Ovaries are to ova as testes are to: a. embryos b. zygotes c. gametes d. sperms

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.5	Given a diagram or a list of the structures of the male reproductive system, the student will correctly identify the structures that: a. produces sperm b. is common to both reproductive and urinary systems c. produces hormones d. sperm travel through when leaving the testes e. introduces sperm into the female body.	13.5 .1	The next five items are based on the following list of structures of the male reproductive system. I. Penis II. Testes III. Vas Deferens IV. Scrotum V. Urethra NOTE: THE TEACHER MAY USE EITHER THE LIST OR THE DIAGRAM.  1. The structure that produces sperm cells is: a. I b. II c. III d. IV

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

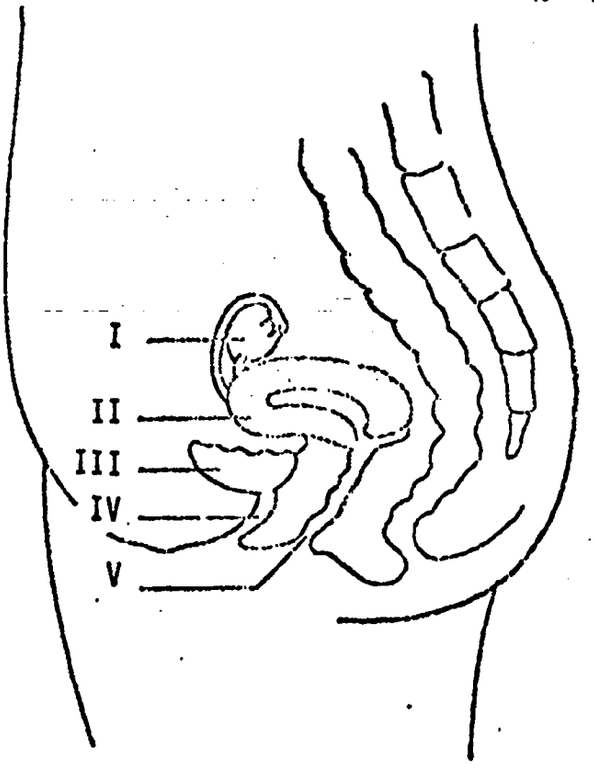
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.5	Cont'd	13.5 .2	The structure used by both the reproductive and urinary system is: a. II b. III c. IV d. V
		13.5 .3	The structure that produces hormones is: a. I b. II c. IV d. V
		13.5 .4	The structure through which sperm travel from the testes to the urethra is: a. I b. II c. III d. IV
		13.5 .5	The structure that introduces sperm into the female body is: a. I b. II c. III d. V
13.6	Given four choices, the student will correctly identify the male sex hormone.	13.6 .1	The male sex hormone is called: a. progesterone b. estrogen c. testosterone d. LH

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.7	Given a diagram or a list of structures of the female reproductive system, the student will identify the structure (s): a. that produces eggs b. in which the embryo develops c. included in the urinary system d. from which the menstrual flow comes e. in which sperm are deposited	13.7 .1	The next five items are based on the following list of structures of the female reproductive system: I. Ovaries II. Uterus III. Urinary Bladder IV. Urethra V. Vagina NOTE: THE TEACHER MAY USE EITHER THE LIST OR THE DIAGRAM.  1. Eggs are produced in: a. I b. II c. III d. IV

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

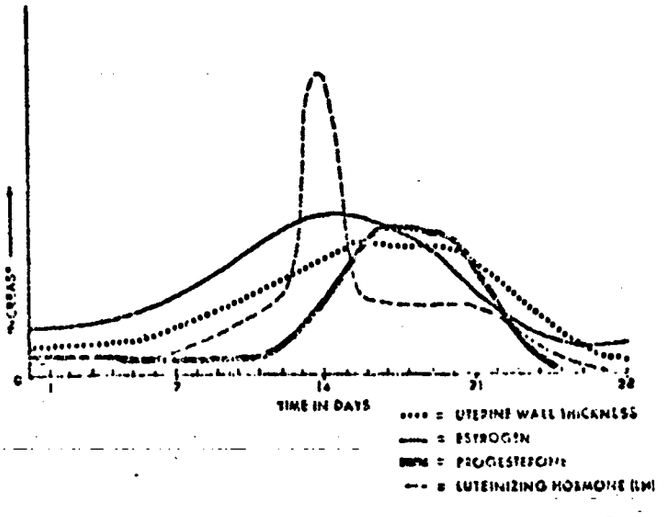
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.7	Continued	13.7 .2	The human embryo develops in: a. II b. III c. IV d. V
		13.7 .3	The structures included in the urinary system are: a. I and II b. II and III c. III and IV d. IV and V
		13.7 .4	The menstrual flow comes from the wall of: a. I b. II c. III d. V
		13.7 .5	Sperm are deposited in: a. II b. III c. IV d. V
13.8	Given four choices, the student will identify the site of fertilization.	13.8 .1	Fertilization of the human egg occurs in the: a. ovary b. oviduct c. uterus d. vagina

COURSE BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.9	Given a graph of the human menstrual cycle, the student will identify: a. when an egg would be released b. why progesterone secretion decreases sharply near the end of the cycle c. what controls hormone levels in this cycle d. the function of the hormone progesterone e. when menstruation would begin f. what factor caused an increase in estrogen activity g. the period during which pregnancy is most likely to occur. h. the period during which the uterus would be most prepared to receive the fertilized egg.	13.9 .1	The next eight questions are based on the following graph of the human menstrual cycle. On it are plotted the amounts of 3 hormones, estrogen, progesterone, and LH as well as uterine wall thickness.  1. In this cycle, the release of an egg occurs: a. between the 16th and 26th day b. between the 12th and the 16th day c. on the 10th day d. on the 28th day

COURSE BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.9	Cont'd	13.9 .1	2. Progesterone secretion decreases sharply near the end of the cycle because: a. the corpus luteum degenerates b. the corpus luteum appears c. ovulation occurs d. pregnancy results 3. The hormone levels in this cycle are controlled by the: a. uterus only b. ovaries only c. uterus and ovaries d. ovaries and pituitary gland 4. Which of the following is a function of the hormone progesterone? It: a. prepares the uterus to receive the egg b. stimulates ovulation c. stimulates estrogen production d. stimulates the corpus luteum 5. Menstruation would begin when a. LH activity is at its peak b. estrogen activity reaches its peak c. progesterone activity is at its highest d. progesterone and estrogen activity are both declining

COURSE BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.9	Cont'd	13.9 .1	6. The increase in estrogen activity is due to: a. FSH stimulation of ovary b. LH activity c. LTH secretion by the pituitary d. increase in size of the uterus 7. After ovulation, the egg lives only a few days and if not fertilized, it disintegrates and is reabsorbed. Knowing this you could predict that the greatest possibility of pregnancy is be-between: a. 0-6 days b. 6-10 days c. 12-18 days c. 22-28 days 8. The uterus would be most prepared to receive the fertilized egg during the period between: a. 0-12 days b. 12-16 days c. 16-22 days d. 0-28 days (the entire period)
13.10	Given four choices, the student will identify the approximate number of times a year an egg is available for fertilization.	13. 10.1	In humans, how many times a year is an egg ready to be fertilized by a sperm? a. one b. six c. thirteen d. twenty-four

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

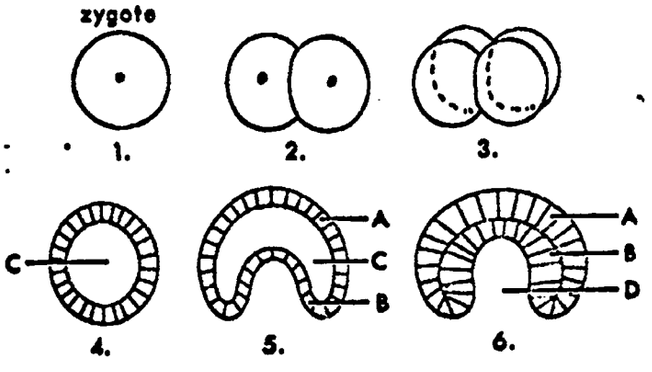
NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.11	Given four choices, the student will identify how a woman might know she was pregnant.	13.11 .1	A woman would know she was pregnant if: a. her menstrual periods stopped b. she was hungry for strange foods c. she had pains in her stomach d. she had a menstrual period
13.12	Given four choices, the student will identify the age range in which puberty usually occurs.	13.12 .1	In humans, sex hormones produce secondary sex characteristics at puberty. The age at the beginning of puberty varies but is most likely to be at: a. 7-8 years of age b. 11-14 years of age c. 18-20 years of age d. 21-22 years of age
13.13	The student will identify the term describing the study of the development of organisms.	13.13 .1	The study of the development of organisms is called: a. biology b. embryology c. botany d. evolution
13.14	Given four choices, the student will identify the contents of a fertilized egg.	13.14 .1	The fertilized egg is a single cell containing: a. two nuclei b. chromosomes of only the female parent c. chromosomes of both the sperm and the egg d. one nucleus and a monoploid set of chromosomes

COURSE BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.15	Given the diagrams of six stages of embryonic development, the student will identify: a. what the cavity in stage 6 will become b. what will happen between stages 1 and 2 c. the cells to which layer A in stages 5 and 6 will give rise	13.15.1	The next four questions are based on the following diagrams of embryonic development.  1. Cavity "D" in stage 6 will become: a. the respiratory cavity b. the digestive cavity c. filled with tissue d. the body cavity 2. Between stages 1 and 2: a. the egg and sperm will fuse b. the chromosomes will undergo mitotic division c. the chromosome number will be reduced by one-half d. major differentiation will occur

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.15	Continued	13.15.1	3. The cells of layer A will give rise to which system? a. nervous b. reproductive c. digestive d. circulatory
13.16	Given four choices, the student will identify the point at which food stored in the egg is no longer necessary.	13.16.1	In organisms where the embryo develops outside the mother's body, the eggs contain enough stored food to last until the: a. sperm fertilizes the egg b. zygote begins to divide c. embryo develops a circulatory system d. new organism can get food on its own
13.17	Given four choices, the student will identify the statement which describes the significance of a greater amount of yolk in a bird egg than in a human egg.	13.17.1	The significance of the greater amount of yolk in bird eggs as compared to the amount of yolk in the human egg is that: a. birds need more energy for development b. mammals do not depend totally on the yolk for development c. birds develop slower and therefore need a greater supply of yolk d. the yolk of mammals is more concentrated

COURSE BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.18	Given four choices, the student will identify the main method evolved in mammals for insuring effectiveness of reproduction.	13.18.1	The main method that mammals have evolved which helps insure the effectiveness of reproduction is: a. storage of yolk as food supply for the embryo b. retention of developing embryo within the female c. reduction in number of eggs produced d. development of a placenta
13.19	Given four choices, the student will identify the hypothesis supported by evidence that the human embryo has gill slits.	13.19.1	The fact that the human embryo also has gill slits lends support to the idea that: a. fish are our closest relatives b. the embryo breathes under water c. all vertebrates are related d. fish are in the same genus as man
13.20	Given the names of extraembryonic membranes in an avian egg, the student will correctly match them with the appropriate function.	13.20.1	Match each extraembryonic membrane with the function it performs in an avian egg. ___ 1. amnion ___ 2. chorion ___ 3. allantois ___ 4. yolk sac a. organ for gas exchange b. storage of wastes c. contains the "portable pond" d. storage of food supply

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.21	Given a list of extraembryonic membranes, the student will identify those which function in an avian embryo that also function in the human placenta.	13.21 .1	Identify those extraembryonic membranes which function in human placenta as well as in avian embryos. ___a. amnion ___b. yolk sac ___c. chorion ___d. allantois
13.22	Given a situation describing the death of a newborn kitten, the student will correctly identify the probable cause of death.	13.22 .1	A newly born kitten remained in its amniotic membrane after birth. It died even though it had lived within this membrane for weeks prior to birth. The most reasonable hypothesis to explore regarding this death is: a. the food supply to the kitten was cut off b. the oxygen supply to the kitten was cut off c. disease resistance is low in new born kittens d. excretory wastes accumulate in the amnion
13.23	Given four choices, the student will identify the process by which different kinds of tissues are produced from a fertilized egg.	13.23 .1	The process by which different kinds of tissues are produced from a fertilized egg is: a. metamorphosis b. parthenogenesis c. cleavage d. differentiation

COURSE PRE-TECH BIOLOGY

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0

SKILL/KNOWLEDGE BASED ON: Reproduction and development

T.P.O.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
13.28	Given four choices, the student will identify what happens in an embryo after differentiation.	13.28 .1	After differentiation, the cells of an embryo must also: a. stop mitosis or an abnormal embryo will result b. organize into various structures c. change into special types of cells d. reduce their chromosomes number by half.

ANSWER KEY 13.0

13.1.1	a	13.14.1	c
13.2.1	a	13.15.1	b
13.3.1	c	13.15.2	b
13.4.1	d	13.15.3	a
13.5.1	b	13.16.1	d
13.5.2	d	13.17.1	b
13.5.3	b	13.18.1	b
13.5.4	c	13.19.1	c
13.5.	a	13.20.1	c
13.6.1	c	13.20.2	a
13.7.1	a	13.20.3	b
13.7.2	a	13.20.4	d
13.7.3	c	13.21.1	a
13.7.4	b	13.22.1	b
13.7.5	d	13.23.1	d
13.8.1	b	13.24.1	c
13.9.1	b	13.25.1	c
13.9.2	a	13.26.1	a
13.9.3	d	13.27.1	a
13.9.4	a	13.28.1	b
13.9.5	d		
13.9.6	b		
13.9.7	c		
13.9.8	c		
13.10.1	c		
13.11.1	a		
13.12.1	b		
13.13.1	b		