

BIOLOGY



QUESTION CATALOGUE

The Living Environment/Biology

Question Catalogue Index

I. UNITY AND DIVERSITY OF LIVING THINGS

1 Definition and Concept of Life	
A. Life Functions	
1. Transport	1
2. Nutrition	2
3. Respiration	3
4. Metabolism	4
5. Synthesis	5
6. Homeostasis	6
7. Excretion	7
8. Regulation	8
9. Growth and Reproduction	9
B. Living vs. Non-living.....	9
2 Diversity of Life	
A. Classification of Organisms	10
3 Structure of Living Things	
A. Cells	
1. The Cell Theory and Exceptions	15
2. Methods of Cell Study	16
3. Cell Organelles	17
4. Cell Organization.....	22
5. Cellular Communication.....	22
4 Cell Biochemistry	
A. Inorganic vs. Organic	
1. Inorganic vs. Organic.....	23
2. Importance of Water.....	24
B. Chemical Enzyme Control	
1. Definition of Enzymes.....	25
2. Factors Affecting Rate of Reactions.....	27
3. Enzyme-Substrate Complex	31
C. Carbohydrates	
1. Composition/Structure and Function	33
2. Dehydration Synthesis of Carbohydrate	35
3. Hydrolysis of Carbohydrates	36
D. Lipids	
1. Composition/Structure and Function	37
2. Dehydration Synthesis of Lipids	38
3. Hydrolysis of Lipids	39
E. Proteins	
1. Composition/Structure and Function	39
2. Dehydration Synthesis of Proteins	41
3. Hydrolysis of Proteins	41
I. Comprehension	
A. Reading Comprehension	42
B. Tables, Graphs, Ext. Task	45
C. Free Response	53
GROUP QUESTIONS for Unit I	56

II. MAINTENANCE IN LIVING THINGS

1 Locomotion

A. Advantages

1. Utilization and Functions 77

B. Adaptations

1. Unicellular Organisms 78
2. Animals - Hydra 80
3. Animals - Earthworm 80
4. Animals - Grasshopper 81

2 Nutrition

A. Autotrophic Nutrition

1. Autotrophs vs. Heterotrophs 82
2. **Process of Photosynthesis** **84**
3. Cellular Structures 86
4. The Role of Light 88

B. Heterotrophic Nutrition

1. Ingestion 91
2. Mechanical and Chemical Digestion 93
3. Egestion 95
4. Fungi, Protozoas, and Animals 96

3 Transport

A. Process of Absorption

1. Structure of Cell Membrane 98
2. Function of Cell Membrane 100
3. Active and Passive Transport 101
4. Cyclosis 105

B. Adaptations for Transport

1. Plants - Roots 105
2. Plants - Stems 106
3. Plants - Leaves 107
4. Animals - Hydra 109
5. Animals - Earthworm 110
6. Animals - Grasshopper 111

4 Respiration

A. Process of Cellular Respiration

1. Anaerobic Respiration - Fermentation 112
2. Aerobic Respiration 114

B. Adaptations of Gas Exchange

1. Monera, Protista, Fungi 118
2. Plants 119
3. Hydra 120
4. Earthworm 121
5. Grasshopper 122

5 Excretion

A. Process of Excretion

1. Products and Results of Excretion 123

B. Adaptations of Excretion

1. Protists 125
2. Plants 126
3. Hydra 126
4. Earthworm 127
5. Grasshopper 128

6 Regulation

A. Nerve Control

1. Stimulus and Response	129
2. Receptors and Effectors	130
3. Impulses	132
4. Synapse and Neurotransmitters	132
B. Animal Adaptations	
1. Hydra	134
2. Earthworm	134
3. Grasshopper	135
C. Plant Chemical Control	
1. Auxins and Tropisms	136
D. Endocrine Control in Animals	
1. Animal Hormones	138
 II. Comprehension	
B. Tables, Graphs, Ext. Task	140
C. Free Response	159
 GROUP QUESTIONS for Unit II	166

III. HUMAN PHYSIOLOGY

1 Locomotion in Humans	
A. Skeleton, Muscles, etc.	
1. Bones and Ligaments	181
2. Skeletal Muscles and Tendons	182
3. Cartilage	184
B. Disorders	
1. Arthritis & Tendonitis	185
 2 Nutrition in Humans	
A. Digestive System	
1. Oral Cavity	186
2. Esophagus	186
3. Stomach	188
4. Small Intestine	189
5. Large Intestine	191
6. Liver, Gall Bladder, Pancreas	192
B. Malfunctions of Digestion	
1. Ulcers	193
2. Gallstones	193
3. Diarrhea and Constipation	193
C. Dietary Needs	
1. Roughage	194
2. Vitamins and Others	194
 3 Transport in Humans	
A. Cells and Immunology	
1. Blood, Plasma and RBCs & Platelets	195
2. WBCs, ICF and Lymph	197
3. Blood Types and Typing	199
4. Immunity: Active and Passive	200
5. Allergies	202
B. Vessels	
1. Arteries	203
2. Capillaries	204
3. Veins	204
C. Circulation	
1. Heart Circulation	205
2. Pulmonary and Systemic Circulation	205
D. Disorders of the Transport System	

1. Disorders: Circulatory	206
2. Disorders: Immunity	207
4 Respiration in Humans	
A. Respiratory System	
1. System up to the Lungs	207
2. Lungs	209
B. Disorders	
1. Emphysema and Asthma	211
5 Excretion in Humans	
A. Excretory System	
1. Liver	211
2. Skin: Sweat Glands	212
3. Kidneys	213
4. Ureter, Urinary Bladder, Urethra	213
5. Nephron	215
B. Disorders	
1. Gout	215
6 Regulation in Humans	
A. The Nervous System	
1. Neurons: Sensory, Motor & Interneuron	216
2. Brain: Cerebrum, Cerebellum & Medulla	217
3. Peripheral vs. Autonomic	218
4. Reflex Arc	219
B. The Endocrine System	
1. Endocrine Glands	220
2. Compared to Nervous System	222
3. Feedback Mechanism	223
C. Disorders of Nervous System	
1. Polio, Meningitis, Stroke, & Cerebral	224
D. Disorders of the Endocrine System	
1. Goiter & Diabetes	224
III. Comprehension	
A. Reading Comprehension	225
B. Tables, Graphs, Ext. Task	229
C. Free Response	235
GROUP QUESTIONS for Unit III	243

IV. REPRODUCTION AND DEVELOPMENT

1 Asexual Reproduction	
A. Types of Asexual Reproduction	
1. Regeneration	269
2. Budding	270
3. Sporulation	271
4. Vegetative Propagation	272
5. Binary Fission	274
6. Viruses and Infection	276
B. Mitotic Cell Division	
1. Mitosis	276
2. Comparison Between Plant and Animal	282
3. Cancer	283
2 Sexual Reproduction in Animals	
A. Gametogenesis	
1. Process of Gametogenesis	283

2. Comparison with Mitotic Cell Division	287
3. Hermaphrodites/Parthenogenesis	288
B. Fertilization	
1. Zygote Formation	288
2. Internal Fertilization	291
3. External Fertilization	292
C. Phases of Development	
1. Cleavage	293
2. Differentiation	295
3. Gastrulation and Growth	296
D. Internal Development	
1. Marsupials	296
2. Placental Mammals	297
E. External Development	
1. Water	298
2. Land	299

3 Human Reproduction

A. Reproductive Systems	
1. Male Reproductive System	300
2. Female Reproductive System	303
3. Menstrual Cycle	305
B. Fertilization in Humans	
1. Fertilization	306
2. Twins	307
C. Development	
1. Prenatal Development	308

4 Reproduction in Flowers

A. Reproduction in Flowers	
1. Pollination	309
2. Fertilization and Embryo Development	311
3. Germination	314
4. Growth	315

IV. Comprehension

A. Reading Comprehension	316
B. Tables, Graphs, Ext. Task	318
C. Free Response	321

GROUP QUESTIONS for Unit IV	325
--	------------

V. GENETICS

1 Foundations of Genetics

A. Basic Concepts	
1. Historical Background	343
2. Segregation, Recombination, Assortment	344
3. Punnett Square Problems	346
4. Test Cross	350
5. Intermediate Inheritance	351
B. Influence of the Environment	
1. Effect on Plants	353
2. Effect on Humans	355
3. Effect on Animals	356
C. Chromosomes and Genes	
1. Gene-Chromosome Theory	357
2. Gene Linkage	360
3. Crossing Over	361
D. Mutations	
1. Change in Chromosome	362

2. Mutagenic Agents	365
3. Inheritance of Mutation	366
2 Human Heredity	
A. Modern Techniques	
1. Amniocentesis	367
2. Karyotyping	367
B. Genetic Disorders	
1. Phenylketonuria (PKU)	369
2. Tay-Sachs Disease	369
3. Sickle-Cell Anemia	370
4. Down Syndrome	371
C. Blood Typing	
1. Blood Genotypes	372
D. Sex Linkage	
1. Sex Linkage	374
2. Sex Determination	375
3 Modern Genetics	
A. DNA	
1. DNA Structure	377
2. DNA Nucleotide	380
3. DNA Replication	382
4. Gene Mutation	383
B. RNA and Protein Synthesis	
1. RNA	385
2. Protein Synthesis	386
C. Genetic Technology	
1. Artificial Selection and Inbreeding	388
2. Genetic Engineering	390
3. Cloning	392
4 Population Genetics	
A. Population Genetics	
1. Gene Pool	394
2. Gene Frequency	394
3. Hardy-Weinberg Principle	397
V. Comprehension	
A. Reading Comprehension	398
B. Tables, Graphs, Ext. Task	402
C. Free Response	405
GROUP QUESTIONS for Unit V	409

VI. EVOLUTION

1 Theories of Evolution	
A. Defining Evolution	
1. Defining Evolution	429
2. Behavior	432
B. Darwin's Theory	
1. Natural Selection	433
2. Adaptation	439
C. Lamarck's Theory	
1. Use and Disuse	440
2 Modern Evolutionary Theory	
A. Producing Variation	

1. Geographic/Reproductive Isolation	442
2. Adaptive Radiation	443
3. Reproduction and Mutations	444
B. Supporting Observations	
1. Comparative Embryology	447
2. Comparative Biochemistry	448
3. Geologic Record/Ancestral Tree	450
4. Comparative Anatomy	453
C. Time Frame for Evolution	
1. Punctuated Equilibrium	456
2. Gradualism	457
D. Extinction	
1. Extinction	458
3 Origin of Life	
A. Heterotroph Hypothesis	460
VI. Comprehension	
A. Reading Comprehension	464
B. Tables, Graphs, Ext. Task	465
C. Free Response	468
GROUP QUESTIONS for Unit VI	472

VII. ECOLOGY

1 Ecosystems, Succession, Biomes	
A. Ecosystems	
1. Defining Ecology and Biosphere	479
2. Describing an Ecosystem	480
3. Abiotic, Biotic and Carrying Capacity	483
4. Describing a Population	487
5. Describing a Community	488
6. Niche Definition & Competition	490
7. Biodiversity	492
B. Succession	
1. Pioneer Organisms	493
2. Climax Community	494
3. Stages of Succession	495
C. Biomes	
1. Terrestrial	499
2. Aquatic	501
2 Material Cycles	
A. Carbon-Hydrogen-Oxygen Cycle	502
B. Water Cycle	504
C. Nitrogen Cycle	
1. Nitrogen Cycle	505
2. Decomposers	507
3 Nutritional Relationships	
A. Predatory - Prey Relationships	509
B. Symbiosis	
1. Parasitism	511
2. Commensalism	511
3. Mutualism	512
4 Energy Relationships	
A. Pyramids and Flow of Energy	513
B. Defining Food Chains and Webs	

1. Producers	519
2. Consumers	520
3. Food Chain	522
4. Food Web	523

5 Human Influences

A. Ecological Concerns

1. Water Pollution	527
2. Conservation and Preservation	528
3. Pesticides and Biological Control	530
4. Air Pollution	533
5. Human Population Growth	534
6. Applying Ecological Principles	536
7. Land Management	539

VII. Comprehension

A. Reading Comprehension	540
B. Tables, Graphs, Ext. Task	550
C. Free Response	558

GROUP QUESTIONS for Unit VII	569
------------------------------------	-----

VIII. LABORATORY SKILLS

1 Testing with Indicators

A. Acids & Bases

1. pH	597
-------------	-----

B. Gas & Moisture

1. Carbon Dioxide	598
-------------------------	-----

C. Nutrient Tests

1. Sugars and Starch	599
----------------------------	-----

2 Measurements and Apparatus

A. Measurement and Apparatus

1. Metric Conversion	601
2. Linear	602
3. Temperature	603
4. Volume	604
5. Mass and Density	607

B. Microscope

1. Parts and Procedures	608
2. Wet Mount / Staining	613
3. Microscopic Measurement	617
4. Dissecting Microscope	620
5. Determining Magnification	621

3 Experimental Fundamentals

A. Experimental Fundamentals	622
B. Control and Variable	626
C. Hypothesis	627
D. Organizing Data	627

4 Safety

A. Apparel and Procedures	628
---------------------------------	-----

5 Dissecting

A. Anatomy

1. Earthworm	629
2. Grasshopper	630
3. Frog	630

4. Plant Parts	631
5. Other	633
B. Dissecting Instruments	633

VIII. Comprehension

B. Tables, Graphs, Ext. Task	634
C. Free Response	645

GROUP QUESTIONS for Unit VIII	650
--	------------

I. INTRODUCTION TO THE LIVING ENVIRONMENT
2 Diversity of Life

A. Classification of Organisms
1. Classification of Organisms

1026. Plants *A* and *B* are classified as members of the same species. Plants *C* and *D* are classified in the same genus as *A* and *B*, but not the same species as *A* and *B*. According to this information, which statement is correct?

- (1) **Plant *A* has many characteristics in common with plant *B*.**
- (2) Plant *C* cannot be the same species as plant *D*.
- (3) Plants *A* and *B* belong to a different kingdom than plants *C* and *D*.
- (4) Plants *A*, *B*, *C*, and *D* must all belong to different phyla.

1310. In which group do all the organisms belong to the same kingdom?

- (1) yeast, mushroom, maple tree
- (2) **paramecium, ameba, spirogyra**
- (3) bacteria, ameba, spirogyra
- (4) bacteria, moss, geranium

1312. Which is the most specific term used to classify humans?

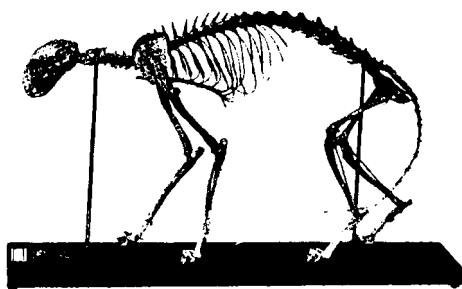
- (1) **sapiens**
- (2) animal
- (3) homo
- (4) chordate

1419. Which two organisms in the chart below have chromosomes that are most similar in genetic composition?

Category	Organism A	Organism B	Organism C	Organism D
Phylum	Tracheophyta	Chordata	Chordata	Chordata
Class	Angiospermae	Mammalia	Mammalia	Mammalia
Genus	Taraxacum	Canis	Canis	Homo
Species	officinale	familiaris	lupus	sapiens

- (1) *A* and *B*
- (2) *A* and *D*
- (3) ***B* and *C***
- (4) *C* and *D*

1536. The photograph below shows the skeleton of an organism.



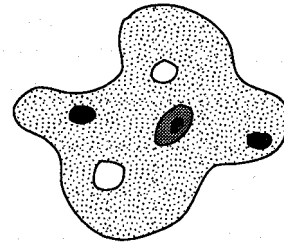
This organism is classified as a member of which phylum?

- (1) annelids
- (2) coelenterates
- (3) **chordates**
- (4) bryophytes

1630. Animals with chitinous exoskeletons and jointed appendages are classified as

- (1) coelenterates
- (2) annelids
- (3) **arthropods**
- (4) chordates

1747. How should the organism shown in the diagram below be classified?

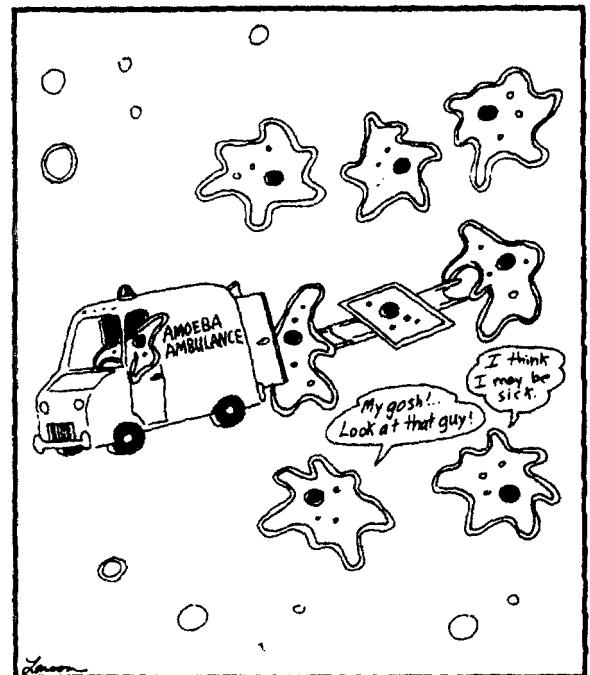


- (1) bacterium
- (2) fungus
- (3) moneran
- (4) **protist**

1748. The scientific name for the fruit fly is *Drosophila melanogaster*. The word *Drosophila* refers to the classification group known as

- (1) kingdom
- (2) phylum
- (3) **genus**
- (4) species

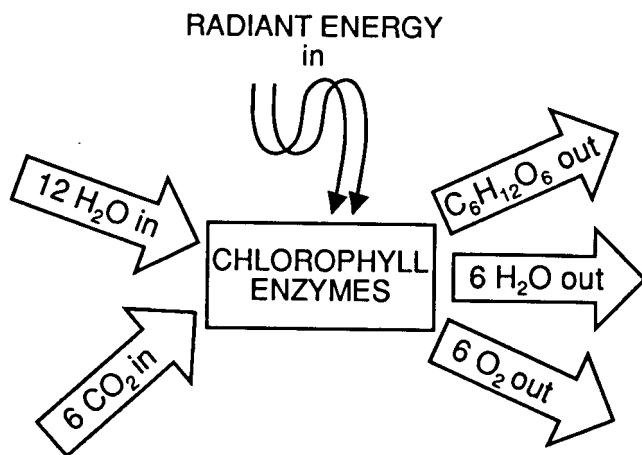
1854. In which kingdom are the organisms represented in the cartoon below classified?



- (1) **protista**
- (2) monera
- (3) fungi
- (4) plant

II. ADAPTATIONS FOR LIFE PROCESSES
2 Nutrition

3114. Which process is best illustrated by the diagram?



- (1) respiration (3) transpiration
 (2) **photosynthesis** (4) hydrolysis

3231. Which activity of autotrophs makes radiant energy available for use by heterotrophic organisms to perform essential cell functions?

- (1) hydrolysis (3) respiration
 (2) **photosynthesis** (4) digestion

3283. Plants may use PGAL (phosphoglyceraldehyde) for the

- (1) **synthesis of sugar**
 (2) splitting of water molecules
 (3) production of oxygen gas
 (4) transport of auxins

3339. What does the process of photosynthesis produce?

- (1) starch, which is metabolized into less complex molecules by dehydration synthesis
 (2) protein, which is metabolized into less complex molecules by dehydration synthesis
 (3) glycerol, which is metabolized into more complex carbohydrates by dehydration synthesis
 (4) **glucose, which is metabolized into more complex carbohydrates by dehydration synthesis**

3639. Which gas is excreted as a waste product of autotrophic nutrition in maple trees?

- (1) nitrogen (3) carbon dioxide
 (2) **oxygen** (4) methane

3688. Most of the oxygen gas present in the atmosphere is produced as a result of

- (1) **photochemical reactions** (3) dehydration synthesis
 (2) cellular respiration (4) alcoholic fermentation

A. Autotrophic Nutrition: Photosynthesis
2. Process of Photosynthesis

3689. Oxygen serves as a hydrogen acceptor during aerobic respiration. This results in the production of

- (1) glucose (3) glycerol
 (2) lactic acid (4) **water**

4108. One immediate cause of a decrease in the rate of photosynthesis is a reduction in the availability of

- (1) **carbon dioxide** (3) hydrogen
 (2) carbon monoxide (4) nitrogen

4597. Which terms would most likely be included in the explanation of the production of starch in a potato?

- (1) proteins, hydrolysis, and amino acids
 (2) **photosynthesis, glucose, and dehydration synthesis**
 (3) protein synthesis, urea, and deamination
 (4) fatty acids, glycerol, and respiration

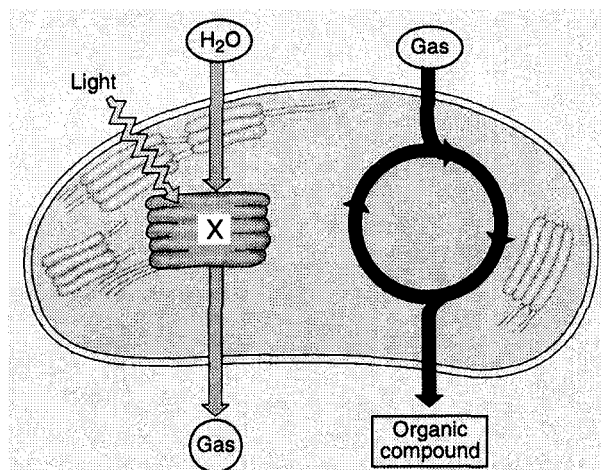
4643. The synthesis of carbohydrates occurs in the stroma of chloroplasts. This process uses energy supplied by

- (1) **ATP** (3) PGAL
 (2) CO₂ (4) O₂

4734. Eating a sweet potato provides energy for human metabolic processes. The original source of this energy is the energy

- (1) in protein molecules stored within the potato
 (2) from starch molecules absorbed by the potato plant
 (3) **made available by photosynthesis**
 (4) in vitamins and minerals found in the soil

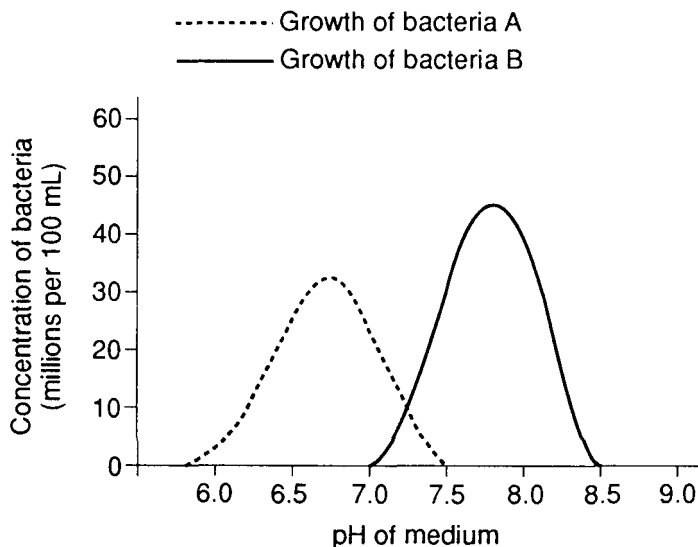
4947. The diagram below represents part of a life process in a leaf chloroplast.



If the process illustrated in the diagram is interrupted by a chemical at point X, there would be an immediate effect on the release of

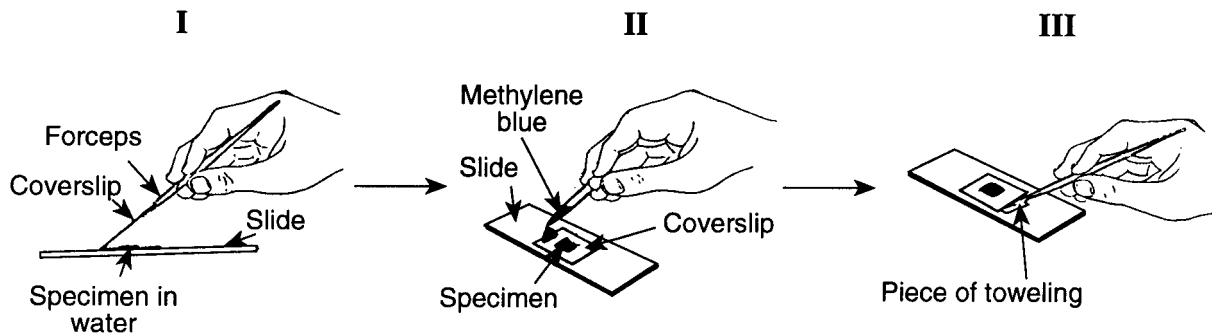
- (1) chlorophyll (3) carbon dioxide
 (2) nitrogen (4) **oxygen**

Base your answers to questions 3103 through 3105 on the graph below and on your knowledge of biology. The graph illustrates the growth curves for two types of Bacteria (*A* and *B*) under differing pH values.



3103. Bacteria *A* grows best in a medium that is
 (1) **slightly acid** (2) neutral (3) slightly basic (4) very basic
3104. Which conclusion concerning bacteria *A* and bacteria *B* can correctly be drawn from the data provided in the graph?
 (1) They could not coexist in the same medium. (3) Bacteria *A* grows at a faster rate than bacteria *B*.
 (2) **Their optimum pH values are different.** (4) Bacteria *A* is larger than bacteria *B*.
3105. A growth medium at pH 6.5 supports approximately what concentration of bacteria *A*?
 (1) 15 million/100 ml (2) **25 million/100 ml** (3) 35 million/100 ml (4) 45 million/100 ml

Base your answers to questions 3589 and 3590 on the diagram below and on your knowledge of biology.



3589. Which laboratory technique is illustrated in the diagram?
 (1) testing a specimen for amino acids (3) measuring the photosynthetic rate in a specimen
 (2) determining the pH of a specimen (4) **preparing a wet mount of a specimen**

3590. Using one or more complete sentences, state a reason why methylene blue was used in the laboratory technique.