



Arkansas Comprehensive Testing, Assessment, and Accountability Program

# Teacher Handbook

## Biology End-of-Course Examination

April 2008 Administration

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**Arkansas Department of Education**



# Teacher Handbook – 2008 Biology

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## Introduction – 2008 Biology

The **Arkansas Comprehensive Testing, Assessment, and Accountability Program (ACTAAP)** includes an April End-of-Course Examination for students completing Biology or the equivalent by the end of the spring semester. The examination consists of multiple-choice and open-response questions that directly assess student knowledge. The Arkansas *Biology Science Curriculum Framework* is the basis for the development of the *Biology End-of-Course Examination*.

In April 2008, all students who had completed or were completing the required course work for Biology by the end of the spring semester participated in the *Biology End-of-Course Examination*. Results of the *Biology End-of-Course Examination* will be provided to all students, schools, and districts to be used as the basis for instructional change.

The handbook provides information about the scoring of student responses to the Biology open-response items. It describes the scoring procedures and the scoring criteria (rubrics) used to assess student responses. Copies of actual student responses are provided, along with scores given to those responses, to illustrate how the scoring criteria were applied to Biology open-response items.

Additional information about the *Biology End-of-Course Examination* is available through the Arkansas Department of Education. Questions can be addressed to Dr. Gayle Potter at 501-682-4558.

## Scoring Student Responses Open-Response Items – 2008 Biology

The multiple-choice and open-response test items for the April *Biology End-of-Course Examination* are developed with the assistance and approval of the Biology Content Advisory Committee. This committee is composed of active Arkansas educators with expertise in Science education. The Biology Content Advisory Committee develops and reviews multiple-choice and open-response items to ensure that they reflect the Arkansas *Biology Science Curriculum Framework*.

While multiple-choice items are scored by machine to determine if the student chose the correct answer from four options, open-response items must be scored by trained “readers” using a pre-established set of scoring criteria.

### **Reader Training**

Readers are trained to score only one content area. Qualified readers for the Arkansas scoring will be those with a four-year college degree in education, science, or related fields.

Before readers are allowed to begin assigning scores to any student responses, they go through intensive training. The first step in that training is for the readers to read the Biology open-response items as they appear in the test booklet and to respond—just as the student test takers are required to do. This step gives the readers some insight into how the students might have responded. The next step is the readers’ introduction to the scoring rubric. All of the specific requirements of the rubric are explained by the Scoring Director who has been specifically trained to lead the scoring group. Then responses (anchor papers) that illustrate the score points of the rubric are presented to the readers and discussed. The goal of this discussion is for the readers to understand why a particular response (or type of response) receives a particular score. After discussion of the rubric and anchor papers, readers practice scoring sets of responses that have been pre-scored and selected for use as training papers. Detailed discussion of the responses and the scores they receive follows.

After three or four of these practice sets, readers are given “qualifying rounds.” These are additional sets of pre-scored papers, and, in order to qualify, each reader must score in exact agreement on at least 80% of the responses and have no more than 5% non-adjacent agreement on the responses. Readers who do not score within the required rate of agreement are not allowed to score the *Biology End-of-Course Examination* responses.

Once scoring of the actual student responses begins, readers are monitored constantly throughout the project to ensure that they are scoring according to the criteria. Daily and cumulative statistics are posted and analyzed, and Scoring Directors or Team Leaders reread selected responses scored by the readers. These procedures promote reliable and consistent scoring. Any reader who does not maintain an acceptable level of agreement is dismissed from the project.

### **Scoring Procedures**

All student responses to the *Biology End-of-Course Examination* open-response test items are scored independently by two readers. Those two scores are compared, and responses that receive scores that are non-adjacent (a “1” and a “3,” for example) are scored a third time by a Team Leader or the Scoring Director for resolution.

On the following pages, open-response items are presented as they appeared in the April 2008 *Biology End-of-Course Examination*. The specific scoring rubric for each item and annotated responses for each score point of the rubric follows. The goal is for classroom teachers and their students to understand how responses are scored. It is hoped that this understanding will help students see what kind of performance is expected of them on the *Biology End-of-Course Examination*.

**BIOLOGY  
RESPONSES**

**Item A – 2008 Biology**

A. The four main parts of a flowering plant are given below.

- roots
- stem
- leaves
- flowers

Select two parts from the list. Identify and explain a reason why each is crucial for the survival of the plant.

**Item A Scoring Rubric – 2008 Biology**

<b>SCORE</b>	<b>DESCRIPTION</b>
<b>4</b>	The student earns 4 points. The response contains no incorrect statements.
<b>3</b>	The student earns 3 points.
<b>2</b>	The student earns 2 points.
<b>1</b>	The student earns 1 point, or some minimal understanding is shown.
<b>0</b>	The student earns 0 points. No understanding is shown.
<b>B</b>	Blank – No Response. A score of “B” will be reported as “NA.” (No attempt to answer the item. Score of “0” assigned for the item.)



**Item A Solution and Scoring – 2008 Biology**

**Solution and Scoring (continued)**

<b>Part</b>	<b>Points</b>
<b>3</b>	<p><b>2 points possible</b></p> <p>2 points:       <b>Correct and complete answer:</b>  Photosynthesis takes place in leaves to make food for the plant.  Or  Leaves absorb sunlight for photosynthesis to take place.  Or  Leaves give off water vapor during transpiration.  Or  Leaves take in CO<sub>2</sub> for photosynthesis.</p> <p>Or</p> <p>1 point:       <b>Incomplete answer:</b>  Leaves absorb sunlight and/or energy.  Or  Leaves make food.  Or  Leaves take in CO<sub>2</sub>.  Or  Leaves give off water vapor.  Or  Leaves contain chloroplasts.</p>
<b>4</b>	<p><b>2 points possible</b></p> <p>2 points:       <b>Correct and complete answer:</b>  Flowers attract pollinators, which help with pollination.  Or  Flowers contain sexual organs which are needed for reproduction.  Or  Seeds are produced in flowers to make more plants.  Or  Flowers are pollinated and reproduce.</p> <p>Or</p> <p>1 point:       <b>Incomplete answer:</b>  Flowers make pollen.  Or  Flowers make seeds.  Or  Flowers are for reproduction.</p>

Leaves are a very crucial part of plant survival. Leaves contain chloroplasts that contain chlorophyll, a chemical that traps the Sun's energy. Leaves then convert this energy into glucose, or sugar, which the plant then eats or stores to stay alive. The stem is also an important part of any plant. Stems contain vascular tissue which distributes food and water throughout the plant. Stems also hold up the plant so that it may be closer to sunlight to receive more energy through its leaves.

**SCORE: 4**

**Points**

**Part 3:**

Correct and complete answer:

“Leaves contain chloroplasts... that traps the Sun's energy...then [converts] this energy into glucose, or sugar...”

2

**Part 2:**

Correct and complete answer:

“Stems contain vascular tissue which distributes food and water...also hold up the plant...closer to sunlight to receive more energy...”

2

**TOTAL POINTS:**

**4**

Item A Sample Responses and Annotations – 2008 Biology

Roots of plants are important because they provide water and minerals for the plant.  
Leaves of plants are crucial for the survival of the plants because it has chloroplasts that carry out photosynthesis.

**SCORE: 3**

**Points**

**Part 1:**

Incomplete answer:

“Roots...provide water and minerals for the plant.”

1

**Part 3:**

Correct and complete answer:

“Leaves... [have] chloroplasts that carry out photosynthesis”

2

**TOTAL POINTS:**

---

3

Out of the two choices that I was given I chose to do. The roots and the leaves. The roots are a very vital part to almost every other plant. They are what get its nutrients such as the water when it is soaked through the soil. And the leaves are where the plant gets its sunlight it soaks up the rays of light and then starts to turn it into chlorophyll which helps the plant survive.

**SCORE: 2**

**Points**

**Part 1:**

Incomplete answer:

“The roots...are what get its nutrients such as the water...”

1

**Part 3:**

Incomplete answer:

“...the leaves are where the plant gets it's sunlight it soaks up the rays of light...”

1

**TOTAL POINTS:**

2

Roots are an important part in a flowering plant.  
 Roots main job is to absorb water for the flower to drink of,  
 from wetness on the dirt.

Flowers are another important main part in a flowering  
 plant. Flowers are what put off oxygen in the air for  
 human beings to survive. Flowers get oxygen by absorbing  
 energy from the sunlight and putting it off as oxygen for  
 living organisms to survive.

**SCORE: 1**

**Points**

**Part 1:**

Incomplete answer:

“Roots main job is to absorb water...”

1

**Part 4:**

Incorrect answer:

“Flowers are what put off oxygen in the air...  
 Flowers get oxygen by absorbing energy from  
 the sunlight and putting it off as oxygen...”

–

**TOTAL POINTS:**

1

The roots are crucial to the survival because without them the plants won't be able to sprout up.

The stem is crucial to the survival also because without the stem it will die automatically.

**SCORE: 0**

**Points**

**Part 1:**

Incorrect answer:

“The roots...because without them the plants won't be able to sprout up.”

–

**Part 2:**

Incorrect answer:

“The stem...because without the stem it will die automatically.”

–

**TOTAL POINTS:**

---

0

**Item B – 2008 Biology**

- B.** In the 1980s, it was discovered that chlorofluorocarbons (CFCs), chemicals released from aerosol cans, reduce the amount of ozone gas in the upper atmosphere. Ozone is a greenhouse gas, and since the reduction of CFC emissions during the 1990s, ozone has increased dramatically in the atmosphere.
1. Identify and explain a positive aspect of the policy to limit CFC emissions.
  2. Identify and explain a negative aspect of the policy to limit CFC emissions.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

**Item B Scoring Rubric – 2008 Biology**

<b>SCORE</b>	<b>DESCRIPTION</b>
<b>4</b>	The student earns 4 points. The response contains no incorrect statements.
<b>3</b>	The student earns 3 points.
<b>2</b>	The student earns 2 points.
<b>1</b>	The student earns 1 point, or some minimal understanding is shown.
<b>0</b>	The student earns 0 points. No understanding is shown.
<b>B</b>	Blank – No Response. A score of “B” will be reported as “NA.” (No attempt to answer the item. Score of “0” assigned for the item.)

**Item B Solution and Scoring – 2008 Biology**

**Solution and Scoring**

<b>Part</b>	<b>Points</b>
	<b>Answers and explanation may be reversed in both parts.</b>
<b>1</b>	<p><b>2 points possible</b></p> <p>1 point:       <b>Correct answer:</b>  CFC limitation allows for (the student must list at least one of the following): less skin cancer, less harm to living things, less harm to the ozone, or less decrease of ozone.  Or  CFC limitation allows the ozone to heal and/or increase.  Or  CFC limitation saves the ozone layer.</p> <p>And  1 point:       <b>Correct explanation:</b>  There is less UV radiation, or the sun’s rays reach the earth’s surface.</p> <p>Or</p> <p>1 point:       <b>Correct answer:</b>  Some companies benefited economically.</p> <p>And  1 point:       <b>Correct explanation:</b>  The companies developed replacements for CFCs.</p>
<b>2</b>	<p><b>2 points possible</b></p> <p>1 point:       <b>Correct answer:</b>  CFCs increased global warming and/or increased the greenhouse effect.</p> <p>And  1 point:       <b>Correct explanation:</b>  The ozone traps infrared radiation (heat) and/or is a greenhouse gas.</p> <p>Or</p> <p>1 point:       <b>Correct answer:</b>  There was negative economic impact on companies using CFCs.</p> <p>And  1 point:       <b>Correct explanation:</b>  A replacement for CFCs had to be found.</p>

Item B Sample Responses and Annotations – 2008 Biology

① One positive aspect of the policy to limit CFC emissions is that ozone can be put back into the atmosphere to block out harmful UV rays that can cause cancer.

② One negative aspect of the policy is that scientists now have to find a chemical that can replace CFCs without causing any damage to the ozone, Earth, and its inhabitants, which could cost hundreds of millions of dollars.

**SCORE: 4**

**Points**

**Part 1:**

Correct answer: “...ozone can be put back into the atmosphere...” 1

Correct and complete explanation: “...to block out harmful UV rays that can cause cancer.” 1

**Part 2:**

Correct answer: “...have to find a chemical that can replace CFCs without causing any damage...” 1

Correct and complete explanation: “...which could cost hundreds of millions of dollars.” 1

**TOTAL POINTS:**

**4**

Item B Sample Responses and Annotations – 2008 Biology

① Limiting CFC emissions would help Reduce the amount of ozone gas being destroyed.

② Limiting CFC emission would create a need for alternatives to replace CFCs. Alternatives may be expensive and less appealing to the public.

**SCORE: 3**

**Points**

**Part 1:**

Correct answer: “...would help Reduce the amount of ozone gas being destroyed.” 1

Missing explanation: —

**Part 2:**

Correct answer: “...would create a need for alternatives to Replace CFCs.” 1

Correct and complete explanation: “Alternatives may be expensive...” 1

**TOTAL POINTS:** 

---

 **3**

Item B Sample Responses and Annotations – 2008 Biology

1. A positive effect is more ozone will prevent harmful sun rays to come into the earth's atmosphere.
2. A negative effect would be more ozone would cause global warming.

**SCORE: 2**

**Points**

**Part 1:**

Correct answer: “...will prevent Harmful sun rays to come into the earth's atmosphere.” 1

Missing explanation: —

**Part 2:**

Correct answer: “...would cause global warming.” 1

Missing explanation: —

**TOTAL POINTS:** 

---

 **2**

Item B Sample Responses and Annotations – 2008 Biology

① One positive aspect to limit CFC emissions is so that it would decrease the skin cancer rate as more UV light comes into Earth as the ozone is depleted.

② One negative aspect to limit CFC emissions is that Earth would get colder and not warmer, because of low greenhouse gases which warm the Earth's surface.

**SCORE: 1**

**Points**

**Part 1:**

Correct answer: “...decrease the skin cancer rate...” 1

Incorrect explanation: “...as more UV light comes into Earth as the ozone is depleted.” –

**Part 2:**

Incorrect answer: “...that Earth would get colder...” –

Incorrect explanation: “...because of low greenhouse gases which warm the Earth's surface.” –

**TOTAL POINTS:** 

---

 **1**

Item B Sample Responses and Annotations – 2008 Biology

① I suppose that a positive aspect of the policy limiting CFC emissions would be that it allows few chemicals in the atmosphere.

② A negative aspect of the policy limiting CFC emissions is that ozone has dramatically increased! CFC emissions are obviously needed to cut back the ozone levels.

**SCORE: 0**

**Points**

**Part 1:**

Incorrect answer: “...it allows few chemicals in the atmosphere.” –

Missing explanation: –

**Part 2:**

Incorrect answer: “...is that ozone has dramatically increased!” –

Missing explanation: –

**TOTAL POINTS:**

**0**

### Item C – 2008 Biology

- C. A mammal that lived 70,000 years ago is found frozen in ice and is very well preserved. Scientists note that it is very similar to a mammal species that is alive today.
1. Identify and explain one easily observable, nonmicroscopic characteristic of the frozen mammal that can help determine how much the modern mammal has evolved in 70,000 years.
  2. Identify one molecular characteristic of the frozen mammal that can help determine how much the modern mammal has evolved in 70,000 years, and explain how this characteristic could be more important than the nonmicroscopic ones.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

### Item C Scoring Rubric – 2008 Biology

SCORE	DESCRIPTION
4	The student earns 4 points. The response contains no incorrect statements.
3	The student earns 3–3 ½ points.
2	The student earns 2–2 ½ points.
1	The student earns ½–1 ½ points, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank – No Response. A score of “B” will be reported as “NA.” (No attempt to answer the item. Score of “0” assigned for the item.)

**Item C Solution and Scoring – 2008 Biology**

**Solution and Scoring**

Part	Points
1	<p><b>2 points possible</b></p> <p>1 point:        <b>Correct answer:</b>  The physical appearance has the same (the student must list at least one of the following): structure, body shape, tusks, claws, teeth, fur, skin, skeletal structure, bones, or organ systems.</p> <p>And</p> <p>1 point:        <b>Correct explanation:</b>  The closer the physical features are, the less evolution that has taken place.                           Or  The greater the difference in the physical features, the more evolution that has taken place.                           Or  Related animals have similar characteristics.                           Or  Physical appearance shows how much mammals have changed and/or shows how much their structure has changed.                           Or  The student compares the structures of old and new by citing example(s).</p> <p>Or</p> <p>½ point:        <b>Incomplete explanation:</b>  Shows how it functions.                           Or  It looks similar.                           Or  See some differences.                           Or  Traits are the same.                           Or  Shows they are related.                           Or  Implies animal has changed.</p>

**Item C Solution and Scoring – 2008 Biology**

**Solution and Scoring (continued)**

<b>Part</b>	<b>Points</b>
<b>2</b>	<b>2 points possible</b>
1 point:	<b>Correct answer:</b> The student must list at least one of the following: DNA, genes, proteins, chromosomes, its genome, amino acid sequences, or allele frequency change.
Or	
½ point:	<b>Incomplete answer:</b> They contain the same kinds of molecules.
And	
1 point:	<b>Correct explanation:</b> Molecular characteristics show (the student must list at least one of the following): genetic makeup, genetic separation, molecular differences, differences in genome, and/or traits that have been passed on. Or The molecular characteristic is evidence of genotype. Or The molecular characteristic compares genetic structure. Or The molecular characteristic is a blue print of the body. Or The molecular characteristic determines characteristics, traits, and/or qualities.
Or	
½ point:	<b>Incomplete explanation:</b> The molecular characteristic is a better indicator of evolution. Or The molecular characteristic proves a relation. Or The molecular characteristic makes a bigger difference. Or The molecular characteristic tells you better. Or The molecular characteristic gives you all sorts of information. Or The molecular characteristic shows how similar they really are. Or The molecular characteristic is the best way. Or The molecular characteristic tells everything. Or The molecular characteristic is more accurate.

1. Look at the skeletons, the more similar they are the less evolution that has taken place.

2. The DNA, it would show you the genes they both have in common. They may look alike, but be very different on the genetic level. Some animals may be more closely related that they look.

**SCORE: 4**

**Points**

**Part 1:**

Correct answer: “Look at the skeletons...” 1

Correct and complete explanation: “...the more similar they are the less evolution that has taken place.” 1

**Part 2:**

Correct answer: “The DNA...” 1

Correct and complete explanation: “...it would show you the genes they both have in common. They may look alike, but be very different on the genetic level. Some animals may be more closely related that they look.” 1

**TOTAL POINTS:**

4

Item C Sample Responses and Annotations – 2008 Biology

! Their bones because the more they are alike,  
the less evolution has taken place.

Σ. DNA

**SCORE: 3**

**Points**

**Part 1:**

Correct answer: "Their bones..." 1

Correct and complete explanation: "...the more they are alike, the less evolution has taken place." 1

**Part 2:**

Correct answer: DNA 1

Missing explanation: —

**TOTAL POINTS:** 

---

 **3**

Item C Sample Responses and Annotations – 2008 Biology

1). They may have the same bone structure,  
2). They may have the same DNA.

**SCORE: 2**

**Points**

**Part 1:**

Correct answer: "They may have the same bone structure." 1

Missing explanation: —

**Part 2:**

Correct answer: "They may have the same DNA." 1

Missing explanation: —

**TOTAL POINTS:** 

---

 **2**

Item C Sample Responses and Annotations – 2008 Biology

1. You can take a animal of the same kind and tell how old or new it can be by looking at there teeth and bones

2.

**SCORE: 1**

**Points**

**Part 1:**

Correct answer: “...looking at there teeth and bones.” 1

Incorrect explanation: “...tell how old or new it can be...” –

**Part 2:**

Missing answer: –

Missing explanation: –

**TOTAL POINTS:** 

---

 1

1. One easily observable, nonmicroscopic characteristic would be the brain function. How they act, react toward different things.
2. One molecular characteristic would be the life span. Probably what they ate 70,000 years ago, and now control how long that these mammals live.

**SCORE: 0**

**Points**

**Part 1:**

Incorrect answer: “...the brain function.” —

Incorrect explanation: “How they act, react toward different things.” —

**Part 2:**

Incorrect answer: “...the life span.” —

Incorrect explanation: “Probably what they ate 70,000 years ago, and now...” —

**TOTAL POINTS:**

**0**

**Item D – 2008 Biology**

**D.** Active and passive transport are very important to cell homeostasis.

1. Identify one type of passive transport and explain in detail how it occurs.
2. Identify one type of active transport and explain in detail how it occurs.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

**Item D Scoring Rubric – 2008 Biology**

<b>SCORE</b>	<b>DESCRIPTION</b>
<b>4</b>	The student earns 4 points. The response contains no incorrect statements.
<b>3</b>	The student earns 3–3 ½ points.
<b>2</b>	The student earns 2–2 ½ points.
<b>1</b>	The student earns ½–1 ½ points, or some minimal understanding is shown.
<b>0</b>	The student earns 0 points. No understanding is shown.
<b>B</b>	Blank – No Response. A score of “B” will be reported as “NA.” (No attempt to answer the item. Score of “0” assigned for the item.)

**Item D Solution and Scoring – 2008 Biology**

**Solution and Scoring**

<b>Part</b>	<b>Points</b>
<b>1</b>	<p><b>2 points possible</b></p> <p>1 point:       <b>Correct answer:</b> Diffusion or facilitated diffusion.</p> <p>And</p> <p>1 point:       <b>Correct and complete explanation:</b> Substances moving from areas of higher concentration to areas of lower concentration. Or Substances moving with no input of energy needed.</p> <p>Or</p> <p>1 point:       <b>Correct and complete explanation with no type of passive transport identified:</b> Substances moving from areas of higher concentration to areas of lower concentration. And Substances moving with no input of energy needed.</p> <p>Or</p> <p>½ point:       <b>Incomplete explanation with no type of passive transport identified:</b> Substances moving from areas of higher concentration to areas of lower concentration. Or Substances moving with no input of energy needed.</p> <p>Or</p> <p>1 point:       <b>Correct answer:</b> Osmosis</p> <p>And</p> <p>1 point:       <b>Correct and complete explanation:</b> Water moves through a selectively permeable membrane (cell membrane) from higher to lower concentration. Or Water moves through a selectively permeable membrane (cell membrane) with no input of energy needed.</p> <p>Or</p> <p>1 point:       <b>Correct and complete explanation with no type of passive transport identified:</b> Water moves through a selectively permeable membrane (cell membrane) from areas of higher concentration to areas of lower concentration, <b>and</b> water moves with no input of energy needed.</p> <p>Or</p> <p>½ point:       <b>Incomplete explanation with no type of passive transport identified:</b> Water moves through a selectively permeable membrane (cell membrane). Or Water moves from areas of higher concentration to areas of lower concentration. Or Water moving with no input energy needed.</p>

**Item D Solution and Scoring – 2008 Biology**

**Solution and Scoring (continued)**

Part	Points
2	<p><b>2 points possible</b></p> <p>1 point:       <b>Correct answer:</b>  The student must list one of the following: Endocytosis, Exocytosis, Phagocytosis, Pinocytosis, Ion Pump/Ion Transporter (or gives an example of an ion pump), or Carrier Protein.</p> <p>And</p> <p>1 point:       <b>Correct and complete explanation:</b>  <u>Endocytosis</u> – cell membrane forms a pocket around the substance it wants to take in, pinches off to form a vesicle within the cell, or (engulfs/surrounds it) with an input of energy needed to take place.  Or  <u>Exocytosis</u> – cell membrane forms a pocket around substance to be released from the cell, pinches off to form a vesicle on the outside of a cell (or forms a contractile vacuole) with an input of energy needed to take place.  Or  <u>Phagocytosis</u> – cell membrane forms a pocket around food particles it wants to take in, pinches off to form a vesicle within the cell (or engulfs/surrounds it) with an input of energy needed to take place.  Or  <u>Pinocytosis</u> – cell membrane forms a pocket around water it wants to take in, pinches off to form a vesicle within the cell, (or engulfs/surrounds it) with an input of energy needed to take place.  Or  <u>Ion pump/Ion transporter (or an example of an ion pump), carrier protein, or protein pump</u> – (the student must list two of the following three facts): protein that moves ions across cell membrane, protein that moves against their concentration gradient, or protein that moves with an input of energy needed to take place.</p> <p>Or</p> <p>½ point:       <b>Incomplete explanation:</b>  Student notes only one fact for any one type of active transport.  Ex: The student lists one of the following: engulfs particle, uses energy, protein that moves ions, cell eating (for phagocytosis), or cell drinking (for pinocytosis)</p>

Item D Sample Responses and Annotations – 2008 Biology

1. Osmosis is when water moved across the cell membrane from areas of higher concentration to areas of lower concentration without the use of energy.

2. Pinocytosis is when the cell membrane forms a pocket around water it wants and then it pinches it off to form a vesicle. It has to use energy to do this.

**SCORE: 4**

**Points**

**Part 1:**

Correct answer:	“Osmosis...”	1
Correct and complete explanation:	“...water moved across the cell membrane from areas of higher concentration to areas of lower concentration without the use of energy.”	1

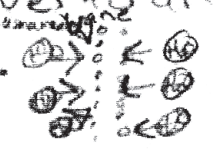
**Part 2:**

Correct answer:	“Pinocytosis...”	1
Correct and complete explanation:	“...when the cell membrane forms a pocket around water it wants and then it pinches it off to form a vesicle. It has to use energy to do this.”	1

**TOTAL POINTS:**

**4**

① Osmosis is a type of passive transport. In osmosis water or  $H_2O$  moves to and fro across the bilayer plasma membrane.



② The sodium-potassium pumps are a type of active transport. These pumps pump sodium out of the cell and potassium in both against the concentration gradient.

**SCORE: 3**

**Points**

**Part 1:**

Correct answer: “Osmosis...” 1

Incomplete explanation: “...water...moves to and fro across the bilayer plasma membrane.” ½

**Part 2:**

Correct answer: “...sodium-potassium pumps...” 1

Complete explanation: “pumps sodium out...and potassium in both against the concentration gradient.” 1

**TOTAL POINTS:**

**3½**

1. One type of passive transport is osmosis, it filters water as it flows through.
2. One type of active transport is exocytosis.

**SCORE: 2**

**Points**

**Part 1:**

Correct answer: “One type of passive transport is osmosis...” 1

Incorrect explanation: “...it filters water as it flows through.” –

**Part 2:**

Correct answer: “One type of active transport is exocytosis.” 1

Missing explanation: –

**TOTAL POINTS:** 

---

 **2**

Item D Sample Responses and Annotations – 2008 Biology

1. one type of passive transport is osmosis. it occurs inside of a cell.  
2. one type of active transport is diffusion. it also occurs inside of a cell.

**SCORE: 1**

**Points**

**Part 1:**

Correct answer: “one type...is osmosis.” 1

Incorrect explanation: “...it occurs inside of a cell.” –

**Part 2:**

Incorrect answer: “One type...is diffusion.” –

Incorrect explanation: “it also occurs inside of a cell.” –

**TOTAL POINTS:**

**1**

Item D Sample Responses and Annotations – 2008 Biology

① Active transport, transports energy to all parts of a cell.

② Passive transport, transports energy to certain parts

**SCORE: 0**

**Points**

**Part 1:**

Missing answer:

–

Incorrect explanation:

“...transports energy to all parts of a cell.”

–

**Part 2:**

Missing answer:

–

Incorrect explanation:

“...transports energy to certain parts.”

–

**TOTAL POINTS:**

**0**

**Item E – 2008 Biology**

- E.** The modern evolution theory includes three concepts: natural selection, environment pressure, and DNA mutation.

Select two of these three concepts. Identify and explain why each supports the theory of evolution.

**Item E Scoring Rubric – 2008 Biology**

<b>SCORE</b>	<b>DESCRIPTION</b>
<b>4</b>	The student earns 4 points. The response contains no incorrect statements.
<b>3</b>	The student earns 3 points.
<b>2</b>	The student earns 2 points.
<b>1</b>	The student earns 1 point, or some minimal understanding is shown.
<b>0</b>	The student earns 0 points. No understanding is shown.
<b>B</b>	Blank – No Response. A score of “B” will be reported as “NA.” (No attempt to answer the item. Score of “0” assigned for the item.)



Item E Sample Responses and Annotations – 2008 Biology

A strong concept of the modern evolutionary theory is natural selection. Natural selection is the idea that a variety of organisms and the environment works together to naturally make some organisms and their traits more suitable to their habitat. This makes them more fit, and more able to reproduce, passing on these favorable traits. This supports evolution because this process of passing on favorable traits fuels evolution. As the fit pass traits and the unfit die, the population changes. DNA mutation also causes evolution. Any time the gene pool of a population changes, the population changes, if only slightly, with it. If a beneficial mutation occurs, it will be passed to many offspring, gradually taking over the population.

**SCORE: 4**

**Points**

**Part 1:**

Correct and complete answer:

“...their traits more suitable to their habitat. This makes them more fit, and more able to reproduce, passing on these favorable traits... fuels evolution...the population changes.”

2

**Part 3:**

Correct and complete answer:

“If a beneficial mutation occurs, it will be passed to many offspring, gradually taking over the population.”

2

**TOTAL POINTS:**

**4**

Item E Sample Responses and Annotations – 2008 Biology

1. Natural selection - those with traits best suited to their environment survive, and pass those traits on to their young, which changes the population over time.
2. Environmental pressure makes some traits beneficial & those traits are passed on to their young.

**SCORE: 3**

**Points**

**Part 1:**

Correct and complete answer:

“Natural selection – those with traits best suited to their environment survive, and pass those traits on to their young, which changes the population over time”

2

**Part 2:**

Incomplete answer:

“Enviornmental pressure makes some traits beneficial & those traits are passed on to their young.”

1

**TOTAL POINTS:**

3

Item E Sample Responses and Annotations – 2008 Biology

Two of the concepts that support the theory of evolution are natural selection & DNA mutation. DNA mutation is when the DNA of a certain animal is changed slightly when it is produced, thus changing the traits of the organism. Natural selection supports evolution by killing the weaker, less suited organisms, leaving only the strongest, most productive organisms to breed.

**SCORE: 2**

**Points**

**Part 2:**

Incomplete answer:

“DNA mutation...changing the traits of the organism.”

1

**Part 1:**

Incomplete answer:

“Natural selection...killing the weaker, less suited organisms, leaving only the strongest, most productive organisms to breed”

1

**TOTAL POINTS:**

---

2

Item E Sample Responses and Annotations – 2008 Biology

1. Natural selection and DNA mutation support the modern evolution theory because natural selection lets an animal choose where it wants to live and what it wants to eat. DNA mutation lets a beneficial mutation occur that will help it survive and it can be passed on.

**SCORE: 1**

**Points**

**Part 1:**

Incorrect answer:

“...natural selection lets an animal choose where it wants to live and what it wants to eat.”

–

**Part 3:**

Incomplete answer:

“DNA mutation lets a beneficial mutation occur that will help it survive and it can be passed on.”

1

**TOTAL POINTS:**

1

Item E Sample Responses and Annotations – 2008 Biology

Dna - mutation - it gives us the blood type of the animal or person.

natural selection - it lets us test anything we want to test on, such as environment pressure and that is where it makes you focus on the environment.

**SCORE: 0**

**Points**

**Part 3:**

Incorrect answer:

“DNA – mutation – it gives us the blood type of the animal or Person.”

–

**Part 1:**

Incorrect answer:

“natural selection – it lets us test anything we want to test on, such as environment pressure and that is where it makes you focus on the environment.”

–

**TOTAL POINTS:**

**0**





# ACTAAP

**Arkansas Comprehensive Testing, Assessment, and Accountability Program**

**DEVELOPED FOR THE ARKANSAS DEPARTMENT OF EDUCATION, LITTLE ROCK, AR 72201**