

2019-2025 Released Tests

Aligned to the Standards

CONTENT BUILDER FOR THE PLC

Science

Biology

Student Expectation/Reporting Category																																																										
DISCUSS: How many questions for this Student Expectation were asked over the past years? Which parts were assessed?																																																										
IQ Analysis Investigating the Question Units	SE # RC #																																																									
<table border="1"> <thead> <tr> <th colspan="3">Analysis of Assessed Standards</th> </tr> </thead> <tbody> <tr> <td colspan="3"> <table border="1"> <thead> <tr> <th>Cluster</th> <th colspan="2"></th> </tr> </thead> <tbody> <tr><td>Subcluster</td><td colspan="2"></td></tr> <tr><td>Content</td><td colspan="2"></td></tr> <tr><td>Process</td><td colspan="2"></td></tr> <tr><td>Item Type</td><td colspan="2"></td></tr> <tr><td>Stimulus</td><td colspan="2"></td></tr> </tbody> </table> </td> </tr> <tr> <td colspan="2"> <table border="1"> <thead> <tr> <th colspan="3">Data Analysis</th> </tr> <tr> <th>Item</th> <th>State</th> <th>Local</th> </tr> </thead> <tbody> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> </tbody> </table> </td> </tr> <tr> <td colspan="2"> <table border="1"> <thead> <tr> <th colspan="2">Error Analysis</th> </tr> <tr> <td><input type="checkbox"/> Guessing</td> <td><input type="checkbox"/> Stopped Too Early</td> </tr> <tr> <td><input type="checkbox"/> Careless Error</td> <td><input type="checkbox"/> Mixed Up Concepts</td> </tr> </thead> <tbody> <tr> <td colspan="2"> Learning from Mistakes Instructional Implications </td> </tr> </tbody> </table> </td> </tr> </tbody> </table> <p>*Correct Answer</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Units COMPLETE: Note the units in which the student expectation is taught.</p> </div> <div style="width: 45%;"> <p>Analysis of Assessed Standards DISCUSS and NOTE: Review the cluster, subcluster, content/process standards, and item type assessed for each item.</p> </div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Stimulus COMPLETE: Note visual representation used. DISCUSS and NOTE: How many different stimuli were used to assess this student expectation?</p> </div> <div style="width: 45%;"> <p>State-Level SE Data and Error Analysis COMPLETE: Add local data for the item. DISCUSS and NOTE: What are the most common error patterns?</p> </div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Learning from Mistakes DISCUSS and NOTE: What patterns in learning errors emerged across items? What is the best way to respond to those error patterns?</p> </div> <div style="width: 45%;"> <p>Instructional Implications DISCUSS and NOTE: How will we adapt instruction to help students improve understanding and application of this student expectation?</p> </div> </div>		Analysis of Assessed Standards			<table border="1"> <thead> <tr> <th>Cluster</th> <th colspan="2"></th> </tr> </thead> <tbody> <tr><td>Subcluster</td><td colspan="2"></td></tr> <tr><td>Content</td><td colspan="2"></td></tr> <tr><td>Process</td><td colspan="2"></td></tr> <tr><td>Item Type</td><td colspan="2"></td></tr> <tr><td>Stimulus</td><td colspan="2"></td></tr> </tbody> </table>			Cluster			Subcluster			Content			Process			Item Type			Stimulus			<table border="1"> <thead> <tr> <th colspan="3">Data Analysis</th> </tr> <tr> <th>Item</th> <th>State</th> <th>Local</th> </tr> </thead> <tbody> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> </tbody> </table>		Data Analysis			Item	State	Local																<table border="1"> <thead> <tr> <th colspan="2">Error Analysis</th> </tr> <tr> <td><input type="checkbox"/> Guessing</td> <td><input type="checkbox"/> Stopped Too Early</td> </tr> <tr> <td><input type="checkbox"/> Careless Error</td> <td><input type="checkbox"/> Mixed Up Concepts</td> </tr> </thead> <tbody> <tr> <td colspan="2"> Learning from Mistakes Instructional Implications </td> </tr> </tbody> </table>		Error Analysis		<input type="checkbox"/> Guessing	<input type="checkbox"/> Stopped Too Early	<input type="checkbox"/> Careless Error	<input type="checkbox"/> Mixed Up Concepts	Learning from Mistakes Instructional Implications	
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In conjunction with the IQ analysis tool, the lead4ward field guides can be a helpful resource for understanding error patterns and instructional implications.

[Learn more](#)

Cell Structure and Biochemistry

B.5 Biological structures, functions, and processes. The student knows that biological structures at multiple levels of organization perform specific functions and processes that affect life.

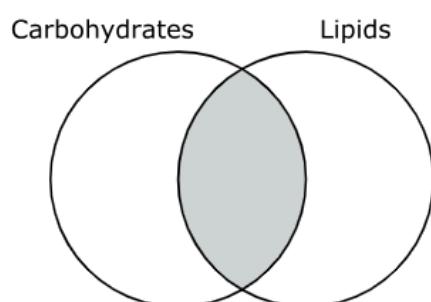
<p>B.5(A) relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell</p>	<p>Analysis of Assessed Standards</p>																	
<p>2025 – Q8</p>		Cluster	Cell Structure and Biochemistry															
<p>One way in which genetically modified mice are developed is by injecting the gene sequence for green fluorescent protein (GFP) into a mouse embryo at a very early stage of development. The injection typically contains genetic material and a biomolecule that catalyzes the reaction.</p>		Subcluster	Cellular Complexity															
<p>Which statement BEST classifies the biomolecules responsible for the development of these genetically modified mice?</p>		Content	Supporting															
<p>(A) Lipids are responsible for carrying the genetic material and carbohydrates are responsible for catalyzing the reaction.</p>		Process																
<p>(B) Carbohydrates are responsible for carrying the genetic material and nucleic acids are responsible for catalyzing the reaction.</p>		Item Type	Multiple Choice (1 pt)															
<p>(C) Proteins are responsible for carrying the genetic material and lipids are responsible for catalyzing the reaction.</p>		Stimulus																
<p>(D) Nucleic acids are responsible for carrying genetic material and proteins are responsible for catalyzing the reaction.</p>		<p>Data Analysis</p> <table border="1" data-bbox="1127 544 1578 798"> <thead> <tr> <th data-bbox="1127 544 1192 587">Item</th><th data-bbox="1192 544 1290 587">State</th><th data-bbox="1290 544 1578 587">Local</th></tr> </thead> <tbody> <tr> <td data-bbox="1127 587 1192 635">A</td><td data-bbox="1192 587 1290 635"></td><td data-bbox="1290 587 1578 635"></td></tr> <tr> <td data-bbox="1127 635 1192 684">B</td><td data-bbox="1192 635 1290 684"></td><td data-bbox="1290 635 1578 684"></td></tr> <tr> <td data-bbox="1127 684 1192 732">C</td><td data-bbox="1192 684 1290 732"></td><td data-bbox="1290 684 1578 732"></td></tr> <tr> <td data-bbox="1127 732 1192 798">D*</td><td data-bbox="1192 732 1290 798">56</td><td data-bbox="1290 732 1578 798"></td></tr> </tbody> </table>		Item	State	Local	A			B			C			D*	56	
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<p>*Correct Answer (D)</p>																		

B.5(A) relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell

Analysis of Assessed Standards

2025 – Q44

A student is completing this Venn diagram that compares carbohydrates and lipids.



Which description belongs in the shaded area of the Venn diagram?

- (A) Change shape in order to function properly
- (B) Act as insulation to reduce heat loss
- (C) Provide organisms with energy
- (D) Encode genetic information

*Correct Answer (C)

Cluster	Cell Structure and Biochemistry	
Subcluster	Cellular Complexity	
Content	Supporting	
Process		
Item Type	Multiple Choice (1 pt)	
Stimulus		
Data Analysis		
Item	State	Local
A		
B		
C*	72	
D		

Error Analysis	
<input type="checkbox"/> Guessing	<input type="checkbox"/> Mixed Up Concepts
<input type="checkbox"/> Careless Error	<input type="checkbox"/> Stopped Too Early

Learning from Mistakes Instructional Implications

B.5(A) relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell

OLD B.9(A) compare the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids

2024 – Q18

Actin is a protein that helps the cell maintain its shape and polarity. It also plays a major role in muscle contraction. A table summarizing the cellular functions of different types of proteins is shown.

Protein Type	Function
Enzyme proteins	Increase the rate of chemical reactions
Structural proteins	Provide structure and support for cells; on a larger scale, allow the body to move
Messenger proteins	Transmit signals to coordinate biological processes between different cells, tissues, and organs
Transport proteins	Bind and carry atoms and small molecules within cells and throughout the body

Based on this information, actin is most likely —

- A an enzyme protein
- B a structural protein
- C a messenger protein
- D a transport protein

*Correct Answer (B)

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B*	76	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.5(A) relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell

OLD B.9(A) compare the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids

! 2024 – Q41

A student athlete wants to choose a drink that will provide quick energy for track practice. Which portion of the label should provide the athlete with information about the amount of quick energy in the drink?

Select **ONE** correct answer.

Nutrition Facts					
Serving Size 8.0 fl. oz (240mL)					
Serving Per Container 2					
Amount Per Serving	Per 8 fl. oz	%DV*	Per Can	%DV*	
Calories	110	220			
Total Fat	0g	0%	0g	0%	
Sodium	180mg	8%	360mg	15%	
Total Carb	29g	10%	58g	19%	
Protein	0g	0g			
Dihydroxyacetone (Vit. B2)	100%	200%			
Niacin (Vit. B3)	100%	200%			
Vitamin B6	100%	200%			
Vitamin B12	100%	200%			
Not a significant source of calcium, fiber, fat, potassium, protein, saturated fat, trans fat, cholesterol, dietary fiber, vitamin A, vitamin C, calcium, and iron.					
*Percent Daily Values are based on a 2,000 calorie diet.					

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Supporting
Process	
Item Type	Hot Spot (1 pt)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	50	
No Credit	50	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (Total Carb (carbohydrates))

B.5(A) relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell

OLD B.9(A) compare the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids

Analysis of Assessed Standards

! 2023 – Q16

Which table correctly identifies the function of each type of RNA?

(A)

Type of RNA	Function
Transfer RNA	Carries genetic information from DNA to ribosomes
Ribosomal RNA	A component of ribosomes that helps catalyze protein synthesis
Messenger RNA	Brings amino acids to growing polypeptides in ribosomes

(B)

Type of RNA	Function
Transfer RNA	A component of ribosomes that helps catalyze protein synthesis
Ribosomal RNA	Brings amino acids to growing polypeptides in ribosomes
Messenger RNA	Carries genetic information from DNA to ribosomes

(C)

Type of RNA	Function
Transfer RNA	Brings amino acids to growing polypeptides in ribosomes
Ribosomal RNA	A component of ribosomes that helps catalyze protein synthesis
Messenger RNA	Carries genetic information from DNA to ribosomes

(D)

Type of RNA	Function
Transfer RNA	Carries genetic information from DNA to ribosomes
Ribosomal RNA	Brings amino acids to growing polypeptides in ribosomes
Messenger RNA	A component of ribosomes that helps catalyze protein synthesis

*Correct Answer (C)

Cluster Cell Structure and Biochemistry

Subcluster Cellular Complexity

Content Supporting

Process

Item Type Multiple Choice (1 pt)

Stimulus

Data Analysis

Item	State	Local
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A	23	
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B	15	
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C*	46	
----	----	--

D	15	
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Error Analysis

Guessing Mixed Up Concepts

Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.5(A) relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell

OLD B.9(A) compare the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids

2023 – Q42

Which pair of statements best compares the primary functions of the carbohydrate chitin and the protein chitinase?

- (A) The chitin in the exoskeleton provides insulation for insects.
The chitinase stores genetic material for insectivorous bats.
- (B) The chitin in the exoskeleton breaks down for energy to be used by insects.
The chitinase provides insulation for insectivorous bats.
- (C) The chitin in the exoskeleton stores genetic material for insects.
The chitinase provides support and protection for insectivorous bats.
- (D) The chitin in the exoskeleton provides support and protection for insects.
The chitinase breaks down chitin for energy to be used by insectivorous bats.

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	14	
B	26	
C	22	
D*	38	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (D)

B.5(A) relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell

OLD B.9(A) compare the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids

Analysis of Assessed Standards

! 2022 – Q31

31 Which statements best compare a function of proteins and lipids in a human cell?

- A** Proteins provide energy for cellular processes.
Lipids catalyze chemical reactions inside the cell.
- B** Proteins catalyze chemical reactions inside the cell.
Lipids allow for the transport of certain molecules into and out of the cell.
- C** Proteins allow for the transport of certain molecules into and out of the cell.
Lipids store genetic information for cells.
- D** Proteins store genetic information for cells.
Lipids provide energy for cellular processes.

Cluster Cell Structure and Biochemistry

Subcluster Cellular Complexity

Content Supporting

Process

Stimulus

Data Analysis

Item	State	Local
A	40	
B*	23	
C	16	
D	21	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (B)

B.5(A) relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell

OLD B.9(A) compare the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids

Analysis of Assessed Standards

2021 – Q12

12 Which statements best compare the function of an ATP molecule to a DNA molecule?

- F ATP carries and transmits the genetic information of organisms.
DNA serves as a biological catalyst that speeds up the rate of chemical reactions.
- G ATP provides energy for chemical reactions in the cell.
DNA carries and transmits the genetic information of organisms.
- H ATP serves as a biological catalyst that speeds up the rate of chemical reactions.
DNA acts as a structural sugar in the cell walls of plants.
- J ATP acts as a structural sugar in the cell walls of plants.
DNA provides energy for chemical reactions in the cell.

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	8	
G*	80	
H	7	
J	6	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

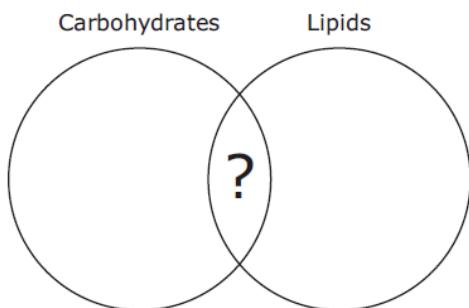
*Correct Answer (G)

B.5(A) relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell

OLD B.9(A) compare the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids

2021 – Q31

31 A student makes a Venn diagram to compare the functions of carbohydrates and lipids.



Which cellular function of carbohydrates and lipids should be placed in the shared section of the Venn diagram?

- A Hormone production
- B Structural support of cell walls
- C Energy storage
- D Catalyst for chemical reactions

*Correct Answer (C)

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Supporting
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
A	7	
B	17	
C*	61	
D	15	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.5(A) relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell

OLD B.9(A) compare the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids

2019 – Q40

A table of four types of carbohydrates is shown.

Type of Carbohydrate	Description
Cellulose	Major component of plant cell walls
Chitin	Major component of fungal cell walls and arthropod exoskeletons
Glycogen	Stored in liver and muscle cells, broken down to glucose when blood glucose levels decrease
Starch	Stored in plant roots and seeds, provides food for seeds to germinate or for animal consumption

Which list correctly matches the functions to the types of carbohydrates?

- F** Energy: glycogen and starch
Structure: cellulose and chitin
- G** Energy: cellulose and chitin
Structure: glycogen and starch
- H** Energy: chitin and glycogen
Structure: cellulose and starch
- J** Energy: cellulose and starch
Structure: chitin and glycogen

*Correct Answer (F)

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Supporting
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
F*	72	
G	11	
H	8	
J	9	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

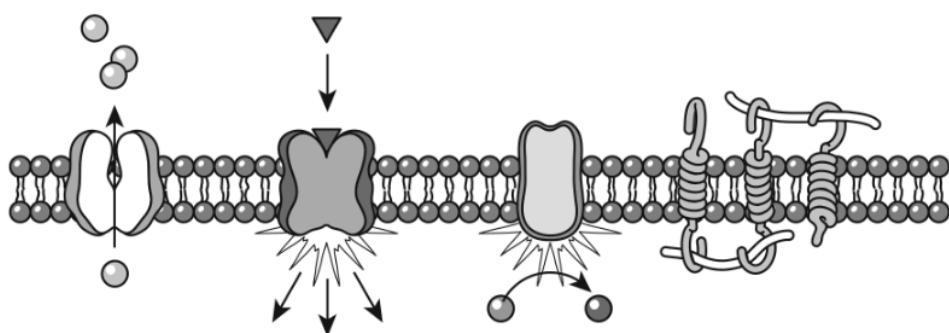
Learning from Mistakes Instructional Implications

B.5(A) relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell

OLD B.9(A) compare the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids

! 2019 – Q50

Transmembrane proteins span the width of cell membranes. Four types of transmembrane proteins are shown in a section of cell membrane.



Although these proteins have different specific functions, they all —

- F** stop chemical reactions within the cell
- G** synthesize molecules that signal other cells
- H** help the cell interact with its external environment
- J** remove large waste particles from the cytoplasm of the cell

*Correct Answer (H)

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	10	
G	22	
H*	45	
J	22	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.5(B) compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

2025 – Q3

Scientists have proposed theories to explain how eukaryotic cells became complex over time. The table compares two of the theories.

Cell Complexity Theories

Endosymbiotic Theory	Autogenous Theory
<ul style="list-style-type: none"> Claims some organelles evolved from symbiotic relationships with prokaryotic ancestors Mainly applies to mitochondria and chloroplasts Proposed by Margulis in 1967 	<ul style="list-style-type: none"> Sees eukaryotes evolving directly from a prokaryote ancestor Claims eukaryotic cells were created by infoldings of the plasma membrane Mainly applies to the endoplasmic reticulum, Golgi body, and single membrane-bound organelles Presented in 1967 by Klein and Cronquist

Which conclusion is shared by **BOTH** theories to explain cell complexity?

- Ⓐ Membrane-bound organelles like the Golgi body are less complex than mitochondria.
- Ⓑ Cells became less complex by joining together with other cells.
- Ⓒ Mitochondria developed before chloroplasts in complex eukaryotic cells.
- Ⓓ Complex eukaryotic cells developed from simpler prokaryotic cells.

*Correct Answer (D)

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)

Stimulus

Data Analysis

Item	State	Local
A		
B		
C		
D*	61	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes
Instructional Implications

B.5(B) compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

Analysis of Assessed Standards

2025 – Q9

Two students list characteristics of an organism:

- has cytoplasm
- has DNA in a nucleus
- has ribosomes
- has a cell wall

Based on the list of characteristics, Student A claims that the organism is prokaryotic, while Student B claims that the organism is eukaryotic.

Identify which student is correct **AND** why that student is correct.

Think about the information carefully. Then enter your response in the box provided.

Cluster Cell Structure and Biochemistry

Subcluster Cellular Complexity

Content Readiness

Process

Item Type Short Constructed Response (2 pts)

Stimulus

Data Analysis

Item	State	Local
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Full Credit	45	
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No Credit	30	
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Partial Credit	25	
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Error Analysis

<input type="checkbox"/> Guessing	<input type="checkbox"/> Mixed Up Concepts
<input type="checkbox"/> Careless Error	<input type="checkbox"/> Stopped Too Early

**Learning from Mistakes
Instructional Implications**

*Correct Answer (See Scoring Guide)

B.5(B) compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

OLD B.4(A) compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

! 2024 – Q23

Which statement accurately compares eukaryotic cells and prokaryotic cells?

- (A) Eukaryotic cells are more complex than prokaryotic cells.
- (B) Eukaryotic cells replicate faster than prokaryotic cells.
- (C) Only prokaryotic cells have membrane-bound organelles.
- (D) Only prokaryotic cells lack outer membranes and cell walls.

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	53	
B		
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (A)

B.5(B) compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

OLD **B.4(A)** compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

2023 – Q11

Scientists observe the traits of cells on four microscope slides and record their observations in a table. Based on the scientists' observations, identify the cell type for each microscope slide in the table.

Move the correct answer to each box. Each answer may be used more than once.

Eukaryotic cells Prokaryotic cells

Slide 1	Slide 2	Slide 3	Slide 4
Are single-celled	Reproduce through mitosis	Have a membrane-bound nucleus	Have mitochondria
Have no nucleus	Have linear DNA	Have membrane-bound organelles	Are larger than 10 micrometers
Have flagella	Have endoplasmic reticulum	Are multicellular	Have complex structure

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Readiness
Process	
Item Type	Drag and Drop (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	17	
No Credit	25	
Partial Credit	57	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

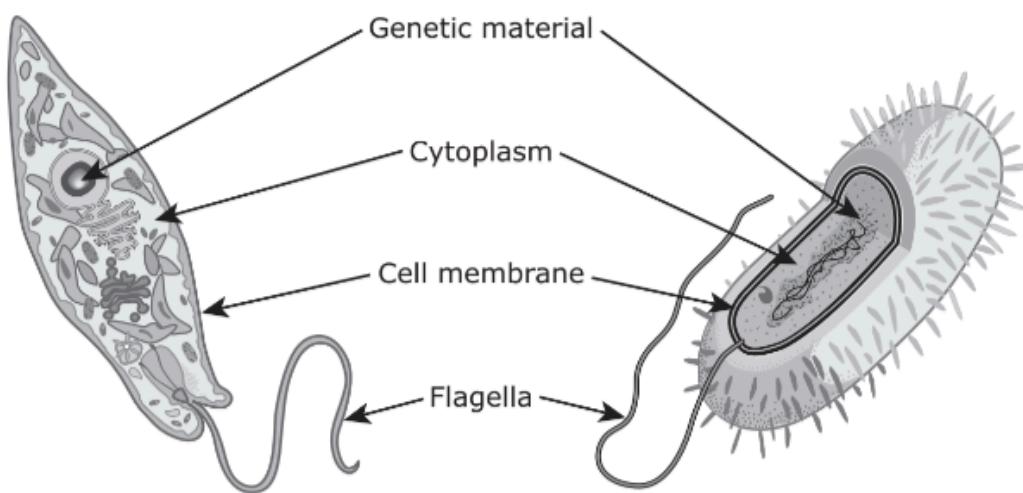
*Correct Answer (Prokaryotic cells, Eukaryotic cells, Eukaryotic cells, Eukaryotic cells)

B.5(B) compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

OLD **B.4(A)** compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

2022 – Q21

21 A prokaryotic cell and a eukaryotic cell are shown.



Note: The drawings are not to scale.

Which characteristic best distinguishes these cells as either prokaryotic or eukaryotic?

- A** The organization of the genetic material
- B** The location of the cytoplasm
- C** The role of the cell membrane
- D** The function of the flagella

*Correct Answer (A)

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Readiness
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
A*	66	
B	9	
C	18	
D	7	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.5(B) compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

OLD **B.4(A)** compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

2021 – Q14

- 14** Students created note cards comparing characteristics of eukaryotic and prokaryotic cells. Which set of note cards most accurately compares these cells?

F

Eukaryotic Cells	Prokaryotic Cells
<ul style="list-style-type: none">Membrane-bound nucleus or organellesDNA chromosomes in the nucleus	<ul style="list-style-type: none">No nucleus or other membrane-bound organellesDNA chromosome in the cytoplasm

G

Eukaryotic Cells	Prokaryotic Cells
<ul style="list-style-type: none">Membrane-bound nucleus or organellesDNA chromosomes in the cytoplasm	<ul style="list-style-type: none">No nucleus or other membrane-bound organellesDNA chromosome in the cytoplasm

H

Eukaryotic Cells	Prokaryotic Cells
<ul style="list-style-type: none">No membrane-bound nucleus or organellesDNA chromosomes in the cytoplasm	<ul style="list-style-type: none">Membrane-bound nucleus or organellesDNA chromosome in the nucleus

J

Eukaryotic Cells	Prokaryotic Cells
<ul style="list-style-type: none">No membrane-bound nucleus or organellesDNA chromosomes in the nucleus	<ul style="list-style-type: none">Membrane-bound nucleus or organellesDNA chromosome in the nucleus

*Correct Answer (F)

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Cellular Complexity
Content	Readiness
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
F*	65	
G	13	
H	14	
J	8	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.5(B) compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

Analysis of Assessed Standards

OLD B.4(A) compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

2019 – Q6

Students use a microscope to look for structures present in four different cells. The students placed an X for each structure that was viewed for each cell on the table shown.

	Cell W	Cell X	Cell Y	Cell Z
Cell Membrane	X	X	X	X
Cell Wall	X	X		X
Chloroplasts	X			
DNA	X	X	X	X
Nucleus	X		X	X

Which cell that was viewed is most likely a prokaryote?

F Cell W

G Cell X

H Cell Y

J Cell Z

*Correct Answer (G)

Cluster Cell Structure and Biochemistry

Subcluster Cellular Complexity

Content Readiness

Process B.2(H)

Stimulus

Data Analysis

Item	State	Local
F	15	
G*	66	
H	11	
J	7	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes
Instructional Implications

B.5(D) compare the structures of viruses to cells and explain how viruses spread and cause disease		Analysis of Assessed Standards	
!	2025 – Q21	Cluster	Cell Structure and Biochemistry
	Which statement BEST describes how viruses disrupt normal cellular processes to cause disease?	Subcluster	Viruses
	(A) Viruses use cell machinery to build products the virus needs.	Content	Supporting
	(B) Viruses release large amounts of energy into the cell, causing increased growth rates.	Process	
	(C) Viruses release antibiotics that destroy the cell membrane so more viral particles can be released.	Item Type	Multiple Choice (1 pt)
	(D) Viruses block gene expression and prevent host cell DNA replication.	Stimulus	
Data Analysis			
	Item	State	Local
	A*	17	
	B		
	C		
	D		
Error Analysis			
	<input type="checkbox"/> Guessing	<input type="checkbox"/> Mixed Up Concepts	
	<input type="checkbox"/> Careless Error	<input type="checkbox"/> Stopped Too Early	
Learning from Mistakes			
Instructional Implications			

*Correct Answer (A)

2025 – Q37

A student creates a table to describe some properties of viruses. How should the student complete the table?

Move the correct answer to each box in the table. Each answer may be used more than once.

host cell
virus cell
smaller than
larger than
DNA only
DNA or RNA

Properties of Viruses		
Reproduction	Size	Genetic Material
Is dependent on a []	Is [] human cells	Uses []

*Correct Answer (host cell; smaller than; DNA or RNA)

Cluster	Cell Structure and Biochemistry
Subcluster	Viruses
Content	Supporting
Process	
Item Type	Drag and Drop (2 pts)
Stimulus	

Data Analysis		
Item	State	Local
Full Credit	37	
No Credit	8	
Partial Credit	55	

Error Analysis	
<input type="checkbox"/> Guessing	<input type="checkbox"/> Mixed Up Concepts
<input type="checkbox"/> Careless Error	<input type="checkbox"/> Stopped Too Early

Learning from Mistakes Instructional Implications	

B.5(D) compare the structures of viruses to cells and explain how viruses spread and cause disease

OLD B.4(C) compare the structures of viruses to cells, describe viral reproduction, and describe the role of viruses in causing diseases such as human immunodeficiency virus (HIV) and influenza

Analysis of Assessed Standards

2022 – Q32

32 A table comparing the characteristics of four samples is shown.

Sample	Nucleus	Chloroplast	Ribosome	Size of Genome
Sample 1	Present	Present	Present	150 billion base pairs
Sample 2	Absent	Absent	Present	4.6 million base pairs
Sample 3	Absent	Absent	Absent	170,000 base pairs
Sample 4	Present	Absent	Present	3.2 billion base pairs

Which sample most likely contains viruses?

- F** Sample 1
- G** Sample 2
- H** Sample 3
- J** Sample 4

*Correct Answer (H)

Cluster Cell Structure and Biochemistry

Subcluster Viruses

Content Supporting

Process B.2(H)

Stimulus

Data Analysis

Item	State	Local
F	15	
G	17	
H*	57	
J	10	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.5(D) compare the structures of viruses to cells and explain how viruses spread and cause disease

OLD B.4(C) compare the structures of viruses to cells, describe viral reproduction, and describe the role of viruses in causing diseases such as human immunodeficiency virus (HIV) and influenza

! 2021 – Q30

- 30 Materials are provided to students to build models of a prokaryotic cell, a eukaryotic cell, and a virus. The materials and the structures they represent are listed in the table shown.

Material	Structure Represented
Gray paper hexagon	Capsid
Yellow paper oval	Cytoplasm
Purple buttons	Ribosomes
Blue yarn	Genetic material
Orange paper circle	Nucleus

Which material will students use in all three models?

- F Yellow paper oval
G Gray paper hexagon
H Blue yarn
J Purple buttons

*Correct Answer (H)

Analysis of Assessed Standards

Cluster	Cell Structure and Biochemistry
Subcluster	Viruses
Content	Supporting
Process	B.3(E)
Stimulus	

Data Analysis

Item	State	Local
F	24	
G	12	
H*	50	
J	15	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.5(D) compare the structures of viruses to cells and explain how viruses spread and cause disease

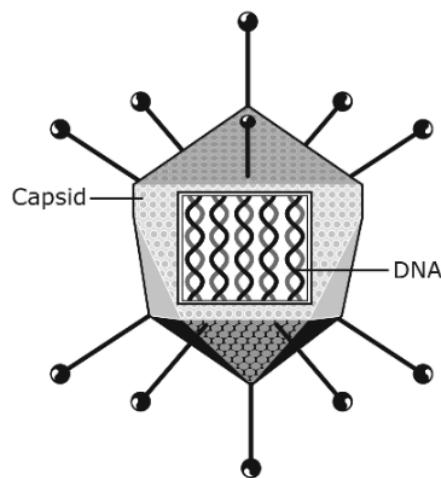
OLD B.4(C) compare the structures of viruses to cells, describe viral reproduction, and describe the role of viruses in causing diseases such as human immunodeficiency virus (HIV) and influenza

Analysis of Assessed Standards

2019 – Q13

A student produces a labeled drawing of a virus for a presentation. The student states that the capsid has a function similar to the nuclear membrane found in animal cells.

Virus Structure



Which of these describes the similar functions of capsids and nuclear membranes?

- A** Both transport proteins throughout the structures.
- B** Both provide energy for activities in the structures.
- C** Both protect genetic information for the structures.
- D** Both code for the proteins needed for reproduction of the structures.

*Correct Answer (C)

Cluster Cell Structure and Biochemistry

Subcluster Viruses

Content Supporting

Process B.2(H)

Stimulus

Data Analysis

Item	State	Local
A	13	
B	9	
C*	65	
D	13	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

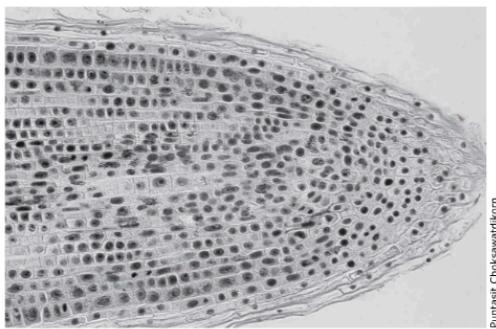
Organism Growth and Cell Differentiation

B.6 Biological structures, functions, and processes. The student knows how an organism grows and the importance of cell differentiation.

B.6(A) explain the importance of the cell cycle to the growth of organisms, including an overview of the stages of the cell cycle and deoxyribonucleic acid (DNA) replication models

2025 – Q42

Students observe onion cells from a tip of the root with a light microscope while studying mitosis.



Which statement best identifies why students would observe the root tip of an onion to see the stages of mitosis?

- (A) The tip of the root is where the plant is doing the most growing.
- (B) The tip of the root is where photosynthesis is taking place.
- (C) The tip of the root is where the most water is being absorbed.
- (D) The tip of the root is where sexual reproduction is occurring.

*Correct Answer (A)

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Cycle
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	40	
B		
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.6(A) explain the importance of the cell cycle to the growth of organisms, including an overview of the stages of the cell cycle and deoxyribonucleic acid (DNA) replication models

Analysis of Assessed Standards

2025 – Q45

When the axolotl, a type of salamander, loses its legs or tail, it can regenerate the damaged tissue and regrow these body parts. Which statement describes the cellular processes that will **MOST LIKELY** occur when an axolotl loses its tail?

- (A) The area where the tail is growing will have an increased rate of meiosis and a decreased rate of mitosis.
- (B) The rate of somatic cell division and meiosis will decrease in all body cells except the tail.
- (C) The size of axolotl body cells will increase until a larger tail has developed due to an increased rate of mitosis.
- (D) The area where the tail is growing will have an increased rate of mitosis and cell division.

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Cycle
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)

Stimulus	
-----------------	--

Data Analysis

Item	State	Local
A		
B		
C		
D*	56	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

*Correct Answer (D)

B.6(A) explain the importance of the cell cycle to the growth of organisms, including an overview of the stages of the cell cycle and deoxyribonucleic acid (DNA) replication models

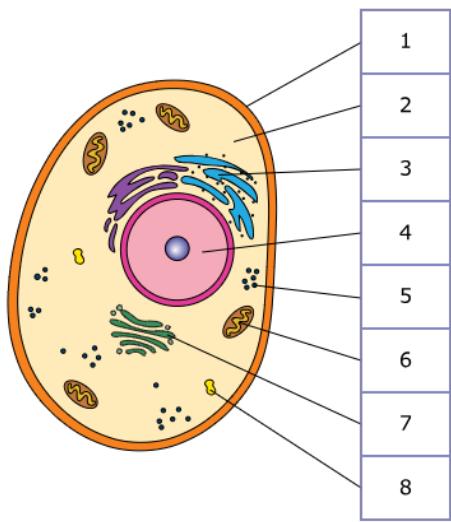
OLD **B.5(A)** describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms

Analysis of Assessed Standards

! 2024 – Q7

Dogs have 39 pairs of chromosomes in their somatic cells. In which part of the cell are these chromosomes replicated during the cell cycle?

Select **ONE** correct answer.



*Correct Answer (4)

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Cycle
Content	Supporting
Process	
Item Type	Hot Spot (1 pt)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	58	
No Credit	42	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

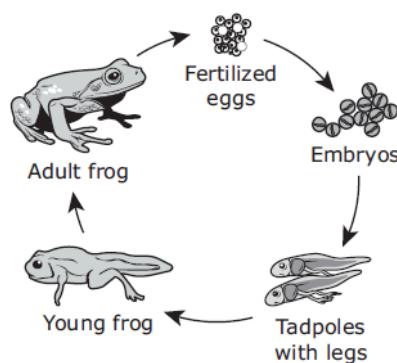
Learning from Mistakes Instructional Implications

B.6(A) explain the importance of the cell cycle to the growth of organisms, including an overview of the stages of the cell cycle and deoxyribonucleic acid (DNA) replication models

OLD **B.5(A)** describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms

2021 – Q8

- 8 The life cycle of a frog is illustrated in the diagram.



Which statement best explains how the cell cycle is important to the life cycle of the frog?

- F It enables frogs to produce tadpoles that are clones.
- G It allows frogs to grow, develop, and reproduce.
- H It prevents overproduction of frog offspring.
- J It ensures the best adapted frogs survive and pass on traits to offspring.

*Correct Answer (G)

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Cycle
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	3	
G*	81	
H	3	
J	13	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

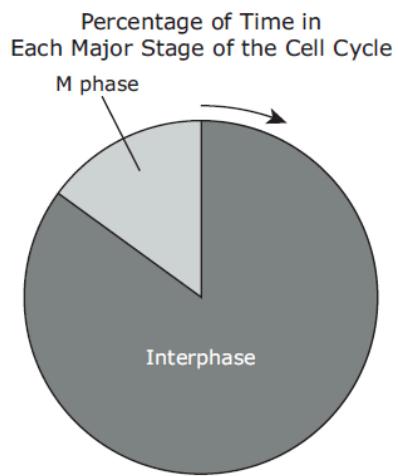
Learning from Mistakes Instructional Implications

B.6(A) explain the importance of the cell cycle to the growth of organisms, including an overview of the stages of the cell cycle and deoxyribonucleic acid (DNA) replication models

OLD **B.5(A)** describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms

! 2021 – Q39

- 39 The diagram shows the major stages of the cell cycle and the percentage of time spent in each phase.



Which statement best describes why a cell spends the majority of its time in interphase?

- A The cell is growing and carrying out processes such as metabolism and DNA replication.
- B The cell is aging and processes are stopping as lysosomes clear dead cell matter away.
- C The cell needs time to synthesize spindle fibers to complete mitosis.
- D The cell needs time to complete cytokinesis.

*Correct Answer (A)

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Cycle
Content	Supporting
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
A*	64	
B	9	
C	19	
D	8	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.6(A) explain the importance of the cell cycle to the growth of organisms, including an overview of the stages of the cell cycle and deoxyribonucleic acid (DNA) replication models

OLD **B.5(A)** describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms

Analysis of Assessed Standards

2019 – Q46

Which table shows two steps of DNA replication?

F

Step 1	Step 2
DNA Polymerase matches uracil to thymine and cytosine to guanine.	Two identical DNA double helixes are produced.

G

Step 1	Step 2
DNA Polymerase matches cytosine to thymine and uracil to guanine.	Two separate but complementary single DNA strands are produced.

H

Step 1	Step 2
DNA Polymerase matches adenine to thymine and cytosine to guanine.	Two identical DNA double helixes are produced.

J

Step 1	Step 2
DNA Polymerase matches uracil to thymine and adenine to guanine.	Two separate but complementary single DNA strands are produced.

*Correct Answer (H)

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Cycle
Content	Supporting
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
F	12	
G	10	
H*	69	
J	9	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.6(B) explain the process of cell specialization through cell differentiation, including the role of environmental factors

2025 – Q31

The table shows a comparison of muscle cells and blood cells.

Patterns of Gene Expression

Genes For	Muscle Cells	Blood Cells	
		White	Red (Immature)
Glycolysis enzymes	On	On	On
Muscle proteins	On	Off	Off
Glucagon	Off	Off	Off
Hemoglobin	Off	Off	On

Based on the table, which conclusion can be made?

- Ⓐ The gene that codes for glucagon is active only in muscle cells.
- Ⓑ The gene that codes for hemoglobin is absent from blood cells.
- Ⓒ The factors that regulate gene expression for muscle proteins are active in red and white blood cells.
- Ⓓ The factors that regulate gene expression for glycolysis enzymes are active in muscle and blood cells.

*Correct Answer (D)

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation	
Subcluster	Cell Differentiation	
Content	Supporting	
Process		
Item Type	Multiple Choice (1 pt)	
Stimulus		
Data Analysis		
Item	State	Local
A		
B		
C		
D*	68	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

B.6(B) explain the process of cell specialization through cell differentiation, including the role of environmental factors

OLD **B.5(B)** describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation

2024 – Q42

As unspecialized cells mature, what controls their development into specific cell types?

- (A) The rate at which the cells grow
- (B) The genes expressed within the cells
- (C) The nutrients available to the cells
- (D) The age of neighboring cells

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Differentiation
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B*	63	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (B)

B.6(B) explain the process of cell specialization through cell differentiation, including the role of environmental factors

OLD B.5(B) describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Differentiation
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	22	
B*	21	
C	29	
D	27	

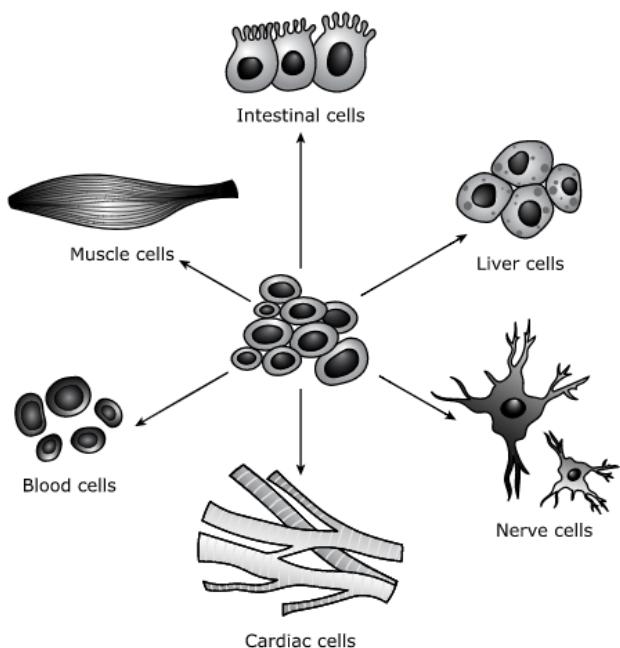
Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

! 2023 – Q4

The diagram shows a process that occurs during the development of an organism.



Which statement explains how the different cell types in the image are formed?

- (A) Each cell type uses its own unique replication process.
- (B) Each cell type expresses different genes at different times.
- (C) Each cell type contains a different part of the original DNA.
- (D) Each cell type has different enzymes to replicate genetic material.

*Correct Answer (B)

B.6(B) explain the process of cell specialization through cell differentiation, including the role of environmental factors

OLD **B.5(B)** describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation

Analysis of Assessed Standards

2022 – Q10

- 10** When a stem cell divides, it produces two daughter cells. One daughter cell will remain a stem cell, while the other daughter cell will differentiate into a specialized cell.

Which factor will most directly determine what type of specialized cell will be produced?

- F** The size of the cell
G The length of the cell cycle
H The number of chromosomes that are replicated
J The genes that are expressed

Cluster	Organism Growth and Cell Differentiation	
Subcluster	Cell Differentiation	
Content	Supporting	
Process		
Stimulus		
Data Analysis		
Item	State	Local
F	5	
G	6	
H	34	
J*	54	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes
Instructional Implications

*Correct Answer (J)

B.6(B) explain the process of cell specialization through cell differentiation, including the role of environmental factors

OLD **B.5(B)** describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation

Analysis of Assessed Standards

2021 – Q23

23 Environmental factors typically activate genes in a cell by causing the cell to —

- A produce identical daughter cells through mitosis
- B form haploid gamete cells through meiosis
- C fuse with another cell to increase the size of its genome
- D transcribe specific DNA segments to mRNA for translation

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Differentiation
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
A	22	
B	16	
C	12	
D*	51	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (D)

B.6(B) explain the process of cell specialization through cell differentiation, including the role of environmental factors

OLD B.5(B) describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Differentiation
Content	Supporting
Process	B.3(A)
Stimulus	

Data Analysis

Item	State	Local
A*	39	
B	25	
C	21	
D	14	

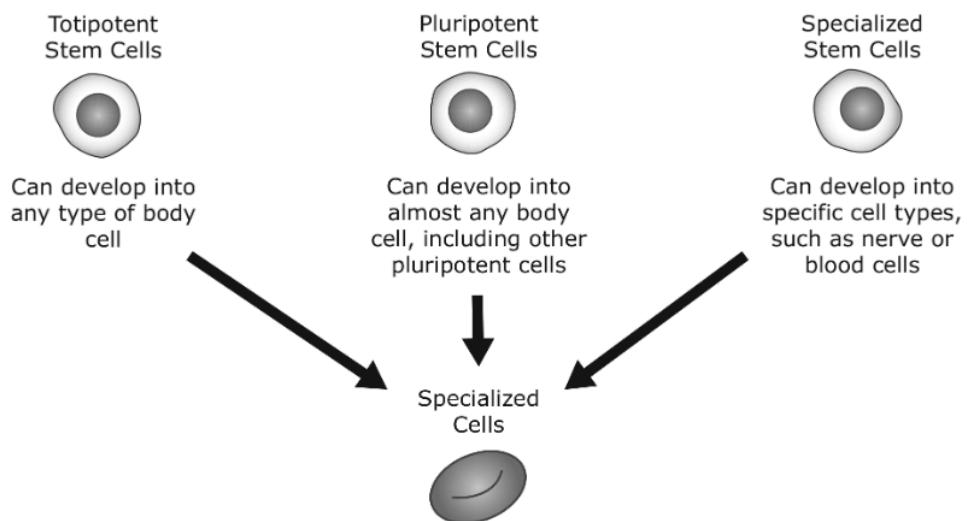
Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

! 2019 – Q49

The diagram shows how specialized body cells can develop.



Which of the following best explains why cells that contain the same genetic material do not develop into the same types of cells?

- A** Because internal or external stimuli can trigger the activation of specific genes in the DNA of cells
- B** Because random mutations can occur in the DNA of cells during early embryonic development
- C** Because messenger RNA is converted to transfer RNA when cell differentiation begins
- D** Because chemical signals that are released during the cell cycle can result in the linking of similar genes

*Correct Answer (A)

<p>B.6(C) relate disruptions of the cell cycle to how they lead to the development of diseases such as cancer</p>	<p>Analysis of Assessed Standards</p>																											
<p>2025 – Q13</p>	<table border="1"> <tr> <td>Cluster</td><td>Organism Growth and Cell Differentiation</td></tr> <tr> <td>Subcluster</td><td>Cell Cycle</td></tr> <tr> <td>Content</td><td>Readiness</td></tr> <tr> <td>Process</td><td></td></tr> <tr> <td>Item Type</td><td>Drag and Drop (2 pts)</td></tr> <tr> <td>Stimulus</td><td></td></tr> </table>	Cluster	Organism Growth and Cell Differentiation	Subcluster	Cell Cycle	Content	Readiness	Process		Item Type	Drag and Drop (2 pts)	Stimulus																
Cluster	Organism Growth and Cell Differentiation																											
Subcluster	Cell Cycle																											
Content	Readiness																											
Process																												
Item Type	Drag and Drop (2 pts)																											
Stimulus																												
<p>The intestine is lined with many fingerlike structures called villi, which allow increased absorption of digested materials. The cells within a villus change position and migrate as they mature. Each cell then dies and is sloughed off. For each of three locations within villi, the table shows the number of cells that are undergoing a cellular change called apoptosis, or programmed cell death.</p> <table border="1"> <thead> <tr> <th>Location within Villi</th><th>Number of Cells Undergoing Apoptosis (per 200 Villi Samples)</th></tr> </thead> <tbody> <tr> <td>Base</td><td>0</td></tr> <tr> <td>Middle</td><td>60</td></tr> <tr> <td>Top</td><td>80</td></tr> </tbody> </table> <p>Hall, P. A., et al., <i>Journal of Cell Science</i>, 1994</p>	Location within Villi	Number of Cells Undergoing Apoptosis (per 200 Villi Samples)	Base	0	Middle	60	Top	80	<p>Data Analysis</p>																			
Location within Villi	Number of Cells Undergoing Apoptosis (per 200 Villi Samples)																											
Base	0																											
Middle	60																											
Top	80																											
<p>Based on the information in the table, how does apoptosis LIKELY affect cells?</p> <p>Move the correct answer to each box. Not all answers will be used. Not all answers can be moved to all boxes.</p> <p>repairs DNA in destroys before it produces DNA for new daughter cells at the end of its lifespan reduce its metabolism become cancerous</p> <p>Apoptosis is a normal cellular process that [] cells. A cell may enter apoptosis []. Without apoptosis, the cell may [].</p> <p>* Correct Answer (destroys; at the end of its lifespan; become cancerous)</p>	<table border="1"> <tr> <td>Item</td><td>State</td><td>Local</td></tr> <tr> <td>Full Credit</td><td>33</td><td></td></tr> <tr> <td>No Credit</td><td>35</td><td></td></tr> <tr> <td>Partial Credit</td><td>31</td><td></td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td colspan="3">Error Analysis</td></tr> <tr> <td colspan="3"> <input type="checkbox"/> Guessing <input type="checkbox"/> Mixed Up Concepts <input type="checkbox"/> Careless Error <input type="checkbox"/> Stopped Too Early </td></tr> <tr> <td colspan="3"> Learning from Mistakes Instructional Implications </td></tr> <tr> <td colspan="3"></td></tr> </table>	Item	State	Local	Full Credit	33		No Credit	35		Partial Credit	31					Error Analysis			<input type="checkbox"/> Guessing <input type="checkbox"/> Mixed Up Concepts <input type="checkbox"/> Careless Error <input type="checkbox"/> Stopped Too Early			Learning from Mistakes Instructional Implications					
Item	State	Local																										
Full Credit	33																											
No Credit	35																											
Partial Credit	31																											
Error Analysis																												
<input type="checkbox"/> Guessing <input type="checkbox"/> Mixed Up Concepts <input type="checkbox"/> Careless Error <input type="checkbox"/> Stopped Too Early																												
Learning from Mistakes Instructional Implications																												

B.6(C) relate disruptions of the cell cycle to how they lead to the development of diseases such as cancer

OLD B.5(C) recognize that disruptions of the cell cycle lead to diseases such as cancer

2024 – Q9

Scientists have reported that more than 95% of the factors that lead to some types of cancers are caused by random DNA-copying errors. During which phase of the cell cycle do these DNA-copying errors most likely occur?

(A) S phase

(B) G₁ phase

(C) G₂ phase

(D) M phase

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Cycle
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	45	
B		
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (A)

B.6(C) relate disruptions of the cell cycle to how they lead to the development of diseases such as cancer

OLD B.5(C) recognize that disruptions of the cell cycle lead to diseases such as cancer

2023 – Q31

Which of these properties is found only in cancer cells?

- A Unregulated cell division
- B Regulated gene expression
- C Response to signals outside of the cell
- D Presence of mitochondria

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Cycle
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	75	
B	8	
C	10	
D	7	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

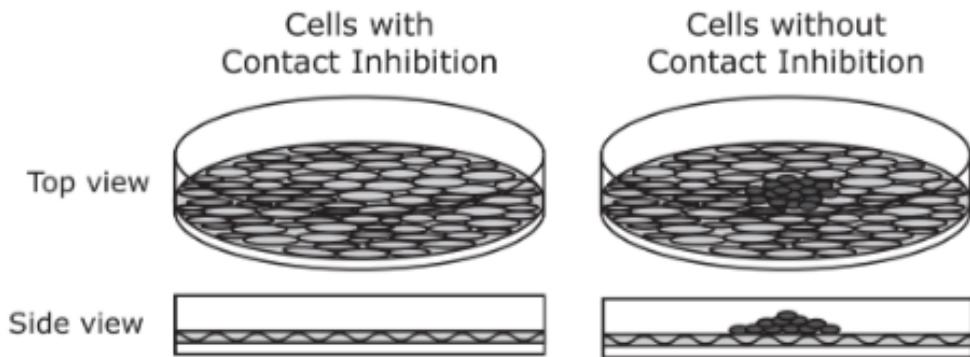
*Correct Answer (A)

B.6(C) relate disruptions of the cell cycle to how they lead to the development of diseases such as cancer

OLD B.5(C) recognize that disruptions of the cell cycle lead to diseases such as cancer

2022 – Q37

- 37** Normal cells have a contact inhibition feedback mechanism that prevents the cells from replicating when other cells are touched. A diagram of cells with contact inhibition and cells without contact inhibition is shown.



Which statement best describes what will happen to cells in an organism that lack contact inhibition?

- A** The cells will continue to grow, causing a tumor in the body.
- B** The cells will replicate normally, replacing body cells that die.
- C** The cells will replicate until the food supply for each cell is used, causing each cell to die.
- D** The cells will stop replicating once one layer is produced, as other body cells will crowd them out.

*Correct Answer (A)

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Cycle
Content	Readiness
Process	B.3(E)
Stimulus	

Data Analysis

Item	State	Local
A*	60	
B	13	
C	15	
D	12	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.6(C) relate disruptions of the cell cycle to how they lead to the development of diseases such as cancer

OLD B.5(C) recognize that disruptions of the cell cycle lead to diseases such as cancer

! 2021 – Q2

- 2 During the cell cycle, proteins called cyclins bind to enzymes that send signals for the cell to progress through stages of cell replication. At the end of this cycle, the cyclins degrade to prevent further signaling for the cell to divide.

Uncontrolled production of cyclins will most likely result in —

- F the formation of tumors
G the immediate death of the cell
H the transfer of cyclins to other cells
J the formation of haploid cells

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Cycle
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local
F*	56	
G	11	
H	22	
J	12	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (F)

B.6(C) relate disruptions of the cell cycle to how they lead to the development of diseases such as cancer

OLD B.5(C) recognize that disruptions of the cell cycle lead to diseases such as cancer

2019 – Q27

When cells lose their ability to regulate the cell cycle, they can divide at an accelerated rate and form a mass of cells. This mass of cells is referred to as —

- A** a tumor
- B** an embryo
- C** a gland
- D** an organ

Analysis of Assessed Standards

Cluster	Organism Growth and Cell Differentiation
Subcluster	Cell Cycle
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local
A*	72	
B	12	
C	7	
D	9	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (A)

Mechanisms of Genetics

B.7 Mechanisms of genetics. The student knows the role of nucleic acids in gene expression.

B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA	Analysis of Assessed Standards		
2025 – Q2	Cluster Mechanisms of Genetics		
The diagram shows important structures found in a cell. Two structures, W and Z, are labeled.	Subcluster DNA		
	Content Supporting		
	Process		
	Item Type Multiple Choice (1 pt)		
	Stimulus		
	Data Analysis		
	Item	State	Local
	A		
	B*	77	
	C		
	D		
	Error Analysis		
	<input type="checkbox"/> Guessing	<input type="checkbox"/> Mixed Up Concepts	
	<input type="checkbox"/> Careless Error	<input type="checkbox"/> Stopped Too Early	
	Learning from Mistakes		
	Instructional Implications		

B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA

Analysis of Assessed Standards

2025 – Q22

Cluster	Mechanisms of Genetics
Subcluster	DNA
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

A DNA sequence is shown.

5' A T C G C T A G 3'

Which strand represents the complementary DNA sequence?

(A) 5' T A C G G A T C 3'

(B) 5' A T C G C T A G 3'

(C) 3' T A G C G A T C 5'

(D) 3' G A T C G C T A 5'

Data Analysis

Item	State	Local
A		
B		
C*	80	
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes
Instructional Implications

*Correct Answer (C)

B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA

OLD B.6(A) identify components of DNA, identify how information for specifying the traits of an organism is carried in the DNA, and examine scientific explanations for the origin of DNA

Analysis of Assessed Standards

2024 – Q1

Humans have thousands of genes that combine in different ways to help create unique individuals. Where is the genetic code primarily located?

(A) Ribose sugars in RNA

(B) Phosphates in DNA

(C) Nucleotides in DNA

(D) Exons in RNA

Cluster	Mechanisms of Genetics
Subcluster	DNA
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C*	76	
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (C)

B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA

OLD B.6(A) identify components of DNA, identify how information for specifying the traits of an organism is carried in the DNA, and examine scientific explanations for the origin of DNA

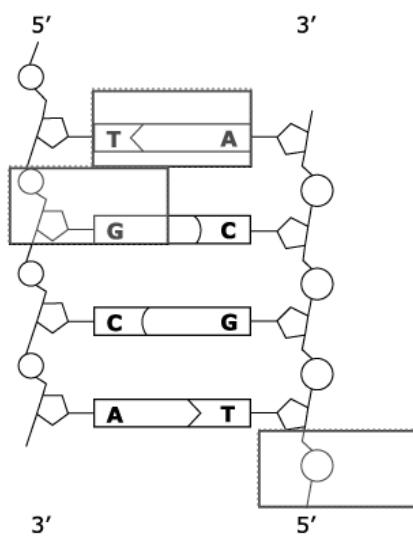
Analysis of Assessed Standards

! 2024 – Q32

Identify the components of DNA.

Move the correct answer to each box. Not all answers will be used.

Deoxyribose sugar	Phosphate	Base pair	Nitrogenous base	Ribose sugar	Nucleotide
-------------------	-----------	-----------	------------------	--------------	------------



*Correct Answer ([from top to bottom] base pair, nucleotide, phosphate)

Cluster	Mechanisms of Genetics
Subcluster	DNA
Content	Supporting
Process	
Item Type	Drag and Drop (2 pts)
Stimulus	

Data Analysis		
Item	State	Local
Full Credit	9	
No Credit	70	
Partial Credit	21	

Error Analysis	
<input type="checkbox"/> Guessing	<input type="checkbox"/> Mixed Up Concepts
<input type="checkbox"/> Careless Error	<input type="checkbox"/> Stopped Too Early
Learning from Mistakes Instructional Implications	

B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA

OLD B.6(A) identify components of DNA, identify how information for specifying the traits of an organism is carried in the DNA, and examine scientific explanations for the origin of DNA

! 2023 – Q32

Albumin is a protein that is secreted by liver cells and transported to the bloodstream. What factor most directly determines the amino acids that are combined to create albumin?

- (A) The temperature of the cell when translation is taking place
- (B) The number of chromosomes in a cell
- (C) The sequence of nucleotides in DNA
- (D) The amount of energy that is available in the cell

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	DNA
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	11	
B	16	
C*	56	
D	18	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (C)

B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA

OLD B.6(A) identify components of DNA, identify how information for specifying the traits of an organism is carried in the DNA, and examine scientific explanations for the origin of DNA

Analysis of Assessed Standards

2023 – Q45

The base sequence of a segment of DNA is shown.

DNA Strand 1: 3' G C G T A C 5'
 | | | | | |
DNA Strand 2: 5' ? ? ? ? ? ? 3'

Which base sequence correctly completes DNA Strand 2?

(A) A T A C G T

(B) G C G T A C

(C) C G C A T G

(D) T A T G C A

Cluster	Mechanisms of Genetics
Subcluster	DNA
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	6	
B	6	
C*	84	
D	3	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (C)

B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA

OLD **B.6(A)** identify components of DNA, identify how information for specifying the traits of an organism is carried in the DNA, and examine scientific explanations for the origin of DNA

Analysis of Assessed Standards

2022 – Q20

20 What components make up the backbone of a DNA molecule?

- F** Purines and deoxyribose
- G** Pyrimidines and purines
- H** Deoxyribose and phosphate groups
- J** Phosphate groups and pyrimidines

Cluster	Mechanisms of Genetics
Subcluster	DNA
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	8	
G	7	
H*	73	
J	12	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (H)

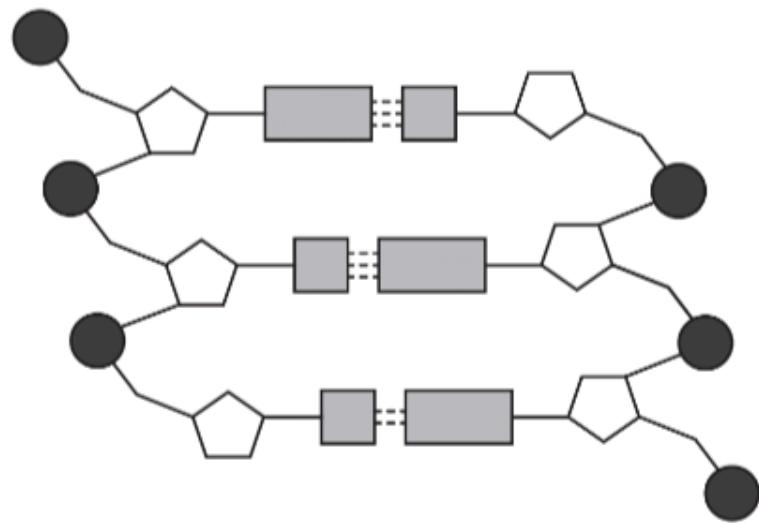
B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA

OLD B.6(A) identify components of DNA, identify how information for specifying the traits of an organism is carried in the DNA, and examine scientific explanations for the origin of DNA

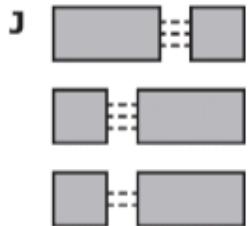
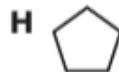
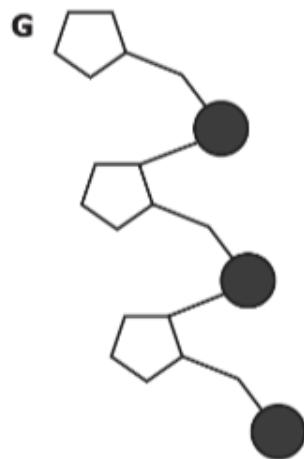
Analysis of Assessed Standards

2022 – Q28

28 A model of DNA is shown.



Which part of the DNA model is most directly associated with the coding of genetic information?



*Correct Answer (J)

Cluster	Mechanisms of Genetics
Subcluster	DNA
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	6	
G	26	
H	6	
J*	62	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

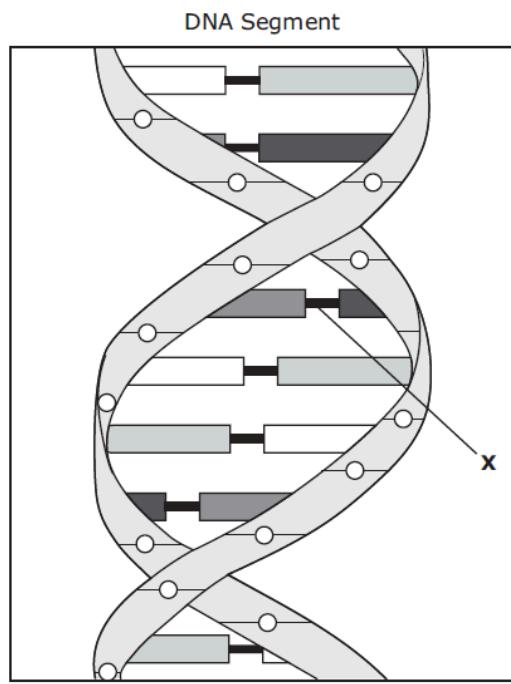
B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA

OLD B.6(A) identify components of DNA, identify how information for specifying the traits of an organism is carried in the DNA, and examine scientific explanations for the origin of DNA

Analysis of Assessed Standards

2021 – Q11

11 A segment of DNA is shown in the diagram.



Which of these identifies the part of the DNA segment labeled X?

- A Nucleotide
- B Phosphate group
- C Hydrogen bond
- D Deoxyribose

*Correct Answer (C)

Cluster	Mechanisms of Genetics
Subcluster	DNA
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
A	14	
B	6	
C*	71	
D	8	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA

OLD **B.6(A)** identify components of DNA, identify how information for specifying the traits of an organism is carried in the DNA, and examine scientific explanations for the origin of DNA

Analysis of Assessed Standards

2021 – Q34

- 34 In Texas Longhorn cattle, coat coloration is an inherited trait. What is the genetic basis of coat-color variation in Texas Longhorn cattle?

- F Differences in the nucleotide sequences of genes
- G Differences in the numbers of chromosomes in cells
- H Differences in the diets of individual cattle
- J Differences in the environmental conditions of different geographic areas

Cluster	Mechanisms of Genetics
Subcluster	DNA
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F*	54	
G	12	
H	6	
J	28	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (F)

B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA

OLD **B.6(A)** identify components of DNA, identify how information for specifying the traits of an organism is carried in the DNA, and examine scientific explanations for the origin of DNA

2019 – Q3

Eight components present in nucleic acids are listed in the box.

Components of Nucleic Acids

1. Phosphate
2. Ribose sugar
3. Deoxyribose sugar
4. Uracil
5. Thymine
6. Adenine
7. Guanine
8. Cytosine

Which components bond with adenine in a section of double-stranded DNA?

- A** 1, 3, 5, and 6 only
B 3 and 5 only
C 2 and 4 only
D 3, 4, 7, and 8 only

*Correct Answer (B)

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	DNA
Content	Supporting
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
A	27	
B*	51	
C	9	
D	13	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes
Instructional Implications

B.7(A) identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA

OLD B.6(A) identify components of DNA, identify how information for specifying the traits of an organism is carried in the DNA, and examine scientific explanations for the origin of DNA

2019 – Q43

A segment of a DNA strand is shown.

3' AGGTCAGGT 5'

Which of these is the correct complementary DNA strand for the segment shown?

- A** 5' AGGTCAGGT 3'
- B** 5' ACCUGAGGU 3'
- C** 5' TGGACTGGA 3'
- D** 5' TCCAGTCCA 3'

*Correct Answer (D)

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	DNA
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
A	5	
B	6	
C	8	
D*	81	

Error Analysis

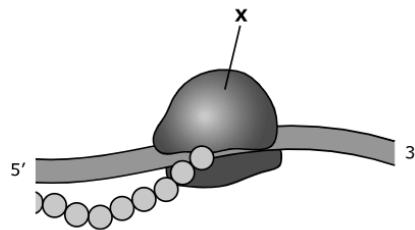
- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.7(B) describe the significance of gene expression and explain the process of protein synthesis using models of DNA and ribonucleic acid (RNA)

2025 – Q6

Proteins serve numerous roles in the human body. Part of the biological process for making proteins is shown in the image.



Based on the image, which of these **BEST** describes the structure and function of the organelle identified as X?

- Ⓐ Endoplasmic reticulum, which carries nucleotides as a DNA strand is being transcribed
- Ⓑ Endoplasmic reticulum, which carries nucleotides as a DNA strand is being translated
- Ⓒ Ribosome, which holds the mRNA in place as amino acids are transported by tRNA
- Ⓓ Ribosome, which holds the tRNA in place as amino acids are transported by mRNA

*Correct Answer (C)

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	Gene Expression
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C*	48	
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

2025 – Q36

A portion of an mRNA sequence and a codon chart are shown.

5' UCU UGU CGA 3'

		Second mRNA Base				Third mRNA Base
		U	C	A	G	
First mRNA Base	U	UUU Phe UUC UUA Leu UUG	UCU Ser UCC UCA UCG	UAU Tyr UAC UAA Stop UAG Stop	UGU Cys UGC UGA Stop UGG Trp	U C A G
	C	CUU Leu CUC CUA CUG	CCU Pro CCC CCA CCG	CAU His CAC CAA Gln CAG	CGU Arg CGC CGA CGG	U C A G
	A	AUU Ile AUC AUA AUG Met	ACU Thr ACC ACA ACG	AAU Asn AAC AAA Lys AAG	AGU Ser AGC AGA Arg AGG	U C A G
	G	GUU Val GUC GUA GUG	GCU Ala GCC GCA GCG	GAU Asp GAC GAA Glu GAG	GGU Gly GGC GGA GGG	U C A G

Based on the codon chart, what sequence of amino acids is produced when this mRNA is translated?

(A) Thr - Asn - Glu

(B) Cys - Phe - Leu

(C) Ser - Cys - Arg

(D) Ser - Trp - Asp

Cluster	Mechanisms of Genetics	
Subcluster	Gene Expression	
Content	Supporting	
Process		
Item Type	Multiple Choice (1 pt)	
Stimulus		
Data Analysis		
Item	State	Local
A		
B		
C*	80	
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes
Instructional Implications

*Correct Answer (C)

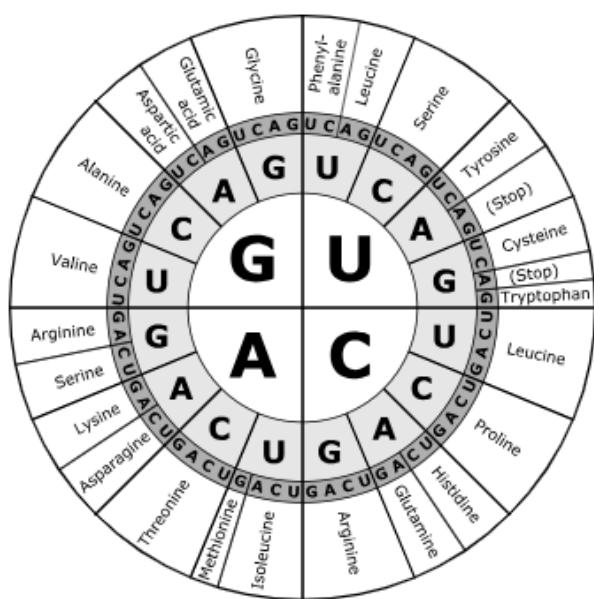
B.7(B) describe the significance of gene expression and explain the process of protein synthesis using models of DNA and ribonucleic acid (RNA)

OLD **B.6(C)** explain the purpose and process of transcription and translation using models of DNA and RNA

2024 – Q24

An mRNA sequence and an mRNA codon chart are shown.

mRNA Sequence: ^{5'} UGC UAC AGA ACC ^{3'}



What is the amino acid sequence that will be translated from the mRNA sequence?

- (A) Threonine - Isoleucine - Serine - Tryptophan
- (B) Cysteine - Tyrosine - Arginine - Threonine
- (C) Serine - Methionine - Tyrosine - Tryptophan
- (D) Proline - Arginine - Histidine - Arginine

*Correct Answer (B)

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	Gene Expression
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)

Stimulus

Data Analysis

Item	State	Local
A		
B*	77	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

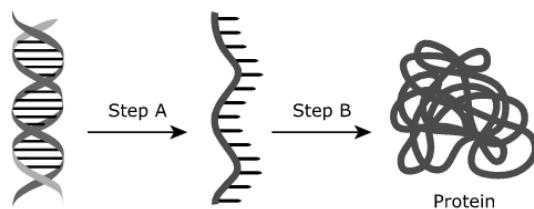
Learning from Mistakes Instructional Implications

B.7(B) describe the significance of gene expression and explain the process of protein synthesis using models of DNA and ribonucleic acid (RNA)

OLD B.6(C) explain the purpose and process of transcription and translation using models of DNA and RNA

2023 – Q29

A diagram of the steps in the production of a protein is shown.



Which description identifies the purpose of Step A in this process?

- (A) To correct mutations in the DNA sequence
- (B) To produce an exact copy of the DNA molecule
- (C) To copy the DNA of a gene sequence onto a strand of mRNA
- (D) To assist in the folding of a protein

*Correct Answer (C)

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	Gene Expression
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	11	
B	15	
C*	68	
D	6	

Error Analysis

- Guessing
- Mixed Up Concepts
- Careless Error
- Stopped Too Early

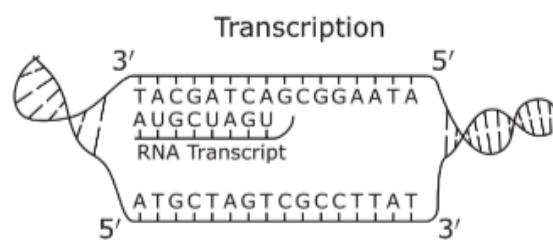
Learning from Mistakes Instructional Implications

B.7(B) describe the significance of gene expression and explain the process of protein synthesis using models of DNA and ribonucleic acid (RNA)

OLD B.6(C) explain the purpose and process of transcription and translation using models of DNA and RNA

2022 – Q16

16 A model of transcription and a codon chart are shown.



Codon Chart

Second Base						
	U	C	A	G		
First Base	U	Phe Phe Leu Leu	Ser Ser Ser Ser	Tyr Tyr Stop Stop	Cys Cys Stop Trp	Third Base
	C	Leu Leu Leu Leu	Pro Pro Pro Pro	His His Gln Gln	Arg Arg Arg Arg	
	A	Ile Ile Ile Met	Thr Thr Lys Thr	Asn Asn Lys Lys	Ser Ser Arg Arg	
	G	Val Val Val Val	Ala Ala Ala Ala	Asp Asp Glu Glu	Gly Gly Gly Gly	
					U C A G	

Which amino acid would be coded first from the DNA strand being transcribed?

- F** Cys
- G** Phe
- H** Ile
- J** Met

*Correct Answer (J)

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	Gene Expression
Content	Supporting
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
F	12	
G	13	
H	12	
J*	64	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.7(B) describe the significance of gene expression and explain the process of protein synthesis using models of DNA and ribonucleic acid (RNA)

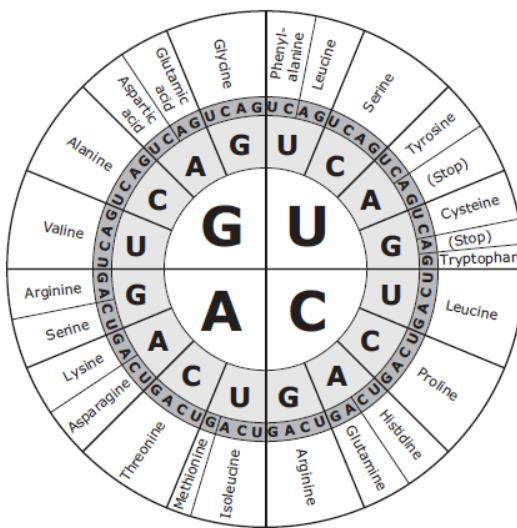
OLD B.6(C) explain the purpose and process of transcription and translation using models of DNA and RNA

! 2021 – Q27

27 A partial DNA segment and an mRNA codon chart are shown.

3' T C A T G C A T G 5'

mRNA Codon Chart



What amino acid sequence is encoded in the partial DNA segment?

- A Serine – Threonine – Tyrosine
- B Serine – Serine – Tyrosine
- C Serine – Threonine – Methionine
- D Serine – Alanine – Methionine

*Correct Answer (A)

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	Gene Expression
Content	Supporting
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
A*	57	
B	8	
C	25	
D	10	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.7(B) describe the significance of gene expression and explain the process of protein synthesis using models of DNA and ribonucleic acid (RNA)

OLD B.6(C) explain the purpose and process of transcription and translation using models of DNA and RNA

Analysis of Assessed Standards

2019 – Q8

Students are modeling mRNA during the process of protein synthesis. Which answer choice correctly describes the model of the mRNA strand being transcribed?

- F** The mRNA strand is complementary to the DNA template strand; however, uracil instead of adenine is paired with thymine.
- G** The mRNA strand is complementary to the DNA template strand; however, uracil instead of thymine is paired with adenine.
- H** The mRNA strand is an exact copy of the DNA template strand; however, uracil instead of adenine is paired with thymine.
- J** The mRNA strand is an exact copy of the DNA template strand; however, uracil instead of thymine is paired with adenine.

Cluster	Mechanisms of Genetics
Subcluster	Gene Expression
Content	Supporting
Process	B.3(E)
Stimulus	

Data Analysis

Item	State	Local
F	13	
G*	54	
H	13	
J	20	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (G)

B.7(C) identify and illustrate changes in DNA and evaluate the significance of these changes		Analysis of Assessed Standards	
2025 – Q34	Cluster	Mechanisms of Genetics	
A base sequence of the DNA from a gene is shown.	Subcluster	Mutations	
ATC GGC TA	Content	Readiness	
Due to a mutation, the base sequence was changed as shown.	Process		
ATT GGC TA	Item Type	Multiple Choice (1 pt)	
Which type of mutation has occurred in the gene?	Stimulus		
(A) Deletion			
(B) Substitution	Data Analysis		
(C) Insertion	Item	State	Local
(D) Translocation	A		
Correct Answer (B)	B	74	
	C		
	D		
	Error Analysis		
	<input type="checkbox"/> Guessing	<input type="checkbox"/> Mixed Up Concepts	
	<input type="checkbox"/> Careless Error	<input type="checkbox"/> Stopped Too Early	
	Learning from Mistakes Instructional Implications		

! 2025 – Q41

Some inherited health disorders are caused by nondisjunction. During nondisjunction, homologous chromosomes fail to separate properly during the formation of sex cells.

Based on the images, which cells **MOST LIKELY** show examples of nondisjunction?

Select **TWO** correct answers.



Cluster	Mechanisms of Genetics
Subcluster	Mutations
Content	Readiness
Process	
Item Type	Hot Spot (1 pt)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	35	
No Credit	65	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (2nd and 5th cells (left to right))

B.7(C) identify and illustrate changes in DNA and evaluate the significance of these changes

OLD B.6(E) identify and illustrate changes in DNA and evaluate the significance of these changes

2024 – Q13

A DNA mutation results in a protein that is the same as the initial protein synthesized before the mutation. Which statement **BEST** explains this outcome?

- (A) One amino acid substitution does not affect protein synthesis.
- (B) Different codons can be translated into the same amino acid, so some mutations do not affect protein synthesis.
- (C) Only mutations that occur at the chromosomal level change protein function.
- (D) Amino acids have similar functions, so their corresponding proteins are unaffected by mutations.

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	Mutations
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B*	62	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (B)

B.7(C) identify and illustrate changes in DNA and evaluate the significance of these changes

OLD B.6(E) identify and illustrate changes in DNA and evaluate the significance of these changes

Analysis of Assessed Standards

! 2023 – Q19

Two mutations of a genetic sequence are shown. A DNA codon chart is also shown.

Original Sequence:

3'-TAC CCG **ATA** GGC CAC-5'

Mutation 1:

3'-TAC CCG **AAA** GGC CAC-5'

Mutation 2:

3'-TAC CCG **AA** GGC CAC-5'

Second Base				Third Base
U	C	A	G	
First Base U	Phenylalanine	Serine	Tyrosine	Cysteine
	Phenylalanine	Serine	Tyrosine	Cysteine
	Leucine	Serine	Stop	Stop
	Leucine	Serine	Stop	Tryptophan
	Leucine	Proline	Histidine	Arginine
	Leucine	Proline	Histidine	Arginine
	Leucine	Proline	Glutamine	Arginine
	Leucine	Proline	Glutamine	Arginine
C	Isoleucine	Threonine	Asparagine	Serine
	Isoleucine	Threonine	Asparagine	Serine
	Isoleucine	Threonine	Lysine	Arginine
	Methionine	Threonine	Lysine	Arginine
	Valine	Alanine	Aspartic acid	Glycine
	Valine	Alanine	Aspartic acid	Glycine
	Valine	Alanine	Glutamic acid	Glycine
	Valine	Alanine	Glutamic acid	Glycine

- Which mutation would have the **MOST** significant impact on the gene product?
- Why would the impact be so significant?

Review the diagram carefully. Then enter your answer and your explanation in the box provided.

Chars 0/475

*Correct Answer (The student identifies that Mutation 2 would have the most significant impact because it would cause a frameshift.)

Cluster	Mechanisms of Genetics
Subcluster	Mutations
Content	Readiness
Process	
Item Type	Short Constructed Response (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	10	
No Credit	49	
Partial Credit	40	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.7(C) identify and illustrate changes in DNA and evaluate the significance of these changes

OLD B.6(E) identify and illustrate changes in DNA and evaluate the significance of these changes

! 2022 – Q5

5 Which of these shows an example of an insertion mutation?

- A**  → 
- B**  → 
- C**  → 
- D**  → 

*Correct Answer (D)

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	Mutations
Content	Readiness
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
A	6	
B	14	
C	23	
D*	57	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.7(C) identify and illustrate changes in DNA and evaluate the significance of these changes

OLD B.6(E) identify and illustrate changes in DNA and evaluate the significance of these changes

2022 – Q34

34 Which statements explain how a mutation in a somatic cell is different from a mutation that occurs in gametes?

- F** Somatic cell mutations occur in cells that give rise to gametes. Gamete mutations occur in cells that result in apoptosis.
- G** Somatic cell mutations are maintained in the gene pool. Gamete mutations are expelled from the gene pool.
- H** Somatic cell mutations are generally not passed to offspring. Gamete mutations are usually passed to offspring.
- J** Somatic cell mutations will not be expressed by the individual that contains the mutation. Gamete mutations will be expressed by the individual.

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	Mutations
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local
F	11	
G	16	
H*	53	
J	19	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

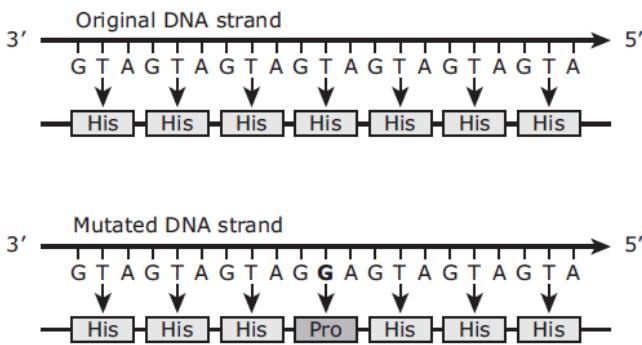
*Correct Answer (H)

B.7(C) identify and illustrate changes in DNA and evaluate the significance of these changes
OLD B.6(E) identify and illustrate changes in DNA and evaluate the significance of these changes

Analysis of Assessed Standards

2021 – Q3

- 3 An illustration of how a particular DNA mutation will most likely affect the polypeptide produced is shown.



What type of mutation is illustrated?

- A Insertion
- B Translocation
- C Substitution
- D Deletion

*Correct Answer (C)

Cluster	Mechanisms of Genetics
Subcluster	Mutations
Content	Readiness
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
A	17	
B	15	
C*	65	
D	3	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.7(C) identify and illustrate changes in DNA and evaluate the significance of these changes

OLD B.6(E) identify and illustrate changes in DNA and evaluate the significance of these changes

2021 – Q37

37 When a new mutation occurs in a somatic cell of a sexually reproducing organism, what percentage of the individual's offspring are likely to inherit the mutation?

- A 100%
- B 75%
- C 25%
- D 0%

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	Mutations
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local
A	13	
B	30	
C	45	
D*	12	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (D)

B.7(C) identify and illustrate changes in DNA and evaluate the significance of these changes

OLD B.6(E) identify and illustrate changes in DNA and evaluate the significance of these changes

2019 – Q28

The model shows a mutation to a partial sequence of bases in a gene.



Which type of mutation does the model demonstrate?

- F Deletion
- G Insertion
- H Substitution
- J Translocation

Analysis of Assessed Standards

Cluster	Mechanisms of Genetics
Subcluster	Mutations
Content	Readiness
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
F	4	
G*	82	
H	8	
J	6	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (G)

<p>B.7(C) identify and illustrate changes in DNA and evaluate the significance of these changes</p> <p>OLD B.6(E) identify and illustrate changes in DNA and evaluate the significance of these changes</p>	Analysis of Assessed Standards	
	Cluster	Mechanisms of Genetics
2019 – Q36	Subcluster	Mutations
Exposure to the building material asbestos has been linked to certain types of cancers. Asbestos causes mutations in the p53 gene, which controls tumor suppression.	Content	Readiness
Which statement best explains why people with cancer due to asbestos exposure do not pass the mutation on to their offspring?	Process	B.3(D)
<p>F The mutation occurred in gametic cells.</p> <p>G The mutation occurred in somatic cells.</p> <p>H The mutation is recessive.</p> <p>J The mutation is sex-linked.</p>	Stimulus	
	Data Analysis	
	Item	State
	F	19
	G*	50
	H	26
	J	6
*Correct Answer (G)	Error Analysis	
	<input type="checkbox"/> Guessing	<input type="checkbox"/> Mixed Up Concepts
	<input type="checkbox"/> Careless Error	<input type="checkbox"/> Stopped Too Early
	Learning from Mistakes	
	Instructional Implications	

Heredity and Diversity

B.8 Mechanisms of genetics. The student knows the role of nucleic acids and the principles of inheritance and variation of traits in Mendelian and non-Mendelian genetics.

B.8(A) analyze the significance of chromosome reduction, independent assortment, and crossing-over during meiosis in increasing diversity in populations of organisms that reproduce sexually

OLD **B.6(G)** recognize the significance of meiosis to sexual reproduction

! 2024 – Q36

Giraffes (*Giraffa camelopardalis*) have 30 chromosomes in their somatic cells. How many chromosomes will each daughter cell have after the final step of meiosis?

Enter your answer in the box. Your answer must be a whole number.

Analysis of Assessed Standards

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Supporting
Process	
Item Type	Text Entry (1 pt)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	41	
No Credit	59	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

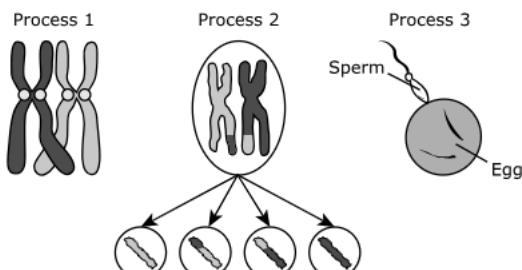
*Correct Answer (15)

B.8(A) analyze the significance of chromosome reduction, independent assortment, and crossing-over during meiosis in increasing diversity in populations of organisms that reproduce sexually

Analysis of Assessed Standards

2025 – Q14

Three processes that are required for sexual reproduction to occur are shown.



Which table most accurately describes the importance of each process to sexual reproduction?

(A)	Process 1	Exchange of genetic material
	Process 2	Produces haploid cells
	Process 3	Produces a diploid cell

(C)	Process 1	Produces diploid cells
	Process 2	Produces haploid cells
	Process 3	Exchange of genetic material

(B)	Process 1	Produces haploid cells
	Process 2	Produces diploid cells
	Process 3	Exchange of genetic material

(D)	Process 1	Exchange of genetic material
	Process 2	Produces diploid cells
	Process 3	Produces a haploid cell

*Correct Answer (A)

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	39	
B		
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes
Instructional Implications

B.8(A) analyze the significance of chromosome reduction, independent assortment, and crossing-over during meiosis in increasing diversity in populations of organisms that reproduce sexually

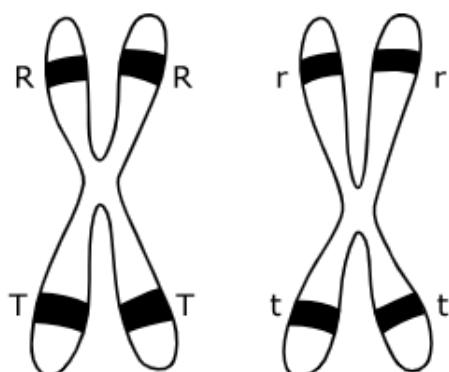
Analysis of Assessed Standards

2025 – Q43

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)

Stimulus

Homologous Chromosomes



Which new gene combinations could result from crossing over?

Item	State	Local
A*	72	
B		
C		
D		

Error Analysis	
<input type="checkbox"/> Guessing	<input type="checkbox"/> Mixed Up Concepts
<input type="checkbox"/> Careless Error	<input type="checkbox"/> Stopped Too Early

Learning from Mistakes Instructional Implications	

*Correct Answer (A)

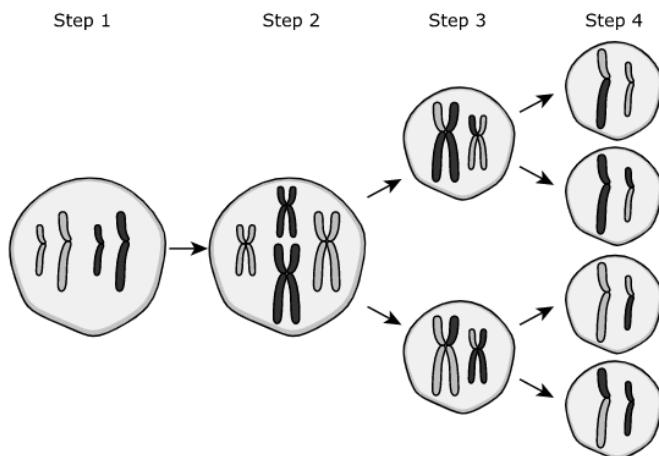
B.8(A) analyze the significance of chromosome reduction, independent assortment, and crossing-over during meiosis in increasing diversity in populations of organisms that reproduce sexually

Analysis of Assessed Standards

OLD **B.6(G)** recognize the significance of meiosis to sexual reproduction

2023 – Q26

A cell undergoing a biological process is shown.



Which process occurs between Step 2 and Step 3 and creates more genetic diversity in the resulting cells?

- A Chromosome nondisjunction
- B Genome replication
- C Crossing over
- D Chromosomal deletion

*Correct Answer (C)

Cluster Heredity and Diversity

Subcluster Genetic Diversity

Content Supporting

Process

Item Type Multiple Choice (1 pt)

Stimulus

Data Analysis

Item	State	Local
A	10	
B	23	
C*	61	
D	6	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

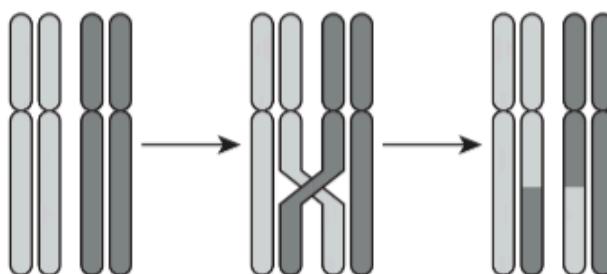
Learning from Mistakes Instructional Implications

B.8(A) analyze the significance of chromosome reduction, independent assortment, and crossing-over during meiosis in increasing diversity in populations of organisms that reproduce sexually

OLD B.6(G) recognize the significance of meiosis to sexual reproduction

2022 – Q18

18 A cellular process is shown.



Which of these is the most likely result of the process shown in the diagram?

- F** Chromosome replication will cease to avoid errors that result in mutations.
- G** Offspring will no longer express traits from previous generations.
- H** Gametes will contain new allele combinations.
- J** Chromatids will have less genetic variety.

*Correct Answer (H)

Analysis of Assessed Standards

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Supporting
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
F	19	
G	11	
H*	65	
J	5	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

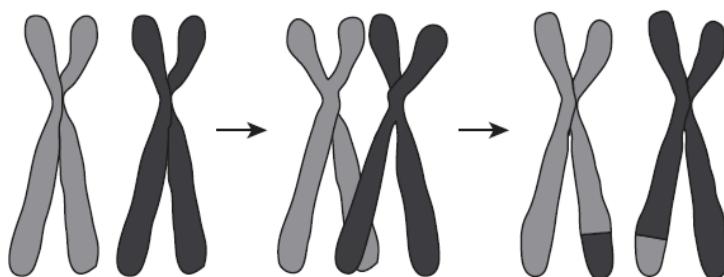
Learning from Mistakes Instructional Implications

B.8(A) analyze the significance of chromosome reduction, independent assortment, and crossing-over during meiosis in increasing diversity in populations of organisms that reproduce sexually

OLD B.6(G) recognize the significance of meiosis to sexual reproduction

! 2021 – Q48

48 A cellular process is shown.



Which statement best describes the significance of this process?

- F The process allows organisms to grow and heal.
- G The process produces clones of the parent organism.
- H The process copies DNA before cell division.
- J The process creates genetic variation in the resulting cells.

*Correct Answer (J)

Analysis of Assessed Standards

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	5	
G	12	
H	20	
J*	63	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.8(A) analyze the significance of chromosome reduction, independent assortment, and crossing-over during meiosis in increasing diversity in populations of organisms that reproduce sexually

OLD B.6(G) recognize the significance of meiosis to sexual reproduction

2019 – Q41

Gametes produced by an organism contain a combination of genes from that organism. In every gamete, this combination is —

- A** the same because it is created from the same DNA
- B** the same because chromosomes are copied prior to meiosis
- C** different due to DNA replication prior to mitosis
- D** different due to independent assortment during meiosis

Analysis of Assessed Standards

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
A	23	
B	20	
C	26	
D*	30	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (D)

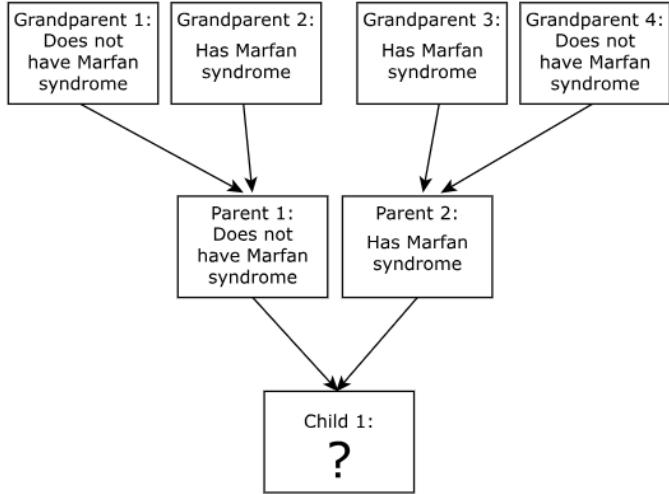
<p>B.8(B) predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles</p>	<p>Analysis of Assessed Standards</p>												
<p>2025 – Q19</p>	<table border="1"> <tr> <td data-bbox="1157 202 1292 236">Cluster</td><td data-bbox="1292 202 1550 236">Heredity and Diversity</td></tr> <tr> <td data-bbox="1157 236 1292 270">Subcluster</td><td data-bbox="1292 236 1550 270">Genetic Diversity</td></tr> <tr> <td data-bbox="1157 270 1292 304">Content</td><td data-bbox="1292 270 1550 304">Readiness</td></tr> <tr> <td data-bbox="1157 304 1292 337">Process</td><td data-bbox="1292 304 1550 337"></td></tr> <tr> <td data-bbox="1157 337 1292 371">Item Type</td><td data-bbox="1292 337 1550 371">Multipart (2 pts)</td></tr> <tr> <td data-bbox="1157 371 1292 405">Stimulus</td><td data-bbox="1292 371 1550 405"></td></tr> </table>	Cluster	Heredity and Diversity	Subcluster	Genetic Diversity	Content	Readiness	Process		Item Type	Multipart (2 pts)	Stimulus	
Cluster	Heredity and Diversity												
Subcluster	Genetic Diversity												
Content	Readiness												
Process													
Item Type	Multipart (2 pts)												
Stimulus													
<p>This question has two parts.</p>													
<p>In cattle, the hornless trait is dominant to the horned trait. A farmer starts with a herd of cattle heterozygous for the horned trait and wants to keep the herd hornless. To keep the hornless trait, the farmer builds fences around the farm to prevent the cattle from mating with any horned cattle in the area.</p>													
<p>Part A</p>													
<p>Which statement describes what will MOST LIKELY happen to the cattle population on the farm over time?</p>													
<p>(A) All the cattle will remain hornless.</p>													
<p>(B) The next generation of cattle will all be horned.</p>													
<p>(C) There will continue to be some horned cattle in each generation.</p>													
<p>(D) Horned cattle will appear after every two generations.</p>													
<p>Part B</p>													
<p>Which evidence supports your answer in Part A?</p>													
<p>(A) Two recessive alleles could be inherited to produce horned cattle.</p>													
<p>(B) The hornless allele is dominant, and the chance of it appearing is always 100%.</p>													
<p>(C) The recessive allele will become a dominant allele after the first mating.</p>													
<p>(D) The appearance of dominant and recessive alleles switches periodically.</p>													
<p>Error Analysis</p>													
<p><input type="checkbox"/> Guessing <input type="checkbox"/> Mixed Up Concepts</p>													
<p><input type="checkbox"/> Careless Error <input type="checkbox"/> Stopped Too Early</p>													
<p>Learning from Mistakes Instructional Implications</p>													

B.8(B) predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles

Analysis of Assessed Standards

2025 – Q27

Marfan syndrome is an autosomal dominant disorder that affects connective tissue in the skeletal system and skin. The figure shows a family affected by Marfan syndrome.



What is the probability that Child 1 will have Marfan syndrome?

- A 25%
- B 50%
- C 75%
- D 100%

*Correct Answer (B)

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B*	70	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.8(B) predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles

OLD B.6(F) predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses, and non-Mendelian inheritance

Analysis of Assessed Standards

! 2024 – Q5

Curly hair and the ability to taste the chemical PTC are inherited traits. Curly hair (*H*) is always dominant to straight hair (*h*). The ability to taste PTC (*P*) is always dominant to not being able to taste PTC (*p*). The alleles for straight hair and a non-taster for PTC are recessive.

If both parents are heterozygous for both traits, what would be the genotype of an offspring with straight hair and the ability to taste PTC?

(A) *HhPp*

(B) *hhPp*

(C) *Hhpp*

(D) *happ*

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B*	42	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (B)

B.8(B) predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles

OLD B.6(F) predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses, and non-Mendelian inheritance

! 2024 – Q28

Cystic fibrosis is an autosomal recessive disorder in humans. What is the probability that an offspring will have cystic fibrosis if both parents are carriers of cystic fibrosis?

(A) 25%

(B) 50%

(C) 75%

(D) 100%

Analysis of Assessed Standards

Cluster Heredity and Diversity

Subcluster Genetic Diversity

Content Readiness

Process

Item Type Multiple Choice (1 pt)

Stimulus

Data Analysis

Item	State	Local
------	-------	-------

A*	22	
----	----	--

B		
---	--	--

C		
---	--	--

D		
---	--	--

Error Analysis

Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (A)

B.8(B) predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles

OLD B.6(F) predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses, and non-Mendelian inheritance

! 2023 – Q10

Achondroplasia is an inherited condition that affects the formation of bone in humans. The allele for achondroplasia (A) is dominant to the unaffected allele (a).

If a person who is homozygous dominant has children with a person who is homozygous recessive, what percentage of their children will likely have achondroplasia?

Enter your answer in the box. Your answer must be a whole number.

%

Analysis of Assessed Standards

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Readiness
Process	
Item Type	Text Entry (1 pt)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	40	
No Credit	60	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (100)

B.8(B) predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles

OLD **B.6(F)** predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses, and non-Mendelian inheritance

2022 – Q9

9 A model of the genetic control of coat color in rabbits is shown.

Allele	Phenotype	Inheritance
C	Black	Dominant to all other alleles
c^{ch}	Chinchilla	Recessive to C; Dominant to c^h and c
c^h	Himalayan	Recessive to C and c^{ch} ; Dominant to c
c	Albino	Recessive to all other alleles

Which Punnett square represents a cross that would produce albino offspring?

A

	c^{ch}	c
c^h		
c		

C

	C	c^{ch}
c^h		
c^h		

B

	c^{ch}	c^h
c^h		
c		

D

	c^{ch}	c^h
c^h		
c^h		

*Correct Answer (A)

Analysis of Assessed Standards

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Readiness
Process	B.2(G)
Stimulus	

Data Analysis		
Item	State	Local
A*	68	
B	10	
C	15	
D	8	

Error Analysis
<input type="checkbox"/> Guessing
<input type="checkbox"/> Mixed Up Concepts
<input type="checkbox"/> Careless Error
<input type="checkbox"/> Stopped Too Early
Learning from Mistakes Instructional Implications

B.8(B) predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles

OLD **B.6(F)** predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses, and non-Mendelian inheritance

2022 – Q30

- 30** In domesticated dogs, hair type is controlled by two different alleles. The allele for wire hair is (H) and the allele for smooth hair is (h).

When two heterozygous dogs are crossed, what percentage of the offspring is expected to be homozygous for smooth hair?

F 0%

G 25%

H 50%

J 75%

Analysis of Assessed Standards

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Readiness
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
F	7	
G*	60	
H	26	
J	7	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (G)

B.8(B) predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles

OLD **B.6(F)** predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses, and non-Mendelian inheritance

Analysis of Assessed Standards

2021 – Q25

25 A genetic cross involving two unlinked genes is represented.

$$AaGG \times aaGg$$

Which genotype is NOT possible in the offspring produced by the cross?

- A AaGG
- B Aagg
- C aaGg
- D aaGG

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Readiness
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
A	9	
B*	64	
C	14	
D	13	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (B)

B.8(B) predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles

Analysis of Assessed Standards

OLD **B.6(F)** predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses, and non-Mendelian inheritance

2021 – Q41

- 41** Some angelfish colors are determined by codominance. Possible phenotypes and genotypes of angelfish colors are shown.

Phenotype	Genotype
	LL
	BB
	BL

Which table shows the expected phenotypes of offspring resulting from a cross between a black angelfish and a black-lace angelfish?

A

Phenotype	Silver	Black	Black Lace
Phenotypic probability of offspring	—	50%	50%

C

Phenotype	Silver	Black	Black Lace
Phenotypic probability of offspring	25%	25%	50%

B

Phenotype	Silver	Black	Black Lace
Phenotypic probability of offspring	50%	50%	—

D

Phenotype	Silver	Black	Black Lace
Phenotypic probability of offspring	25%	50%	25%

*Correct Answer (A)

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Readiness
Process	B.2(G)
Stimulus	

Data Analysis		
Item	State	Local
A*	50	
B	9	
C	20	
D	22	

Error Analysis
<input type="checkbox"/> Guessing <input type="checkbox"/> Mixed Up Concepts
<input type="checkbox"/> Careless Error <input type="checkbox"/> Stopped Too Early

Learning from Mistakes Instructional Implications

B.8(B) predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles

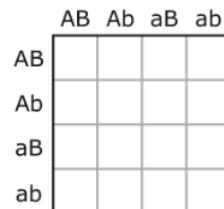
Analysis of Assessed Standards

OLD B.6(F) predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses, and non-Mendelian inheritance

2019 – Q17

Mice have two unlinked allele pairs that affect fur color. The table shows how allele pairs affect fur color. The term “agouti” describes fur with pigmentation that changes in each hair from the shaft to the tip, giving the fur a banded appearance. Mice with the aa allele pair are albino, regardless of the second allele-pair combination.

Alleles	Fur Pigment
AA	Agouti
Aa	Agouti
aa	Albino
BB	Agouti
Bb	Agouti
bb	Solid black



What is the probability of albinism in the offspring of a cross between two mice with AaBb alleles?

A $\frac{1}{16}$

B $\frac{3}{16}$

C $\frac{4}{16}$

D $\frac{9}{16}$

*Correct Answer (C)

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Readiness
Process	B.2(F)
Stimulus	

Data Analysis		
Item	State	Local
A	13	
B	14	
C*	69	
D	4	

Error Analysis
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<input type="checkbox"/> Careless Error <input type="checkbox"/> Stopped Too Early

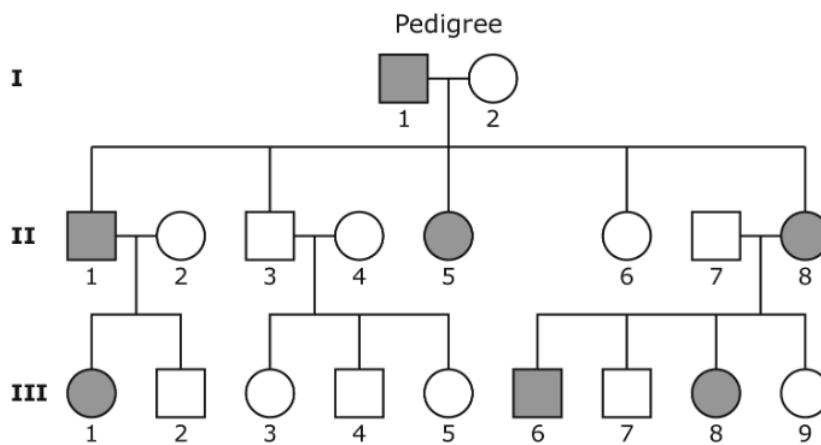
Learning from Mistakes Instructional Implications

B.8(B) predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles

OLD B.6(F) predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses, and non-Mendelian inheritance

! 2019 – Q26

The inheritance pattern for an autosomal dominant trait is shown in the pedigree. Shaded symbols represent individuals that express the dominant trait.



Based on this pedigree, what are the most likely genotypes of individuals I-1 and I-2?

- F** I-1: aa
I-2: Aa
- G** I-1: AA
I-2: Aa
- H** I-1: Aa
I-2: aa
- J** I-1: aa
I-2: AA

*Correct Answer (H)

Analysis of Assessed Standards

Cluster	Heredity and Diversity
Subcluster	Genetic Diversity
Content	Readiness
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
F	10	
G	25	
H*	55	
J	9	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

Evolutionary Theory

B.9 Biological evolution. The student knows evolutionary theory is a scientific explanation for the unity and diversity of life that has multiple lines of evidence.

B.9(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

2025 – Q28

Cytochrome c is a protein that helps release energy from food and is produced by nearly all organisms. The table shows a short sequence of the amino acids in cytochrome c for several species.

Organism	Amino Acid Sequence				
	9	10	11	12	13
Tuna	Glycine	Aspartic acid	Valine	Alanine	Lysine
Chicken	Glycine	Aspartic acid	Isoleucine	Glutamic acid	Lysine
Neurospora	Glycine	Aspartic acid	Serine	Lysine	Lysine
Gray whale	Glycine	Aspartic acid	Valine	Glutamic acid	Lysine
Silkworm moth	Glycine	Asparagine	Alanine	Glutamic acid	Asparagine

Identify the organism that is **MOST CLOSELY** related to tuna **AND** explain your reasoning using evidence from the table.

Think about the information carefully. Then enter your response in the box provided.

*Correct Answer (See Scoring Guide)

Analysis of Assessed Standards

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Supporting
Process	
Item Type	Short Constructed Response (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	65	
No Credit	15	
Partial Credit	20	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

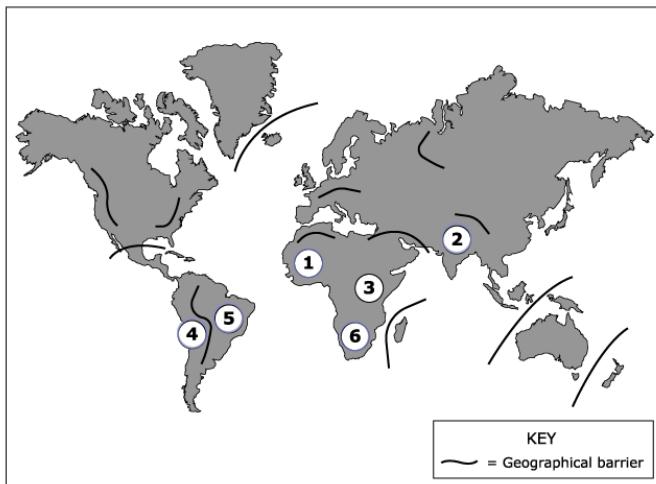
B.9(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

Analysis of Assessed Standards

2025 – Q32

The geographical distribution of flightless birds is shown on the map. Which locations **MOST LIKELY** share a most recent common ancestor with the birds found at Location 3?

Select **TWO** correct answers.



*Correct Answer (1; 6)

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Supporting
Process	
Item Type	Hot Spot (1 pt)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	72	
No Credit	28	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes
Instructional Implications

B.9(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

OLD B.7(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

2024 – Q19

Cytochrome c is a protein that is found in the mitochondria of all aerobic eukaryotic cells. The gene sequence for cytochrome c has been mapped and analyzed for thousands of species. The table shows the percentage of the cytochrome c amino-acid sequence that different species have in common.

Percent Similarity of Cytochrome c Amino-Acid Sequence

	Chimpanzee	Horse	Donkey	Mouse	Lamprey
Chimpanzee		88.5%	89.4%	91.3%	80.8%
Horse	88.5%		99.0%	94.2%	84.6%
Donkey	89.4%	99.0%		95.2%	85.6%
Mouse	91.3%	94.2%	95.2%		84.6%
Lamprey	80.8%	84.6%	85.6%	84.6%	

Source: Adapted from Kulkarni, K., and Sundarrajan, P.,
Int. Res. Journal of Science & Engineering, 2016

Which list is ordered from the species most closely related to the mouse to the species least closely related to the mouse?

(A) Horse, chimpanzee, donkey, lamprey

(B) Lamprey, donkey, chimpanzee, horse

(C) Chimpanzee, donkey, lamprey, horse

(D) Donkey, horse, chimpanzee, lamprey

*Correct Answer (D)

Analysis of Assessed Standards

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)

Stimulus	
-----------------	--

Data Analysis

Item	State	Local
A		
B		
C		
D*	71	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.9(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

Analysis of Assessed Standards

OLD B.7(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

! 2023 – Q36

During early stages of development, dolphin embryos begin to develop hind limbs. By the time the dolphin fetuses are fully developed, the hind limbs have disappeared.

Which statement best explains the early development and then disappearance of hind limbs in dolphins?

- (A) Dolphin fetuses change their development to adapt to an aquatic environment.
- (B) The genes that control the development of hind limbs are destroyed as the fetus develops.
- (C) The early ancestors of dolphins had hind limbs.
- (D) Dolphins are evolving to become terrestrial animals.

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	41	
B	28	
C*	26	
D	5	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

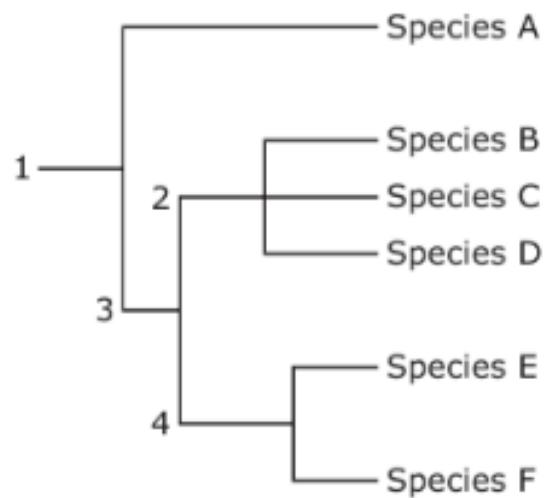
*Correct Answer (C)

B.9(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

OLD B.7(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

2022 – Q41

41 A phylogenetic tree based on genetic similarities is shown.



Which numbered location on the phylogenetic tree identifies characteristics shared by Species B, C, and D?

- A** Location 1
- B** Location 2
- C** Location 3
- D** Location 4

*Correct Answer (B)

Analysis of Assessed Standards

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Supporting
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
A	6	
B*	79	
C	9	
D	6	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

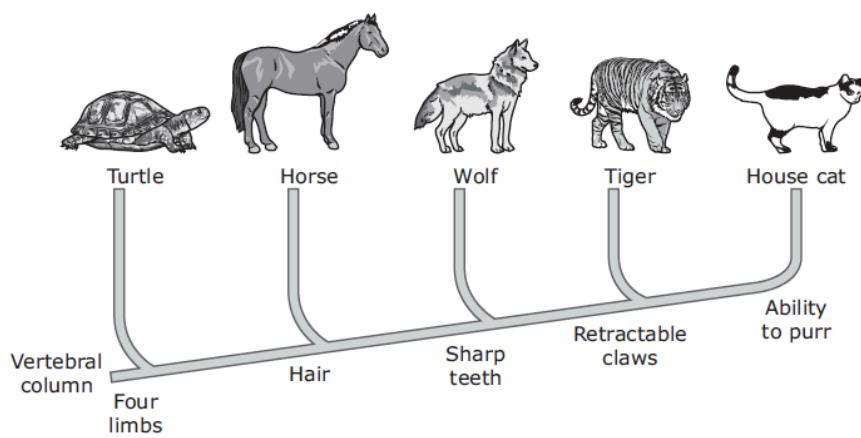
B.9(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

OLD B.7(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

Analysis of Assessed Standards

2021 – Q13

13 A cladogram of five species is shown.



Based on the cladogram, the ancestral species most likely had —

- A a vertebral column
- B a vertebral column and hair
- C sharp teeth and retractable claws
- D the ability to purr

*Correct Answer (A)

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Supporting
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
A*	71	
B	13	
C	13	
D	3	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

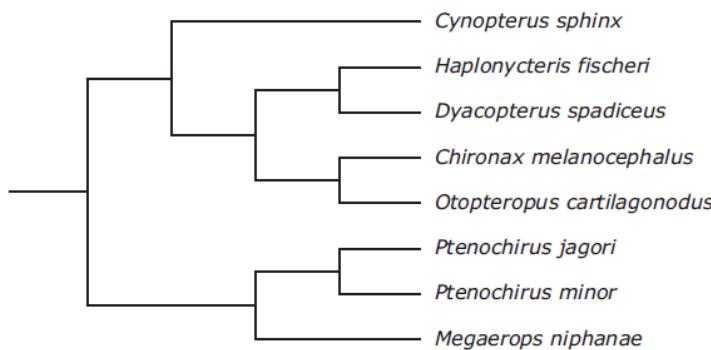
B.9(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

OLD B.7(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

Analysis of Assessed Standards

2021 – Q44

- 44** Researchers analyzed a mitochondrial gene of different bat species to determine relatedness. A cladogram of their results is shown.



Based on the cladogram, which set of bat species is the least related?

- F *Ptenochirus minor* and *Megaerops niphanae*
- G *Dyacopterus spadiceus* and *Otopterus cartilagonodus*
- H *Haplonycteris fischeri* and *Ptenochirus jagori*
- J *Cynopterus sphinx* and *Chironax melanocephalus*

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Supporting
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
F	13	
G	11	
H*	63	
J	13	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (H)

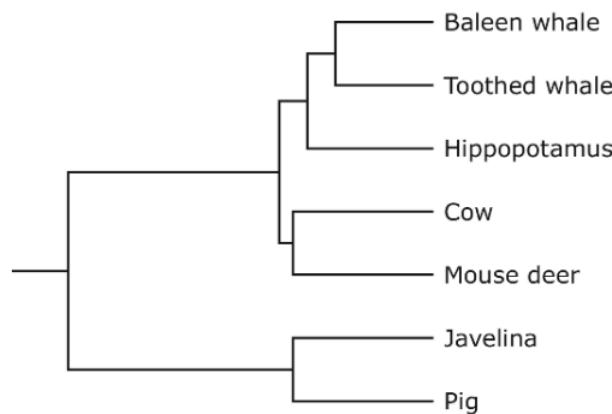
B.9(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

OLD B.7(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

Analysis of Assessed Standards

2019 – Q47

This cladogram shows the evolutionary relationships among some mammals based on homologous structures.



Which statement is supported by this cladogram?

- A** Hippopotamuses are more closely related to cows than to javelinas.
- B** Toothed whales are more closely related to mouse deer than to hippopotamuses.
- C** Javelinas and pigs are more closely related than baleen whales and toothed whales.
- D** Cows and mouse deer are more closely related than javelinas and pigs.

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Supporting
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
A*	67	
B	6	
C	16	
D	11	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

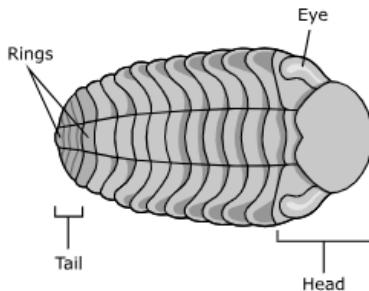
Learning from Mistakes Instructional Implications

*Correct Answer (A)

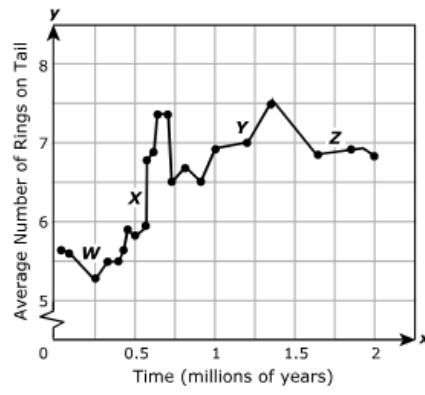
B.9(B) examine scientific explanations for varying rates of change such as gradualism, abrupt appearance, and stasis in the fossil record

2025 – Q1

Scientists studied the evolution of ancient organisms known as trilobites. An image of a trilobite is shown, and some of its body structures are labeled.



Scientists collected fossils of one species of trilobite that were determined to have lived during a 2-million-year span. The scientists observed that, over time, the number of rings in the trilobites' tails changed. The graph shows the results of this investigation.



Source: Hunt, G., *The American Naturalist*, 2010

Which labeled section of the graph represents a time when the environment where trilobites lived was changing rapidly?

A Section W

B Section Y

C Section X

D Section Z

*Correct Answer (B)

Analysis of Assessed Standards

Cluster Evolutionary Theory

Subcluster Evolution

Content Readiness

Process

Item Type Multiple Choice (1 pt)

Stimulus

Data Analysis

Item	State	Local
A		
B*	73	
C		
D		

Error Analysis

- Guessing
- Mixed Up Concepts
- Careless Error
- Stopped Too Early

Learning from Mistakes Instructional Implications

B.9(B) examine scientific explanations for varying rates of change such as gradualism, abrupt appearance, and stasis in the fossil record

OLD B.7(B) examine scientific explanations of abrupt appearance and stasis in the fossil record

! 2024 – Q20

Scientists can use the fossil record to determine changes in an environment. What does the abrupt appearance of new organisms show?

Move the correct answer to each box.

- the age of fossils
- an increase in biodiversity
- stasis
- transitional fossils
- gradualism
- an unstable environment

The abrupt appearance of new organisms is evidence of _____ and _____.

Analysis of Assessed Standards

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Readiness
Process	
Item Type	Drag and Drop (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	21	
No Credit	23	
Partial Credit	57	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (an increase in biodiversity, an unstable environment (or vice versa))

B.9(B) examine scientific explanations for varying rates of change such as gradualism, abrupt appearance, and stasis in the fossil record

OLD B.7(B) examine scientific explanations of abrupt appearance and stasis in the fossil record

! 2023 – Q27

Certain species of the coral-like sea organisms called bryozoans first appeared about 140 million years ago. They remained unchanged for the first 40 million years and then suddenly experienced rapid genetic change.

Which process would **BEST** account for the pattern of evolution in bryozoans?

(A) Convergent evolution

(B) Differentiation

(C) Punctuated equilibrium

(D) Gradualism

Analysis of Assessed Standards

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	48	
B	13	
C*	28	
D	11	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (C)

B.9(B) examine scientific explanations for varying rates of change such as gradualism, abrupt appearance, and stasis in the fossil record

OLD **B.7(B)** examine scientific explanations of abrupt appearance and stasis in the fossil record

! 2022 – Q39

39 Two scientists studied patterns of evolution in the fossil record. Many species they analyzed showed periods of slow changes interrupted by a period of rapid change.

This pattern of periods of slow change interrupted by periods of rapid change with few, if any transitional fossils, best describes the theory of —

- A** natural selection
- B** genetic drift
- C** punctuated equilibrium
- D** gene flow

*Correct Answer (C)

Analysis of Assessed Standards

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Readiness
Process	B.3(A)
Stimulus	

Data Analysis

Item	State	Local
A	34	
B	33	
C*	18	
D	15	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.9(B) examine scientific explanations for varying rates of change such as gradualism, abrupt appearance, and stasis in the fossil record

OLD B.7(B) examine scientific explanations of abrupt appearance and stasis in the fossil record

2021 – Q22

22 When multiple transitional fossils are found in many rock layers, they provide evidence of —

- F seasonal variation in the diet of a species
- G gradual change of a species over time
- H DNA functioning as the genetic material of organisms
- J an unchanging environment

Analysis of Assessed Standards

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Readiness
Process	B.3(A)
Stimulus	

Data Analysis

Item	State	Local
F	5	
G*	71	
H	16	
J	8	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

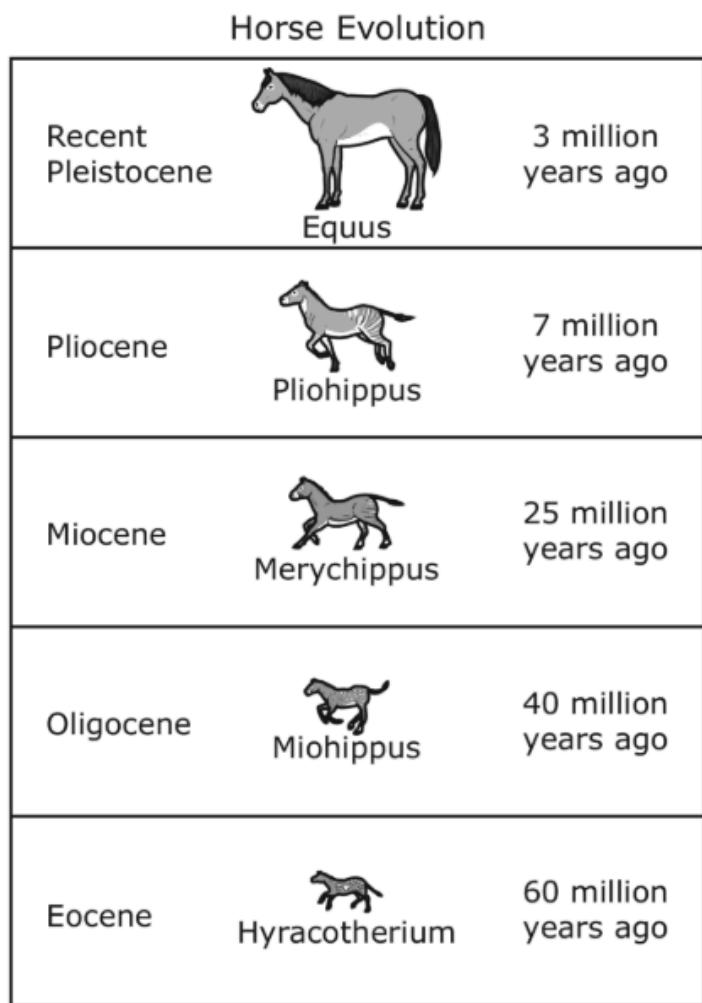
*Correct Answer (G)

B.9(B) examine scientific explanations for varying rates of change such as gradualism, abrupt appearance, and stasis in the fossil record

OLD B.7(B) examine scientific explanations of abrupt appearance and stasis in the fossil record

2019 – Q12

The diagram shows data on the evolution of horses.



The data in the diagram is evidence that —

- F** a new species of horse suddenly appeared
- G** horses slowly developed over time
- H** horses have similar stages of rapid embryological development
- J** horses have a common ancestry with other hooved animals

*Correct Answer (G)

Analysis of Assessed Standards

Cluster	Evolutionary Theory
Subcluster	Evolution
Content	Readiness
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
F	3	
G*	73	
H	9	
J	15	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

Evolutionary Mechanisms

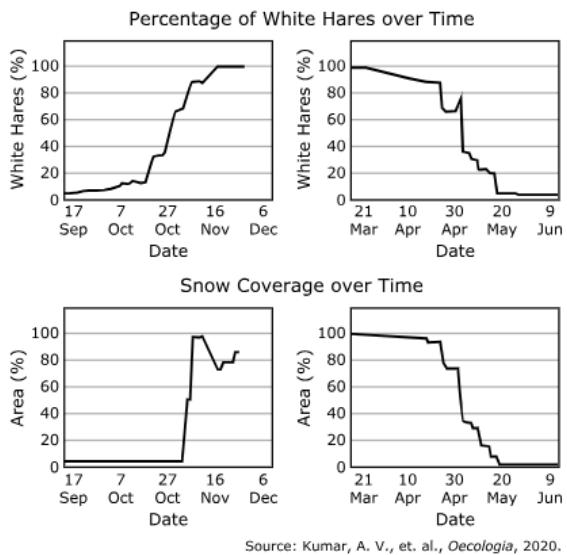
B.10 Biological evolution. The student knows evolutionary theory is a scientific explanation for the unity and diversity of life that has multiple mechanisms.

B.10(A) analyze and evaluate how natural selection produces change in populations and not in individuals

2025 – Q11

The snowshoe hare often molts, or sheds its fur, during different seasons, going from a reddish brown to a white fur color.

The graphs show both the change in coat color in one population of snowshoe hares and the average snow coverage during two periods of the year.



Which statement **BEST** explains the data shown in the graphs?

- A Hares with seasonal changes in fur color have a survival advantage and are more likely to successfully reproduce.
- B Hares change their fur color as a result of mating choice during the spring months.
- C Natural selection allows for mutations to occur during seasonal changes when food is abundant.
- D Hare fur color changes when sexual maturity occurs in the fall months.

*Correct Answer (A)

Analysis of Assessed Standards

Cluster	Evolutionary Mechanisms
Subcluster	Natural Selection
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	73	
B		
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.10(A) analyze and evaluate how natural selection produces change in populations and not in individuals

OLD B.7(C) analyze and evaluate how natural selection produces change in populations, not individuals

2021 – Q4

- 4 Farmers spray pesticides on their plants to protect the plants from being eaten by insects. Some individual insects have a genetic mutation that makes them resistant to the toxins in the pesticides.

Which statement best describes how only a few resistant individuals resulted in the pesticide becoming ineffective?

- F The resistant insects change the toxin on the plants, making it safe for others.
G The resistant insects grow larger and eat less of the plants.
H The resistant insects eat the contaminated surface and leave the rest for others.
J The resistant insects are able to survive to reproduce and create a population that is also resistant.

Analysis of Assessed Standards

Cluster	Evolutionary Mechanisms
Subcluster	Natural Selection
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	7	
G	4	
H	10	
J*	79	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (J)

B.10(A) analyze and evaluate how natural selection produces change in populations and not in individuals

OLD B.7(C) analyze and evaluate how natural selection produces change in populations, not individuals

! 2019 – Q33

Male guppies found in areas without predators are more colorful than the ones found in locations with large predator populations. A population of adult guppies originating from an area with a large number of predators is transferred to a nearby area with few predators.

Which of these is most likely to happen over a few generations?

- A** The mortality rate of the guppies will increase.
- B** Offspring will stop competing for resources.
- C** There will be an increase in mutations in the offspring.
- D** There will be an increase in the number of colorful guppies.

Analysis of Assessed Standards

Cluster	Evolutionary Mechanisms
Subcluster	Natural Selection
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
A	13	
B	6	
C	25	
D*	57	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (D)

B.10(B) analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

2025 – Q20

The reproduction rates of citrus rust mites are shown.

Average Number of Eggs Produced per Day	Temperature
4.20	30 °C
1.20	16 °C

Based on the information provided, which statement **BEST** describes the effect of temperature on the citrus rust mite?

- Ⓐ Temperature can affect the size of its egg.
- Ⓑ Temperature can influence the gender of its offspring.
- Ⓒ Temperature can affect its rate of reproductive success.
- Ⓓ Temperature can influence the availability of nutrients.

Analysis of Assessed Standards

Cluster	Evolutionary Mechanisms
Subcluster	Natural Selection
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C*	80	
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

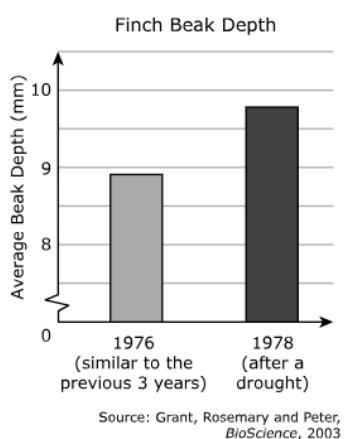
*Correct Answer (C)

B.10(B) analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

OLD **B.7(D)** analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

! 2024 – Q34

The bar graph shows the average beak depth (distance from the top of the beak to the bottom) of a population of finches. The data were collected in 1976 and in 1978, after a drought occurred in 1977 in the area.



Which factor **BEST** describes the change in this population of finches?

- (A) An increase in resource availability
- (B) A change in the reproductive success of one individual bird
- (C) A decrease in fitness that increased survival rates
- (D) A change in phenotype distribution because of an environmental factor

*Correct Answer (D)

Analysis of Assessed Standards

Cluster	Evolutionary Mechanisms
Subcluster	Natural Selection
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C		
D*	54	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

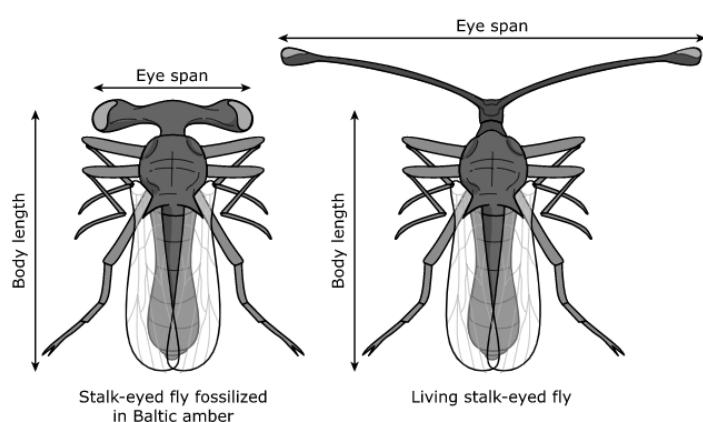
Learning from Mistakes Instructional Implications

B.10(B) analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

OLD B.7(D) analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

2023 – Q38

The figure shows fossilized and living stalk-eyed flies from the family Diopsidae. In fossils, the eye spans of the flies are much smaller than those of living flies.



Which question would **BEST** help determine whether the change in eye span in stalk-eyed flies was influenced by natural selection?

- (A) Is the eye span of male stalk-eyed flies similar to that of female flies?
- (B) What is the relationship between the body length and eye span of stalk-eyed flies?
- (C) How does the eye span of stalk-eyed flies compare from one generation to the next?
- (D) Do fossilized stalk-eyed flies have a shorter body length than living flies?

*Correct Answer (C)

Analysis of Assessed Standards

Cluster	Evolutionary Mechanisms
Subcluster	Natural Selection
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	10	
B	17	
C*	66	
D	7	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.10(B) analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

OLD **B.7(D)** analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

2022 – Q11

11 Blue flying fish live in the upper layers of the ocean. Blue flying fish have enlarged pectoral fins that enable them to glide for 400 meters above the ocean surface and appear to fly.

Which statement best describes how natural selection led to enlarged pectoral fins in blue flying fish?

- A** Fish were able to glide out of the ocean and into other bodies of water to mate with other species.
- B** Fish were able to live both on land and in the water as a result of their larger pectoral fins.
- C** Fish with enlarged pectoral fins were able to glide out of the ocean to escape predators, increasing their fitness.
- D** Fish changed their DNA to express enlarged pectoral fins, changing the allele frequency of the population.

*Correct Answer (C)

Analysis of Assessed Standards

Cluster	Evolutionary Mechanisms
Subcluster	Natural Selection
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
A	10	
B	8	
C*	70	
D	12	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.10(B) analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

Analysis of Assessed Standards

OLD **B.7(D)** analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

2021 – Q40

- 40** The giant octopus lays 20,000 to 100,000 fertilized eggs. After hatching, most octopuses become prey to larger marine organisms, and less than 5% will reach adulthood to reproduce.

One benefit of the giant octopus laying many eggs is to —

- F increase the average body size for surviving individuals to avoid predation
G decrease competition between different octopus species to maintain resources in the population
H increase the chance that more individuals will survive to maintain the population
J decrease the likelihood of offspring being consumed by predators

Cluster	Evolutionary Mechanisms
Subcluster	Natural Selection
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	6	
G	9	
H*	78	
J	8	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (H)

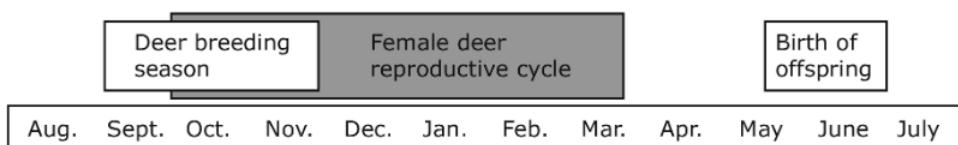
B.10(B) analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

OLD **B.7(D)** analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

! 2019 – Q42

White-tailed deer are seasonal breeders. Female white-tailed deer begin their reproductive cycle in the fall. Rising testosterone levels in male white-tailed deer cause them to start their breeding season around the same time. Offspring are born the following spring and summer.

Deer Reproductive Cycle



What is the most likely explanation for white-tailed deer having a seasonal breeding cycle instead of a monthly breeding cycle like many domesticated animals?

- F** Male and female deer come into contact with each other only in the fall.
- G** Large predators are not found in deer habitats during the spring and summer months.
- H** Giving birth only in the spring and summer ensures that offspring are born when food is most available.
- J** Deer give birth in the spring and summer in order to avoid being pregnant during the hot summer months.

*Correct Answer (H)

Analysis of Assessed Standards

Cluster	Evolutionary Mechanisms
Subcluster	Natural Selection
Content	Supporting
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
F	14	
G	10	
H*	69	
J	7	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.10(C) analyze and evaluate how natural selection may lead to speciation				Analysis of Assessed Standards																	
2025 – Q7				Cluster	Evolutionary Mechanisms																
<p><i>Peromyscus polionotus</i> is a species of mouse found in inland fields as well as on the Gulf and Atlantic coasts of the southeastern United States. Coastal populations of this species have lighter fur than inland populations, and coastal populations blend into a beach environment more easily than the field mice do. Scientists investigated changes in two genes, <i>Agouti</i> and <i>Mc1r</i>, that are involved in fur coloration in this species. The table shows data from this investigation.</p> <table border="1"> <thead> <tr> <th>Location</th><th>Phenotype</th><th><i>Agouti</i> Gene</th><th><i>Mc1r</i> Gene</th></tr> </thead> <tbody> <tr> <td>Gulf coast</td><td>Lighter coat color</td><td>Mutated</td><td>No mutation</td></tr> <tr> <td>Atlantic coast</td><td>Lighter coat color</td><td>No mutation</td><td>Mutated</td></tr> <tr> <td>Inland</td><td>Darker coat color</td><td>No mutation</td><td>No mutation</td></tr> </tbody> </table> <p>Source: Steiner et al., <i>Molecular Biology and Evolution</i>, 2009</p>				Location	Phenotype	<i>Agouti</i> Gene	<i>Mc1r</i> Gene	Gulf coast	Lighter coat color	Mutated	No mutation	Atlantic coast	Lighter coat color	No mutation	Mutated	Inland	Darker coat color	No mutation	No mutation	Subcluster	Natural Selection
Location	Phenotype	<i>Agouti</i> Gene	<i>Mc1r</i> Gene																		
Gulf coast	Lighter coat color	Mutated	No mutation																		
Atlantic coast	Lighter coat color	No mutation	Mutated																		
Inland	Darker coat color	No mutation	No mutation																		
<p>Which evidence would BEST support the claim that the phenotypes of these populations of mice are a result of natural selection?</p> <ul style="list-style-type: none"> Ⓐ A mutation in the same gene led to the coastal populations having the same coat color. Ⓑ An allele for light coat color is more common in the coastal populations than the inland population. Ⓒ The genes that code for a light coat color have been lost from the inland population. Ⓓ The coastal and inland populations all share the same alleles for coat color. 				Content	Readiness																
				Process																	
				Item Type	Multiple Choice (1 pt)																
				Stimulus																	
Data Analysis																					
		Item	State	Local																	
		A																			
		B*	58																		
		C																			
		D																			
Error Analysis																					
<input type="checkbox"/> Guessing <input type="checkbox"/> Mixed Up Concepts <input type="checkbox"/> Careless Error <input type="checkbox"/> Stopped Too Early																					
Learning from Mistakes Instructional Implications																					

*Correct Answer (B)

2025 – Q39

Which statement describes why brightly colored feathers are selected for in populations of male peacocks?

A The feathers help resist diseases.

B The feathers help avoid competition.

C The feathers help attract mates.

D The feathers help with movement.

Cluster	Evolutionary Mechanisms
Subcluster	Natural Selection
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C*	81	
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (C)

B.10(C) analyze and evaluate how natural selection may lead to speciationOLD **B.7(E)** analyze and evaluate the relationship of natural selection to adaptation and to the development of diversity in and among species

2024 – Q45

During the Industrial Revolution in England, burning coal increased the soot level in the air, and the soot darkened the tree bark. As a result, the population of dark-colored peppered moths significantly increased.

Which statement describes the **MOST LIKELY** reason why the population of dark-colored peppered moths increased?

- (A) Light-colored peppered moths were better adapted than dark-colored peppered moths.
- (B) Light-colored peppered moths migrated to areas with less pollution.
- (C) Changes to the peppered moths' diet caused an increase of pigment that led to a darker color.
- (D) Dark-colored peppered moths had a genetic variation that provided better coverage from predators in their changing environment.

Analysis of Assessed Standards

Cluster	Evolutionary Mechanisms
Subcluster	Natural Selection
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C		
D*	75	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications*****Correct Answer (D)**

B.10(D) analyze evolutionary mechanisms other than natural selection, including genetic drift, gene flow, mutation, and genetic recombination, and their effect on the gene pool of a population

Analysis of Assessed Standards

2025 – Q24

There are only about 3,000 to 4,000 wild tigers left on Earth. Due to a decrease in habitat, wild tiger populations have become isolated.

How is the genetic diversity of the species affected by decreasing tiger habitat?

Move the correct answer to each box. Each answer may be used more than once.

increasing decreasing constant

The genetic diversity of wild tiger populations is [redacted], because the gene flow is [redacted] due to isolation from habitat loss.

Cluster	Evolutionary Mechanisms
Subcluster	Nonadaptive Mechanisms
Content	Supporting
Process	
Item Type	Drag and Drop (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	40	
No Credit	9	
Partial Credit	51	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (decreasing; decreasing)

B.10(D) analyze evolutionary mechanisms other than natural selection, including genetic drift, gene flow, mutation, and genetic recombination, and their effect on the gene pool of a population

OLD B.7(F) analyze other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination

Analysis of Assessed Standards

! 2024 – Q33

As part of a wildlife conservation program, researchers take a small population of wolves and relocate them to an island. After several generations, researchers analyze the genomes of the wolves in the population and determine that there is little genetic variation in the population.

Which evolutionary mechanism **BEST** explains the low level of genetic variation of these wolves?

(A) Gene flow

(B) Founder effect

(C) Mutation

(D) Recombination

Cluster	Evolutionary Mechanisms
Subcluster	Nonadaptive Mechanisms
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B*	24	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (B)

B.10(D) analyze evolutionary mechanisms other than natural selection, including genetic drift, gene flow, mutation, and genetic recombination, and their effect on the gene pool of a population

OLD B.7(F) analyze other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination

! 2023 – Q40

The Florida panther (*Puma concolor coryi*) population had declined to approximately 20 to 30 individuals as a result of habitat loss and hunting. Many of the panthers had genetic mutations due to inbreeding that affected their ability to reproduce and survive. Female Texas pumas (*Puma concolor stanleyana*) were introduced into Florida to mate with the endangered population of panthers. Hybrid panthers had more genetic variation and reproductive success than the Florida panthers.

Which table best represents the mechanism of evolution and the effect on the gene pool of the Florida panther population?

(A)	Mechanism of Evolution	Event	Effect on Genetic Variation
	Gene flow	Texas puma introduction	Increased

(B)	Mechanism of Evolution	Event	Effect on Genetic Variation
	Gene flow	Hunting and habitat loss	Decreased

(C)	Mechanism of Evolution	Event	Effect on Genetic Variation
	Artificial selection	Texas puma introduction	Decreased

(D)	Mechanism of Evolution	Event	Effect on Genetic Variation
	Artificial selection	Hunting and habitat loss	Increased

*Correct Answer (A)

Analysis of Assessed Standards

Cluster	Evolutionary Mechanisms
Subcluster	Nonadaptive Mechanisms
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	47	
B	23	
C	15	
D	15	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.10(D) analyze evolutionary mechanisms other than natural selection, including genetic drift, gene flow, mutation, and genetic recombination, and their effect on the gene pool of a population

OLD B.7(F) analyze other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination

Analysis of Assessed Standards

2022 – Q43

43 Cross-pollination of flowers from different populations of the same species will most likely result in —

- A** gene flow as new alleles are introduced
- B** evolution of a different species as alleles mix
- C** hybrid sterility as gametes from different individuals are incompatible
- D** a decrease of genetic variation among individuals

Cluster	Evolutionary Mechanisms
Subcluster	Nonadaptive Mechanisms
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
A*	40	
B	31	
C	18	
D	10	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (A)

B.10(D) analyze evolutionary mechanisms other than natural selection, including genetic drift, gene flow, mutation, and genetic recombination, and their effect on the gene pool of a population

OLD B.7(F) analyze other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination

Analysis of Assessed Standards

2019 – Q22

Conservation biologists studying cheetah populations have determined that the lack of genetic diversity among the cheetahs is due to genetic drift.

Which statement explains the most likely consequence of having a low genetic diversity on the cheetah population?

- F** The chances of a mutation occurring in the cheetah population are decreased, increasing the cheetah survival rate.
- G** The gene pool remains in equilibrium and future generations of cheetah offspring are stronger and better adapted to their environments.
- H** The cheetah population becomes less likely to survive an outbreak of a disease or an environmental change, increasing the chance of species extinction.
- J** Genetic variability is maintained from older cheetah populations that have survived and endured environmental stressors.

Cluster	Evolutionary Mechanisms
Subcluster	Nonadaptive Mechanisms
Content	Supporting
Process	B.3(D)
Stimulus	

Data Analysis

Item	State	Local
F	10	
G	13	
H*	67	
J	10	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (H)

Energy Conversions in Organisms

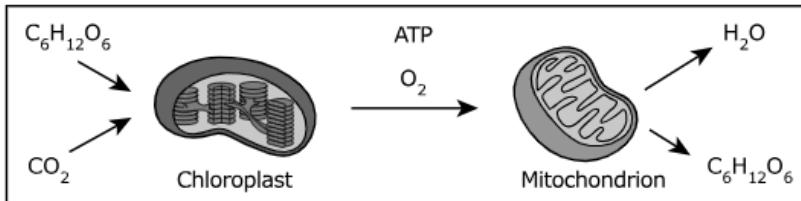
B.11 Biological structures, functions, and processes. The student knows the significance of matter cycling, energy flow, and enzymes in living organisms.

B.11(A) explain how matter is conserved and energy is transferred during photosynthesis and cellular respiration using models, including the chemical equations for these processes

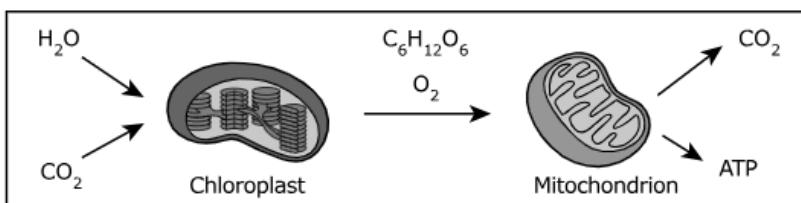
2025 – Q17

Which model shows the correct conversion of molecules by the labeled cell structures?

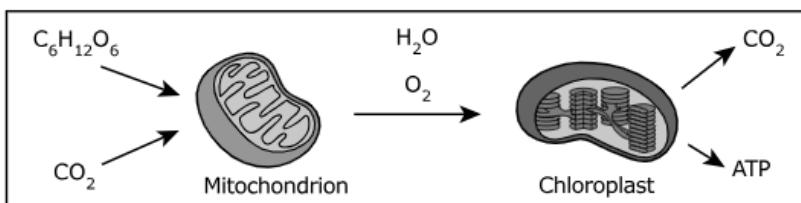
(A)



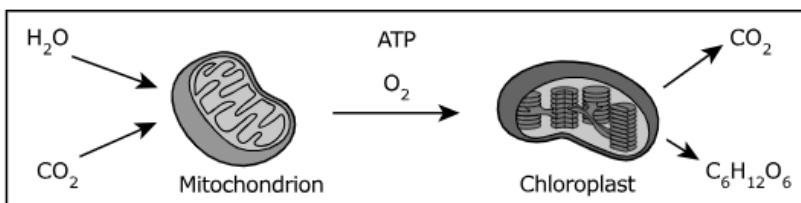
(B)



(C)



(D)



*Correct Answer (B)

Analysis of Assessed Standards

Cluster	Energy Conversions in Organisms
Subcluster	Photosynthesis
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B*	44	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.11(A) explain how matter is conserved and energy is transferred during photosynthesis and cellular respiration using models, including the chemical equations for these processes

OLD B.9(B) compare the reactants and products of photosynthesis and cellular respiration in terms of energy, energy conversions, and matter

Analysis of Assessed Standards

2024 – Q22

A student is making a table to describe the processes of photosynthesis and cellular respiration. Complete the table by identifying which process causes each result shown in the table.

Move the correct answer to each box. Each answer may be used more than once.

Photosynthesis Cellular respiration

Result	Process
Carbon dioxide is released to the atmosphere.	[.....]
Energy is stored in carbon compounds.	[.....]
Carbon dioxide is removed from the atmosphere.	[.....]
Energy is released from carbon compounds.	[.....]

Cluster	Energy Conversions in Organisms
Subcluster	Cellular Respiration; Photosynthesis
Content	Supporting
Process	
Item Type	Drag and Drop (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	36	
No Credit	16	
Partial Credit	49	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer ([from top to bottom] Cellular respiration, Photosynthesis, Photosynthesis, Cellular Respiration)

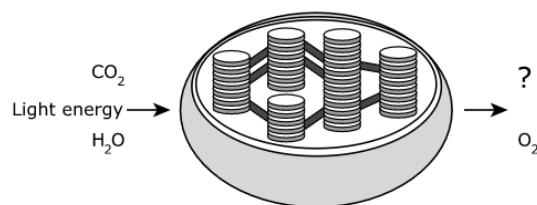
B.11(A) explain how matter is conserved and energy is transferred during photosynthesis and cellular respiration using models, including the chemical equations for these processes

OLD B.9(B) compare the reactants and products of photosynthesis and cellular respiration in terms of energy, energy conversions, and matter

Analysis of Assessed Standards

2023 – Q2

The diagram represents a cellular process.



Which molecule is a direct product of this cellular process?

- A Glucose
- B Phospholipid
- C Insulin
- D DNA

Cluster	Energy Conversions in Organisms
Subcluster	Photosynthesis
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	78	
B	12	
C	5	
D	5	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (A)

B.11(A) explain how matter is conserved and energy is transferred during photosynthesis and cellular respiration using models, including the chemical equations for these processes

OLD **B.9(B)** compare the reactants and products of photosynthesis and cellular respiration in terms of energy, energy conversions, and matter

Analysis of Assessed Standards

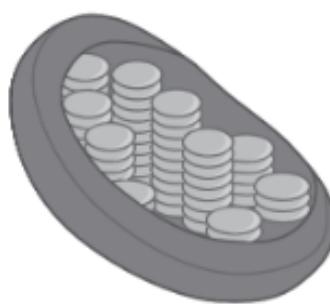
! 2022 – Q45

45 A model of two structures that perform cellular processes is shown.

I



II



What are the products of the cellular processes in these organelles?

- A** I: glucose and carbon dioxide
II: oxygen and water
- B** I: carbon dioxide and oxygen
II: glucose and water
- C** I: oxygen and glucose
II: water and carbon dioxide
- D** I: carbon dioxide and water
II: glucose and oxygen

*Correct Answer (D)

Cluster	Energy Conversions in Organisms
Subcluster	Cellular Respiration; Photosynthesis
Content	Supporting
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
A	20	
B	22	
C	23	
D*	35	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

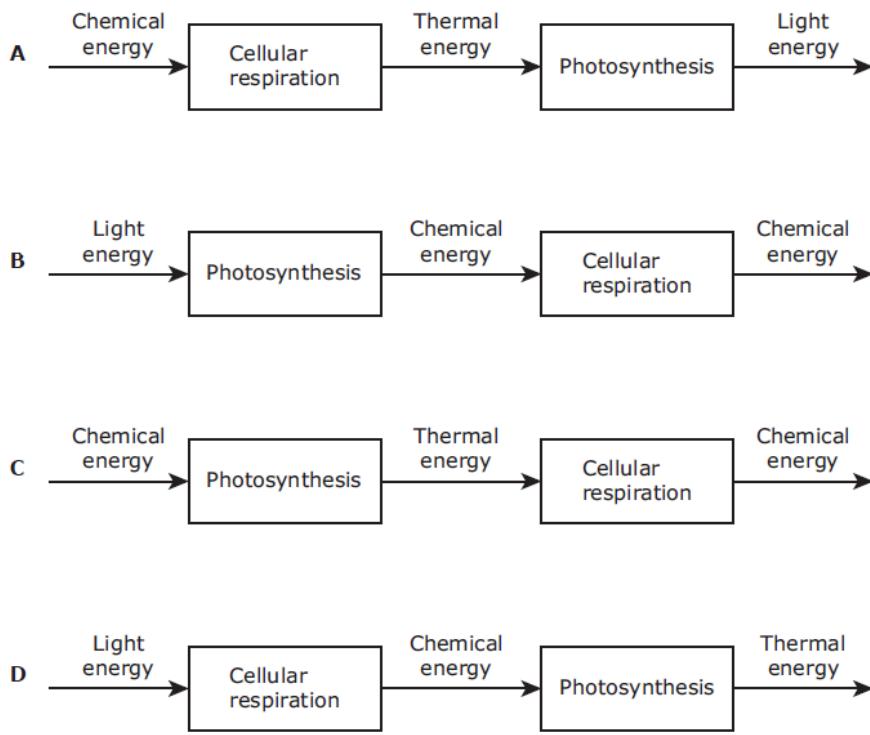
B.11(A) explain how matter is conserved and energy is transferred during photosynthesis and cellular respiration using models, including the chemical equations for these processes

OLD **B.9(B)** compare the reactants and products of photosynthesis and cellular respiration in terms of energy, energy conversions, and matter

Analysis of Assessed Standards

2021 – Q9

- 9 Which graphic organizer best compares the energy inputs and outputs of cellular respiration and photosynthesis?



*Correct Answer (B)

Cluster	Energy Conversions in Organisms
Subcluster	Cellular Respiration; Photosynthesis
Content	Supporting
Process	B.2(H)
Stimulus	

Data Analysis		
Item	State	Local
A	14	
B*	65	
C	8	
D	13	

Error Analysis
<input type="checkbox"/> Guessing
<input type="checkbox"/> Mixed Up Concepts
<input type="checkbox"/> Careless Error
<input type="checkbox"/> Stopped Too Early

Learning from Mistakes Instructional Implications

B.11(A) explain how matter is conserved and energy is transferred during photosynthesis and cellular respiration using models, including the chemical equations for these processes

OLD **B.9(B)** compare the reactants and products of photosynthesis and cellular respiration in terms of energy, energy conversions, and matter

Analysis of Assessed Standards

2019 – Q45

Which statement accurately describes the energy needs for photosynthesis and cellular respiration?

- A** Solar energy is needed for cellular respiration but not for photosynthesis.
- B** Chemical energy in the form of glucose is needed for both cellular respiration and photosynthesis.
- C** Chemical energy in the form of glucose is needed for photosynthesis, and solar energy is needed for cellular respiration.
- D** Solar energy is needed for photosynthesis, and chemical energy in the form of glucose is needed for cellular respiration.

Cluster	Energy Conversions in Organisms
Subcluster	Cellular Respiration; Photosynthesis
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
A	3	
B	11	
C	11	
D*	75	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

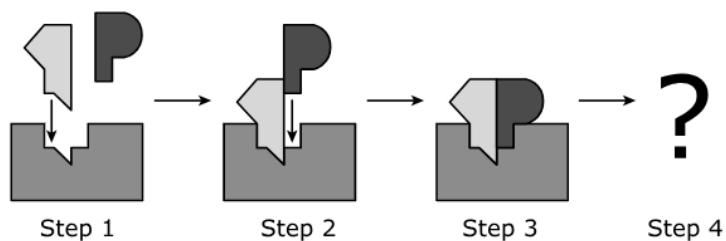
*Correct Answer (D)

B.11(B) investigate and explain the role of enzymes in facilitating cellular processes		Analysis of Assessed Standards															
2025 – Q29		Cluster Energy Conversions in Organisms Subcluster Cellular Respiration Content Readiness Process Item Type Multiple Choice (1 pt) Stimulus															
Lipase is an enzyme responsible for breaking fat down in the stomach. Which statement explains the effectiveness of lipase as it moves through the digestive system from the stomach to the intestine?																	
<p>Ⓐ It becomes less effective because it is used up by fats in the stomach.</p> <p>Ⓑ It becomes more effective because it acquires energy for more reactions from fats.</p> <p>Ⓒ It becomes less effective because it is inhibited by the change in pH from the stomach to the intestines.</p> <p>Ⓓ It becomes more effective because it changes shape and is able to break down other materials in the intestines.</p>																	
		Data Analysis															
		<table border="1"> <thead> <tr> <th>Item</th> <th>State</th> <th>Local</th> </tr> </thead> <tbody> <tr> <td>A</td> <td></td> <td></td> </tr> <tr> <td>B</td> <td></td> <td></td> </tr> <tr> <td>C*</td> <td>30</td> <td></td> </tr> <tr> <td>D</td> <td></td> <td></td> </tr> </tbody> </table>	Item	State	Local	A			B			C*	30		D		
Item	State	Local															
A																	
B																	
C*	30																
D																	
		Error Analysis															
		<input type="checkbox"/> Guessing <input type="checkbox"/> Mixed Up Concepts <input type="checkbox"/> Careless Error <input type="checkbox"/> Stopped Too Early															
		Learning from Mistakes Instructional Implications															

*Correct Answer (C)

! 2025 – Q38

The diagram illustrates a biological process.



Which statement describes what will most likely happen during Step 4?

- (A) The substrates will bind together to form a product, and the enzyme will be unchanged.
- (B) The substrates will bind together to form a product, and the enzyme will be denatured.
- (C) The enzymes and substrates will all bind together to form one product.
- (D) The enzyme will become the product and both substrates will be released.

*Correct Answer (A)

Cluster	Energy Conversions in Organisms
Subcluster	Cellular Respiration
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	29	
B		
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.11(B) investigate and explain the role of enzymes in facilitating cellular processesOLD **B.9(C)** identify and investigate the role of enzymes**Analysis of Assessed Standards**

! 2024 – Q37

Rennin is an enzyme that catalyzes a reaction that solidifies milk. Rennin was added to three different test tubes with milk. Each test tube was placed in a water bath for ten minutes. The data collected during the experiment are shown.

Test Tube	Variable	Result
1	Cold water bath	Few solids present in the liquid milk
2	Room-temperature water bath	Semi-solid milk
3	Hot water bath	No solids, only liquid milk

Which statement best explains the result of test tube 3?

- (A) The enzyme changed the product.
- (B) The substrate was used up.
- (C) The enzyme was denatured.
- (D) The substrate reacted with the enzyme.

*Correct Answer (C)

Cluster	Energy Conversions in Organisms
Subcluster	Cellular Respiration
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C*	47	
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes
Instructional Implications

B.11(B) investigate and explain the role of enzymes in facilitating cellular processes

OLD B.9(C) identify and investigate the role of enzymes

2023 – Q28

The function of an enzyme in a biochemical reaction is to —

- (A) raise the temperature of the system
- (B) speed up the rate of the reaction
- (C) increase the amount of substrate added
- (D) change the type of product formed

Analysis of Assessed Standards

Cluster	Energy Conversions in Organisms
Subcluster	Cellular Respiration
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	9	
B*	58	
C	19	
D	13	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (B)

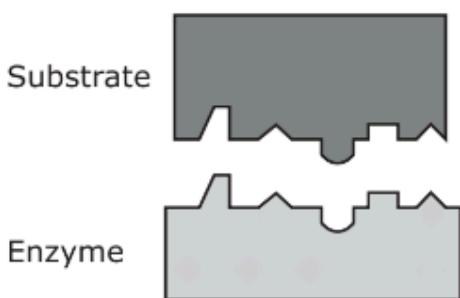
B.11(B) investigate and explain the role of enzymes in facilitating cellular processes

OLD B.9(C) identify and investigate the role of enzymes

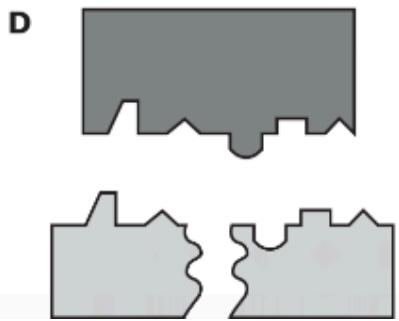
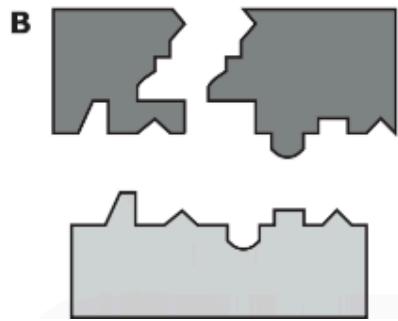
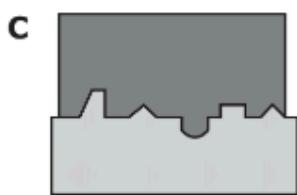
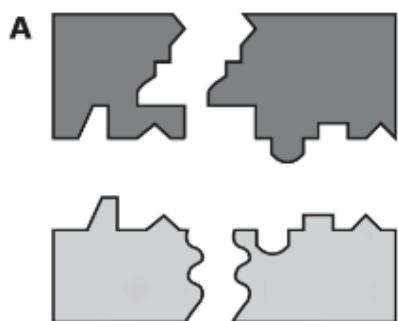
Analysis of Assessed Standards

! 2022 – Q29

29 A model of an enzyme and its corresponding substrate is shown.



Which model best represents the molecules at the end of the reaction?



*Correct Answer (B)

Cluster	Energy Conversions in Organisms
Subcluster	Cellular Respiration
Content	Readiness
Process	B.3(E)
Stimulus	

Data Analysis

Item	State	Local
A	12	
B*	21	
C	55	
D	11	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.11(B) investigate and explain the role of enzymes in facilitating cellular processes

OLD B.9(C) identify and investigate the role of enzymes

Analysis of Assessed Standards

2021 – Q19

19 For an enzyme to be able to catalyze a reaction, the active site must —

- A be occupied by an inhibitor
- B increase the activation energy level
- C have a complementary shape to the substrate
- D cause the enzyme to be destroyed in the reaction

Cluster	Energy Conversions in Organisms
Subcluster	Cellular Respiration
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local
A	13	
B	30	
C*	44	
D	12	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

*Correct Answer (C)

B.11(B) investigate and explain the role of enzymes in facilitating cellular processes

OLD B.9(C) identify and investigate the role of enzymes

Analysis of Assessed Standards

2019 – Q14

Enzymes are proteins that have a three-dimensional shape that is specific to a particular substrate. Environmental conditions can change the shape of the protein.

What is the most likely result if the shape of the enzyme changes?

- F** The substrate will change its shape to match the enzyme.
- G** The enzyme will no longer be able to catalyze the reaction with the substrate.
- H** The products made from the enzyme and the substrate will be changed.
- J** The enzyme will be able to bind to more diverse substrates than before.

Cluster	Energy Conversions in Organisms
Subcluster	Cellular Respiration
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local
F	21	
G*	48	
H	18	
J	13	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

*Correct Answer (G)

Interactions Among Biological Systems

B.12 Biological structures, functions, and processes. The student knows that multicellular organisms are composed of multiple systems that interact to perform complex functions.

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

! 2025 – Q5

When a splinter pierces the skin, the body responds with an inflammatory reaction. A table describing the response to the injury is shown.

Injury with a Splinter

1	The inflammatory response is triggered when damaged or infected cells release chemical alarm signals.
2	The temperature around the injury increases, preventing bacterial growth.
3	The chemical alarm signals white blood cells to move to the site of injury. White blood cells attack pathogens and consume dead and infected cells.
4	The chemical alarm stimulates additional blood flow and fluids to the injury, resulting in swelling.

Which set of statements describes how body systems interact after an injury?

- (A) The immune system alerts the integumentary system that the skin has been broken.

The muscular system increases the blood flow to the area, which causes swelling.

- (B) The integumentary system alerts the body that the skin has been broken.

The immune system sends white blood cells to attack pathogens that enter the body.

- (C) The nervous system alerts the capillaries to increase the temperature at the site of the injury.

The immune system releases water into the injured area to cool the area after the increase in temperature.

- (D) The immune system increases the temperature of the area to reduce bacterial growth.

The circulatory system increases blood flow to cleanse the injury.

*Correct Answer (B)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B*	48	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

Analysis of Assessed Standards

2025 – Q23

How do other body systems interact with the endocrine system to regulate body processes?

Select **TWO** correct answers.

- The nervous system helps control the release of hormones throughout the body.
- The immune system helps prevent infection from hormones within the body.
- The digestive system helps convert hormones into proteins that are absorbed within the body.
- The circulatory system helps transport hormones throughout the body.
- The integumentary system helps provide oxygen to initiate hormone production throughout the body.

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	
Item Type	Multiselect (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	39	
No Credit	16	
Partial Credit	45	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

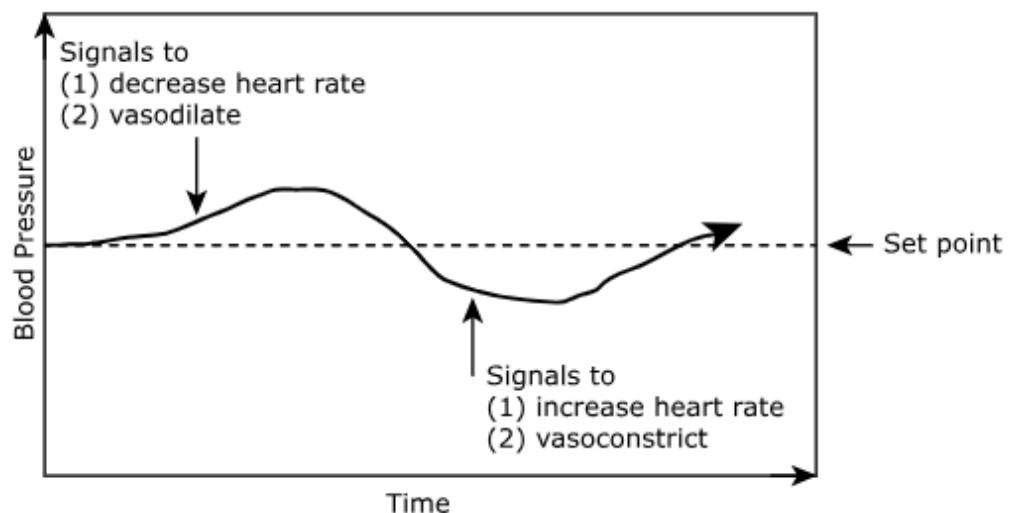
*Correct Answer (A, D)

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

! 2024 – Q10

The diagram shows changes in blood pressure over time.



Vasodilation and vasoconstriction occur because blood —

- (A) flows through veins and arteries
- (B) is a necessary component for life
- (C) flows through the heart at various rates
- (D) pressure is controlled by a feedback mechanism

*Correct Answer (D)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C		
D*	27	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

! 2024 – Q31

This question has two parts.

By sending signals that stimulate the release of hormones, the human brain controls the cycle of digestion, including the processes of nutrient absorption. The brain initiates the release of these hormones at certain times of the day, based on the body's 24-hour circadian clock. These hormones then stimulate nutrient absorption.

Part A

Based on this information, which two body systems are **MOST DIRECTLY** regulating the digestive system?

(A) Endocrine and nervous

(B) Respiratory and nervous

(C) Muscular and excretory

(D) Integumentary and excretory

Part B

Which statement **BEST** supports the answer to Part A?

(A) Signals are sent to glands that release chemicals into the blood, leading to the increased absorption of nutrients.

(B) Signals are sent to reduce the intake of oxygen so that nutrients can be more readily absorbed.

(C) Signals increase muscle contractions, reducing water in the body to improve the absorption of nutrients.

(D) Signals open pores in the skin so that excess water can be released, making room for the increased absorption of nutrients.

*Correct Answer (A, A)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	
Item Type	Multipart (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	40	
No Credit	51	
Partial Credit	10	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

2023 – Q13

The body sometimes needs to send messages long distances by releasing hormones into the bloodstream. The hormones are then carried to the target location.

Which body systems are involved in this interaction?

Move the correct answer to each box. Not all answers will be used.

digestive circulatory respiratory nervous endocrine immune

The _____ system releases hormones into the bloodstream, and the _____ system carries them to the target location.

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	
Item Type	Drag and Drop (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	40	
No Credit	32	
Partial Credit	28	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

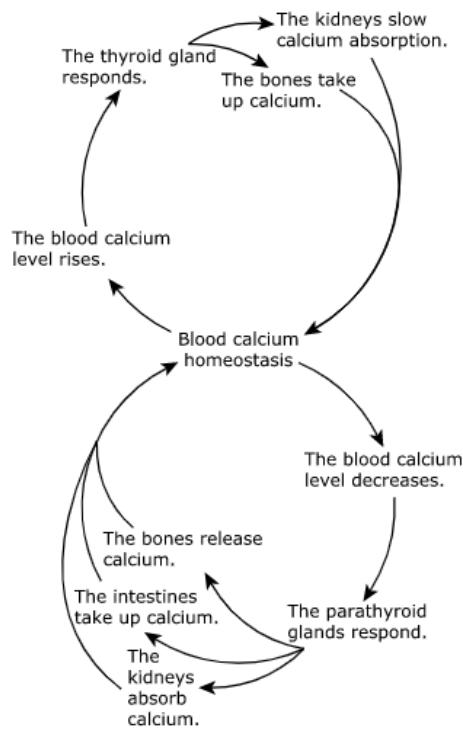
*Correct Answer (endocrine, circulatory)

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

2023 – Q21

The feedback loop for blood calcium homeostasis is shown.



According to the diagram, which four body systems are interacting to maintain blood calcium homeostasis?

- Ⓛ Respiratory, digestive, muscular, skeletal
- Ⓜ Respiratory, immune, reproductive, endocrine
- Ⓝ Endocrine, excretory, integumentary, muscular
- Ⓞ Endocrine, digestive, excretory, skeletal

*Correct Answer (D)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	24	
B	18	
C	15	
D*	43	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

2022 – Q3

- 3** Biting flies can transmit diseases and cause loss of blood for animals in nature. Horses have developed behaviors to repel biting flies such as ear twitching, head tossing, leg stomping, and tail swishing.

Which statement best describes the interaction between body systems that allows horses to repel biting flies?

- A** The nervous system senses the biting flies and sends a signal to the muscular system to move.
- B** The circulatory system senses the biting flies and sends a signal to the nervous system to move.
- C** The muscular system senses the biting flies and sends a signal to the integumentary system to move.
- D** The integumentary system senses the biting flies and sends a signal to the circulatory system to move.

*Correct Answer (A)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	B.3(A)
Stimulus	

Data Analysis

Item	State	Local
A*	79	
B	9	
C	8	
D	4	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

2022 – Q22

22 Which sequence best describes an interaction between the integumentary and excretory systems that helps maintain homeostasis?

- F** Heart rate increases → Blood vessels constrict → Blood pressure increases
- G** Blood vessel is damaged → Platelets begin to clump → Blood vessel ruptures
- H** Blood sugar levels rise → Pancreas secretes insulin → Blood sugar continues to rise
- J** Body temperature increases → Glands release sweat → Body temperature decreases

*Correct Answer (J)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	15	
G	10	
H	11	
J*	64	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

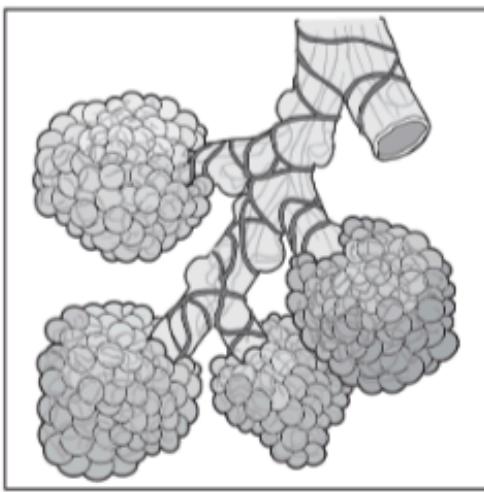
Analysis of Assessed Standards

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

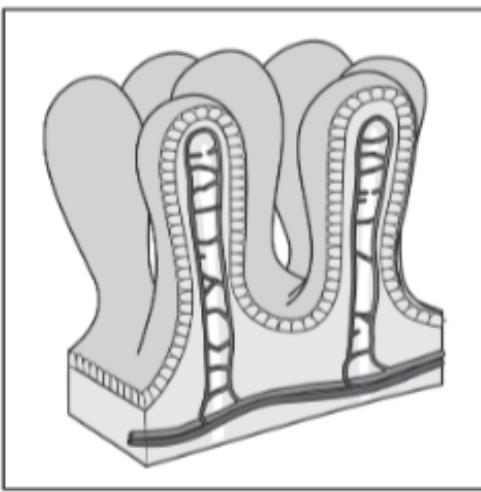
2022 – Q42

- 42** Both the respiratory system and the digestive system involve the uptake of necessary molecules from an animal's surroundings. Alveoli are tiny sacs that aid in the exchange of carbon dioxide and oxygen in the lungs. Intestinal villi are tiny projections along the lining of the intestines used to take in nutrients from food passing through.

Alveoli



Intestinal Villi



Which system must interact with the respiratory and digestive systems to transport gases and nutrients throughout the body?

- F** Endocrine
- G** Integumentary
- H** Immune
- J** Circulatory

*Correct Answer (J)

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
F	13	
G	15	
H	14	
J*	57	

Error Analysis

- Guessing
- Mixed Up Concepts
- Careless Error
- Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

2021 – Q1

- 1 When the skin comes in contact with an irritant, receptors in the skin send signals to the spinal cord. The signal is then sent to the brain for processing, and the individual begins to scratch the affected area.

Which two systems are most likely interacting when a person experiences itching caused by a skin irritant?

- A Circulatory and excretory
- B Integumentary and nervous
- C Digestive and muscular
- D Respiratory and lymphatic

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	B.3(A)
Stimulus	

Data Analysis

Item	State	Local
A	12	
B*	82	
C	3	
D	3	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (B)

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

! 2021 – Q26

26 Breaking down food for nutrients involves many body systems. A student made a partial list of the processes that occur.

- Salivary enzymes begin to break down starch molecules in food.
- Gastrointestinal enzymes are released in response to a hormone signal.
- Nutrients are absorbed into the bloodstream from the small intestine.

Which body systems interact most directly in the three listed processes?

F Digestive
Integumentary
Muscular

H Circulatory
Excretory
Immune

G Excretory
Immune
Muscular

J Circulatory
Digestive
Endocrine

*Correct Answer (J)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	28	
G	6	
H	11	
J*	55	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

Analysis of Assessed Standards

2021 – Q49

- 49 Which statement best describes an interaction between the muscular system and the respiratory system?
- A The hormone adrenaline causes blood vessels to contract and send more blood to major muscles.
 - B Metabolic wastes generated by muscle cells are eliminated in urine.
 - C The diaphragm contracts causing the chest cavity to expand, which draws air into the lungs.
 - D Nutrients absorbed in the small intestine are transported in blood to the brain.

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
A	20	
B	6	
C*	66	
D	8	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (C)

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

Analysis of Assessed Standards

2019 – Q5

Which four body systems interact to allow a person to sneeze?

- A** Muscular, immune, nervous, respiratory
- B** Nervous, respiratory, circulatory, skeletal
- C** Respiratory, endocrine, skeletal, circulatory
- D** Lymphatic, skeletal, respiratory, muscular

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
A*	73	
B	14	
C	6	
D	6	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (A)

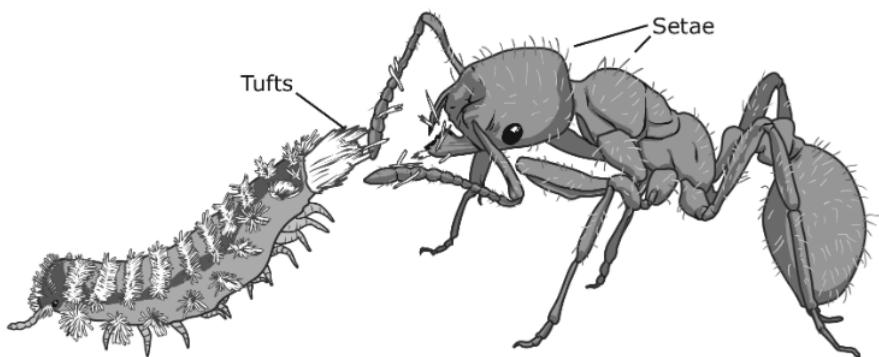
B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

2019 – Q25

The fuzzy millipede, *Polyxenus fasciculatus*, is found in Texas and is preyed upon by most species of ants. To protect itself against the ants, it ejects fibers from a tuft located at the tail end of its body. The tufts have hooks at the tips and barbs along their length that lock and interlink with the ant's setae, small hairs that cover the body of the ant. When an ant attacks, the millipede flexes its back end toward the ant and wipes the tufts against it. As the ant attempts to remove the tufts, it entangles itself more, becoming immobilized.

Fuzzy Millipede and Ant Encounter



Which two systems most directly interact in the fuzzy millipede's defense against ants?

- A** Muscular and integumentary
- B** Immune and muscular
- C** Integumentary and endocrine
- D** Endocrine and immune

*Correct Answer (A)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
A*	65	
B	17	
C	12	
D	6	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

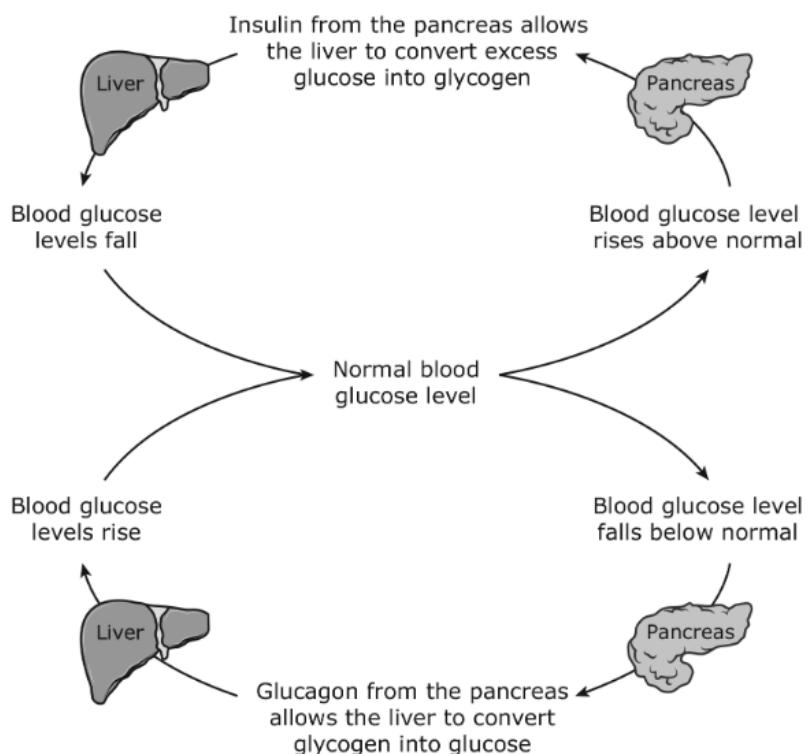
Learning from Mistakes Instructional Implications

B.12(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

OLD B.10(A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals

! 2019 – Q38

A feedback mechanism in the human body is shown.



Based on this diagram, which two systems interact to maintain homeostasis?

- F** The nervous and reproductive systems work together to stimulate the production of insulin.
- G** The circulatory and endocrine systems work together to keep blood sugar levels constant.
- H** The excretory and nervous systems work together to convert glycogen into glucose.
- J** The immune and circulatory systems work together to circulate blood through the pancreas.

*Correct Answer (G)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Animal Structure and Function
Content	Supporting
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
F	8	
G*	57	
H	13	
J	21	

Error Analysis

- Guessing
- Mixed Up Concepts
- Careless Error
- Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

! 2025 – Q12

Flowering is a process that occurs in many plants to ensure reproductive success. Which statement **MOST DIRECTLY** describes the interactions needed for flowering to occur?

- Ⓐ A hormone triggers the production of pigments that travel to the flower and initiate blooming.
- Ⓑ Water is absorbed through the plant's shoots to increase the leaf's ability to support the opening of flowers.
- Ⓒ Plants respond to environmental factors by producing hormones needed for flowering.
- Ⓓ Warmer temperatures increase the rate at which water and nutrients are transported to the flower bud by traveling through the phloem.

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Plant Structure and Function
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C*	27	
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (C)

B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

Analysis of Assessed Standards

2025 – Q33

A person waters a grapefruit tree on a sunny day. Which process **MUST** occur for the tree to use the water?

- (A) Water is absorbed by the roots and then moved to the top of the tree by the xylem.
- (B) Water is gathered by the leaves and then converted into glucose for the tree to use as energy.
- (C) Water is moved from the top of the tree and then transported into the roots by the phloem.
- (D) Water is collected in the flowers on the tree and then converted into tissue to produce bark.

Cluster	Interactions Among Biological Systems
Subcluster	Plant Structure and Function
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	73	
B		
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

*Correct Answer (A)

B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

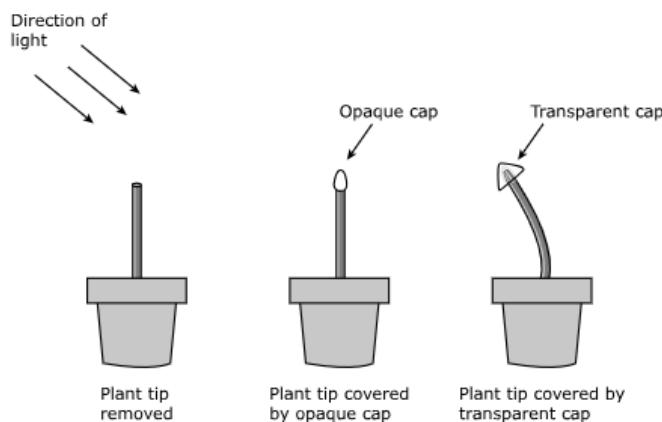
OLD B.10(B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants

2024 – Q8

In the late 19th century, Charles Darwin and his son performed a series of experiments on young grass seedlings to observe the plants' response to sunlight. They grouped the seedlings as shown in the list:

- They removed the tips of one group of seedlings.
- They placed opaque caps over the tips of a second group of seedlings.
- They placed transparent caps over the tips of a third group of seedlings.

The results of the experiment are shown in the diagram.



Based on the diagram, which statement **BEST** supports the results of the experiment?

- (A) The direction of light is detected by cells on the shoot tips, and plants respond by producing chlorophyll.
- (B) The direction of light is detected by cells on the roots, and plants respond by bending toward the light.
- (C) The direction of light is detected by cells on the shoot tips, and plants respond by bending toward the light.
- (D) The direction of light is detected by cells within the roots, and plants respond by bending in the direction of gravity.

*Correct Answer (C)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Plant Structure and Function
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C*	69	
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

OLD B.10(B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants

! 2023 – Q18

Which plant response would best aid a plant in maximizing and retaining water acquired during a drought?

- (A) Decreasing root growth, while increasing stem and leaf growth
- (B) Increasing root, stem, and leaf growth
- (C) Decreasing stem and leaf growth, while increasing root growth
- (D) Increasing leaf and root growth, while decreasing stem growth

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Plant Structure and Function
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	12	
B	25	
C*	44	
D	19	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (C)

B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

OLD B.10(B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants

! 2023 – Q39

This question has two parts.

Roots of different plants can be connected by a network of underground fungal extensions called hyphae. These fungi contribute minerals to the plants, and the plants contribute carbohydrates to the fungi.

Part A

Which statement about the transportation of these substances within the plant is true?

- (A) The minerals are transported from the phloem to the xylem in the shoot system.
- (B) The carbohydrates are transported from the shoot system to the fungi by the xylem.
- (C) The minerals are transported from the xylem to the phloem in the roots.
- (D) The carbohydrates are transported to the fungi through the phloem.

Part B

Which statement supports the answer to Part A?

- (A) The xylem is part of the plant's vascular tissues.
- (B) The phloem transfers glucose throughout the plant.
- (C) The xylem can move substances up from the roots.
- (D) The phloem is connected to the roots by the xylem.

*Correct Answer (D, B)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Plant Structure and Function
Content	Readiness
Process	
Item Type	Multipart (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	14	
No Credit	79	
Partial Credit	7	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

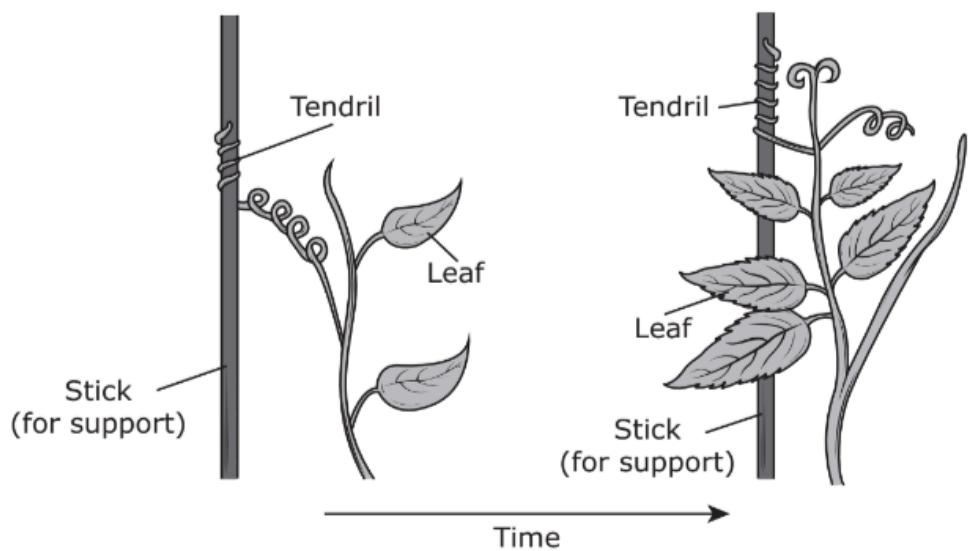
**Learning from Mistakes
Instructional Implications**

B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

OLD B.10(B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants

2022 – Q7

- 7** Positive thigmotropism is a response in plants in which they move and grow toward an object the plant comes into physical contact with, usually curling around the object.



This response of the shoot system benefits the plant by allowing the plant to —

- A** produce more pollen for pollinators
- B** take in more carbon dioxide to convert into glucose
- C** absorb more water to transport to the leaves
- D** reach more sunlight for photosynthesis

*Correct Answer (D)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Plant Structure and Function
Content	Readiness
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
A	4	
B	10	
C	14	
D*	71	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

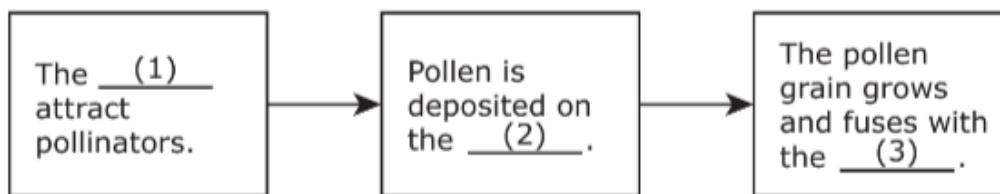
B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

OLD **B.10(B)** describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants

Analysis of Assessed Standards

! 2022 – Q19

19 Students studying the interaction among the reproductive parts of flowering plants make the graphic organizer shown.



Which terms best complete the numbered blanks in the flowchart?

- A** (1) filaments
(2) petals
(3) stigma

- B** (1) petals
(2) ovule
(3) stigma

- C** (1) filaments
(2) petals
(3) ovule

- D** (1) petals
(2) stigma
(3) ovule

*Correct Answer (D)

Cluster	Interactions Among Biological Systems
Subcluster	Plant Structure and Function
Content	Readiness
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
A	13	
B	24	
C	14	
D*	48	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

OLD B.10(B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants

2022 – Q47

47 Water, sugar, and other important nutrients need to be transported from one part of a plant to another. Which statement correctly describes the interaction of the root and shoot systems during nutrient transport?

- A** The leaves take in water and sugar, which are then transported to the rest of the plant through vascular tissues.
- B** The roots take in water and sugar, which are then transported to the rest of the plant through vascular tissues.
- C** The leaves take in water and the roots produce sugar that are transported to the rest of the plant through vascular tissues.
- D** The roots take in water and the leaves produce sugar that are transported to the rest of the plant through vascular tissues.

*Correct Answer (D)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Plant Structure and Function
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local
A	9	
B	22	
C	12	
D*	56	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

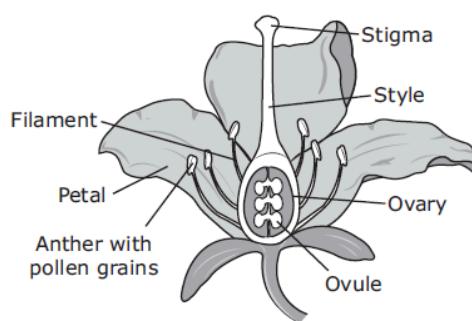
Learning from Mistakes Instructional Implications

B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

OLD B.10(B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants

2021 – Q24

- 24 A flower that has both male and female reproductive structures is shown.



Which statement best describes an interaction that will allow a flowering plant to reproduce by self-pollination?

- F An anther is transferred from a filament to another filament within the same flower.
- G An ovule is transferred from the ovary to a petal on a different flower.
- H A pollen grain is transferred from an anther to the stigma of the same flower.
- J An ovary is transferred from a flower on one plant to a flower on a different plant.

*Correct Answer (H)

Analysis of Assessed Standards

Cluster	Interactions Among Biological Systems
Subcluster	Plant Structure and Function
Content	Readiness
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
F	15	
G	14	
H*	63	
J	9	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

OLD B.10(B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants

Analysis of Assessed Standards

2021 – Q46

- 46 Students set up a controlled experiment by growing the same type of seedlings in two different locations. After a period of time, the students observed the seedlings and recorded their observations in the table shown.

	Group #1	Group #2
Growth Location	Enclosed in a box with a lamp on top of seedlings	On the windowsill
Observation	Shoots grow straight and upright	Shoots bend in the direction of the window

What caused the shoots of the seedlings on the windowsill to bend toward the window?

- F Hormones produced in response to a light stimulus
- G Sugars produced in response to a gravity stimulus
- H Carbon dioxide produced in response to a water stimulus
- J Water produced in response to a nitrogen stimulus

*Correct Answer (F)

Cluster	Interactions Among Biological Systems
Subcluster	Plant Structure and Function
Content	Readiness
Process	B.2(E)
Stimulus	

Data Analysis

Item	State	Local
F*	72	
G	10	
H	12	
J	6	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

OLD B.10(B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants

Analysis of Assessed Standards

2019 – Q18

Gibberellins are hormones produced in the root tips of plants. The plant uses these hormones to stimulate the growth of shoots.

How are gibberellins able to affect other parts of the plant?

- F** Gibberellins are absorbed through the stomata and attach to chloroplasts.
- G** Gibberellins are transported through vascular tissues to other parts of the plant.
- H** Gibberellins become concentrated within the tissues of the plant during mitosis.
- J** Gibberellins become modified once they infect healthy cells and are later released to infect other cells.

Cluster	Interactions Among Biological Systems
Subcluster	Plant Structure and Function
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local
F	22	
G*	53	
H	16	
J	9	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (G)

B.12(B) explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures

OLD B.10(B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants

Analysis of Assessed Standards

2019 – Q35

A chart of some plant systems and functions is shown.

Option	System	Functions
1	Root	absorption of water and nutrients
2	Shoot	seed dispersal and absorption of CO ₂
3	Root	respiration and food storage
4	Shoot	photosynthesis and food transport

Which system interactions are dependent on the plant's ability to respond to the direction of light?

- A** Option 1
- B** Option 2
- C** Option 3
- D** Option 4

*Correct Answer (D)

Cluster Interactions Among Biological Systems

Subcluster Plant Structure and Function

Content Readiness

Process B.2(G)

Stimulus

Data Analysis

Item	State	Local
A	10	
B	9	
C	5	
D*	75	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

Interdependence and Ecosystem Stability

B.13 Interdependence within environmental systems. The student knows that interactions at various levels of organization occur within an ecosystem to maintain stability.

B.13(A) investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability	Analysis of Assessed Standards		
2025 – Q35	Cluster	Interdependence and Ecosystem Stability	
	Subcluster	Ecosystem Stability	
	Content	Supporting	
	Process		
	Item Type	Multiple Choice (1 pt)	
	Stimulus		
	Data Analysis		
Ⓐ Mutualism	Item	State	Local
Ⓑ Commensalism	A*	68	
Ⓒ Parasitism	B		
Ⓓ Predation	C		
	D		
	Error Analysis		
	<input type="checkbox"/> Guessing	<input type="checkbox"/> Mixed Up Concepts	
	<input type="checkbox"/> Careless Error	<input type="checkbox"/> Stopped Too Early	
Learning from Mistakes Instructional Implications			
*Correct Answer (A)			

B.13(A) investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability

Analysis of Assessed Standards

2025 – Q40

A student lists facts about raccoons:

1. Coyotes and bobcats eat raccoons.
2. Raccoons will eat fruit and nuts after they have dropped onto the ground.
3. Raccoons eat a variety of foods, including fish, small rodents, and frogs.
4. Raccoons can use their fingers to open garbage cans to eat what is inside.

Which facts describe a predator-prey relationship?

A Facts 1 and 2

B Facts 1 and 3

C Facts 2 and 4

D Facts 3 and 4

*Correct Answer (B)

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B*	80	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes
Instructional Implications

B.13(A) investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability

OLD **B.12(A)** interpret relationships, including predation, parasitism, commensalism, mutualism, and competition, among organisms

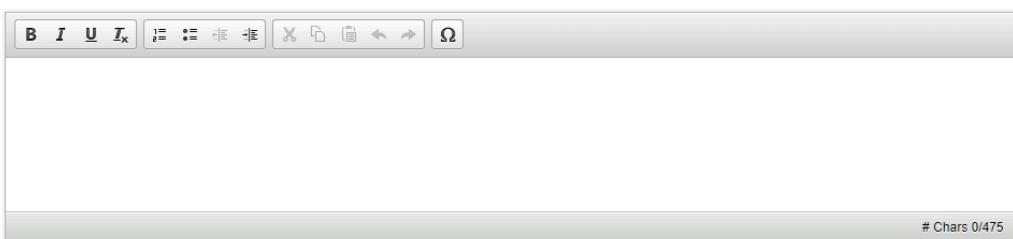
! 2024 – Q26

Ecological relationships occur between two species that live close to each other. Two examples of ecological relationships are described.

- **Example 1:** Bees gather nectar and pollen from flowering plants, providing food for the bees. As the bees move to different flowers, some of the pollen attached to the bees' bodies is spread and released. If the pollen falls on the flower of a plant of the same species, it may fertilize the plant and produce seeds.
- **Example 2:** Orchids are flowering plants that grow on other plants. They typically grow in tall trees high in the canopy, where they can reach sunlight for photosynthesis. They get water and nutrients from rainwater runoff that carries organic material down the host plant's branches. No water or nutrients are taken from the host plant.

What is the main difference between the ecological relationships described in the two examples? Include the scientific term used to define each of the relationships.

Think about the question carefully. Then enter your answer in the box provided.



*Correct Answer (See Scoring Guide)

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Item Type	Short Constructed Response (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	26	
No Credit	64	
Partial Credit	10	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.13(A) investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability

Analysis of Assessed Standards

OLD **B.12(A)** interpret relationships, including predation, parasitism, commensalism, mutualism, and competition, among organisms

! 2024 – Q38

The oak mistletoe is a green, leafy plant that grows on trees and has white berries. Mistletoe seeds are spread to other trees through the waste of birds that feed on the berries. The mistletoe seedlings grow into the tree to obtain water and nutrients.

Which answer choice correctly identifies a relationship between two of these organisms?

(A) The relationship between the tree and the mistletoe is commensalism.

(B) The relationship between the birds and the trees is predator-prey.

(C) The relationship between the birds and the trees is mutualism.

(D) The relationship between the tree and the mistletoe is parasitism.

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C		
D*	28	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (D)

B.13(A) investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability

OLD B.12(A) interpret relationships, including predation, parasitism, commensalism, mutualism, and competition, among organisms

Analysis of Assessed Standards

2023 – Q30

Spores of the fungus *Ustilago maydis* land and grow on sweet corn. The fungus then infects the plant tissue, extracting nutrients from the plant's cells.

The relationship between sweet corn and *Ustilago maydis* can best be described as —

(A) competition

(B) commensalism

(C) predation

(D) parasitism

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)

Stimulus

Data Analysis

Item	State	Local
A	6	
B	13	
C	10	
D*	71	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (D)

B.13(A) investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability

OLD **B.12(A)** interpret relationships, including predation, parasitism, commensalism, mutualism, and competition, among organisms

Analysis of Assessed Standards

2022 – Q15

15 Leaf-cutter ants harvest leaves and carry them to fungi that convert plant material into a usable form for the ants to digest. The fungi depend on the leaves for nutrients. The ants also produce an antibiotic on their bodies that helps protect the fungi from harmful bacteria.

Which of these explains the relationship between the leaf-cutter ants and the fungi?

- A** Predation, because the ants feed on the fungi
- B** Mutualism, because both the ants and the fungi benefit from each other
- C** Competition, because both organisms consume the same resource for energy
- D** Commensalism, because the ants receive energy from the fungi and the fungi are unaffected

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
A	5	
B*	79	
C	8	
D	8	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

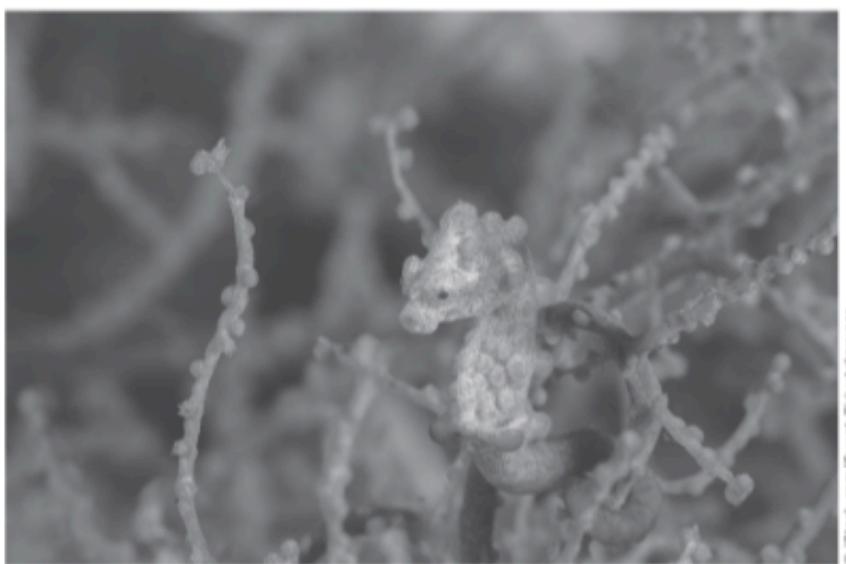
*Correct Answer (B)

B.13(A) investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability

OLD B.12(A) interpret relationships, including predation, parasitism, commensalism, mutualism, and competition, among organisms

2022 – Q38

- 38** In some coral reefs, a symbiotic relationship exists between pygmy seahorses and sea fans. The pygmy seahorse can wrap its tail around the branches of the sea fan. This allows the pygmy seahorse to be camouflaged within the sea fan, protecting it from predators. The pygmy seahorse does not harm or benefit the sea fan while it grasps the branches with its tail.



What is the correct classification of this symbiotic relationship?

- F** Predator/prey
- G** Mutualism
- H** Commensalism
- J** Parasite/host

*Correct Answer (H)

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
F	10	
G	15	
H*	68	
J	6	

Error Analysis

- Guessing
- Mixed Up Concepts
- Careless Error
- Stopped Too Early

Learning from Mistakes Instructional Implications

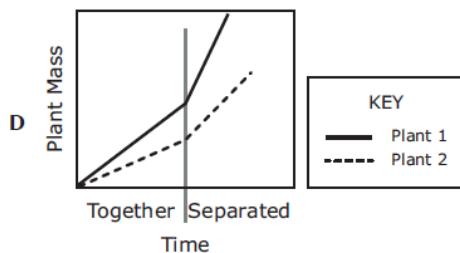
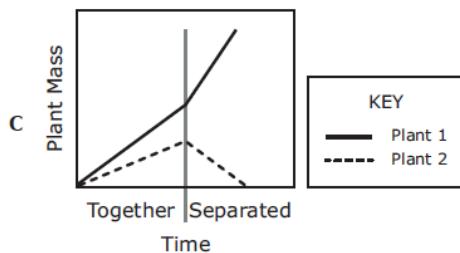
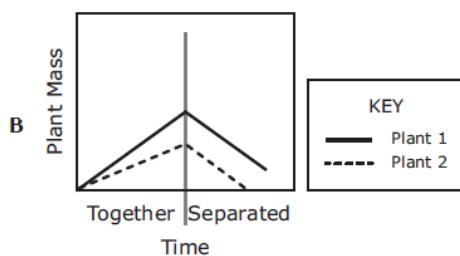
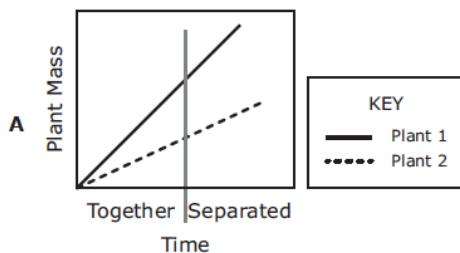
B.13(A) investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability

OLD **B.12(A)** interpret relationships, including predation, parasitism, commensalism, mutualism, and competition, among organisms

! 2021 – Q21

- 21 In an experiment, two plants are grown together for a time and then separated. Plant 2 is a parasite of Plant 1.

Which graph best predicts the growth of Plant 1 and Plant 2 during the experiment?



*Correct Answer (C)

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
A	11	
B	9	
C*	64	
D	15	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.13(A) investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability

OLD **B.12(A)** interpret relationships, including predation, parasitism, commensalism, mutualism, and competition, among organisms

2021 – Q38

- 38 Researchers have observed striped hyenas and gray wolves hunting together in certain areas. One hypothesis suggests that changing hunting behavior aids both species in obtaining better and more resources. In this hypothesis the hyenas benefit because the wolves chase and take down large animals, such as goats, that the hyenas usually cannot catch alone. The wolves benefit from hyenas using their jaw strength to crack open large bones of prey to access additional nutrients from bone marrow.

Which table best identifies the ecological relationships among the gray wolf, hyena, and goats?

F

Organisms Involved	Relationship
Hyenas and gray wolves	Predator-prey
Gray wolves and goats	Commensalism

G

Organisms Involved	Relationship
Hyenas and gray wolves	Mutualism
Gray wolves and goats	Predator-prey

H

Organisms Involved	Relationship
Hyenas and gray wolves	Parasitism
Gray wolves and goats	Mutualism

J

Organisms Involved	Relationship
Hyenas and gray wolves	Commensalism
Gray wolves and goats	Parasitism

*Correct Answer (G)

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	11	
G*	74	
H	8	
J	7	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

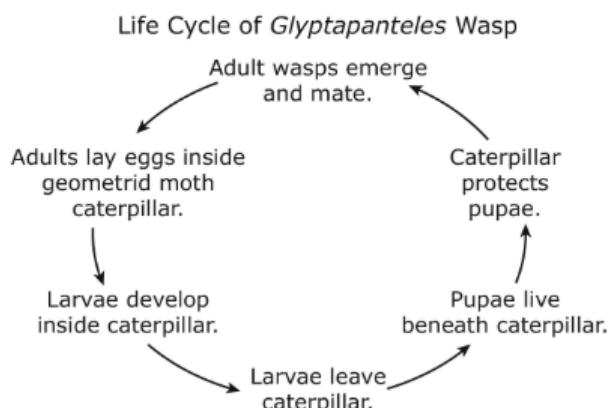
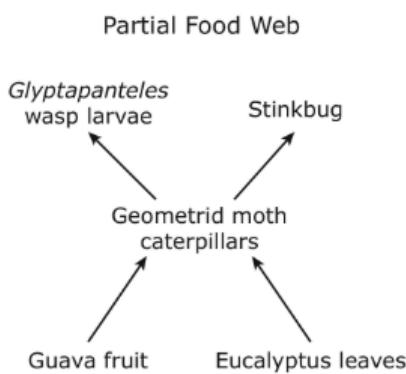
B.13(A) investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability

OLD B.12(A) interpret relationships, including predation, parasitism, commensalism, mutualism, and competition, among organisms

Analysis of Assessed Standards

! 2019 – Q32

The diagrams show a partial food web containing the *Glyptapanteles* wasp and the life cycle of this wasp.



Based on the two diagrams, which list correctly identifies the relationships *Glyptapanteles* wasp larvae have with other organisms?

- F**
- Competition: stinkbugs
 - Parasitism: geometrid moths

- G**
- Competition: geometrid moths
 - Commensalism: stinkbugs
 - Mutualism: guava and eucalyptus trees

- H**
- Competition: stinkbugs and geometrid moths
 - Commensalism: guava and eucalyptus trees

- J**
- Parasitism: geometrid moths
 - Commensalism: stinkbugs
 - Mutualism: guava and eucalyptus trees

*Correct Answer (F)

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F*	56	
G	14	
H	15	
J	14	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.13(A) investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability

OLD B.12(A) interpret relationships, including predation, parasitism, commensalism, mutualism, and competition, among organisms

2019 – Q44

The ocean sunfish (*Mola mola*) is a large, flat fish that spends most of its time in deep water feeding mainly on jellyfish. Sunfish often have many species of copepods, small crustaceans, that bury their heads into the soft tissue of the sunfish. Sunfish will swim to the surface of the water and lie sideways, allowing seabirds to eat the copepods from their skin.



© O'reena/Dreamstime.com

Which list describes the types of relationships the sunfish has with other marine organisms?

- F** Seabirds: mutualism
Jellyfish: predation
Copepods: parasitism
- G** Seabirds: parasitism
Jellyfish: commensalism
Copepods: predation
- H** Seabirds: predation
Jellyfish: mutualism
Copepods: commensalism
- J** Seabirds: commensalism
Jellyfish: parasitism
Copepods: mutualism

*Correct Answer (F)

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F*	76	
G	8	
H	9	
J	8	

Error Analysis

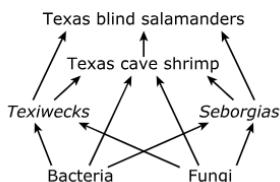
- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

B.13(B) analyze how ecosystem stability is affected by disruptions to the cycling of matter and flow of energy through trophic levels using models

2025 – Q18

The Edwards Aquifer in South Central Texas is home to several unique species, some of which are found nowhere else in the world. A food web with some aquifer species is shown.



An environmental change that harms which organism would cause the **MOST** instability in the aquifer ecosystem?

(A) Texas cave shrimp

(B) *Seborgias*

(C) Texas blind salamanders

(D) Bacteria

*Correct Answer (D)

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C		
D*	42	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

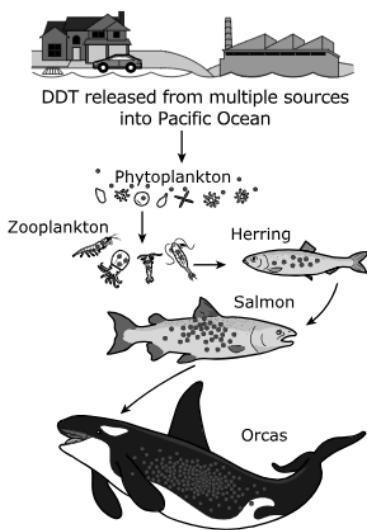
Learning from Mistakes Instructional Implications

B.13(B) analyze how ecosystem stability is affected by disruptions to the cycling of matter and flow of energy through trophic levels using models

Analysis of Assessed Standards

! 2025 – Q30

In the past, an insecticide known as DDT was widely used in the United States. However, the use of DDT was made illegal in 1972 because it does not easily break down in the environment and it collects in the tissue of animals. The diagram shows the movement of DDT in the tissues of different organisms in the Pacific Ocean.



Which phenomenon explains why the orcas have more DDT in their tissues than the zooplankton?

- A Biogeography
- B Biomagnification
- C Biomass
- D Biotic factors

*Correct Answer (B)

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B*	22	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

B.13(B) analyze how ecosystem stability is affected by disruptions to the cycling of matter and flow of energy through trophic levels using models

OLD B.12(C) analyze the flow of matter and energy through trophic levels using various models, including food chains, food webs, and ecological pyramids

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Item Type	Short Constructed Response (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	52	
No Credit	15	
Partial Credit	32	

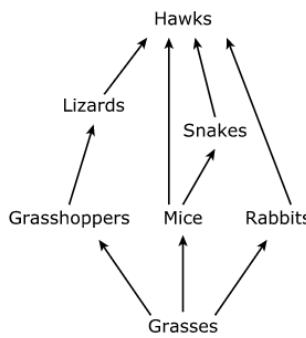
Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

! 2023 – Q3

A food web is shown.



Identify and explain **ONE** effect that the removal of mice would have on the food web.

Review the food web carefully. Then enter your answer and your explanation in the box provided.

Rich text editor toolbar:

Grasshoppers, Mice, Rabbits, Lizards, Snakes, Hawks, Grasses, # Chars 0/475

*Correct Answer (The student describes and explains one of the following: increase in grasses (because mice consume grasses), decrease in snakes (because snakes consume mice), decrease in rabbits (because hawks would prey upon more rabbits in the absence of mice as a food source), decrease in lizards (because hawks would prey upon more lizards in the absence of mice as a food source), decrease in hawks (because hawks consume mice as a food source), or increase in grasshoppers (because grasshoppers compete with mice for the grasses as a food source).)

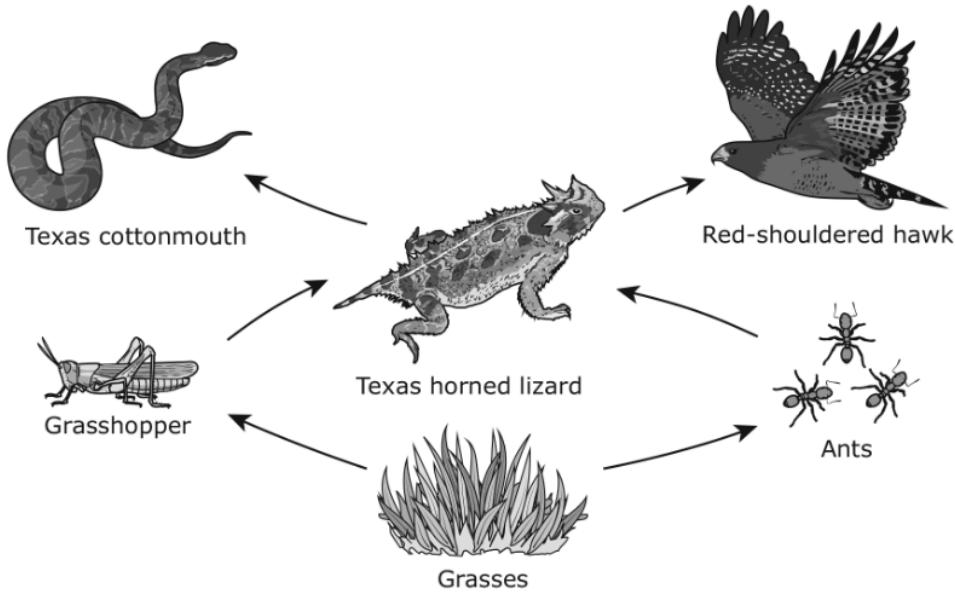
B.13(B) analyze how ecosystem stability is affected by disruptions to the cycling of matter and flow of energy through trophic levels using models

OLD B.12(C) analyze the flow of matter and energy through trophic levels using various models, including food chains, food webs, and ecological pyramids

2019 – Q20

A partial Texas food web is shown.

Partial Texas Food Web



The populations of which organisms will most likely increase as a result of a disease that suddenly reduced the population of Texas horned lizards?

- F** Grasses and ants
- G** Ants and grasshoppers
- H** Grasshoppers and Texas cottonmouths
- J** Texas cottonmouths and red-shouldered hawks

*Correct Answer (G)

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	B.2(H)
Stimulus	

Data Analysis

Item	State	Local
F	6	
G*	79	
H	3	
J	12	

Error Analysis

- Guessing
- Mixed Up Concepts
- Careless Error
- Stopped Too Early

Learning from Mistakes Instructional Implications

B.13(C) explain the significance of the carbon and nitrogen cycles to ecosystem stability and analyze the consequences of disrupting these cycles	Analysis of Assessed Standards		
2025 – Q10	Cluster	Interdependence and Ecosystem Stability	
The uptake of nitrogen by plants would likely be MOST affected by which occurrence?	Subcluster	Ecosystem Stability	
A period of seasonal rainfall	Content	Supporting	
A decrease in the burning of fossil fuels	Process		
An increase in herbivore populations	Item Type	Multiple Choice (1 pt)	
The destruction of bacteria in the soil	Stimulus		
Data Analysis			
A	Item	State	Local
B			
C			
D*		44	
Error Analysis			
<input type="checkbox"/> Guessing <input type="checkbox"/> Mixed Up Concepts			
<input type="checkbox"/> Careless Error <input type="checkbox"/> Stopped Too Early			
Learning from Mistakes Instructional Implications			
*Correct Answer (D)			

B.13(C) explain the significance of the carbon and nitrogen cycles to ecosystem stability and analyze the consequences of disrupting these cycles

Analysis of Assessed Standards

! 2025 – Q15

Many marine organisms rely on plentiful supplies of nitrite ions to survive. Ammonium can be used to produce nitrite. When seawater is highly acidic, less ammonium is converted to nitrite. One cause of ocean acidification is the absorption of large amounts of carbon dioxide by oceans.

Which statement describes how environmental changes are **MOST LIKELY** affecting the nitrogen cycle?

(A) Decreasing carbon dioxide emissions will make oceans more acidic and will decrease the available nitrite in oceans and help marine life.

(B) Decreasing carbon dioxide emissions will make oceans less acidic and will increase the available nitrite in oceans and harm marine life.

(C) Increasing carbon dioxide emissions will make oceans more acidic and will decrease the available nitrite in oceans and harm marine life.

(D) Increasing carbon dioxide emissions will make oceans less acidic and will increase the available nitrite in oceans and help marine life.

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)

Stimulus

Data Analysis

Item	State	Local
A		
B		
C*	55	
D		

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

*Correct Answer (C)

B.13(C) explain the significance of the carbon and nitrogen cycles to ecosystem stability and analyze the consequences of disrupting these cycles

OLD B.12(D) describe the flow of matter through the carbon and nitrogen cycles and explain the consequences of disrupting these cycles

! 2024 – Q11

Nitrogen is an essential component of all living things. However, atmospheric nitrogen is unavailable for organisms to use. Through various processes and chemical changes, nitrogen moves through the biosphere, atmosphere, and geosphere in different forms, making it available for all organisms. Atmospheric nitrogen is deposited in the soil and surface waters primarily through precipitation. Once in the soil, microorganisms break down the nitrogen into different forms, which is then taken up by plants. Nitrogen eventually makes its way back into the atmosphere.

What would happen within the nitrogen cycle if a bactericide, a substance that kills bacteria, was added to the soil?

- (A) The rate at which nitrogen is broken down would increase, resulting in faster absorption by plants.
- (B) Microorganisms would not be present to break down the nitrogen into a usable form for plants.
- (C) More nutrients would be added to the soil, increasing the amount of nitrogen available to plants.
- (D) Nitrogen would be blocked from entering the soil, making it unavailable for plants to use.

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B*	51	
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (B)

B.13(C) explain the significance of the carbon and nitrogen cycles to ecosystem stability and analyze the consequences of disrupting these cycles

OLD B.12(D) describe the flow of matter through the carbon and nitrogen cycles and explain the consequences of disrupting these cycles

2023 – Q25

When sawdust is added to soil, organisms in the soil will use all the available nitrogen to break the sawdust down. What effect will the lack of nitrogen have on the plants that are near the sawdust?

- A The plants will not be able to grow.
- B The plants will grow faster than before.
- C The plants will be replaced with new plants.
- D The plants will evolve to no longer need nitrogen.

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	62	
B	14	
C	9	
D	15	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

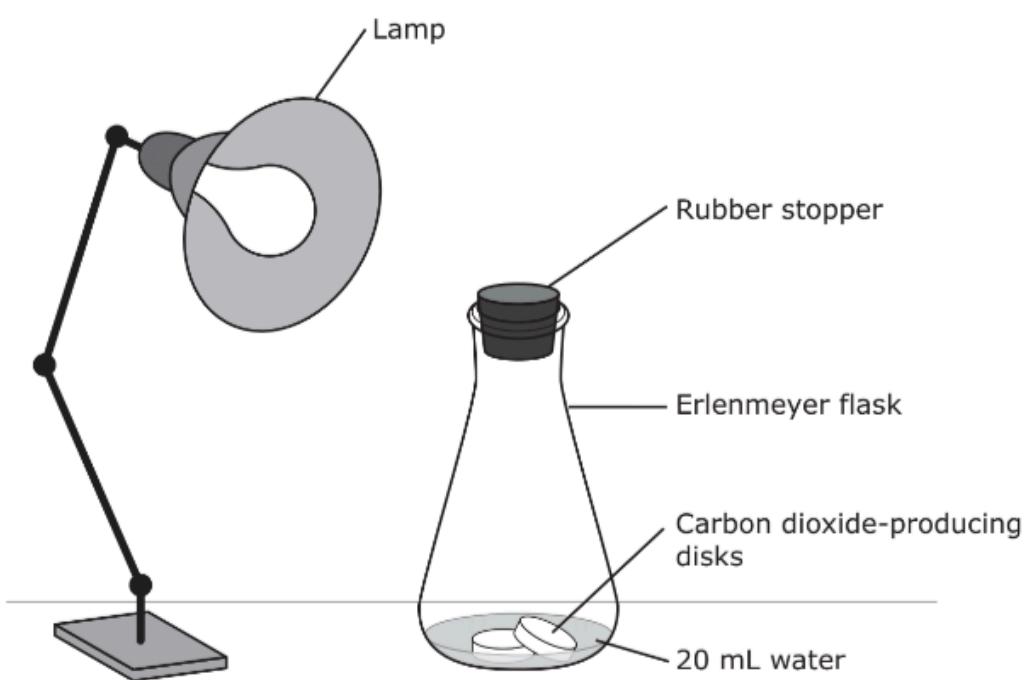
*Correct Answer (A)

B.13(C) explain the significance of the carbon and nitrogen cycles to ecosystem stability and analyze the consequences of disrupting these cycles

OLD B.12(D) describe the flow of matter through the carbon and nitrogen cycles and explain the consequences of disrupting these cycles

2022 – Q24

- 24** Students designed an experiment to model the carbon cycle. The students combined water and carbon dioxide-producing disks in a sealed flask. The flask represented Earth's atmosphere, and the lamp represented the sun. Their design is shown.



Which component can be added to the flask to reduce the concentration of carbon dioxide in the model atmosphere created by the disks?

- F** Bacteria to use carbon during nitrification
- G** Plants to absorb carbon in the process of photosynthesis
- H** Snails to use carbon through cellular respiration
- J** Mushrooms to absorb carbon during decomposition

*Correct Answer (G)

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	B.2(E)
Stimulus	

Data Analysis

Item	State	Local
F	12	
G*	73	
H	7	
J	8	

Error Analysis

- Guessing
- Mixed Up Concepts
- Careless Error
- Stopped Too Early

Learning from Mistakes Instructional Implications

B.13(C) explain the significance of the carbon and nitrogen cycles to ecosystem stability and analyze the consequences of disrupting these cycles

OLD B.12(D) describe the flow of matter through the carbon and nitrogen cycles and explain the consequences of disrupting these cycles

2021 – Q32

32 Which statement is an example of how carbon moves through a food chain as part of the carbon cycle?

- F Producers release carbon dioxide, and consumers take it in.
- G Producers take in carbon dioxide, and consumers release it.
- H Producers take in carbon from the soil, and they release it when they decompose.
- J Producers release carbon into the soil, and consumers take it in from the soil.

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	23	
G*	54	
H	14	
J	9	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (G)

B.13(C) explain the significance of the carbon and nitrogen cycles to ecosystem stability and analyze the consequences of disrupting these cycles

OLD B.12(D) describe the flow of matter through the carbon and nitrogen cycles and explain the consequences of disrupting these cycles

2019 – Q4

What would be the most likely effect of a wildfire that burned a large area of a forest?

- F** More sugars and starches would be available for animals in the area.
- G** The availability of fossil fuels for use by industries in the area would be reduced.
- H** Less carbon dioxide would be removed from the atmosphere in the area by plants.
- J** An increase in animal respiration would increase the release of carbon dioxide in the area.

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Supporting
Process	
Stimulus	

Data Analysis

Item	State	Local
F	3	
G	14	
H*	64	
J	19	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (H)

<p>B.13(D) explain how environmental change, including change due to human activity, affects biodiversity and analyze how changes in biodiversity impact ecosystem stability</p>	<p>Analysis of Assessed Standards</p>																	
<p>2025 – Q4</p>		Cluster	Interdependence and Ecosystem Stability															
<p>This question has two parts.</p>		Subcluster	Ecosystem Stability															
<p>East Texas has a wide variety of frog species that take advantage of different resources in the ecosystem, by eating different foods, choosing different ponds, and mating at different times of the year.</p>		Content	Readiness															
<p>Part A How does the biodiversity of frog species MOST LIKELY affect the stability of the ecosystem?</p>		Process																
<p>(A) By making the ecosystem more vulnerable to population losses (B) By increasing the ecosystem's ability to stay healthy when conditions change (C) By reducing the ability of individual organisms to adapt to changing conditions (D) By making individual organisms less vulnerable to competition from invasive species</p>		Item Type	Multipart (2 pts)															
<p>Part B Which statement BEST supports the answer to Part A?</p>		Stimulus																
<p>(A) When species are numerous, an alternative species may be able to fill the role of a species lost as a result of changing conditions. (B) When species have similar roles in an ecosystem, the loss of a single species can severely damage the ecosystem. (C) When species are well adapted to conditions in an ecosystem, a change in those conditions can cause multiple extinctions. (D) When species face competition from native organisms, they are poorly adapted to compete with invasive organisms for resources.</p>		<p>Data Analysis</p> <table border="1"> <thead> <tr> <th data-bbox="1139 597 1253 671">Item</th> <th data-bbox="1253 597 1367 671">State</th> <th data-bbox="1367 597 1578 671">Local</th> </tr> </thead> <tbody> <tr> <td data-bbox="1139 671 1253 745">Full Credit</td><td data-bbox="1253 671 1367 745">30</td><td data-bbox="1367 671 1578 745"></td></tr> <tr> <td data-bbox="1139 745 1253 819">No Credit</td><td data-bbox="1253 745 1367 819">55</td><td data-bbox="1367 745 1578 819"></td></tr> <tr> <td data-bbox="1139 819 1253 893">Partial Credit</td><td data-bbox="1253 819 1367 893">16</td><td data-bbox="1367 819 1578 893"></td></tr> <tr> <td data-bbox="1139 893 1253 967"></td><td data-bbox="1253 893 1367 967"></td><td data-bbox="1367 893 1578 967"></td></tr> </tbody> </table>		Item	State	Local	Full Credit	30		No Credit	55		Partial Credit	16				
Item	State	Local																
Full Credit	30																	
No Credit	55																	
Partial Credit	16																	
<p>Error Analysis <input type="checkbox"/> Guessing <input type="checkbox"/> Mixed Up Concepts <input type="checkbox"/> Careless Error <input type="checkbox"/> Stopped Too Early</p>		<p>Learning from Mistakes Instructional Implications</p>																

*Correct Answer (B, A)

B.13(D) explain how environmental change, including change due to human activity, affects biodiversity and analyze how changes in biodiversity impact ecosystem stability

Analysis of Assessed Standards

2025 – Q25

The population of an invasive crab species, *Callinectes sapidus*, is rapidly increasing along coastal Europe. This aggressive, fast-growing omnivore reproduces quickly and is causing the extinction of many native species.

Which statement **BEST** describes the effect of a native species' extinction on local ecosystem biodiversity and stability?

- (A) Extinction leads to decreases in biodiversity and decreases in stability.
- (B) Extinction leads to increases in biodiversity and decreases in stability.
- (C) Extinction leads to increases in biodiversity and increases in stability.
- (D) Extinction leads to decreases in biodiversity and increases in stability.

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A*	61	
B		
C		
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

*Correct Answer (A)

B.13(D) explain how environmental change, including change due to human activity, affects biodiversity and analyze how changes in biodiversity impact ecosystem stability

OLD **B.12(E)** describe how environmental change can impact ecosystem stability

! 2024 – Q14

This question has two parts.

Giant salvinia is a floating fern native to Brazil introduced to Texas as an aquarium plant and is now found in large bodies of water across the state. The invasive plant may be carried to new bodies of water by fishing and recreational boats. It grows quickly, covering large areas of the water's surface. When the plant dies and decomposes, the oxygen content in the water declines.

Part A

Which statement **BEST** describes how giant salvinia affects a Texas ecosystem?

(A) It promotes the growth of new types of plants.

(B) It increases the stability of the ecosystem.

(C) It provides an energy source for the ecosystem.

(D) It inhibits the growth of native plant species.

Part B

Which evidence supports the answer to Part A?

(A) Giant salvinia is poisonous to other plants that grow on the water's surface.

(B) Giant salvinia produces waste products that are used by other plants.

(C) Giant salvinia releases carbon dioxide that other plants cannot use.

(D) Giant salvinia prevents light from reaching plants that grow underwater.

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Readiness
Process	
Item Type	Multipart (2 pts)
Stimulus	

Data Analysis

Item	State	Local
Full Credit	30	
No Credit	46	
Partial Credit	24	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes
Instructional Implications

*Correct Answer (D, D)

B.13(D) explain how environmental change, including change due to human activity, affects biodiversity and analyze how changes in biodiversity impact ecosystem stability

Analysis of Assessed Standards

OLD **B.12(E)** describe how environmental change can impact ecosystem stability

2024 – Q40

Purple loosestrife is an invasive flowering plant species now found in North America. In an effort to control the purple loosestrife, biologists tested and released three beetle species to use as a biological control of the plant.

Beetle Species	Effect on Purple Loosestrife
<i>Galerucella pusilla</i>	Feeds on leaves and new shoots
<i>Hylobius transversovittatus</i>	Deposits eggs in the stem; larvae feed on root tissue
<i>Nanophyes marmoratus</i>	Feeds on flowers and reduces seed production

Which result is an unintended negative consequence of releasing these beetle species into the environment?

- Ⓐ There will be an increase in the available habitat for non-native plant species.
- Ⓑ There will be an increase in the population numbers of native beetle species in the habitat.
- Ⓒ There will be an increase in competition for food resources among all beetle species in the habitat.
- Ⓓ There will be an increase in pollination of native flowering plant species.

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A		
B		
C*	56	
D		

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (C)

B.13(D) explain how environmental change, including change due to human activity, affects biodiversity and analyze how changes in biodiversity impact ecosystem stability

OLD B.12(E) describe how environmental change can impact ecosystem stability

! 2023 – Q8

Kelp forests are critical ecosystems that provide habitats to a variety of animals, including sea urchins, sea stars, sea anemones, crabs, jellyfish, snails, and fish. They also provide hunting grounds for mammals, including sea otters, sea lions, seals, and many different birds. In recent years scientists have documented an increase in shark attacks on sea otters in and around kelp forests.

Which consequence is most likely to occur in kelp forests as a result of increased predation of sea otters?

- (A) Kelp forests will become more stable due to the decrease in otter predation pressure.
- (B) Kelp forests will become more stable as sharks replace otters as the top predator in the food chain.
- (C) Kelp forests will become less stable due to the increase in the size of the otters' prey populations.
- (D) Kelp forests will become less stable as sharks will also eliminate the prey of the otters.

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Readiness
Process	
Item Type	Multiple Choice (1 pt)
Stimulus	

Data Analysis

Item	State	Local
A	19	
B	13	
C*	45	
D	22	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

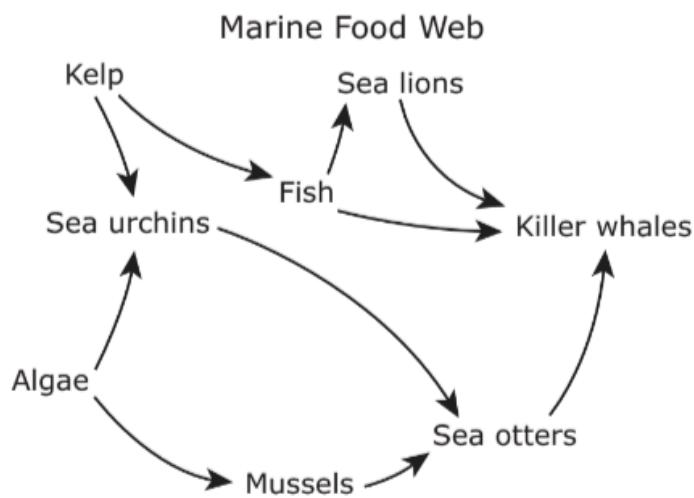
*Correct Answer (C)

B.13(D) explain how environmental change, including change due to human activity, affects biodiversity and analyze how changes in biodiversity impact ecosystem stability

OLD **B.12(E)** describe how environmental change can impact ecosystem stability

! 2022 – Q4

- 4** Oil spills in the ocean affect marine food webs. Animals that are initially affected by oil spills include sea otters, seabirds, and other organisms that spend most of their time on the ocean surface.



Based on the food web, how would a significant decrease in the sea otter population due to an oil spill most likely affect this ecosystem?

- F** The sea urchin population would increase causing the kelp population to decrease.
- G** The fish population would increase in response to the changes in the mussel population.
- H** The mussel population would increase in response to the changes in the algae population.
- J** The killer whale population would increase causing the fish population to decrease.

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Readiness
Process	B.2(G)
Stimulus	

Data Analysis

Item	State	Local
F*	63	
G	8	
H	17	
J	12	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (F)

B.13(D) explain how environmental change, including change due to human activity, affects biodiversity and analyze how changes in biodiversity impact ecosystem stability

OLD B.12(E) describe how environmental change can impact ecosystem stability

2022 – Q46

46 During an extended dry season in an area, the majority of the ground cover dried up. Which description best explains how this would affect the ecosystem in that area?

- F** The ecosystem would become less stable because the ranges of many organisms would expand and overlap.
- G** The ecosystem would become more stable because there would be less competition among canopy plants.
- H** The ecosystem would become less stable because less energy would be available to it from the decrease in producers.
- J** The ecosystem would become more stable because organisms in higher trophic levels would be able to find prey more easily.

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local
F	8	
G	7	
H*	75	
J	9	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (H)

B.13(D) explain how environmental change, including change due to human activity, affects biodiversity and analyze how changes in biodiversity impact ecosystem stability

OLD B.12(E) describe how environmental change can impact ecosystem stability

2021 – Q10

- 10** Overfishing is causing the decline of fish populations, such as Eastern Atlantic bluefin tuna in the Mediterranean. Eastern Atlantic bluefin tuna are caught faster than they can reproduce.

Which statement describes the most likely effect that overfishing will have on this ecosystem?

- F Overfishing makes the ecosystem more stable by increasing competition for limited resources.
- G Overfishing decreases the stability of the ecosystem by disrupting food chains.
- H Overfishing has no effect on ecosystem's stability because it affects one species out of many.
- J Overfishing increases ecosystem stability by allowing prey populations to overproduce.

Analysis of Assessed Standards

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local
F	5	
G*	85	
H	5	
J	5	

Error Analysis

- Guessing Mixed Up Concepts
 Careless Error Stopped Too Early

Learning from Mistakes Instructional Implications

*Correct Answer (G)

B.13(D) explain how environmental change, including change due to human activity, affects biodiversity and analyze how changes in biodiversity impact ecosystem stability

Analysis of Assessed Standards

OLD B.12(E) describe how environmental change can impact ecosystem stability

2021 – Q28

- 28 A farmer is struggling to control the population of a certain insect on his farm. After researching population control techniques, he discovers that a particular bird is a predator of this insect. The farmer purchases a number of these birds and releases them onto his farm.

How might the farmer's action most likely have a negative impact on the ecosystem?

- F The birds will increase biodiversity of native plant species.
- G The birds will pollinate native species, increasing genetic variation.
- H The birds will consume beneficial insects, as well as the pest species.
- J The birds will mate with native birds and create a new species.

Cluster	Interdependence and Ecosystem Stability
Subcluster	Ecosystem Stability
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local
F	9	
G	12	
H*	70	
J	9	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

*Correct Answer (H)

B.13(D) explain how environmental change, including change due to human activity, affects biodiversity and analyze how changes in biodiversity impact ecosystem stability

Analysis of Assessed Standards

OLD B.12(E) describe how environmental change can impact ecosystem stability

2019 – Q11

The San Marcos salamander, *Eurycea nana*, is a light reddish-brown translucent salamander about 2–5 cm in length. *E. nana* is found only in Spring Lake and a portion of the San Marcos River.

Which human activity would most likely decrease the ability of the salamanders to survive?

- A** Increasing water consumption that decreases the flow of clean water from the springs that feed the river
- B** Public transportation that reduces the number of automobiles that contribute to pollution runoff into the river
- C** Tourism that helps fund the educational programs related to river ecosystem conservation
- D** The addition of a new food source into the river that limits competition for resources

Cluster Interdependence and Ecosystem Stability

Subcluster Ecosystem Stability

Content Readiness

Process

Stimulus

Data Analysis

Item	State	Local
A*	67	
B	19	
C	5	
D	9	

Error Analysis

- Guessing Mixed Up Concepts
- Careless Error Stopped Too Early

**Learning from Mistakes
Instructional Implications**

*Correct Answer (A)

			Analysis of Assessed Standards		
			Cluster		
			Subcluster		
			Content		
			Process		
			Item Type		
			Stimulus		
			Data Analysis		Error Analysis
			Item	State	Local
			Learning from Mistakes Instructional Implications		
* Correct Answer ()					

			Analysis of Assessed Standards		
			Cluster		
			Subcluster		
			Content		
			Process		
			Item Type		
			Stimulus		
			Data Analysis		Error Analysis
			Item	State	Local
			Learning from Mistakes Instructional Implications		
* Correct Answer ()					