Biology Practice Test
Answer Key

This document contains the answer keys, rubrics, and Scoring Notes for items on the Biology Practice Test. Additional Practice Test resources are available in the LDOE Practice Test Library.

Session	Set	Sequence	Item Type	Key	Point Value	Alignment
1	Alaskan Salmon	1	MC	C	1	PE: HS-LS1-6 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) CCC: Energy and Matter
1		2	TEI	See Rubric	2	PE: HS-LS1-4 SEP: 2. Developing and using models DCI: HS.LS1B.c CCC: Systems and System Models
1		3	TEI	See Rubric	2	PE: HS-LS1-6 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) CCC: Energy and Matter
1		4	MC	C	1	PE: HS-LS1-6 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) DCI: HS.LS1C.b CCC: Energy and Matter
1	Scales and Feathers	5	MC	C	1	PE: HS-LS4-1 SEP: 8. Obtaining, evaluating, and communicating information DCI: HS.LS4A.a CCC: Patterns
1		6	TPD: MC/ MC	A/A	2	PE: HS-LS1-1 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) DCI: HS.LS1A.a CCC: Structure and Function
1		7	MC	D	1	PE: HS-LS4-1 DCI: HS.LS4A.a CCC: Patterns
1		8	CR	See Rubric	2	PE: HS-LS1-1 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) DCI: HS.LS1A.a CCC: Structure and Function
1	Tonewood Trees	9	MC	A	1	PE: HS-LS1-7 SEP: 5. Using mathematics and computational thinking DCI: HS.LS1C.c CCC: Patterns
1		10	MC	D	1	PE: HS-LS2-4 SEP: 5. Using mathematics and computational thinking DCI: HS.LS2B.b CCC: Energy and Matter

Session	Set	Sequence	Item Type	Key	Point Value	Alignment
1	Tonewood Trees	11	TPD: TEI/ MS	TEI: See Rubric; MS: D, E	2	PE: HS-LS1-7 SEP: 5. Using mathematics and computational thinking DCI: HS.LS1C.d CCC: Energy and Matter
1		12	CR	See Rubric	2	PE: HS-LS2-4 DCI: HS.LS2B.c CCC: Energy and Matter
1	Standalone Items	13	MS	A, D, E	1	PE: HS-LS3-1 SEP: 1. Asking questions (for science) and defining problems (for engineering) DCI: HS.LS3A.b
1		14	TEI	See Rubric	2	PE: HS-LS1-5 SEP: 2. Developing and using models DCI: HS.LS1C.a CCC: Energy and Matter
1		15	TEI	See Rubric	1	PE: HS-LS1-8 SEP: 8. Obtaining, evaluating, and communicating information DCI: HS.LS1E.c CCC: Scale, Proportion and Quantity
2	Banded Snails	16	MC	B	1	PE: HS-LS4-5 SEP: 7. Engaging in argument from evidence DCI: HS.LS4C.c
2		17	TPD: MC/ MC	C/D	2	PE: HS-LS4-4 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) DCI: HS.LS4C.c CCC: Cause and Effect
2		18	TEI	See Rubric	1	PE: HS-LS4-5 DCI: HS.LS4C.d CCC: Cause and Effect
2		19	TEI	See Rubric	2	PE: HS-LS4-4 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) DCI: HS.LS4C.a CCC: Cause and Effect
2		20	ER	See Rubric	9	PE: HS-LS4-4 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) DCI: HS.LS4C.a CCC: Cause and Effect
2	Standalone Items	21	TEI	See Rubric	2	PE: HS-LS1-7 SEP: 2. Developing and using models DCI: HS.LS1C.d CCC: Energy and Matter
2		22	MC	C	1	PE: HS-LS3-1 SEP: 4. Analyzing and interpreting data DCI: HS.LS3A.b CCC: Scale, Proportion and Quantity

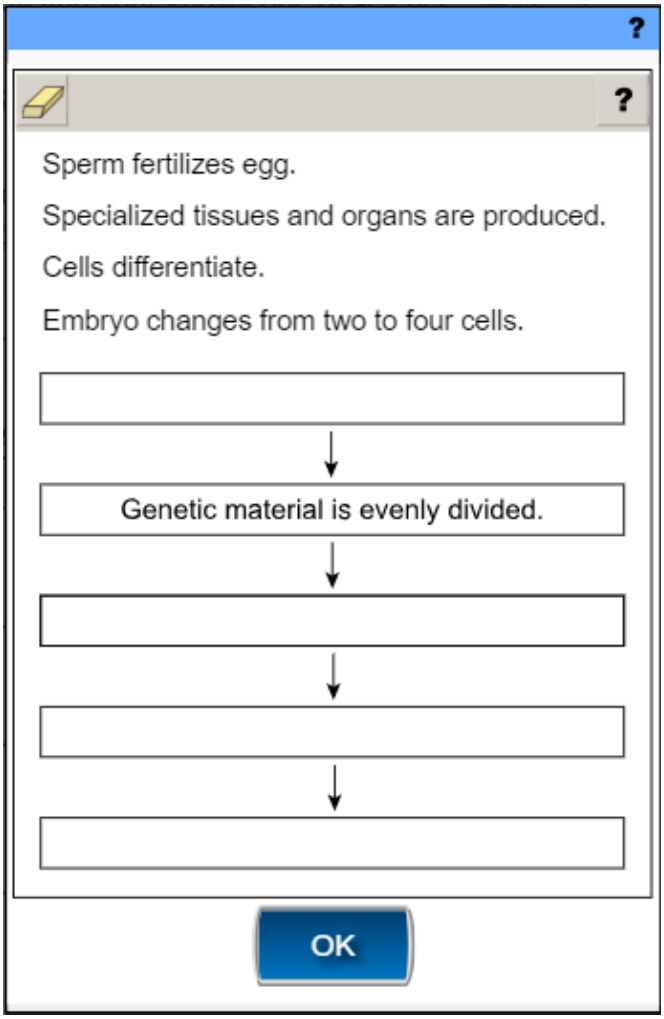
Session	Set	Sequence	Item Type	Key	Point Value	Alignment
2	Standalone Items	23	MS	C, E, G	1	PE: HS-LS1-5 DCI: HS.LS1C.a CCC: Energy and Matter
3	Kit Fox Ecology	24	MC	B	1	PE: HS-LS2-1 SEP: 5. Using mathematics and computational thinking DCI: HS.LS2A.a CCC: Stability and Change
3		25	TPI: MC/ MC	D/B	2	PE: HS-LS2-1 SEP: 5. Using mathematics and computational thinking DCI: HS.LS2A.b CCC: Stability and Change
3		26	MC	C	1	PE: HS-LS2-7 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) DCI: HS.LS2C.b CCC: Stability and Change
3		27	CR	See Rubric	2	PE: HS-LS2-7 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) DCI: HS.LS2C.b CCC: Stability and Change
3	Primate Traits	28	MS	A, D, E	1	PE: HS-LS3-2 DCI: HS.LS3B.b CCC: Cause and Effect
3		29	TEI	See Rubric	2	PE: HS-LS3-2 DCI: HS.LS3B.b CCC: Cause and Effect
3		30	MC	C	1	PE: HS-LS3-1 SEP: 1. Asking questions (for science) and defining problems (for engineering) DCI: HS.LS3A.a
3		31	TEI	See Rubric	2	PE: HS-LS3-2 SEP: 7. Engaging in argument from evidence DCI: HS.LS3A.a CCC: Cause and Effect
3	Standalone Items	32	TPD: MS/ MS	A, B, E/ A, F	2	PE: HS-LS1-3 SEP: 3. Planning and carrying out investigations DCI: HS.LS1A.d CCC: Stability and Change
3		33	TEI	See Rubric	2	PE: HS-LS4-2 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) DCI: HS.LS4B.a CCC: Cause and Effect

Session	Set	Sequence	Item Type	Key	Point Value	Alignment
3	Standalone Items	34	MS	B, F	1	PE: HS-LS1-2 SEP: 2. Developing and using models DCI: HS.LS1A.b CCC: Systems and System Models
3		35	MC	A	1	PE: HS-LS4-2 SEP: 6. Constructing explanations (for science) and designing solutions (for engineering) DCI: HS.LS4B.a
3		36	MC	B	1	PE: HS-LS1-8 SEP: 8. Obtaining, evaluating, and communicating information DCI: HS.LS1E.c
3		37	MS	A, D, E	1	PE: HS-LS4-3 SEP: 4. Analyzing and interpreting data DCI: HS.LS4C.a CCC: Patterns
3		38	TEI	See Rubric	2	PE: HS-LS1-3 SEP: 3. Planning and carrying out investigations DCI: HS.LS1A.d CCC: Stability and Change
3		39	TEI	See Rubric	1	PE: HS-LS1-2 SEP: 2. Developing and using models DCI: HS.LS1A.b CCC: Systems and System Models
3		40	TPD: MS/ MC	A, D/ B	2	PE: HS-LS2-6 SEP: 7. Engaging in argument from evidence DCI: HS.LS2C.a CCC: Stability and Change
3		41	MC	D	1	PE: HS-LS4-3 SEP: 4. Analyzing and interpreting data DCI: HS.LS4B.c

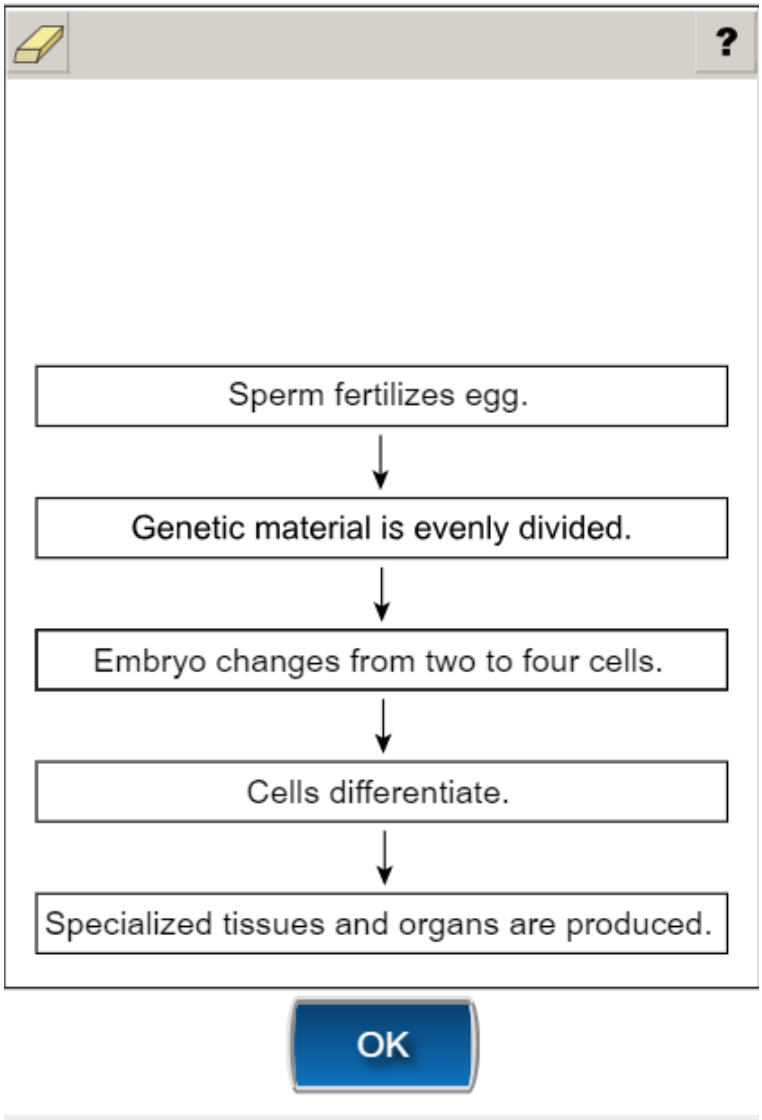
Session 1 Item 2 (TEI)

Develop a model that can be used to explain the stages of growth and development that result in a salmon fry.

Drag **each** statement into the correct box to show the stages in order.



Scoring for Session 1 Item 2 (TEI)



Scoring Notes:

This item is worth 2 points. Partial credit (1 point) will be awarded if half or more of the student responses are correct. For this item, the key contains 4 correct responses; therefore 1 point will be awarded if the student selects 2 or more correct responses.

Scoring for Session 1 Item 3 (TEI)

Chum salmon fry average 3.8 cm in length, compared to 3 cm for pink salmon fry and 10 cm for coho salmon fry.

Select the correct answer from each drop-down menu to complete the sentences about the relationship between a salmon's size and matter intake.

Based on the information in Graph 3, chum salmon fry are likely to eat prey that is [larger than ▾] prey eaten by the pink salmon fry and [smaller than ▾] prey eaten by the coho salmon fry. This is because as a salmon's size increases, its matter intake needs [increase ▾].

Scoring Notes:

This item is worth 2 points. Partial credit (1 point) will be awarded if half or more of the student responses are correct. For this item, the key contains 3 correct responses; therefore 1 point will be awarded if the student selects 2 correct responses.

Scoring for Session 1 Item 8 (CR)

Mammals did not descend directly from dinosaurs, but mammal embryos have placodes, as shown in Figure 3.

Use the information about scales and feathers to explain why mammal embryos and dinosaur embryos each have placodes. Identify the information that can be used as evidence to support your explanation, and then explain why this information can be used as evidence.

Scoring Information	
Score	**Description**
2	Student's response correctly identifies the information that can be used as evidence to support the explanation and correctly explains how the evidence supports the explanation.
1	Student's response identifies the information that can be used as evidence to support the explanation but does not correctly explain how the evidence supports the explanation.
0	Student's response does **not** correctly identify the information that can be used as evidence to support the explanation or correctly explain how the evidence supports the explanation. **OR** Student's response is blank, irrelevant, or too brief to evaluate.

Scoring Notes:

- Correct explanation (1 point)
- Correct evidence to support explanation (1 point)

Examples include:

- Theropods gave rise to other types of dinosaurs with feathers and scales. This evidence supports an explanation that they emerged from an ancestor with placodes capable of growing different body coverings. Since mammals have placodes as well, it is likely that both theropods and mammals emerged from a common ancestor that had placodes. Those placodes mutated in each species over time to produce fur in mammals, while allowing for different body coverings among the descendants of theropods (feathers and scales).

Accept other reasonable answers.

Scoring for Session 1 Item 11 (TEI)

Part A

The data for 1945 in Table 2 represent the typical relationship between environmental factors and the growth pattern for trees in the Dolomite mountain range.

Select the correct answer from **each** drop-down menu to complete the claim about which conditions are ideal for producing tonewood trees.

Tonewood trees are **most likely** to be produced as a result of [higher-than-average ▾] temperatures and [lower-than-average ▾] precipitation.

Scoring for Session 1 Item 12 (CR)

Scientists have noted a difference in the concentration of atmospheric gases available to Norway spruce trees at site 1 and site 2. Use Table 1 and Figure 2 to describe the difference in atmospheric gases at each site. Explain how the flow of matter and energy differs in these two locations as a result of the concentration difference. Use evidence from any of the tables or figures to support your answer.

Scoring Information	
Score	**Description**
2	Student's response correctly describes the difference in atmospheric gases and explains how the flow of matter and energy differs in these two locations as a result, using evidence to support the explanation.
1	Student's response correctly describes the difference in atmospheric gases but does not explain how the flow of matter and energy differs in these two locations as a result or use evidence to support the explanation. **OR** Student's response correctly explains how the flow of matter and energy differs in these two locations as a result of the difference in atmospheric gases, but does not correctly describe the difference in atmospheric gases or use evidence to support the explanation.
0	Student's response does **not** correctly describe the difference in atmospheric gases or explain how the flow of matter and energy differs in these two locations as a result. **OR** Student's response is blank, irrelevant, or too brief to evaluate.

Scoring Notes:

- Description of difference in atmospheric gases, with evidence (1 point)
- Explanation of flow of energy and matter with evidence (1 point)

Examples include:

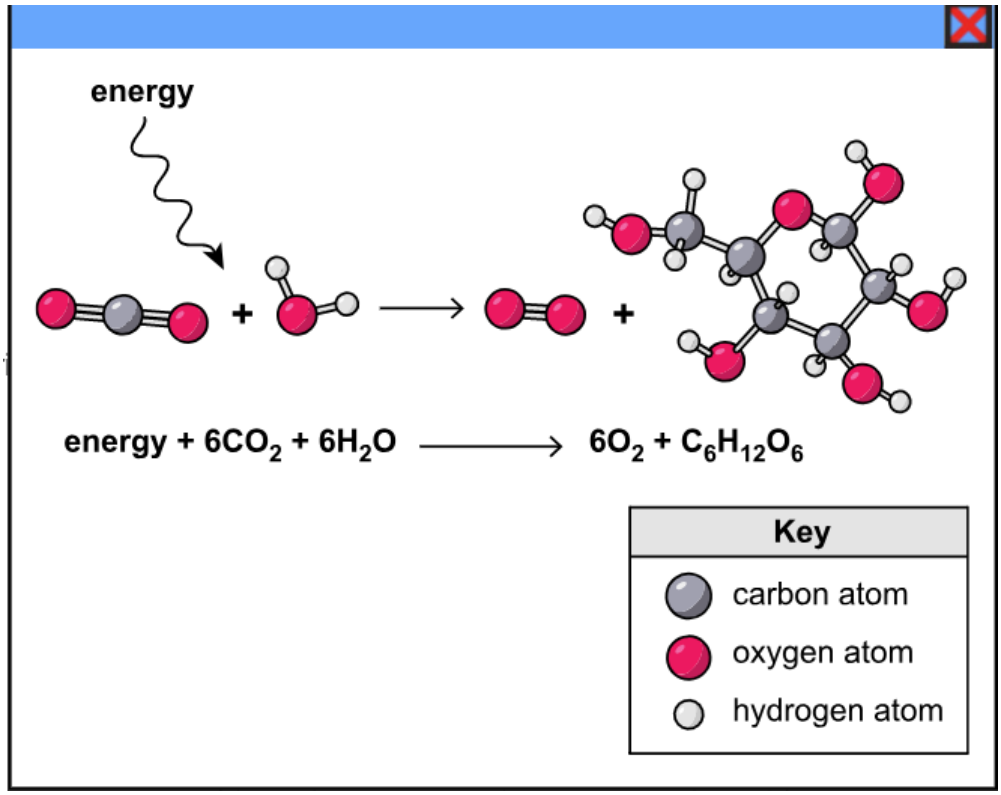
- Table 1 shows that trees at site 2 grow faster and are at a lower elevation than trees at site 1. Faster growth means that the processes of photosynthesis and subsequent cellular respiration occur more quickly. Photosynthesis requires carbon dioxide, so trees at site 2 have a higher concentration of CO_2 than the trees at site 1. As a result of a higher concentration of CO_2, there is more energy and matter available to all other organisms in the food web at site 2 than at site 1.

Accept other reasonable answers.

Session 1 Item 14 (TEI)

Use the information and your knowledge of science to answer the question.

The model shows the process of photosynthesis.



Session 1 Item 14 (TEI), continued

Drag **each** phrase into the appropriate column of the table to show what this model of photosynthesis can and cannot be used to explain.

?

how carbon dioxide is split

how sugars are broken down to release energy

how oxygen gas is released from water molecules

how glucose is built from smaller molecules

how the Sun's energy is stored within carbon dioxide molecules

how energy is stored within carbohydrates

Can Be Explained Using This Model of Photosynthesis	Cannot Be Explained Using This Model of Photosynthesis

OK

Scoring for Session 1 Item 14 (TEI)

Can Be Explained Using This Model of Photosynthesis	Cannot Be Explained Using This Model of Photosynthesis
how energy is stored within carbohydrates how glucose is built from smaller molecules how oxygen gas is released from water molecules how carbon dioxide is split	how sugars are broken down to release energy how the Sun's energy is stored within carbon dioxide molecules

OK

Scoring Notes:

This item is worth 2 points. Partial credit (1 point) will be awarded if half or more of the student responses are correct. For this item, the key contains 6 correct responses; therefore 1 point will be awarded if the student selects 3 or more correct responses.

Scoring for Session 1 Item 15 (TEI)

Use the information and your knowledge of science to answer the question.

The characteristics of infectious diseases vary greatly. The table shows differences in the number of deaths caused each year by certain diseases, as well as the treatment and prevention of each disease.

Information about Infectious Diseases

Infectious Disease	Number of Deaths Worldwide (millions)	Treatment	Prevention
HIV/AIDS	1.0	antiviral drugs	education; avoid contact with body fluids
tuberculosis	1.7	six-month course of antibiotics	wear face mask around people with untreated disease
influenza (flu)	0.65	bed rest, antiviral drugs	annual vaccine (varies in effectiveness)
measles	0.09	bed rest, fever reducers, vitamin A	childhood vaccination

Select the correct answer from **each** drop-down menu to complete the sentences.

One reason that the number of deaths due to measles is significantly lower than the number of deaths due to HIV/AIDS is the introduction of [vaccines ▾].
The large number of cases of tuberculosis despite an effective treatment strategy suggests that complete control of an infectious disease depends on educating patients about [proper use of antibiotics ▾].

Scoring for Session 2 Item 18 (TEI)

Select the correct answer from **each** drop-down menu to complete the sentence.

As the climate in northern regions changes, the population of snails with darker-colored shells will likely [decrease ▾] because they have [higher body temperatures ▾] than snails with lighter-colored shells.

Session 2 Item 19 (TEI)

Use Graph 1, Figure 1, and the information about banded snails to answer the question.

Drag the correct statement into **each** box to show an effect that each cause is likely to have on a snail population with a high degree of genetic diversity.

Not all statements will be used.

?

Dark-colored banded snails become more common than yellow-colored banded snails.

Snails with a darker shell color are less likely to survive and reproduce to pass traits on to offspring.

Only snails with a lighter shell color and banding are able to survive in the new environment.

Snails of any color with the most banding survive better than snails with any color and no banding.

Cause	Effect
Regions begin experiencing cooler than average winter climates.	
A new species of predator is able to detect darker colors better than song thrushes can.	
Warmer temperatures cause wood environments to change into hedge environments.	

OK

Scoring for Session 2 Item 19 (TEI)

Only snails with a lighter shell color and banding are able to survive in the new environment.

Cause	Effect
Regions begin experiencing cooler than average winter climates.	Dark-colored banded snails become more common than yellow-colored banded snails.
A new species of predator is able to detect darker colors better than song thrushes can.	Snails with a darker shell color are less likely to survive and reproduce to pass traits on to offspring.
Warmer temperatures cause wood environments to change into hedge environments.	Snails of any color with the most banding survive better than snails with any color and no banding.

OK

Scoring Notes:

This item is worth 2 points. Partial credit (1 point) will be awarded if half or more of the student responses are correct. For this item, the key contains 3 correct responses; therefore 1 point will be awarded if the student selects 2 correct responses.

Scoring for Session 2 Item 20 (ER)

Extended Response

As you respond to Part A, Part B, and Part C, follow the directions below.

- Address all of the instructions in each prompt.
- Use the evidence from the information provided and your own knowledge of science to support your responses.

Part A

Based on the information in Graph 1, explain the relationships between shell color, presence of banding, and habitat. Use the evidence from the graph to support your answer.

Part B

The characteristics of two snail populations are shown.

- Population 1: high degree of genetic variation among snails living in a wood environment at higher elevations
- Population 2: all snails have the same traits specialized for a hedge environment that is found in warmer locations

Explain how **each** snail population will likely be affected if the trend shown in Graph 2 continues. Use evidence from Graph 1, Graph 2, and Figure 1 to support your explanation.

Part C

Describe the snail color that will offer the **greatest** selective advantage if the trends shown in Graph 2 continue. Use evidence from the information on banded snails to support your claim.

Session 2 Item 20 (ER), continued

Score Points

- The student's score is the sum total of all the points earned across all parts (up to an item-maximum of 9 points) of the item.
- The student's score is 0 if the response is blank, incorrect, or does not address the prompt.

PART A (0-3 points maximum)

- 1 point for explaining relationship between shell color, banding, and habitat for meadow environment shown in graph
- 1 point for explaining relationship between shell color, banding, and habitat for wood environment shown in graph
- 1 point for explaining relationship between shell color, banding, and habitat for hedge environment shown in graph

PART B (0-4 points maximum)

- 1 point for explanation of how Population 1 will be affected
- 1 point for explanation of how Population 2 will be affected
- 1 point for evidence to support the explanation of Population 1
- 1 point for evidence to support the explanation of Population 2

PART C (0-2 points maximum)

- 1 point for description of snail color with greatest selective advantage
- 1 point for using evidence to support the claim

Score information:

Part A: explaining relationship between shell color and habitat for each environment (1 point each)

- Snails that are yellow- or brown-colored and have a high to medium degree of banding do best in meadow environments (1 point)
- Snails with brown color and a medium degree of banding to no banding do best in wood environments (1 point)
- Snails that are mostly yellow-colored with a higher degree of banding do best in hedge environments (1 point).

Session 2 Item 20 (ER), continued

Part B: explaining how Population 1 will be affected (1 point),

using evidence to support explanation (1 point),

explaining how Population 2 will be affected (1 point),

using evidence to support explanation (1 point)

- Population 1 will likely survive the climate change (warming) (1 point)
- Evidence to support: because they have a high degree of genetic diversity that increases the chances that some individuals will have traits suited to the new/changed/warmed environment. Being at higher elevations, shell colors are likely to become more yellow over time as those individuals have lower body temperatures when compared to darker-colored snails (1 point).
- Population 2 is at a greater risk of extinction (1 point)
- Evidence to support: because individuals are specialized for a particular environment that is already warm and will continue to warm, as the trend in Graph 2 indicates. Without genetic diversity, it is less likely that enough individuals will have traits that are favorable in the changed environment (1 point).

Part C: description of snail color (1 point),

evidence to support claim (1 point)

- Yellow snails will have a greater advantage in a warmer climate because they can keep their body temperatures cooler than darker-colored snails (1 point).
- Evidence: Figure 1 shows that snails are moving north and into higher elevations as the temperature warms, and that these snails have a selective advantage over darker snails (which likely get too warm) (1 point).

Student Responses for Session 2 Item 20

Part A

Based on the information in Graph 1, explain the relationships between shell color, presence of banding, and habitat. Use the evidence from the graph to support your answer

Response 1

Shell color, banding and habitat all correlate when determining the environments that each snail is best suited for. For example, Graph 1 shows a cluster of wooded area where snails are brown and have little to no banding. In opposition, there is a large amount of hedge area where snails are yellow and have a higher percentage of banding. And meadow areas are pretty spread out among the graph, showing that snails of either color with any type of banding are able to survive in that area. From this, we can gather that the shell color and presence of banding determine where the snails habitats may be. Wood snails will have darker shell colors and little to no banding, while hedge snails will have lighter shell colors and may have lots of banding. This is due to the camouflage that is necessary in each environment and can protect each snail from their predators.

Score: 3

This response earns a 3. It accurately explains the relationship between the shell color, banding, and habitat for the meadow environment, “And meadow areas are pretty spread out among the graph, showing that snails of either color with any type of banding are able to survive in that area.” The response provides an accurate explanation for the relationship between the shell color, banding, and habitat for the wood environment, “Wood snails will have darker shell colors and little to no banding.” The response accurately explains the relationship between the shell color, banding, and habitat for the hedge environment, “hedge snails will have lighter shell colors and may have lots of banding.”

Response 2

In the woods, snails have darker shell colors to blend in better with the color of dark tree trunks and soil. Snails with lighter yellow colored shells will likely be found in hedges and meadows because they can blend in with grass. The snails that live in grassy areas would need more banding in order to blend in even better with the environment, making them less of a target to predators. The wood snails wouldn't really need banding because they are not really hiding in grass as much as the other snails are.

Score: 2

This response earns a 2. It accurately explains the relationship between the shell color, banding, and habitat for the meadow environment, "Snails with lighter yellow colored shells will likely be found in hedges and meadows. The snails that live in grassy areas would need more banding." The response also provides an accurate explanation for the relationship between the shell color, banding, and habitat for the wood environment, "In the woods, snails have darker shell colors. The wood snails wouldn't really need banding." The response does not fully explain the relationship between the shell color, banding, and habitat for the hedge environment, "Snails with lighter yellow colored shells will likely be found in hedges and meadows. The snails that live in grassy areas would need more banding." It explains the relationship between shell color and the environment but not banding. This response only explains the banding relationship for snails living in meadows, since hedges are not grassy areas.

Response 3

depending on the habitat type, certain snails live in only particular habitat areas. lightly colored shells typically live in meadow or hedge areas but cannot survive in the wood areas. brown colored snails can live in wood and some hedge areas. in the graph (1), it shows how particular colors live more banded in certain areas than others. yellow shelled snails are more banded in meadow areas while brown shelled snails live in more wood areas.

Score: 1

This response earns a 1. It accurately explains the relationship between the shell color, banding, and habitat for the meadow environment, “yellow shelled snails are more banded in meadow areas.” The response does not fully provide an explanation for the relationship between the shell color, banding, and habitat for the wood environment. It provides the relationship between the shell color and environment but not banding, “brown shelled snails live in more wood areas.” The response does not fully explain the relationship between the shell color, banding, and habitat for the hedge environment. It provides the relationship between the shell color and environment but not banding, “lightly colored shells typically live in meadow or hedge areas but cannot survive in the wood areas. brown colored snails can live in wood and some hedge areas.”

Response 4

brown shelled snails and yellow shelled snails survive in two different climates. but snails containing bother brown and yellow in their shells can survive in both. brown shelled snails typically survive in more woodland like climates and yellow colored snails survive in warmer, open climates.

Score: 0

This response earns a 0. It does not explain the relationship between the shell color, banding, and habitat for the meadow environment. The response does not fully provide an explanation for the relationship between the shell color, banding, and habitat for the wood environment. It provides the relationship between the shell color and environment but not banding, “brown shelled snails typically survive in more woodland like climates.” The response does not explain the relationship between the shell color, banding, and habitat for the hedge environment.

Part B

The characteristics of two snail populations are shown.

- Population 1: high degree of genetic variation among snails living in a wood environment at higher elevations
- Population 2: all snails have the same traits specialized for a hedge environment that is found in warmer locations

Explain how **each** snail population will likely be affected if the trend shown in Graph 2 continues. Use evidence from Graph 1, Graph 2, and Figure 1 to support your explanation.

Response 1

Population 1 will probably survive the climate change because they have high genetic diversity, increasing the chances that some individuals will have traits that are adapted to the new environment. Population 2 is at a greater risk of extinction because their bodies will continue to warm with the changes to the environment.

Score: 4

This response earns a 4. It accurately explains how Population 1 will be affected, “Population 1 will probably survive the climate change.” The response accurately uses evidence to support the explanation, “they have high genetic diversity, increasing the chances that some individuals will have traits that are adapted to the new environment.” The response provides an accurate explanation of how Population 2 will be affected, “Population 2 is at a greater risk of extinction.” It accurately uses evidence to support the explanation, “their bodies will continue to warm with the changes to the environment.”

Response 2

If the trend as shown in Graph 2 would continue, population 1 would most likely live longer than population 2. This is because population 1 has a high degree of genetic variation among snails living in a wood environment at higher elevations. Because of this variation, they have more of a chance of adapting better to their new regions. Whereas, population 2, all snails have the same traits specialized for a hedge environment that is found in warmer locations. In Figure 1, there is mostly medium frequency, meaning that population 2 does not have the better survival rate.

Score: 3

This response earns a 3. It accurately explains how Population 1 will be affected, "population 1 would most likely live longer than population 2." The response accurately uses evidence to support the explanation, "population 1 has a high degree of genetic variation among snails living in a wood environment at higher elevations. Because of this variation, they have more of a chance of adapting better to their new regions." The response provides an accurate explanation of how Population 2 will be affected, "population 2 does not have the better survival rate." The response does not fully support the explanation with evidence. It provides text given in the prompt and does not elaborate on the meaning, "Whereas, population 2, all snails have the same traits specialized for a hedge environment that is found in warmer locations." The explanation should note that without genetic diversity, these snails would have a less favorable chance of surviving.

Response 3

Population 1 will be affected less than population 2. The reason is that they have a higher genetic variation and will be able to adapt faster than population 2 which has the same traits in all the snails. If the temperatures keep going up pop. 1 will be able to adapt to change before pop. 2

Score: 2

This response earns a 2. It accurately explains how Population 1 will be affected, "Population 1 will be affected less than population 2." The response accurately uses evidence to support the explanation, "The reason is that they have a higher genetic variation and will be able to adapt faster than population 2." The response does not provide an explanation of how Population 2 will be affected, and therefore, does not receive credit for support of the explanation.

Response 4

The population 1 snails will most likely increase because they live in wood environment with browner shells, which will help them survive the climate changes. Population 2 snails will remain the same because it says they have same traits for a hedge environment. In the graph, it shows hedge snails have a yellow shell in warm climates so they shouldn't be affected in climate changes.

Score: 1

This response earns a 1. It accurately explains how Population 1 will be affected, "The population 1 snails will most likely increase." The response does not accurately use evidence to support the explanation, "because they live in wood environment with browner shells, which will help them survive the climate changes." The response does not provide an accurate explanation, and thus support of this explanation, of how Population 2 will be affected, "Population 2 snails will remain the same."

Response 5

Within graph 2 it shows the temperature over the years compared to what the temperature used to be. The lighter colored snails live in warmer climates so as the graph starts rising over the years and even doubling the temperature at 1860 with winter land at 0.00 and summer land at 0.50 now on the graph it shows that winter land and summer land are both above 1.00 degrees celsius. This will not be good for darker colored snails because they need a colder climate in order to stay alive while this is good for the lighter colored snails as they need a warmer climate to survive. overall in the end the lighter colored snails are going to have the competitive advantage over the darker colored snails which will then lead to the darker colored snails either adapting to warmer climates or dying out.

Score: 0

This response earns a 0. It does not accurately explain how Population 1 will be affected nor does it support the explanation. The response does not provide an explanation of how Population 2 will be affected nor does it support the explanation.

Part C

Describe the snail color that will offer the **greatest** selective advantage if the trends shown in Graph 2 continue. Use evidence from the information on banded snails to support your claim.

Response 1

The yellow snail color with banding will offer the greatest selective advantage if the trends shown in Graph 2 continue. As stated in the text, "...snails with lighter-colored shells have a lower body temperature than those with darker-colored shells." Lower body temperatures entail that the organism can endure higher heats and must live in an overall warmer environment. Also, the text state that, "Snails with darker-colored shells tend to be found living farther north than those with lighter-colored shells." Therefore, if the trend in Graph 2 continue, lighter colored snails, in this case yellow snails, would offer the greatest selective advantage, because they can withstand higher temperatures naturally because they can handle this overall warming in climate.

Score: 2

This response earns a 2. It accurately describes the snail color that will offer the greatest selective advantage if the trends shown in Graph 2 continue, "The yellow snail color with banding will offer the greatest selective advantage." The response uses evidence to support the claim, "in this case yellow snails, because they can withstand higher temperatures naturally because they can handle this overall warming in climate."

Response 2

Lighter colored snails will have the greatest selective advantage because darker colored snails are more often found further north they are used to cooler temp but i temp. increases they will not be able to adapt.

Score: 1

This response earns a 1. It accurately describes the snail color that will offer the greatest selective advantage if the trends shown in Graph 2 continue, "Lighter colored snails will have the greatest selective advantage." The response does not fully and accurately use evidence to support the claim, "because darker colored snails are more often found further north they are used to cooler temp but i temp. increases they will not be able to adapt." The response does not address why the snails will not be able to adapt because of their body temperature.

Response 3

The snail color that will offer the greatest selective advantage if the trend of Graph 2 keep consistant the best color will be brow with semi to all banding around the shell. With the rising temperatures in Graph 2 and the plants around the areas becoming more dense, the snails need to be camoflaged and be brown and have some banding for them to thrive in the environment.

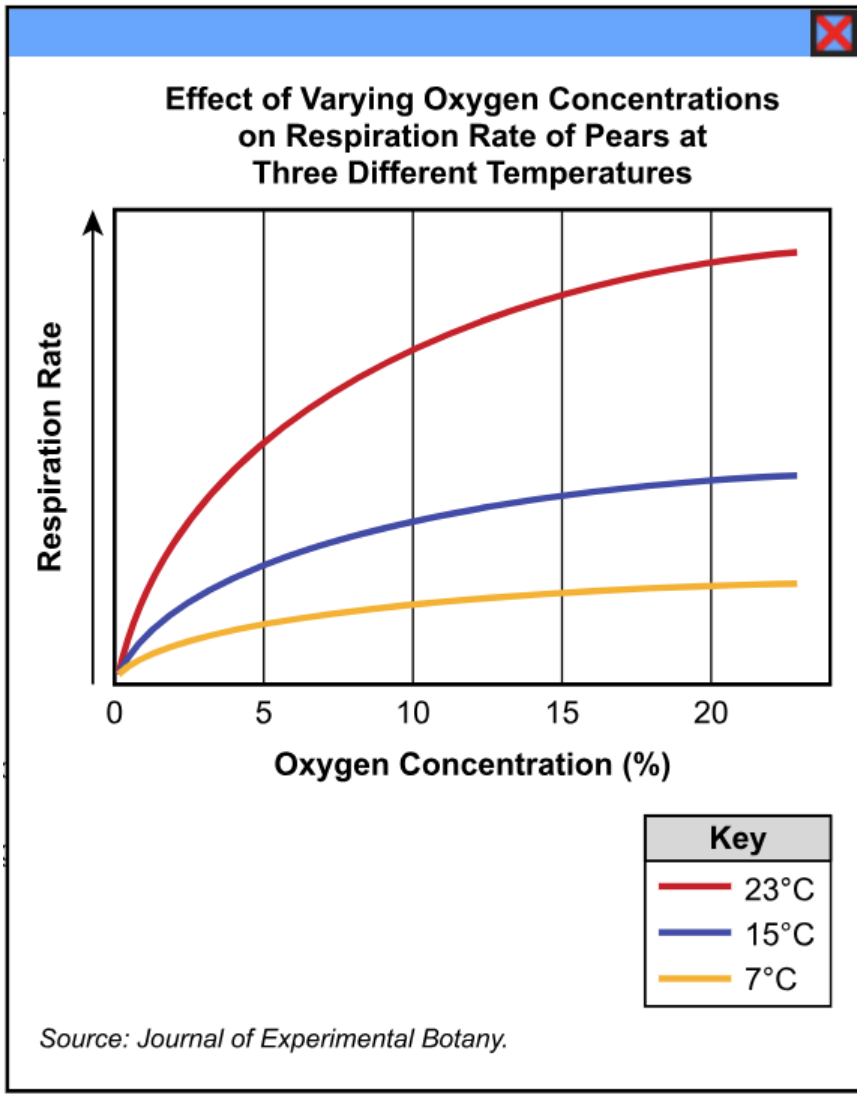
Score: 0

This response earns a 0. It does not accurately describe the snail color that will offer the greatest selective advantage if the trends shown in Graph 2 continue, and thus does not provide accurate evidence to support the claim, “the best color will be brow with semi to all banding around the shell.”

Session 2 Item 21 (TEI)

Use the information and your knowledge of science to answer the question.

Like all fruit, pears continue to undergo cellular respiration after they are harvested. As pears ripen, they begin respiration, and carbohydrates in the fruit are converted to other forms. If enough time goes by, the fruit may begin to rot. Growers want to keep the pears unripe for as long as possible, and ripen the fruit just before sending them to the supermarket. For this reason, growers have investigated storing pears under different conditions. The graph shows the results of one investigation.



Scoring for Session 2 Item 21 (TEI)

Select the correct answer from **each** drop-down menu to complete the sentences related to cellular respiration in pears.

For long-term storage of pears, the oxygen concentration should be [5%] and the temperature should be [7°C]. This will result in the [least] amount of energy being used by the pears.

Scoring Notes:

This item is worth 2 points. Partial credit (1 point) will be awarded if half or more of the student responses are correct. For this item, the key contains 3 correct responses; therefore 1 point will be awarded if the student selects 2 correct responses

Scoring for Session 3 Item 27 (CR)

Constructed Response

Scientists studying San Joaquin kit foxes have proposed the three strategies shown in an effort to increase the kit fox population.

- Strategy 1: Work with landowners to create artificial dens that prevent coyotes and bobcats from entering.
- Strategy 2: Place tracking devices on lizards and rodents to understand how the kit fox's prey use the territory.
- Strategy 3: Restore a portion of agricultural land back to its original saltbush habitat.

Identify which strategy is likely to result in the **greatest** increase in the San Joaquin kit fox population. Explain why the strategy you identified is **more likely** than the other two strategies to lead to the greatest increase in the kit fox population. Use evidence from the information about kit foxes to support your explanation.

Scoring Information	
Score	**Description**
2	Student's response correctly identifies which strategy is likely to result in the greatest increase in the kit fox population and explains why this strategy is more likely than the other two strategies to succeed, using evidence from the information about kit foxes to support the explanation.
1	Student's response correctly describes which strategy is likely to result in the greatest increase in the population of kit foxes and explains why this strategy is more likely than the other two strategies to succeed, but does **not** correctly use evidence from the information about kit foxes to support the explanation.
0	Student's response does **not** correctly describe which strategy is likely to result in the greatest increase in the kit fox population, or explain why the strategy is more likely than the other two strategies to succeed, or use evidence from information about kit foxes to support the explanation.

Session 3 Item 27 (CR), continued

Scoring Notes:

- Identification and explanation of strategy (1 point)
- Evidence to support the explanation (1 point)

NOTE: Identification of a strategy without an explanation is worth 0 points.

Examples include:

- Strategy 1 (working with landowners to create artificial dens for San Joaquin kit foxes) is more likely than the other two strategies to increase the kit fox population because artificial dens will allow kit foxes habitat in which to escape their main predators (shown in Table 1). This strategy also provides locations for kit foxes to raise their offspring in a protected area, so that more offspring are likely to survive and grow to adulthood.
- Strategy 2 will not be as successful as strategy 1 because strategy 2 will only provide information on prey animals of kit foxes, but will not provide direct information about any increases in the prey populations or kit fox populations over time, nor will this strategy make any changes that help to increase the kit fox population.
- Strategy 3 may provide additional habitats that were once part of California, but, as Table 1 shows, saltbush is not the main historic habitat for kit foxes—their main habitat is grassland. Increasing saltbush does not restore the kit foxes' main habitat.

Accept other reasonable answers.

Session 3 Item 29 (TEI)

Drag **each** word or phrase into the correct box to identify whether or not each word or phrase represents a reason for the change in chimpanzee hands.

?

crossbreeding

differences in enhancer sequences

differences in the ways chimpanzees use their hands

sexual reproduction

mutations in chimpanzee DNA

A Reason for the Change in Chimpanzee Hands	Not a Reason for the Change in Chimpanzee Hands

OK

Scoring for Session 3 Item 29 (TEI)

A Reason for the Change in Chimpanzee Hands	Not a Reason for the Change in Chimpanzee Hands
mutations in chimpanzee DNA sexual reproduction differences in enhancer sequences	crossbreeding differences in the ways chimpanzees use their hands

OK

Scoring Notes:

This item is worth 2 points. Partial credit (1 point) will be awarded if half or more of the student responses are correct. For this item, the key contains 5 correct responses; therefore 1 point will be awarded if the student selects 3 or more correct responses.

Session 3 Item 31 (TEI)

Chimpanzees within a population have a range of different hand shapes and sizes, but all chimpanzees carry the mutant enhancer protein that causes their hands to differ from those of gorillas.

Select the correct answer from **each** drop-down menu to support a claim about how the mutant enhancer protein became common within the chimpanzee population.

Evidence suggests that chimpanzees and gorillas descended from a common ancestor that produced a [normal ▾] enhancer protein. At one point, [an individual chimpanzee ▾] developed a mutation in the [DNA ▾] that affected hand shape. This trait was passed on to offspring over many generations, and those individuals [with ▾] the trait were more successful than other individuals. This resulted in the mutant enhancer protein becoming common among all chimpanzees.

Scoring Notes:

This item is worth 2 points. Partial credit (1 point) will be awarded if half or more of the student responses are correct. For this item, the key contains 4 correct responses; therefore 1 point will be awarded if the student selects 2 or more correct responses.

Session 3 Item 33 (TEI)

Use the information and your knowledge of science to answer the question.

Drag **each** statement into the correct box to identify the causes and effects of Huntington's disease within a population.

Dutch settlers in South Africa carried the gene for Huntington's disease.

Only 766 male immigrants are the ancestors of 56 million South Africans.

Dutch settlers remained in small communities within South Africa.

People of Dutch ancestry in South Africa have an unusually high frequency of the allele that causes Huntington's disease.

Cause	Effect

OK

Scoring for Session 3 Item 33 (TEI)

Cause	Effect
Dutch settlers in South Africa carried the gene for Huntington's disease. Dutch settlers remained in small communities within South Africa.	People of Dutch ancestry in South Africa have an unusually high frequency of the allele that causes Huntington's disease. Only 766 male immigrants are the ancestors of 56 million South Africans.

OK

Scoring Notes:

This item is worth 2 points. Partial credit (1 point) will be awarded if half or more of the student responses are correct. For this item, the key contains 4 correct responses; therefore 1 point will be awarded if the student selects 2 or more correct responses.

Session 3 Item 38 (TEI)

Use the information and your knowledge of science to answer the question.

Temperature regulation in humans is controlled by feedback mechanisms. If body temperature decreases below the optimal temperature, the central nervous system causes muscles in the skin to contract. This pulls each hair into a vertical position and causes parts of the skin to raise into small bumps called goosebumps. This response helps reduce the amount of blood that is exposed to the environment.

A student wants to investigate the feedback mechanism that causes goosebumps.

Drag the correct statement into **each** box to show the most appropriate order of the steps a student should take in this investigation.

Not all statements will be used.

Have a participant place one hand into a bowl of warm water.

Prepare one bowl of hot water, one bowl of room-temperature water, and one bowl of cold water.

Ask the participant whether or not his or her skin usually gets goosebumps.

Drip each water sample on the back of the participant's neck.

Record observation data.

Observe the hand in water for goosebumps.

Step 1	
Step 2	
Step 3	Observe the skin on the arms and legs of the participant.
Step 4	

OK

Scoring for Session 3 Item 38 (TEI)

Have a participant place one hand into a bowl of warm water.

Ask the participant whether or not his or her skin usually gets goosebumps.

Observe the hand in water for goosebumps.

Step 1	Prepare one bowl of hot water, one bowl of room-temperature water, and one bowl of cold water.
Step 2	Drip each water sample on the back of the participant's neck.
Step 3	Observe the skin on the arms and legs of the participant.
Step 4	Record observation data.

OK

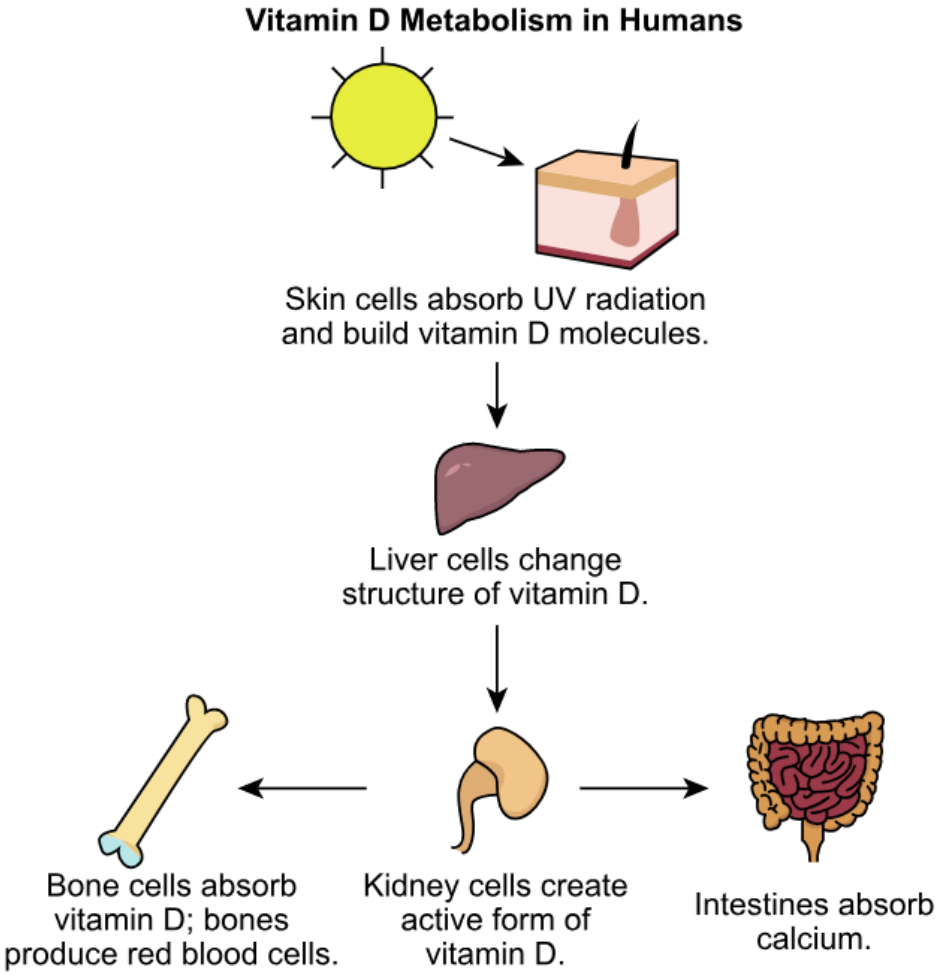
Scoring Notes:

This item is worth 2 points. Partial credit (1 point) will be awarded if half or more of the student responses are correct. For this item, the key contains 3 correct responses; therefore 1 point will be awarded if the student selects 2 correct responses.

Session 3 Item 39 (TEI)

Use the information and your knowledge of science to answer the question.

Vitamin D is a molecule that assists chemical reactions within a cell. Human skin cells produce vitamin D when they are exposed to ultraviolet radiation from the Sun. The model shows how the body metabolizes (alters and uses) vitamin D.



Scoring for Session 3 Item 39 (TEI)

Select the correct answer from **each** drop-down menu to show what the model can be used to explain about vitamin D metabolism.

In order to make vitamin D into a usable form, it must first be transported from the skin to different [organs within each system ▼]. The model shows that the interaction of [different organ systems ▼] is necessary to accomplish specific functions within the body.