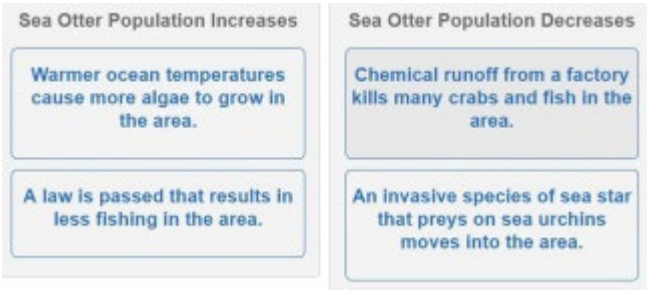
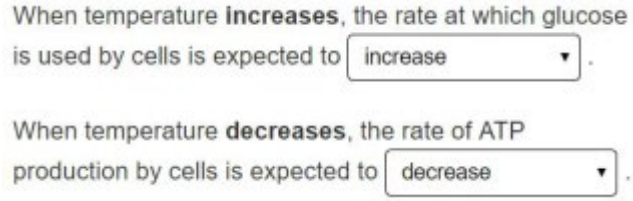
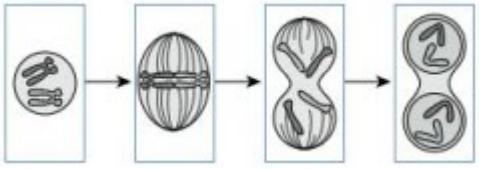
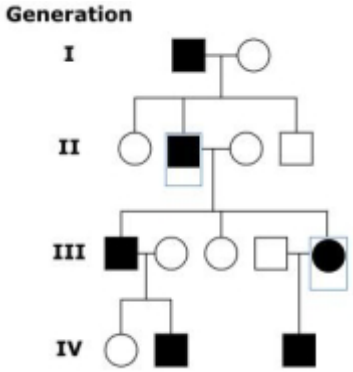
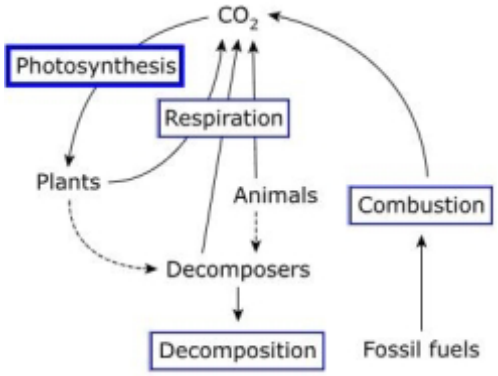
MCAS Biology Computer-based Practice Test Answer Key

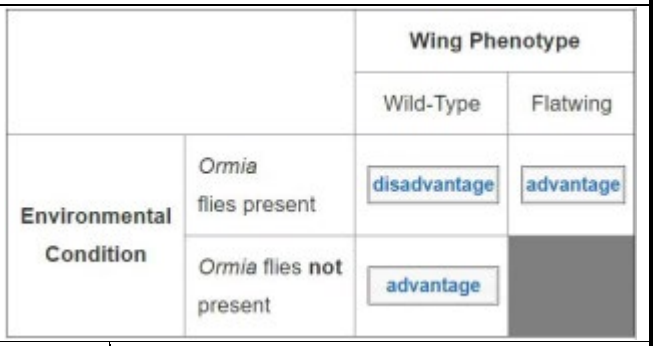
The practice test is approximately equal to what students experience (common items and matrix items) in a single session of the MCAS Biology Test. Information about the test design is posted here. To allow for more familiarity with different question types, this practice test has a larger percentage of technology-enhanced questions compared to the operational MCAS test.

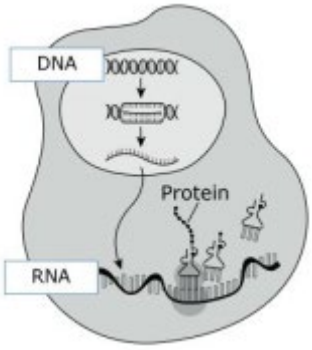
The following pages include the reporting category, standard alignment, practice (if applicable), and point value for each question on the practice test. An answer is also provided for each selected-response item. A rubric and sample student responses are included for each constructed-response item.

Item Number	Reporting Category	2016 Standard	Practice	Points	Correct Answer
1	Evolution	HS-LS-4-1	Evidence, Reasoning, & Modeling	1	C
2	Ecology	HS-LS-2-1	Evidence, Reasoning, & Modeling	1	
3	Heredity	HS-LS-3-2	None	1	D
4	Molecules to Organisms	HS-LS-1-7	Mathematics & Data	1	
5	Evolution	HS-LS-4-1	Evidence, Reasoning, & Modeling	1	C
6	Molecules to Organisms	HS-LS-1-4	Evidence, Reasoning, & Modeling	2	Part A:  Part B: B
7	Evolution	HS-LS-4-2	None	1	A

Item Number	Reporting Category	2016 Standard	Practice	Points	Correct Answer
8	Molecules to Organisms	HS-LS-1-1	Evidence, Reasoning, & Modeling	1	D
9	Heredity	HS-LS-3-3	Evidence, Reasoning, & Modeling	1	
10	Molecules to Organisms	HS-LS-1-5	None	1	C, E
11	Heredity	HS-LS-3-3	None	1	For a genetically engineered trait to be inherited by offspring from their parents, a [gene ▾] must be present in the parents' [gametes ▾].
12	Ecology	HS-LS-2-5	Evidence, Reasoning, & Modeling	2	Part A:  Part B: D
13	Molecules to Organisms	HS-LS-1-4	Evidence, Reasoning, & Modeling	1	Original DNA Strand: G T A T C New DNA Strand: C A T A G

Module: Students read about a scientific scenario or phenomenon and then answered three 1-point questions, one 2-point question, and one constructed response question worth 3 points.

Item Number	Reporting Category	2016 Standard	Practice	Points	Correct Answer
14	Ecology	HS-LS-2-1	None	1	Based on the information provided, the ecological relationship between the *Ormia* fly and the field cricket can be described as [parasitism ▾].
15	Evolution	HS-LS-4-2	None	1	D
16	Heredity	HS-LS-3-4	Evidence, Reasoning, & Modeling	1	
17	Ecology	HS-LS-2-1	Mathematics & Data	2	Part A: The size of the *Ormia* fly population on Kauai would have [decreased ▾] between 1995 and 1999. Part B: D
18	Ecology	HS-LS-2-6	None	3	See scoring guide and sample student responses below. (Maximum of 3 points)
19	Heredity	HS-LS-3-4	Mathematics & Data	1	The student's claim [is consistent ▾] with the data because the data show [a range of heights among the students ▾].
20	Ecology	HS-LS-2-1	Mathematics & Data	1	D
21	Evolution	HS-LS-4-2	Evidence, Reasoning, & Modeling	1	C

<table>
<tr><th>Item Number</th><th>Reporting Category</th><th>2016 Standard</th><th>Practice</th><th>Points</th><th colspan="2">Correct Answer</th></tr>
<tr><td rowspan="2">22</td><td rowspan="2">Ecology</td><td rowspan="2">HS-LS-2-4</td><td rowspan="2">Evidence, Reasoning, & Modeling</td><td rowspan="2">2</td><td>Part A</td><td>B</td></tr>
<tr><td>Part B</td><td><table><tr><th></th><th>Producers</th><th>Primary Consumers</th><th>Secondary Consumers</th><th>Tertiary Consumers</th></tr><tr><td>convert sunlight into chemical energy</td><td>●</td><td>○</td><td>○</td><td>○</td></tr><tr><td>depend on other organisms for energy</td><td>○</td><td>●</td><td>●</td><td>●</td></tr></table></td></tr>
<tr><td rowspan="2">23</td><td rowspan="2">Molecules to Organisms</td><td rowspan="2">HS-LS-1-1</td><td rowspan="2">Evidence, Reasoning, & Modeling</td><td rowspan="2">2</td><td>Part A</td><td> 
</td></tr>
<tr><td>Part B</td><td>C</td></tr>
<tr><td>24</td><td>Molecules to Organisms</td><td>HS-LS-1-2</td><td>Evidence, Reasoning, & Modeling</td><td>1</td><td colspan="2">mouth → stomach → small intestine → large intestine</td></tr>
<tr><td>25</td><td>Evolution</td><td>HS-LS-4-1</td><td>None</td><td>1</td><td colspan="2">D</td></tr>
<tr><td>26</td><td>Heredity</td><td>HS-LS-1-1</td><td>Evidence, Reasoning, & Modeling</td><td>1</td><td colspan="2">D, E</td></tr>
<tr><td>27</td><td>Molecules to Organisms</td><td>HS-LS-1-2</td><td>None</td><td>1</td><td colspan="2">A, E</td></tr>
<tr><td>28</td><td>Evolution</td><td>HS-LS-4-2</td><td>Evidence, Reasoning, & Modeling</td><td>4</td><td colspan="2">See scoring guide and sample student responses below.
(Maximum of 4 points)</td></tr>
<tr><td>29</td><td>Heredity</td><td>HS-LS-3-3</td><td>Mathematics & Data</td><td>4</td><td colspan="2">See scoring guide and sample student responses below.
(Maximum of 4 points)</td></tr>
</table>

Question 18: Scoring Guide

Score	Description
3	The response demonstrates a thorough understanding of the effects of human activities on biodiversity and ecosystem health. The response clearly describes two characteristics of an organism that would allow it to become an invasive species. The response also clearly explains why people are concerned about invasive species being introduced into an ecosystem.
2	The response demonstrates a partial understanding of the effects of human activities on biodiversity and ecosystem health.
1	The response demonstrates a minimal understanding of the effects of human activities on biodiversity and ecosystem health.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Question 18: Sample Student Responses

Score	Part	Student Response
3	A	Characteristics of an invasive species are that the species has no natural predators in its new area and is able to reproduce quickly.
	B	An invasive species has no natural predators in the area or none adapted to it, which allows the species to flourish and reproduce quickly. This can lead to overpopulation, which can eliminate any population or species in that area which may be prey to the invasive species. Such can disrupt the natural ecosystem of that area.
2	A	The ability to understand your prey's mating call in order to lay your eggs in them. Also it had no predators to keep its population in check.
	B	Invasive species can destroy large amounts of the ecosystem with their large numbers and possibly large appetites, decrease the biodiversity of those ecosystems, and could possibly make the native species in that ecosystem die out.
1	A	The *Ormia* flies are an invasive species because they have no natural predator and they have the best traits to survive the environment.
	B	Invasive species do not have natural predators and therefore they cannot be killed by any organism in the environment.
0	A	2 characteristics of an organism the ormia fly has that would allow it to become an invasive species are that it could sing and fly
	B	people would be concernd because the invasive species is different from everything they've seen

Question 28: Scoring Guide

Score	Description
4	The response demonstrates a thorough understanding of evolution through natural selection. The response clearly describes how the number of fruit flies that can detect the toxin will most likely change and clearly explains how this change will occur via natural selection. The response also clearly describes what will most likely happen to the plants' production of the toxin and clearly explains the answer.
3	The response demonstrates a general understanding of evolution through natural selection.
2	The response demonstrates a limited understanding of evolution through natural selection.
1	The response demonstrates a minimal understanding of evolution through natural selection.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Question 28: Sample Student Responses

Score	Part	Student Response
4	A	The number of fruit flys in the population that can detect the toxin will most likely increase over the next 25 years.
	B	This prediction will come true because of natural selection. The organisms with the genetic variation are more suited for their environment. Since these fruit flys can sense the toxin, they won't go near it, allowing them to produce more offspring that can also sense the toxin. Flies that do eat the toxic plants won't have as many offspring to carry on their genes. This means the toxin-sensing flies will become more common.
	C	Based on the changes in fruit flies, the plants will most likely keep putting out toxins. While more fruit flies will know it's there, they still aren't eating the plant. If the toxin is removed, the plant will be consumed.
3	A	The population of toxin detecting fruit flies will increase over the next 25 years.
	B	According to natural selections, the fruit flies who eat the toxic plant, because they are unable to detect the toxin, will reproduce less frequently. If the non-toxin detecting fruit flies reproduce slower that the toxin detecting ones, then the toxin detecting population will quickly become larger than the non-toxin detecting population.
	C	The plants production of the toxin will change based on the fruit fly population because if more flies can detect which plants have the toxin in them, the plants without the toxin will quickly be consumed. If more toxic plants survive to reproduce, the will pass on the advantageous toxin gene to their offspring. With more toxic plants producing more toxic offspring, the number of toxic plants will rise.

2	A	Their population will increase because they will more successfully be able to reproduce.
	B	It will occur because the fruit flies who can detect the toxin will avoid the plant and be able to successfully reproduce. But the flies who cannot detect the toxin will eat the plant and not be able to produce more offspring. Therefore, the population who can detect the toxin will increase, while the ones that cannot will decrease.
	C	The plants toxin may change to a different type of toxin that the flies cannot detect. This would occur via natural selection.
1	A	The fruit flies with the mutation will reproduce in the next 25 years.
	B	The flies will pass down the mutation from generation to generation.
	C	It will increse because the flies will sense it and the plants can keep populating.
0	A	The fruit flies in the population will decreses in the next 25 years.
	B	The change will occure when the insect eat up the plants because there is a decrease of toxin that protects the plants and insects are highly populated.
	C	What most likely will happen is that a season will come when the insect will be low in population so the fruit fly will get the chance to produce a new toxin to take over and protect them from being eaten by the insect when they are back.

Question 29: Scoring Guide

Score	Description
4	The response demonstrates a thorough understanding of how Mendel's law of independent assortment can be observed through patterns of inheritance such as dihybrid crosses. The response correctly identifies all the possible phenotypes and calculates the ratios for fruit color and fruit shape. The response also clearly explains what is meant by independent assortment and describes one way in which the answers support independent assortment of the fruit color and fruit shape genes.
3	The response demonstrates a general understanding of how Mendel's law of independent assortment can be observed through patterns of inheritance such as dihybrid crosses.
2	The response demonstrates a limited understanding of how Mendel's law of independent assortment can be observed through patterns of inheritance such as dihybrid crosses.
1	The response demonstrates a minimal understanding of how Mendel's law of independent assortment can be observed through patterns of inheritance such as dihybrid crosses.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Question 29: Sample Student Responses

Score	Part	Student Response
4	A	9=red round, 3=red pear, 3=yellow round, 1 yellow pear
	B	12 red to 4 yellow or 3:1 ratio
	C	12 round to 4 pear or 3:1 ratio
	D	Independent assortment is when the color of the tomatoes is determined independently from the shape of the tomatoes, meaning that the color has no effect on the shape. My answers to questions a, b, c support the conclusion that the genes for fruit color and fruit shape are sorted independently. Because you can determine how many plants will be red or yellow without using the alleles for shape, and you can determine how many plants will produce fruit that are round or pear shaped without using the alleles for color. So the fruit shape and fruit color genes are sorted independently.
3	A	For this cross, all the possible phenotypes for the tomato are red and round-shaped, red and pear-shaped, yellow and round-shaped, and yellow and pear-shaped.
	B	The ratio of fruit color of the tomato with red fruit to offspring with yellow fruit determined by the Punnett square would be 3:1.
	C	The ratio of fruit shape of the tomato with round-shape to offspring with pear shape determined by the Punnett square would be 3:1.
	D	Independent assortment is when one of an organism's traits do not influence another one of its traits. One way that the answers to parts a, b, and c support my conclusion is that there is no pattern of similarity between plant color and plant shape.
2	A	The offspring could have phenotypes such as red fruit with a round shape, red fruit with a pear shape, yellow fruit with a round shape, and yellow fruit with pear shape.
	B	12:4 or 3:1
	C	12:4 or 3:1
	D	Independent assortment is when you can take two different traits of two crossed genes and determine the genotype/phenotype of the offspring. My answers from a, b, c support the conclusion that the genes for fruit color and fruit shape sort independently because in b and c I determined the independent ratio for both fruit color and fruit shape.
1	A	For this cross all of the possible phenotypes are red round fruit, yellow round fruit, red pear-shaped fruit, and yellow pear-shaped fruit.
	B	The ratio of red fruit to yellow fruit according to the Punnett square is 13:4.
	C	The ratio of round-shaped fruit to pear-shaped fruit according to the Punnett square is 12:4.
	D	Independent assortment is when alleles are crosses and come out with many possible phenotypes.
0	A	Ff, Rr, rr, ff, FF, RR
	B	40%
	C	50%
	D	That shape doesn't have to do with the color there independent because each has a different job.