MEA 2012–2013

Science Grade 8

The table below shows the entire eighth-grade science test design. Scores are based on common items only, half of which are released and can be found in this document.

Test Design

Content Area	Common		Field Test Items		Total Items per Student		Base Testing Time	Points
	MC	CR	MC	CR	MC	CR		
Science	40	4	8	1	48	5	105 min.	56

Each item on the MEA measures a content standard of Maine's 2007 *Learning Results*.

Science Content Standards Assessed on the MEA

D. The Physical Setting
1. Universe and Solar System
2. Earth
3. Matter and Energy
4. Force and Motion

E. The Living Environment
1. Biodiversity
2. Ecosystems
3. Cells
4. Heredity and Reproduction
5. Evolution

Item Information Chart

Please refer to the item information chart on the next page for in-depth information on each science released item. The released item numbers in the chart correspond to item numbers in the practice test and on the MEA Class Analysis Report.

Constructed-Response Scoring Guides

A constructed-response scoring guide includes score point descriptions used to determine the score. Training notes that follow the scoring guide provide in-depth descriptions or particular information also used to determine the score.

Student Work

At least one sample student response is provided for each score point with annotations that explain the reasoning behind the assigned score.

Grade 8 Science Released Item Information

Released Item Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Practice Test Page Number	1	1	1	1	2	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6	7	7
Content Strand (Maine 2007 *Learning Results*)	D3	D1	D2	E1	E2	D2	D4	E1	E4	D3	D2	D3	D4	D1	E3	D3	E5	D1	E5	D4	D2	E1
Depth of Knowledge Code	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	3	2	3
Item Type	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	CR	CR
Possible Points	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	4
Answer Key	B	D	B	B	A	B	A	A	D	C	D	D	C	D	A	B	D	A	C	C		
% Who Chose A or Earned 1 Point	9	3	5	6	42	6	59	37	3	4	8	18	18	10	54	14	6	66	14	21	38	14
% Who Chose B or Earned 2 Points	69	3	80	86	29	68	6	8	2	56	5	27	14	36	11	66	15	14	7	14	32	33
% Who Chose C or Earned 3 Points	16	8	14	3	18	13	3	48	13	32	48	2	41	8	12	15	12	15	72	53	15	23
% Who Chose D or Earned 4 Points	5	85	1	4	11	13	32	7	81	8	39	52	27	45	22	5	67	4	7	12	5	8
Statewide Average Student Score																					1.65	1.81

Content Strands: See "MDOE Regulation 132--*Learning Results: Parameters for Essential Instruction*" at http://www.maine.gov/education/lres/pei/index.html.

Item Type: MC = multiple choice, CR = constructed response

Answer Key: the letter of the correct answer choice

Constructed-Response Item 21

21 Carbon dioxide (CO_2) is a colorless, odorless gas. It is used by plants to make sugars, and it is used to make the bubbles in soda. However, scientists and other people are concerned about the long-term effects that increasing carbon dioxide emissions may have on the environment.

a. Describe **two** human activities that release carbon dioxide into the atmosphere.

b. Describe **one** direct result of increased carbon dioxide levels in the atmosphere.

c. Describe **one** indirect result of increased carbon dioxide levels in the atmosphere.

Scoring Guide for Constructed-Response Item 21

Score	Description
4	The response demonstrates a thorough understanding of human actions that affect short- and long-term changes to Earth. The response correctly describes two human activities that release carbon dioxide into the atmosphere and correctly describes one direct impact and one indirect impact. The response contains no errors or omissions.
3	The response demonstrates a general understanding of human actions that affect short- and long-term changes to Earth. The response has one error or omission.
2	The response demonstrates a limited understanding of human actions that affect short- and long-term changes to Earth. The response has two errors or omissions.
1	The response demonstrates a minimal understanding of human actions that affect short- and long-term changes to Earth. The response has one correct piece of information.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Training Notes for Constructed-Response Item 21

a.

- breathing
- deforestation
- burning wood
- burning fossil fuels (coal, oil, natural gas burning plants, driving cars, airline travel, manufacturing/ factories, heating homes)

Note: For a score of 4, responses cannot use "burning fossil fuels" and a specific case of burning fossil fuels as two different examples. Two different specific examples of burning fossil fuels are acceptable.

b. Direct result:

- increases the greenhouse effect, causing Earth to become warmer (increase in the temperature of Earth's atmosphere)

c. Indirect result:

- climate change
- melting of the polar ice caps, glaciers, and permafrost
- changing global weather patterns
- warming oceans
- increase in sea levels
- increase in ocean temperatures
- changes in populations of organisms
- changes in animal behavior

Note: Students who confuse direct and indirect causes will not be penalized at scores below 4.

Part (a) is worth 2 points, part (b) is worth 1 point, and part (c) is worth 1 point.

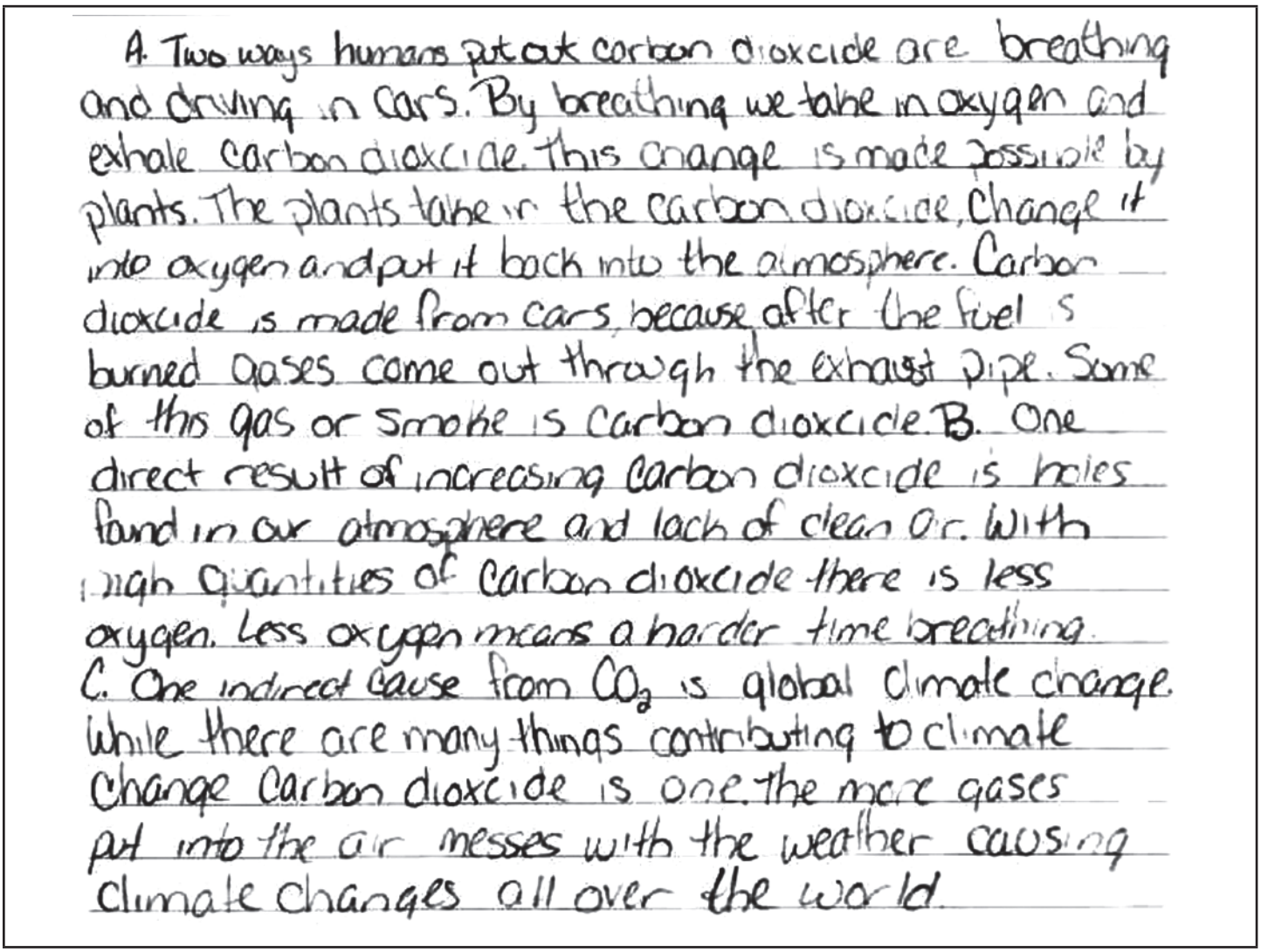
A. One human activity that produces CO_2 is industrial production. These factories give off a lot of CO_2 in the process of making household items. A second human activity that gives off CO_2 is driving cars. Every single gas powered car gives of CO_2 from its exhaust pipe. The is then made much bigger by the shear numbers of cars on the road each day.

B. A direct result of rising CO_2 levels is that the temperatures goes up globally. This is because the CO_2 acts as a blanket trapping in heat.

C. A indirect result of rising CO_2 levels is that the glaciers are melting. They are melting because the rising heat makes the ice melt.

Summary annotation statement:

The response is thorough and complete giving “industrial production” and “driving cars” in part (a), global temperature rise in part (b), and melting glaciers in part (c). The response expresses a thorough understanding and receives a score of 4.



A. Two ways humans put out carbon dioxcide are breathing and driving in cars. By breathing we take in oxygen and exhale carbon dioxcide. This change is made possible by plants. The plants take in the carbon dioxcide, change it into oxygen and put it back into the atmosphere. Carbon dioxcide is made from cars, because after the fuel is burned gases come out through the exhaust pipe. Some of this gas or smoke is carbon dioxcide. B. One direct result of increasing carbon dioxcide is holes found in our atmosphere and lack of clean air. With high quantities of carbon dioxcide there is less oxygen. Less oxygen means a harder time breathing. C. One indirect cause from CO_2 is global climate change. While there are many things contributing to climate change carbon dioxcide is one. The more gases put into the air messes with the weather causing climate changes all over the world.

Summary annotation statement:

Part (a) names two appropriate sources of carbon dioxide, “cars” and “breathing.” Part (b) is not relevant (“[l]ess oxygen means a harder time breathing”) and earns no credit. Part (c) names global climate change as an indirect cause, which is valid. This response is general and receives a score of 3.

a. Two human activites that realease carbon dioxcide into the atmosphere are, driving cars that run on gasoline, and using products that come in an aerosol can, such as hair spray or axe.

b. One direct result of increased levels of carbon dioxcide in the atmosphere is the rise in temperature, because in the past as levels of CO_2 have risen and fallen so has the overall temperature of the atmosphere. As CO_2 rises, so does the temperature and as CO_2 falls, so does the temperature.

c. One indirect result of increased levels of carbon dioxcide in the atmosphere is the deteriation of the ozone layer. Over time high amounts of CO_2 in the atmosphere have eaten away at the ozone layer causing it to thin and allow more ultra violet rays to enter into our atmosphere from the sun. The ozone layer protects life on earth from the harmful ultra violet rays from the sun.

Summary annotation statement:

This response correctly names cars as a source of carbon dioxide in part (a). Aerosol cans release CFCs and other non-carbon dioxide gases, so this portion of the response does not receive credit. The response in part (b), while not entirely accurate, correctly names rising atmospheric temperatures as a direct result of carbon dioxide emission. No credit was given in part (c) as carbon dioxide does not eat away at the ozone layer. This response is limited and receives a score of 2.

Sample 1-Point Response with Annotations for Constructed-Response Item 21

two human activities that release (CO_2)
well we breath dont we. we humans take
in oxygen and breathe out (CO_2). Another
activitie is gasses that releases carbon dioxide.
well one easy one is the human body period
we just we kill the envirment by how we
live just everything we do.

Summary annotation statement:

Part (a) correctly names breathing as a source of carbon dioxide. The remainder of the response is too vague for further credit. As a result this response is considered minimal and receives a score of 1.

Sample 0-Point Response with Annotations for Constructed-Response Item 21

b. Something can cause a leak, and then it would
get into the atmosphere

Summary annotation statement:

This response is too vague in its wording, “something can cause a leak,” to be given credit.

Constructed-Response Item 22

22 The table below shows similarities and differences among four animals.

	Marsh Hawk	Ladybug	Garter Snake	Snapping Turtle
Internal skeleton	×		×	×
Warm-blooded	×			
Walks on legs	×	×		×
Flies	×	×		
Scales			×	×
Number of legs	2	6	0	4
Cares for offspring	×			

a. Based on the information about the animals shown in the table, make a conclusion about two animals that scientists would consider closely related **and** provide evidence from the table to support your conclusion.

b. Describe the types of information scientists use for classifying organisms **and** explain how these ideas connect to your answer in part a.

Scoring Guide for Constructed-Response Item 22

Score	Description
4	The student demonstrates a thorough understanding of how biologists use internal and external anatomical features to determine relatedness among organisms and to form the basis for classification systems. The response provides a conclusion about the two animals that scientists would consider closely related and provides evidence from the table to support their claim. The response has no errors or omissions.
3	The response demonstrates a general understanding of how biologists use internal and external anatomical features to determine relatedness among organisms and to form the basis for classification systems. The response has one error or omission overall.
2	The response demonstrates a limited understanding of how biologists use internal and external anatomical features to determine relatedness among organisms and to form the basis for classification systems. The response has two errors or omissions overall.
1	The response demonstrates a minimal understanding of how biologists use internal and external anatomical features to determine relatedness among organisms and to form the basis for classification systems. The response has one piece of correct information.
0	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Training Notes for Constructed-Response Item 22

a. Possible responses include:

- turtle and snake, because they have scales or are cold-blooded [also have vertebrae]
- turtle and hawk, because both have vertebrae and walk [on legs]

Part (a) must include two pieces of evidence from the table for full credit.

b. The response discusses the use of anatomical features (not behaviors) that determine relatedness **AND** the response makes a reasonable connection to their claim.

Sample 4-Point Response with Annotations for Constructed-Response Item 22

Two animals that scientists would consider closely related are a garter snake and a snapping turtle. You know this because in the table it says that they both have internal skeletons. They are both cold-blooded. They both have scales, and they both don't care for their offspring. The information that scientists use for classifying organisms are things like where they live and their physical characteristics. The physical characteristics is how they connect them in the table. This is because things like having an internal skeleton, having scales, and the number of legs are all physical characteristics of an organism. That means to determine that garter snakes and snapping turtles are closely related, you use their physical characteristics.

Summary annotation statement:

This response gives an acceptable pairing, "garter snake and a snapping turtle." along with detailed supporting evidence from the table. The response states specifically that physical characteristics are used to classify organisms and gives a complete explanation connecting this portion of the response back to the evidence given in part (a). The response expresses a thorough understanding and receives a score of 4.

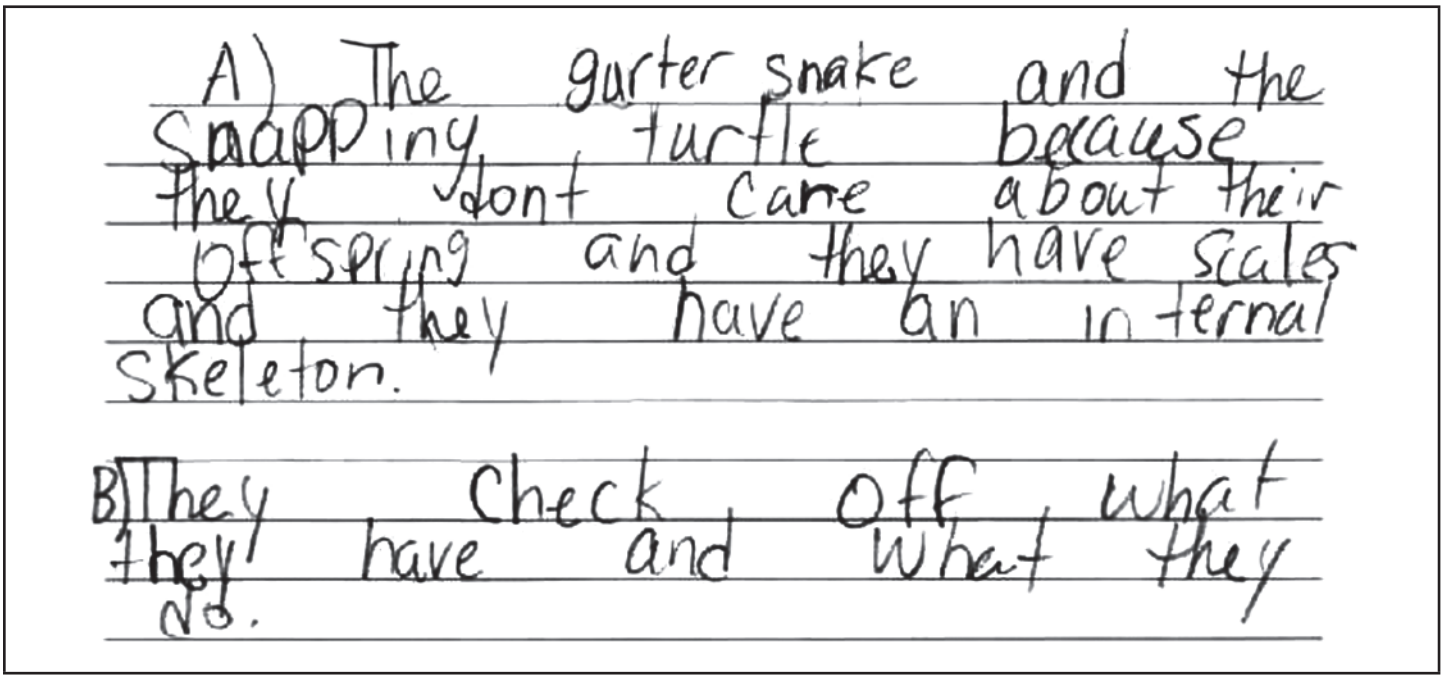
Sample 3-Point Response with Annotations for Constructed-Response Item 22

A.) 2 animals that are closely related would be Garter Snake and Snapping turtle. This is because, both have an internal skeleton, scales, and cold blooded. This would classify these animals to be reptiles. They are the only reptiles in the table. However they are the only alike species on the table, because a Hawk is a mamel and a lady bug is an incect. In conclusion, the Garter Snake and the Snapping turtle have the most in common.
B.) Types of infomation scientists use for classifying organisms would be, warm/cold blooded, if they need oxygen to live or water to live, and if they are a mamel, incect, reptile ect. These ideas connect to my answer in part a because the snake and the turtle are both cold blooded need oxygen to live, and both reptiles. In coclustion, thoes are the types of infomation scientist use and how it connects to my 'a' answer.

Summary annotation statement:

This response has a complete part (a). It lists an acceptable pairing of organisms (garter snake and snapping turtle) with multiple physical traits from the table given as supporting evidence. Part (b) implies that anatomical features are the primary characterization tool, by stating that "cold blooded…need oxygen to live…are a mammal" but does not specify the anatomical features. This response is considered general and receives a score of 3.

Sample 2-Point Response with Annotations for Constructed-Response Item 22

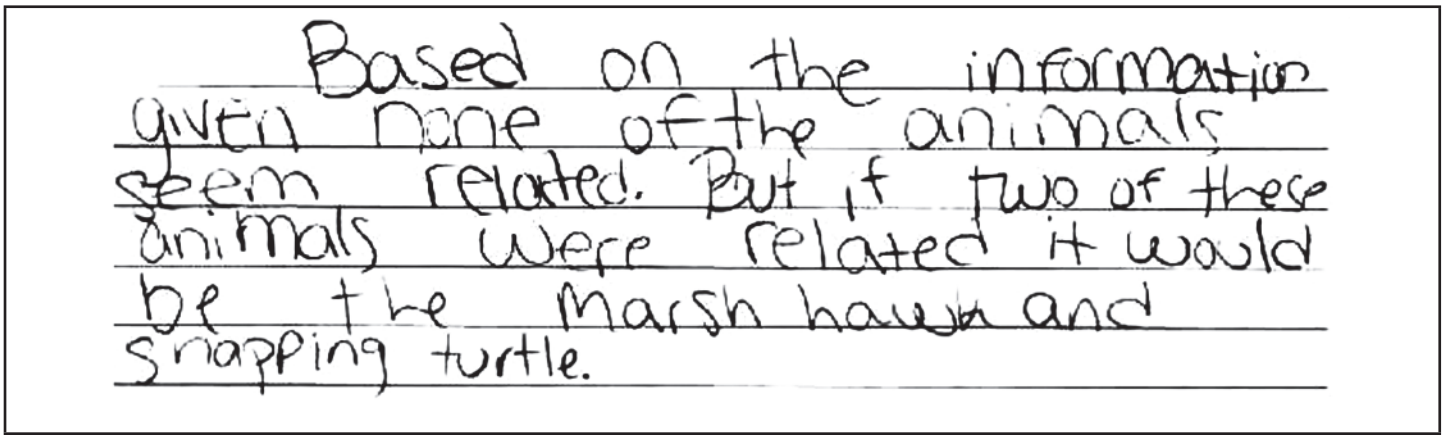

A) The garter snake and the snapping turtle because they dont care about their offspring and they have scales and they have an internal skeleton.

B) They check off what they have and what they do.

Summary annotation statement:

An acceptable pairing is given in part (a), garter snake and snapping turtle, with two physical characteristics from the table, "have scales and…an internal skeleton." given as supporting evidence. Part (b) addresses the prompt only vaguely and receives no credit. This response is limited and receives a score of 2.

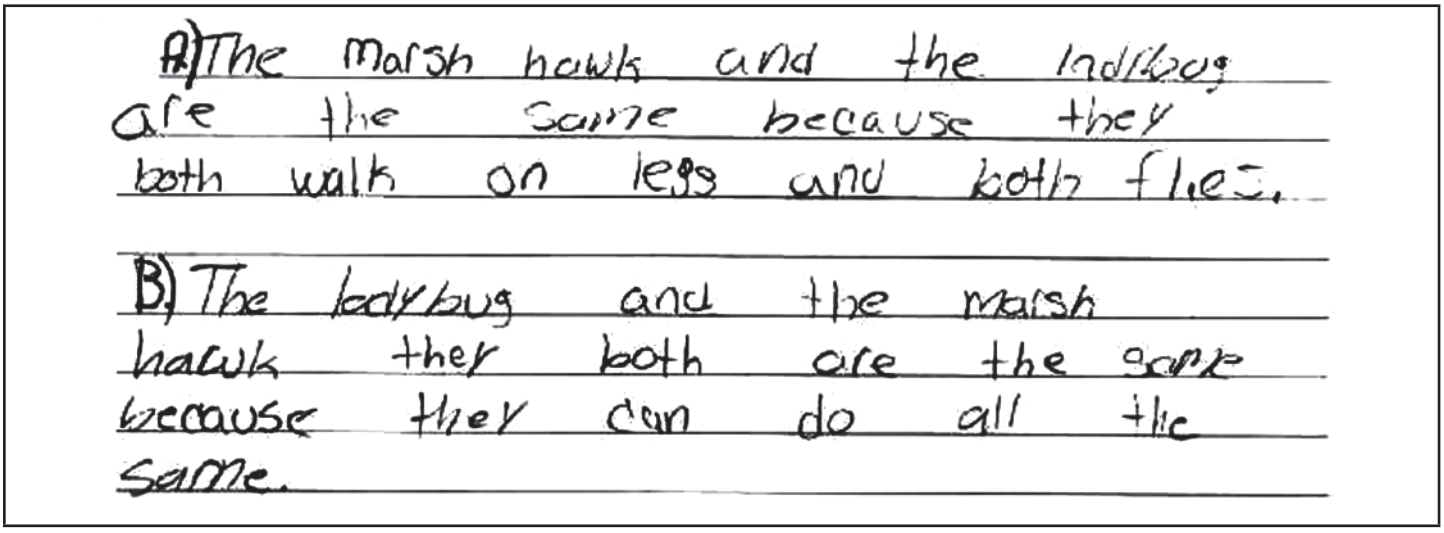
Sample 1-Point Response with Annotations for Constructed-Response Item 22


Based on the information given none of the animals seem related. But if two of these animals were related it would be the marsh hawk and snapping turtle.

Summary annotation statement:

This response gives an acceptable pairing, marsh hawk and snapping turtle, without any associated explanation or evidence from the table. As a result this response is minimal and is given a score of 1.

Sample 0-Point Response with Annotations for Constructed-Response Item 22


A) The marsh hawk and the ladybug are the same because they both walk on legs and both flies.

B) The ladybug and the marsh hawk ther both are the same because they can do all the same.

Summary annotation statement:

Part (a) gives an incorrect pairing, marsh hawk and ladybug. Part (b) gives vague, incorrect reasoning, "because they can."