



Minnesota Comprehensive Assessment-Series IV (MCA-IV)

Guide to Science MCA-IV Released Items

Grade 5

Purpose of the Guide to Released Items

The purpose of this guide is to give Minnesota education professionals some examples of phenomenon-based, multidimensional items aligned to the 2019 Minnesota Science Standards. These items can be used for professional development to prepare for the Science MCA-IV, which will be administered beginning in Spring 2025. Until that time, students will be assessed using the Science MCA-III. Resources for students to prepare for testing can be found on the [Minnesota Assessments-Student Tutorials page](#).

This group of items is an example of one phenomenon with its associated items. There are some unique features specific to the MCA-IV:

- Phenomenon-based item sets. The context for each phenomenon is focused around observable events occurring in the universe that can be explained or predicted with scientific reasoning (Achieve, Next Generation Science Storylines and STEM Teaching Tools).
- Multi-dimensional items. Each item assesses the Practice and Core Idea of the benchmark. Most items also assess the Crosscutting Concept of the benchmark.
- Tabs. The information explaining the phenomenon may be contained in multiple tabs, which are all simultaneously available for each item.
- Constructed Response. In order to better assess student learning of several of the practices, MDE is investigating the use of short-answer constructed response items. An example is contained in this set of items.

The data included in this document are actual student responses from the 2021 field test results. Items in this guide are not interactive. Visit [G05 Science MCA-IV Released Items](#) to see this Grade 5 phenomenon as it will appear in the testing platform.

For more information, see [Minnesota Comprehensive Assessment-Series IV \(MCA-IV\) Draft Test Specifications for Science](#).

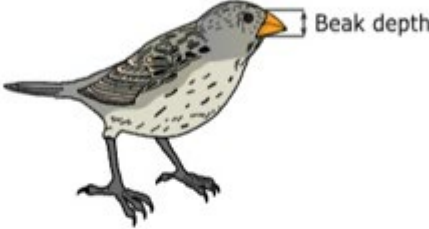
Phenomenon Title: Galapagos Finches

Tab A

Tab A Tab B

In the 1970s, scientists studied the beak depths of a population of medium ground finches on one of the Galápagos Islands. Medium ground finches are small birds that eat seeds. Figure 1 shows the beak depth of a medium ground finch.

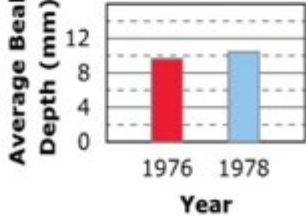
Figure 1. Medium Ground Finch



In 1976 and 1978, the scientists measured the average beak depths, in millimeters (mm), of the medium ground finches on this island. The results are shown in Graph 1.

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Graph 1. Average Beak Depth, 1976 and 1978



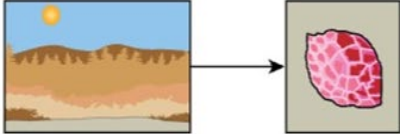
Year	Average Beak Depth (mm)
1976	10
1978	11

Tab B


Tab A Tab B

The scientists observed that finches with deep beaks could eat both small seeds and large seeds. However, finches with shallow beaks could eat only small seeds. Figure 2 shows the types of seeds available in different weather conditions on the island.

Figure 2. Weather and Food Availability



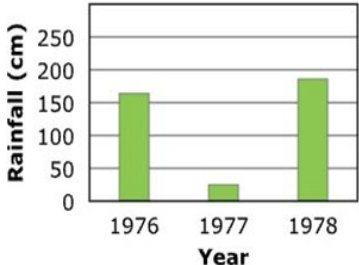
In dry conditions, only large, hard seeds were available.



In wet conditions, small, soft seeds were also available.

Graph 2 shows how much rain fell on this island from 1976 to 1978.

Graph 2. Island Rainfall, 1976–1978



Year	Rainfall (cm)
1976	170
1977	20
1978	190

Item 1

Item 1 Information

Item Characteristic	Description
Item Number	1
Associated Tab	Tab A
Phenomenon	Galapagos Finches
Benchmark	4L.4.2.1.2 Obtain information from various media sources to determine that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. (P: 8, CC: 1, CI: LS3) Emphasis of the practice is to compare and/or combine information across texts and other reliable media. Emphasis is on organisms other than humans and the patterns in traits between offspring and their parents or among siblings.
Practice	8 Obtaining, evaluating, and communicating information
Cross-cutting Concept	1 Patterns
Core Idea	LS3 Heredity: Inheritance and variation of traits
Points	1

Illustration Reference for Item 1

The scientists observe different traits in the medium ground finch population. Determine which traits are inherited from their parents and which traits are acquired from the environment.

Drag each trait into the correct box.

Deep beak

Injured wing

Muddy feet

Feather color

Inherited from Parents

Acquired from Environment

Item 1 Scoring Information

Score	Description	Percent of Student Responses
1	Inherited from Parents: Deep beak, Feather color Acquired from Environment: Injured wing, Muddy feet	77%
0	The response is incorrect or irrelevant.	23%

Item 2

Item Characteristic	Description
Item Number	2
Associated Tab	Tab A
Phenomenon	Galapagos Finches
Benchmark	4L.4.2.1.2 Obtain information from various media sources to determine that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. (P: 8, CC: 1, CI: LS3) Emphasis of the practice is to compare and/or combine information across texts and other reliable media. Emphasis is on organisms other than humans and the patterns in traits between offspring and their parents or among siblings.
Practice	8 Obtaining, evaluating, and communicating information
Cross-cutting Concept	1 Patterns
Core Idea	LS3 Heredity: Inheritance and variation of traits
Points	1

Illustration Reference for Item 2

Based on the information in Figure 1 (Tab A) and Graph 1 (Tab A), what is the most likely reason that the scientists measured the beak depth of many individual finches instead of just 1?

- A. To investigate how beak depth affects finch behavior.
- B. To investigate how beak depth affects the ability of finches to fly.
- C. To investigate the variation in beak depth in the finch population.
- D. To investigate the relationship between beak depth and finch life span.

Item 2 Scoring Information

Score	Description	Percent of Student Responses
0	A. Figure 1 and Graph 1 do not reference finch behavior.	17.1%
0	B. Figure 1 and Graph 1 do not reference wings or flying.	10.7%
1	C. Correct. By measuring many individuals, they can learn about the variation in the trait in the population.	55.3%
0	D. Figure 1 and Graph 1 do not reference finch life spans.	16.9%

Item 3

Item 3 Information

Item Characteristic	Description
Item Number	3
Associated Tab	Tab B
Phenomenon	Galapagos Finches
Benchmark	3L.3.2.1.1 Construct an explanation using evidence from various sources for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. (P: 6, CC: 2 CI: LS4) Examples of cause and effect relationships may include how individual plants of the same species with different-length thorns may be more or less likely to be eaten by predators; or animals that have better camouflage coloration than others of their species may be more likely to survive and therefore more likely to leave offspring.
Practice	6 Constructing explanations (for science) and designing solutions (for engineering)
Cross-cutting Concept	2 Cause and effect: Mechanism and explanation
Core Idea	LS4 Biological evolution: Unity and diversity
Points	1

Illustration Reference for Item 3

Use the information in Figure 1 (Tab A) and Figure 2 (Tab B) to explain why some finches have a disadvantage compared to other finches during a dry year.

Drag the words into the boxes.

During a dry year, there are only to eat.

Finches with shallower beaks are likely to survive because they cannot eat these seeds.

Item 3 Scoring Information

Score	Description	Percent of Student Responses
1	The examinee drags the words into the following boxes: During a dry year, there are only large, hard seeds to eat. Finches with shallower beaks are less likely to survive because they cannot eat these seeds.	75%
0	The response is incorrect or irrelevant.	25%

Item 4

Item 4 Information

Item Characteristic	Description
Item Number	4
Associated Tab	Tab B
Phenomenon	Galapagos Finches
Benchmark	3L.3.2.1.1 Construct an explanation using evidence from various sources for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. (P: 6, CC: 2 CI: LS4) Examples of cause and effect relationships may include how individual plants of the same species with different-length thorns may be more or less likely to be eaten by predators; or animals that have better camouflage coloration than others of their species may be more likely to survive and therefore more likely to leave offspring.
Practice	6 Constructing explanations (for science) and designing solutions (for engineering)
Cross-cutting Concept	2 Cause and effect: Mechanism and explanation
Core Idea	LS4 Biological evolution: Unity and diversity
Points	1

Illustration Reference for Item 4

Use all the evidence in Tabs A and B to support the argument that the average beak depth of the medium ground finch can be affected by rainfall.

Select the words that complete the sentences.

In 1977, low rainfall resulted in only for finches to eat.

This meant that finches with were more likely to survive and reproduce.

This caused the average beak depth to .

Response Number	First Answer Option	Second Answer Option
Response 1	small, soft seeds	large, hard seeds
Response 2	deep beaks	shallow beaks
Response 3	increase	decrease

Item 4 Scoring Information

Score	Description	Percent of Student Responses
1	The examinee selects the following words to complete the sentences: In 1977, low rainfall resulted in only large, hard seeds for finches to eat. This meant that finches with deep beaks were more likely to survive and reproduce. This caused the average beak depth to increase .	37%
0	The response is incorrect or irrelevant.	63%

Item 5

Item 5 Information

Item Characteristic	Description
Item Number	5
Associated Tab	Tab B
Phenomenon	Galapagos Finches
Benchmark	3L.3.2.1.1 Construct an explanation using evidence from various sources for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. (P: 6, CC: 2 CI: LS4) Examples of cause and effect relationships may include how individual plants of the same species with different-length thorns may be more or less likely to be eaten by predators; or animals that have better camouflage coloration than others of their species may be more likely to survive and therefore more likely to leave offspring.
Practice	6 Constructing explanations (for science) and designing solutions (for engineering)
Cross-cutting Concept	2 Cause and effect: Mechanism and explanation
Core Idea	LS4 Biological evolution: Unity and diversity
Points	1

Illustration Reference for Item 5

Based on the information in Graph 1 (Tab A) and Figure 2 (Tab B), which beak depth would most likely provide an advantage during dry years?

- A. Deeper beaks, because more small, soft seeds will be available
- B. Deeper beaks, because more large, hard seeds will be available
- C. Shallower beaks, because more small, soft seeds will be available
- D. Shallower beaks, because more large, hard seeds will be available

Item 5 Scoring Information

Score	Description	Percent of Student Responses
0	A. According to figure 2, during dry years, small, soft seeds are scarce, and deep beaks are better at eating large, hard seeds, not small, soft seeds.	13.2%
1	B. Correct. According to figure 2, during dry years, small, soft seeds are scarce, and deep beaks are better at eating large, hard seeds.	61.8%
0	C. A dry year would result in scarce small, soft seeds.	16.1%
0	D. The passage states that deeper beaks are better at eating large, hard seeds, not shallower beaks	8.9%

Item 6

Item 6 Information

Item Characteristic	Description
Item Number	6
Associated Tab	Tab B
Phenomenon	Galapagos Finches
Benchmark	3L.3.2.1.1 Construct an explanation using evidence from various sources for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. (P: 6, CC: 2 CI: LS4) Examples of cause and effect relationships may include how individual plants of the same species with different-length thorns may be more or less likely to be eaten by predators; or animals that have better camouflage coloration than others of their species may be more likely to survive and therefore more likely to leave offspring
Practice	6 Constructing explanations (for science) and designing solutions (for engineering)
Cross-cutting Concept	2 Cause and effect: Mechanism and explanation
Core Idea	LS4 Biological evolution: Unity and diversity
Points	3

Illustration Reference for Item 6

Based on the information in Graph 1 (Tab A), Figure 2 (Tab B), and Graph 2 (Tab B), describe why the average beak depth of medium ground finches changed from 1976 to 1978.

In your explanation, be sure to do the following:

- Describe how the average beak depth changed from 1976 to 1978.
- Explain how the amount of rainfall in 1977 affected the food that was available.
- Use evidence from Tabs A and B to support your explanation.

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Item 6 Scoring Information

Score	Description	Percent of student Responses
3	<p>The response demonstrates a complete understanding of the question. The response thoroughly: explores phenomena/problems; utilizes evidence; develops explanations/solutions; and/or communicates information.</p> <ul style="list-style-type: none">• The response is fully cohesive and developed.• The response is solidly based on core ideas.• The response clearly and definitively connects ideas/concepts to the question.• The response is solidly based on evidence.	1.2%
2	<p>The response demonstrates a partial understanding of the question. The response somewhat: explores phenomena/problems; utilizes evidence; develops explanations/solutions; and/or communicates information.</p> <ul style="list-style-type: none">• The response is somewhat cohesive and developed.• The response is based on core ideas.• The response connects ideas/concepts to the question.	9.2%
1	<p>The response demonstrates a minimal understanding of the question. The response minimally: explores phenomena/problems; utilizes evidence; develops explanations/solutions; and/or communicates information.</p> <ul style="list-style-type: none">• The response lacks cohesion and development.• The response may be based on core ideas.• The response lacks connections between ideas/concepts and the question.	26.4%
0	<p>The response demonstrates no understanding of the question.</p> <ul style="list-style-type: none">• The response may contain correct information, but overall the response lacks enough correct information that is connected to the question.	63.2%

3-point Actual Student Response from 2021

The average beak depth increased in 1978 because in 1977 there was little rain, so there was less small, soft seeds. Causing the finches with shallow beaks, who can only eat small seeds to have a higher chance of death. In conclusion, the finches with shallow beaks lessened, so the beak depth increased.