

MEA 2012–2013

Science Grade 5

The table below shows the entire fifth-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	32	4	8	1	40	5	90 MIN.	48

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 5 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
Practice Test Page Number	1	1	1	2	2	2	2	3	3	3	4	4	4	5	5	5	6	6
Content Strand (<i>Maine 2007 Learning Results</i>)	D1	E1	D3	E3	E5	E4	D3	D2	E3	E1	D4	D1	D3	E2	E4	D1	D2	E2
Depth of Knowledge Code	1	2	2	1	2	2	2	2	1	2	2	1	2	3	2	2	2	3
Item Type	MC	CR	CR															
Possible Points	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	4
Answer Key	B	B	A	B	A	B	D	D	C	D	A	C	C	A	D	C		
% Who Chose A or Earned 1 Point	6	5	64	18	81	7	13	9	11	12	91	5	4	73	6	5	23	17
% Who Chose B or Earned 2 Points	87	75	13	25	8	86	13	45	7	3	6	8	7	8	2	10	36	19
% Who Chose C or Earned 3 Points	1	15	16	43	5	4	8	2	73	13	1	76	67	7	27	71	28	22
% Who Chose D or Earned 4 Points	5	5	7	13	6	2	66	42	9	71	2	9	22	12	65	14	6	23
Statewide Average Student Score																	2.02	2.13

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

MEA Science Grade 5 Released Items – Student Work

Constructed-Response Item 17

- 17 Most plants grow in soil.
- Identify **two** materials that form soil.
 - Describe **two** ways that plants, animals, or other living things improve soil used for growing plants.

Be sure to label parts a and b in your answer booklet.

Scoring Guide for Constructed-Response Item 17

Score	Description
4	The response demonstrates a thorough understanding of the kinds of materials that form soil. The response identifies two materials that form soil and describes two ways that living things improve soil used for growing plants. The response contains no errors or omissions.
3	The response demonstrates general understanding of the kinds of materials that form soil. The response contains an error or omission.
2	The response demonstrates limited ability to explain the kinds of materials that form soil. The response contains errors and omissions.
1	The response demonstrates minimal ability to explain the kinds of materials that form soil. The response is minimal.
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 17

a. Materials that form soil:

Dead plant materials; these may include any of the following:

- leaves, stems, and roots of dead plants
- kitchen scraps – apple cores, banana peels, potato skins, etc.
- grass cuttings
- bark
- hay

Rocks – small stones, small rock pieces, dirt, sand, etc.

Organisms

- worms, worm castings
- manure
- dead insects
- bones and other parts of decaying animal materials

b. Ways that living things improve soil:

- Worms keep soil aerated.
- Any kind of organic material adds nutrients to soil (see lists above).
- Bacteria add nitrogen to the soil.
- Humans add water to the soil.

Part (a) is worth 2 points, and part (b) is worth 4 points.

Score Conversion

6 points = 4

4–5 points = 3

2–3 points = 2

1 point = 1

Additional Note:

- Fertilizer is not accepted as something that makes up soil. It is acceptable as something that improves soil.
- Water is also not accepted as something that makes up soil. It is acceptable as something that improves soil.
- Dirt is acceptable as something that makes up soil. Dirt is technically broken down rocks. While acceptable, dirt is not viewed as different from rocks, so a response that says dirt and rocks only receives 1 point in part (a).

A. Water breaks up ^① rocks that turn into soil. The ^② rocks get soft. Some times you see woodchips in soil.

B. There is dark soil and light colored soil. The dark colored soil has materials from living things. ^① Plants grow better in dark soil. the animal material (droppings) mixes in with the soil and gives fertilizer to the plants.
^② Leaves get decomposed and turn into soil. You can put compost on your garden. It add nutrients to the soil.

Summary annotation statement:

This response gives two legitimate materials in part (a) rocks and woodchips. In part (b), the response states, “the animal material (droppings)...gives fertilizer” and “compost...add[s] nutrients to the soil.” This response is thorough and receives a score of 4.

(A) Fertilizer can help form soil. So can dead organisms.

(B) 1. One way is animal wastes. Animals eat something, and then leave droppings. This decomposes and the nutrients in the wastes get into the soil. The nutrients make the soil richer.

2. Another way is dead organisms. Decomposers break down dead organisms such as dead trees or other plants and animals. Plants and animals have rich nutrients in them, and when they are broken down, the nutrients return to the soil.

Summary annotation statement:

This response names fertilizer and dead organisms as materials in part (a); while dead organisms is acceptable for credit, fertilizer is not (fertilizer does not make up soil, it improves soil). Part (b) provides a good description of two ways to provide nutrients to soil (animal waste/dead organisms). This response is general and receives a score of 3.

Sample 2-Point Response with Annotations for Constructed-Response Item 17

① Two materials that form soil are dead decayed trees and decayed plants. Two ways plants or animals help are Cow manure and if a tree dies it gives good soil.

Summary annotation statement:

This response only names one item in part (a); decayed trees and decayed plants are considered the same thing. In part (b), manure and decomposing trees are offered as improvements but with no associated explanation. This response is limited and receives a score of 2.

Sample 1-Point Response with Annotations for Constructed-Response Item 17

a. water and dert make soil.

b.

Summary annotation statement:

In part (a), “dert [dirt]” receives credit. Water is not acceptable as a material that makes up soil. No attempt was made to answer part (b). As a result this is considered a minimal response and receives a score of 1.

A. Plants and Trees.

B Plants grow into longer vines which produces more soil. Animals eat plants then the plant grows back and produces more soil.

Summary annotation statement:

This response names “plants and trees” in part (a); these organisms do not begin to make up soil until they start to decay, so no credit is earned in this part. The response does not adequately explain in part (b) how the plants/animals would lead to soil improvement; no credit was earned.

Constructed-Response Item 18

- 18 A food chain is shown below.

grass → grasshopper → bird → snake

- a. Explain why there has to be grass in order for the snake to survive in this ecosystem.
- b. Explain **two** ways the food chain may change if all of the birds move to another ecosystem.

Be sure to label parts a and b in your answer booklet.

Scoring Guide for Constructed-Response Item 18

Score	Description
4	The response demonstrates a thorough understanding of how the food of most animals can be traced back to plants and how the animal uses food for energy. The response explains why the snake needs the grass to survive and explains two ways the food chain may change if all of the birds leave that environment. The response has no errors or omissions.
3	The response demonstrates a general understanding of how the food of most animals can be traced back to plants and how the animal uses food for energy. The response has an error or omission.
2	The response demonstrates a limited understanding of how the food of most animals can be traced back to plants and how the animal uses food for energy. The response has errors and omissions.
1	The response demonstrates a minimal understanding of how the food of most animals can be traced back to plants and how the animal uses food for energy. The response has several errors and omissions.
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 18

- a. The reasons why there has to be grass in order for the snake to get energy (there needs to be a unifying statement that goes beyond the food chain):
- If there were no grass, the grasshopper would have nothing to eat. If the grasshopper had nothing to eat, there would be no grasshopper. If there were no grasshoppers, the birds wouldn't have anything to eat. If the birds had nothing to eat, then there would be no birds and the snake would not be able to get energy from the bird.
 - The grasshopper eats the grass. The bird eats the grasshopper, and the snake eats the bird. Each one gives the other one food (for energy) which gets passed to the snake. If there were no grass, none of them could survive.
 - All food chains begin with a producer and end with a top consumer. The grass has the most material in the entire food chain, and that food contains energy which gets passed from one organism to the next.
- b. The ways the food chain changes if birds leave the ecosystem:
- The snake would eat other organisms.
 - The number of grasshoppers would increase.
 - The grasshoppers would eat more grass.
 - The snakes might eat grasshoppers.
 - The number of snakes would decrease.
 - Other grasshopper predators might move to the area.

Points - part (a) is worth two points, and part (b) is worth two points.

A. There has to be grass in order for a snake to survive in an ecosystem for a certain reason. First, the grasshopper eats the grass. Then, the bird eats the grasshopper. Third, the snake eats the bird. Last, if there wasn't any grass none of the grasshoppers could live, so the birds and snakes would die.

B. If the birds moved to another ecosystem, then the grasshoppers would be more populated, and the snakes would become less populated.

Summary annotation statement:

The response includes a thorough description of how the food chain passes energy in part (a). In part (b), two valid changes are provided. The response expresses a thorough understanding and receives a score of 4.

A. well the snake eats a bird. The bird can't live or be eaten by a snake if it had nothing to eat but it did eat a grasshoper, the grasshoper got food from the grass so it could live so the bird could eat it and so the snake could eat the bird.

B. Grasshoppers would prosper and snakes would die.

Summary annotation statement:

In part (a), the response includes a correct description of how energy passes through the given food chain. Part (b) expresses a correct observation of how the population of snakes would be affected; however, the statement “[g]rasshoppers would prosper” does not discuss in detail what would happen to the population of grasshoppers. This response is considered general and receives a score of 3.

IF there was no grass the grasshopper couldn't eat and it would die and if the grasshopper died the bird would die and if the bird died the snake would die.

B

Summary annotation statement:

This response includes a complete and correct discussion of energy flow through the food web in part (a) and no attempt at part (b). As a result this response is considered limited and receives a score of 2.

A Grass → grasshopper → bird → snake
gose in that order because the
snake eats the bird the eat the
grasshopper and the grasshopper
eats the grass.

B if the bird eats something clls
then it would eat a warm and
it would go like this soil → warm →
bird → snak.

Summary annotation statement:

This response describes the food chain correctly in part (a). However, the statement is limited in that the response states, “the bird the eat the grasshopper” which is unclear. The response does not answer the question in the prompt in part (b), so no credit is given. This is a minimal response and receives a score of 1.

Part A. the snake survives because
it might be poisonous

Part B. The food chain may change
because if all the birds move to
another place we would have no
meat.

Summary annotation statement:

The response contains no information that correctly responds to the question. No credit is earned.