

MEA 2013–2014

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 Item 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	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5
Content Strand (<i>Maine 2007 Learning Results</i>)	E3	D2	D1	D4	E1	D4	E3	E1	D2	D4	E5	D3	E5	E2	D2	E5	D1	E2
Depth of Knowledge Code	1	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	3	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	A	C	D	C	A	D	A	C	A	B	A	C	D	A	C	A		
% Who Chose A or Earned 1 Point	67	23	9	3	87	6	85	13	90	3	44	19	7	47	12	70	15	39
% Who Chose B or Earned 2 Points	8	3	6	6	6	29	3	3	4	61	20	17	5	16	28	11	57	32
% Who Chose C or Earned 3 Points	12	68	4	87	3	7	10	68	4	19	21	32	3	11	53	7	21	12
% Who Chose D or Earned 4 Points	12	6	81	2	4	57	2	16	2	16	14	32	85	26	7	12	2	3
Statewide Average Student Score																	2.00	1.49

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 The Sun is a star.
- Name **two** characteristics that the Sun shares with other stars in the universe.
 - Describe **two** ways that the Sun looks different from other stars in the sky.
 - Explain each difference you described in part b.

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

Scoring Guide for Constructed-Response Item 17

Score	Description
4	The response demonstrates a thorough understanding that the Sun is a star and is similar to other stars in the universe. The response names two characteristics that the Sun shares with other stars and two ways that the Sun looks different in the sky than other stars and explains why. The response has no errors or omissions.
3	The response demonstrates a general understanding that the Sun is a star and is similar to other stars in the universe. The response has one error or omission.
2	The response demonstrates a limited understanding that the Sun is a star and is similar to other stars in the universe. The response has errors and omissions.
1	The response demonstrates a minimal understanding that the Sun is a star and is similar to other stars in the universe. 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.
1. The Sun produces light.
 2. The Sun uses nuclear fusion (a nuclear reaction) to produce light and energy.
 3. The Sun is made of mainly hydrogen and helium.
 4. The Sun produces heat.
 5. The Sun is bright.
 6. The Sun is light.
 7. The Sun can be seen from far away.
- b. and c.
1. The Sun is bigger because it is closer to Earth.
 2. The Sun is visible in daylight because it is closer to Earth.
 3. The Sun is brighter because it is closer to Earth.
 4. When the Sun is out, a person cannot see other stars because the Sun is closer to Earth.
 5. We feel more heat from the Sun or “it feels hotter” is okay for a 3 pt. score or less because the Sun is closer to the Earth.
 6. Stars can be different colors because they have different characteristics.

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

Sample 4-Point Response with Annotations for Constructed-Response Item 17

A. Two characteristics the sun shares with other stars is that all stars are really hot. They also all give off light.

B. It looks bigger because it's closer. The sun also looks brighter.

C. The sun looks bigger because it's closer. It also looks brighter because it closer.

Summary annotation statement:

In part a, this response offers two characteristics that our Sun shares with other stars: “really hot” and “give off light.” In part b, this response provides two ways the Sun looks different from other stars: “looks bigger” and “looks brighter.” Part c, explains each difference based on being closer. This response is thorough and receives a score of 4.

A. The Sun is hot, Stars are hot. They are both bright.
B. It is bigger. And Brighter
C. The Sun is larger than Any Stars. The Sun because it is bigger so it is brighter.

Summary annotation statement:

In part a, this response offers two characteristics that the Sun shares with other stars: they are both hot and bright. Part b provides two ways the Sun looks different from other stars: “bigger” and “brighter,” but no explanation is given to explain their different appearances. There is also an incorrect statement: “The Sun is larger than any stars.” This response is general and receives a score of 3.

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

A. brightness and shape
B. bigger and is hotter
C stars are not as hot
as the sun and is 10x
bigger

Summary annotation statement:

In part a, this response offers one characteristic that the Sun shares with other stars: “brightness” (giving off light). Shape is not considered acceptable as a characteristic. Part b provides two relative differences: “bigger and is hotter.” No explanation is given to explain the different appearances in part c. This response is limited and receives a 2 score.

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

The brightness and there both in
the sky.

Summary annotation statement:

This response offers one characteristic that the Sun shares with other stars in part a: “the brightness.” Being located “in the sky” is not considered acceptable as a characteristic. No attempt was made to answer part b or part c. As a result, this is considered a minimal response and receives a score of 1.

Ⓐ it shares it w/ the SUN because when the SUN goes down the stars go up.

Ⓑ it looks different because the sun is a whole piece and stars are like this small 

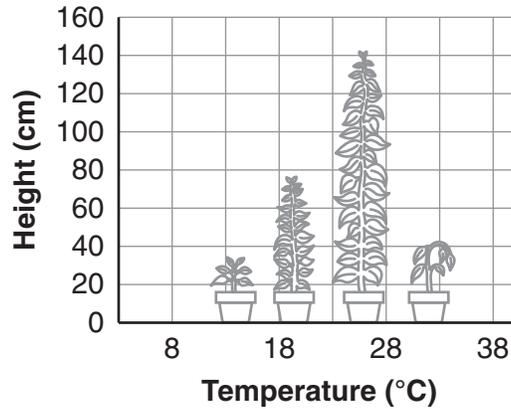
Ⓒ the differences are that a star is not as big as the sun.

Summary annotation statement:

The example offered in part a, “when the [S]sun goes down the stars go up” does not address characteristics the Sun shares with other stars. In part b, the idea that the Sun is a “whole piece” and stars are “this small” does not adequately explain the difference in their appearance. The explanation offered in part c, “a star is not as big as the sun” is inaccurate; some stars are much larger than the Sun. No credit is earned.

Constructed-Response Item 18

- 18 Students in a fifth-grade science class are investigating how an organism is affected by temperature changes in the organism's habitat. They grow four of the same type of plant at different temperatures. All of the plants are cared for in the same way. The results of the investigation are shown below.



- Based on the graph, make a statement about what the graph tells you about how temperature affects the plants. Support your statement with evidence from the graph.
- Explain how organisms can be affected by changes in their habitat **and** explain how this connects to your statement in part a.

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

Scoring Guide for Constructed-Response Item 18

Score	Description
4	The student demonstrates a thorough understanding of how changes in an organism's habitat can influence its survival. The response describes how temperature affects the plants in the investigation and includes evidence to support this statement. The response has no errors or omissions.
3	The response demonstrates a general understanding of how changes in an organism's habitat can influence its survival. The response has one error/omission overall.
2	The response demonstrates a limited understanding of how changes in an organism's habitat can influence its survival. The response has two errors/omissions overall.
1	The response demonstrates a minimal understanding of how changes in an organism's habitat can influence its survival. The response has one piece of correct information.
0	The response is incorrect or irrelevant to the skill or concept being measured.
Blank	No response.

Training Notes for Constructed-Response Item 18

- a. As temperatures become very low or very high, plant growth slows. Middle temperatures are most suited for plant growth **AND** the response must have evidence from the graph.
- b. The response must include a discussion of ways that the living or non-living environment affects the health of plants (e.g., some plants need a certain temperature, amount of sunlight, or fire to grow well) **AND** the response also connects to specific ideas in their statement from part a.

Ⓐ Plants grow larger and healthier when they are grown at warmer ^(but not too hot) temperatures. Here is why. In a graph that some students made, the plant that was grown at 28° went to be the tallest plant. But a plant that was grown at 33° wilted and was very short. Also, a plant that was grown at 8° was small, but looked pretty healthy. Don't grow plants too hot, but don't grow them cold either.

Ⓑ Plants can be affected by a change in their habitat. If their habitat is too cold, they can grow very short. If their habitat is too hot, the plant might dry up and die. For example, if you take a tropical plant and bring it to Alaska, it would die. This connects with what I wrote in part a, because temperature has a lot to do with the habitat, and clearly, the plant that those students were growing was supposed to grow at about 28° .

Summary annotation statement:

In part a, a good description of how temperature affects plants is offered. Strong support, including specific data, is offered from the graph. Part b offers a good explanation of how organisms can be affected by changes in their habitats and connects the answer back to the statement in part a. This response is thorough and receives a score of 4.

Ⓐ The graph shows that there are different growing cycle's based on temperature and habitat. If it is too hot the plant will die and if it is in between it will be healthy. The plant grew the tallest because it was in the right temperature.

Ⓑ They can be affected because if they are in a hot place it gets too dry and they get dried out. If they are in a wet place they would get over-watered and die. This connects to my statement in answer Ⓐ because I told that in temperature not habitat but it affects the plants the same way.

Summary annotation statement:

In part a, a good description of how temperature affects plants is given, but it is weakly supported by evidence from the graph. Part b offers a good explanation of how organisms can be affected by changes in their habitats and connects back to the statement in part a by connecting temperature to habitat. This response is general and receives a score of 3.

Well, you can tell that cool weather will stump the plants growth along with really hot weather. The reason why is because the plant is used to a climate, (the temature) and if it is warmer or colder, the plant wont adapt quick enough and will die.

Summary annotation statement:

In part a, a reasonable statement about how temperature affects plants is offered, but that statement is not connected to evidence from the graph. In part b, a brief explanation is offered about how organisms can be affected by their habitat, but there is no connection back to the statement in part a. This response is limited and receives a score of 2.

A The tempacher gets to hot then the plants get to hot and die.

B They get to hot and die.

Summary annotation statement:

Part a offers a single correct statement about what the graph tells us about how temperature affects the plants, “plants get to [too] hot and die.” Part b partially repeats the response from part a. This response is minimal and receives a score of 1.

EVERY BODY KNOWS ABOUT PLANTS BUT HERE
IS ONE THING THAT I HOPE YOU KNOW IS
THAT PLANTS NEED SUN AND WATER TO GROW.

Summary annotation statement:

This response is not responsive to the question, discussing a plant's need for "sun and water" rather than addressing the effect of temperature. No credit is earned.