MEA 2014–2015

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	5	6	6	7	7
Content Strand (Maine 2007 *Learning Results*)	E1	D2	D4	E2	E1	D2	D4	E4	D1	E2	D3	D4	D2	D3	E2	D3	D2	E4	D2	E1	D1	E3
Depth of Knowledge Code	2	2	1	2	1	2	1	2	1	2	3	2	2	2	2	2	2	1	2	2	2	2
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	A	D	A	B	C	B	C	B	B	C	C	A	C	D	D	C	D	C	B	D		
% Who Chose A or Earned 1 Point	55	7	86	10	4	13	24	11	6	6	12	61	8	3	5	19	10	4	18	19	17	14
% Who Chose B or Earned 2 Points	13	7	6	61	4	74	5	64	63	12	37	24	33	7	6	8	5	4	54	5	16	40
% Who Chose C or Earned 3 Points	26	8	5	21	87	9	56	13	4	78	41	9	47	3	5	51	3	89	13	3	16	20
% Who Chose D or Earned 4 Points	6	78	2	8	5	4	14	11	27	2	9	6	12	87	82	21	81	2	14	72	13	9
Statewide Average Student Score																					1.48	1.88

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 a. Name **two** units of time that are based on the motion of Earth as a planet.

b. For each unit of time named in part a, describe the motion of Earth on which it is based.

Scoring Guide for Constructed-Response Item 21

Score	Description
4	Response demonstrates a thorough understanding of the motions that cause days, years, and phases of the Moon. Response names a day and a year and describes the motion of Earth that causes each unit of time. Response has no errors or omissions.
3	Response demonstrates a general understanding of the motions that cause days, years, and phases of the Moon. Response has an error or omission.
2	Response demonstrates a limited understanding of the motions that cause days, years, and phases of the Moon. Response has errors and omissions.
1	Response demonstrates a minimal understanding of the motions that cause days, years, and phases of the Moon. Response is minimal.
0	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. one day, 24 hours, or one Earth day
one year, 365 days, or one Earth year
one season is approximately one quarter of one Earth year

b. one rotation or spinning of Earth on its north-south axis
one orbit or revolution of Earth as it circles the Sun
one season is approximately one-quarter of a revolution about the Sun

Note: Must be clear about the words. Rotation is spinning on its axis; revolution is Earth's path around the Sun or its orbit about the Sun. Part (a) is worth 2 points and part (b) is worth 2 points.

a) We generally count long periods of time on earth in either days or years, both of which depend on the motion of the earth. (b) One day on Earth, 24 hours, is the time it takes Earth to completely rotate on its axis. The time in front of the face of the sun seperates night from day. While the Earth is rotating, it is also orbiting around the sun. It takes 365 Earth days to complete an orbit, which is how we count our years.

Summary annotation statement:

This response is thorough and complete, giving two correct units of time in part (a) with correct descriptions of the movement of Earth in relation to each unit of time in part (b).

A. A year and a day

b The earth has to rotate around 365 times to make a year. The earth has to rotate around once to make a day.

Summary annotation statement:

This response has a complete part (a). In part (b), the description for day is correct for partial credit, however the description for year is incorrect (relating a year to rotations of the Earth rather than a revolution around the Sun). This response is general and receives a score of 3.

a) Two units of time that are based on the motion of Earth as a planet, are years, and days.
b) In years the motion of Earth as a planet is how long it takes the Earth to get closer to the sun. I days the motion of Earth as a planet is how many days it takes to get a year gone by to get closer to the sun.

Summary annotation statement:

This response earns full credit in part (a) for identifying two correct units of time. Part (b) is incorrect and earns no credit, as it refers to a length of time it takes the Earth or other planets to get closer to the Sun. This response is limited and receives a score of 2.

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

a. Day and Month.

b. Every day the Moon revolves around the earth one time. That is why we only see one side of the Moon. Because when the other side is facing Earth it is day time so we can not see it. About Every 6 Months there is a solar eclipse, when the Sun and Moon line up.

Summary annotation statement:

This response earns partial credit in part (a) for identifying the day as a correct unit of time. No other credit was earned in the response, as part (b) focuses on the movement of the Moon around the Earth. This is considered a minimal response and receives a score of 1.

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

A: Two unit of time are motion of of as a planet.

B:

Summary annotation statement:

This response does not specifically address any part of the prompt. No credit was earned.

Constructed-Response Item 22

22 a. Describe how organs, organ systems, cells, and tissues are related.

b. Give an example of an organ, an organ system, a cell, and a tissue.

Scoring Guide for Constructed-Response Item 22

Score	Description
4	Response demonstrates a thorough understanding of how cells, tissues, organs, and organ systems are related and the functions of each in organisms. Response describes how organs, organ systems, cells, and tissues are related and gives an example of each. Response has no errors or omissions.
3	Response demonstrates a general understanding of how cells, tissues, organs, and organ systems are related and the functions of each in organisms. Response has one error or omission.
2	Response demonstrates a limited understanding of how cells, tissues, organs, and organ systems are related and the functions of each in organisms. Response has errors and omissions.
1	Response demonstrates a minimal understanding of how cells, tissues, organs, and organ systems are related and the functions of each in organisms. Response is minimal.
0	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. Organs are made up of tissues, and organ systems consist of organs. Tissue is made up of cells.

b. Organ:

- heart, lungs, liver, etc.

Organ system:

- circulatory, nervous, etc.

Cell:

- skin cells, white or red blood cells, bone cells, etc.

Tissue:

- skin, bone, muscle, blood, etc.

Part (a) is worth 1 point and part (b) is worth 4 points.

Score conversion:

- 5 points = 4
- 4 points = 3
- 2–3 points = 2
- 1 point = 1

a) Organs, organ systems, cells, and tissues are related because cells make up tissues, tissues make up organs and organs make up organ systems.

b) An example of an organ would be the stomach, an example of an organ system would be the digestive system, an example of a cell would be a red blood cell, and an example of a tissue would be muscle tissue.

Summary annotation statement:

The response is thorough and complete, giving the appropriate relationship between the levels of organization in part (a) and correct examples of each level in part (b).

a. They all work together to help the body stay healthy.
b. Example of an organ would be the heart. Example of an organ system would be the circulatory system. Example of a cell would be a skin cell. Finally an example of a tissue would be muscle tissue.

Summary annotation statement:

This response earns no credit in part (a), as it does not specifically organize these terms. In part (b), all of the examples of the levels of organization are correct. This response is general and receives a score of 3.

a. Organs, Organ systems, cells, and tissues are related because they are all things in your body, also they are all things you need to live. b. An organ would be the heart, Organ system im not sure, Cells like blood cells, and tissues like cartalege.

Summary annotation statement:

This response earns no credit in part (a), as it does not specifically organize these terms. In part (b), examples for organ, cell, and tissue were acceptable. This response is limited and receives a score of 2.

A. They are apart of the human body as they are in the circulatory system

B an organ is the liver. And organ system is how the liver filters out your blood.

Summary annotation statement:

This response earns no credit in part (a), as it does not specifically organize these terms. In part (b), only the example for organ is acceptable. As a result, this is considered a minimal response and receives a score of 1.

They are all parts of the body, they are all alive, and their are all needed for a human to survive.

Summary annotation statement:

This response does not specifically address any part of the prompt. No credit was earned.