MEA 2010–2011

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 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 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	1	2	2	2	2	3	3	3	3	4	4	4	5	5	5	6	7	7
Content Strand (Maine 2007 Learning Results)	D1	E1	E2	E3	E5	E2	D1	D4	D2	E4	D4	D2	E5	E4	D2	D2	D3	E2	E5	D3	D1	E3
Depth of Knowledge Code	1	2	2	2	3	2	2	2	1	2	2	3	2	2	2	2	2	2	2	2	3	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	A	D	B	D	B	A	B	A	D	D	A	A	D	C	A	A	A	C	B	C		
% Who Chose A or Earned 1 Point	56	1	8	7	16	76	6	85	16	12	72	45	6	4	61	57	40	8	9	23	35	12
% Who Chose B or Earned 2 Points	14	2	57	8	43	13	71	11	9	11	7	4	10	15	11	17	12	4	77	15	18	16
% Who Chose C or Earned 3 Points	5	9	23	16	27	4	16	1	20	30	13	30	6	75	6	4	10	76	9	40	7	8
% Who Chose D or Earned 4 Points	25	88	11	68	13	7	6	1	53	47	7	20	77	5	21	22	37	12	4	22	2	13
Statewide Average Student Score																					0.98	1.19

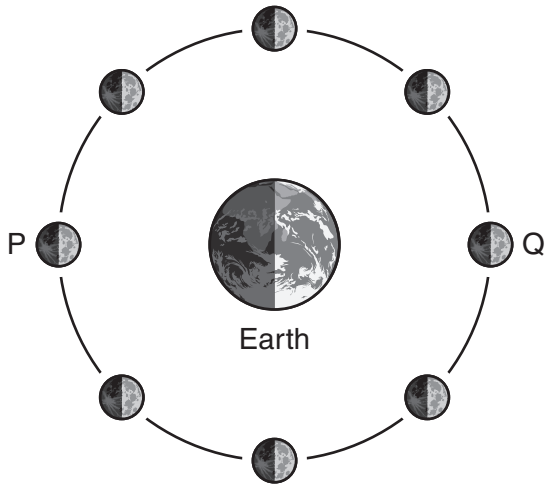
Content Strands: See "MDOE Regulation 132—Learning Results: Parameters for Essential Instruction" at http://www.maine.gov/education/lres/pei/index.html.

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

Answer Key: the letter of the correct answer choice

Constructed-Response Item 21

21 The diagram below shows different phases of the Moon.



a. Describe the Moon's phases as seen from Earth when the Moon is at positions P and Q.

b. Explain why the Moon has different phases.

Scoring Guide for Constructed-Response Item 21

Score	Description
4	The response demonstrates a thorough understanding of the motion and location of the Moon. The response describes the phases of the Moon at the positions P and Q. The response also explains why the Moon has different phases. The response has no errors or omissions.
3	The response demonstrates a general understanding of the motion and location of the Moon. The response has one error or omission.
2	The response demonstrates a limited understanding of the motion and location of the Moon. The response has errors or omissions.
1	The response demonstrates a minimal understanding of the motion and location of the Moon. The response is minimal or 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. An observer on Earth would see a full moon (full lit face of the Moon) when the Moon is at position P. An observer on Earth would see a new moon (Moon cannot be seen) at position Q.

b. The response for part (b) must address the following:

- The Moon is always half lit.
- The Moon orbits (revolves) around Earth.
- Since the Moon orbits (revolves around) Earth, the changing perspective makes different amounts of the lit half of the Moon visible from Earth.

Part (a) is worth 1 point and part (b) is worth 3 points. Credit in part (a) is awarded on an “all-or-nothing” basis, except for a minimal score of 1.

Sample 4-Point Response with Annotations for Constructed-Response Item 21

a. When The moon is at position P, It would be a night with a full moon. This is because light from the Sun is hitting only half of the moon, which is the only half we could see. At position Q, We would call that a new moon because that half of the moon we would see would not get any sunlight.

b. The moon has multiple phases. This is because of how we humans perceive the light hitting the moon as from a single position on the Earth. Sunlight is always hitting one half of the moon. Does that moon that we should always see a half moon? No. From our viewpoint on Earth, we see only different angles of the moon lit up as it revolves around the earth. Each of these different angles at which we see the moon, these are our phases. These phases change at a steady rate as the moon circles the earth and the suns light always comes from a single point That is why the moon has phases

Summary annotation statement:

The response describes the Moon's phases as seen from Earth. Position P is described as "a night with a full moon…because light from the sun is hitting only half of the moon, which is the only half we could see." Position Q is a new moon because the "half of the moon we would see would not get any sunlight." The response also explains the phases of the Moon: "Sunlight is always hitting one half of the moon" as the Moon "revolves around the earth," and as the Moon revolves, "each of these different angles at which we see the moon, these are our phases." The response expresses a thorough understanding and receives a score of 4.

Sample 3-Point Response with Annotations for Constructed-Response Item 21

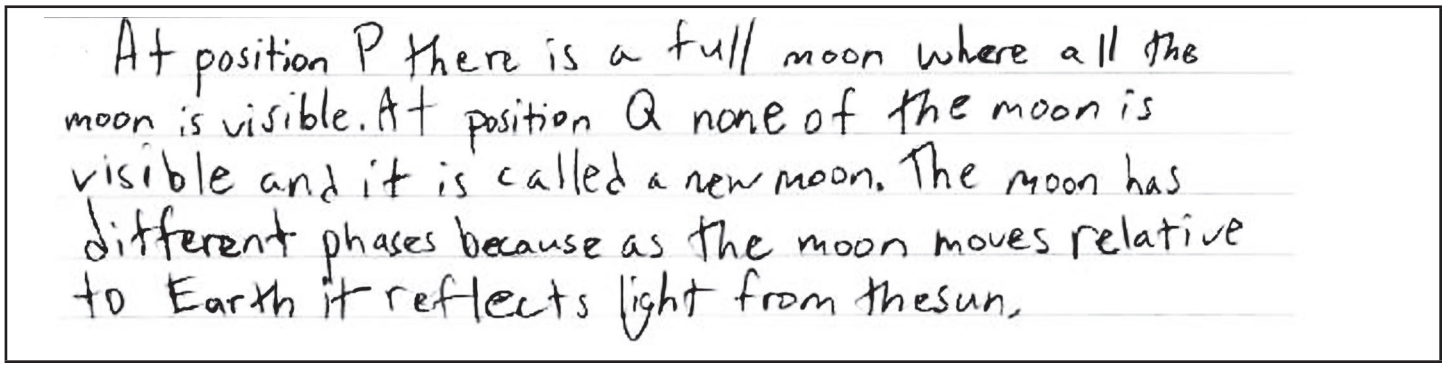
A. The moon's phase as seen from the Earth when the moon is at position P is a full moon. Position Q is seen as a new moon from Earth.

B. Half of the moon always has light from the sun reflecting off of it, except during eclipses. From the earth we can only see part of the moon where the sun light is reflecting, except during new moons, when we can't see any of the reflected light, and full moons, where we see the whole half of the moon where sun light reflects. The moon doesn't change shapes, but because of it's rotation, we see the lit up part of the moon in different phases.

Summary annotation statement:

The response describes the Moon's phases as seen from Earth, where position P is a "full moon" and position Q is "seen as a new moon from Earth." The response also explains the phases of the moon by including, "half of the moon always has light from the sun reflecting off of it" and "from the earth, we can only see part of the moon where the sunlight is reflecting," but the response does not include describing how the Moon revolves around Earth. The response expresses a general understanding of the topic and receives a score of 3.

Sample 2-Point Response with Annotations for Constructed-Response Item 21



Summary annotation statement:

The response describes the Moon's phases as seen from Earth, where position P is a "full moon" and position Q is when "none of the moon is visible" and "is called a new moon." The response also includes "as the moon moves relative to Earth, it reflects light from the sun," which vaguely explains the changing perspective from Earth. The response lacks an explanation about the Moon always being half lit and revolving around Earth. For these reasons the response is considered limited and receives a score of 2.

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

A. The moons phases at P and Q are the same. They are in the same position and everything.
B. The moon has different phases because. the way the moon rotates around the earth and the way the earth spins. the moon will have different phases. Also the moon has different phases because of the light and the way it hits it.

Summary annotation statement:

The response only mentions that the "moon rotates around the earth." This response uses an incorrect verb but communicates the idea of motion around Earth. It also includes "because of the light and the way it hits it," which is too vague for credit. The response expresses a minimal understanding and receives a score of 1.

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

A. From earth you can only see the right half of position P. You can only see the left half of position Q.
B. The moon has different phase because like everything else in the solar system, the moon has it's own natural cycle. The natural cycle of a moon, are the different phases. The moon has this because the moon just happens to be a natural thing. No man made the moon, which makes it natural. Meaning it has a natural cycle, or phases as it is called.

Summary annotation statement:

The response seems to be a misunderstanding of the term "phases." The response receives a score of 0.

Constructed-Response Item 22

22 The parts within a single-celled organism, such as paramecium, euglena, or amoeba, do jobs similar to those done by organs and organ systems in humans.

a. Identify **two** parts within a single-celled organism.

b. Describe the job that **each** part does.

c. Identify the organ or organ system in a human that performs the same jobs you described in part b.

Scoring Guide for Constructed-Response Item 22

Score	Description
4	The response demonstrates a thorough understanding of the similarities in structures, systems, and interactions that allow single-celled organisms and multi-celled plants and animals to defend themselves, acquire and use energy, self-regulate, reproduce, and coordinate movement. The response correctly identifies two structures in a single-celled organism and correctly describes the job that each structure does. The response lists the analogous human organ or organ system. The response has no errors or omissions.
3	The response demonstrates a general understanding of the similarities in structures, systems, and interactions that allow single-celled organisms and multi-celled plants and animals to defend themselves, acquire and use energy, self-regulate, reproduce, and coordinate movement. The response has an error or omits one part.
2	The response demonstrates a limited understanding of the similarities in structures, systems, and interactions that allow single-celled organisms and multi-celled plants and animals to defend themselves, acquire and use energy, self-regulate, reproduce, and coordinate movement. The response has multiple errors and/or omissions in any part of the item.
1	The response demonstrates a minimal understanding of the similarities in structures, systems, and interactions that allow single-celled organisms and multi-celled plants and animals to defend themselves, acquire and use energy, self-regulate, reproduce, and coordinate movement. The response has one or two correct pieces 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 22

Parts (a), (b), and (c).

- Part (mitochondria) enables the single-celled organism to generate energy. In a human the digestive system does a similar job.
- Parts (cilia, flagella, or pseudopods) enable the single-celled organism to move. In a human, skeletal and muscular organ systems and organs such as arms, legs, feet, and hands enable a human to move.
- Parts (vacuoles) enable the single-celled organism to store/digest food/wastes/water. This functions most similarly to the digestive system, fatty tissue, and the bladder.
- Parts (eyespot) enable the single-celled organism to detect light. In a human, eyes and nervous system enable a human to see objects that are lit.
- Part (cell membrane) serves a protective layer that controls what enters and exits a cell and site of gas exchange needed for respiration. In a human the skin serves as a protective layer.
- Part (cell wall) provides structure to the cell and controls the entry of large molecules. In a human the skeletal system is most similar to the cell wall.
- Part (nucleus) controls all cell activities and cell reproduction (cell division). In a human the brain controls functions.

Each part, (a), (b), or (c), is worth 2 points.
6 points = score of 4
5 points = score of 3
3–4 points = score of 2
1–2 points = score of 1

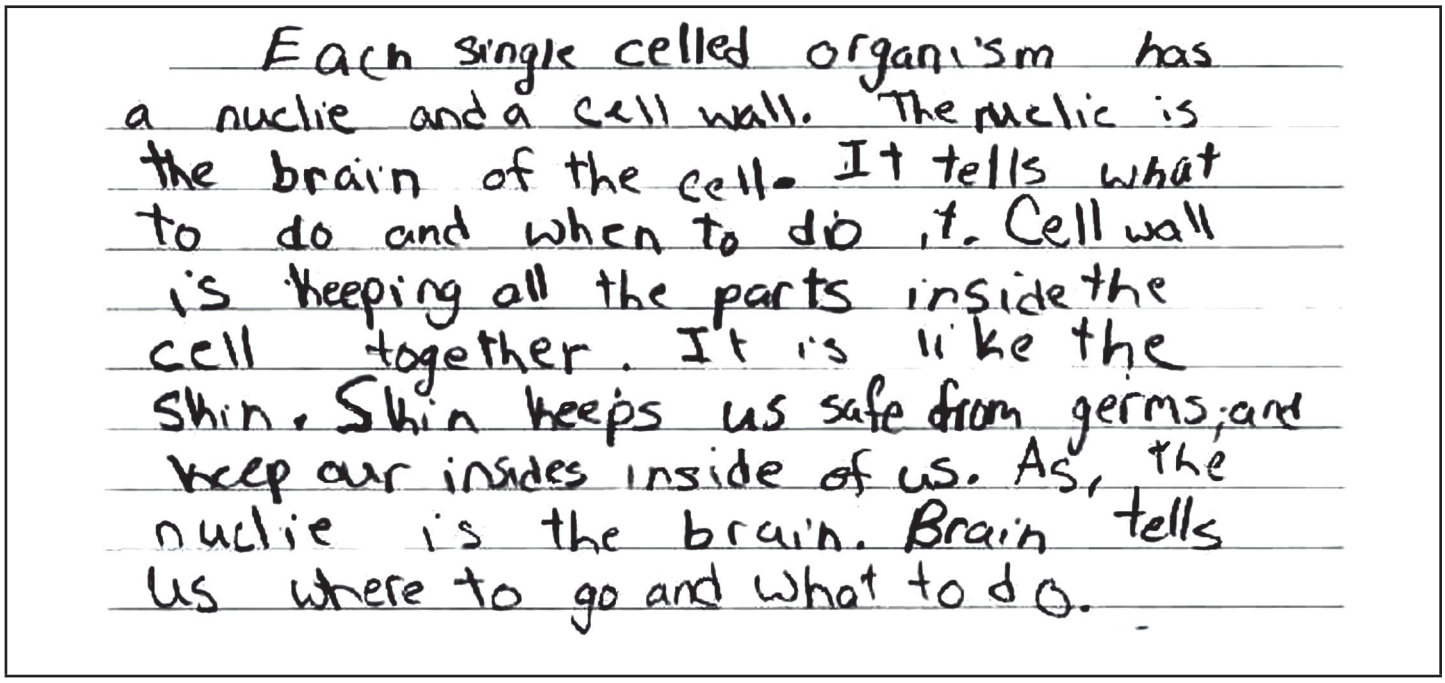
Sample 4-Point Response with Annotations for Constructed-Response Item 22

a. An amoeba is a single-celled organism An amoeba consists of a cell membrane, and a nucleus, along with many other parts.
B. The cell membrane protects the cell, and either blocks things from coming inside the cell, or allows it to enter. The cell membrane has a similar concept to the skin of a human. The nucleus of a cell is the "controler" or "brain" of the cell. It controls all of the functions and actions of the cell.
C. The human brain is an organ system that goes on inside our bodies. The brain of a human preforms the same jobs as the nucleus of a cell because they are both the main function of the structure they are controling. Neither a cell, or a body would be able to live/function without a brain, or nucleus.

Summary annotation statement:

The response identifies two parts of a single-celled organism: "membrane" and "nucleus." The response also describes the job that the membrane performs, "protects the cell," and compares it to the skin of a human. The job of the nucleus is also described as the "'controler' [controller]" of the cell and is compared to the brain of a human as the brain performs the "main function of the structure they are controling [controlling]." The response expresses a thorough understanding and receives a score of 4.

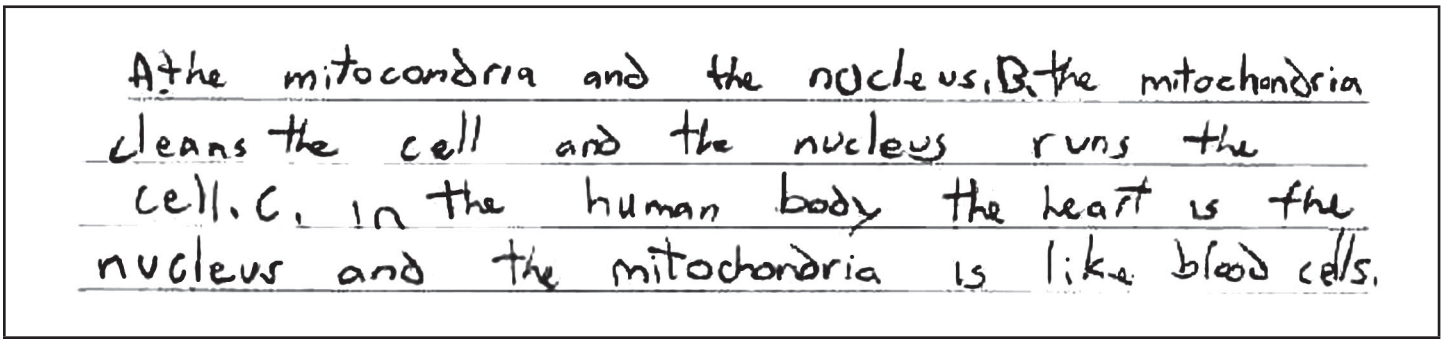
Sample 3-Point Response with Annotations for Constructed-Response Item 22


Each single celled organism has a nuclie and a cell wall. The nuclic is the brain of the cell. It tells what to do and when to do it. Cell wall is keeping all the parts inside the cell together. It is like the skin. Skin keeps us safe from germs, and keep our insides inside of us. As, the nuclie is the brain. Brain tells us where to go and what to do.

Summary annotation statement:

The response identifies two parts of a single-celled organism: "nuclei" and "cell wall." The response describes the job that the nucleus performs, "it tells what to do and when to do it," and compares it to the brain in a human. The job of the cell wall, "keeping all the parts inside," is too vague for credit. The response compares the cell wall to the skin of a human, which is considered valid (one job of the cell wall is to control the entry of large molecules in a single-celled organism). The response expresses a general understanding of the topic and receives a score of 3.

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


A. the mitocondria and the nucleus. B. the mitochondria cleans the cell and the nucleus runs the cell. C. in the human body the heart is the nucleus and the mitochondria is like blood cells.

Summary annotation statement:

The response identifies two parts of a single-celled organism: “mitocondria [mitochondria]” and “nucleus.” The response describes one job of the nucleus as “runs the cell.” The response lacks a valid job description of the mitochondria and valid comparisons to an organ or organ system in a human. The response expresses a limited understanding of the topic and receives a score of 2.

A.) 1Cloroplast, 2Midocondrian

B.) The cloroplast stors liquid, and is almost like the cells filing Cabenet. The Midocondrian protects the cell.

C The stomach does the same thing as the cloroplast, they both have used to store things. The Mido condrian is most like, skin It is used for a protective layer.

Summary annotation statement:

The response only identifies two parts of a single-celled organism: "cloroplast [chloroplast], midocondrian [mitochondria]." The response lacks valid descriptions of the parts and does not include a valid comparison to an organ or organ system in a human. The response expresses a minimal understanding and receives a score of 1.

a. paramecium and amoeba are both parts within a single-celled organism.
b. Paramecium gets rid of all the bad things and Amoeba takes in the good stuff
c. Paramecium and Amoeba are like the parts of your digestive system.

(I really have no clue to what the answers are)

Summary annotation statement:

The response identifies two single-celled organisms but does not address the prompt. The response receives a score of 0.