

# MEA 2008–2009

## Science Grade 8

The table below shows the entire eighth MEA 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	6	8	2	40	8	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
Practice Test Page Number	2	2	2	3	3	3	3	3	3	4	4	5	5	6	6	7	8	8	9
Content Standards	D2	D3	E2	E1	E1	E3	D1	D4	D2	D3	D4	D2	E4	E5	D3	E2	D3	E4	D1
Item Type	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	CR	CR	CR
Possible Points	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	4	4
Key	B	C	D	D	A	D	A	B	A	D	C	A	D	C	D	C			
% Who Chose A or Earned 1 Point	27	19	7	7	77	19	78	6	55	11	7	67	15	16	15	4	29	23	36
% Who Chose B or Earned 2 Points	55	13	13	16	9	8	9	39	16	12	5	21	19	9	22	3	31	31	43
% Who Chose C or Earned 3 Points	16	46	11	6	7	10	4	20	9	22	81	5	15	69	10	91	19	24	8
% Who Chose D or Earned 4 Points	2	22	68	71	7	63	9	34	19	55	7	7	50	5	52	2	8	8	3
Statewide Average Student Score																	1.8	1.9	1.61

**Content Standards:** 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 17

- 17 The tables below show information about two liquids and three solids.

**Density of Two Liquids**

Liquid	Density (g/mL)
A	1.0
B	2.0

**Mass and Volume of  
Three Solids**

Solid	Mass (g)	Volume (mL)
X	20	5
Y	5	10
Z	15	10

Derek was given two colorless liquids and a table listing their densities. He also was given three irregularly shaped solids. He measured the mass and volume of each solid. His results are shown above in the table on the right.

- a. Find the densities of solids X, Y, and Z.
- b. Predict which solid or solids will **sink** in liquid A.
- c. Predict which solid or solids will **float** in liquid B.

### Scoring Guide for Constructed-Response Item 17

This item is scored holistically using the scoring guide below.

Score	Description
4	Student demonstrates a thorough ability to predict whether objects will float or sink by giving the correct density and unit of each solid and correctly predicting which solids will sink in liquids A and B. Response is well developed and contains no errors.
3	Student demonstrates a general ability to predict whether objects will float or sink by giving the density and unit of each solid and predicting which solids will sink in liquids A and B. Response is broad and contains an error or omission.
2	Student demonstrates a limited ability to predict whether objects will float or sink by giving the density and unit of each solid and/or predicting which solids will sink in liquids A and B. Response is partial and contains errors and/or omissions.
1	Student demonstrates little ability to predict whether objects will float or sink by correctly answering any one part of a or b or c. Response is minimal and contains errors and/or omissions.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
<b>Blank</b>	No response.

## Training Notes for Constructed-Response Item 17

Part a:

Density of X =  $20 \text{ g} / 5 \text{ mL} = 4 \text{ g/mL}$

Density of Y =  $5 \text{ g} / 10 \text{ mL} = 0.5 \text{ g/mL}$

Density of Z =  $15 \text{ g} / 10 \text{ mL} = 1.5 \text{ g/mL}$

Part b:

X will sink in liquid A.

Z will sink in liquid A.

Part c:

X will sink in liquid B.

**Note:** If answers to part a are incorrect, student can receive credit for answers to parts b and c based on the student's answer to part a.

Example: Part a density of X = 0.2 or  $1/5 \text{ g/mL}$

Correct: part b: X will not sink in liquid A or in liquid B.

Based on Correct Answers to Part a

Solid	Will Sink or Float	In Liquid
X	Sink	A
X	Sink	B
Y	Float	A
Y	Float	B
Z	Sink	A
Z	Float	B

## Constructed-Response Item 18

- 18** A few years ago, a scientist surprised the world by cloning a sheep. Today, several other species of animals have been cloned. Other scientists have begun to think about cloning human beings.
- a. In general terms, describe what makes cloning different from sexual reproduction.
  - b. Give one example of asexual reproduction and one example of sexual reproduction found in nature.

### Scoring Guide for Constructed-Response Item 18

This item is scored holistically using the scoring guide below.

Score	Description
4	Response demonstrates an in-depth knowledge of how sexually and asexually reproducing species transfer genetic information to offspring. Student response clearly describes what makes cloning different from sexual reproduction in general and correctly gives an example of sexual reproduction and asexual reproduction. Response is well developed and contains no errors.
3	Response demonstrates a general knowledge of how sexually and asexually reproducing species transfer genetic information to offspring. Student response generally describes what makes cloning different from sexual reproduction and gives an example of sexual reproduction and asexual reproduction. Response contains minor errors.
2	Response demonstrates a limited knowledge of how sexually and asexually reproducing species transfer genetic information to offspring. Student response describes in general terms what makes cloning different from sexual reproduction <b>OR</b> student response gives an example of sexual reproduction and asexual reproduction.
1	Response demonstrates a minimal knowledge of how sexually and asexually reproducing species transfer genetic information to offspring. Student response minimally describes what makes cloning different from sexual reproduction <b>OR</b> student response is minimal. Response contains errors.
0	Response is incorrect or contains some correct work that is irrelevant to the skill being measured.
<b>Blank</b>	No response.

### Training Notes for Constructed-Response Item 18

Possible answers:

Part a:

- only one parent   - artificial/not natural
- no genetic diversity   - manipulated by humans

Part b:

- yeast produced by budding
- plant produced by cross-pollination or the reproduction of a frog

## Constructed-Response Item 19

- 19 The table below shows data on Earth and Venus.

**Earth and Venus Data**

Planet	Venus	Earth
Diameter (km)	12,275	12,756
Gravity	0.89	1.00
Satellites	0	1
Atmosphere	CO <sub>2</sub>	N <sub>2</sub> , O <sub>2</sub>
Water	No	Yes

Scientists have concluded that human life on Venus is not possible.

- Choose **three** pieces of evidence from the table.
- Explain in scientific terms how each piece of evidence you chose either supports or does not support this conclusion.

## Scoring Guide for Constructed-Response Item 19

This item is scored holistically using the scoring guide below.

Score	Description
4	Response demonstrates a thorough understanding of how to support reasoning based on a variety of evidence. The student chooses three pieces of evidence and completely explains how each either supports or does not support the conclusion. Response is logical and contains no errors.
3	Response demonstrates a general understanding of how to support reasoning based on a variety of evidence. The student chooses three pieces of evidence and broadly explains how each either supports or does not support the conclusion. Response is logical and may contain an error.
2	Response demonstrates a limited understanding of how to support reasoning based on a variety of evidence. The student chooses two to three pieces of evidence and explains how each either supports or does not support the conclusion. Response may contain errors or lack some information.
1	Response demonstrates a minimal understanding of how to support reasoning based on a variety of evidence. The student gives one piece of information that correctly relates to the item. Response contains errors and lacks information.
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 19

Evidence supporting conclusion:

Human life requires oxygen and water to survive. Venus has neither.

Evidence that does not support conclusion:

The diameter and the gravitational pull are similar for both planets and thus do not support reasoning based on differences between the two planets.