

MEA 2013–2014

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	3	3	3	4	4	4	5	5	5	6	6	6	6	7	8
Content Strand (Maine 2007 Learning Results)	D2	E3	E1	D2	E4	E2	D1	D3	D3	E4	E2	D3	E5	D2	D4	D1	E5	D4	E2	E3	D2	E4
Depth of Knowledge Code	2	1	2	2	1	2	3	2	2	2	2	2	3	2	2	1	2	2	2	2	3	2
Item Type	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	B	A	C	B	C	B	D	A	B	A	A	C	C	A	C	B	A	C	A		
% Who Chose A or Earned 1 Point	60	4	38	5	7	7	17	4	30	18	77	33	21	12	30	2	7	68	14	78	21	5
% Who Chose B or Earned 2 Points	8	73	25	4	89	6	61	6	25	59	4	17	9	7	25	2	70	6	6	8	41	21
% Who Chose C or Earned 3 Points	13	15	15	86	3	68	12	24	30	9	14	25	56	59	23	66	15	16	68	5	26	60
% Who Chose D or Earned 4 Points	19	8	22	5	1	19	9	67	14	14	5	25	14	22	21	29	7	9	11	9	3	8
Statewide Average Student Score																					1.93	2.59

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 8 Released Items – Student Work

Constructed-Response Item 21

- 21 The map of the United States below shows the locations of San Francisco, CA, and Denver, CO. The table below shows the latitude, longitude, and yearly rainfall for San Francisco and Denver.

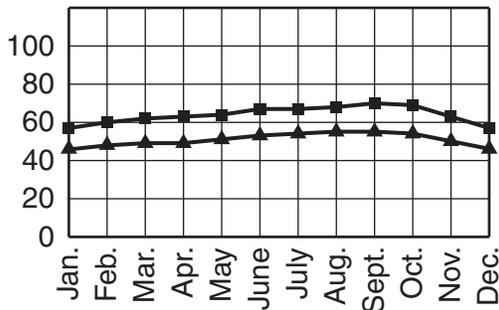


Latitude, Longitude, and Rainfall for San Francisco and Denver

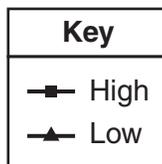
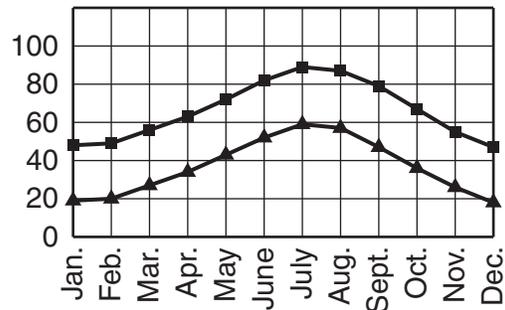
	San Francisco	Denver
Latitude	37°N	39°N
Longitude	122°W	105°W
Yearly Rainfall	20.7 in.	15.6 in.

The graphs below show temperature information for San Francisco and Denver.

Average Monthly Temperatures (°F) for San Francisco



Average Monthly Temperatures (°F) for Denver



- Describe three differences between the weather in San Francisco and the weather in Denver based on the information above.
- Describe the physical features that might cause the differences in weather between San Francisco and Denver. Explain your reasoning.

Scoring Guide for Constructed-Response Item 21

Score	Description
4	The response demonstrates a thorough understanding of why weather is different in different regions of Earth. The response describes three differences between the weather in San Francisco and the weather in Denver, and describes the physical features that cause these differences. The response has no errors or omissions.
3	The response demonstrates a general understanding of why weather is different in different regions of Earth. The response has an error/omission.
2	The response demonstrates a limited understanding of why weather is different in different regions of Earth. The response has errors/omissions.
1	The response demonstrates a minimal understanding of why weather is different in different regions of Earth. The response has one piece of correct 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. Differences in weather may include:

- San Francisco has less variation in temperature than Denver has over a year.
- San Francisco has less variation in temperature than Denver has in any given month.
- Denver has hotter summers than San Francisco has.
- Denver has colder winters than San Francisco has.
- San Francisco gets more rain than Denver gets.

b. Possible explanations include:

- Elevation/mountains of Denver cause it to be cooler and dryer than San Francisco.
- San Francisco is located right next to an ocean, while Denver is inland. This results in more moisture in San Francisco's climate, which creates more precipitation and less temperature variation.

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

A. San Francisco maintains a higher over all temperature than Denver does. But, Denver also has a higher temperature during the summer months. Furthermore, San Francisco has a smaller flucuation in is temperature when compared to Denver. And, it gets about five more inches of rain a year that Denver.

B. I feel that San Francisco has a more stable climate because of it's proxsimity to a large body of water. I think this is true because water is known to keep an area cooler in the summer, and warmer in the winter bcause of its thermal retention properities. Water takes longer to warm up during the summer months, allowing an area cool air from over the water. It also takes longer to cool during the winter, allowing an area near water to remain warmer during thw winter. Denver is also located two degrees north, meaning it is closer to cold air in the north. And, due to its lack of water, doesn't have the heating and cooling advantages present in San Francisco.

Summary annotation statement:

Part a describes three good comparisons of the weather in the two cities based on the information provided from the map, table, and graphs. In part b, specific physical features are connected to the differences in weather between the two cities, and good reasoning is provided such as the “thermal retention properties” of a large body of water. This response is thorough and receives a score of 4.

One of the differences between the weather in Denver and the weather in San Francisco is that the rain fall in San Francisco is greater than the rain fall of Denver. Another difference is that the temperature for San Francisco stays in the range of 40°F-70°F, around the same temperature year around. The temperature of Denver ranges from 20°F-90°F, thats a big difference in temperature in a year. One more difference in weather is that the high and low temperatures of Denver are very far apart, basically 30°F apart. The high and low difference for San Francisco was very similar. The are some physical features that might cause the differences in weather. One of the differences are that there might be mountains that could block the sun, the wind and rain. Also San Francisco is located near the ocean, so the temperature is affected by the ocean. Also in San Francisco there is the Marine West Coast. That is a place that has tons of rain fall and cool weather.

Summary annotation statement:

Part a describes three good differences in the weather between the two cities based on the information provided from the map, table, and graphs. Two reasonable physical features are offered in part b, “San Francisco is located near the ocean” and “there might be mountains,” but the influence of the mountains, blocking “the sun, the wind and rain” for Denver is weakly explained. This response is general and receives a score of 3.

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

The weather in San Francisco stay at a mutal temperture while in Denver it goes up and down. In the summer in denver they have hot days and in San Farnacsisco they have mutal mild day through out the year. San fransiscos highs only get about 65 while denver gets to 85. Denver is in a hot area while san fransisco is in a cooler area.

Summary annotation statement:

Part a offers two reasonable differences between the weather in the two cities. (Denver's temperature fluctuates more than San Francisco's, and Denver is hotter in the summer.) Part b is not attempted, as no connection to physical features is provided. This response is limited and receives a score of 2.

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

A: Denvers weather rises and lowers throughout the year where as San Francisco stays the same through the year.

B: i'm sure the climates are different between the to its like in the winter when San Francisco doesn't get any snow i'm sure denver does.

Summary annotation statement:

Part a offers one reasonable difference in the weather by indicating temperature fluctuations in Denver. No physical features are discussed in part b. This response is considered minimal and receives a score of 1.

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

they didnt have that much rain in a year so the plants didnt keep growing and nether did the palon

Summary annotation statement:

This response is irrelevant. The pronoun “they” does not serve to compare one city to the other and plants do not enter into the question at all. No credit is earned.

Constructed-Response Item 22

- 22 During a human pregnancy there are many risks to the developing embryo.
- a. Identify **three** factors related to the mother's diet and/or lifestyle that may harm the embryo.
 - b. Explain why the embryo is affected by the mother's choices.

Scoring Guide for Constructed-Response Item 22

Score	Description
4	Response demonstrates a thorough understanding of the risks to the healthy development of an embryo including factors in the mother's diet and lifestyle. Response identifies three factors that impact the embryo and explains why the embryo is so dependent upon the mother. The response has no errors or omissions.
3	Response demonstrates a general understanding of the risks to the healthy development of an embryo including factors in the mother's diet, lifestyle, and hygiene. The response has an error or omission.
2	Response demonstrates a limited understanding of the risks to the healthy development of an embryo including factors in the mother's diet, lifestyle, and hygiene. The response has errors and omissions.
1	Response demonstrates a minimal understanding of the risks to the healthy development of an embryo including factors in the mother's diet, lifestyle, and hygiene. The 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

Factors that might be discussed include:

- smoking
- alcohol (drinking)
- drugs (caffeine is a drug)
- poor diet (lacking nutrients required for proper embryologic development)
- lifestyle (issues such as tattoos that cause infection and can impact the child, and any sudden jerky motion that may abort or cause premature delivery, like running or jumping)
- poor hygiene and/or disease

Explanation of the embryo's dependence on the mother's behavior may include any of the items below. Explanation should express the concept of the interrelationship between embryo and mother; the embryo gets all it needs through the mother.

- the embryo obtains food/energy from mother via the placenta
- the embryo obtains oxygen (gases) through mother
- the embryo eliminates wastes through mother
- the embryo maintains proper temperature and obtains protection through amniotic sac
- the mother provides protection against impact

Any understanding of the delicate balance between mother and embryo on a biological level should be given credit.

Part a is worth 3 points and part b is worth 1 point.

Note: for a score of 4, a minor error is acceptable.

a. ① she could smoke

② Could do harmful drugs or drink alcohol

③ Fatty foods, energy drinks, not too many chocolate bars

b. Because it is inside her - what she eats

is what the baby eats through the umbilical cord.

Summary annotation statement:

Part a offers more than three factors related to the mother's diet and lifestyle that may harm the embryo. Part b explains why the embryo is affected by the mother's choices and specifically identifies the pathway as the umbilical cord. This response is thorough and receives a score of 4.

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

a) Some things that might harm the baby is drugs
, smoking, eat bad food.

b) If the mom makes bad choices not just the
mom gets hurt It is the baby to.

Summary annotation statement:

Part a offers three factors relating to the mother's diet and lifestyle that may harm the embryo. In part b, no specific explanation is offered. This response is general and receives a score of 3.

I need to explain three factors related to the mother's diet and/or lifestyle that may harm the embryo. Smoking is harmful to the embryo, drinking is harmful to the embryo, sleeping on the belly is bad.

I need to explain why the embryo is affected by the mother's choices. Smoking bad for them because the baby can smoke to like drinking when they get older. If the mother lays on her belly she can crush the baby.

Summary annotation statement:

In part a, two reasonable factors (smoking and drinking) are identified as possibly harming the embryo. "Sleeping on the belly" is not considered an acceptable response. Part b does not explain why the embryo is affected by the mother's choices but reiterates and expands on the answers given in part a. This response is limited and receives a score of 2

Sample 1-Point Response with Annotations for Constructed-Response Item 22

a. if she smokes or does anything with tobacco
her embryo will have birth defects.
b. because she chooses what she does.

Summary annotation statement:

In part a, a connection is made between smoking (and other tobacco products) and the possibility of harm to the embryo. Part b does not explain why the embryo is affected by the mother's choices. This response is minimal and receives a score of 1.

A They should drink a lot of milk.
They should keep their feet up so
they don't get big

B This is why the embryo is affected
by what the mother does. It is because
a mother chooses what she wants to
do. Also that can affect it.

Summary annotation statement:

This response does not address the concept of harm to the embryo, but instead lists factors that would benefit the mother. Part b does not explain why the embryo is affected by the mother's choices. This response is not given credit.