

MEA 2007–2008

Science and Technology Grade 4

The table below shows the entire MEA science and technology 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			RESEARCH ITEMS			TOTAL ITEMS PER STUDENT			BASE TESTING TIME	POINTS
	MC	CR	SA	MC	CR	SA	MC	CR	SA		
SCIENCE AND TECHNOLOGY	32	4	0	8	1	0	40	5	0	90 MIN.	48

Each item on the MEA measures a grade span expectation based on Maine’s 1997 *Learning Results*. Score points for items are accumulated and reported in clusters. Each content standard is included in a cluster as indicated below.

Science and Technology Clusters

1. Life Sciences

- Classifying Life Forms (A)
- Ecology (B)
- Cells (C)

2. Physical Sciences

- Structure of Matter (E)
- Energy (H)
- Motion (I)

3. Earth and Space Sciences

- Continuity and Change (D)
- The Earth (F)
- The Universe (G)

4. Nature and Implications of Science

- Inquiry and Problem Solving (J)
- Scientific Reasoning (K)
- Communication (L)
- Implications of Science and Technology (M)

Item Information Chart

Please refer to the item information chart on the next page for in-depth information on each science and technology 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. At least one sample student response is provided for each score point with annotations that explain the reasoning behind the assigned score.

Student Work

Student work samples to supplement these scoring guides are found in the file labeled “Student Work.”

Grade 4 Science and Technology 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	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	7
Grade Span Expectation (GSE)	M4	I1	E2	L4	B2	A4	D3	G4	D3	D1	C4	F4	B1	C1	J3	D3*	H1	K4
Cluster	4	2	2	4	1	1	3	3	3	3	1	3	1	1	4	4	2	4
Item Type	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	4	4
Answer Key	C	A	C	B	C	B	C	B	B	D	B	D	D	B	B	B		
% Who Chose A or Earned 1 Point	19	88	10	18	9	8	2	5	5	3	7	34	10	11	3	6	37	17
% Who Chose B or Earned 2 Points	3	7	18	66	5	71	3	64	85	7	75	7	6	65	83	52	26	50
% Who Chose C or Earned 3 Points	58	2	44	7	77	9	89	9	5	4	9	9	5	11	9	32	14	26
% Who Chose D or Earned 4 Points	19	3	28	8	7	12	5	21	5	86	10	49	79	12	5	10	9	2
Statewide Average Student Score																	1.65	2.03

Grade Span Expectation (GSE): See “State of Maine 2007 Grade Span Expectations for MEA at Grades 4 and 8” document available at the Maine Department of Education’s Web site at <http://www.maine.gov/education/lsalt/gles.htm>.

Cluster: A group of content standards. (See previous page for groups.)

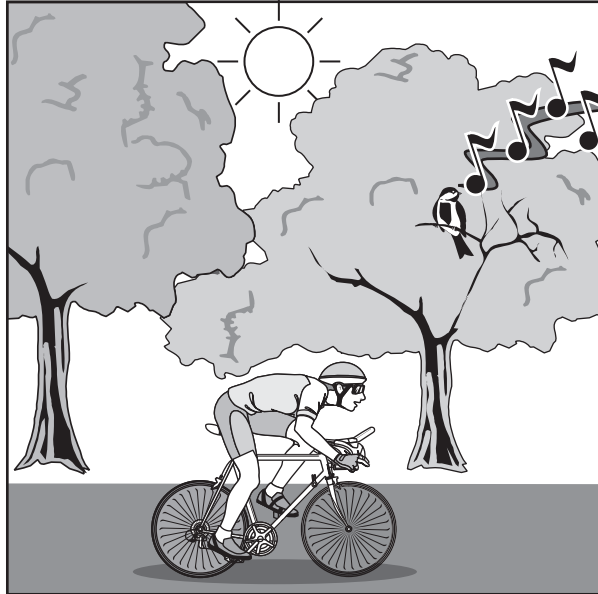
Item Type: MC = multiple-choice, CR = constructed-response

Answer Key: the letter of the correct answer choice

*Revised 7/31/08

Constructed-Response Item 17

Use the picture below to answer question 17.



- 17 a. Identify **three** different forms of energy in the picture.
b. Tell where or how **each** form is shown.

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

Scoring Guide for Constructed-Response Item 17

Score	Description
4	Response demonstrates a thorough understanding of different forms of energy. Student identifies three different forms of energy in the picture and tells where or how each form is shown. Response meets the requirements of the question with no errors or omissions.
3	Response demonstrates a general understanding of different forms of energy. Student identifies two different forms of energy in the picture and tells where or how each form is shown. Response meets the requirements of the question with minor errors or omissions.
2	Response demonstrates a partial understanding of different forms of energy. Student identifies one form of energy in the picture and tells where or how the form is shown. OR Student identifies three forms of energy without telling where or how they are shown in the picture. Response meets the requirements of the question with errors and/or omissions.
1	Response demonstrates a minimal understanding of different forms of energy. Student identifies one or two forms of energy in the picture but does not tell where or how each form is shown. Response meets the requirements of the question with major errors or omissions.
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 17

Forms of energy in the picture include

- mechanical (motion of the bike),
- light (from the Sun),
- heat (from the Sun and from the friction of the bike tires on the road),
- sound (from the bird singing and the bike's motion), and
- chemical (in the plants, from photosynthesis, and in the person, burning food as he exercises).

Constructed-Response Item 18

Use the information below to answer question 18.

Billy's Trip Record

I went to the store twice this week.

I went to school one time on my bike.

I went to John's every day.

Jacob's Trip Record

Trip Destination	Mileage	Date
Store	6 miles	3/9
Kenny's house	3 miles	3/10
Kenny's house	3 miles	3/10
Store	6 miles	3/11
School	1 mile	3/11
Kenny's house	6 miles	3/11
School	1 mile	3/12

18 Billy and Jacob keep a record of their bike rides. Each boy says that he rode his bike the farthest over the last few days.

a. Which boy recorded more useful data?

b. Use data from the boys' trip records to support your answer to part a.

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

Scoring Guide for Constructed-Response Item 18

Score	Description
4	Response demonstrates a thorough understanding of how to use facts and evidence to support a claim. Student correctly answers part a and supports the answer using specific data from the trip records. Response meets the requirements of the question with no errors or omissions.
3	Response demonstrates a general understanding of how to use facts and evidence to support a claim. Student correctly answers part a and supports the answer using general, qualitative information from the trip records. Response meets the requirements of the question with a minor error or omission.
2	Response demonstrates a partial understanding of how to use facts and evidence to support a claim. Student correctly answers part a but does not clearly connect the information in the trip records to support the answer. Response meets the requirements of the question with errors and/or omissions.
1	Response demonstrates a minimal understanding of how to use facts and evidence to support a claim. Student correctly answers part a but does not support the answer using the trip records. Response meets the requirements of the question with major errors or omissions.
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 18

- a. Jacob's data is more useful.
- b. Jacob's trip record shows specific data: distances, places, and dates that show he rode 26 miles during the four days in March. Billy's trip record does not allow any actual distances to be calculated for the days since he does not show how far each destination is.