THE UNIVERSITY OF THE STATE OF NEW YORK

GRADE 4

ELEMENTARY-LEVEL
SCIENCE TEST

SPRING 2007

FOR TEACHERS ONLY

RATING GUIDE FOR WRITTEN TEST, PART II

This rating guide contains detailed directions for rating student responses to Part II of the written test in Elementary-Level Science. All raters should become familiar with the detailed directions before beginning to rate student responses.

Appendix A provides a performance levels chart that translates final scores into four performance levels. A conversion chart is also needed to translate a student's raw scores on the written and performance tests to a final score. This chart will be posted on the Department's web site http://www.emsc.nysed.gov/osa/ on Wednesday, April 11, 2007. Conversion charts provided for previous administrations of this test must *not* be used to determine student's final scores for the 2007 administration of the test.

Appendix B provides four charts that link the individual questions on the test to the *Elementary-Level Science Core Curriculum Grades K-4*. This core curriculum is based on the *New York State Learning Standards in Mathematics, Science, and Technology*.

Any clarifications or changes to this rating guide will be posted on the New York State Education Department web site at http://www.emsc.nysed.gov/osa/ at the end of the test administration period. Check this web page before starting the rating process and several times during the rating period.

Questions regarding this test should be directed to the Office of Curriculum, Instruction, and Instructional Technology at (518) 474-5922.

Note: Retain this rating guide for future use. Do *not* return it to SED with the performance test materials.

Detailed Directions for Rating Part II of the Written Test

This guide contains detailed directions and criteria for rating student responses to the questions in Part II of the written test. Raters should become familiar with the detailed directions and rating criteria before beginning to rate the student responses. Refer to the 2007 Manual for Administrators and Teachers for suggestions about organizing the rating process.

In rating the student responses, follow the procedure outlined below.

1. Familiarize yourself with the system your school is using for processing the answer papers and recording the student scores. For example, scores may be transferred to each student's scannable answer sheet or to the Class Record Sheet.

2. Have a test booklet on hand. Read each Part II question carefully. Note exactly what is required.

3. Carefully read the criteria provided in this guide for rating each question. Look at the acceptable responses for each point value.

4. For most questions, examples of acceptable responses are provided. Acceptable responses include, but are not limited to, the examples given. Other responses that convey the same general meaning as those given in this guide should also receive credit. Raters must use their professional judgement to decide if the student's answer meets the criteria. You may find it helpful to discuss questionable student responses with other raters.

5. Discuss with other raters the requirements of each question and the rating criteria. When you are certain that you clearly understand the requirements and criteria, you are ready to begin rating the student responses.

6. It is recommended that you rate all the student responses to one question or group of questions before proceeding to the next question or group of questions. This method helps ensure that the rating criteria are applied consistently.

7. Students should *not* lose credit for incorrect spelling, grammar, capitalization, or punctuation.

8. In responses to questions where a specific number of answers are required (e.g., identify three materials, give two examples), if the student provides more than the required number of responses, score only the required number, in the order in which they appear.

9. Record the number of credits you allow for each question in the table provided on the back cover of the test booklet. The maximum number of credits for each question appears in the table.

10. When you have finished rating all the Part II questions, add the credits allowed for each question to obtain the total raw score for Part II.

11. The total raw score for Part II can be transferred to the student's scannable answer sheet. Check to be certain that the student name on the test booklet matches the name on the answer sheet. Scores may also be transferred to the Class Record Sheet if your school uses it.

    Note: Some schools will transfer a score for each Part II question rather than a total raw score for Part II. These are local decisions that depend on the answer sheet your school uses.

12. Add the student's raw score for Part II to the raw score for Part I to determine the student's total raw score for the written test. Use the conversion chart to convert the written and performance test raw scores to a final score for the student. This chart will be provided on the Department's web site http://www.emsc.nysed.gov/osa/ on Wednesday, April 11, 2007.

On-line Submission of Teacher Evaluations of the Test to the Department

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an on-line evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

1. Go to www.emsc.nysed.gov/osa/exameval.

2. Select the test title.

3. Complete the required demographic fields.

4. Complete each evaluation question and provide comments in the space provided.

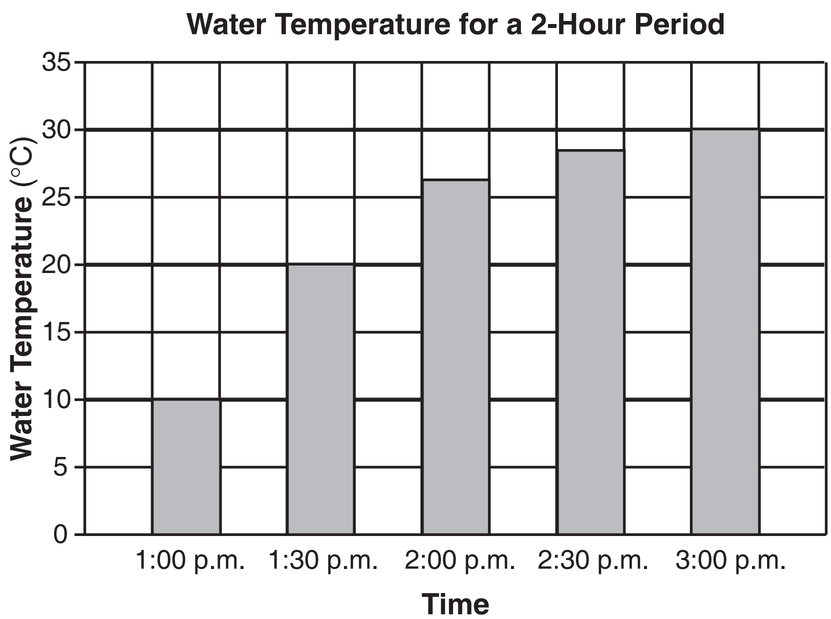
5. Click the SUBMIT button at the bottom of the page to submit the completed form.

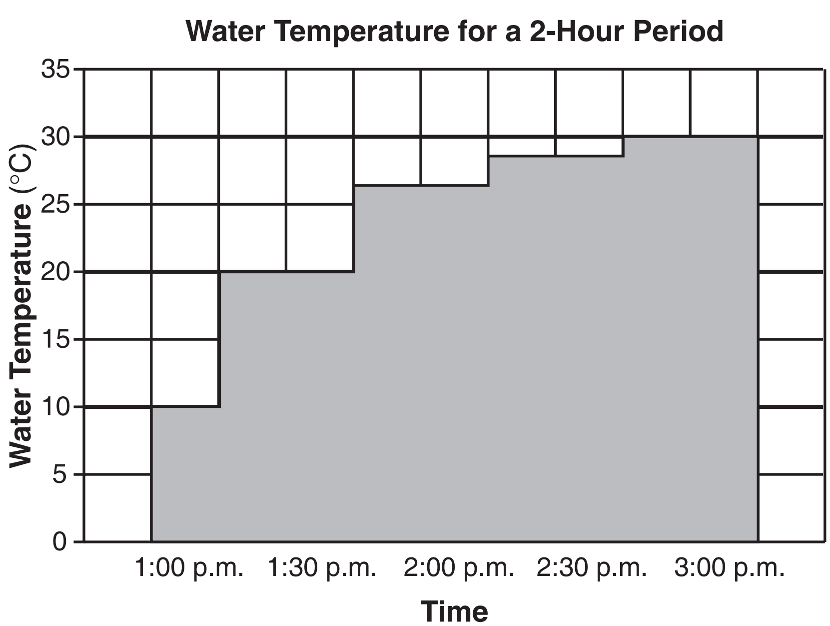
31 [2] Allow a maximum of 2 credits, allocated as follows:

Allow 2 credits if all four student-constructed bars are shaded correctly (± 1º).
Allow 1 credit if only three student-constructed bars are shaded correctly (± 1º).
Allow 0 credit if fewer than three student-constructed bars are shaded correctly (± 1º).

Note: The bar for 1:00 p.m. was provided.
Raters might find it helpful to use a transparent overlay when scoring this graph.
If a student constructs a histogram, allow credit as specified above.

Examples of 2-credit responses:





32 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— heat
— light
— thermal
— radiant

33 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The battery is dead.
— The switch is broken.
— The circuit is not complete.
— There is no battery/bulb in the flashlight.
— The batteries were put in incorrectly.
— The bulb filament is broken.
— It could be an open circuit.
— The bulb blew.
— The wrong kind of battery was used.
— The battery ran out of energy.

Unacceptable responses include:

The flashlight is broken.

34 [1] Allow 1 credit if all eight letters are correctly placed in the boxes, as shown below.

Triangles
A D E G

Not Triangles
B C F H

35 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— color
— black and white
— black/not black
— white/not white
— dark and light
— shaded/not shaded

36 [1] Allow 1 credit for the correct order, as shown below.

apple	orange	pear
1	2	3

37 [1] Allow 1 credit if all three states of matter are identified correctly, as shown in the chart below.

Substance	State of Matter
water vapor	gas
water	liquid
ice cube	solid

38 [2] Allow a maximum of 2 credits, allocated as follows:

Allow 2 credits if all three plant structures are identified correctly, as shown in the chart below.
Allow 1 credit if only two plant structures are identified correctly.
Allow 0 credit if fewer than two structures are identified correctly.

Function	Plant Structure
takes in water and nutrients	— roots — root
makes food for the plant	— leaves — leaf — stem
produces fruit and seeds	— flowers — flower

39 [2] Allow a maximum of 2 credits, 1 for each acceptable response. Acceptable responses include, but are not limited to:

— fins
— scales
— gills

40 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- — There would be nowhere for the owls to live.
- — less food for the owls
- — no homes for the owl's prey, so less food
- — easier to see their prey
- — population decrease

Note: Do *not* allow credit for "fewer trees." Responses must apply to the owls.

41 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- — Camouflage helps animals hide from predators.
- — Camouflage helps animals capture prey.
- — The animal can blend in with the environment and hide from predators.
- — They can sneak up on prey because they can blend in with their surroundings.

Unacceptable responses include:

Their color blends with surroundings.
The animals can blend in with the environment.
(These two responses define camouflage, but do not address *why* it helps the animal to survive.)

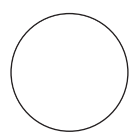
42 [1] Allow 1 credit for the correct sequence, as shown below.

Corn

2

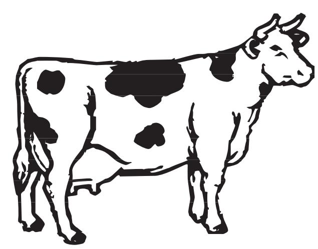
Student drinking milk

4



Sun

1



Cow

3

Appendix A

New York State Grade 4 Elementary-Level Science Test
Spring 2007

Performance Levels Chart

The chart on the next page defines the four performance levels for this test. The state-designated level of performance for this test is a final score of 65 or higher (level 3 and 4). Students scoring below 65 (levels 1 and 2) must be provided with academic intervention services according to section 100.2(ee)(i) of the Regulations of the Commissioner of Education. The chart provides the score range and a brief description of student performance for each level.

The conversion chart will be posted on the Department's website http://www.emsc.nysed.gov/osa/ on Wednesday, April 11, 2007.

Note: Conversion charts provided for previous administrations of this test must *not* be used to determine students' final scores for the 2007 administration.

Performance Levels for Final Score
Grade 4 Elementary-Level Science Test

Level	Final Test Score Range	Description of Student Performance
4	85–100	**Meeting the Standards with Distinction** • A student demonstrates superior understanding of elementary-level science content and concepts for the learning standards and key ideas being assessed. • The student demonstrates superior elementary-level science skills related to the learning standards and key ideas being assessed. • The student demonstrates superior understanding of the science content, concepts, and skills required for an elementary-level academic environment.
3	65–84	**Meeting the Standards** • The student demonstrates understanding of elementary-level science content and concepts for the learning standards and key ideas being assessed. • The student demonstrates elementary-level science skills related to the learning standards and key ideas being assessed. • The student demonstrates understanding of the science content, concepts, and skills required for an elementary-level academic environment.
2	45–64	**Not Fully Meeting the Standards** • The student demonstrates only minimal understanding of elementary-level science content and concepts for each of the learning standards and key ideas being assessed. • The student demonstrates minimal elementary-level science skills related to the learning standards and key ideas being assessed. • The student demonstrates minimal understanding of the science content, concepts, and skills required for an elementary-level academic environment.
1	0–44	**Not Meeting the Standards** • The student is unable to demonstrate understanding of elementary-level science content and concepts for the learning standards and key ideas being assessed. • The student is unable to demonstrate elementary-level science skills related to the learning standards and key ideas being assessed. • The student is unable to demonstrate understanding of the science content, concepts, and skills required for an elementary-level academic environment.

Appendix B

Item Maps

New York State Grade 4 Elementary-Level Science Test
Spring 2007 Written Test
Performance Test Form A

Item maps contained in this appendix:

- Reference to *Elementary-Level Science Core Curriculum Grades K-4* — Spring 2007 Written Test and Performance Test, Form A
- Reference to Process Skills Based on Standard 4 — Spring 2007 Written Test and Performance Test, Form A
- Reference to Core Curriculum for Individual Test Questions — Spring 2007 Written Test
- Reference to Core Curriculum for Individual Test Questions — Performance Test, Form A

Note: Core curriculum is based on *NYS Learning Standards for Mathematics, Science and Technology.*

NYS Learning Standards for Mathematics, Science, and Technology **Standard/Area**	**Reference to *Elementary-Level Science Core Curriculum Grades K-4* Key Idea or Performance Indicator**	**Performance Test Form A Question Number**			**Spring 2007 Written Test Question Number**
		Station 1	**Station 2**	**Station 3**	
Standard 1 Mathematical Analysis	**M1** Abstraction and symbolic representation are used to communicate mathematically.	1, 2, 4, 5		1	
	M2 Deductive and inductive reasoning are used to reach mathematical conclusions.			3, 5	
	M3 Critical thinking skills are used in the solution of mathematical problems.	1, 2, 4	1, 3	1	
Standard 1 Scientific Inquiry Key Idea 1	**S1.1** Ask "why" questions in attempts to seek greater understanding concerning objects and events they have observed and heard about.				
	S1.2 Question the explanations they hear from others and read about, seeking clarification and comparing them with their own observations and understandings.		4		
	S1.3 Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.		2		
Standard 1 Scientific Inquiry Key Idea 2	**S2.1** Develop written plans for exploring phenomena or for evaluating explanations guided by questions or proposed explanations they have helped formulate.				
	S2.2 Share their research plans with others and revise them based on their suggestions.				
	S2.3 Carry out their plans for exploring phenomena through direct observation and through the use of simple instruments that permit measurement of quantities such as length, mass, volume, temperature, and time.			1	7
Standard 1 Scientific Inquiry Key Idea 3	**S3.1** Organize observations and measurements of objects and events through classification and the preparation of simple charts and tables.		1, 3		31, 34, 35
	S3.2 Interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships.		2, 4	2, 3	15
	S3.3 Share their findings with others and actively seek their interpretations and ideas.		4		
	S3.4 Adjust their explanations and understandings of objects and events based on their findings and new ideas.			4, 5	
Standard 1 Engineering Design	**T1.1 -T1.5** Engineering design is an iterative process involving modeling and optimization to develop technological solutions to problems within given constraints.			4	

NYS Learning Standards for Mathematics, Science, and Technology **Standard/Area**	**Reference to *Elementary-Level Science Core Curriculum Grades K-4*** **Key Idea or Performance Indicator**	**Performance Test Form A Question Number**			**Spring 2007 Written Test Question Number**
		Station 1	**Station 2**	**Station 3**	
Standard 2 Information Systems	**1** Information technology is used to retrieve, process, and communicate information as a tool to enhance learning.				
	2 Knowledge of the impacts and limitations of information systems is essential to its effectiveness and ethical use.				
	3 Information technology can have positive and negative impacts on society, depending upon how it is used.				
Standard 4 Physical Setting	**1** Earth and celestial phenomena can be described by principles of relative motion and perspective.				5
	2 Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.				6, 10, 13, 14, 15, 19
	3 Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.	1, 2, 3, 4, 5	1, 2		2, 3, 6, 7, 8, 11, 12, 34, 35, 36, 37
	4 Energy exists in many forms, and when these forms change energy is conserved.		1, 2		2, 32, 33
	5 Energy and matter interact through forces that result in changes in motion.		3, 4	1, 2, 3, 4, 5	1, 4, 9
Standard 4 Living Environment	**1** Living things are both similar to and different from each other and from nonliving things.				18
	2 Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.				25
	3 Individual organisms and species change over time.				23, 24, 26, 29, 38, 39, 41
	4 The continuity of life is sustained through reproduction and development.				17, 26, 28
	5 Organisms maintain a dynamic equilibrium that sustains life.				16, 20, 21, 22, 24, 41
	6 Plants and animals depend on each other and their physical environment.				14, 27, 30, 40, 42
	7 Human decisions and activities have had a profound impact on the physical and living environment.				40

NYS Learning Standards for Mathematics, Science, and Technology **Standard/Area**	**Reference to *Elementary-Level Science Core Curriculum Grades K-4* Key Idea or Performance Indicator**	**Performance Test Form A Question Number**			**Spring 2007 Written Test Question Number**
		Station 1	**Station 2**	**Station 3**	
Standard 6 Interconnectedness: Common Themes	**1 Systems Thinking** Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions.				
	2 Models Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design.				6, 9, 10, 11, 12, 13, 14, 18, 19, 20, 23, 25, 26, 32, 33, 38, 39, 42
	3 Magnitude and Scale The grouping of magnitudes of size, time, frequency, and pressures or other units of measurement into a series of relative order provides a useful way to deal with the immense range and the changes in scale that affect the behavior and design of systems.				36
	4 Equilibrium and Stability Equilibrium is a state of stability due either to a lack of change (static equilibrium) or a balance between opposing forces (dynamic equilibrium).				
	5 Patterns of Change Identifying patterns of change is necessary for making predictions about future behavior and conditions.			2, 3	
	6 Optimization In order to arrive at the best solution that meets criteria within constraints, it is often necessary to make trade-offs.			5	
Standard 7 Interdisciplinary Problem Solving	**1 Connections** The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those related to issues of science/technology/society, consumer decision-making, design, and inquiry into phenomena.				
	2 Strategies Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results.				

Grade 4 Elementary-Level Science Core Curriculum Grades K-4
Reference to Process Skills Based On Standard 4

	Process Skills–General Skills	Performance Test Form A Question Number			Spring 2007 Written Test Question Number
		Station 1	Station 2	Station 3	
i	follow safety procedures in the classroom, laboratory, and field				
ii	safely and accurately use the following tools: hand lens, ruler (metric), balance, gram weights, spring scale, thermometer (C°, F°), measuring cups, graduated cylinder, timepiece(s)	1, 2, 4			
iii	develop an appreciation of and respect for all learning environments (classroom, laboratory, field, etc.)				
iv	manipulate materials through teacher direction and free discovery				
v	use information systems appropriately				
vi	select appropriate standard and nonstandard measurement tools for measurement activities	1, 2, 4			7
vii	estimate, find, and communicate measurements, using standard and nonstandard units	1, 2, 4, 5			
viii	use and record appropriate units for measured or calculated values	2, 5			
ix	order and sequence objects and/or events				36, 42
x	classify objects according to an established scheme				34
xi	generate a scheme for classification				35
xii	utilize senses optimally for making observations				
xiii	observe, analyze, and report observations of objects and events	3	1, 3	1	
xiv	observe, identify, and communicate patterns			2, 3	15
xv	observe, identify, and communicate cause and effect relationships	3			40, 41
xvi	generate appropriate questions (teacher and student based) in response to observations, events, and other experiences				
xvii	observe, collect, organize, and appropriately record data, then accurately interpret results				
xviii	collect and organize data, choosing the appropriate representation: journal entries, graphic representations, drawings/pictorial representations				
xix	make predictions based on prior experiences and/or information			2, 3, 5	
xx	compare and contrast organisms/objects/events/ in the living and physical environments		2, 4		39
xxi	identify and control variables/factors			4	
xxii	plan, design, and implement a short-term and long-term investigation based on a student- or teacher-posed problem				
xxiii	communicate procedures and conclusions through oral and written presentations				

Grade 4 Elementary-Level Science Written Test – Spring 2007
Reference to *Elementary-Level Science Core Curriculum* for Individual Test Questions

Question Number	MST Learning Standard	Area within Standard 4 (PS or LE)	Key Idea or Major Understanding	Other Standards, Key Ideas, or Major Understandings	Process Skills Based on Standard 4 (p. 11 in core)
1	4	PS	5.1e		
2	4	PS	3.2b	4.1a	
3	4	PS	3.1d		
4	4	PS	5.1c		
5	4	PS	1.1a		
6	4	PS	3.1e	2.1b; St 6 KI 2	
7	4	PS	3.1e	St 1 S 2.3a	skill vi
8	4	PS	3.1c		
9	4	PS	5.1f	St 6 KI 2	
10	4	PS	2.1d	St 6 KI 2	
11	4	PS	3.2a	3.2c; St 6 KI 2	
12	4	PS	3.2a	3.2c; St 6 KI 2	
13	4	PS	2.1c	St 6 KI 2	
14	4	PS	2.1c	LE 6.2c; St 6 KI 2	
15	St 1	—	S 3.2	PS 2.1b	skill xiv
16	4	LE	5.2e		
17	4	LE	4.1c		
18	4	LE	1.2a	St 6 KI 2	
19	4	PS	2.1c	St 6 KI 2	
20	4	LE	5.1b	St 6 KI 2	
21	4	LE	5.3a		
22	4	LE	5.2b		
23	4	LE	3.1c	St 6 KI 2	
24	4	LE	5.2f	3.1c	
25	4	LE	2.1a	St 6 KI 2	
26	4	LE	4.1b	3.1b; St 6 KI 2	
27	4	LE	6 Introduction		
28	4	LE	4.1e		
29	4	LE	3.1c		
30	4	LE	6.1d		
31	St 1	—	S3.1a	PS	
32	4	PS	4.2b	St 6 KI 2	
33	4	PS	4.1e	St 6 KI 2	
34	4	PS	3.1f	St 1 S 3.1a	skill x
35	4	PS	3.1f	St 1 S 3.1a	skill xi
36	St 6	—	KI 3	PS 3.1c	skill ix
37	4	PS	3.2a		
38	4	LE	3.1b	St 6 KI 2	
39	4	LE	3.1a	St 6 KI 2	skill xx
40	4	LE	7.1c	7.1b, 6.1f	skill xv
41	4	LE	3.1c	5.2e	skill xv
42	St 6	—	KI 2	LE 6.1c, 6.2b	skill ix

Grade 4 Elementary-Level Science Performance Test, Form A
Reference to *Elementary-Level Science Core Curriculum* for Individual Test Questions

Station	Item			Reference to Elementary Science Core Curriculum			
	Item #	**task**	**credits**	**General Skills (p. 11)**	**MST Standard 1 (Mathematical Analysis, Scientific Inquiry and Engineering Design) Key Idea/Performance Indicator**	**MST Standard 6 Interconnected/ Common Themes**	**MST Standard 4 The Physical Setting Key Idea/Performance Indicator**
1 **(9 credits total)**	**1a** **1b**	width height	1 1	ii vi vii	M 1.1c M 3.1a		3.1c 3.1d
	2	volume	2	ii vi vii viii	M 1.1c M 3.1a		3.1c 3.1d 3.2a
	3	water level up	1	xiii xv			3.1a 3.1c
	4	mass of two jars	1	ii vi vii	M 1.1c M 3.1a		3.1c 3.1d
	5	mass of water only	3	vii viii	M 1.1b M 1.1c		3.1c 3.1d
2 **(9 credits total)**	**1**	electricity data	2	xiii	M 3.1a S 3.1		3.1e 3.1f 4.1 a-e
	2	statement about electricity	3	xx	S 1.3 S 3.2a		3.1e 3.1f 4.1 a-e
	3	magnet data	2	xiii	M 3.1a S 3.1		5.1e 5.2a
	4	explanation	2	xx	S 1.2 S 3.2a S 3.3a		5.1e 5.2a
3 **(8 credits total)**	**1**	collect data	2	xiii	M 1.1c M 3.1a S 2.3a S 2.3b		5.1a 5.1b 5.1c 5.1f
	2	predict where to release the ball	1	xiv xix	S 3.2	Key Idea 5	5.1
	3	explain response to #2	1	xiv xix	M 2.1a M 2.1b S 3.2a	Key Idea 5	5.1
	4	suggest a change to the setup	2	xxi	T 1.3c S 3.4		5.1
	5	explain response to #4	2	xix	M 2.1b S 3.4a	Key Idea 6	5.1