

THE UNIVERSITY OF THE STATE OF NEW YORK

# GRADE 4

## ELEMENTARY-LEVEL SCIENCE TEST

JUNE 2022 WRITTEN TEST

FOR TEACHERS ONLY

RATING GUIDE FOR 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.nysed.gov/state-assessment/>. Conversion charts provided for previous administrations of this test must *not* be used to determine students' final scores for the 2022 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.nysed.gov/state-assessment/> during the rating period. Check the "Scoring Information" link at this web site before starting the rating process and several times during the rating period.

Questions regarding this test should be directed to the Office of State Assessment at (518) 474-5900.

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

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THE STATE EDUCATION DEPARTMENT  
ALBANY, NEW YORK 12234

## Detailed Directions for Rating Part II of the Written Test

**Note:** Teachers are not permitted to score their own students' responses.

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 *2022 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.
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.
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 judgment to decide if the student's answer meets the criteria. You may find it helpful to discuss questionable student responses with other raters.
5. Acceptable responses separated by a slash (/) are considered to be the same response and should be counted for credit once.
6. To ensure the accuracy of overlays, select a printer setting such as *full*, *actual size*, or *100%* when printing this document. Do not select the *fit to page* setting.
7. 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.
8. It is recommended that you score 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 scoring criteria are applied consistently.
9. Students should *not* lose credit for incorrect spelling, grammar, capitalization, or punctuation.
10. For questions where there is more than one answer and 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.

11. Sometimes in questions where there is only one acceptable answer, the student will provide more than one answer. These must be considered on a case-by-case basis. If the second answer indicates that the student does not understand the question or is simply guessing, then credit should not be allowed.
12. 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.
13. 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.
14. Follow your school's procedure for transferring Part II scores to the student's scannable answer sheet. These are local decisions that depend on the answer sheet your school uses. Some schools will transfer a score for each Part II question while others may transfer a total raw score for Part II. Check to be certain that the student name on the test booklet matches the name on the answer sheet.

### **Online 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 online 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 <http://www.nysed.gov/state-assessment/teacher-feedback-state-assessments>.
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 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Student A will fall on the ground/floor.
- Student A will stumble/move backwards.
- Student A may be able to stand up straight.

32 [1] Allow 1 credit for sample C *and* an acceptable explanation. Acceptable responses include, but are not limited to:

- The more tree rings, the older the tree.
- It has the most tree rings.
- Thirty-nine/39 is the highest number of tree rings.

**Note:** Do *not* allow credit for “each year the tree adds to its diameter and the new growth is called a tree ring” because it does not explain why tree C has the most rings.

Do *not* allow credit for “39 rings” as an explanation because it does not compare 39 to the remainder of the data in the table.

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

- There are different growing conditions (flood, drought, insect attacks, forest fires) each year.
- Growing conditions cause different tree ring widths.
- Trees receive different amounts of water, causing different tree ring widths.
- Widths are a result of the amount of water available.

34 [1] Allow 1 credit if *all five* letters are correctly listed, as shown below.

**Data Table**

<b>Object</b>	<b>Length of Object (cm)</b>	<b>Letter on Ruler</b>
pen	14	D
eraser	4.5	A
marker	12	C
pencil	15.5	E
paper clip	5	B

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

- The length of one paper clip is 5 cm. The length of three paper clips is 15 cm ( $5 \times 3$ ). The length of one pen is 14 cm. Therefore, three paper clips are not the same length as one pen.
- Three paper clips would be 15 cm long and one pen is 14 cm long.
- Three paper clips are one centimeter longer than one pen.
- 15 cm is greater than 14 cm.
- $15 \text{ cm} > 14 \text{ cm}$
- The pen would have to be 15 cm to equal three paper clips.

36 [1] Allow 1 credit for a correct response in *all four* unshaded boxes of the chart, as shown below.

Examples	Living or Nonliving	Human-created or Naturally Occurring
dog	living	naturally occurring
soccer ball	nonliving	human-created
rock	nonliving	naturally occurring
oak tree	living	naturally occurring

37 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Deer A has larger antlers to fight deer B.
- Deer A is bigger/taller than deer B.
- Deer A is stronger/more muscular than deer B.
- Deer B is smaller than deer A.

**Note:** Do *not* allow credit for “size/height” or “antlers” alone because it does not describe the difference between deer A and deer B.

38 [1] Allow 1 credit for *two* correct resources. Acceptable responses include, but are not limited to:

- food/plants
- space
- water
- shelter/area/territory

39 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- absorb/take in water
- take in nutrients from environment
- anchor/support the plant
- They keep the plant in the ground.

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

- Plants use the Sun’s energy to make food/sugar/glucose.
- Plants use the Sun’s energy for photosynthesis.
- because plants are producers that can make their own food

**Note:** Do *not* allow credit for responses that indicate the Sun gives/provides nutrients/nutrition because nutrients are available through the soil.

Do *not* allow credit for “producers” alone because it does not show the understanding of how this helps a plant to grow.

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

- fewer trees/less space to live in
- decreased food/water supply
- pollutes the air they breathe
- contaminates the water they drink
- Their habitat is polluted.
- Increased noise puts stress on the animals.
- More animals would be hit by cars.
- The dam flooded the animals’ habitat.

**Note:** Acceptable responses *must* include an effect on the organism.

**42** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- increase the temperature/add heat
- warm it up
- put the glass in the sunlight
- by melting the ice

**Note:** Do *not* allow credit for “change the temperature” because it does not describe an increase needed to melt ice.

**43** [1] Allow 1 credit for any rounded shape drawn anywhere on the line between bead *C* and bead *D*.

**Note:** Do *not* allow credit for incorrect shapes between beads *C* and *D*.

Do *not* allow credit if the bead does not touch the line.

Do *not* allow credit if the student drew more than one bead anywhere on the line.

**44** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- It’s a closed circuit.
- It completes the circuit.
- The metal clips are conductors, and electricity can travel through if they touch.

**45** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- It is the power source.
- It provides the energy to produce electricity.
- It powers the circuit.
- changes chemical energy to electrical energy
- source of potential energy

## Appendix A

### New York State Grade 4 Elementary-Level Science Test June 2022

#### 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 web site <http://www.nysed.gov/state-assessment/elementary-and-intermediate-level-tests> through the “Scoring Information” link.

**Note:** Conversion charts provided for previous administrations of this test must *not* be used to determine students’ final scores for the 2022 administration.



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

Level	Final Test Score Range	Description of Student Performance
4	85–100	<p><b>Meeting the Standards with Distinction</b></p> <ul style="list-style-type: none"> <li>• The student demonstrates superior understanding of elementary-level science content and concepts for the learning standards and key ideas being assessed.</li> <li>• The student demonstrates superior elementary-level science skills related to the learning standards and key ideas being assessed.</li> <li>• The student demonstrates superior understanding of the science content, concepts, and skills required for an elementary-level academic environment.</li> </ul>
3	65–84	<p><b>Meeting the Standards</b></p> <ul style="list-style-type: none"> <li>• The student demonstrates understanding of elementary-level science content and concepts for the learning standards and key ideas being assessed.</li> <li>• The student demonstrates elementary-level science skills related to the learning standards and key ideas being assessed.</li> <li>• The student demonstrates understanding of the science content, concepts, and skills required for an elementary-level academic environment.</li> </ul>
2	45–64	<p><b>Not Fully Meeting the Standards</b></p> <ul style="list-style-type: none"> <li>• The student demonstrates only minimal understanding of elementary-level science content and concepts for each of the learning standards and key ideas being assessed.</li> <li>• The student demonstrates minimal elementary-level science skills related to the learning standards and key ideas being assessed.</li> <li>• The student demonstrates minimal understanding of the science content, concepts, and skills required for an elementary-level academic environment.</li> </ul>
1	0–44	<p><b>Not Meeting the Standards</b></p> <ul style="list-style-type: none"> <li>• The student is <i>unable</i> to demonstrate understanding of elementary-level science content and concepts for the learning standards and key ideas being assessed.</li> <li>• The student is <i>unable</i> to demonstrate elementary-level science skills related to the learning standards and key ideas being assessed.</li> <li>• The student is <i>unable</i> to demonstrate understanding of the science content, concepts, and skills required for an elementary-level academic environment.</li> </ul>

## Appendix B

### Item Maps

#### **New York State Grade 4 Elementary-Level Science Test June 2022 Written Test Performance Test, Form A**

Item maps contained in this appendix:

- Reference to *Elementary-Level Science Core Curriculum Grades K–4* — June 2022 Written Test and Performance Test, Form A
- Reference to Process Skills Based on Standard 4 — June 2022 Written Test and Performance Test, Form A
- Reference to Core Curriculum for Individual Test Questions — June 2022 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*.

<i>NYS Learning Standards for Mathematics, Science, and Technology Standard/Area</i>	<b>Reference to <i>Elementary-Level Science Core Curriculum Grades K-4</i> Key Idea or Performance Indicator</b>	<b>Performance Test Form A Question Number</b>			<b>June 2022 Written Test Question Number</b>
		<b>Station 1</b>	<b>Station 2</b>	<b>Station 3</b>	
<b>Standard 1 Mathematical Analysis</b>	<b>M1</b> Abstraction and symbolic representation are used to communicate mathematically.	1, 2, 4, 5		1	34, 35
	<b>M2</b> Deductive and inductive reasoning are used to reach mathematical conclusions.			3, 5	33
	<b>M3</b> Critical thinking skills are used in the solution of mathematical problems.	1, 2, 4	1, 3	1	30
<b>Standard 1 Scientific Inquiry Key Idea 1</b>	<b>S1.1</b> Ask “why” questions in attempts to seek greater understanding concerning objects and events they have observed and heard about.				
	<b>S1.2</b> Question the explanations they hear from others and read about, seeking clarification and comparing them with their own observations and understandings.		4		24
	<b>S1.3</b> Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.		2		
<b>Standard 1 Scientific Inquiry Key Idea 2</b>	<b>S2.1</b> Develop written plans for exploring phenomena or for evaluating explanations guided by questions or proposed explanations they have helped formulate.				25
	<b>S2.2</b> Share their research plans with others and revise them based on their suggestions.				
	<b>S2.3</b> 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	
<b>Standard 1 Scientific Inquiry Key Idea 3</b>	<b>S3.1</b> Organize observations and measurements of objects and events through classification and the preparation of simple charts and tables.		1, 3		26
	<b>S3.2</b> Interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships.		2, 4	2, 3	27, 32
	<b>S3.3</b> Share their findings with others and actively seek their interpretations and ideas.		4		
	<b>S3.4</b> Adjust their explanations and understandings of objects and events based on their findings and new ideas.			4, 5	
<b>Standard 1 Engineering Design</b>	<b>T1.1–T1.5</b> Engineering design is an iterative process involving modeling and optimization to develop technological solutions to problems within given constraints.			4	

<i>NYS Learning Standards for Mathematics, Science, and Technology Standard/Area</i>	<b>Reference to <i>Elementary-Level Science Core Curriculum Grades K-4</i> Key Idea or Performance Indicator</b>	<b>Performance Test Form A Question Number</b>			<b>June 2022 Written Test Question Number</b>
		<b>Station 1</b>	<b>Station 2</b>	<b>Station 3</b>	
<b>Standard 2 Information Systems</b>  Students will access, generate, process, and transfer information using appropriate technologies.	<b>1</b> Information technology is used to retrieve, process, and communicate information as a tool to enhance learning.				
	<b>2</b> Knowledge of the impacts and limitations of information systems is essential to its effectiveness and ethical use.				
	<b>3</b> Information technology can have positive and negative impacts on society, depending upon how it is used.				
<b>Standard 4 The Physical Setting</b>	<b>1</b> Earth and celestial phenomena can be described by principles of relative motion and perspective.				14
	<b>2</b> Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.				16, 17, 28
	<b>3</b> Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.	1, 2, 3, 4, 5	1, 2		18, 19, 20, 21, 42, 44
	<b>4</b> Energy exists in many forms, and when these forms change, energy is conserved.		1, 2		22, 23, 45
	<b>5</b> Energy and matter interact through forces that result in changes in motion.		3, 4	1, 2, 3, 4, 5	15, 29, 43
<b>Standard 4 The Living Environment</b>	<b>1</b> Living things are both similar to and different from each other and from nonliving things.				36
	<b>2</b> Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.				1
	<b>3</b> Individual organisms and species change over time.				2, 3, 4, 5, 37, 38, 39, 40
	<b>4</b> The continuity of life is sustained through reproduction and development.				6, 7
	<b>5</b> Organisms maintain a dynamic equilibrium that sustains life.				8, 41
	<b>6</b> Plants and animals depend on each other and their physical environment.				9, 10, 11, 12
	<b>7</b> Human decisions and activities have had a profound impact on the physical and living environment.				13

<i>NYS Learning Standards for Mathematics, Science, and Technology Standard/Area</i>	<b>Reference to Elementary-Level Science Core Curriculum Grades K-4 Key Idea or Performance Indicator</b>	<b>Performance Test Form A Question Number</b>			<b>June 2022 Written Test Question Number</b>
		<b>Station 1</b>	<b>Station 2</b>	<b>Station 3</b>	
<b>Standard 6 Interconnectedness: Common Themes</b>  Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.	<b>1 Systems Thinking</b> 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.				
	<b>2 Models</b> Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design.				
	<b>3 Magnitude and Scale</b> 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.				
	<b>4 Equilibrium and Stability</b> Equilibrium is a state of stability due either to a lack of change (static equilibrium) or a balance between opposing forces (dynamic equilibrium).				31
	<b>5 Patterns of Change</b> Identifying patterns of change is necessary for making predictions about future behavior and conditions.			2, 3	
	<b>6 Optimization</b> In order to arrive at the best solution that meets criteria within constraints, it is often necessary to make trade-offs.			5	
<b>Standard 7 Interdisciplinary Problem Solving</b>  Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.	<b>1 Connections</b> 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.				
	<b>2 Strategies</b> 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 Test—June 2022**  
**Reference to Process Skills Based On Standard 4**

Process Skills—General Skills (From <i>Grade 4 Elementary-Level Science Core Curriculum Grades K-4</i> )	Performance Test Form A Question Number			June 2022 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			25, 30
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			
vii estimate, find, and communicate measurements, using standard and nonstandard units	1, 2, 4, 5			19, 26, 27, 34
viii use and record appropriate units for measured or calculated values	2, 5			
ix order and sequence objects and/or events				43
x classify objects according to an established scheme				36
xi generate a scheme for classification				
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	
xv observe, identify, and communicate cause and effect relationships	3			20, 44, 16
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				35
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	31
xx compare and contrast organisms/objects/events in the living and physical environments		2, 4		37
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 – June 2022**  
**Reference to *Elementary-Level Science Core Curriculum* for Individual Test Questions**

<b>Question Number</b>	<b>MST Learning Standard</b>	<b>Area within Standard 4 (PS or LE)</b>	<b>Key Idea or Major Understanding</b>	<b>Other Standards, Key Ideas, or Major Understandings</b>	<b>Process Skills Based on Standard 4 (p. 11 in core)</b>
1	4	LE	2.1b		
2	4	LE	3.1a		
3	4	LE	3.1c		
4	4	LE	3.1c	5.2f	
5	4	LE	3.1c		
6	4	LE	4.1g	4.1f	
7	4	LE	4.2b	1.1a	
8	4	LE	5.2a		
9	4	LE	6.1a	St 6 KI 2	
10	4	LE	6.1c	St 6 KI 2, PS 5.1a	
11	4	LE	6.1f		
12	4	LE	6.1c		
13	4	LE	7.1c		
14	4	PS	1.1b	1.1a	
15	4	PS	5.29	5.1c, St 6 KI 2	
16	4	PS	2.1c	4.1d	xv
17	4	PS	2.1e		
18	4	PS	3.1a		
19	4	PS	3.1c	St 6 KI 2	xii
20	4	PS	3.1e		xv
21	4	PS	3.2c		
22	4	PS	4.1b	4.1a, St 6 KI 2	
23	4	PS	4.1d		
24	1	–	S 1.29		
25	1	–	S 2.1a	M 3.1a, PS 3.1e	ii
26	1	–	S 3.1		vii
27	1	–	S 3.2	PS 2.1b, PS 2.1a	vii
28	4	PS	2.1b	St 1 S 3.2	
29	4	PS	5.1d	S 1.1	
30	1	–	M 3.1a		ii
31	6	–	KI 4		xix
32	1	–	S 3.2b	St 6 KI 2	
33	6	–	M 2.1b	S 3.2a, LE 4.2a	
34	1	–	M 1.1a	St 6 KI 2, PS 3.1c	vii
35	1	–	M 1.1a	PS 3.1c	xvii
36	4	LE	1.1d	1.1c	x
37	4	LE	3.2a	St 6 KI 2	xx
38	4	LE	3.2a		
39	4	LE	3.1b	1.1b, St 6 KI 1	
40	4	LE	3.1b	6.2a, St 6 KI 1	
41	4	LE	5.2 g	St 6 KI 2	
42	4	PS	3.2b	3.2a, St 6 KI 2	
43	4	PS	5.1a	St 6 KI 2	ix
44	4	PS	3.1e	4.1c, St 6 KI 2	xv
45	4	PS	4.2b	St 6 KI 2	

**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 No.	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	width	1	ii	M 1.1c		3.1c
	1b	height	1	vi vii	M 3.1a		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 No.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 No.4	2	xix	M 2.1b S 3.4a	Key Idea 6	5.1