

FOR TEACHERS ONLY

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

PS-P

PHYSICAL SETTING/PHYSICS

Wednesday, June 16, 2004 — 1:15 to 4:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 3 before rating student papers.

Part A and Part B-1
Allow 1 credit for each correct response

Part A					Part B-1				
1	4	13	4	25	2	36	4	42	2
2	1	14	2	26	4	37	3	43	2
3	4	15	2	27	4	38	3	44	1
4	3	16	3	28	1	39	1	45	4
5	3	17	2	29	3	40	1	46	4
6	1	18	1	30	2	41	3		
7	2	19	3	31	3				
8	2	20	3	32	3				
9	1	21	2	33	3				
10	4	22	1	34	1				
11	4	23	2	35	4				
12	2	24	1						

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Visit the site <http://www.emsc.nysed.gov/osa/> and select the link "Latest Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and at least one more time before the final scores for the examination are recorded.

Directions to the Teacher

Follow the procedures below for scoring student answer papers for the Physical Setting/Physics examination. Additional information about scoring is provided in the publication *Information for Administering and Scoring Regents Examinations in the Sciences*.

Use only *red* ink or *red* pencil in rating Regents papers. Do not attempt to *correct* the student's work by making insertions or changes of any kind.

On the detachable answer sheet for Part A and Part B–1, indicate by means of a checkmark each incorrect or omitted answer. In the box provided at the end of each part, record the number of questions the student answered correctly for that part.

Students' responses must be scored strictly according to the Scoring Key and Rating Guide. For open-ended questions, credit may be allowed for responses other than those given in the rating guide if the response is a scientifically accurate answer to the question and demonstrates adequate knowledge as indicated by the examples in the rating guide.

Fractional credit is *not* allowed. Only whole-number credit may be given to a response. Units need not be given when the wording of the questions allows such omissions.

Raters should enter the scores earned for Part A, Part B–1, Part B–2, and Part C on the appropriate lines in the box printed on the answer booklet, and then should add these four scores and enter the total in the box labeled "Total Written Test Score." Then, the student's raw score on the written test should be converted to a scaled score by using the conversion chart that will be posted on the Department's web site: <http://www.emsc.nysed.gov/osa/> on Wednesday, June 16, 2004. The student's scaled score should be entered in the labeled box on the student's answer booklet. The scaled score is the student's final examination score.

All student answer papers that receive a scaled score of 60 through 64 **must** be scored a second time. For the second scoring, a different committee of teachers may score the student's paper or the original committee may score the paper, except that no teacher may score the same open-ended questions that he/she scored in the first rating of the paper. The school principal is responsible for assuring that the student's final examination score is based on a fair, accurate, and reliable scoring of the student's answer paper.

Because scaled scores corresponding to raw scores in the conversion chart may change from one examination to another, it is crucial that for each administration, the conversion chart provided for that administration be used to determine the student's final score.

Please refer to the Department publication *Regents Examination in Physical Setting/Physics: Rating Guide for Parts B–2 and C*. This publication can be found on the NYS Education Department web site at <http://www.emsc.nysed.gov/osa/scire/phyratg02.pdf>. Teachers should become familiar with this guide before rating students' papers.

Scoring Criteria for Calculations

For each question requiring the student to show *all calculations, including the equation and substitution with units*, apply the following scoring criteria:

- Allow 1 credit for the equation and substitution of values with units. If the equation and/or substitution with units is not shown, do *not* allow this credit.
- Allow 1 credit for the correct answer (number and unit). If the number is given without the unit, do *not* allow this credit.
- Penalize a student only once per equation for omitting units.
- Allow full credit even if the answer is not expressed with the correct number of significant figures.

Part B–2

- 47 Allow a maximum of 2 credits for calculating the speed of the car. Refer to *Scoring Criteria for Calculations* in this scoring key.

Example of an Acceptable Response

$$\bar{v} = \frac{d}{t}$$

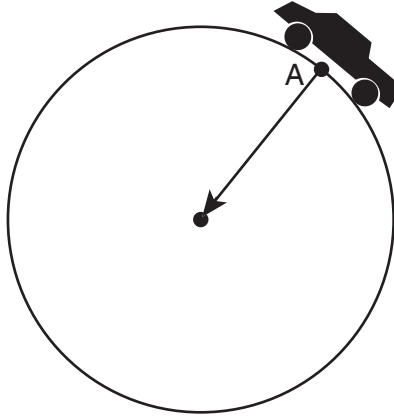
$$\bar{v} = \frac{2\pi r}{t}$$

$$\bar{v} = \frac{2\pi(160 \text{ m})}{36 \text{ s}}$$

$$\bar{v} = 28 \text{ m/s } \textit{or} \textit{ } 27.9 \text{ m/s}$$

- 48 Allow 1 credit for drawing an arrow directed toward the center of the circle.

Example of an Acceptable Response



- 49 Allow a maximum of 2 credits for calculating the magnitude of the acceleration of the car. Refer to *Scoring Criteria for Calculations* in this scoring key.

Example of an Acceptable Response

$$a_c = \frac{v^2}{r}$$

$$a_c = \frac{(28 \text{ m/s})^2}{160 \text{ m}}$$

$$a_c = 4.9 \text{ m/s}^2$$

Allow credit for an answer that is consistent with the student's response to question 47.

- 50 Allow a maximum of 2 credits for calculating the magnitude of the cannon's velocity. Refer to *Scoring Criteria for Calculations* in this scoring key.

Example of an Acceptable Response

$$p = mv$$

$$v = \frac{p}{m}$$

$$v = \frac{2.40 \times 10^3 \text{ kg} \cdot \text{m/s}}{1.00 \times 10^3 \text{ kg}}$$

$$v = 2.40 \text{ m/s}$$

51 Allow 1 credit for identifying the direction of the cannon’s velocity. Acceptable responses include, but are not limited to:

- west
- opposite
- backward

52 Allow a maximum of 2 credits, 1 credit for the magnitude and 1 credit for the direction.

Examples of 2-Credit Responses

- 2.0 m/s² west
- 2.0 m/s² east

Examples of 1-Credit Responses

- 2.0 m/s² east
- 2.0 m/s² west

53 Allow 1 credit for indicating that the slope is not constant. Acceptable responses include, but are not limited to:

- The slope changes.
- The line (or graph) curves.
- The graph is not a straight line.

Note: Do not allow credit for “slope” only.

54 Allow 1 credit for **2**.

55 Allow 1 credit for indicating that the temperature changed, or the resistivity changed. Acceptable responses include, but are not limited to:

- As the voltage increased, the temperature increased, causing a higher resistance.
- The bulb got hotter.
- the temperature of the bulb
- resistivity

56 Allow 1 credit for **2**.

- 57 Allow a maximum of 2 credits for calculating the wavelength of the sound wave. Refer to *Scoring Criteria for Calculations* in this scoring key.

Example of an Acceptable Response

$$v = f\lambda$$

$$\lambda = \frac{v}{f}$$

$$\lambda = \frac{331 \text{ m/s}}{650 \text{ Hz}}$$

$$\lambda = 0.51 \text{ m or } 0.509 \text{ m}$$

- 58 Allow a maximum of 2 credits for calculating the absolute index of refraction of medium X. Refer to *Scoring Criteria for Calculations* in this scoring key.

Example of an Acceptable Response

$$n = \frac{c}{v}$$

$$n = \frac{3.00 \times 10^8 \text{ m/s}}{1.80 \times 10^8 \text{ m/s}}$$

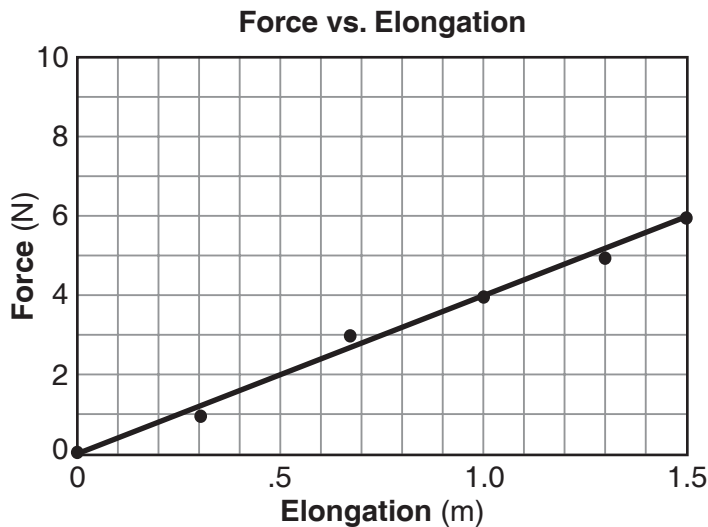
$$n = 1.67 \text{ or } 1.7$$

- 59 Allow 1 credit for **75** m.

Part C

60 Allow 1 credit for correctly plotting all points ± 0.3 grid space.

61 Allow 1 credit for drawing the best-fit line.

60–61 Example of a 2-Credit Graph

62 Allow a maximum of 2 credits for calculating the spring constant of the spring. Refer to *Scoring Criteria for Calculations* in this scoring key.

Example of an Acceptable Response

$$k = \text{slope}$$

$$k = \frac{\Delta F}{\Delta x}$$

$$k = \frac{4.0 \text{ N} - 2.0 \text{ N}}{1.0 \text{ m} - 0.5 \text{ m}}$$

$$k = 4.0 \text{ N/m}$$

Allow credit for an answer that is consistent with the student's response to questions 60 and 61.

Note: The slope may be determined by direct substitution of data points only if the data values are on the best-fit line, or if the student failed to draw a best-fit line.

- 63** Allow a maximum of 2 credits for describing a procedure to obtain the necessary measurements, allocated as follows:

Allow 1 credit for setting up a measured distance.

and

Allow 1 credit for measuring the time to travel that distance.

- 64** Allow 1 credit for an equation or equations that could be used to correctly determine the student's acceleration.

Examples of Acceptable Responses

$$d = v_i t + \frac{1}{2} a t^2$$

or

$$a = \frac{2d}{t^2}$$

- 65** Allow 1 credit for **12,000 N** *or* **11,800 N**.
- 66** Allow a maximum of 2 credits for calculating the frictional force the road applied to the car in stopping it. Refer to *Scoring Criteria for Calculations* in this scoring key.

Example of an Acceptable Response

$$F_f = \mu F_N$$

$$F_f = (0.67)(12,000 \text{ N})$$

$$F_f = 8,000 \text{ N} \quad \text{or} \quad 8,040 \text{ N}$$

Allow credit for an answer that is consistent with the student's response to question 65.

- 67 Allow a maximum of 2 credits for calculating the work done by the frictional force in stopping the car. Refer to *Scoring Criteria for Calculations* in this scoring key.

Example of an Acceptable Response

$$W = Fd$$

$$W = (8,000 \text{ N})(16 \text{ m})$$

$$W = 1.3 \times 10^5 \text{ J} \quad \text{or} \quad 128,000 \text{ J}$$

Allow credit for an answer that is consistent with the student's response to question 66.

- 68 Allow a maximum of 2 credits for calculating the speed of the car before the brakes were applied. Refer to *Scoring Criteria for Calculations* in this scoring key.

Examples of Acceptable Responses

$$W = KE = \frac{1}{2}mv^2$$

$$v = \sqrt{\frac{2KE}{m}}$$

$$v = \sqrt{\frac{2(1.3 \times 10^5 \text{ J})}{1.2 \times 10^3 \text{ kg}}}$$

$$v = 15 \text{ m/s}$$

or

$$a = \frac{F_{net}}{m}$$

$$a = 6.7 \text{ m/s}^2$$

$$v_f^2 = v_i^2 + 2ad$$

$$v_i = \sqrt{v_f^2 - 2ad}$$

$$v_i = \sqrt{0 - 2(-6.7 \text{ m/s}^2)(16 \text{ m})}$$

$$v_i = 14.6 \text{ m/s}$$

Allow credit for an answer that is consistent with the student's responses to questions 66 and/or 67.

- 69 Allow 1 credit for indicating the color with the lowest intensity.

Examples of Acceptable Responses

violet

the one with the greatest frequency

- 70** Allow 1 credit for using information from the graph to explain the advantage of using yellow-green paint.

Examples of Acceptable Responses

Yellow green has a higher intensity.

Yellow green is brighter than red.

- 71** Allow a maximum of 2 credits for calculating the frequency of this light. Refer to *Scoring Criteria for Calculations* in this scoring key.

Example of an Acceptable Response

$$v = f\lambda$$

$$f = \frac{v}{\lambda}$$

$$f = \frac{3.00 \times 10^8 \text{ m/s}}{6.56 \times 10^{-7} \text{ m}}$$

$$f = 4.57 \times 10^{14} \text{ Hz} \quad \text{or} \quad 4.6 \times 10^{14} \text{ Hz}$$

- 72** Allow 1 credit for $3.03 \times 10^{-19} \text{ J}$ or an answer that is consistent with the student's response to question 71.
- 73** Allow 1 credit for 1.89 eV or an answer that is consistent with the student's response to question 72.

Regents Examination in Physical Setting/Physics

June 2004

**Chart for Converting Total Test Raw Scores to
Final Examination Scores (Scaled Scores)**

The *Chart for Determining the Final Examination Score for the June 2004 Regents Examination in Physical Setting/Physics* will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Wednesday, June 16, 2004. Conversion charts provided for previous administrations of the Regents Examination in Physical Setting/Physics must NOT be used to determine students' final scores for this administration.

Map to Core Curriculum

June 2004 Physical Setting/Physics			
Question Numbers			
Key Ideas	Part A	Part B	Part C
Standard 1			
Math Key Idea 1		47,49,50,52,57,58, 59	60,61,65,66,67, 68,71,72,73
Math Key Idea 2			
Math Key Idea 3		40	
Sci. Inq. Key Idea 1			
Sci. Inq. Key Idea 2			63
Sci. Inq. Key Idea 3		36,39,45	64,69,70
Eng. Des. Key Idea 1			
Standard 2			
Key Idea 1			
Key Idea 2			
Standard 6			
Key Idea 1			
Key Idea 2		51	
Key Idea 3		38	
Key Idea 4			
Key Idea 5		37	
Key Idea 6			
Standard 7			
Key Idea 1			
Key Idea 2			
Standard 4 Process Skills			
4.1		42,43,44,46,53,54, 55	
4.3		56	
5.1		48	62
5.3		41	
Standard 4			
4.1	11,12,13,14,15,16,18,19, 22,23	37,42,43,44,46,53, 54,55	
4.3	26,27,28,29,30,31,32,33, 34,35	39,56,57,58,	69,70,71
5.1	1,2,3,4,5,6,7,8,9,10,20,21	36,45,47,48,49,50, 51,52,59	60,61,62,63,64
5.3	17,24,25	40,41	72,73