FOR TEACHERS ONLY

PS–P

PHYSICAL SETTING/PHYSICS

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

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

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.

Part A and Part B–1

Allow 1 credit for each correct response.

Part A			Part B–1	
1 . . . . .**3**.	13 . . . . .**1**.	25 . . . . .**1**.	36 . . . . .**2**.	42 . . . . .**1**. . . . .
2 . . . . .**2**. . . .	14 . . . . .**4**.	26 . . . . .**2**.	37 . . . . .**4**.	43 . . . . .**3**. . . . .
3 . . . . .**3**.	15 . . . . .**2**.	27 . . . . .**1**.	38 . . . . .**2**.	44 . . . . .**3**. . . . .
4 . . . . .**3**.	16 . . . . .**2**.	28 . . . . .**1**.	39 . . . . .**1**.	45 . . . . .**4**. . . . .
5 . . . . .**2**.	17 . . . . .**4**.	29 . . . . .**2**.	40 . . . . .**3**.	46 . . . . .**1**. . . . .
6 . . . .**3**. . . .	18 . . . . .**3**.	30. . . . .**4**.	41 . . . . .**2**.	47 . . . . .**4**. . . . .
7 . . . . .**3**.	19 . . . . .**3**.	31 . . . . .**3**.		
8 . . . . .**4**.	20 . . . . .**2**.	32 . . . . .**3**.		
9 . . . . .**1**.	21 . . . . .**3**.	33 . . . . .**4**.		
10 . . . . .**3**.	22 . . . . .**2**.	34 . . . . .**1**.		
11 . . . . .**2**.	23 . . . . .**4**.	35 . . . . .**2**.		
12 . . . . .**1**.	24 . . . . .**3**.			

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 22, 2005. 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 New York State Education Department web site http://www.emsc.nysed.gov/osa/scire/scirearch/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

48 Allow 1 credit for marking an appropriate scale on the axis labeled "Potential Drop (V)."

49 Allow 1 credit for plotting all points accurately (±0.3 grid space).

50 Allow 1 credit for drawing the line of best fit. Allow credit for an answer that is consistent with the student's response to questions 48 and/or 49.

48–50

Example of a 3-Credit Graph

Potential Drop vs. Current

[4]
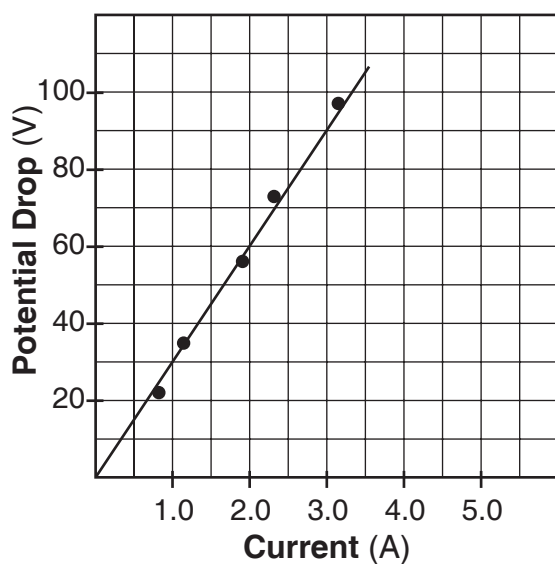
51 Allow a maximum of 2 credits. Refer to S*coring Criteria for Calculations* in this rating guide.

Example of an Acceptable Response

$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{\Delta V}{\Delta A}$$

$$\text{slope} = \frac{90.V - 30.V}{3.0\,A - 1.0\,A}$$

$$\text{slope} = 30.\frac{V}{A} \quad or \quad 30\,\Omega$$

Allow credit for an answer that is consistent with the student's graph.

Note: The slope may be determined by 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.

52 Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.
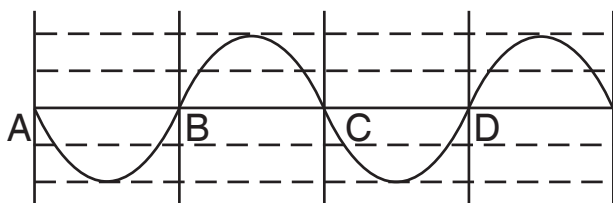
Example of an Acceptable Response

$$V = \frac{W}{q}$$

$$W = qV$$

$$W = \left(1.60 \times 10^{-19}\ C\right)\left(2.5 \times 10^{4}\ V\right)$$

$$W = 4.0 \times 10^{-15}\ J$$

53 Allow 1 credit for the correct order: *C A B D*. Allow credit even if the student writes the list of materials instead of the letters.

54 Allow 1 credit for drawing a transverse wave that would produce complete destructive interference when superimposed with the original wave.

Example of an Acceptable Response

55 Allow 1 credit for 233 MeV.

56 Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Example of an Acceptable Response

$$a = \frac{\Delta v}{t}$$

$$a = \frac{25 \text{ m/s} - 13 \text{ m/s}}{5.0 \text{ s}}$$

$$a = 2.4 \text{ m/s}^2$$

57 Allow 1 credit for 19 m/s.

58 Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Example of an Acceptable Response

$$F = G\frac{m_1 m_2}{r^2}$$

$$m_2 = \frac{Fr^2}{Gm_1}$$

$$m_2 = \frac{\left(3.52 \times 10^{22} \text{ N}\right)\left(1.50 \times 10^{11} \text{m}\right)^2}{\left(6.67 \times 10^{-11} \frac{\text{N} \cdot \text{m}^2}{\text{kg}^2}\right)\left(5.98 \times 10^{24} \text{ kg}\right)}$$

$$m_2 = 1.99 \times 10^{30} \text{ kg}$$

59 Allow 1 credit for -1.6×10^{-19} C.

60 Allow 1 credit for 1.

61 Allow 1 credit for 0e.

Note: Allow credit if the student writes "neutral."

[6]

Part C

62 Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Example of an Acceptable Response

$\Delta PE = mg\Delta h$

$\Delta PE = (250. \text{ kg} + 75 \text{ kg})(9.81 \text{ m/s}^2)(20. \text{ m})$

$\Delta PE = 6.4 \times 10^4 \text{ J}$

63 Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Examples of Acceptable Responses

$\Delta PE = KE = \frac{1}{2}mv^2$

$v = \sqrt{\dfrac{2\Delta PE}{m}}$

$v = \sqrt{\dfrac{2(6.4 \times 10^4 \text{ J})}{325 \text{ kg}}}$

$v = 20. \text{ m/s}$

or

$\Delta PE = KE = \frac{1}{2}mv^2$

$6.4 \times 10^4 \text{ J} = \frac{1}{2}(250. \text{ kg} + 75 \text{ kg})v^2$

$v^2 = 394$

$v = 20. \text{ m/s}$

Allow credit for an answer that is consistent with the student's response to question 62.

64 Allow 1 credit for indicating that the total mechanical energy is the same at all three points.

65 Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

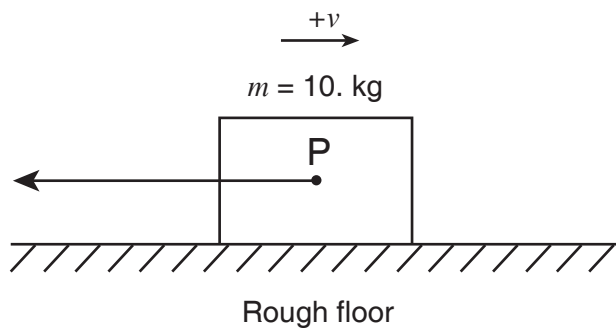**Example of an Acceptable Response**

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

$F_{net} = ma$

$F_{net} = (10. \text{ kg})(-2.0 \text{ m/s}^2)$

$F_{net} = -20. \text{ N} \quad or \quad 20 \text{ N}$

66 Allow a maximum of 2 credits. Allow 1 credit for a length of 4.0 cm (±0.2 cm). Allow 1 credit for drawing a vector directed to the left. Allow credit even if the vector does not begin at point *P*.

Example of a 2-Credit Response

Rough floor

67 Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Example of an Acceptable Response

$$F_f = \mu F_N$$

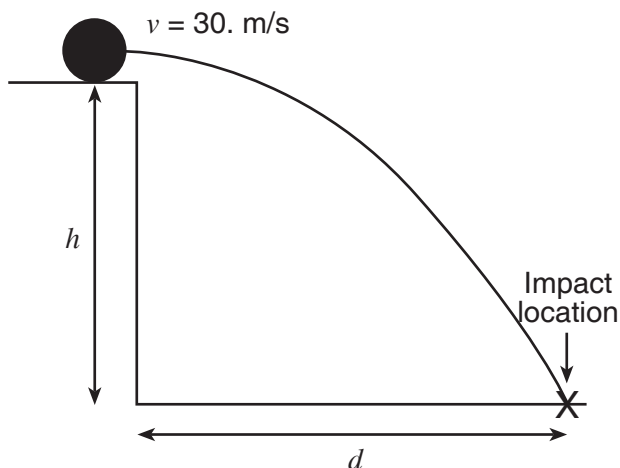$$\mu = \frac{F_f}{F_N}$$

$$\mu = \frac{20.\,N}{98.1\,N}$$

$$\mu = 0.20$$

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

68 Allow 1 credit for sketching the theoretical path of the projectile.

Example of an Acceptable Response

69 Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Examples of Acceptable Responses

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

$$d = (30.\ \text{m/s})(2.5\ \text{s}) + \frac{1}{2}(0\ \text{m/s}^2)(2.5\ \text{s})^2 \qquad or$$

$$d = 75\ \text{m}$$

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

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

$$d = (30.\ \text{m/s})(2.5\ \text{s})$$

$$d = 75\ \text{m}$$

70 Allow a maximum of 2 credits, 1 credit for a correct equation with substitution and 1 credit for solving for t (not t^2).

Examples of Acceptable Responses

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

$$t = \sqrt{\frac{2d}{a}} \qquad or$$

$$t = \sqrt{\frac{2h}{g}}$$

$$h = v_i t + \frac{1}{2}gt^2$$

$$h = \frac{1}{2}gt^2 \qquad or$$

$$t = \sqrt{\frac{2h}{g}}$$

$$t = \sqrt{\frac{2h}{g}}$$

Note: Allow full credit if d_y or s_y are used in place of h. Allow 1 credit if d is used in place of h.

71 Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Example of an Acceptable Response

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$\sin \theta_2 = \frac{n_1 \sin \theta_1}{n_2}$$

$$\sin \theta_2 = \frac{(1.33)(\sin 40.°)}{1.00}$$

$$\sin \theta_2 = 0.855$$

$$\theta_2 = 59° \qquad or \qquad 58.7°$$

72 Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Examples of Acceptable Responses

$$\frac{n_2}{n_1} = \frac{v_1}{v_2}$$

$$v_1 = \frac{n_2 \, v_2}{n_1}$$

$$v_1 = \frac{1.00 \left(3.00 \times 10^8 \text{ m/s} \right)}{1.33}$$

$$v_1 = 2.26 \times 10^8 \text{ m/s}$$

or

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

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

$$v = \frac{3.00 \times 10^8 \text{ m/s}}{1.33}$$

$$v = 2.26 \times 10^8 \text{ m/s}$$

[10]

Regents Examination in Physical Setting/Physics

June 2005

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

> **The *Chart for Determining the Final Examination Score for the June 2005 Regents Examination in Physical Setting/Physics* will be posted on the Department's web site <ins>http://www.emsc.nysed.gov/osa/</ins> on Wednesday, June 22, 2005. 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 2005 Physical Setting/Physics			
Question Numbers			
Key Ideas	Part A	Part B	Part C
Standard 1			
Math Key Idea 1	1,2,6,7,9,10,11,12,16,18, 19,20,21,22,23,32	48,49,50,52,55,56,57 ,58	62,63,65,66,67,69, 70,71,72
Math Key Idea 2		38	
Math Key Idea 3		40,51	
Sci. Inq. Key Idea 1			
Sci. Inq. Key Idea 2			
Sci. Inq. Key Idea 3		44,46	68
Eng. Des. Key Idea 1			
Standard 2			
Key Idea 1			
Key Idea 2			
Standard 6			
Key Idea 1			
Key Idea 2			
Key Idea 3		36,41	
Key Idea 4			
Key Idea 5			
Key Idea 6			
Standard 7			
Key Idea 1			
Key Idea 2			
Standard 4 Process Skills			
4.1		39,47,51	64
4.3		42,54	
5.1		45	66
5.3		43	
Standard 4			
4.1	16,17,18,19,20,21,22,23	37,39,40,41,47,51,52	62,63,64
4.3	24,25,26,27,28,29,30	42,53,54	71,72
5.1	1,2,3,4,5,6,7,8,9,10,11,12 13,14,15	38,44,45,46,56,57,58	65,66,67,68,69,70
5.3	31,32,33,34,35	43,55,59,60,61	