

FOR TEACHERS ONLY

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

PS-P

PHYSICAL SETTING/PHYSICS

Wednesday, June 24, 2009 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 2 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. Check this web site <http://www.emsc.nysed.gov/osa/> and select the link "Examination Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents examination period.

Part A and Part B-1

Allow 1 credit for each correct response.

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

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 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 check mark 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 24, 2009. 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 [1] Allow 1 credit for 5.66 m.

49 [1] Allow 1 credit for 50 N.

50 [2] Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Examples of 2-credit responses:

$$\begin{array}{l}
 p_{\text{before}} = p_{\text{after}} \\
 m_1 v_1 + m_2 v_2 = 0 \\
 v_1 = \frac{-m_2 v_2}{m_1} \\
 v_1 = \frac{-(2.5 \times 10^3 \text{ kg})(8.0 \text{ m/s})}{1.1 \times 10^3 \text{ kg}} \\
 v_1 = -18 \text{ m/s} \quad \text{or} \quad 18 \text{ m/s}
 \end{array}
 \qquad
 \begin{array}{l}
 m_1 v_1 = m_2 v_2 \\
 \text{or} \quad (1.1 \times 10^3 \text{ kg}) v_1 = (2.5 \times 10^3 \text{ kg})(8.0 \text{ m/s}) \\
 v_1 = 18 \text{ m/s}
 \end{array}$$

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

Example of a 2-credit response:

$$F_c = \frac{mv^2}{r}$$

$$v = \sqrt{\frac{F_c r}{m}}$$

$$v = \sqrt{\frac{(36 \text{ N})(5.0 \text{ m})}{20. \text{ kg}}}$$

$$v = 3.0 \text{ m/s}$$

- 52 [2] Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Example of a 2-credit response:

$$F_s = kx$$

$$k = \frac{F_s}{x}$$

$$k = \frac{10. \text{ N}}{0.25 \text{ m}}$$

$$k = 40. \text{ N/m}$$

- 53 [2] Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Example of a 2-credit response:

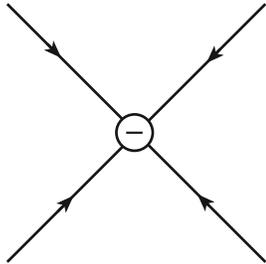
$$E = \frac{F_e}{q}$$

$$E = \frac{3.60 \times 10^{-15} \text{ N}}{1.60 \times 10^{-19} \text{ C}}$$

$$E = 2.25 \times 10^4 \text{ N/C}$$

- 54 [1] Allow 1 credit for *at least four* straight lines drawn perpendicular to the surface of the sphere with each line having an arrowhead directed toward the sphere and ending within 0.2 cm of the sphere.

Example of a 1-credit response:

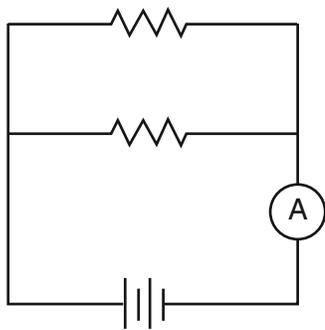


Note: Allow credit even if the lines are *not* drawn symmetrically.

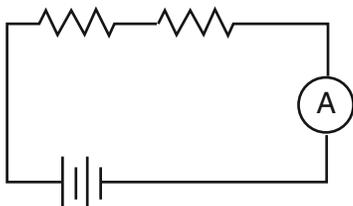
- 55 [2] Allow a maximum of 2 credits, allocated as follows:

- Allow 1 credit for two resistors connected in parallel with the battery (or cell) in a complete circuit.
- Allow 1 credit for an ammeter connected in the circuit to measure the total current.

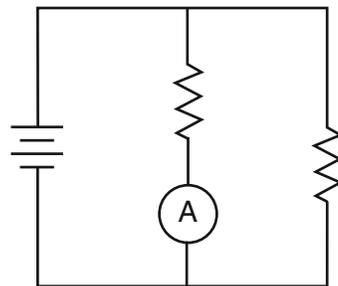
Example of a 2-credit response:



Examples of 1-credit responses:



or



Note: Allow credit for lines *not* touching the battery if the distance from the lines to the battery is \leq the distance between the battery symbol lines.

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

Example of a 2-credit response:

$$P = \frac{V^2}{R}$$

$$R = \frac{V^2}{P}$$

$$R = \frac{(120 \text{ V})^2}{900. \text{ W}}$$

$$R = 16 \Omega$$

- 57 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- north and south
- up and down
- perpendicular to spring
- left and right

Note: Do *not* allow credit for back and forth or east and west.

- 58 [1] Allow 1 credit for 1.5 m.

- 59 [1] Allow 1 credit for indicating that the wavelength is shorter while the speaker is moving *or* for an answer that is consistent with the student's response to question 58.

Part C

60 [1] Allow 1 credit for 16 m/s.

61 [1] Allow 1 credit for 4.9 m/s.

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

Example of a 2-credit response:

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

$$d_y = (4.9 \text{ m/s}) (0.50 \text{ s}) + \frac{1}{2} (9.81 \text{ m/s}^2) (0.50 \text{ s})^2$$

$$d_y = 3.7 \text{ m}$$

Note: Allow credit for an answer that is consistent with the student's response to question 61.

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

Example of a 2-credit response:

$$\Delta KE = \Delta PE = mg\Delta h$$

$$\Delta h = \frac{\Delta KE}{mg}$$

$$\Delta h = \frac{3.13 \times 10^5 \text{ J}}{(290. \text{ kg})(9.81 \text{ m/s}^2)}$$

$$\Delta h = 110. \text{ m}$$

- 64 [2] Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Example of a 2-credit response:

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

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

$$v = \sqrt{\frac{2(3.13 \times 10^5 \text{ J})}{290. \text{ kg}}}$$

$$v = 46.5 \text{ m/s}$$

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

Example of a 2-credit response:

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

$$a = \frac{46.5 \text{ m/s}}{5.3 \text{ s}}$$

$$a = 8.8 \text{ m/s}^2$$

Note: Allow credit for an answer that is consistent with the student's response to question 64.

- 66 [1] Allow 1 credit for 3.0 m *or* 3 m.

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

Example of a 2-credit response:

$$v = f\lambda$$

$$v = (20.0 \text{ Hz})(3.0 \text{ m})$$

$$v = 60. \text{ m/s}$$

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

- 68 [2] Allow a maximum of 2 credits. Refer to *Scoring Criteria for Calculations* in this rating guide.

Example of a 2-credit response:

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

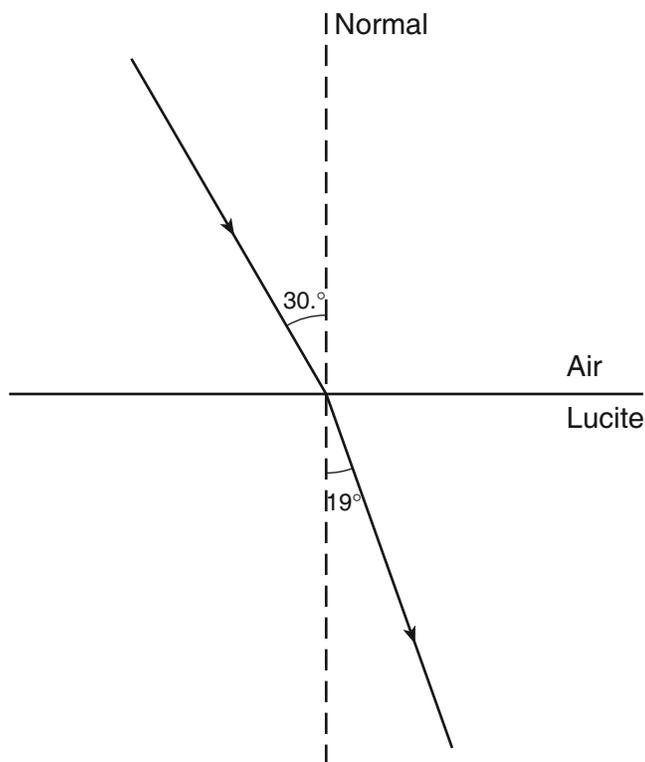
$$\sin \theta_2 = \frac{n_1 \sin \theta_1}{n_2}$$

$$\sin \theta_2 = \frac{(1.00)(\sin 30.^\circ)}{1.50}$$

$$\theta_2 = 19^\circ$$

- 69 [1] Allow 1 credit for a response correctly showing the refracted ray at $19^\circ \pm 2^\circ$ to the normal.

Example of a 1 credit response:



Note: Allow credit even if the arrowhead is missing.

Allow credit for an answer that is consistent with the student's response to question 68.

70 [1] Allow 1 credit for green.

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

Example of a 2-credit response:

$$E_{\text{photon}} = hf$$

$$E_{\text{photon}} = (6.63 \times 10^{-34} \text{ J}\cdot\text{s})(5.48 \times 10^{14} \text{ Hz})$$

$$E_{\text{photon}} = 3.63 \times 10^{-19} \text{ J}$$

72 [1] Allow 1 credit for 2.27 eV.

Note: Allow credit for an answer that is consistent with the student's response to question 71.

Regents Examination in Physical Setting/Physics

June 2009

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

The *Chart for Determining the Final Examination Score for the June 2009 Regents Examination in Physical Setting/Physics* will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Wednesday, June 24, 2009. 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.

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 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.

Map to Core Curriculum

June 2009 Physical Setting/Physics			
Question Numbers			
Key Ideas	Part A 1–35	Part B 36–59	Part C 60–72
Standard 1			
Math Key Idea 1	1,2,4,5,7,8,10,12,13,14,16,17,18, 19,20,26,28,32,34	39,40,41,42,43,44,45, 46,47,49,51,52,53,56	63,64,65,67,68, 71,72
Math Key Idea 2	9	54	
Math Key Idea 3			
Sci. Inq. Key Idea 1			70
Sci. Inq. Key Idea 2			
Sci. Inq. Key Idea 3	23		
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	
Key Idea 4			
Key Idea 5	17,18		
Key Idea 6			
Standard 7			
Key Idea 1			
Key Idea 2			
Standard 4 Process Skills			
4.1		55	
4.3	29	57,58,59	66,69
5.1		37,38,48,50	60,61,62
5.3			
Standard 4			
4.1	13,14,15,16,18,19,20,21	36,41,42,43,45,46,47, 55,56	63,64
4.3	23,24,25,26,27,28,29,30	36,41,42,43,45,46,47, 57,58,59	66,67,68,69,70
5.1	1,2,3,4,5,6,7,8,9,10,11,12,17,22,34	37,38,39,40,48,49,50, 51,52,53,54	60,61,62,65
5.3	31,32,33,35,	44	71,72