

# FOR TEACHERS ONLY

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

# PS-P

## PHYSICAL SETTING/PHYSICS

Wednesday, June 15, 2011 — 1:15 to 4:15 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 at: <http://www.p12.nysed.gov/apda/> and select the link "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 ..... <b>1</b> .....	13 ..... <b>2</b> .....	25 ..... <b>1</b> .....	36 ..... <b>2</b> .....	44 ..... <b>4</b> .....
2 ..... <b>2</b> .....	14 ..... <b>3</b> .....	26 ..... <b>4</b> .....	37 ..... <b>1</b> .....	45 ..... <b>1</b> .....
3 ..... <b>1</b> .....	15 ..... <b>2</b> .....	27 ..... <b>3</b> .....	38 ..... <b>3</b> .....	46 ..... <b>2</b> .....
4 ..... <b>4</b> .....	16 ..... <b>3</b> .....	28 ..... <b>2</b> .....	39 ..... <b>3</b> .....	47 ..... <b>4</b> .....
5 ..... <b>3</b> .....	17 ..... <b>1</b> .....	29 ..... <b>2</b> .....	40 ..... <b>3</b> .....	48 ..... <b>3</b> .....
6 ..... <b>1</b> .....	18 ..... <b>4</b> .....	30 ..... <b>1</b> .....	41 ..... <b>2</b> .....	49 ..... <b>3</b> .....
7 ..... <b>1</b> .....	19 ..... <b>2</b> .....	31 ..... <b>3</b> .....	42 ..... <b>2</b> .....	50 ..... <b>1</b> .....
8 ..... <b>4</b> .....	20 ..... <b>2</b> .....	32 ..... <b>2</b> .....	43 ..... <b>4</b> .....	
9 ..... <b>3</b> .....	21 ..... <b>1</b> .....	33 ..... <b>3</b> .....		
10 ..... <b>4</b> .....	22 ..... <b>3</b> .....	34 ..... <b>4</b> .....		
11 ..... <b>2</b> .....	23 ..... <b>3</b> .....	35 ..... <b>4</b> .....		
12 ..... <b>4</b> .....	24 ..... <b>1</b> .....			

## 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.

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.

At least two science teachers must participate in the scoring of each student's responses to the Part B–2 and Part C open-ended questions. Each of these teachers should be responsible for scoring a selected number of the open-ended questions on each answer paper. No one teacher is to score more than approximately one-half of the open-ended questions on a student's answer paper.

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 scale score by using the conversion chart that will be posted on the Department's web site at: <http://www.p12.nysed.gov/apda/> on Wednesday, June 15, 2011. The student's scale score should be entered in the labeled box on the student's answer booklet. The scale score is the student's final examination score. On the front of the student's answer booklet, raters must enter their initials on the lines next to "Rater 1" or "Rater 2."

**Beginning in June 2011, schools are no longer permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools must, however, ensure that the scores have been tabulated correctly and that the resulting scale score has been determined accurately.**

Because scale 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.

Teachers should become familiar with 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.p12.nysed.gov/apda/science/phyratg02.pdf>. This guide provides a set of directions, along with some examples, to assist teachers in rating parts B–2 and C of the Regents Examination in Physical Setting/Physics.

### 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 credit if the student has listed the values with units and written a correct equation.
- Allow 1 credit for the correct answer (number and unit). If the number is given without the unit, allow credit if the credit for units was previously deducted for this calculation problem.
- Penalize a student only once per calculation problem for incorrect or omitted units.
- Allow credit if the answer is not expressed with the correct number of significant figures

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### Part B–2

- 51 [1] Allow 1 credit for the equation and substitution with units. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Example of a 1-credit response:**

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

$$F_{net} = ma$$

$$F_{net} = (0.50 \text{ kg})(3.0 \text{ m/s}^2)$$

- 52 [1] Allow 1 credit for the correct answer with units *or* for an answer that is consistent with the student's response to question 51.

**Example of a 1-credit response:**

$$F_{net} = 1.5 \text{ N}$$

53 [1] Allow 1 credit for 850 N.

54 [1] Allow 1 credit for the equation and substitution with units *or* for an answer that is consistent with the student's response to question 53. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Example of a 1-credit response:**

$$F_f = \mu F_N$$

$$F_f = (0.05)(850 \text{ N})$$

55 [1] Allow 1 credit for the correct answer with units *or* for an answer that is consistent with the student's response to question 54.

**Example of a 1-credit response:**

$$F_f = 40 \text{ N}$$

56 [1] Allow 1 credit for the equation and substitution with units. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Example of a 1-credit response:**

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

$$KE = \frac{1}{2} (3.34 \times 10^{-27} \text{ kg})(2.89 \times 10^5 \text{ m/s})^2$$

57 [1] Allow 1 credit for the correct answer with units *or* for an answer that is consistent with the student's response to question 56.

**Example of a 1-credit response:**

$$KE = 1.39 \times 10^{-16} \text{ J}$$

58 [1] Allow 1 credit for 20.  $\Omega$ .

59 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— power

— the rate at which work is done

**Note:** Do *not* allow credit for a linear relationship.

- 60 [1] Allow 1 credit for the equation and substitution with units. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Example of a 1-credit response:**

$$P = \frac{V^2}{R}$$
$$P = \frac{(12\text{ V})^2}{1.2\ \Omega}$$

- 61 [1] Allow 1 credit for the correct answer with units *or* for an answer that is consistent with the student's response to question 60.

**Example of a 1-credit response:**

$$P = 120\text{ W}$$

- 62 [1] Allow 1 credit for the equation and substitution with units. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Example of a 1-credit response:**

$$\frac{n_2}{n_1} = \frac{\lambda_1}{\lambda_2}$$
$$\lambda_2 = \frac{n_1 \lambda_1}{n_2}$$
$$\lambda_2 = \frac{1.00(5.89 \times 10^{-7}\text{ m})}{1.47}$$

- 63 [1] Allow 1 credit for the correct answer with units *or* for an answer that is consistent with the student's response to question 62.

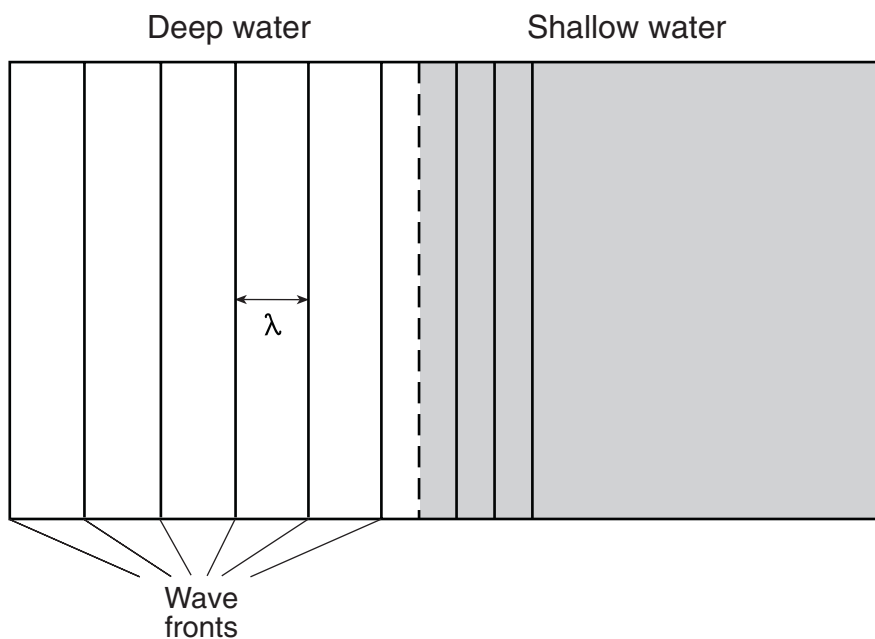
**Example of a 1-credit response:**

$$\lambda_2 = 4.01 \times 10^{-7}\text{ m}$$

- 64 [1] Allow 1 credit for  $4.22 \times 10^{-2}\text{ u}$ .

- 65 [1] Allow 1 credit for a minimum of *three* wave fronts, approximately evenly spaced, drawn parallel to each other and to the original wave fronts, *and* spaced closer together than the original wave fronts.

**Example of a 1-credit response:**

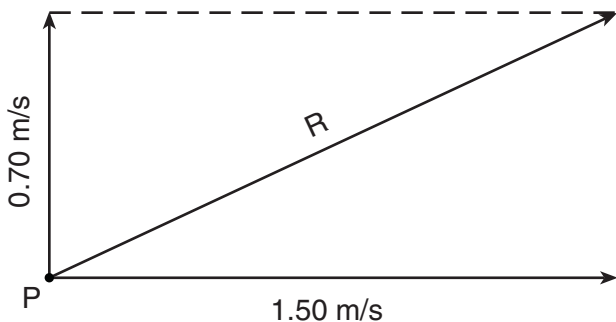


### Part C

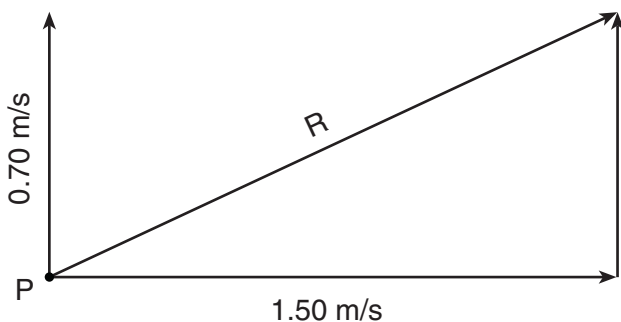
66 [1] Allow 1 credit for  $1.0 \text{ cm} = 0.20 \text{ m/s} \pm 0.04 \text{ m/s}$ .

67 [1] Allow 1 credit for constructing the resultant  $8.3 \text{ cm} \pm 0.2 \text{ cm}$  long at an angle of  $65^\circ \pm 2^\circ$  east of north.

#### Examples of 1-credit responses:



or



**Note:** The resultant vector need *not* be labeled to receive this credit.

68 [1] Allow 1 credit for  $1.7 \text{ m/s}$  or an answer that is consistent with the student's response to questions 66 and 67.

69 [1] Allow 1 credit for  $65^\circ \pm 2^\circ$  or an answer that is consistent with the student's response to questions 67 and/or 68.

- 70** [1] Allow 1 credit for the equation and substitution with units. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Example of a 1-credit response:**

$$F_s = kx$$
$$x = \frac{F_s}{k} = \frac{mg}{k}$$
$$x = \frac{(2.00 \text{ kg})(9.81 \text{ m/s}^2)}{150. \text{ N/m}}$$

- 71** [1] Allow 1 credit for the correct answer with units *or* for an answer that is consistent with the student's response to question 70.

**Example of a 1-credit response:**

$$x = 0.131 \text{ m}$$

- 72** [1] Allow 1 credit for the equation and substitution with units, *or* for an answer that is consistent with the student's response to question 71. Refer to *Scoring Criteria for Calculations* in this rating guide.

$$PE_s = \frac{1}{2} kx^2$$
$$PE_s = \frac{1}{2} (150. \text{ N/m})(0.131 \text{ m})^2$$

- 73** [1] Allow 1 credit for the correct answer with units *or* for an answer that is consistent with the student's response to question 72.

**Example of a 1-credit response:**

$$PE_s = 1.29 \text{ J}$$



74 [1] Allow 1 credit for 6.00  $\Omega$ .

75 [1] Allow 1 credit for the equation and substitution with units, *or* for an answer that is consistent with the student's response to question 74. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Example of a 1-credit response:**

$$R = \frac{\rho L}{A}$$

$$A = \frac{\rho L}{R}$$

$$A = \frac{(150. \times 10^{-8} \Omega \cdot \text{m})(0.100 \text{ m})}{6.00 \Omega}$$

76 [1] Allow 1 credit for the correct answer with units *or* for an answer that is consistent with the student's response to question 75.

**Example of a 1-credit response:**

$$A = 2.50 \times 10^{-8} \text{ m}^2$$

77 [1] Allow 1 credit for equation and substitution with units. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Example of a 1-credit response:**

$$E_{\text{photon}} = \frac{hc}{\lambda}$$

$$E_{\text{photon}} = \frac{(6.63 \times 10^{-34} \text{ J}\cdot\text{s})(3.00 \times 10^8 \text{ m/s})}{2.29 \times 10^{-7} \text{ m}}$$

78 [1] Allow 1 credit for the correct answer with units *or* for an answer that is consistent with the student's response to question 77.

**Example of a 1-credit response:**

$$E_{\text{photon}} = 8.69 \times 10^{-19} \text{ J}$$

79 [1] Allow 1 credit for 5.43 eV *or* an answer that is consistent with the student's response to question 78.

80 [1] Allow 1 credit for indicating that the photon can be absorbed and explaining that the energy of the photon is exactly equal to the energy-level difference between the ground state and level *d*.

**Note:** Allow credit for an answer that is consistent with the student's response to question 79.

81 [1] Allow 1 credit for  $41^\circ \pm 2^\circ$ .

82 [1] Allow 1 credit for equation and substitution with units, *or* for an answer that is consistent with the student's response to question 81. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Example of a 1-credit response:**

$$\begin{aligned}n_1 \sin \theta_1 &= n_2 \sin \theta_2 \\n_2 &= \frac{n_1 \sin \theta_1}{\sin \theta_2} \\n_2 &= \frac{(1.00)(\sin 41^\circ)}{\sin 20^\circ}\end{aligned}$$

83 [1] Allow 1 credit for the correct answer with units *or* for an answer that is consistent with the student's response to question 82.

**Example of a 1-credit response:**

$$n_2 = 1.9$$

84 [1] Allow 1 credit for equation and substitution with units, *or* for an answer that is consistent with the student's response to question 82 and/or 83. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Example of a 1-credit response:**

$$\begin{aligned}n &= \frac{c}{v} & \frac{n_2}{n_1} &= \frac{v_1}{v_2} \\v &= \frac{c}{n} & v_2 &= \frac{n_1 v_1}{n_2} \\v &= \frac{3.00 \times 10^8 \text{ m/s}}{1.9} & v_2 &= \frac{(1.00)(3.00 \times 10^8 \text{ m/s})}{1.9}\end{aligned}$$

85 [1] Allow 1 credit for the correct answer with units *or* for an answer that is consistent with the student's response to question 84.

**Example of a 1-credit response:**

$$v = 1.6 \times 10^8 \text{ m/s}$$

## Regents Examination in Physical Setting/Physics

June 2011

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

**The *Chart for Determining the Final Examination Score for the June 2011 Regents Examination in Physical Setting/Physics* will be posted on the Department's web site at: <http://www.p12.nysed.gov/apda/> on Wednesday, June 15, 2011. 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 <http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.htm>.
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

<b>June 2011 Physical Setting/Physics</b>			
<b>Question Numbers</b>			
Key Ideas	Part A	Part B	Part C
<b>Standard 1</b>			
Math Key Idea 1	2, 3, 5, 9, 10, 12, 19, 20, 23, 27, 29, 30	37, 38, 39, 44, 50, 51, 52, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64	66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 82, 83, 84, 85
Math Key Idea 2	7, 14, 21	40, 41, 42, 43, 50	
Math Key Idea 3		26, 28, 37, 59	
Sci. Inq. Key Idea 1		49	
Sci. Inq. Key Idea 2			
Sci. Inq. Key Idea 3		47	81
Eng. Des. Key Idea 1			
<b>Standard 2</b>			
Key Idea 1			
Key Idea 2			
<b>Standard 6</b>			
Key Idea 1			
Key Idea 2			
Key Idea 3		36	
Key Idea 4		53	
Key Idea 5		65	
Key Idea 6			
<b>Standard 7</b>			
Key Idea 1			
Key Idea 2			
<b>Standard 4 Process Skills</b>			
4.1		45, 58	72, 73, 74
4.3		46, 48, 50	82, 83
5.1	12	37, 39, 53	67, 68, 69
5.3			80
<b>Standard 4</b>			
4.1	9, 10, 14, 19, 20, 21, 22, 23, 24	42, 44, 45, 56, 57, 58, 59, 60, 61	72, 73, 74, 75, 76, 77, 78, 79
4.3	16, 25, 26, 27, 28, 29, 31, 32, 33	46, 47, 48, 50, 62, 63, 65	81, 82, 83, 84, 85
5.1	1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 15, 17, 18	37, 38, 39, 40, 41, 43, 51, 52, 53, 54, 55	66, 67, 68, 69, 70, 71
5.3	30, 34, 35	49, 64	80