

# FOR TEACHERS ONLY

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

# PS-P

## PHYSICAL SETTING/PHYSICS

Tuesday, June 19, 2018 — 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/assessment/> 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			
1 ..... 2 .....	10 ..... 3 .....	19 ..... 3 .....	28 ..... 3 .....
2 ..... 1 .....	11 ..... 4 .....	20 ..... 2 .....	29 ..... 2 .....
3 ..... 4 .....	12 ..... 1 .....	21 ..... 3 .....	30 ..... 2 .....
4 ..... 2 .....	13 ..... 2 .....	22 ..... 4 .....	31 ..... 2 .....
5 ..... 3 .....	14 ..... 1 .....	23 ..... 3 .....	32 ..... 4 .....
6 ..... 4 .....	15 ..... 2 .....	24 ..... 2 .....	33 ..... 1 .....
7 ..... 3 .....	16 ..... 3 .....	25 ..... 1 .....	34 ..... 1 .....
8 ..... 4 .....	17 ..... 3 .....	26 ..... 1 .....	35 ..... 4 .....
9 ..... 1 .....	18 ..... 4 .....	27 ..... 4 .....	
Part B-1			
36 ..... 2 .....	40 ..... 4 .....	44 ..... 4 .....	48 ..... 3 .....
37 ..... 3 .....	41 ..... 3 .....	45 ..... 2 .....	49 ..... 3 .....
38 ..... 2 .....	42 ..... 2 .....	46 ..... 1 .....	50 ..... 1 .....
39 ..... 1 .....	43 ..... 4 .....	47 ..... 2 .....	

## Directions to the Teacher

Follow the procedures below for scoring student answer papers for the Regents Examination in Physical Setting/Physics. Additional information about scoring is provided in the publication *Information Booklet for Scoring Regents Examinations in the Sciences*, which may be found on the Department web site at <http://www.p12.nysed.gov/assessment/science/science-hs.html>.

**Do not attempt to correct the student's work by making insertions or changes of any kind. If the student's responses for the multiple-choice questions are being hand scored prior to being scanned, the scorer must be careful not to make any marks on the answer sheet except to record the scores in the designated score boxes. Marks elsewhere on the answer sheet will interfere with the accuracy of the scanning.**

Allow 1 credit for a correct response to each item.

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 on a student's paper. 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. Teachers may not score their own students' answer papers.

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. On the student's separate answer sheet, for each question, record the number of credits earned and the teacher's assigned rater/scorer letter.

Fractional credit is *not* allowed. Only whole-number credit may be given for a response. If the student gives more than one answer to a question, only the first answer should be rated. Units need not to be given when the wording of the question allows such omissions.

For hand scoring, raters should enter the scores earned in the appropriate boxes printed on the separate answer sheet. Next, the rater should add these scores and enter the total in the box labeled "Total Raw 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/assessment/> on Tuesday, June 19, 2018. The student's scale score should be entered in the box labeled "Scale Score" on the student's answer booklet. The scale score is the student's final examination score.

**Schools are not 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 are required to ensure that the raw scores have been added 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 administration 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’s web site <http://www.p12.nysed.gov/assessment/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:

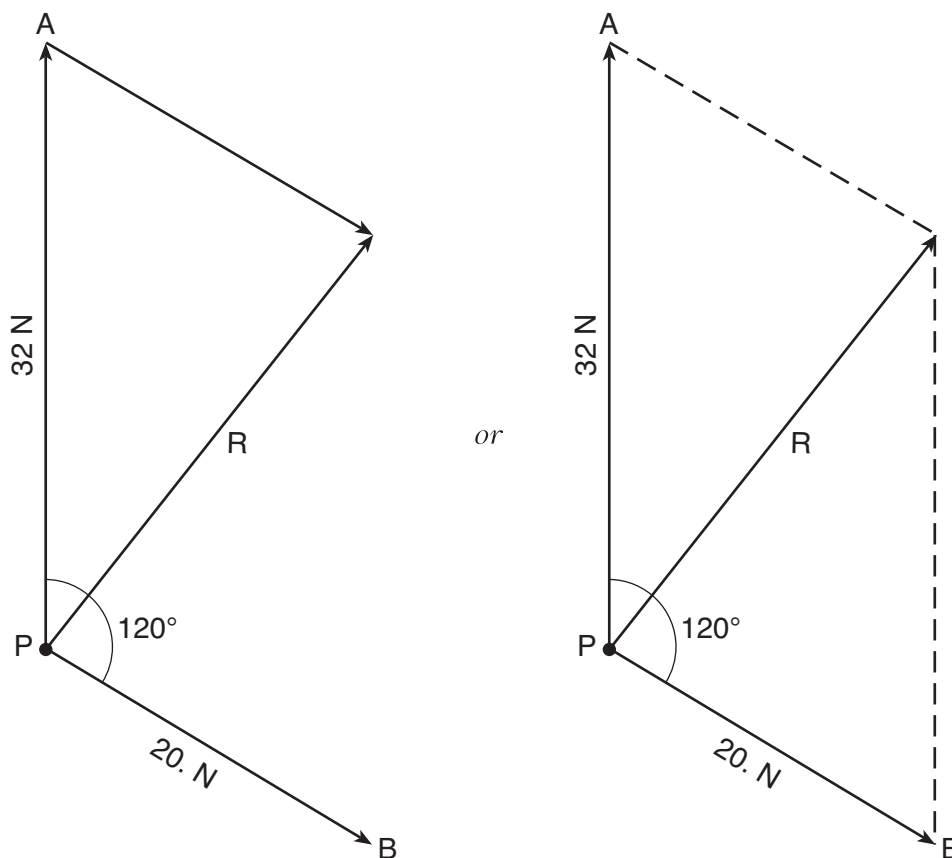
- Allow 1 credit for the equation and substitution of values with units. If the equation and/or substitution with units is not shown, do *not* allow this credit. Allow credit if the student has listed the values with units and written a correct equation.
  - Allow 1 credit for the correct answer (number 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.
-

**Part B–2**

51 [1] Allow 1 credit for  $4.0 \text{ N} \pm 0.2 \text{ N}$ .

52 [1] Allow 1 credit for constructing the resultant  $7.0 \text{ cm} \pm 0.2 \text{ cm}$  long at an angle of  $38^\circ \pm 2^\circ$  clockwise from force A.

**Examples of 1-credit responses:**



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

53 [1] Allow 1 credit for  $28 \text{ N} \pm 2 \text{ N}$  *or* for an answer that is consistent with the student's responses to questions 51 and 52.

54 [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:**

$$W = Fd$$

$$W = (25 \text{ N})(6.0 \text{ m})$$

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

**Examples of 1-credit responses:**

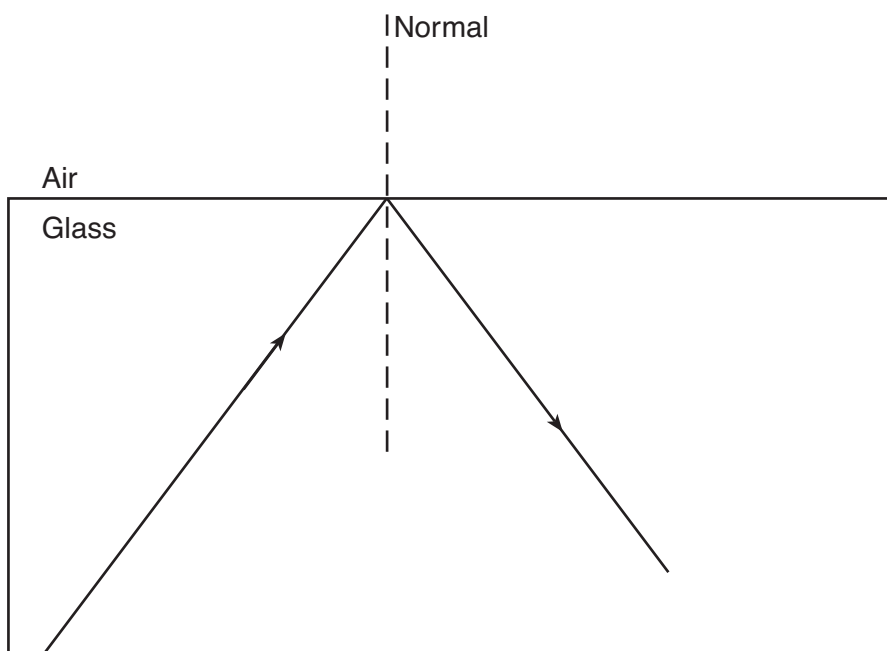
$$W = 150 \text{ J} \quad \text{or} \quad 150 \text{ N}\cdot\text{m}$$

**Note:** Do *not* penalize the student more than 1 credit for errors in units in questions 54 and 55.

- 56 [1] Allow 1 credit for stating that the total work would increase.

- 57 [1] Allow 1 credit for a light ray drawn at an angle of  $37^\circ \pm 2^\circ$ .

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



**Note:** No arrowhead is required on the reflected ray. The direction of the ray is implied by the arrowhead on the incident ray. (Rays are not vectors.)

- 58 [1] Allow 1 credit for the equation and substitution with units. Refer to the *Scoring Criteria for Calculations* in this rating guide.

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

$$I = \frac{\Delta q}{t}$$

$$\Delta q = It$$

$$\Delta q = (5.0 \text{ A})(36 \text{ s})$$

- 59 [1] Allow 1 credit for the correct answer with units *or* for an answer, with units, that is consistent with the student's response to question 58.

**Examples of a 1-credit responses:**

$$\Delta q = 180 \text{ C} \quad \text{or} \quad 180 \text{ A}\cdot\text{s}$$

**Note:** Do *not* penalize the student more than 1 credit for errors in units in questions 58 and 59.

- 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:**

$$PE_s = \frac{1}{2} kx^2$$

$$x = \sqrt{\frac{2PE_s}{k}}$$

$$x = \sqrt{\frac{2(2.0 \text{ J})}{100. \text{ N/m}}}$$

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

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

$$x = 0.20 \text{ m}$$

**Note:** Do *not* penalize the student more than 1 credit for errors in units in questions 60 and 61.

- 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:**

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

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

$$n_2 = \frac{(1.00) \sin 45.0^\circ}{\sin 29.0^\circ}$$

- 63** [1] Allow 1 credit for the correct answer *or* for an answer, without units, that is consistent with the student's response to question 62.

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

$$n_2 = 1.46$$

**Note:** Do *not* penalize the student more than 1 credit for errors in units in questions 62 and 63.

- 64** [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:**

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

$$E_{\text{photon}} = \frac{(6.63 \times 10^{-34} \text{ J}\cdot\text{s})(3.00 \times 10^8 \text{ m/s})}{4.88 \times 10^{-7} \text{ m}}$$

- 65** [1] Allow 1 credit for the correct answer with units *or* for an answer, with units, that is consistent with the student's response to question 64.

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

$$E_{\text{photon}} = 4.08 \times 10^{-19} \text{ J}$$

**Note:** Do *not* penalize the student more than 1 credit for errors in units in questions 64 and 65.

## Part C

- 66 [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:**

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

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

$$A = \frac{(5.60 \times 10^{-8} \Omega \cdot \text{m})(0.22 \text{ m})}{19 \Omega}$$

- 67 [1] Allow 1 credit for the correct answer with units *or* for an answer, with units, that is consistent with the student's response to question 66.

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

$$A = 6.5 \times 10^{-10} \text{ m}^2$$

**Note:** Do *not* penalize the student more than 1 credit for errors in units in questions 66 and 67.

- 68 [1] Allow 1 credit for an explanation that the filament of the operating bulb is at a higher temperature. Acceptable responses include, but are not limited to:
- The operating bulb is hotter.
  - The filament gets hot when the bulb is operating.
  - The resistivity of the tungsten increases.
  - The temperature of the filament increases.

- 69 [1] Allow 1 credit for the equation and substitution with units. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Examples of 1-credit responses:**

$$P = \frac{V^2}{R} \quad \text{or} \quad P = VI$$
$$P = \frac{(120 \text{ V})^2}{240 \Omega} \quad P = (120 \text{ V})(0.50 \text{ A})$$



- 70 [1] Allow 1 credit for the correct answer with units *or* for an answer, with units, that is consistent with the student's response to question 69.

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

$$P = 60. \text{ W}$$

**Note:** Do *not* penalize the student more than 1 credit for errors in units in questions 69 and 70.

- 71 [1] Allow 1 credit for the equation and substitution with units. Refer to *Scoring Criteria for Calculations* in this rating guide.

**Examples of 1-credit responses:**

$$\begin{array}{l} A_x = A \cos\theta \\ F_x = (150 \text{ N})(\cos 30.^\circ) \end{array} \quad \text{or} \quad \begin{array}{l} \cos\theta = \frac{b}{c} \\ b = c \cos\theta \\ F_x = (150 \text{ N})(\cos 30.^\circ) \end{array}$$

- 72 [1] Allow 1 credit for a correct answer with units *or* for an answer, with units, that is consistent with the student's response to question 71.

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

$$F_x = 130 \text{ N}$$

**Note:** Do *not* penalize the student more than 1 credit for errors in units in questions 71 and 72.

- 73 [1] Allow 1 credit for 130 N *or* for an answer that is equal to the student's response to question 72.

- 74 [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 73. Refer to *Scoring Criteria for Calculations* in this rating guide.

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

$$\begin{array}{l} F_f = \mu F_N \\ F_N = \frac{F_f}{\mu} \\ F_N = \frac{130 \text{ N}}{0.30} \end{array}$$

- 75 [1] Allow one credit for the correct answer with units *or* for an answer, with units, that is consistent with the student's response to question 74.

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

$$F_N = 430 \text{ N}$$

**Note:** Do *not* penalize the student more than 1 credit for errors in units in questions 74 and 75.

- 76 [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:**

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

$$v = \sqrt{a_c r}$$

$$v = \sqrt{(3.2 \text{ m/s}^2)(45 \text{ m})}$$

- 77 [1] Allow 1 credit for the correct answer with units *or* for an answer, with units, that is consistent with the student's response to question 76.

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

$$v = 12 \text{ m/s}$$

**Note:** Do *not* penalize the student more than 1 credit for errors in units in questions 76 and 77.

- 78 [1] Allow 1 credit for 4800 N.

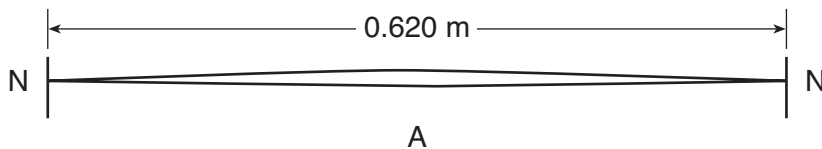
- 79 [1] Allow 1 credit for friction, static friction, or electromagnetic. Do *not* allow credit for centripetal force, net force, gravitational force, weight, or normal force.

- 80 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- The magnitude of the centripetal force decreases.
- It becomes less.
- decreases

81 [1] Allow 1 credit for labeling *one* node and *one* antinode correctly.

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



82 [1] Allow 1 credit for 1.24 m *or* 1.240 m.

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

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

$$v = f\lambda$$

$$v = (196 \text{ Hz})(1.240 \text{ m})$$

84 [1] Allow 1 credit for a correct answer with units *or* for an answer, with units, that is consistent with the student's response to question 83.

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

$$v = 243 \text{ m/s}$$

**Note:** Do *not* penalize the student more than 1 credit for errors in units in questions 83 and 84.

85 [1] Allow 1 credit for a statement indicating that the frequency will increase. Acceptable responses include, but are not limited to:

- It increases.
- The frequency gets higher.

## Regents Examination in Physical Setting/Physics

June 2018

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

**The *Chart for Determining the Final Examination Score for the June 2018 Regents Examination in Physical Setting/Physics* will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Tuesday, June 19, 2018. 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.cfm>.
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 2018 Physical Setting/Physics</b>			
<b>Question Numbers</b>			
Key Ideas	Part A	Part B	Part C
<b>Standard 1</b>			
Math Key Idea 1	3, 4, 5, 7, 9, 13, 15, 20, 24, 25, 29, 30, 31, 32	37, 38, 39, 40, 42, 43, 44, 48, 50, 51, 52, 53, 54, 55, 58, 59, 60, 61, 62, 63, 64, 65	66, 67, 69, 70, 71, 72, 74, 75, 76, 77, 78, 82, 83, 84
Math Key Idea 2	19	41, 45, 46, 49, 56	80, 85
Math Key Idea 3			
Science Inquiry Key Idea 1			
Science Inquiry Key Idea 2			
Science Inquiry Key Idea 3	34	36	
Engineering Design Key Idea 1			
<b>Standard 2</b>			
Key Idea 1			66, 67, 68, 69, 70
Key Idea 2			
<b>Standard 6</b>			
Key Idea 1			
Key Idea 2			80, 81, 82, 85
Key Idea 3		36, 37, 42	
Key Idea 4			
Key Idea 5		45, 46, 49	
Key Idea 6			
<b>Standard 7</b>			
Key Idea 1			76, 77, 85
Key Idea 2			
<b>Standard 4 Process Skills</b>			
4.1	33	38, 43, 45, 60, 61	66, 67
4.3	17, 25, 27, 35	41, 47, 48, 57, 62, 63	81, 82, 83, 84, 85
5.1	6, 7, 8, 32	39, 51, 52, 53	71, 72, 78
5.3			
<b>Standard 4</b>			
4.1	15, 18, 19, 33	38, 43, 46, 50, 54, 55, 56, 58, 59, 60, 61	66, 67, 68, 69, 70
4.3	21, 22, 23, 24, 25, 26, 27, 35	41, 47, 48, 49, 57, 62, 63	81, 82, 83, 84, 85
5.1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 20, 30, 32, 34	36, 37, 39, 40, 44, 45, 51, 52, 53	71, 72, 73, 74, 75, 76, 77, 78, 79, 80
5.3	28, 29, 31	42, 64, 65	