

FOR TEACHERS ONLY

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

PS-P

PHYSICAL SETTING/PHYSICS

Thursday, January 26, 2006 — 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.

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 2	13 3	25 4	36 3	42 2
2 1	14 3	26 2	37 1	43 2
3 3	15 3	27 2	38 3	44 4
4 3	16 2	28 4	39 2	45 4
5 2	17 1	29 1	40 1	46 3
6 3	18 3	30 3	41 1	47 3
7 3	19 4	31 2		
8 1	20 2	32 4		
9 4	21 1	33 4		
10 1	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 Thursday, January 26, 2006. 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/sciresearch/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 55 J.

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

Examples of 2-credit responses:

$$\begin{array}{l}
 PE = mgh \\
 m = \frac{PE}{gh} \\
 m = \frac{25\text{ J}}{(9.81\text{ m/s}^2)(1.0\text{ m})} \\
 m = 2.5\text{ kg} \quad \text{or} \quad 2.55\text{ kg}
 \end{array}
 \qquad
 \text{or}
 \qquad
 \begin{array}{l}
 PE = mgh \\
 m = \frac{55\text{ J}}{(2.25\text{ m})(9.81\text{ m/s}^2)} \\
 m = 2.5\text{ kg}
 \end{array}$$

Allow credit for an answer that is consistent with the student's response to question 48.

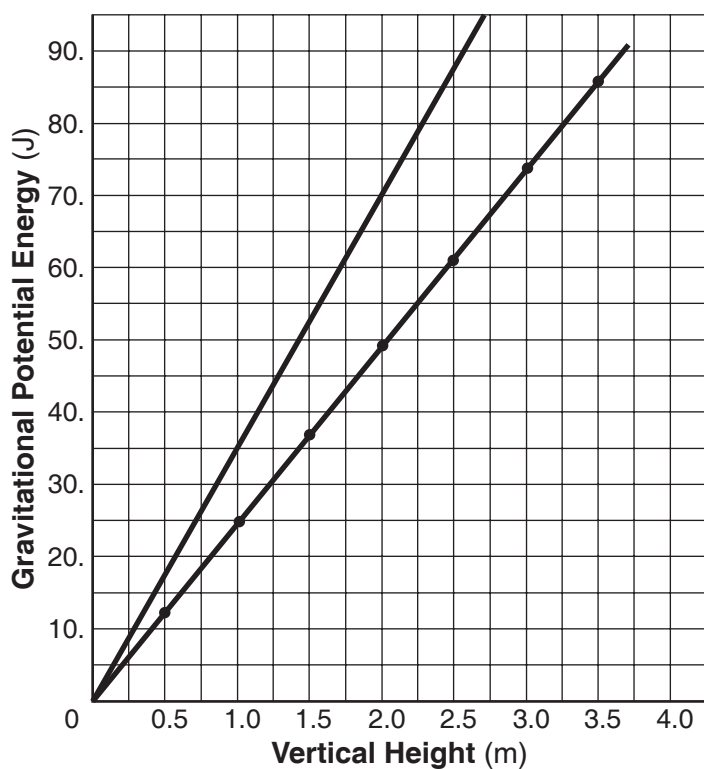
50 Allow 1 credit. Acceptable responses include, but are not limited to:

- weight of object *or* weight
- mg
- force
- F_g

51 Allow 1 credit for drawing a line that would represent the relationship between gravitational potential energy and vertical height for an object having a greater mass. The line must be straight, with a slope steeper than that of the given line.

Example of a 1-credit response:

Gravitational Potential Energy vs. Vertical Height



52 Allow 1 credit for $55^\circ (\pm 2^\circ)$.

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

Example of a 2-credit response:

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

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

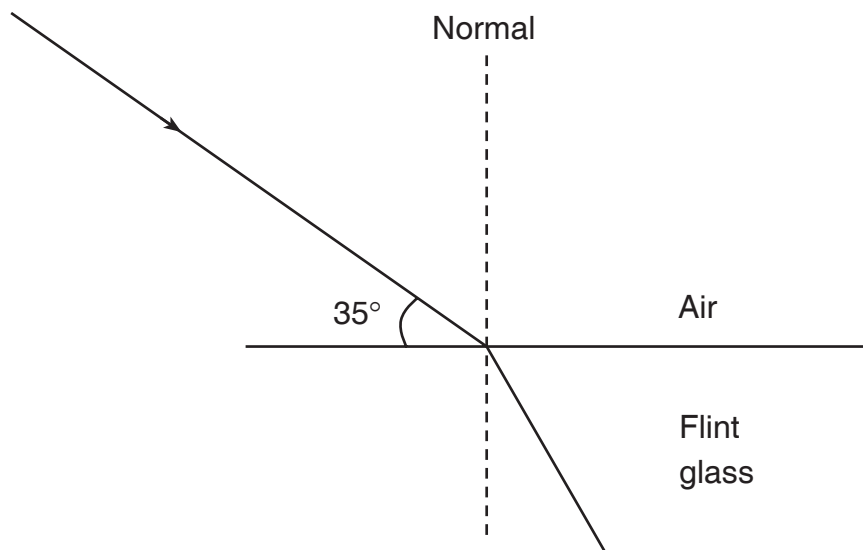
$$\sin \theta_2 = \frac{(1.00)(\sin 55^\circ)}{1.66} = 0.493$$

$$\theta_2 = 29.6^\circ \text{ or } 30.^\circ$$

Allow credit for an answer that is consistent with the student's response to question 52.

- 54** Allow 1 credit for drawing the refracted ray at an angle of $30.^\circ (\pm 2^\circ)$.

Example of a 1-credit response:



Allow credit for an answer that is consistent with the student's response to question 53.

- 55** Allow 1 credit for stating what would happen to light from the incident ray that is not refracted or absorbed. Acceptable responses include, but are not limited to:

- reflected
- scattered

- 56 Allow 1 credit for indicating that a feather does not accelerate at 9.81 meters per second² when dropped near the surface of Earth because the net force is less than F_g . Acceptable responses include, but are not limited to:

- Air friction acts on the feather.
- The feather is not in free fall.

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

Example of a 2-credit response:

$$F_f = \mu F_N$$

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

$$F_N = \frac{39 \text{ N}}{.05}$$

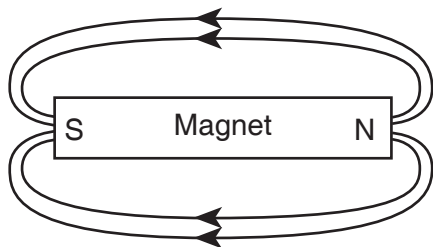
$$F_N = 780 \text{ N}$$

- 58 Allow 1 credit for $6000 \frac{\text{kg} \cdot \text{m}}{\text{s}}$.

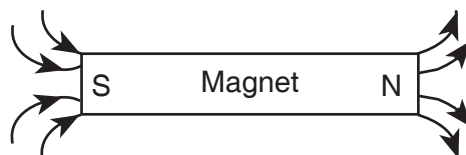
- 59 Allow a maximum of 2 credits, allocated as follows:

- Allow 1 credit for drawing four field lines that do *not* cross and are closest together at the poles.
- Allow 1 credit for four field lines drawn from N to S.

Examples of 2-credit responses:



or



PHYSICAL SETTING/PHYSICS – *continued*

60 Allow 1 credit for indicating that mass is converted into energy.

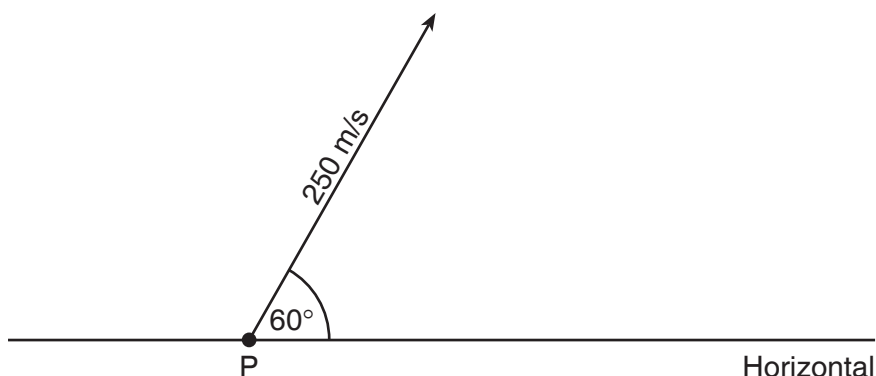
61 Allow 1 credit for 3.28 m *or* 3.3 m.

Part C

62 Allow a maximum of 2 credits, allocated as follows:

- Allow 1 credit for a length of 5.0 cm (± 0.2 cm) and an arrow.
- Allow 1 credit for an angle above the horizontal of $60.^\circ$ ($\pm 2^\circ$).

Example of a 2-credit response:



63 Allow 1 credit for 125 m/s (± 10 m/s).

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

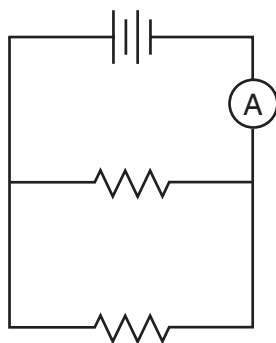
64 Allow 1 credit for explaining why the projectile has no acceleration in the horizontal direction. Acceptable responses include, but are not limited to:

- no force on object in horizontal direction
- The only force is vertical.
- Gravity acts only vertically.

65 Allow a maximum of 2 credits, allocated as follows:

- Allow 1 credit for drawing a parallel circuit containing two resistors and a battery.
- **Note:** Do *not* allow this credit if the student draws a cell instead of a battery.
- Allow 1 credit for correct placement of the ammeter.

Example of a 2-credit response:



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

Example of a 2-credit response:

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R_{eq}} = \frac{1}{18\Omega} + \frac{1}{36\Omega}$$

$$R_{eq} = 12\Omega$$

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

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

Examples of 2-credit responses:

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

$$P = \frac{(24\text{ V})^2}{12\Omega}$$

$$P = 48\text{ W}$$

or

$$I = \frac{V}{R} = \frac{24\text{ V}}{12\Omega} = 2\text{ A}$$

and

$$P = VI$$

$$P = (24\text{ V})(2\text{ A})$$

$$P = 48\text{ W}$$

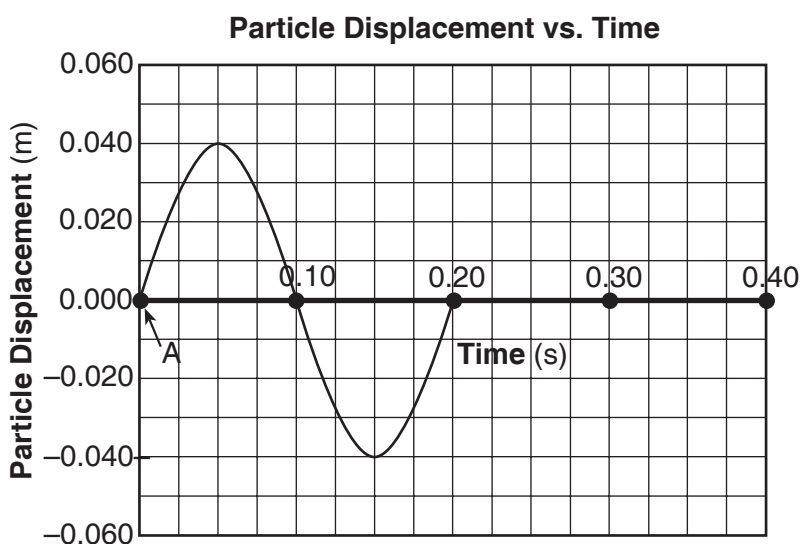
Allow credit for an answer that is consistent with the student's response to question 66.

- 68** Allow 1 credit for 0.20 s *or* $\frac{1}{5}$ s.

69 Allow a maximum of 2 credits, allocated as follows:

- Allow 1 credit for correct amplitude ± 0.3 grid space.
- Allow 1 credit for correct period ± 0.3 grid space.

Example of a 2-credit response:



Note: Allow credit for any periodic wave form (e.g., square or triangular) that meets these criteria.

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

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

Examples of 2-credit responses:

$$v = f\lambda$$

$$v = (5.0\text{ Hz})(0.080\text{ m}) \quad \text{or} \quad v = \frac{d}{t}$$

$$v = 0.40\text{ m/s} \quad \quad \quad v = \frac{0.080\text{ m}}{0.2\text{ s}}$$

$$v = .4\text{ m/s}$$

71 Allow 1 credit for 3.02 eV.

72 Allow 1 credit for 4.83×10^{-19} J.

Allow credit for a response that is consistent with the student’s response to question 71.

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

Example of a 2-credit response:

$$E = hf$$

$$f = \frac{E}{h}$$

$$f = \frac{4.83 \times 10^{-19} \text{ J}}{6.63 \times 10^{-34} \text{ J}\cdot\text{s}}$$

$$f = 7.29 \times 10^{14} \text{ Hz}$$

Allow credit for an answer that is consistent with the student’s response to question 72.

74 Allow 1 credit for explaining why this is not the only energy and/or frequency that an electron in the $n = 6$ energy level of a hydrogen atom could emit. Acceptable responses include, but are not limited to:

- No, the $n = 6$ level can return to any of the 5 lower energy levels.
- No, the electron can drop to many different energy levels.
- The electron can fall from $n = 6$ to any other level between $n = 5$ and $n = 1$.
- $6 \rightarrow 5$ $6 \rightarrow 4$ $6 \rightarrow 3$ $6 \rightarrow 1$

Note: Do *not* allow credit for “no” without a correct explanation.

Regents Examination in Physical Setting/Physics
January 2006
Chart for Converting Total Test Raw Scores to
Final Examination Scores (Scaled Scores)

The *Chart for Determining the Final Examination Score for the January 2006 Regents Examination in Physical Setting/Physics* will be posted on the Department's web site <http://www.emsc.nysed.gov/osa/> on Thursday, January 26, 2006. 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
(Corrected Edition—February 28, 2006)

January 2006 Physical Setting/Physics			
Question Numbers			
Key Ideas	Part A	Part B	Part C
Standard 1			
Math Key Idea 1	1,2,5,8,9,10,11,12,14,15,16,17,19,20,21,23,24,26	45,48,49,53,57,58,61	63,66,67,68,70,72,73
Math Key Idea 2	22	38	
Math Key Idea 3			
Sci. Inq. Key Idea 1			
Sci. Inq. Key Idea 2		55	
Sci. Inq. Key Idea 3	27,31	40,42,44,50,51	74
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			
Key Idea 6			
Standard 7			
Key Idea 1			
Key Idea 2			
Standard 4 Process Skills			
4.1		39,41,59,60	65
4.3		52,54	69
5.1		38,40,45,46,56,57,58	62,63,64
5.3		47	71
Standard 4			
4.1	15,16,17,18,19,20,21,22,23,24,25,26	37,39,41,44,48,49,50,51	65,66,67
4.3	28,29,30,31,32,34	52,53,54,55,61	68,69,70
5.1	1,2,3,4,5,6,7,8,9,10,11,12,13,14,27	38,40,43,45,46,56,57,58,59	62,63,64
5.3	33,35	42,47,60	71,72,73,74