FOR TEACHERS ONLY

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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICS

Tuesday, January 22, 2002 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY

Part I

Refer to the table on the answer paper for the number of credits to be given on Part I.

Part I (65 credits)

1	1	**X**	3	4	**21**	1	2	3	**X**	**41**	1	2	3	**X**
2	1	**X**	3	4	**22**	1	2	**X**	4	**42**	**X**	2	3	4
3	**X**	2	3	4	**23**	**X**	2	3	4	**43**	1	2	3	**X**
4	1	2	3	**X**	**24**	1	**X**	3	4	**44**	**X**	2	3	4
5	1	**X**	3	4	**25**	**X**	2	3	4	**45**	**X**	2	3	4
6	1	2	3	**X**	**26**	1	2	3	**X**	**46**	1	2	**X**	4
7	**X**	2	3	4	**27**	1	**X**	3	4	**47**	1	**X**	3	4
8	1	2	**X**	4	**28**	1	2	**X**	4	**48**	1	2	3	**X**
9	1	2	**X**	4	**29**	1	2	3	**X**	**49**	1	2	3	**X**
10	**X**	2	3	4	**30**	1	2	3	**X**	**50**	1	2	3	**X**
11	1	**X**	3	4	**31**	1	**X**	3	4	**51**	1	**X**	3	4
12	1	2	**X**	4	**32**	1	2	**X**	4	**52**	1	2	3	**X**
13	1	2	**X**	4	**33**	1	**X**	3	4	**53**	1	**X**	3	
14	1	**X**	3	4	**34**	1	**X**	3	4	**54**	1	**X**	3	
15	1	2	3	**X**	**35**	1	2	**X**	4	**55**	**X**	2	3	
16	1	**X**	3	4	**36**	**X**	2	3	4					
17	1	**X**	3	4	**37**	1	2	3	**X**					
18	1	2	**X**	4	**38**	1	2	**X**	4					
19	1	2	3	**X**	**39**	**X**	2	3	4					
20	**X**	2	3	4	**40**	1	2	**X**	4					

Directions to the teacher:

Use only *red* ink or *red* pencil in rating Regents examination papers. Do *not* correct the student's work by making insertions or changes of any kind.

Scan each answer paper to make certain that the student has marked only one answer for each question. If a student has marked two or more answers with an X in ink, draw a red line through the row of numbers for that question to indicate that no credit is to be allowed for that question when the answer paper is scored.

To facilitate scoring, the scoring key has been printed in the same format as the answer paper. The scoring key for **Part I and Part II** may be made into a scoring stencil by punching out the correct answers. Be sure that the stencil is aligned with the answer paper so that the holes correspond to the correct answers. To aid in proper alignment, punch out the first and last item numbers in each part and place the stencil on the answer paper so that these item numbers appear through the appropriate holes.

[OVER]

Part II

Allow a total of 20 credits, one credit for each question, for only two of the six groups in this part. If more than two groups are answered, only the first two should be considered.

Group 1
Motion in a Plane

56	**X**	2	3	4
57	1	2	3	**X**
58	1	**X**	3	4
59	1	2	**X**	4
60	1	**X**	3	4
61	1	2	**X**	4
62	**X**	2	3	4
63	1	**X**	3	4
64	1	**X**	3	4
65	1	2	3	**X**

Group 2
Internal Energy

66	**X**	2	3	4
67	1	2	3	**X**
68	**X**	2	3	4
69	1	2	**X**	4
70	1	2	**X**	4
71	1	2	3	**X**
72	1	**X**	3	4
73	**X**	2	3	4
74	1	2	3	**X**
75	1	**X**	3	

Group 3
Electromagnetic Applications

76	1	**X**	3	4
77	1	2	3	**X**
78	1	2	**X**	4
79	1	**X**	3	4
80	1	2	**X**	4
81	**X**	2	3	4
82	**X**	2	3	4
83	1	**X**	3	4
84	1	2	3	**X**
85	1	2	3	**X**

Group 4
Geometric Optics

86	1	2	3	**X**
87	1	2	**X**	4
88	**X**	2	3	4
89	1	**X**	3	4
90	1	**X**	3	4
91	**X**	2	3	4
92	1	2	**X**	4
93	1	**X**	3	4
94	1	2	3	**X**
95	1	2	**X**	4

Group 5
Solid State

96	1	2	**X**	4
97	1	2	**X**	4
98	**X**	2	3	4
99	1	**X**	3	4
100	1	2	3	**X**
101	1	**X**	3	4
102	**X**	2	3	4
103	1	2	3	**X**
104	1	2	3	**X**
105	1	2	**X**	

Group 6
Nuclear Energy

106	1	2	**X**	4
107	1	2	3	**X**
108	**X**	2	3	4
109	**X**	2	3	4
110	1	**X**	3	4
111	1	2	**X**	4
112	1	2	3	**X**
113	1	**X**	3	4
114	1	2	**X**	4
115	**X**	2	3	4

Part III (15 credits)

Please refer to the Department publication *Regents Examination in Physics: Rating Guide for Part III*. Teachers should become familiar with this guide before rating students' papers.

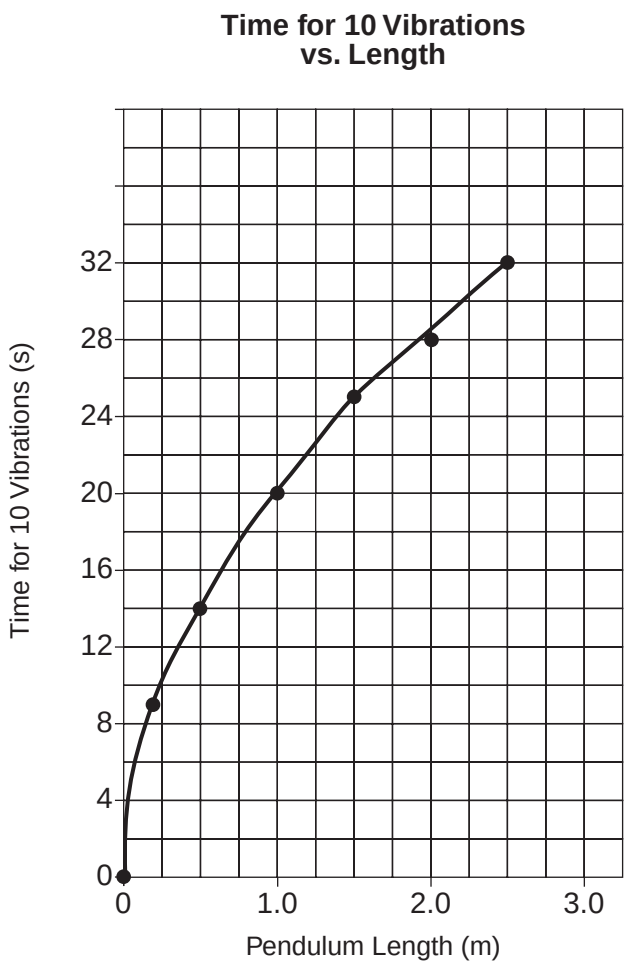
Scoring Criteria for Calculations

For each question requiring the student to *show all calculations, including the equation and substitution with units,* apply the following scoring criteria:

Allow a total of two credits for questions 121 and 125.

- Allow one 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 one 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.

116–118 Example of Acceptable Response



116 Allow 1 credit.

The scale must be linear and appropriate to receive this credit.

117 Allow 1 credit.

All points must be plotted accurately (±0.3 grid space).

118 Allow 1 credit.

The best-fit line must be curved. If one or more points are plotted incorrectly in question 117, but a best-fit curve is drawn, allow this credit.

119 Allow 1 credit.

Examples of Acceptable Responses

2.0 s

or

2 seconds

Allow credit for an answer that is consistent with the student's answer to question 118.

120 Allow a total of 3 credits.

Example of Acceptable Response

[See the back of the Scoring Key for Part I.]

If each of the three sketched forces meets all three of the following criteria, award a total of 3 credits.

- A line originating at point *C* and having the correct orientation
  - — weight: perpendicular to the horizontal
  - — friction: parallel to the incline
  - — normal force: perpendicular to the incline
- An arrowhead in the correct direction
  - — weight: directed towards the horizontal
  - — friction: directed up the incline
  - — normal force: directed away from the incline
- A label
  - — weight or F_g
  - — friction or F_f
  - — normal force or F_N

If each of the three sketched forces meets *at least two* of the three criteria, award a total of 2 credits.

If each of the three sketched forces meets *at least one* of the three criteria, award a total of 1 credit.

or

It two of the sketched forces meet all three criteria, award a total of 2 credits.

If one of the sketched forces meets all three criteria, award a total of 1 credit.

121 Allow a total of two credits. Refer to *Scoring Criteria for Calculations* in this scoring key.

Examples of Acceptable Responses

$g = \frac{F_g}{m}$

$F_g = mg$

$F_g = (10.0\ \text{kg})(9.81\ \text{m/s}^2)$

$F_g = 98.1\ \text{N}$

or

$w = mg$

$w = (10.0\ \text{kg})(9.81\ \text{m/s}^2)$

$w = 98\ \frac{\text{kg•m}}{\text{s}^2}$

122 Allow 1 credit. To receive this credit the response must be written in one or more complete sentences.

Examples of Acceptable Responses

The block would accelerate.
The speed of the block would increase.
The speed of the block would not be constant.

123 Allow 1 credit.

Example of Acceptable Response

[See the back of the Scoring Key for Part I.]

Allow credit for a line making an angle of 90.° ± 2° with the mirror at the point where the rays meet at the mirror. Do not penalize the student if the line is solid and/or the label is missing.

124 Allow 1 credit.

34° ± 2°

Allow credit for an answer that is consistent with the student's answer to question 123.

125 Allow a total of 2 credits. Refer to *Scoring Criteria for Calculations* in this scoring key.

Examples of Acceptable Responses

$v = f\lambda$

$\lambda = \frac{v}{f}$

$\lambda = \frac{3.00 \times 10^8\ \text{m/s}}{5.00 \times 10^{14}\ \text{Hz}}$

$\lambda = 6.00 \times 10^{-7}\ \text{m}$

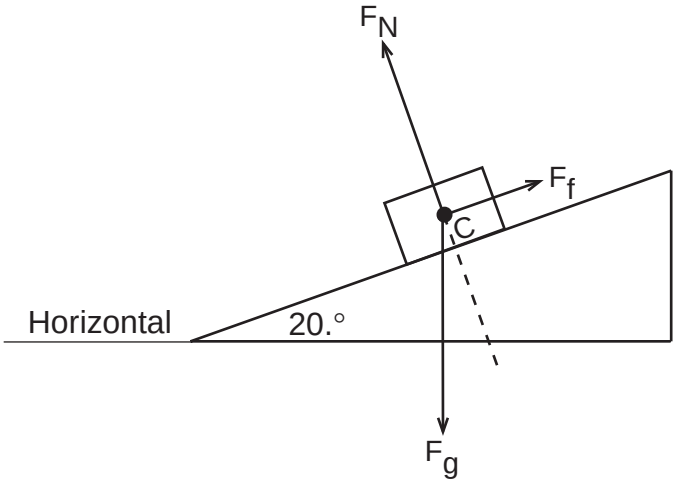
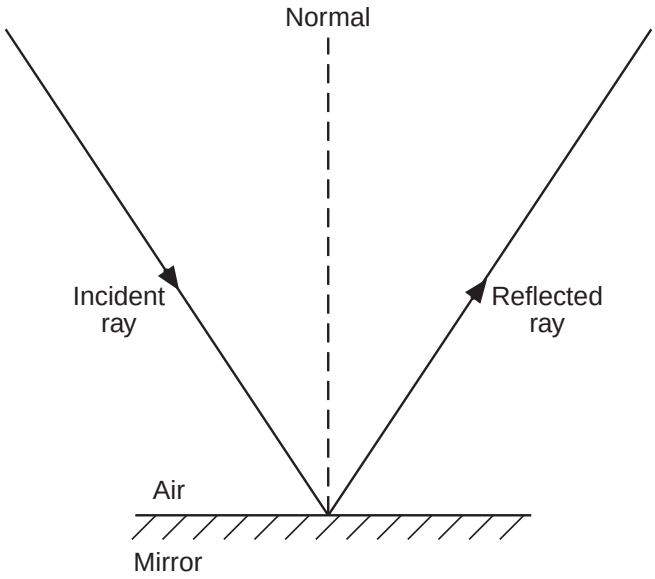
or

$\lambda = 0.6 \times 10^{-6}\ \text{m}$

126 Allow 1 credit.

orange

120 Example of Acceptable Response



123 Example of Acceptable Response