EGE HIGH CH LE A I A I

PHYSICAL SETTING/PHYSICS

RATING GUIDE

For Parts B-2 and C

2015 Edition

HE , A E ED CA I DE A E

THE UNIVERSITY OF THE STATE OF NEW YORK

I D C I

This guide provides a set of directions, along with some examples, to assist teachers in rating the answers to Parts B-2 and C of the Regents Examination in Physical Setting/Physics. While it is not possible to anticipate all the possible questions that may arise, the suggestions and examples in this guide deal with those that tend to occur most frequently.

In all work in Physical Setting/Physics, the aim should be accuracy—not only in the mechanical aspects, but also in the aspects that require concept understanding, reasoning, judgment, and application. In every instance where an error occurs, allowing proper credit requires that careful consideration be given to the relative importance of these aspects in the question.

The principal of each school administering the examination is responsible for establishing rating procedures that will assure reasonable confidence in the accuracy of the scores assigned to the Part B-2 and C answers by individual teachers. The criterion in all cases is that the rating assigned to a student's answers is a fair and accurate rating of those answers.

GE E AL G IDELI E, F A I G

1. Follow all instructions in the , available on the State Education Department website at http://www.p12.nysed.gov/assessment/hsgen

ECIFIC A I G C I E IA

The examples presented and discussed in the following section of this guide contain references to these general suggestions for rating, where appropriate.

f C

Generally, a calculation is worth a maximum of 2 credits (1,1). Allow the first credit if the student shows the equation and substitution with units into the equation. Allow the second credit if the correct answer is recorded with appropriate units. If students list knowns before their equation and include all units, students need not use units in substitution to receive credit for substitution with units; however units must be included in the answer.

An equation is a relationship between physical quantities. Therefore it includes symbols (not units) that represent quantities.

When rating calculations, review all the student's work to be certain that the physics concepts are applied correctly. At times, a student may make two or more errors that cancel each other out, resulting in a correct answer based on erroneous physics.

Allow 1 credit (0,1) if a student records the equation, substitutes with numbers only, and records the correct

- = (4.0 kg)(3.0m/s)
  = 12 kg•m/s
  [(0,1) no equation, incorrect substitution, appropriate answer with units]

- = ,
  = 15 kg•m/s
  [(0,1) no substitution, correct answer with units]

- = ,
  = (5.0)(3.0)
  = 15
  [(0,1) no units in substitution and in answer, calculation correct]

- = ,
  = (5.0 kg)(3.0 m/s)
  = 15
  [(1,0) all work correct, no units in answer]

Calculations allowed no credit (0,0):

- = ,
  = (5.0)(3.0)
  = 8 kg•m/s
  [(0,0) no units in substitution, calculations incorrect]

- = 15
  [(0,0) no equation, no substitution, no units in answer]

- = ,
  = (5 kg)(2 m/s)
  = 10 kg•m/s
  [(0,1) incorrect substitution, appropriate answer with units]

- = (5.0 kg)(3.0 m/s)
  = 12 kg•m/s
  [(0,0) no equation, incorrect answer]

Allow credit (0,1) if a student copies the appropriate equation incorrectly, but then follows the calculation through to a correct answer based on the incorrect equation.

4

Calculations allowed 1 credit, based on the correct calculations shown above, where = mv = 15 kg•m/s.

- = 1/2,
  = 1/2(5.0 kg)(3.0 m/s)
  = 15 kg•m/s
  [(0,1) incorrect equation, correct answer with units]

- = 2,
  = 2(5 kg)(3 m/s)
  = 30 kg•m/s
  [(0,1) incorrect equation, appropriate answer with units]

4Calculate the kinetic energy of a 3.0-kilogram object moving at 4.0 meters per second.

- = 1/2, 2
  = 1/2(3.0 kg)(4.0 m/s)
  = 6.0 J
  [(0,1) incorrect substitution, appropriate answer with units]

- = 1/2, 2
  = 1/2(3.0 kg)(4.0 m/s)
  = 6.0 kg•m/s
  [(0,1) incorrect substitution, appropriate answer with units]

- = 1/2, 2
  = 1/2(3.0 kg)(4.0 m/s)
  = 24 J
  [(0,1) incorrect substitution, correct answer with units]

- = 1/2, 2
  = 1/2(3.0 kg)(4.0 m/s)
  = 24 kg•m/s
  [(0,0) incorrect substitution, incorrect units for calculation]

E [illegible] f [illegible] A [illegible]

Do not penalize students for not using significant figures. Allow credit even if a student has rounding errors or truncation errors. If 3.247 is the correct answer, then 3.24; 3.25; 3.2; 3.3; and 3 would all receive credit.

Scientific notation - The preferred form for expressing a value using scientific notation is 3.00×10^8, but alternatives are acceptable:

$3.00 \times 10^8 = 3.00E8 = 3.00e8$

[illegible] C [illegible]

Often calculations may be performed using equations and/or solution strategies other than those provided in the scoring key and rating guide. In such cases, allow full credit if the physics and the solution are correct. To ensure that students receive maximum credit, raters should concentrate on the last step of the calculation by applying the rules for rating a single step calculation.

[illegible] 4Calculate the speed of a 2.0-kilogram object, initially at rest, after it has fallen freely 10. meters.

Δ [illegible] = [illegible] Δh
Δ [illegible] = (2.0)(9.81)(10.m)
Δ [illegible] = 98.1 J

[illegible] = 1/2[illegible] 2
98.1 J = 1/2(2.0 kg) 2
= 9.9 m/s

The student attempts a multistep calculation. The first calculation is missing units and is incorrect. Only the last step is rated. As a result, 1 credit is allowed. [(0,1) incorrect substitution, appropriate answer with correct units]

[illegible] D[illegible] [illegible] E [illegible]

Since texts use various symbols for physical quantities, students may write equations with different symbols than those on the [illegible] / [illegible] and still receive credit for the equation. Example: Δs = [illegible] + 1/2 2 (Δs = displacement).

A student may use an equation not on the [illegible] / [illegible]. If this equation is valid for solving the problem, the student should receive credit. For example, a student uses $E = \frac{V}{d}$ to find the electric field strength between two parallel, oppositely charged plates. This is a valid equation and the student should be given credit.

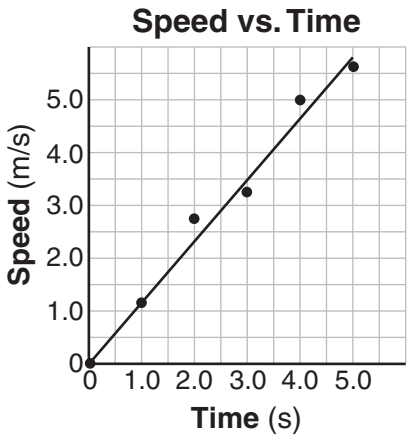
The SI (International System) units are used in the Physical Setting/Physics Core Curriculum and in the Regents examinations. However, students are expected to have an understanding of metric units. Where more appropriate, cgs units will be used. Although students are generally expected to record answers in the correct SI unit, also allow credit for the use of correct non-SI units.

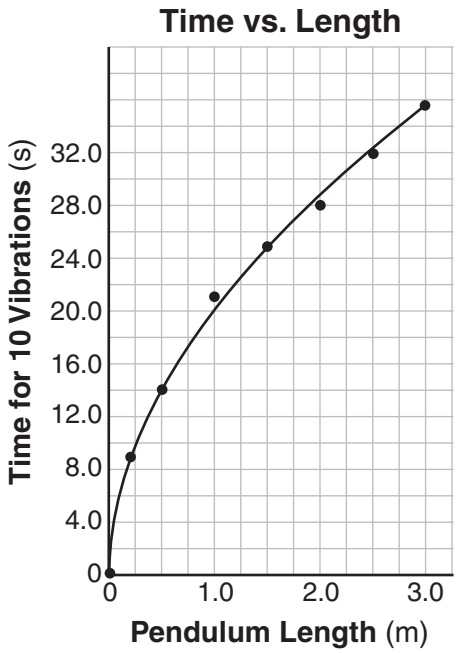
Hertz (Hz) is the accepted SI unit for frequency, but cycles per second (cps) is equivalent and acceptable.

- = 10 Hz; allow full credit; units are SI
- = 10 cps; allow full credit; units are equivalent to Hz
- = 10 s^{-1}; allow full credit; units are equivalent to Hz

Often when large distances are expressed, the use of kilometers is conceptually more appropriate than the use of meters. Similarly, expressing a small mass as 2 grams may have more meaning for the student than 0.002

Examples of appropriate best fit line and curve:





5. Slope of a graph: To find the slope of a straight line graph, the student must pick two points on the best-fit line and use an appropriate formula (e.g. = Δ /Δ or = Δ /Δ) to determine the value, with units, of the slope. Values taken from the data table may be used only if the student's best-fit line