



## AP<sup>®</sup> Physics B 2002 Scoring Commentary Form B

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**Question 1**

Sample 1 (Score 15)

This student uses the alternate method for parts (a) and (b) outlined in the “Note” in the scoring guideline.

Sample 2 (Score 14)

This student’s only error is not specifying the direction in part (a).

**Question 2**

Sample 1 (Score 15)

In part (d), this student uses  $\alpha$  instead of the usual  $\omega$  to denote angular speed, but by writing  $\alpha = v/r$  the usage is made clear.

Sample 2 (Score 14)

This student loses 1 point in part (a) for the extra force, labeled  $F_c$ .

**Question 3**

Sample 1 (Score 15)

This student uses calculations where possible to justify the responses.

Sample 2 (Score 15)

This student uses some verbal explanations in the justifications.

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**Question 4**

Sample 1 (Score 14)

The student loses 1 point for not drawing the image in part (d).

Sample 2 (Score 13)

This student only earns only 2 points in part (d), for one correct ray and showing an image. The student then loses a point in (e) for saying that the image is virtual, since the image the student drew would be real.

**Question 5**

Sample 1 (Score 10)

This student uses the energy method to solve the last part.

Sample 2 (Score 9)

This student uses the force and kinematics method for the last part, but loses 1 point for an error in calculation.

**Question 6**

Sample 1 (Score 10)

Although the student writes the energy lost by the neon in part (c) in terms of the mass, the substitution is correctly made in terms of moles.

Sample 2 (Score 8)

In parts (a) and (b), the student determines the pressure in atmospheres, correctly recalling the appropriate value for the universal gas constant  $R$ , which is not included in the table of information provided with the exam. This student loses 2 points in part (c); 1 for the incorrect calculation for neon and 1 for the incorrect temperature difference.

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**Question 7**

Sample 1 (Score 10)

This student converts the energy to joules in part (b) before proceeding with the calculation.

Sample 2 (Score 10)

This student works directly with electron volts in part (b), as shown in the scoring guideline.