



## **AP® Physics B 2004 Scoring Commentary**

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**AP<sup>®</sup> PHYSICS B  
2004 SCORING COMMENTARY**

**Question 1**

**Sample: A**

**Score: 12**

This paper earned full credit for parts (a) and (b). Part (c) i received only one point for the weight vector. Part (c) ii earned full credit, but (d) received only one point because the justification is not complete since it does not specifically relate lowering the height to a lower potential energy.

**Sample: B**

**Score: 9**

This paper also earned full credit for parts (a) and (b), and only one point for the weight vector in (c) i. Part (c) ii received one point for the value of the weight, and no credit for part (d) since a change is being made to the initial hill, not the loop.

**AP<sup>®</sup> PHYSICS B  
2004 SCORING COMMENTARY**

**Question 2**

**Sample: A**

**Score: 14**

This paper contains correct solutions for all the parts, but an excessive number of significant figures was used in the answers to parts (b) and (d) and therefore one point was lost for part (b).

**Sample: B**

**Score: 11**

This paper received no credit for the answer to part (a), which showed an apparent lack of understanding of the difference between gauge pressure and absolute pressure. Full credit was given for part (b) but none for part (c) because the pressure was divided by the area instead of being multiplied by it. Full credit was also given for parts (d), (e), and (f), which dealt only with kinematics.

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2004 SCORING COMMENTARY**

**Question 3**

**Sample: A**

**Score: 14**

This paper lost one point in part (c) ii, since the response does not explain how the right-hand rule leads to the answer.

**Sample: B**

**Score: 12**

This paper earned full credit except for part (c) ii.

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2004 SCORING COMMENTARY**

**Question 4**

**Sample: A**

**Score: 15**

This clearly written paper received full credit for all the parts. Method 1 was used in part (b), and the justification in part (c) was done by calculating the location of another minimum. The justification in part (d) i, though brief, is adequate because the statement of inverse proportionality and the conclusion that  $Y$  increases imply that  $d$  decreases as the speakers moves closer together.

**Sample: B**

**Score: 14**

Method 1 was used for part (b) but one point was lost for using  $m = 1$  instead of  $m = 1/2$ , thus leading to a calculation of a maximum instead of a minimum. Full credit was awarded for the remaining parts because the reasoning was correct and consistent with the incorrect answer to part (b). The justification in part (c) made use of the symmetry argument.

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2004 SCORING COMMENTARY**

**Question 5**

**Sample: A**

**Score: 10**

This paper received full credit on all the parts to the question. Although the justification for part (c) ii is not fully complete, it is consistent with the correct signs for work used in parts (a) i and (a) iii.

**Sample: B**

**Score: 8**

This paper lost one point for the negative sign for work in part (a) i. The negative sign is correct in part (a) iii, however, since the work term in the equation for the first law of thermodynamics is by convention the work done on the gas, which is the negative of that done by the gas. This paper also lost one point for the incorrect justification of the answer to (c) ii.

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2004 SCORING COMMENTARY**

**Question 6**

**Sample: A**

**Score: 10**

This paper received full credit on all the parts to the question. The explanation in part (d) for how the graph in part (b) would change is very detailed.

**Sample: B**

**Score: 9**

In part (c), an excessively rounded value was used for the frequency at the lower point in calculating the slope. This led to an answer that was outside of the accepted range, and consequently a one-point deduction. The explanation in part (d) is very good and includes a diagram as well as a verbal description.