



AP[®] Physics C Electricity & Magnetism 2004 Scoring Commentary

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Question 1

Sample: A

Score: 15

In part (c), this student correctly uses differentials in applying Gauss's law instead of the more common integral approach.

Sample: B

Score: 10

In part (a), two points only were earned. One point was for having no field inside the conductor, since the few arrows toward the upper left are enough to show a field elsewhere. The other point was earned for the distribution of positive charge. The only error in (b) is the ranking of point *a*. Part (c) earned full credit until iii. In (c)ii the student does correctly substitute the contribution of the cylinder into Gauss's law and, since the final answer was not graded, the loss of a square on one term does not matter. However, in part iii the squares on the radii in the cylinder's contribution are completely missing.

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Question 2

Sample: A
Score: 15

In part (c), this student sets up a proportionality instead of doing the intermediate step of calculating a current.

Sample: B
Score: 12

This student does an excellent job until part (f), where no credit was earned.

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Question 3

Sample: A

Score: 15

This student appears to rewrite the answer to part (a) incorrectly; however since $2 \ln 4 = 4 \ln 2$ the two answers are actually equivalent.

Sample: B

Score: 8

Part (a) earned no credit. The point for using the 4ℓ dimension was only awarded when used to convert from an area integral to a distance integral. The rest of the flux calculation is incorrect. Parts (b) and (c) earned full credit, but part (d) only earned one point for the expression for power.