Electric Potentials from Two Charges

Your group will be assigned one of the following problems. Work out your problem together with your group at the whiteboard. Then the recorder should write your solution (with a reasonable number of intermediate steps) on the board. If your group gets done early, go on to another problem. The last 2 problems are the most challenging, and the most interesting.

- Two charges $+Q$ and $+Q$ are placed on a line at $x = -D$ and $x = +D$ respectively. What is a fourth order approximation to the electric potential $V(x)$ for $|x| \ll D$? For what values of x does your series converge? For what values of x is your approximation a good one? Which direction would a test charge move under the influence of this electric potential?

- Two charges $-Q$ and $+Q$ are placed on a line at $x = -D$ and $x = +D$ respectively. What is a fourth order approximation to the electric potential $V(x)$ for $|x| \ll D$? For what values of x does your series converge? For what values of x is your approximation a good one? Which direction would a test charge move under the influence of this electric potential?

- Two charges $+Q$ and $+Q$ are placed on a line at $x = -D$ and $x = +D$ respectively. What is a fourth order approximation to the electric potential $V(x)$ for $|x| \gg D$? For what values of x does your series converge? For what values of x is your approximation a good one? Which direction would a test charge move under the influence of this electric potential?

- Two charges $-Q$ and $+Q$ are placed on a line at $x = -D$ and $x = +D$ respectively. What is a fourth order approximation to the electric potential $V(x)$ for $|x| \gg D$? For what values of x does your series converge? For what values of x is your approximation a good one? Which direction would a test charge move under the influence of this electric potential?

- Two charges $+Q$ and $+Q$ are placed on a line at $x = -D$ and $x = +D$ respectively. What is a fourth order approximation to the electric potential $V(x, y)$ for $x = 0$ and $|y| \ll D$? For what values of y does your series converge? For what values of y is your approximation a good one? Which direction would a test charge move under the influence of this electric potential?

- Two charges $-Q$ and $+Q$ are placed on a line at $x = -D$ and $x = +D$ respectively. What is a fourth order approximation to the electric potential $V(x, y)$ for $x = 0$ and $|y| \ll D$? For what values of y does your series converge? For what values of y is your approximation a good one? Which direction would a test charge move under the influence of this electric potential?

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