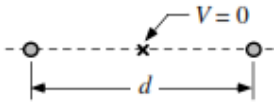
AP Physics 2 – Electric Potential

D1-TT51: Potential near Two Charges—Electric Field

Two equal magnitude electric charges are separated by a distance d. The electric potential at the midpoint between these two charges is zero. A student considering this situation says:

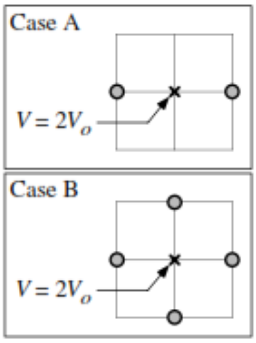


"The electric field at the midpoint between the two charges will be zero also, since the two charges are opposite in sign, so the fields will be equal but opposite, and add to zero."

There is something wrong with the student's statement. **Identify any problem(s) and explain how to correct it/them.**

D1-CT52: Potential near Charges—Electric Field

In each case, a point midway between equal magnitude electric charges is identified. The signs of these charges are not given. The electric potential at this midpoint is $2V_o$ in both cases, where V_o is the potential due to a single positive charge.

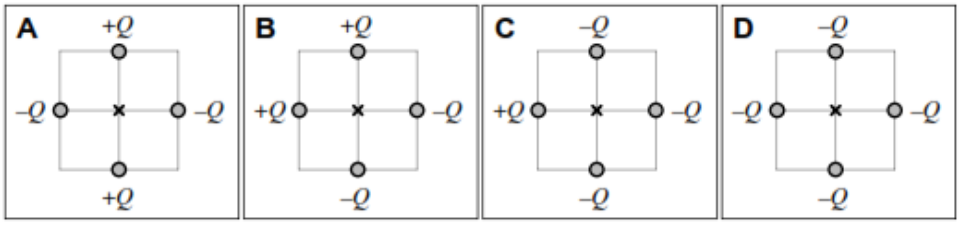


Is the magnitude of the electric field at the midpoint (i) *greater* in Case A, (ii) *greater* in Case B, or (iii) *the same* in both cases? _____

Explain your reasoning.

D1-RT55: Four Charges in Two Dimensions—Electric Potential

In each situation shown below, small charged particles are fixed on grids having the same spacing. Each charge Q on this page has the same magnitude with the signs indicated in the diagrams.



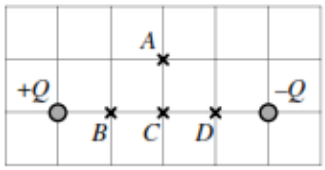
Rank the electric potential at the location marked with an "x."

☐ 1 Greatest ☐ 2 ☐ 3 ☐ 4 Least OR ☐ All the same ☐ All zero ☐ Cannot determine

Explain your reasoning.

D1-RT56: Points near a Pair of Equal Opposite Charges—Electric Potential

Two equal and opposite charges are fixed to a grid at the locations shown. Four points in the vicinity of these charges are labeled *A*–*D*.



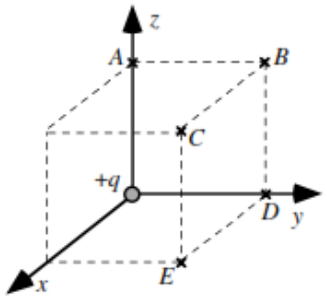
Rank the electric potential at the labeled points.

1	2	3	4	OR	All	All	Cannot
Greatest			Least		the same	zero	determine

Explain your reasoning.

D1-RT57: Near a Point Charge—Electric Potential at Three-Dimensional Locations

There is a positive point charge $+q$ located at (0, 0, 0) as shown in the three-dimensional region below. Within that region are points located on the corners of a cube as shown.



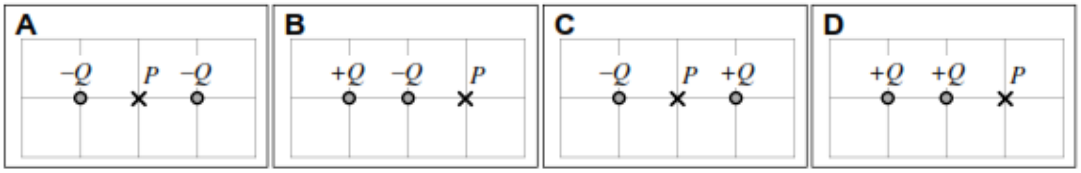
Rank the electric potential at the labeled points.

1	2	3	4	5	OR	All	All	Cannot
Greatest				Least		the same	zero	determine

Explain your reasoning.

D1-RT58: Two Electric Charges—Electric Potential

In each figure, two charges are fixed in place on a grid, and a point near those particles is labeled *P*. All of the charges are the same size, *Q*, but they can be either positive or negative.



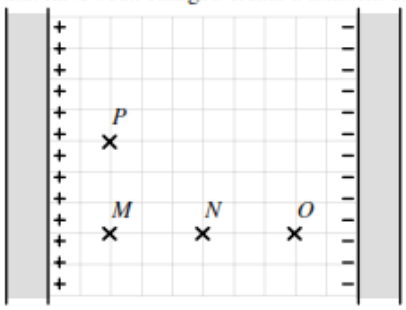
Rank the strength (magnitude) of the electric potential at point *P*.

1	2	3	4	OR	All	All	Cannot
Greatest			Least		the same	zero	determine

Explain your reasoning.

D1-RT60: Uniform Electric Field—Potential Difference

Two parallel plates that have been charged create a uniform electric field of 30 N/C between the plates.



	From	To
A	M	N
B	N	O
C	P	M
D	P	N
E	P	O
F	N	M

Rank the electrical potential differences of all the different combinations listed between the four points *M* at (2, 0) m; *N* at (5, 0) m; *O* at (8, 0) m; and *P* at (2, 3) m within this region. (Positive values are larger than negative values.)

						OR			
1 Greatest	2	3	4	5	6 Least		All the same	All zero	Cannot determine

Explain your reasoning.