**Answer on Question #51507-Physics-Electromagnetism**

Charges of $+Q = +2\ C$ and $-Q = -2\ C$ are situated at points P and Q respectively which are at a distance apart. A point X is mid-way between P and Q. Which of the following correctly describes the electric field and the electric potential at point X?

a. electric field is toward Q, electric potential is zero

b. electric field is toward Q, electric potential is negative

c. electric field is toward P, electric potential zero

d. electric field is toward P, electric potential is positive

**Solution**

Electric field always oriented from positive charge to negative charge. In our case - toward Q.

The electric potential $V$ at a distance $r$ from a charge $q$ is,

$$V = \frac{kq}{r}.$$

Thus, electric potential at X ($PX = XQ = \frac{1}{2}d$, where $d$ is the distance between the charges) is

$$V = V_1 + V_2 = \frac{k(+Q)}{\frac{d}{2}} + \frac{k(-Q)}{\frac{d}{2}} = 0.$$

Thus, the electric potential at X would be zero.

**Answer: a. electric field is toward Q, electric potential is zero.**