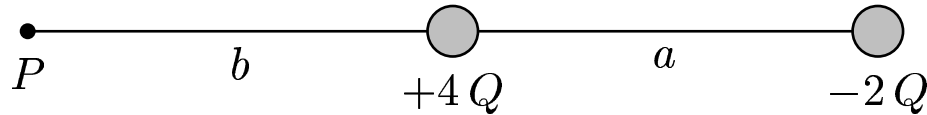


Two point charges are located a distance  $a$  apart and lie on the  $x$ -axis. Point  $P$  is located a distance  $b$  from the charge  $+4Q$  (the left-most charge).



At  $P$ , the direction of the electric field due to the  $-2Q$  charge and the  $+4Q$  charge are in opposite directions.

Compare the magnitude of the electric fields from the two charges at a point  $P$  to the left of the  $+4Q$  charge on the  $x$ -axes.

- A) Only  $E_{-2Q} > E_{+4Q}$  is possible.
- B) Only  $E_{-2Q} = E_{+4Q}$  is possible.
- C) Only  $E_{-2Q} < E_{+4Q}$  is possible.
- D) All of the above are possible.
- E) None of the above are possible.

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Coulomb's law is  $\vec{E} = k \frac{Q}{r^2} \hat{r}$ .

$$\|\vec{E}_{+4Q}\| = k \frac{|+4Q|}{b^2}$$

$$\|\vec{E}_{-2Q}\| = k \frac{|-2Q|}{(a+b)^2} < k \frac{|-2Q|}{b^2} < k \frac{|+4Q|}{b^2},$$

therefore only  $E_{-2Q} < E_{+4Q}$  is possible.

Answer **C**.