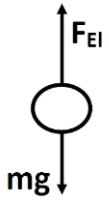
20. A tiny ball (mass = 0.012 kg) carries a charge of -18 µC. What electric field (magnitude and direction) is needed to cause the ball to float above the ground?



$$\sum F_y = F_{El} - mg = ma_y = 0$$

$$F_{El} - mg = 0$$

$$F_{El} = mg = qE$$

Solve for E

$$E = \frac{mg}{q} = \frac{(0.012\ kg)\left(9.80\ {}^{m}/_{s^2}\right)}{18\ x\ 10^{-6} C} = 6.533\ x\ 10^{3}\ {}^{N}/_{C}$$

Since we need F_{El} to point up and we have a negative charge, we need the Field to point down, since the negative charge will then create a force acting up against gravity.

$$\boxed{\vec{E} = 6.5\ x\ 10^{3}\ {}^{N}/_{C}\ \widehat{down}}$$

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