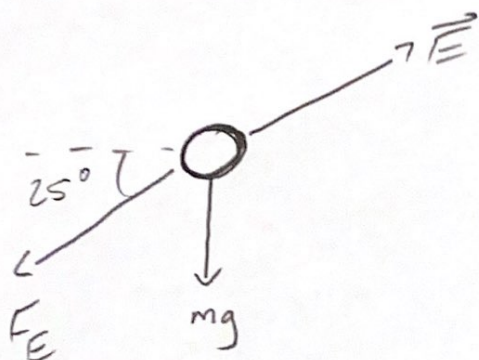


### Quiz 18.1A

A 325-gram rubber ball has a net charge of  $-21.8 \mu\text{C}$ . The ball is in a region filled with a uniform electric field of  $57,800 \text{ N/C}$  directed  $25.0^\circ$  above the  $+x$  direction. Assume only Earth's gravity and the electric force are relevant in this problem.

What is the magnitude and direction of the acceleration experienced by the ball?



$$|F_g| = (0.325)(9.8) = 3.185, -y$$

$$|F_E| = (21.8 \times 10^{-6})(57800) = 1.26, 25^\circ \text{ below } -x$$

$$F_{g,x} = 0$$

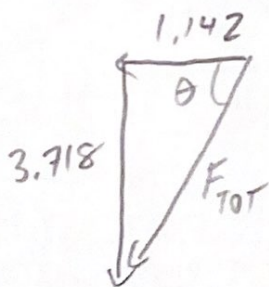
$$F_{g,y} = -3.185$$

$$F_{E,x} = -1.26 \cos 25^\circ = -1.142$$

$$F_{E,y} = -1.26 \sin 25^\circ = -0.5325$$

$$F_{\text{TOT},x} = -1.142$$

$$F_{\text{TOT},y} = -3.718$$



$$|F_{\text{TOT}}| = \sqrt{1.142^2 + 3.718^2} = 3.889 \text{ N}$$

$$\theta = \tan^{-1}\left(\frac{3.718}{1.142}\right) = 72.9^\circ \text{ below } -x$$

$$|a| = \frac{|F_{\text{TOT}}|}{m} = \frac{3.889}{0.325} = 12.0 \text{ m/s}^2$$

$72.9^\circ \text{ below } -x$