52. (a) This distance is determined by the longitudinal speed:

$$d_\ell = v_\ell t = (2000\,\text{m/s})\left(40 \times 10^{-6}\,\text{s}\right) = 8.0 \times 10^{-2}\ \text{m}\ .$$

(b) Assuming the acceleration is constant (justified by the near-straightness of the curve $a = 300/40 \times 10^{-6}$) we find the stopping distance d:

$$v^2 = v_\text{o}^2 + 2ad \implies d = \frac{(300)^2\left(40 \times 10^{-6}\right)}{2(300)}$$

which gives $d = 6.0 \times 10^{-3}$ m. This and the radius r form the legs of a right triangle (where r is opposite from $\theta = 60°$). Therefore,

$$\tan 60° = \frac{r}{d} \implies r = d\tan 60° = 1.0 \times 10^{-2}\ \text{m}\ .$$