28. We consider the point at which it enters the field-filled region, velocity vector pointing downward. The field points out of the page so that $\vec{v} \times \vec{B}$ points leftward, which indeed seems to be the direction it is "pushed"; therefore, $q > 0$ (it is a proton).

(a) Eq. 29-17 becomes

$$\begin{aligned} T &= \frac{2\pi m_{\mathrm{p}}}{e\,|\vec{B}|} \\ 2\left(130 \times 10^{-9}\right) &= \frac{2\pi\left(1.67 \times 10^{-27}\right)}{\left(1.60 \times 10^{-19}\right)|\vec{B}|} \end{aligned}$$

which yields $|\vec{B}| = 0.252$ T.

(b) Doubling the kinetic energy implies multiplying the speed by $\sqrt{2}$. Since the period T does not depend on speed, then it remains the same (even though the radius increases by a factor of $\sqrt{2}$). Thus, $t = T/2 = 130$ ns, again.