QUESTION ONE

(a).
$$E_k = 50 \,\text{GeV} = 50 \times 10^9 \times 1.6 \times 10^{-19} \,\text{J} = 8 \times 10^{-9} \,\text{J}.$$

(b).
$$v_f = \sqrt{\frac{2E_k}{m}} = \sqrt{\frac{2\times8\times10^{-9} \text{ J}}{9.11\times10^{-31} \text{ kg}}} = 1.325\times10^{11} \text{ m s}^{-1}$$
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(b). $v_f = \sqrt{\frac{2E_k}{m}} = \sqrt{\frac{2\times 8 \times 10^{-9} \,\mathrm{J}}{9.11 \times 10^{-31} \,\mathrm{kg}}} = 1.325 \times 10^{11} \,\mathrm{m \, s^{-1}}.$
(c). $v_f^2 = 2ad \Rightarrow a = \frac{(1.325 \times 10^{11} \,\mathrm{m \, s^{-1}})^2}{2\times 3.2 \times 10^3 \,\mathrm{m}} = 2.743 \times 10^{18} \,\mathrm{m \, s^{-2}}.$ Then $t = \frac{v_f}{a} = \frac{1.325 \times 10^{11} \,\mathrm{m \, s^{-1}}}{2.743 \times 10^{18} \,\mathrm{m \, s^{-2}}} = 4.83 \times 10^{-8} \,\mathrm{s}$
(d).

$$\frac{1.325 \times 10^{11} \text{ m s}^{-1}}{2.743 \times 10^{18} \text{ m s}^{-2}} = 4.83 \times 10^{-8} \text{ s}$$