Question 12 (4 marks)

a. kinetic energy = $(\gamma - 1)mc^2$

$= (7.1 - 1) \times 105.7$ 1 mark

$= 644.8$ MeV 1 mark

b. chamber length relative to the muons = rest length $\times \sqrt{\left(1 - \frac{v^2}{c^2}\right)}$

$= 1000 \times \sqrt{(1 - 0.99^2)}$ 1 mark

$= 1000 \times 0.1411$

$= 141.1$ m 1 mark

