Marks

Question 21 (4 marks)

In his science fiction novel *From the Earth to the Moon*, Jules Verne describes how to launch a capsule from a cannon to land on the moon. To reach the moon, the capsule must leave the cannon with a speed of 1.06×10^4 m s^{-1}. The cannon has a length of 215 m, over which the capsule can be assumed to accelerate constantly.

(a) Calculate the magnitude of the acceleration required to achieve this speed using this cannon. **2**

$a = \frac{v^2}{2x}$ $= v = r/t$ $t = \frac{r}{v} =$

$a = \frac{v^2}{r} = \frac{(1.06 \times 10^4)^2}{215} = 5.22 \times 10^5 = 5.3 \times 10^4$ g's

(b) Referring to your answer in part (a), explain why Jules Verne's method is unsuitable for sending a living person to the moon. **2**

at 53327 g's a person would be crushed under the force of the ~~acce~~ acceleration

$a = \frac{\Delta v}{t}$

$\frac{1}{2}v^2 = wx$ $\quad w = \frac{v^2}{2x}$

$v^2 = 2wx$