

## 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  $1.06 \times 10^4 \text{ m s}^{-1}$ . 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

$$v = 1.06 \times 10^4 \text{ m s}^{-1} \quad a_{av} = \frac{v - 0}{t}$$

$$l = 215 \text{ m}$$

- (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

It would be unsuitable to send a living person to the moon because the velocity and acceleration needed to do so would have a dangerous effect on the person because of the g-forces associated with such speeds.