1. (a) A cannon is placed at the edge of a vertical cliff. The muzzle of the cannon is 200 m above the level of sea water. It fires a shell with a muzzle velocity of 180 ms^{-1}. What should be the angle of elevation of the barrel of the cannon if the shell were to hit a stationary target at sea level and **a**t a perpendicular distance of 2.5 km away from the vertical wall of the cliff?

[3 marks]

1. (b) At the instant when the shell is fired, the target starts to move away from the cliff along a line perpendicular to the face of the cliff, with a constant speed of 10 ms^{-1}. Suppose the angle of elevation of the barrel of the gun remains unchanged, what alteration must be made to the muzzle speed of the shell in order for it to hit the target?

[7 marks]