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]

2. (a) Two satellites X and Y are orbiting around Earth in circular orbits above the equator (or co-centre with the equator). The orbit of X is 500 km above the surface of Earth while that of Y is 1000 km above the surface Earth. At a particular instant, both satellites are vertically above a point on the surface of Earth. After t **minutes**, they are found to be vertically above another point on the surface of Earth. Determine the value of t, taking the radius of Earth to be 6360 km.

[3 marks]