12. A golf ball is hit over horizontal ground from a point O on the ground. The velocity of projection is 30 ms^{-1} at 40° to the horizontal. The effects of air resistance should be neglected.

The ball passes directly over a tree which is at a horizontal distance of 34 m from O.

(a) Find the time taken for the ball to reach a point directly above the tree. [3]

(b) Find the vertical component of the velocity of the ball at this point. [4]

(c) Calculate the speed and direction of the ball as it passes over the tree. [3]

13. The diagram shows a mass of 50 kg attached to a string on a rough slope which makes an angle of 30° with the horizontal. The coefficient of friction between the mass and the slope is 0.25. You may assume that the mass does not tip up.
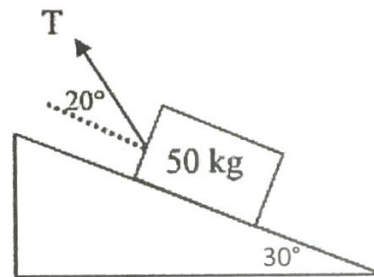
Find the magnitude of the tension, T, if the mass is

(a) about to move up the slope, and [6]

(b) accelerating at 5 ms^{-2} up the slope. [4]